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# BK7258 Datasheet

DS-BK7258-E13 V2.2

2025/8/4

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# 1. Features

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## Wi-Fi®

- IEEE 802.11b/g/n/ax 1x1 compliant
- 20 MHz/40 MHz channel bandwidths for 2.4 GHz
- Supports 802.11ax with 20 MHz and 40 MHz channels up to MCS9
- Supports MCS 32 HT duplicate mode
- Supports antenna diversity to combat multipath fading and improve reception
- Supports dual carrier modulation (DCM) for improved signal reliability and coverage
- Supports channel state information (CSI)-based Wi-Fi sensing
- Support for 802.11mc precise indoor location positioning
- Supports downlink Multi-User Multiple-Input Multiple-Output (DL MU-MIMO)
- Supports Orthogonal Frequency Division Multiple Access (OFDMA)
- Supports Target Wake Time (TWT)
- TX and RX Low-Density Parity Check (LDPC) support for extended range
- WPA™/WPA2™/WPA3™-Personal support for enhanced security
- Supports STA, SoftAP, and Wi-Fi Direct (P2P) modes
- Supports concurrent SoftAP + STA
- Integrated Bluetooth/Wi-Fi coexistence (PTA)
- TX power up to +20 dBm
- RX sensitivity -98 dBm

## Bluetooth®

- Dual-mode Bluetooth 5.4 compliant
- Dedicated low-power Bluetooth transceiver (BK7258QN88617 and BK7258QN6868 only)
- Supports Basic Rate (BR), Enhanced Data Rate (EDR) 2 Mbps and 3 Mbps, Low Energy (LE) 1 Mbps, 2 Mbps, and long range (125 kbps and 500 kbps)
- Supported Bluetooth Low Energy features: LE Audio, Angle of Arrival (AoA) and Angle of Departure (AoD) direction finding, 2 Mbps, advertising extensions, and long range
- Supports an antenna array with up to 16 antennas for precise positioning

## Core

- Arm®v8-M STAR-MC1 MCU at up to 480 MHz:
  - Double-precision floating-point unit (FPU)
  - 16 KB ITCM + 16 KB DTCM
  - Embedded TrustZone®
  - Supports DSP instructions with SIMD
  - 3.84 CoreMark®/MHz
- UART flash download
- Serial Wire Debug (SWD) interface

## Memories

- Flash (XIP): SiP flash up to 8 MB, external flash up to 16 MB
- SiP PSRAM: up to 16 MB
- Flash/PSRAM expansion: up to 4 GB via QSPI interface
- 640 KB Share SRAM
- 64 KB ROM
- eFuse

## Clock Management

- External oscillators: 26 MHz crystal oscillator (XTALH), 32 kHz crystal oscillator (XTALL)
- Internal oscillators: 26–360 MHz digitally controlled oscillator (DCO), 32 kHz ring oscillator (ROSC)
- 320 MHz/480 MHz PLL (DPLL)
- Audio PLL (APLL)

## Power Management

- 2.5 to 4.35 V VBAT supply
- On-chip Power-On Reset (POR) and Brown-Out Detector (BOD)
- Embedded buck (DC-DC) converters and LDO regulators
- Low power consumption:
  - Wi-Fi active mode RX: 17.5 mA
  - Bluetooth LE active mode RX: 12 mA (BK7258QN88617 and BK7258QN6868)
  - Bluetooth LE active mode TX: 19 mA (BK7258QN88617 and BK7258QN6868)
  - Sleep mode: 43 µA
  - Deep sleep mode: 16 µA

- Shutdown mode: 2.5  $\mu$ A

## Peripherals

- GPIOs: 56 in QFN88, 46 in BK7258QN6854 QFN68, 40 in BK7258QN6855 QFN68, 38 in BK7258QN6868 QFN68
- 2x SPI
- 2x QSPI
- 3x UART, 1 with hardware flow control and flash download support
- 1x Smart Card controller (SC)
- 1x SDIO
- 2x I2C
- 1x high-speed USB2.0 (HS)
- 1x CAN controller with CAN FD (CAN)
- 1x LIN controller (LIN)
- 2x general-purpose DMA controller (GDMA), each with 8 channels
- 1x DMA2D controller (DMA2D)
- 1x rotation module (ROTT)
- 2x scaling module (SCALE)
- 1x display controller (DISPLAY) supporting RGB and 8080 interfaces
- 1x segment LCD controller (SLCD) for up to 8 x 28 segments
- 1x JPEG hardware encoder
- 1x JPEG hardware decoder
- 1x 8-bit CIS DVP interface (CIS)
- 1x 720p H.264 video encoder (H.264)
- 1x Ethernet MAC interface (ENET)
- 12x 32-bit PWM channel
- 3x I2S
- 1x four-band digital hardware equalizer (EQ)
- 2x audio ADC
- 1x audio DAC
- 1x DMIC
- 1x SBC accelerator (SBC)
- 12-bit AUX ADC, up to 11 channels



- 6x 32-bit general-purpose timer
- 2x watchdog timer (WDT)
- 1x real-time counter (RTC)
- 1x IrDA
- 1x temperature sensor
- 1x touch sensor (TOUCH), up to 16 touch sensing I/Os

## Packaging

- QFN88 package, 9 x 9 x 0.9 mm
- BK7258QN6854/BK7258QN6855: QFN68 package, 8 x 8 x 0.9 mm
- BK7258QN6868: QFN68 package, 7 x 7 x 0.9 mm
- Operating temperature range: -40 to +85 °C

## Applications

- HMI (Human Machine Interface) applications
- Home appliance
  - Refrigerator
  - Air conditioner
  - Thermostat
  - Washing machine
  - Robot cleaner
- Smart plug
- Smart lighting
  - Light bulb
  - Light switch
  - Ceiling light
  - Stand light
- Others
  - Remote controller
  - Toy
  - Drone
  - Industrial terminal
  - Factory automation sensor/switch



## Features

- Smart meter
- Payment terminal
- Industrial computer
- Medical devices
- Kitchen appliances
- Home automation switch/sensor
- Door lock
- Door camera

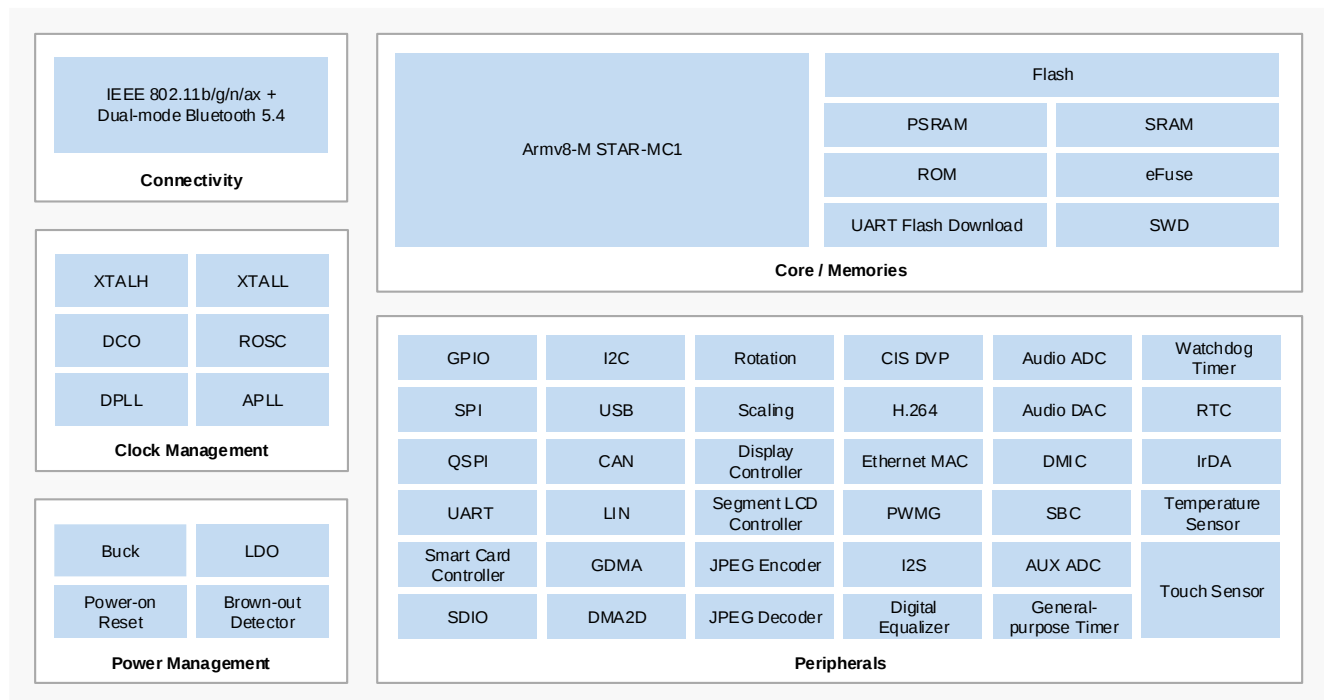
## 2. Overview

The BK7258 is a highly integrated 1x1 single-band 2.4 GHz Wi-Fi 6 (802.11b/g/n/ax) and dual-mode Bluetooth 5.4 combo solution designed for applications that require abundant resources and low power consumption. The integration of a 32-bit Armv8-M STAR-MC1 MCU and a comprehensive set of peripherals makes the BK7258 ideal for advanced Internet of Things (IoT) applications.

Using advanced design techniques and ultra-low power process technology, the BK7258 delivers high integration and minimal power consumption for IP cameras, HMI applications, smart locks, and other advanced IoT applications.

Figure 2-1 shows the general block diagram of the BK7258.

**Figure 2-1 BK7258 Block Diagram**



The BK7258 devices are offered in four packages. The set of included peripherals varies depending on the package. Table 2-1 shows the list of peripherals available on each package.

**Table 2-1 Device Options and Features**

| Feature                |                    | QFN88                     | BK7258QN6854<br>QFN68     | BK7258QN6855<br>QFN68     | BK7258QN6868<br>QFN68                           |
|------------------------|--------------------|---------------------------|---------------------------|---------------------------|-------------------------------------------------|
| Flash                  |                    | 8 MB                      | 4 MB                      | 4 MB                      | 8 MB                                            |
| PSRAM                  |                    | 8 MB or 16 MB             | 4 MB                      | 4 MB                      | 8 MB                                            |
| GPIO                   |                    | 56                        | 46                        | 40                        | 38                                              |
| SPI                    | Master/Slave       | 2                         | 2                         | 2                         | 2                                               |
| QSPI                   |                    | 2                         | 2                         | 2                         | 1                                               |
| UART                   |                    | 3                         | 3                         | 3                         | 3 (hardware flow control unavailable for UART0) |
| Smart Card controller  |                    | 1                         | 1                         | 1                         | 1                                               |
| SDIO                   |                    | 1                         | 1                         | 1                         | 1                                               |
| I2C                    | Master/Slave       | 2                         | 2                         | 2                         | 2                                               |
| USB                    |                    | 1                         | 1                         | 1                         | 1                                               |
| CAN                    |                    | 1                         | 1                         | -                         | -                                               |
| LIN                    |                    | 1                         | 1                         | 1                         | 1                                               |
| GDMA                   |                    | 2                         | 2                         | 2                         | 2                                               |
| DMA2D                  |                    | 1                         | 1                         | 1                         | 1                                               |
| Rotation module        |                    | 1                         | 1                         | 1                         | 1                                               |
| Scaling module         |                    | 2                         | 2                         | 2                         | 2                                               |
| Display controller     |                    | 1                         | 1                         | -                         | -                                               |
| Segment LCD controller |                    | 1 (up to 8 x 28 segments) | 1 (up to 6 x 20 segments) | 1 (up to 4 x 26 segments) | 1 (up to 4 x 24 segments)                       |
| JPEG encoder           |                    | 1                         | 1                         | 1                         | 1                                               |
| JPEG decoder           |                    | 1                         | 1                         | 1                         | 1                                               |
| CIS DVP interface      |                    | 1                         | -                         | 1                         | 1                                               |
| H.264 video encoder    |                    | 1                         | 1                         | 1                         | 1                                               |
| Ethernet MAC interface |                    | 1                         | 1                         | 1                         | 1                                               |
| PWMG                   | Number of channels | 12                        | 8                         | 12                        | 11                                              |

| Feature                 |                    | QFN88                   | BK7258QN6854<br>QFN68   | BK7258QN6855<br>QFN68   | BK7258QN6868<br>QFN68   |
|-------------------------|--------------------|-------------------------|-------------------------|-------------------------|-------------------------|
| I2S                     | Master/Slave       | 3                       | 3                       | -                       | 2                       |
| Digital equalizer       |                    | 1                       | 1                       | 1                       | 1                       |
| Audio ADC               |                    | 2                       | -                       | 1                       | 2                       |
| Audio DAC               |                    | Mono                    | Mono                    | Mono                    | Mono                    |
| DMIC                    |                    | 1                       | 1                       | 1                       | 1                       |
| SBC accelerator         |                    | 1                       | 1                       | 1                       | 1                       |
| AUX<br>ADC              | 12 bits            | 1                       | 1                       | 1                       | 1                       |
|                         | Number of channels | 11                      | 11                      | 11                      | 6                       |
| General-purpose timer   |                    | 6                       | 6                       | 6                       | 6                       |
| Watchdog timer (WDT)    |                    | 2                       | 2                       | 2                       | 2                       |
| Real-time counter (RTC) |                    | 1                       | 1                       | 1                       | 1                       |
| IrDA                    |                    | 1                       | 1                       | 1                       | 1                       |
| Temperature sensor      |                    | 1                       | 1                       | 1                       | 1                       |
| Touch sensing I/O       |                    | 16                      | 7                       | 14                      | 12                      |
| Package                 |                    | 9 x 9 x 0.9 mm<br>QFN88 | 8 x 8 x 0.9 mm<br>QFN68 | 8 x 8 x 0.9 mm<br>QFN68 | 7 x 7 x 0.9 mm<br>QFN68 |
| Operating voltage       |                    | 2.5 to 4.35 V           |                         |                         |                         |
| Operating temperature   |                    | -40 to +85 °C           |                         |                         |                         |

## 3. Pin Descriptions

The BK7258 provides Wi-Fi and Bluetooth functionality in four packages of 68 pins and 88 pins.

### 3.1 QFN88 Pin Descriptions

Figure 3-1 shows the pin assignments of the 9 x 9 mm, 88-pin QFN package.

**Figure 3-1 QFN88 Pin Assignments**

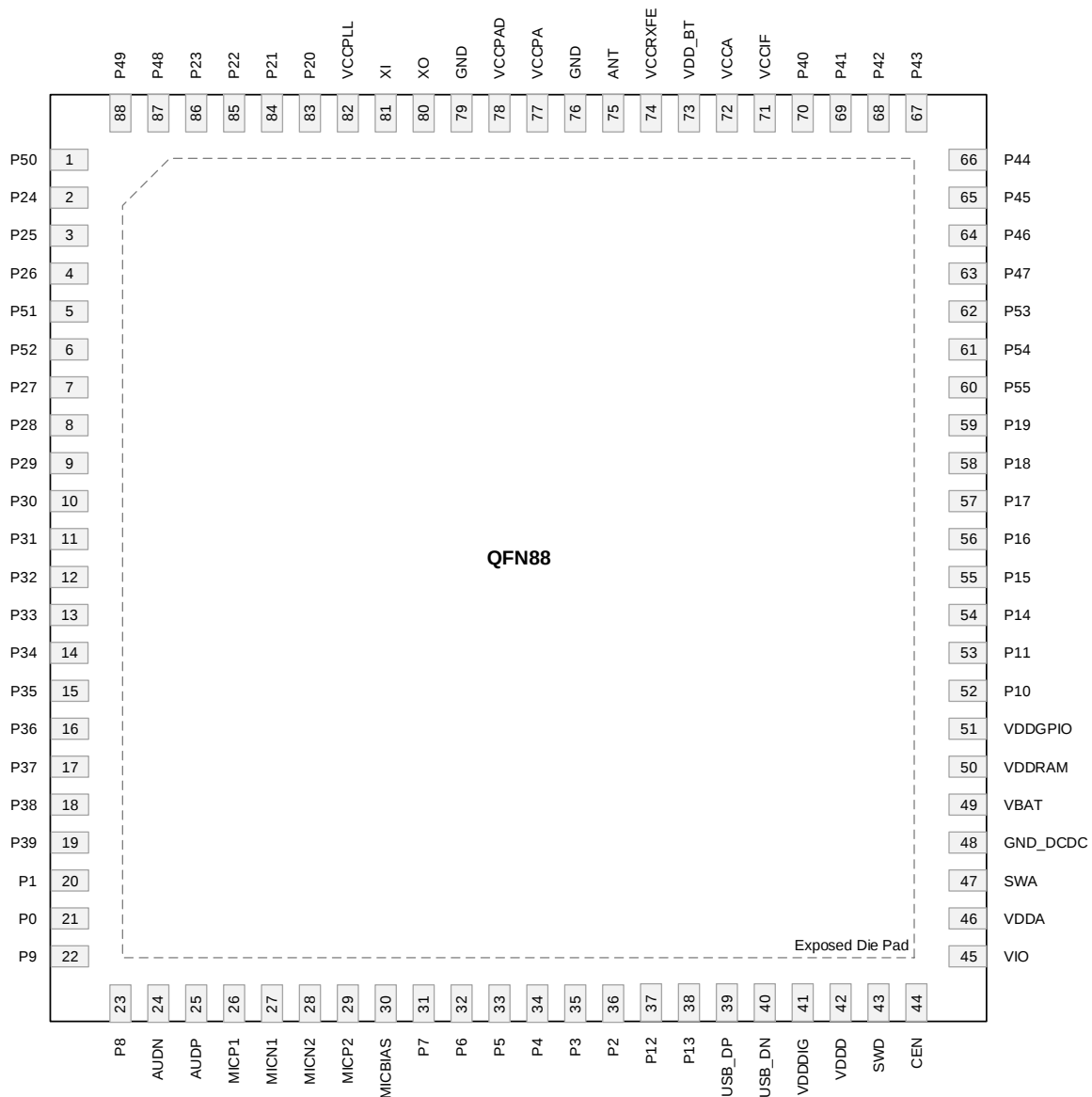


Table 3-1 shows the pin descriptions of the QFN88 package.

**Table 3-1 QFN88 Pin Descriptions**

| Pin # | Name | I/O | Type           | Description                                                                                                                                                                                                                                                                                                            |
|-------|------|-----|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1     | P50  | I/O | Digital        | <ul style="list-style-type: none"> <li>GPIO50: general-purpose I/O</li> <li>ENET_RXD1: receive data</li> <li>RGB_R0: red data</li> </ul>                                                                                                                                                                               |
| 2     | P24  | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO24: general-purpose I/O</li> <li>LPO_CLK: 32 kHz clock output</li> <li>PWMG0_PWM4: PWM4 channel of PWMG0</li> <li>ADC2: analog input channel</li> <li>QSPI0_IO0: data</li> <li>RGB_G7: green data</li> <li>I8080_RSX: data/command select</li> <li>SEG6: segment</li> </ul> |
| 3     | P25  | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO25: general-purpose I/O</li> <li>IRDA: infrared data</li> <li>PWMG0_PWM5: PWM5 channel of PWMG0</li> <li>ADC1: analog input channel</li> <li>QSPI0_IO1: data</li> <li>RGB_G6: green data</li> <li>I8080_WRX: write enable</li> <li>SEG5: segment</li> </ul>                 |
| 4     | P26  | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO26: general-purpose I/O</li> <li>WIFI_TX_EN: transmit enable</li> <li>QSPI0_IO2: data</li> <li>RGB_G5: green data</li> <li>I8080_RDX: read enable</li> <li>SEG4: segment</li> </ul>                                                                                         |
| 5     | P51  | I/O | Digital        | <ul style="list-style-type: none"> <li>GPIO51: general-purpose I/O</li> <li>ENET_RXDV: receive data valid</li> <li>RGB_G1: green data</li> </ul>                                                                                                                                                                       |
| 6     | P52  | I/O | Digital        | <ul style="list-style-type: none"> <li>GPIO52: general-purpose I/O</li> <li>ENET_TXD0: transmit data</li> </ul>                                                                                                                                                                                                        |

| Pin # | Name | I/O | Type           | Description                                                                                                                                                                                                                                                                                                                        |
|-------|------|-----|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|       |      |     |                | <ul style="list-style-type: none"> <li>RGB_G0: green data</li> </ul>                                                                                                                                                                                                                                                               |
| 7     | P27  | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO27: general-purpose I/O</li> <li>CIS_MCLK: master clock</li> <li>CLK_AUXS_CIS: CIS master clock (derived from DCO/APLL/CLK_320M/CLK_480M)</li> <li>ENET_PHY_INT: PHY interrupt</li> <li>QSPI0_IO3: data</li> <li>SEG17: segment</li> </ul>                                              |
| 8     | P28  | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO28: general-purpose I/O</li> <li>WIFI_RX_EN: receive enable</li> <li>I2S_MCLK: master clock</li> <li>ADC4: analog input channel</li> <li>TOUCH2: touch sensing I/O</li> <li>CLK_AUXS_CIS: CIS master clock (derived from DCO/APLL/CLK_320M/CLK_480M)</li> <li>SEG18: segment</li> </ul> |
| 9     | P29  | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO29: general-purpose I/O</li> <li>CIS_PCLK: pixel clock</li> <li>ENET_MDC: management data clock</li> <li>TOUCH3: touch sensing I/O</li> <li>SEG19: segment</li> </ul>                                                                                                                   |
| 10    | P30  | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO30: general-purpose I/O</li> <li>CIS_HSYNC: horizontal synchronization</li> <li>UART2_RX: receive data input</li> <li>LIN_RXD: receive data input</li> <li>TOUCH4: touch sensing I/O</li> <li>SC_CLK: clock</li> <li>SEG20: segment</li> </ul>                                          |
| 11    | P31  | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO31: general-purpose I/O</li> <li>CIS_VSYNC: vertical synchronization</li> <li>UART2_TX: transmit data output</li> <li>LIN_TXD: transmit data output</li> <li>TOUCH5: touch sensing I/O</li> </ul>                                                                                       |

| Pin # | Name | I/O | Type           | Description                                                                                                                                                                                                                                                                                |
|-------|------|-----|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|       |      |     |                | <ul style="list-style-type: none"> <li>SC_IO: data input/output</li> <li>SEG21: segment</li> </ul>                                                                                                                                                                                         |
| 12    | P32  | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO32: general-purpose I/O</li> <li>CIS_PXD0: data</li> <li>PWMG1_PWM0: PWM0 channel of PWMG1</li> <li>ENET_MDIO: management data</li> <li>TOUCH6: touch sensing I/O</li> <li>SC_RSTN: reset</li> <li>SEG22: segment</li> </ul>                    |
| 13    | P33  | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO33: general-purpose I/O</li> <li>CIS_PXD1: data</li> <li>PWMG1_PWM1: PWM1 channel of PWMG1</li> <li>ENET_RXD0: receive data</li> <li>TOUCH7: touch sensing I/O</li> <li>SPI0_SCK: serial clock</li> <li>SEG23: segment</li> </ul>               |
| 14    | P34  | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO34: general-purpose I/O</li> <li>CIS_PXD2: data</li> <li>PWMG1_PWM2: PWM2 channel of PWMG1</li> <li>ENET_RXD1: receive data</li> <li>TOUCH8: touch sensing I/O</li> <li>SPI0_CSN: chip select</li> <li>SEG24: segment</li> </ul>                |
| 15    | P35  | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO35: general-purpose I/O</li> <li>CIS_PXD3: data</li> <li>PWMG1_PWM3: PWM3 channel of PWMG1</li> <li>ENET_RXDV: receive data valid</li> <li>TOUCH9: touch sensing I/O</li> <li>SPI0_MOSI: master out slave in</li> <li>SEG25: segment</li> </ul> |
| 16    | P36  | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO36: general-purpose I/O</li> <li>CIS_PXD4: data</li> </ul>                                                                                                                                                                                      |

| Pin # | Name | I/O | Type           | Description                                                                                                                                                                                                                                                                         |
|-------|------|-----|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|       |      |     |                | <ul style="list-style-type: none"> <li>PWMG1_PWM4: PWM4 channel of PWMG1</li> <li>ENET_TXD0: transmit data</li> <li>TOUCH10: touch sensing I/O</li> <li>SPI0_MISO: master in slave out</li> <li>SEG26: segment</li> </ul>                                                           |
| 17    | P37  | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO37: general-purpose I/O</li> <li>CIS_PXD5: data</li> <li>PWMG1_PWM5: PWM5 channel of PWMG1</li> <li>ENET_TXD1: transmit data</li> <li>TOUCH11: touch sensing I/O</li> <li>SEG27: segment</li> </ul>                                      |
| 18    | P38  | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO38: general-purpose I/O</li> <li>CIS_PXD6: data</li> <li>I2C1_SCL: serial clock</li> <li>ENET_TXEN: transmit data enable</li> <li>TOUCH12: touch sensing I/O</li> <li>COM4: common</li> <li>SEG28: segment</li> </ul>                    |
| 19    | P39  | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO39: general-purpose I/O</li> <li>CIS_PXD7: data</li> <li>I2C1_SDA: serial data</li> <li>ENET_REF_CLK: RMII reference clock</li> <li>TOUCH13: touch sensing I/O</li> <li>COM5: common</li> <li>SEG29: segment</li> </ul>                  |
| 20    | P1   | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO1: general-purpose I/O</li> <li>UART1_RX: receive data input</li> <li>I2C1_SDA: serial data</li> <li>SWDIO: serial wire data</li> <li>SC_CLK: clock</li> <li>ADC13: analog input channel</li> <li>LIN_RXD: receive data input</li> </ul> |
| 21    | P0   | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO0: general-purpose I/O</li> </ul>                                                                                                                                                                                                        |

| Pin # | Name    | I/O | Type           | Description                                                                                                                                                                                                                                                                                                |
|-------|---------|-----|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|       |         |     |                | <ul style="list-style-type: none"> <li>UART1_TX: transmit data output</li> <li>I2C1_SCL: serial clock</li> <li>SWCLK: serial wire clock</li> <li>SC_IO: data input/output</li> <li>ADC12: analog input channel</li> <li>LIN_TXD: transmit data output</li> </ul>                                           |
| 22    | P9      | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO9: general-purpose I/O</li> <li>BT_PRIOPRIORITY: Bluetooth priority</li> <li>PWMG0_PWM3: PWM3 channel of PWMG0</li> <li>I2S0_DOUT: serial data output</li> <li>DMIC_DAT: data</li> <li>32K_XI: 32.768 kHz crystal input</li> </ul>                              |
| 23    | P8      | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO8: general-purpose I/O</li> <li>BT_ACTIVE: Bluetooth active</li> <li>PWMG0_PWM2: PWM2 channel of PWMG0</li> <li>I2S0_DIN: serial data input</li> <li>DMIC_CLK: clock</li> <li>ADC10: analog input channel</li> <li>32K_XO: 32.768 kHz crystal output</li> </ul> |
| 24    | AUDN    | -   | Analog output  | Audio channel negative output                                                                                                                                                                                                                                                                              |
| 25    | AUDP    | -   | Analog output  | Audio channel positive output                                                                                                                                                                                                                                                                              |
| 26    | MICP1   | -   | Analog input   | Microphone 1 positive input                                                                                                                                                                                                                                                                                |
| 27    | MICN1   | -   | Analog input   | Microphone 1 negative input                                                                                                                                                                                                                                                                                |
| 28    | MICN2   | -   | Analog input   | Microphone 2 negative input                                                                                                                                                                                                                                                                                |
| 29    | MICP2   | -   | Analog input   | Microphone 2 positive input                                                                                                                                                                                                                                                                                |
| 30    | MICBIAS | -   | Analog output  | Microphone bias output                                                                                                                                                                                                                                                                                     |
| 31    | P7      | I/O | Digital        | <ul style="list-style-type: none"> <li>GPIO7: general-purpose I/O</li> <li>WIFI_ACTIVE: Wi-Fi active</li> <li>PWMG0_PWM1: PWM1 channel of PWMG0</li> <li>I2S0_SYNC: frame synchronization</li> <li>QSPI1_IO3: data</li> </ul>                                                                              |

| Pin # | Name | I/O | Type           | Description                                                                                                                                                                                                                                            |
|-------|------|-----|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 32    | P6   | I/O | Digital        | <ul style="list-style-type: none"> <li>GPIO6: general-purpose I/O</li> <li>CLK13M: 26 MHz clock output (divide by 1/2/4/8)</li> <li>PWMG0_PWM0: PWM0 channel of PWMG0</li> <li>I2S0_SCK: serial clock</li> <li>QSPI1_IO2: data</li> </ul>              |
| 33    | P5   | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO5: general-purpose I/O</li> <li>SPI1_MISO: master in slave out</li> <li>SDIO_DATA1: data</li> <li>COM7: common</li> <li>QSPI1_IO1: data</li> <li>SEG31: segment</li> </ul>                                  |
| 34    | P4   | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO4: general-purpose I/O</li> <li>SPI1_MOSI: master out slave in</li> <li>SDIO_DATA0: data</li> <li>COM6: common</li> <li>QSPI1_IO0: data</li> <li>SEG30: segment</li> </ul>                                  |
| 35    | P3   | I/O | Digital        | <ul style="list-style-type: none"> <li>GPIO3: general-purpose I/O</li> <li>SPI1_CSN: chip select</li> <li>SDIO_CMD: command/response</li> <li>SC_VCC: power supply to the smart card</li> <li>QSPI1_CS: chip select</li> </ul>                         |
| 36    | P2   | I/O | Digital        | <ul style="list-style-type: none"> <li>GPIO2: general-purpose I/O</li> <li>SPI1_SCK: serial clock</li> <li>SDIO_CLK: clock</li> <li>SC_RSTN: reset</li> <li>LIN_SLEEP: transceiver sleep mode (active low)</li> <li>QSPI1_SCK: serial clock</li> </ul> |
| 37    | P12  | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO12: general-purpose I/O</li> <li>UART0_RTS: request to send</li> <li>TOUCH0: touch sensing I/O</li> <li>ADC14: analog input channel</li> </ul>                                                              |

| Pin # | Name     | I/O | Type           | Description                                                                                                                                                                                                                                                                                 |
|-------|----------|-----|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 38    | P13      | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO13: general-purpose I/O</li> <li>UART0_CTS: clear to send</li> <li>TOUCH1: touch sensing I/O</li> <li>ADC15: analog input channel</li> </ul>                                                                                                     |
| 39    | USB_DP   | I/O | Digital        | USB D+                                                                                                                                                                                                                                                                                      |
| 40    | USB_DN   | I/O | Digital        | USB D-                                                                                                                                                                                                                                                                                      |
| 41    | VDDDIG   | -   | Analog output  | Digital core LDO output                                                                                                                                                                                                                                                                     |
| 42    | VDDD     | -   | Analog output  | Digital buck/LDO output                                                                                                                                                                                                                                                                     |
| 43    | SWD      | -   | Analog output  | Digital buck switch output                                                                                                                                                                                                                                                                  |
| 44    | CEN      | -   | Analog input   | Chip enable, active high                                                                                                                                                                                                                                                                    |
| 45    | VIO      | -   | Analog output  | IO LDO output                                                                                                                                                                                                                                                                               |
| 46    | VDDA     | -   | Analog output  | Analog buck/LDO output                                                                                                                                                                                                                                                                      |
| 47    | SWA      | -   | Analog output  | Analog buck switch output                                                                                                                                                                                                                                                                   |
| 48    | GND_DCDC | -   | GND            | Buck ground                                                                                                                                                                                                                                                                                 |
| 49    | VBAT     | -   | Power          | Chip power supply                                                                                                                                                                                                                                                                           |
| 50    | VDDRAM   | -   | Analog output  | EXMEM LDO output                                                                                                                                                                                                                                                                            |
| 51    | VDDGPIO  | -   | Analog output  | Power supply for GPIOs                                                                                                                                                                                                                                                                      |
| 52    | P10      | I/O | Digital        | <ul style="list-style-type: none"> <li>GPIO10: general-purpose I/O</li> <li>DL_UART_RX: UART flash download receive data input</li> <li>UART0_RX: receive data input</li> <li>SDIO_DATA2: data</li> <li>CLK_AUXS_CIS: CIS master clock (derived from DCO/APLL/CLK_320M/CLK_480M)</li> </ul> |
| 53    | P11      | I/O | Digital        | <ul style="list-style-type: none"> <li>GPIO11: general-purpose I/O</li> <li>DL_UART_TX: UART flash download transmit data output</li> <li>UART0_TX: transmit data output</li> <li>SDIO_DATA3: data</li> </ul>                                                                               |
| 54    | P14      | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO14: general-purpose I/O</li> <li>SDIO_CLK: clock</li> </ul>                                                                                                                                                                                      |

| Pin # | Name | I/O | Type           | Description                                                                                                                                                                                                                                                                                                      |
|-------|------|-----|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|       |      |     |                | <ul style="list-style-type: none"> <li>SPI0_SCK: serial clock</li> <li>BT_ANT0: Bluetooth antenna select</li> <li>I2C1_SCL: serial clock</li> <li>RGB_DCLK: clock output</li> <li>I8080_D15: data</li> <li>SEG16: segment</li> </ul>                                                                             |
| 55    | P15  | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO15: general-purpose I/O</li> <li>SDIO_CMD: command/response</li> <li>SPI0_CSN: chip select</li> <li>BT_ANT1: Bluetooth antenna select</li> <li>I2C1_SDA: serial data</li> <li>RGB_DISP: display on enable</li> <li>I8080_D14: data</li> <li>SEG15: segment</li> </ul> |
| 56    | P16  | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO16: general-purpose I/O</li> <li>SDIO_DATA0: data</li> <li>SPI0_MOSI: master out slave in</li> <li>BT_ANT2: Bluetooth antenna select</li> <li>RGB_DE: data enable</li> <li>I8080_D13: data</li> <li>SEG14: segment</li> </ul>                                         |
| 57    | P17  | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO17: general-purpose I/O</li> <li>SDIO_DATA1: data</li> <li>SPI0_MISO: master in slave out</li> <li>BT_ANT3: Bluetooth antenna select</li> <li>RGB_HSYNC: horizontal synchronization</li> <li>I8080_D12: data</li> <li>SEG13: segment</li> </ul>                       |
| 58    | P18  | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO18: general-purpose I/O</li> <li>SDIO_DATA2: data</li> <li>PWMG0_PWM0: PWM0 channel of PWMG0</li> <li>RGB_VSYNC: vertical synchronization</li> <li>I8080_D11: data</li> <li>SEG12: segment</li> </ul>                                                                 |

| Pin # | Name | I/O | Type           | Description                                                                                                                                                                                                                                                                                                                                                            |
|-------|------|-----|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 59    | P19  | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO19: general-purpose I/O</li> <li>SDIO_DATA3: data</li> <li>PWMG0_PWM1: PWM1 channel of PWMG0</li> <li>RGB_R7: red data</li> <li>I8080_D10: data</li> <li>SEG11: segment</li> </ul>                                                                                                                                          |
| 60    | P55  | I/O | Digital        | <ul style="list-style-type: none"> <li>GPIO55: general-purpose I/O</li> <li>ENET_REF_CLK: RMII reference clock</li> <li>RGB_B0: blue data</li> </ul>                                                                                                                                                                                                                   |
| 61    | P54  | I/O | Digital        | <ul style="list-style-type: none"> <li>GPIO54: general-purpose I/O</li> <li>ENET_TXEN: transmit data enable</li> <li>RGB_B1: blue data</li> </ul>                                                                                                                                                                                                                      |
| 62    | P53  | I/O | Digital        | <ul style="list-style-type: none"> <li>GPIO53: general-purpose I/O</li> <li>ENET_TXD1: transmit data</li> <li>RGB_B2: blue data</li> </ul>                                                                                                                                                                                                                             |
| 63    | P47  | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO47: general-purpose I/O</li> <li>SPI0_MISO: master in slave out</li> <li>ENET_MDC: management data clock</li> <li>TOUCH15: touch sensing I/O</li> <li>RGB_B3: blue data</li> <li>I8080_D0: data</li> <li>COM0: common</li> <li>I2S2_DOUT: serial data output</li> </ul>                                                     |
| 64    | P46  | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO46: general-purpose I/O</li> <li>CAN_STBY: transceiver standby mode (active high)</li> <li>SPI0_MOSI: master out slave in</li> <li>ENET_PHY_INT: PHY interrupt</li> <li>TOUCH14: touch sensing I/O</li> <li>RGB_B4: blue data</li> <li>I8080_D1: data</li> <li>COM1: common</li> <li>I2S2_DIN: serial data input</li> </ul> |
| 65    | P45  | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO45: general-purpose I/O</li> </ul>                                                                                                                                                                                                                                                                                          |

| Pin # | Name | I/O | Type           | Description                                                                                                                                                                                                                                                                                                   |
|-------|------|-----|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|       |      |     |                | <ul style="list-style-type: none"> <li>CAN_RX: receive</li> <li>SPI0_CSN: chip select</li> <li>RGB_B5: blue data</li> <li>I8080_D2: data</li> <li>COM2: common</li> <li>I2S2_SYNC: frame synchronization</li> </ul>                                                                                           |
| 66    | P44  | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO44: general-purpose I/O</li> <li>CAN_TX: transmit</li> <li>SPI0_SCK: serial clock</li> <li>RGB_B6: blue data</li> <li>I8080_D3: data</li> <li>COM3: common</li> <li>I2S2_SCK: serial clock</li> </ul>                                                              |
| 67    | P43  | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO43: general-purpose I/O</li> <li>I2C1_SDA: serial data</li> <li>I2S1_DOUT: serial data output</li> <li>SC_VCC: power supply to the smart card</li> <li>RGB_B7: blue data</li> <li>I8080_D4: data</li> <li>SEG0: segment</li> </ul>                                 |
| 68    | P42  | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO42: general-purpose I/O</li> <li>I2C1_SCL: serial clock</li> <li>I2S1_DIN: serial data input</li> <li>LIN_SLEEP: transceiver sleep mode (active low)</li> <li>SC_RSTN: reset</li> <li>RGB_G2: green data</li> <li>I8080_D5: data</li> <li>SEG1: segment</li> </ul> |
| 69    | P41  | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO41: general-purpose I/O</li> <li>UART2_TX: transmit data output</li> <li>I2S1_SYNC: frame synchronization</li> <li>LIN_TXD: transmit data output</li> <li>SC_IO: data input/output</li> <li>RGB_G3: green data</li> </ul>                                          |

| Pin # | Name     | I/O | Type           | Description                                                                                                                                                                                                                                                                                |
|-------|----------|-----|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|       |          |     |                | <ul style="list-style-type: none"> <li>I8080_D6: data</li> <li>SEG2: segment</li> </ul>                                                                                                                                                                                                    |
| 70    | P40      | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO40: general-purpose I/O</li> <li>UART2_RX: receive data input</li> <li>I2S1_SCK: serial clock</li> <li>LIN_RXD: receive data input</li> <li>SC_CLK: clock</li> <li>RGB_G4: green data</li> <li>I8080_D7: data</li> <li>SEG3: segment</li> </ul> |
| 71    | VCCIF    | -   | Analog input   | IF power supply                                                                                                                                                                                                                                                                            |
| 72    | VCCA     | -   | Analog input   | Analog power supply                                                                                                                                                                                                                                                                        |
| 73    | VDD_BT   | -   | Analog output  | Bluetooth LDO output                                                                                                                                                                                                                                                                       |
| 74    | VCCRFXFE | -   | Analog input   | RF receiver power supply                                                                                                                                                                                                                                                                   |
| 75    | ANT      | -   | RF             | 2.4 GHz RF signal port                                                                                                                                                                                                                                                                     |
| 76    | GND      | -   | GND            | Ground                                                                                                                                                                                                                                                                                     |
| 77    | VCCPA    | -   | Analog input   | RF PA power supply                                                                                                                                                                                                                                                                         |
| 78    | VCCPAD   | -   | Analog input   | RF PA driver power supply                                                                                                                                                                                                                                                                  |
| 79    | GND      | -   | GND            | Ground                                                                                                                                                                                                                                                                                     |
| 80    | XO       | -   | Analog output  | 26 MHz crystal output                                                                                                                                                                                                                                                                      |
| 81    | XI       | -   | Analog input   | 26 MHz crystal input                                                                                                                                                                                                                                                                       |
| 82    | VCCPLL   | -   | Analog input   | RF PLL power supply                                                                                                                                                                                                                                                                        |
| 83    | P20      | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO20: general-purpose I/O</li> <li>I2C0_SCL: serial clock</li> <li>SWCLK: serial wire clock</li> <li>RGB_R6: red data</li> <li>I8080_D9: data</li> <li>SEG10: segment</li> </ul>                                                                  |
| 84    | P21      | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO21: general-purpose I/O</li> <li>I2C0_SDA: serial data</li> <li>SWDIO: serial wire data</li> <li>ADC6: analog input channel</li> </ul>                                                                                                          |

| Pin #   | Name     | I/O | Type           | Description                                                                                                                                                                                                                                                                                                         |
|---------|----------|-----|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|         |          |     |                | <ul style="list-style-type: none"> <li>RGB_R5: red data</li> <li>I8080_D8: data</li> <li>SEG9: segment</li> </ul>                                                                                                                                                                                                   |
| 85      | P22      | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO22: general-purpose I/O</li> <li>CLK26M: 26 MHz clock output</li> <li>PWMG0_PWM2: PWM2 channel of PWMG0</li> <li>ADC5: analog input channel</li> <li>QSPI0_SCK: serial clock</li> <li>RGB_R4: red data</li> <li>I8080_CSX: chip select</li> <li>SEG8: segment</li> </ul> |
| 86      | P23      | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO23: general-purpose I/O</li> <li>PWMG0_PWM3: PWM3 channel of PWMG0</li> <li>ADC3: analog input channel</li> <li>QSPI0_CS: chip select</li> <li>RGB_R3: red data</li> <li>I8080_RESET: reset</li> <li>SEG7: segment</li> </ul>                                            |
| 87      | P48      | I/O | Digital        | <ul style="list-style-type: none"> <li>GPIO48: general-purpose I/O</li> <li>ENET_MDIO: management data</li> <li>RGB_R2: red data</li> <li>I8080_D16: data</li> </ul>                                                                                                                                                |
| 88      | P49      | I/O | Digital        | <ul style="list-style-type: none"> <li>GPIO49: general-purpose I/O</li> <li>ENET_RXD0: receive data</li> <li>RGB_R1: red data</li> <li>I8080_D17: data</li> </ul>                                                                                                                                                   |
| Die pad | GND_SLUG | -   | GND            | Ground                                                                                                                                                                                                                                                                                                              |

## 3.2 BK7258QN6854 QFN68 Pin Descriptions

Figure 3-2 shows the pin assignments of the BK7258QN6854's 8 x 8 mm, 68-pin QFN package.

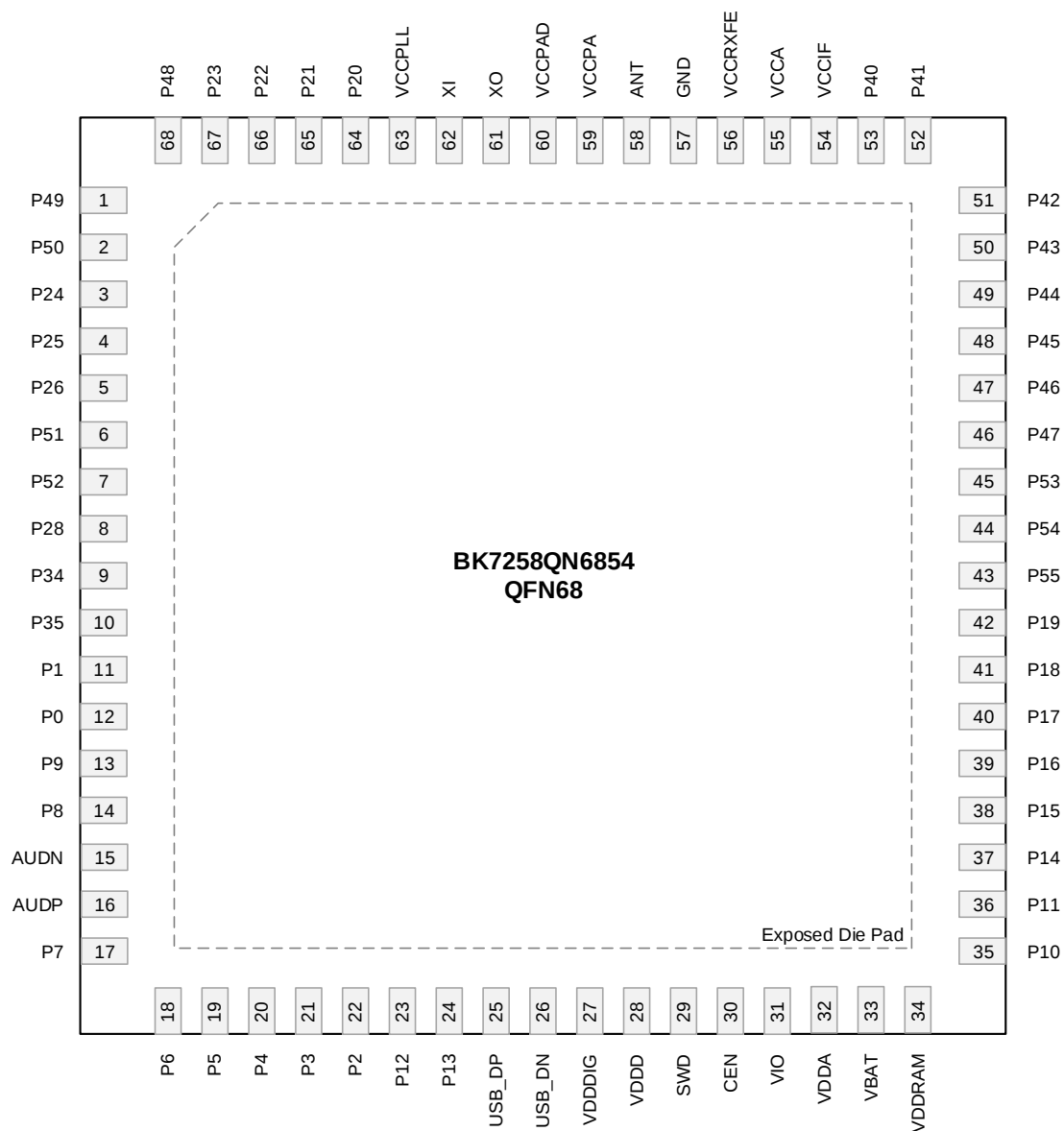
**Figure 3-2 BK7258QN6854 QFN68 Pin Assignments**


Table 3-2 shows the pin descriptions of the BK7258QN6854 QFN68 package.

**Table 3-2 BK7258QN6854 QFN68 Pin Descriptions**

| Pin # | Name | I/O | Type    | Description                                                                                                                                                       |
|-------|------|-----|---------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1     | P49  | I/O | Digital | <ul style="list-style-type: none"> <li>GPIO49: general-purpose I/O</li> <li>ENET_RXD0: receive data</li> <li>RGB_R1: red data</li> <li>I8080_D17: data</li> </ul> |

| Pin # | Name | I/O | Type           | Description                                                                                                                                                                                                                                                                                                            |
|-------|------|-----|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2     | P50  | I/O | Digital        | <ul style="list-style-type: none"> <li>GPIO50: general-purpose I/O</li> <li>ENET_RXD1: receive data</li> <li>RGB_R0: red data</li> </ul>                                                                                                                                                                               |
| 3     | P24  | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO24: general-purpose I/O</li> <li>LPO_CLK: 32 kHz clock output</li> <li>PWMG0_PWM4: PWM4 channel of PWMG0</li> <li>ADC2: analog input channel</li> <li>QSPI0_IO0: data</li> <li>RGB_G7: green data</li> <li>I8080_RSX: data/command select</li> <li>SEG6: segment</li> </ul> |
| 4     | P25  | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO25: general-purpose I/O</li> <li>IRDA: infrared data</li> <li>PWMG0_PWM5: PWM5 channel of PWMG0</li> <li>ADC1: analog input channel</li> <li>QSPI0_IO1: data</li> <li>RGB_G6: green data</li> <li>I8080_WRX: write enable</li> <li>SEG5: segment</li> </ul>                 |
| 5     | P26  | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO26: general-purpose I/O</li> <li>WIFI_TX_EN: transmit enable</li> <li>QSPI0_IO2: data</li> <li>RGB_G5: green data</li> <li>I8080_RDX: read enable</li> <li>SEG4: segment</li> </ul>                                                                                         |
| 6     | P51  | I/O | Digital        | <ul style="list-style-type: none"> <li>GPIO51: general-purpose I/O</li> <li>ENET_RXDV: receive data valid</li> <li>RGB_G1: green data</li> </ul>                                                                                                                                                                       |
| 7     | P52  | I/O | Digital        | <ul style="list-style-type: none"> <li>GPIO52: general-purpose I/O</li> <li>ENET_TXD0: transmit data</li> <li>RGB_G0: green data</li> </ul>                                                                                                                                                                            |
| 8     | P28  | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO28: general-purpose I/O</li> <li>WIFI_RX_EN: receive enable</li> </ul>                                                                                                                                                                                                      |

| Pin # | Name | I/O | Type           | Description                                                                                                                                                                                                                                                                                          |
|-------|------|-----|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|       |      |     |                | <ul style="list-style-type: none"> <li>I2S_MCLK: master clock</li> <li>ADC4: analog input channel</li> <li>TOUCH2: touch sensing I/O</li> <li>CLK_AUXS_CIS: CIS master clock (derived from DCO/APLL/CLK_320M/CLK_480M)</li> <li>SEG18: segment</li> </ul>                                            |
| 9     | P34  | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO34: general-purpose I/O</li> <li>PWMG1_PWM2: PWM2 channel of PWMG1</li> <li>ENET_RXD1: receive data</li> <li>TOUCH8: touch sensing I/O</li> <li>SPI0_CSN: chip select</li> <li>SEG24: segment</li> </ul>                                                  |
| 10    | P35  | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO35: general-purpose I/O</li> <li>PWMG1_PWM3: PWM3 channel of PWMG1</li> <li>ENET_RXDV: receive data valid</li> <li>TOUCH9: touch sensing I/O</li> <li>SPI0_MOSI: master out slave in</li> <li>SEG25: segment</li> </ul>                                   |
| 11    | P1   | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO1: general-purpose I/O</li> <li>UART1_RX: receive data input</li> <li>I2C1_SDA: serial data</li> <li>SWDIO: serial wire data</li> <li>SC_CLK: clock</li> <li>ADC13: analog input channel</li> <li>LIN_RXD: receive data input</li> </ul>                  |
| 12    | P0   | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO0: general-purpose I/O</li> <li>UART1_TX: transmit data output</li> <li>I2C1_SCL: serial clock</li> <li>SWCLK: serial wire clock</li> <li>SC_IO: data input/output</li> <li>ADC12: analog input channel</li> <li>LIN_TXD: transmit data output</li> </ul> |
| 13    | P9   | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO9: general-purpose I/O</li> </ul>                                                                                                                                                                                                                         |

| Pin # | Name | I/O | Type           | Description                                                                                                                                                                                                                                                                                                |
|-------|------|-----|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|       |      |     |                | <ul style="list-style-type: none"> <li>BT_PRIOPRITY: Bluetooth priority</li> <li>PWMG0_PWM3: PWM3 channel of PWMG0</li> <li>I2S0_DOUT: serial data output</li> <li>DMIC_DAT: data</li> <li>32K_XI: 32.768 kHz crystal input</li> </ul>                                                                     |
| 14    | P8   | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO8: general-purpose I/O</li> <li>BT_ACTIVE: Bluetooth active</li> <li>PWMG0_PWM2: PWM2 channel of PWMG0</li> <li>I2S0_DIN: serial data input</li> <li>DMIC_CLK: clock</li> <li>ADC10: analog input channel</li> <li>32K_XO: 32.768 kHz crystal output</li> </ul> |
| 15    | AUDN | -   | Analog output  | Audio channel negative output                                                                                                                                                                                                                                                                              |
| 16    | AUDP | -   | Analog output  | Audio channel positive output                                                                                                                                                                                                                                                                              |
| 17    | P7   | I/O | Digital        | <ul style="list-style-type: none"> <li>GPIO7: general-purpose I/O</li> <li>WIFI_ACTIVE: Wi-Fi active</li> <li>PWMG0_PWM1: PWM1 channel of PWMG0</li> <li>I2S0_SYNC: frame synchronization</li> <li>QSPI1_IO3: data</li> </ul>                                                                              |
| 18    | P6   | I/O | Digital        | <ul style="list-style-type: none"> <li>GPIO6: general-purpose I/O</li> <li>CLK13M: 26 MHz clock output (divide by 1/2/4/8)</li> <li>PWMG0_PWM0: PWM0 channel of PWMG0</li> <li>I2S0_SCK: serial clock</li> <li>QSPI1_IO2: data</li> </ul>                                                                  |
| 19    | P5   | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO5: general-purpose I/O</li> <li>SPI1_MISO: master in slave out</li> <li>SDIO_DATA1: data</li> <li>COM7: common</li> <li>QSPI1_IO1: data</li> <li>SEG31: segment</li> </ul>                                                                                      |
| 20    | P4   | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO4: general-purpose I/O</li> </ul>                                                                                                                                                                                                                               |

| Pin # | Name   | I/O | Type           | Description                                                                                                                                                                                                                                            |
|-------|--------|-----|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|       |        |     |                | <ul style="list-style-type: none"> <li>SPI1_MOSI: master out slave in</li> <li>SDIO_DATA0: data</li> <li>COM6: common</li> <li>QSPI1_IO0: data</li> <li>SEG30: segment</li> </ul>                                                                      |
| 21    | P3     | I/O | Digital        | <ul style="list-style-type: none"> <li>GPIO3: general-purpose I/O</li> <li>SPI1_CSN: chip select</li> <li>SDIO_CMD: command/response</li> <li>SC_VCC: power supply to the smart card</li> <li>QSPI1_CS: chip select</li> </ul>                         |
| 22    | P2     | I/O | Digital        | <ul style="list-style-type: none"> <li>GPIO2: general-purpose I/O</li> <li>SPI1_SCK: serial clock</li> <li>SDIO_CLK: clock</li> <li>SC_RSTN: reset</li> <li>LIN_SLEEP: transceiver sleep mode (active low)</li> <li>QSPI1_SCK: serial clock</li> </ul> |
| 23    | P12    | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO12: general-purpose I/O</li> <li>UART0_RTS: request to send</li> <li>TOUCH0: touch sensing I/O</li> <li>ADC14: analog input channel</li> </ul>                                                              |
| 24    | P13    | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO13: general-purpose I/O</li> <li>UART0_CTS: clear to send</li> <li>TOUCH1: touch sensing I/O</li> <li>ADC15: analog input channel</li> </ul>                                                                |
| 25    | USB_DP | I/O | Digital        | USB D+                                                                                                                                                                                                                                                 |
| 26    | USB_DN | I/O | Digital        | USB D-                                                                                                                                                                                                                                                 |
| 27    | VDDDIG | -   | Analog output  | Digital core LDO output                                                                                                                                                                                                                                |
| 28    | VDDD   | -   | Analog output  | Digital buck/LDO output                                                                                                                                                                                                                                |
| 29    | SWD    | -   | Analog output  | Digital buck switch output                                                                                                                                                                                                                             |
| 30    | CEN    | -   | Analog input   | Chip enable, active high                                                                                                                                                                                                                               |
| 31    | VIO    | -   | Analog output  | IO LDO output                                                                                                                                                                                                                                          |

| Pin # | Name   | I/O | Type           | Description                                                                                                                                                                                                                                                                                                      |
|-------|--------|-----|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 32    | VDDA   | -   | Analog output  | Analog LDO output                                                                                                                                                                                                                                                                                                |
| 33    | VBAT   | -   | Power          | Chip power supply                                                                                                                                                                                                                                                                                                |
| 34    | VDDRAM | -   | Analog output  | EXMEM LDO output                                                                                                                                                                                                                                                                                                 |
| 35    | P10    | I/O | Digital        | <ul style="list-style-type: none"> <li>GPIO10: general-purpose I/O</li> <li>DL_UART_RX: UART flash download receive data input</li> <li>UART0_RX: receive data input</li> <li>SDIO_DATA2: data</li> <li>CLK_AUXS_CIS: CIS master clock (derived from DCO/APLL/CLK_320M/CLK_480M)</li> </ul>                      |
| 36    | P11    | I/O | Digital        | <ul style="list-style-type: none"> <li>GPIO11: general-purpose I/O</li> <li>DL_UART_TX: UART flash download transmit data output</li> <li>UART0_TX: transmit data output</li> <li>SDIO_DATA3: data</li> </ul>                                                                                                    |
| 37    | P14    | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO14: general-purpose I/O</li> <li>SDIO_CLK: clock</li> <li>SPI0_SCK: serial clock</li> <li>BT_ANT0: Bluetooth antenna select</li> <li>I2C1_SCL: serial clock</li> <li>RGB_DCLK: clock output</li> <li>I8080_D15: data</li> <li>SEG16: segment</li> </ul>               |
| 38    | P15    | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO15: general-purpose I/O</li> <li>SDIO_CMD: command/response</li> <li>SPI0_CSN: chip select</li> <li>BT_ANT1: Bluetooth antenna select</li> <li>I2C1_SDA: serial data</li> <li>RGB_DISP: display on enable</li> <li>I8080_D14: data</li> <li>SEG15: segment</li> </ul> |
| 39    | P16    | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO16: general-purpose I/O</li> <li>SDIO_DATA0: data</li> <li>SPI0_MOSI: master out slave in</li> </ul>                                                                                                                                                                  |

| Pin # | Name | I/O | Type           | Description                                                                                                                                                                                                                                                                                |
|-------|------|-----|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|       |      |     |                | <ul style="list-style-type: none"> <li>BT_ANT2: Bluetooth antenna select</li> <li>RGB_DE: data enable</li> <li>I8080_D13: data</li> <li>SEG14: segment</li> </ul>                                                                                                                          |
| 40    | P17  | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO17: general-purpose I/O</li> <li>SDIO_DATA1: data</li> <li>SPI0_MISO: master in slave out</li> <li>BT_ANT3: Bluetooth antenna select</li> <li>RGB_HSYNC: horizontal synchronization</li> <li>I8080_D12: data</li> <li>SEG13: segment</li> </ul> |
| 41    | P18  | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO18: general-purpose I/O</li> <li>SDIO_DATA2: data</li> <li>PWMG0_PWM0: PWM0 channel of PWMG0</li> <li>RGB_VSYNC: vertical synchronization</li> <li>I8080_D11: data</li> <li>SEG12: segment</li> </ul>                                           |
| 42    | P19  | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO19: general-purpose I/O</li> <li>SDIO_DATA3: data</li> <li>PWMG0_PWM1: PWM1 channel of PWMG0</li> <li>RGB_R7: red data</li> <li>I8080_D10: data</li> <li>SEG11: segment</li> </ul>                                                              |
| 43    | P55  | I/O | Digital        | <ul style="list-style-type: none"> <li>GPIO55: general-purpose I/O</li> <li>ENET_REF_CLK: RMI reference clock</li> <li>RGB_B0: blue data</li> </ul>                                                                                                                                        |
| 44    | P54  | I/O | Digital        | <ul style="list-style-type: none"> <li>GPIO54: general-purpose I/O</li> <li>ENET_TXEN: transmit data enable</li> <li>RGB_B1: blue data</li> </ul>                                                                                                                                          |
| 45    | P53  | I/O | Digital        | <ul style="list-style-type: none"> <li>GPIO53: general-purpose I/O</li> <li>ENET_TXD1: transmit data</li> <li>RGB_B2: blue data</li> </ul>                                                                                                                                                 |

| Pin # | Name | I/O | Type           | Description                                                                                                                                                                                                                                                                                                                                                            |
|-------|------|-----|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 46    | P47  | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO47: general-purpose I/O</li> <li>SPI0_MISO: master in slave out</li> <li>ENET_MDC: management data clock</li> <li>TOUCH15: touch sensing I/O</li> <li>RGB_B3: blue data</li> <li>I8080_D0: data</li> <li>COM0: common</li> <li>I2S2_DOUT: serial data output</li> </ul>                                                     |
| 47    | P46  | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO46: general-purpose I/O</li> <li>CAN_STBY: transceiver standby mode (active high)</li> <li>SPI0_MOSI: master out slave in</li> <li>ENET_PHY_INT: PHY interrupt</li> <li>TOUCH14: touch sensing I/O</li> <li>RGB_B4: blue data</li> <li>I8080_D1: data</li> <li>COM1: common</li> <li>I2S2_DIN: serial data input</li> </ul> |
| 48    | P45  | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO45: general-purpose I/O</li> <li>CAN_RX: receive</li> <li>SPI0_CSN: chip select</li> <li>RGB_B5: blue data</li> <li>I8080_D2: data</li> <li>COM2: common</li> <li>I2S2_SYNC: frame synchronization</li> </ul>                                                                                                               |
| 49    | P44  | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO44: general-purpose I/O</li> <li>CAN_TX: transmit</li> <li>SPI0_SCK: serial clock</li> <li>RGB_B6: blue data</li> <li>I8080_D3: data</li> <li>COM3: common</li> <li>I2S2_SCK: serial clock</li> </ul>                                                                                                                       |
| 50    | P43  | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO43: general-purpose I/O</li> <li>I2C1_SDA: serial data</li> <li>I2S1_DOUT: serial data output</li> </ul>                                                                                                                                                                                                                    |

| Pin # | Name    | I/O | Type           | Description                                                                                                                                                                                                                                                                                                         |
|-------|---------|-----|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|       |         |     |                | <ul style="list-style-type: none"> <li>SC_VCC: power supply to the smart card</li> <li>RGB_B7: blue data</li> <li>I8080_D4: data</li> <li>SEG0: segment</li> </ul>                                                                                                                                                  |
| 51    | P42     | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO42: general-purpose I/O</li> <li>I2C1_SCL: serial clock</li> <li>I2S1_DIN: serial data input</li> <li>LIN_SLEEP: transceiver sleep mode (active low)</li> <li>SC_RSTN: reset</li> <li>RGB_G2: green data</li> <li>I8080_D5: data</li> <li>SEG1: segment</li> </ul>       |
| 52    | P41     | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO41: general-purpose I/O</li> <li>UART2_TX: transmit data output</li> <li>I2S1_SYNC: frame synchronization</li> <li>LIN_TXD: transmit data output</li> <li>SC_IO: data input/output</li> <li>RGB_G3: green data</li> <li>I8080_D6: data</li> <li>SEG2: segment</li> </ul> |
| 53    | P40     | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO40: general-purpose I/O</li> <li>UART2_RX: receive data input</li> <li>I2S1_SCK: serial clock</li> <li>LIN_RXD: receive data input</li> <li>SC_CLK: clock</li> <li>RGB_G4: green data</li> <li>I8080_D7: data</li> <li>SEG3: segment</li> </ul>                          |
| 54    | VCCIF   | -   | Analog input   | IF power supply                                                                                                                                                                                                                                                                                                     |
| 55    | VCCA    | -   | Analog input   | Analog power supply                                                                                                                                                                                                                                                                                                 |
| 56    | VCCRxFE | -   | Analog input   | RF receiver power supply                                                                                                                                                                                                                                                                                            |
| 57    | GND     | -   | GND            | Ground                                                                                                                                                                                                                                                                                                              |

| Pin # | Name   | I/O | Type           | Description                                                                                                                                                                                                                                                                                                         |
|-------|--------|-----|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 58    | ANT    | -   | RF             | 2.4 GHz RF signal port                                                                                                                                                                                                                                                                                              |
| 59    | VCCPA  | -   | Analog input   | RF PA power supply                                                                                                                                                                                                                                                                                                  |
| 60    | VCCPAD | -   | Analog input   | RF PA driver power supply                                                                                                                                                                                                                                                                                           |
| 61    | XO     | -   | Analog output  | 26 MHz crystal output                                                                                                                                                                                                                                                                                               |
| 62    | XI     | -   | Analog input   | 26 MHz crystal input                                                                                                                                                                                                                                                                                                |
| 63    | VCCPLL | -   | Analog input   | RF PLL power supply                                                                                                                                                                                                                                                                                                 |
| 64    | P20    | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO20: general-purpose I/O</li> <li>I2C0_SCL: serial clock</li> <li>SWCLK: serial wire clock</li> <li>RGB_R6: red data</li> <li>I8080_D9: data</li> <li>SEG10: segment</li> </ul>                                                                                           |
| 65    | P21    | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO21: general-purpose I/O</li> <li>I2C0_SDA: serial data</li> <li>SWDIO: serial wire data</li> <li>ADC6: analog input channel</li> <li>RGB_R5: red data</li> <li>I8080_D8: data</li> <li>SEG9: segment</li> </ul>                                                          |
| 66    | P22    | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO22: general-purpose I/O</li> <li>CLK26M: 26 MHz clock output</li> <li>PWMG0_PWM2: PWM2 channel of PWMG0</li> <li>ADC5: analog input channel</li> <li>QSPI0_SCK: serial clock</li> <li>RGB_R4: red data</li> <li>I8080_CSX: chip select</li> <li>SEG8: segment</li> </ul> |
| 67    | P23    | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO23: general-purpose I/O</li> <li>PWMG0_PWM3: PWM3 channel of PWMG0</li> <li>ADC3: analog input channel</li> <li>QSPI0_CS: chip select</li> <li>RGB_R3: red data</li> </ul>                                                                                               |



| Pin #   | Name     | I/O | Type    | Description                                                                                                                                                     |
|---------|----------|-----|---------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
|         |          |     |         | <ul style="list-style-type: none"><li>I8080_RESET: reset</li><li>SEG7: segment</li></ul>                                                                        |
| 68      | P48      | I/O | Digital | <ul style="list-style-type: none"><li>GPIO48: general-purpose I/O</li><li>ENET_MDIO: management data</li><li>RGB_R2: red data</li><li>I8080_D16: data</li></ul> |
| Die pad | GND_SLUG | -   | GND     | Ground                                                                                                                                                          |

## 3.3 BK7258QN6855 QFN68 Pin Descriptions

Figure 3-3 shows the pin assignments of the BK7258QN6855's 8 x 8 mm, 68-pin QFN package.

**Figure 3-3 BK7258QN6855 QFN68 Pin Assignments**

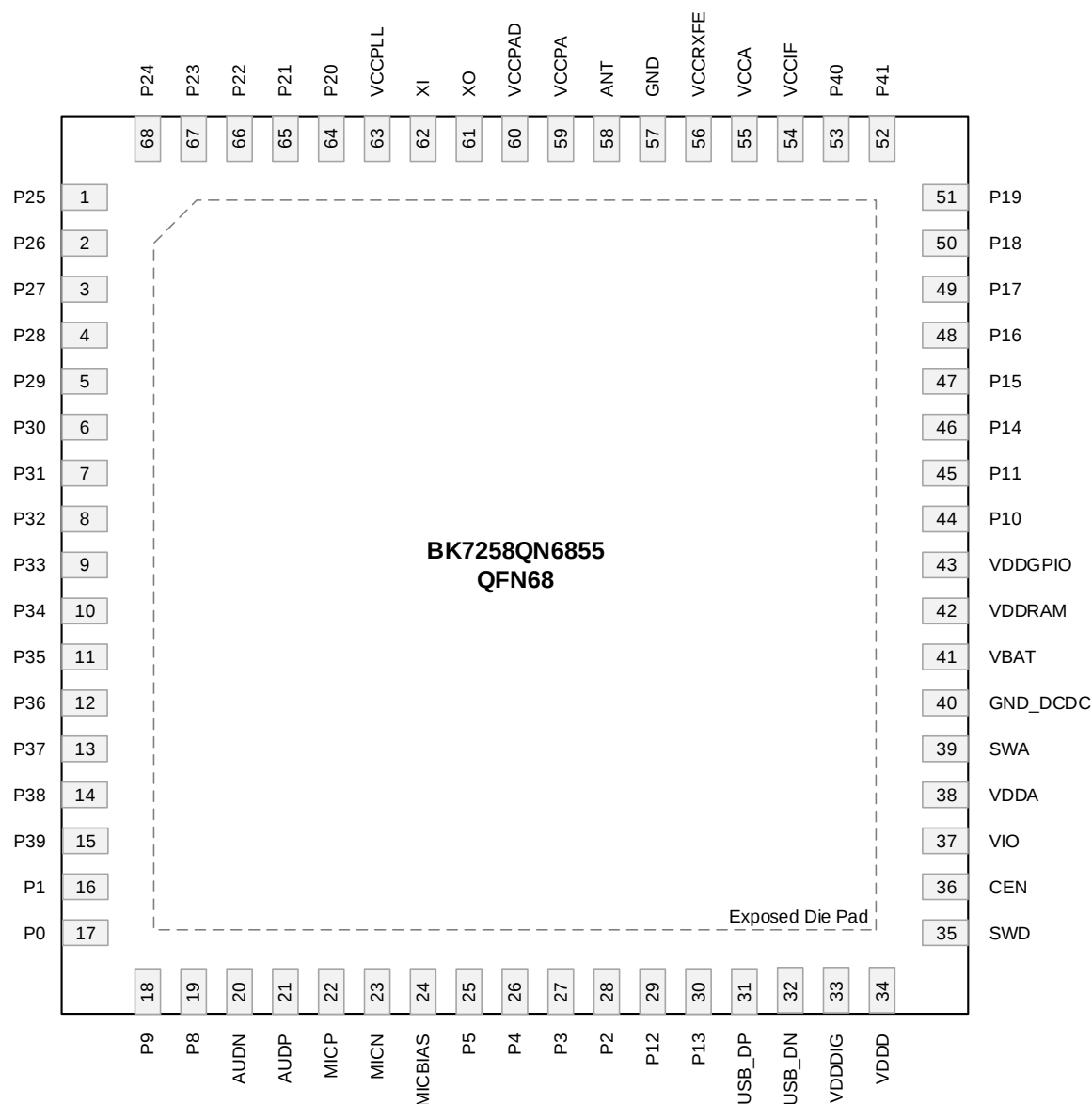


Table 3-3 shows the pin descriptions of the BK7258QN6855 QFN68 package.

**Table 3-3 BK7258QN6855 QFN68 Pin Descriptions**

| Pin # | Name | I/O | Type           | Description                                                                                                                                                                                                                                                                                                                        |
|-------|------|-----|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1     | P25  | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO25: general-purpose I/O</li> <li>IRDA: infrared data</li> <li>PWMG0_PWM5: PWM5 channel of PWMG0</li> <li>ADC1: analog input channel</li> <li>QSPI0_IO1: data</li> <li>SEG5: segment</li> </ul>                                                                                          |
| 2     | P26  | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO26: general-purpose I/O</li> <li>WIFI_TX_EN: transmit enable</li> <li>QSPI0_IO2: data</li> <li>SEG4: segment</li> </ul>                                                                                                                                                                 |
| 3     | P27  | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO27: general-purpose I/O</li> <li>CIS_MCLK: master clock</li> <li>CLK_AUXS_CIS: CIS master clock (derived from DCO/APLL/CLK_320M/CLK_480M)</li> <li>ENET_PHY_INT: PHY interrupt</li> <li>QSPI0_IO3: data</li> <li>SEG17: segment</li> </ul>                                              |
| 4     | P28  | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO28: general-purpose I/O</li> <li>WIFI_RX_EN: receive enable</li> <li>I2S_MCLK: master clock</li> <li>ADC4: analog input channel</li> <li>TOUCH2: touch sensing I/O</li> <li>CLK_AUXS_CIS: CIS master clock (derived from DCO/APLL/CLK_320M/CLK_480M)</li> <li>SEG18: segment</li> </ul> |
| 5     | P29  | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO29: general-purpose I/O</li> <li>CIS_PCLK: pixel clock</li> <li>ENET_MDC: management data clock</li> <li>TOUCH3: touch sensing I/O</li> <li>SEG19: segment</li> </ul>                                                                                                                   |
| 6     | P30  | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO30: general-purpose I/O</li> <li>CIS_HSYNC: horizontal</li> </ul>                                                                                                                                                                                                                       |

| Pin # | Name | I/O | Type           | Description                                                                                                                                                                                                                                                                                                          |
|-------|------|-----|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|       |      |     |                | synchronization <ul style="list-style-type: none"> <li>• UART2_RX: receive data input</li> <li>• LIN_RXD: receive data input</li> <li>• TOUCH4: touch sensing I/O</li> <li>• SC_CLK: clock</li> <li>• SEG20: segment</li> </ul>                                                                                      |
| 7     | P31  | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>• GPIO31: general-purpose I/O</li> <li>• CIS_VSYNC: vertical synchronization</li> <li>• UART2_TX: transmit data output</li> <li>• LIN_TXD: transmit data output</li> <li>• TOUCH5: touch sensing I/O</li> <li>• SC_IO: data input/output</li> <li>• SEG21: segment</li> </ul> |
| 8     | P32  | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>• GPIO32: general-purpose I/O</li> <li>• CIS_PXD0: data</li> <li>• PWMG1_PWM0: PWM0 channel of PWMG1</li> <li>• ENET_MDIO: management data</li> <li>• TOUCH6: touch sensing I/O</li> <li>• SC_RSTN: reset</li> <li>• SEG22: segment</li> </ul>                                |
| 9     | P33  | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>• GPIO33: general-purpose I/O</li> <li>• CIS_PXD1: data</li> <li>• PWMG1_PWM1: PWM1 channel of PWMG1</li> <li>• ENET_RXD0: receive data</li> <li>• TOUCH7: touch sensing I/O</li> <li>• SPI0_SCK: serial clock</li> <li>• SEG23: segment</li> </ul>                           |
| 10    | P34  | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>• GPIO34: general-purpose I/O</li> <li>• CIS_PXD2: data</li> <li>• PWMG1_PWM2: PWM2 channel of PWMG1</li> <li>• ENET_RXD1: receive data</li> <li>• TOUCH8: touch sensing I/O</li> <li>• SPI0_CSN: chip select</li> </ul>                                                      |

| Pin # | Name | I/O | Type           | Description                                                                                                                                                                                                                                                                                |
|-------|------|-----|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|       |      |     |                | <ul style="list-style-type: none"> <li>SEG24: segment</li> </ul>                                                                                                                                                                                                                           |
| 11    | P35  | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO35: general-purpose I/O</li> <li>CIS_PXD3: data</li> <li>PWMG1_PWM3: PWM3 channel of PWMG1</li> <li>ENET_RXDV: receive data valid</li> <li>TOUCH9: touch sensing I/O</li> <li>SPI0_MOSI: master out slave in</li> <li>SEG25: segment</li> </ul> |
| 12    | P36  | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO36: general-purpose I/O</li> <li>CIS_PXD4: data</li> <li>PWMG1_PWM4: PWM4 channel of PWMG1</li> <li>ENET_TXD0: transmit data</li> <li>TOUCH10: touch sensing I/O</li> <li>SPI0_MISO: master in slave out</li> <li>SEG26: segment</li> </ul>     |
| 13    | P37  | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO37: general-purpose I/O</li> <li>CIS_PXD5: data</li> <li>PWMG1_PWM5: PWM5 channel of PWMG1</li> <li>ENET_TXD1: transmit data</li> <li>TOUCH11: touch sensing I/O</li> <li>SEG27: segment</li> </ul>                                             |
| 14    | P38  | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO38: general-purpose I/O</li> <li>CIS_PXD6: data</li> <li>I2C1_SCL: serial clock</li> <li>ENET_TXEN: transmit data enable</li> <li>TOUCH12: touch sensing I/O</li> <li>COM4: common</li> <li>SEG28: segment</li> </ul>                           |
| 15    | P39  | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO39: general-purpose I/O</li> <li>CIS_PXD7: data</li> <li>I2C1_SDA: serial data</li> <li>ENET_REF_CLK: RMII reference clock</li> <li>TOUCH13: touch sensing I/O</li> </ul>                                                                       |

| Pin # | Name    | I/O | Type           | Description                                                                                                                                                                                                                                                                                          |
|-------|---------|-----|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|       |         |     |                | <ul style="list-style-type: none"> <li>COM5: common</li> <li>SEG29: segment</li> </ul>                                                                                                                                                                                                               |
| 16    | P1      | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO1: general-purpose I/O</li> <li>UART1_RX: receive data input</li> <li>I2C1_SDA: serial data</li> <li>SWDIO: serial wire data</li> <li>SC_CLK: clock</li> <li>ADC13: analog input channel</li> <li>LIN_RXD: receive data input</li> </ul>                  |
| 17    | P0      | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO0: general-purpose I/O</li> <li>UART1_TX: transmit data output</li> <li>I2C1_SCL: serial clock</li> <li>SWCLK: serial wire clock</li> <li>SC_IO: data input/output</li> <li>ADC12: analog input channel</li> <li>LIN_TXD: transmit data output</li> </ul> |
| 18    | P9      | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO9: general-purpose I/O</li> <li>PWMG0_PWM3: PWM3 channel of PWMG0</li> <li>DMIC_DAT: data</li> <li>32K_XI: 32.768 kHz crystal input</li> </ul>                                                                                                            |
| 19    | P8      | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO8: general-purpose I/O</li> <li>PWMG0_PWM2: PWM2 channel of PWMG0</li> <li>DMIC_CLK: clock</li> <li>ADC10: analog input channel</li> <li>32K_XO: 32.768 kHz crystal output</li> </ul>                                                                     |
| 20    | AUDN    | -   | Analog output  | Audio channel negative output                                                                                                                                                                                                                                                                        |
| 21    | AUDP    | -   | Analog output  | Audio channel positive output                                                                                                                                                                                                                                                                        |
| 22    | MICP    | -   | Analog input   | Microphone positive input                                                                                                                                                                                                                                                                            |
| 23    | MICN    | -   | Analog input   | Microphone negative input                                                                                                                                                                                                                                                                            |
| 24    | MICBIAS | -   | Analog output  | Microphone bias output                                                                                                                                                                                                                                                                               |
| 25    | P5      | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO5: general-purpose I/O</li> <li>SPI1_MISO: master in slave out</li> </ul>                                                                                                                                                                                 |

| Pin # | Name   | I/O | Type           | Description                                                                                                                                                                                                                                            |
|-------|--------|-----|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|       |        |     |                | <ul style="list-style-type: none"> <li>SDIO_DATA1: data</li> <li>COM7: common</li> <li>QSPI1_IO1: data</li> <li>SEG31: segment</li> </ul>                                                                                                              |
| 26    | P4     | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO4: general-purpose I/O</li> <li>SPI1_MOSI: master out slave in</li> <li>SDIO_DATA0: data</li> <li>COM6: common</li> <li>QSPI1_IO0: data</li> <li>SEG30: segment</li> </ul>                                  |
| 27    | P3     | I/O | Digital        | <ul style="list-style-type: none"> <li>GPIO3: general-purpose I/O</li> <li>SPI1_CSN: chip select</li> <li>SDIO_CMD: command/response</li> <li>SC_VCC: power supply to the smart card</li> <li>QSPI1_CS: chip select</li> </ul>                         |
| 28    | P2     | I/O | Digital        | <ul style="list-style-type: none"> <li>GPIO2: general-purpose I/O</li> <li>SPI1_SCK: serial clock</li> <li>SDIO_CLK: clock</li> <li>SC_RSTN: reset</li> <li>LIN_SLEEP: transceiver sleep mode (active low)</li> <li>QSPI1_SCK: serial clock</li> </ul> |
| 29    | P12    | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO12: general-purpose I/O</li> <li>UART0_RTS: request to send</li> <li>TOUCH0: touch sensing I/O</li> <li>ADC14: analog input channel</li> </ul>                                                              |
| 30    | P13    | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO13: general-purpose I/O</li> <li>UART0_CTS: clear to send</li> <li>TOUCH1: touch sensing I/O</li> <li>ADC15: analog input channel</li> </ul>                                                                |
| 31    | USB_DP | I/O | Digital        | USB D+                                                                                                                                                                                                                                                 |
| 32    | USB_DN | I/O | Digital        | USB D-                                                                                                                                                                                                                                                 |
| 33    | VDDDIG | -   | Analog output  | Digital core LDO output                                                                                                                                                                                                                                |

| Pin # | Name     | I/O | Type           | Description                                                                                                                                                                                                                                                                                 |
|-------|----------|-----|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 34    | VDDD     | -   | Analog output  | Digital buck/LDO output                                                                                                                                                                                                                                                                     |
| 35    | SWD      | -   | Analog output  | Digital buck switch output                                                                                                                                                                                                                                                                  |
| 36    | CEN      | -   | Analog input   | Chip enable, active high                                                                                                                                                                                                                                                                    |
| 37    | VIO      | -   | Analog output  | IO LDO output                                                                                                                                                                                                                                                                               |
| 38    | VDDA     | -   | Analog output  | Analog buck/LDO output                                                                                                                                                                                                                                                                      |
| 39    | SWA      | -   | Analog output  | Analog buck switch output                                                                                                                                                                                                                                                                   |
| 40    | GND_DCDC | -   | GND            | Buck ground                                                                                                                                                                                                                                                                                 |
| 41    | VBAT     | -   | Power          | Chip power supply                                                                                                                                                                                                                                                                           |
| 42    | VDDRAM   | -   | Analog output  | EXMEM LDO output                                                                                                                                                                                                                                                                            |
| 43    | VDDGPIO  | -   | Analog output  | Power supply for GPIOs                                                                                                                                                                                                                                                                      |
| 44    | P10      | I/O | Digital        | <ul style="list-style-type: none"> <li>GPIO10: general-purpose I/O</li> <li>DL_UART_RX: UART flash download receive data input</li> <li>UART0_RX: receive data input</li> <li>SDIO_DATA2: data</li> <li>CLK_AUXS_CIS: CIS master clock (derived from DCO/APLL/CLK_320M/CLK_480M)</li> </ul> |
| 45    | P11      | I/O | Digital        | <ul style="list-style-type: none"> <li>GPIO11: general-purpose I/O</li> <li>DL_UART_TX: UART flash download transmit data output</li> <li>UART0_TX: transmit data output</li> <li>SDIO_DATA3: data</li> </ul>                                                                               |
| 46    | P14      | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO14: general-purpose I/O</li> <li>SDIO_CLK: clock</li> <li>SPI0_SCK: serial clock</li> <li>BT_ANT0: Bluetooth antenna select</li> <li>I2C1_SCL: serial clock</li> <li>SEG16: segment</li> </ul>                                                   |
| 47    | P15      | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO15: general-purpose I/O</li> <li>SDIO_CMD: command/response</li> <li>SPI0_CSN: chip select</li> <li>BT_ANT1: Bluetooth antenna select</li> </ul>                                                                                                 |

| Pin # | Name  | I/O | Type           | Description                                                                                                                                                                                                           |
|-------|-------|-----|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|       |       |     |                | <ul style="list-style-type: none"> <li>I2C1_SDA: serial data</li> <li>SEG15: segment</li> </ul>                                                                                                                       |
| 48    | P16   | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO16: general-purpose I/O</li> <li>SDIO_DATA0: data</li> <li>SPI0_MOSI: master out slave in</li> <li>BT_ANT2: Bluetooth antenna select</li> <li>SEG14: segment</li> </ul>    |
| 49    | P17   | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO17: general-purpose I/O</li> <li>SDIO_DATA1: data</li> <li>SPI0_MISO: master in slave out</li> <li>BT_ANT3: Bluetooth antenna select</li> <li>SEG13: segment</li> </ul>    |
| 50    | P18   | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO18: general-purpose I/O</li> <li>SDIO_DATA2: data</li> <li>PWMG0_PWM0: PWM0 channel of PWMG0</li> <li>SEG12: segment</li> </ul>                                            |
| 51    | P19   | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO19: general-purpose I/O</li> <li>SDIO_DATA3: data</li> <li>PWMG0_PWM1: PWM1 channel of PWMG0</li> <li>SEG11: segment</li> </ul>                                            |
| 52    | P41   | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO41: general-purpose I/O</li> <li>UART2_TX: transmit data output</li> <li>LIN_TXD: transmit data output</li> <li>SC_IO: data input/output</li> <li>SEG2: segment</li> </ul> |
| 53    | P40   | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO40: general-purpose I/O</li> <li>UART2_RX: receive data input</li> <li>LIN_RXD: receive data input</li> <li>SC_CLK: clock</li> <li>SEG3: segment</li> </ul>                |
| 54    | VCCIF | -   | Analog input   | IF power supply                                                                                                                                                                                                       |
| 55    | VCCA  | -   | Analog input   | Analog power supply                                                                                                                                                                                                   |

| Pin # | Name    | I/O | Type           | Description                                                                                                                                                                                                                                               |
|-------|---------|-----|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 56    | VCCRxFE | -   | Analog input   | RF receiver power supply                                                                                                                                                                                                                                  |
| 57    | GND     | -   | GND            | Ground                                                                                                                                                                                                                                                    |
| 58    | ANT     | -   | RF             | 2.4 GHz RF signal port                                                                                                                                                                                                                                    |
| 59    | VCCPA   | -   | Analog input   | RF PA power supply                                                                                                                                                                                                                                        |
| 60    | VCCPAD  | -   | Analog input   | RF PA driver power supply                                                                                                                                                                                                                                 |
| 61    | XO      | -   | Analog output  | 26 MHz crystal output                                                                                                                                                                                                                                     |
| 62    | XI      | -   | Analog input   | 26 MHz crystal input                                                                                                                                                                                                                                      |
| 63    | VCCPLL  | -   | Analog input   | RF PLL power supply                                                                                                                                                                                                                                       |
| 64    | P20     | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO20: general-purpose I/O</li> <li>I2C0_SCL: serial clock</li> <li>SWCLK: serial wire clock</li> <li>SEG10: segment</li> </ul>                                                                                   |
| 65    | P21     | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO21: general-purpose I/O</li> <li>I2C0_SDA: serial data</li> <li>SWDIO: serial wire data</li> <li>ADC6: analog input channel</li> <li>SEG9: segment</li> </ul>                                                  |
| 66    | P22     | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO22: general-purpose I/O</li> <li>CLK26M: 26 MHz clock output</li> <li>PWMG0_PWM2: PWM2 channel of PWMG0</li> <li>ADC5: analog input channel</li> <li>QSPI0_SCK: serial clock</li> <li>SEG8: segment</li> </ul> |
| 67    | P23     | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO23: general-purpose I/O</li> <li>PWMG0_PWM3: PWM3 channel of PWMG0</li> <li>ADC3: analog input channel</li> <li>QSPI0_CS: chip select</li> <li>SEG7: segment</li> </ul>                                        |
| 68    | P24     | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO24: general-purpose I/O</li> <li>LPO_CLK: 32 kHz clock output</li> <li>PWMG0_PWM4: PWM4 channel of</li> </ul>                                                                                                  |

| Pin #   | Name     | I/O | Type | Description                                                                                                                          |
|---------|----------|-----|------|--------------------------------------------------------------------------------------------------------------------------------------|
|         |          |     |      | PWMG0 <ul style="list-style-type: none"><li>• ADC2: analog input channel</li><li>• QSPI0_IO0: data</li><li>• SEG6: segment</li></ul> |
| Die pad | GND_SLUG | -   | GND  | Ground                                                                                                                               |

## 3.4 BK7258QN6868 QFN68 Pin Descriptions

Figure 3-4 shows the pin assignments of the BK7258QN6868's 7 x 7 mm, 68-pin QFN package.

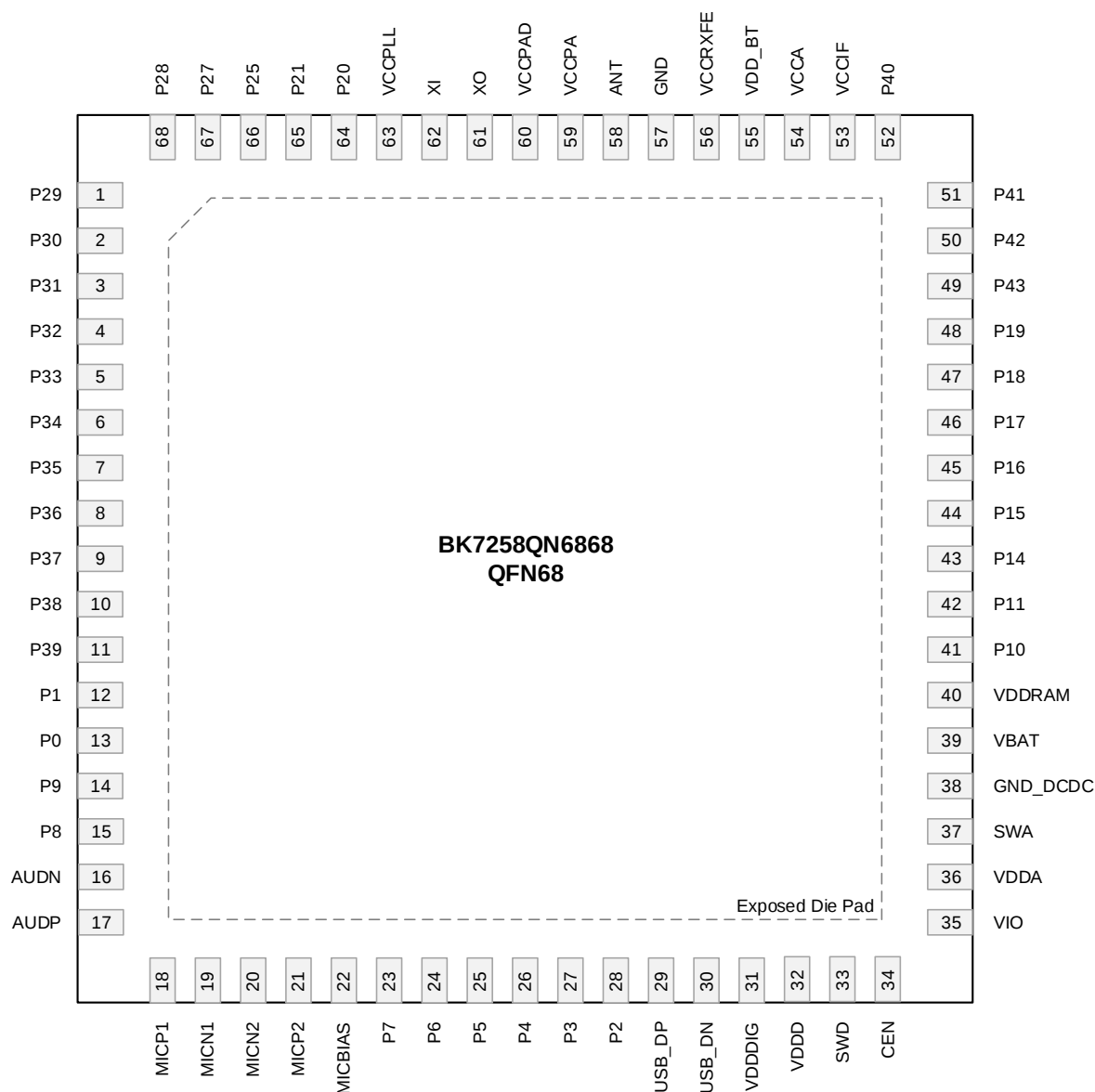
**Figure 3-4 BK7258QN6868 QFN68 Pin Assignments**


Table 3-4 shows the pin descriptions of the BK7258QN6868 QFN68 package.

**Table 3-4 BK7258QN6868 QFN68 Pin Descriptions**

| Pin # | Name | I/O | Type           | Description                                                                                                                                                                              |
|-------|------|-----|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1     | P29  | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO29: general-purpose I/O</li> <li>CIS_PCLK: pixel clock</li> <li>ENET_MDC: management data clock</li> <li>TOUCH3: touch sensing I/O</li> </ul> |

| Pin # | Name | I/O | Type           | Description                                                                                                                                                                                                                                                                                            |
|-------|------|-----|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|       |      |     |                | <ul style="list-style-type: none"> <li>SEG19: segment</li> </ul>                                                                                                                                                                                                                                       |
| 2     | P30  | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO30: general-purpose I/O</li> <li>CIS_HSYNC: horizontal synchronization</li> <li>UART2_RX: receive data input</li> <li>LIN_RXD: receive data input</li> <li>TOUCH4: touch sensing I/O</li> <li>SC_CLK: clock</li> <li>SEG20: segment</li> </ul>              |
| 3     | P31  | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO31: general-purpose I/O</li> <li>CIS_VSYNC: vertical synchronization</li> <li>UART2_TX: transmit data output</li> <li>LIN_TXD: transmit data output</li> <li>TOUCH5: touch sensing I/O</li> <li>SC_IO: data input/output</li> <li>SEG21: segment</li> </ul> |
| 4     | P32  | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO32: general-purpose I/O</li> <li>CIS_PXD0: data</li> <li>PWMG1_PWM0: PWM0 channel of PWMG1</li> <li>ENET_MDIO: management data</li> <li>TOUCH6: touch sensing I/O</li> <li>SC_RSTN: reset</li> <li>SEG22: segment</li> </ul>                                |
| 5     | P33  | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO33: general-purpose I/O</li> <li>CIS_PXD1: data</li> <li>PWMG1_PWM1: PWM1 channel of PWMG1</li> <li>ENET_RXD0: receive data</li> <li>TOUCH7: touch sensing I/O</li> <li>SPI0_SCK: serial clock</li> <li>SEG23: segment</li> </ul>                           |
| 6     | P34  | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO34: general-purpose I/O</li> <li>CIS_PXD2: data</li> <li>PWMG1_PWM2: PWM2 channel of PWMG1</li> </ul>                                                                                                                                                       |

| Pin # | Name | I/O | Type           | Description                                                                                                                                                                                                                                                                                              |
|-------|------|-----|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|       |      |     |                | <ul style="list-style-type: none"> <li>• ENET_RXD1: receive data</li> <li>• TOUCH8: touch sensing I/O</li> <li>• SPI0_CSN: chip select</li> <li>• SEG24: segment</li> </ul>                                                                                                                              |
| 7     | P35  | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>• GPIO35: general-purpose I/O</li> <li>• CIS_PXD3: data</li> <li>• PWMG1_PWM3: PWM3 channel of PWMG1</li> <li>• ENET_RXDV: receive data valid</li> <li>• TOUCH9: touch sensing I/O</li> <li>• SPI0_MOSI: master out slave in</li> <li>• SEG25: segment</li> </ul> |
| 8     | P36  | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>• GPIO36: general-purpose I/O</li> <li>• CIS_PXD4: data</li> <li>• PWMG1_PWM4: PWM4 channel of PWMG1</li> <li>• ENET_TXD0: transmit data</li> <li>• TOUCH10: touch sensing I/O</li> <li>• SPI0_MISO: master in slave out</li> <li>• SEG26: segment</li> </ul>     |
| 9     | P37  | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>• GPIO37: general-purpose I/O</li> <li>• CIS_PXD5: data</li> <li>• PWMG1_PWM5: PWM5 channel of PWMG1</li> <li>• ENET_TXD1: transmit data</li> <li>• TOUCH11: touch sensing I/O</li> <li>• SEG27: segment</li> </ul>                                               |
| 10    | P38  | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>• GPIO38: general-purpose I/O</li> <li>• CIS_PXD6: data</li> <li>• I2C1_SCL: serial clock</li> <li>• ENET_TXEN: transmit data enable</li> <li>• TOUCH12: touch sensing I/O</li> <li>• COM4: common</li> <li>• SEG28: segment</li> </ul>                           |
| 11    | P39  | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>• GPIO39: general-purpose I/O</li> <li>• CIS_PXD7: data</li> </ul>                                                                                                                                                                                                |

| Pin # | Name | I/O | Type           | Description                                                                                                                                                                                                                                                                                                |
|-------|------|-----|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|       |      |     |                | <ul style="list-style-type: none"> <li>I2C1_SDA: serial data</li> <li>ENET_REF_CLK: RMI reference clock</li> <li>TOUCH13: touch sensing I/O</li> <li>COM5: common</li> <li>SEG29: segment</li> </ul>                                                                                                       |
| 12    | P1   | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO1: general-purpose I/O</li> <li>UART1_RX: receive data input</li> <li>I2C1_SDA: serial data</li> <li>SWDIO: serial wire data</li> <li>SC_CLK: clock</li> <li>ADC13: analog input channel</li> <li>LIN_RXD: receive data input</li> </ul>                        |
| 13    | P0   | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO0: general-purpose I/O</li> <li>UART1_TX: transmit data output</li> <li>I2C1_SCL: serial clock</li> <li>SWCLK: serial wire clock</li> <li>SC_IO: data input/output</li> <li>ADC12: analog input channel</li> <li>LIN_TXD: transmit data output</li> </ul>       |
| 14    | P9   | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO9: general-purpose I/O</li> <li>BT_PRIOPRIORITY: Bluetooth priority</li> <li>PWMG0_PWM3: PWM3 channel of PWMG0</li> <li>I2S0_DOUT: serial data output</li> <li>DMIC_DAT: data</li> <li>32K_XI: 32.768 kHz crystal input</li> </ul>                              |
| 15    | P8   | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO8: general-purpose I/O</li> <li>BT_ACTIVE: Bluetooth active</li> <li>PWMG0_PWM2: PWM2 channel of PWMG0</li> <li>I2S0_DIN: serial data input</li> <li>DMIC_CLK: clock</li> <li>ADC10: analog input channel</li> <li>32K_XO: 32.768 kHz crystal output</li> </ul> |
| 16    | AUDN | -   | Analog output  | Audio channel negative output                                                                                                                                                                                                                                                                              |

| Pin # | Name    | I/O | Type           | Description                                                                                                                                                                                                                               |
|-------|---------|-----|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 17    | AUDP    | -   | Analog output  | Audio channel positive output                                                                                                                                                                                                             |
| 18    | MICP1   | -   | Analog input   | Microphone 1 positive input                                                                                                                                                                                                               |
| 19    | MICN1   | -   | Analog input   | Microphone 1 negative input                                                                                                                                                                                                               |
| 20    | MICN2   | -   | Analog input   | Microphone 2 negative input                                                                                                                                                                                                               |
| 21    | MICP2   | -   | Analog input   | Microphone 2 positive input                                                                                                                                                                                                               |
| 22    | MICBIAS | -   | Analog output  | Microphone bias output                                                                                                                                                                                                                    |
| 23    | P7      | I/O | Digital        | <ul style="list-style-type: none"> <li>GPIO7: general-purpose I/O</li> <li>WIFI_ACTIVE: Wi-Fi active</li> <li>PWMG0_PWM1: PWM1 channel of PWMG0</li> <li>I2S0_SYNC: frame synchronization</li> <li>QSPI1_IO3: data</li> </ul>             |
| 24    | P6      | I/O | Digital        | <ul style="list-style-type: none"> <li>GPIO6: general-purpose I/O</li> <li>CLK13M: 26 MHz clock output (divide by 1/2/4/8)</li> <li>PWMG0_PWM0: PWM0 channel of PWMG0</li> <li>I2S0_SCK: serial clock</li> <li>QSPI1_IO2: data</li> </ul> |
| 25    | P5      | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO5: general-purpose I/O</li> <li>SPI1_MISO: master in slave out</li> <li>SDIO_DATA1: data</li> <li>COM7: common</li> <li>QSPI1_IO1: data</li> <li>SEG31: segment</li> </ul>                     |
| 26    | P4      | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO4: general-purpose I/O</li> <li>SPI1_MOSI: master out slave in</li> <li>SDIO_DATA0: data</li> <li>COM6: common</li> <li>QSPI1_IO0: data</li> <li>SEG30: segment</li> </ul>                     |
| 27    | P3      | I/O | Digital        | <ul style="list-style-type: none"> <li>GPIO3: general-purpose I/O</li> <li>SPI1_CSN: chip select</li> <li>SDIO_CMD: command/response</li> </ul>                                                                                           |

| Pin # | Name     | I/O | Type          | Description                                                                                                                                                                                                                                                                                 |
|-------|----------|-----|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|       |          |     |               | <ul style="list-style-type: none"> <li>SC_VCC: power supply to the smart card</li> <li>QSPI1_CS: chip select</li> </ul>                                                                                                                                                                     |
| 28    | P2       | I/O | Digital       | <ul style="list-style-type: none"> <li>GPIO2: general-purpose I/O</li> <li>SPI1_SCK: serial clock</li> <li>SDIO_CLK: clock</li> <li>SC_RSTN: reset</li> <li>LIN_SLEEP: transceiver sleep mode (active low)</li> <li>QSPI1_SCK: serial clock</li> </ul>                                      |
| 29    | USB_DP   | I/O | Digital       | USB D+                                                                                                                                                                                                                                                                                      |
| 30    | USB_DN   | I/O | Digital       | USB D-                                                                                                                                                                                                                                                                                      |
| 31    | VDDDIG   | -   | Analog output | Digital core LDO output                                                                                                                                                                                                                                                                     |
| 32    | VDDD     | -   | Analog output | Digital buck/LDO output                                                                                                                                                                                                                                                                     |
| 33    | SWD      | -   | Analog output | Digital buck switch output                                                                                                                                                                                                                                                                  |
| 34    | CEN      | -   | Analog input  | Chip enable, active high                                                                                                                                                                                                                                                                    |
| 35    | VIO      | -   | Analog output | IO LDO output                                                                                                                                                                                                                                                                               |
| 36    | VDDA     | -   | Analog output | Analog buck/LDO output                                                                                                                                                                                                                                                                      |
| 37    | SWA      | -   | Analog output | Analog buck switch output                                                                                                                                                                                                                                                                   |
| 38    | GND_DCDC | -   | GND           | Buck ground                                                                                                                                                                                                                                                                                 |
| 39    | VBAT     | -   | Power         | Chip power supply                                                                                                                                                                                                                                                                           |
| 40    | VDDRAM   | -   | Analog output | EXMEM LDO output                                                                                                                                                                                                                                                                            |
| 41    | P10      | I/O | Digital       | <ul style="list-style-type: none"> <li>GPIO10: general-purpose I/O</li> <li>DL_UART_RX: UART flash download receive data input</li> <li>UART0_RX: receive data input</li> <li>SDIO_DATA2: data</li> <li>CLK_AUXS_CIS: CIS master clock (derived from DCO/APLL/CLK_320M/CLK_480M)</li> </ul> |
| 42    | P11      | I/O | Digital       | <ul style="list-style-type: none"> <li>GPIO11: general-purpose I/O</li> <li>DL_UART_TX: UART flash download transmit data output</li> </ul>                                                                                                                                                 |

| Pin # | Name | I/O | Type           | Description                                                                                                                                                                                                                                        |
|-------|------|-----|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|       |      |     |                | <ul style="list-style-type: none"> <li>UART0_TX: transmit data output</li> <li>SDIO_DATA3: data</li> </ul>                                                                                                                                         |
| 43    | P14  | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO14: general-purpose I/O</li> <li>SDIO_CLK: clock</li> <li>SPI0_SCK: serial clock</li> <li>BT_ANT0: Bluetooth antenna select</li> <li>I2C1_SCL: serial clock</li> <li>SEG16: segment</li> </ul>          |
| 44    | P15  | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO15: general-purpose I/O</li> <li>SDIO_CMD: command/response</li> <li>SPI0_CSN: chip select</li> <li>BT_ANT1: Bluetooth antenna select</li> <li>I2C1_SDA: serial data</li> <li>SEG15: segment</li> </ul> |
| 45    | P16  | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO16: general-purpose I/O</li> <li>SDIO_DATA0: data</li> <li>SPI0_MOSI: master out slave in</li> <li>BT_ANT2: Bluetooth antenna select</li> <li>SEG14: segment</li> </ul>                                 |
| 46    | P17  | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO17: general-purpose I/O</li> <li>SDIO_DATA1: data</li> <li>SPI0_MISO: master in slave out</li> <li>BT_ANT3: Bluetooth antenna select</li> <li>SEG13: segment</li> </ul>                                 |
| 47    | P18  | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO18: general-purpose I/O</li> <li>SDIO_DATA2: data</li> <li>PWMG0_PWM0: PWM0 channel of PWMG0</li> <li>SEG12: segment</li> </ul>                                                                         |
| 48    | P19  | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO19: general-purpose I/O</li> <li>SDIO_DATA3: data</li> <li>PWMG0_PWM1: PWM1 channel of PWMG0</li> <li>SEG11: segment</li> </ul>                                                                         |
| 49    | P43  | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO43: general-purpose I/O</li> </ul>                                                                                                                                                                      |

| Pin # | Name    | I/O | Type           | Description                                                                                                                                                                                                                                                     |
|-------|---------|-----|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|       |         |     |                | <ul style="list-style-type: none"> <li>I2C1_SDA: serial data</li> <li>I2S1_DOUT: serial data output</li> <li>SC_VCC: power supply to the smart card</li> <li>SEG0: segment</li> </ul>                                                                           |
| 50    | P42     | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO42: general-purpose I/O</li> <li>I2C1_SCL: serial clock</li> <li>I2S1_DIN: serial data input</li> <li>LIN_SLEEP: transceiver sleep mode (active low)</li> <li>SC_RSTN: reset</li> <li>SEG1: segment</li> </ul>       |
| 51    | P41     | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO41: general-purpose I/O</li> <li>UART2_TX: transmit data output</li> <li>I2S1_SYNC: frame synchronization</li> <li>LIN_TXD: transmit data output</li> <li>SC_IO: data input/output</li> <li>SEG2: segment</li> </ul> |
| 52    | P40     | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO40: general-purpose I/O</li> <li>UART2_RX: receive data input</li> <li>I2S1_SCK: serial clock</li> <li>LIN_RXD: receive data input</li> <li>SC_CLK: clock</li> <li>SEG3: segment</li> </ul>                          |
| 53    | VCCIF   | -   | Analog input   | IF power supply                                                                                                                                                                                                                                                 |
| 54    | VCCA    | -   | Analog input   | Analog power supply                                                                                                                                                                                                                                             |
| 55    | VDD_BT  | -   | Analog output  | Bluetooth LDO output                                                                                                                                                                                                                                            |
| 56    | VCCRxFE | -   | Analog input   | RF receiver power supply                                                                                                                                                                                                                                        |
| 57    | GND     | -   | GND            | Ground                                                                                                                                                                                                                                                          |
| 58    | ANT     | -   | RF             | 2.4 GHz RF signal port                                                                                                                                                                                                                                          |
| 59    | VCCPA   | -   | Analog input   | RF PA power supply                                                                                                                                                                                                                                              |
| 60    | VCCPAD  | -   | Analog input   | RF PA driver power supply                                                                                                                                                                                                                                       |
| 61    | XO      | -   | Analog output  | 26 MHz crystal output                                                                                                                                                                                                                                           |

| Pin #   | Name     | I/O | Type           | Description                                                                                                                                                                                                                                                                                    |
|---------|----------|-----|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 62      | XI       | -   | Analog input   | 26 MHz crystal input                                                                                                                                                                                                                                                                           |
| 63      | VCCPLL   | -   | Analog input   | RF PLL power supply                                                                                                                                                                                                                                                                            |
| 64      | P20      | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO20: general-purpose I/O</li> <li>I2C0_SCL: serial clock</li> <li>SWCLK: serial wire clock</li> <li>SEG10: segment</li> </ul>                                                                                                                        |
| 65      | P21      | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO21: general-purpose I/O</li> <li>I2C0_SDA: serial data</li> <li>SWDIO: serial wire data</li> <li>ADC6: analog input channel</li> <li>SEG9: segment</li> </ul>                                                                                       |
| 66      | P25      | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO25: general-purpose I/O</li> <li>IRDA: infrared data</li> <li>PWMG0_PWM5: PWM5 channel of PWMG0</li> <li>ADC1: analog input channel</li> <li>SEG5: segment</li> </ul>                                                                               |
| 67      | P27      | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO27: general-purpose I/O</li> <li>CIS_MCLK: master clock</li> <li>CLK_AUXS_CIS: CIS master clock (derived from DCO/APLL/CLK_320M/CLK_480M)</li> <li>ENET_PHY_INT: PHY interrupt</li> <li>SEG17: segment</li> </ul>                                   |
| 68      | P28      | I/O | Digital/Analog | <ul style="list-style-type: none"> <li>GPIO28: general-purpose I/O</li> <li>I2S_MCLK: master clock</li> <li>ADC4: analog input channel</li> <li>TOUCH2: touch sensing I/O</li> <li>CLK_AUXS_CIS: CIS master clock (derived from DCO/APLL/CLK_320M/CLK_480M)</li> <li>SEG18: segment</li> </ul> |
| Die pad | GND_SLUG | -   | GND            | Ground                                                                                                                                                                                                                                                                                         |

## 3.5 Pin Multiplexing

Table 3-5 shows the pin mux functions of GPIOs.

**Table 3-5 Pin Multiplexing**

| GPIO                      | Flash Download | Alternate Functions                                                                                   |                                                                 |                                                                     |                                                        |                                                                                                 |         |                                           |                                       |
|---------------------------|----------------|-------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|---------------------------------------------------------------------|--------------------------------------------------------|-------------------------------------------------------------------------------------------------|---------|-------------------------------------------|---------------------------------------|
|                           |                | AF1                                                                                                   | AF2                                                             | AF3                                                                 | AF4                                                    | AF5                                                                                             | AF6     | AF7                                       | AF8                                   |
|                           | UART           | UART1/SPI1/<br>Clock/PTA/<br>UART0/SDIO/<br>I2C0/IrDA/<br>TX/RX Enable/<br>CIS DVP/UART2/<br>I2C1/CAN | I2C1/SDIO/<br>PWMG0/SPI0/<br>SWD/Clock/<br>UART2/PWMG1/<br>I2S1 | SWD/I2S0/<br>Clock/<br>AoA/AoD/<br>AUX ADC/<br>Ethernet MAC/<br>LIN | Smart Card<br>Controller/<br>DMIC/TOUCH/<br>I2C1/QSPI0 | AUX ADC/LIN/Segment<br>LCD Controller/Display<br>Controller/Clock/Smart<br>Card Controller/SPI0 | LIN     | QSPI1/XTALL/<br>Segment LCD<br>Controller | Segment<br>LCD<br>Controller/<br>I2S2 |
| GPIO0 <sup>(1)</sup>      |                | UART1_TX                                                                                              | I2C1_SCL                                                        | SWCLK                                                               | SC_IO                                                  | ADC12                                                                                           | LIN_TXD |                                           |                                       |
| GPIO1                     |                | UART1_RX                                                                                              | I2C1_SDA                                                        | SWDIO                                                               | SC_CLK                                                 | ADC13                                                                                           | LIN_RXD |                                           |                                       |
| GPIO2                     |                | SPI1_SCK                                                                                              | SDIO_CLK                                                        |                                                                     | SC_RSTN                                                | LIN_SLEEP                                                                                       |         | QSPI1_SCK                                 |                                       |
| GPIO3                     |                | SPI1_CSN                                                                                              | SDIO_CMD                                                        |                                                                     | SC_VCC                                                 |                                                                                                 |         | QSPI1_CS                                  |                                       |
| GPIO4 <sup>(1)</sup>      |                | SPI1_MOSI                                                                                             | SDIO_DATA0                                                      |                                                                     |                                                        | COM6                                                                                            |         | QSPI1_IO0                                 | SEG30                                 |
| GPIO5 <sup>(1)</sup>      |                | SPI1_MISO                                                                                             | SDIO_DATA1                                                      |                                                                     |                                                        | COM7                                                                                            |         | QSPI1_IO1                                 | SEG31                                 |
| GPIO6                     |                | CLK13M                                                                                                | PWMG0_PWM0                                                      | I2S0_SCK                                                            |                                                        |                                                                                                 |         | QSPI1_IO2                                 |                                       |
| GPIO7                     |                | WIFI_ACTIVE                                                                                           | PWMG0_PWM1                                                      | I2S0_SYNC                                                           |                                                        |                                                                                                 |         | QSPI1_IO3                                 |                                       |
| GPIO8 <sup>(1), (2)</sup> |                | BT_ACTIVE                                                                                             | PWMG0_PWM2                                                      | I2S0_DIN                                                            | DMIC_CLK                                               | ADC10                                                                                           |         | 32K_XO                                    |                                       |
| GPIO9                     |                | BT_PRIORITY                                                                                           | PWMG0_PWM3                                                      | I2S0_DOUT                                                           | DMIC_DAT                                               |                                                                                                 |         | 32K_XI                                    |                                       |



| GPIO                  | Flash Download | Alternate Functions                                                                                   |                                                                 |                                                                     |                                                        |                                                                                                 |     |                                           |                                       |
|-----------------------|----------------|-------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|---------------------------------------------------------------------|--------------------------------------------------------|-------------------------------------------------------------------------------------------------|-----|-------------------------------------------|---------------------------------------|
|                       |                | AF1                                                                                                   | AF2                                                             | AF3                                                                 | AF4                                                    | AF5                                                                                             | AF6 | AF7                                       | AF8                                   |
|                       | UART           | UART1/SPI1/<br>Clock/PTA/<br>UART0/SDIO/<br>I2C0/IrDA/<br>TX/RX Enable/<br>CIS DVP/UART2/<br>I2C1/CAN | I2C1/SDIO/<br>PWMG0/SPI0/<br>SWD/Clock/<br>UART2/PWMG1/<br>I2S1 | SWD/I2S0/<br>Clock/<br>AoA/AoD/<br>AUX ADC/<br>Ethernet MAC/<br>LIN | Smart Card<br>Controller/<br>DMIC/TOUCH/<br>I2C1/QSPI0 | AUX ADC/LIN/Segment<br>LCD Controller/Display<br>Controller/Clock/Smart<br>Card Controller/SPI0 | LIN | QSPI1/XTALL/<br>Segment LCD<br>Controller | Segment<br>LCD<br>Controller/<br>I2S2 |
| GPIO10 <sup>(1)</sup> | DL_UART_RX     | UART0_RX                                                                                              | SDIO_DATA2                                                      | CLK_AUXS_CIS                                                        |                                                        |                                                                                                 |     |                                           |                                       |
| GPIO11 <sup>(1)</sup> | DL_UART_TX     | UART0_TX                                                                                              | SDIO_DATA3                                                      |                                                                     |                                                        |                                                                                                 |     |                                           |                                       |
| GPIO12                |                | UART0_RTS                                                                                             |                                                                 |                                                                     | TOUCH0                                                 | ADC14                                                                                           |     |                                           |                                       |
| GPIO13                |                | UART0_CTS                                                                                             |                                                                 |                                                                     | TOUCH1                                                 | ADC15                                                                                           |     |                                           |                                       |
| GPIO14                |                | SDIO_CLK                                                                                              | SPI0_SCK                                                        | BT_ANT0                                                             | I2C1_SCL                                               | RGB_DCLK/I8080_D15                                                                              |     |                                           | SEG16                                 |
| GPIO15                |                | SDIO_CMD                                                                                              | SPI0_CSN                                                        | BT_ANT1                                                             | I2C1_SDA                                               | RGB_DISP/I8080_D14                                                                              |     |                                           | SEG15                                 |
| GPIO16                |                | SDIO_DATA0                                                                                            | SPI0_MOSI                                                       | BT_ANT2                                                             |                                                        | RGB_DE/I8080_D13                                                                                |     |                                           | SEG14                                 |
| GPIO17                |                | SDIO_DATA1                                                                                            | SPI0_MISO                                                       | BT_ANT3                                                             |                                                        | RGB_HSYNC/I8080_D12                                                                             |     |                                           | SEG13                                 |
| GPIO18                |                | SDIO_DATA2                                                                                            | PWMG0_PWM0                                                      |                                                                     |                                                        | RGB_VSYNC/I8080_D11                                                                             |     |                                           | SEG12                                 |
| GPIO19                |                | SDIO_DATA3                                                                                            | PWMG0_PWM1                                                      |                                                                     |                                                        | RGB_R7/I8080_D10                                                                                |     |                                           | SEG11                                 |
| GPIO20 <sup>(1)</sup> |                | I2C0_SCL                                                                                              | SWCLK                                                           |                                                                     |                                                        | RGB_R6/I8080_D9                                                                                 |     |                                           | SEG10                                 |
| GPIO21 <sup>(1)</sup> |                | I2C0_SDA                                                                                              | SWDIO                                                           | ADC6                                                                |                                                        | RGB_R5/I8080_D8                                                                                 |     |                                           | SEG9                                  |
| GPIO22 <sup>(1)</sup> |                | CLK26M                                                                                                | PWMG0_PWM2                                                      | ADC5                                                                | QSPI0_SCK                                              | RGB_R4/I8080_CSX                                                                                |     |                                           | SEG8                                  |
| GPIO23 <sup>(1)</sup> |                |                                                                                                       | PWMG0_PWM3                                                      | ADC3                                                                | QSPI0_CS                                               | RGB_R3/I8080_RESET                                                                              |     |                                           | SEG7                                  |



| GPIO   | Flash Download | Alternate Functions                                                                                   |                                                                 |                                                                     |                                                        |                                                                                                 |     |                                           |                                       |
|--------|----------------|-------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|---------------------------------------------------------------------|--------------------------------------------------------|-------------------------------------------------------------------------------------------------|-----|-------------------------------------------|---------------------------------------|
|        |                | AF1                                                                                                   | AF2                                                             | AF3                                                                 | AF4                                                    | AF5                                                                                             | AF6 | AF7                                       | AF8                                   |
|        | UART           | UART1/SPI1/<br>Clock/PTA/<br>UART0/SDIO/<br>I2C0/IrDA/<br>TX/RX Enable/<br>CIS DVP/UART2/<br>I2C1/CAN | I2C1/SDIO/<br>PWMG0/SPI0/<br>SWD/Clock/<br>UART2/PWMG1/<br>I2S1 | SWD/I2S0/<br>Clock/<br>AoA/AoD/<br>AUX ADC/<br>Ethernet MAC/<br>LIN | Smart Card<br>Controller/<br>DMIC/TOUCH/<br>I2C1/QSPI0 | AUX ADC/LIN/Segment<br>LCD Controller/Display<br>Controller/Clock/Smart<br>Card Controller/SPI0 | LIN | QSPI1/XTALL/<br>Segment LCD<br>Controller | Segment<br>LCD<br>Controller/<br>I2S2 |
| GPIO24 |                | LPO_CLK                                                                                               | PWMG0_PWM4                                                      | ADC2                                                                | QSPI0_IO0                                              | RGB_G7/I8080_RSX                                                                                |     |                                           | SEG6                                  |
| GPIO25 |                | IRDA                                                                                                  | PWMG0_PWM5                                                      | ADC1                                                                | QSPI0_IO1                                              | RGB_G6/I8080_WRX                                                                                |     |                                           | SEG5                                  |
| GPIO26 |                | WIFI_TX_EN                                                                                            |                                                                 |                                                                     | QSPI0_IO2                                              | RGB_G5/I8080_RDX                                                                                |     |                                           | SEG4                                  |
| GPIO27 |                | CIS_MCLK                                                                                              | CLK_AUXS_CIS                                                    | ENET_PHY_INT                                                        | QSPI0_IO3                                              |                                                                                                 |     |                                           | SEG17                                 |
| GPIO28 |                | WIFI_RX_EN                                                                                            | I2S_MCLK                                                        | ADC4                                                                | TOUCH2                                                 | CLK_AUXS_CIS                                                                                    |     |                                           | SEG18                                 |
| GPIO29 |                | CIS_PCLK                                                                                              |                                                                 | ENET_MDC                                                            | TOUCH3                                                 |                                                                                                 |     |                                           | SEG19                                 |
| GPIO30 |                | CIS_HSYNC                                                                                             | UART2_RX                                                        | LIN_RXD                                                             | TOUCH4                                                 | SC_CLK                                                                                          |     |                                           | SEG20                                 |
| GPIO31 |                | CIS_VSYNC                                                                                             | UART2_TX                                                        | LIN_TXD                                                             | TOUCH5                                                 | SC_IO                                                                                           |     |                                           | SEG21                                 |
| GPIO32 |                | CIS_PXD0                                                                                              | PWMG1_PWM0                                                      | ENET_MDIO                                                           | TOUCH6                                                 | SC_RSTN                                                                                         |     |                                           | SEG22                                 |
| GPIO33 |                | CIS_PXD1                                                                                              | PWMG1_PWM1                                                      | ENET_RXD0                                                           | TOUCH7                                                 | SPI0_SCK                                                                                        |     |                                           | SEG23                                 |
| GPIO34 |                | CIS_PXD2                                                                                              | PWMG1_PWM2                                                      | ENET_RXD1                                                           | TOUCH8                                                 | SPI0_CSN                                                                                        |     |                                           | SEG24                                 |
| GPIO35 |                | CIS_PXD3                                                                                              | PWMG1_PWM3                                                      | ENET_RXDV                                                           | TOUCH9                                                 | SPI0_MOSI                                                                                       |     |                                           | SEG25                                 |
| GPIO36 |                | CIS_PXD4                                                                                              | PWMG1_PWM4                                                      | ENET_TXD0                                                           | TOUCH10                                                | SPI0_MISO                                                                                       |     |                                           | SEG26                                 |
| GPIO37 |                | CIS_PXD5                                                                                              | PWMG1_PWM5                                                      | ENET_TXD1                                                           | TOUCH11                                                |                                                                                                 |     |                                           | SEG27                                 |



| GPIO   | Flash Download | Alternate Functions                                                                                   |                                                                 |                                                                     |                                                        |                                                                                                 |     |                                           |                                       |
|--------|----------------|-------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|---------------------------------------------------------------------|--------------------------------------------------------|-------------------------------------------------------------------------------------------------|-----|-------------------------------------------|---------------------------------------|
|        |                | AF1                                                                                                   | AF2                                                             | AF3                                                                 | AF4                                                    | AF5                                                                                             | AF6 | AF7                                       | AF8                                   |
|        | UART           | UART1/SPI1/<br>Clock/PTA/<br>UART0/SDIO/<br>I2C0/IrDA/<br>TX/RX Enable/<br>CIS DVP/UART2/<br>I2C1/CAN | I2C1/SDIO/<br>PWMG0/SPI0/<br>SWD/Clock/<br>UART2/PWMG1/<br>I2S1 | SWD/I2S0/<br>Clock/<br>AoA/AoD/<br>AUX ADC/<br>Ethernet MAC/<br>LIN | Smart Card<br>Controller/<br>DMIC/TOUCH/<br>I2C1/QSPI0 | AUX ADC/LIN/Segment<br>LCD Controller/Display<br>Controller/Clock/Smart<br>Card Controller/SPI0 | LIN | QSPI1/XTALL/<br>Segment LCD<br>Controller | Segment<br>LCD<br>Controller/<br>I2S2 |
| GPIO38 |                | CIS_PXD6                                                                                              | I2C1_SCL                                                        | ENET_TXEN                                                           | TOUCH12                                                |                                                                                                 |     | COM4                                      | SEG28                                 |
| GPIO39 |                | CIS_PXD7                                                                                              | I2C1_SDA                                                        | ENET_REF_CLK                                                        | TOUCH13                                                |                                                                                                 |     | COM5                                      | SEG29                                 |
| GPIO40 |                | UART2_RX                                                                                              | I2S1_SCK                                                        | LIN_RXD                                                             | SC_CLK                                                 | RGB_G4/I8080_D7                                                                                 |     |                                           | SEG3                                  |
| GPIO41 |                | UART2_TX                                                                                              | I2S1_SYNC                                                       | LIN_TXD                                                             | SC_IO                                                  | RGB_G3/I8080_D6                                                                                 |     |                                           | SEG2                                  |
| GPIO42 |                | I2C1_SCL                                                                                              | I2S1_DIN                                                        | LIN_SLEEP                                                           | SC_RSTN                                                | RGB_G2/I8080_D5                                                                                 |     |                                           | SEG1                                  |
| GPIO43 |                | I2C1_SDA                                                                                              | I2S1_DOUT                                                       |                                                                     | SC_VCC                                                 | RGB_B7/I8080_D4                                                                                 |     |                                           | SEG0                                  |
| GPIO44 |                | CAN_TX                                                                                                | SPI0_SCK                                                        |                                                                     |                                                        | RGB_B6/I8080_D3                                                                                 |     | COM3                                      | I2S2_SCK                              |
| GPIO45 |                | CAN_RX                                                                                                | SPI0_CSN                                                        |                                                                     |                                                        | RGB_B5/I8080_D2                                                                                 |     | COM2                                      | I2S2_SYNC                             |
| GPIO46 |                | CAN_STBY                                                                                              | SPI0_MOSI                                                       | ENET_PHY_INT                                                        | TOUCH14                                                | RGB_B4/I8080_D1                                                                                 |     | COM1                                      | I2S2_DIN                              |
| GPIO47 |                |                                                                                                       | SPI0_MISO                                                       | ENET_MDC                                                            | TOUCH15                                                | RGB_B3/I8080_D0                                                                                 |     | COM0                                      | I2S2_DOUT                             |
| GPIO48 |                |                                                                                                       |                                                                 | ENET_MDIO                                                           |                                                        | RGB_R2/I8080_D16                                                                                |     |                                           |                                       |
| GPIO49 |                |                                                                                                       |                                                                 | ENET_RXD0                                                           |                                                        | RGB_R1/I8080_D17                                                                                |     |                                           |                                       |
| GPIO50 |                |                                                                                                       |                                                                 | ENET_RXD1                                                           |                                                        | RGB_R0                                                                                          |     |                                           |                                       |
| GPIO51 |                |                                                                                                       |                                                                 | ENET_RXDV                                                           |                                                        | RGB_G1                                                                                          |     |                                           |                                       |

| GPIO   | Flash Download | Alternate Functions                                                                                   |                                                                 |                                                                     |                                                        |                                                                                                 |     |                                           |                                       |
|--------|----------------|-------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|---------------------------------------------------------------------|--------------------------------------------------------|-------------------------------------------------------------------------------------------------|-----|-------------------------------------------|---------------------------------------|
|        |                | AF1                                                                                                   | AF2                                                             | AF3                                                                 | AF4                                                    | AF5                                                                                             | AF6 | AF7                                       | AF8                                   |
|        | UART           | UART1/SPI1/<br>Clock/PTA/<br>UART0/SDIO/<br>I2C0/IrDA/<br>TX/RX Enable/<br>CIS DVP/UART2/<br>I2C1/CAN | I2C1/SDIO/<br>PWMG0/SPI0/<br>SWD/Clock/<br>UART2/PWMG1/<br>I2S1 | SWD/I2S0/<br>Clock/<br>AoA/AoD/<br>AUX ADC/<br>Ethernet MAC/<br>LIN | Smart Card<br>Controller/<br>DMIC/TOUCH/<br>I2C1/QSPI0 | AUX ADC/LIN/Segment<br>LCD Controller/Display<br>Controller/Clock/Smart<br>Card Controller/SPI0 | LIN | QSPI1/XTALL/<br>Segment LCD<br>Controller | Segment<br>LCD<br>Controller/<br>I2S2 |
| GPIO52 |                |                                                                                                       |                                                                 | ENET_TXD0                                                           |                                                        | RGB_G0                                                                                          |     |                                           |                                       |
| GPIO53 |                |                                                                                                       |                                                                 | ENET_TXD1                                                           |                                                        | RGB_B2                                                                                          |     |                                           |                                       |
| GPIO54 |                |                                                                                                       |                                                                 | ENET_TXEN                                                           |                                                        | RGB_B1                                                                                          |     |                                           |                                       |
| GPIO55 |                |                                                                                                       |                                                                 | ENET_REF_CLK                                                        |                                                        | RGB_B0                                                                                          |     |                                           |                                       |

- (1) Due to power-up glitches, the following GPIO pins are not recommended for applications sensitive to power-up fluctuations, such as LEDs or motor control: GPIO0, GPIO4, GPIO5, GPIO8, GPIO10, GPIO11, GPIO20, GPIO21, GPIO22, and GPIO23.
- (2) It is not recommended to connect GPIO8 to externally touchable peripherals, such as buttons or touch sensors. If it must be connected, an ESD protection diode is required.

## 4. Functional Description

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### 4.1 RF Transceivers

The BK7258 integrates a high-performance Wi-Fi/Bluetooth transceiver. The BK7258QN88617 and BK7258QN6868 uniquely feature an additional, dedicated low-power Bluetooth transceiver. Each transceiver incorporates two on-chip baluns. On the receive side, the on-chip balun converts the single-ended (unbalanced) RF signal from the antenna into a differential (balanced) signal and the low noise amplifier (LNA) amplifies the differential signal to achieve a better noise and linearity trade-off. On the transmit side, the power amplifier (PA) amplifies the differential signal and the on-chip balun converts the differential signal to a single-ended signal for feeding the antenna. This enables transmit and receive operations with only one ANT pin connected to the antenna. The communication range can be extended by configuring GPIO26 and GPIO28 as WIFI\_TX\_EN and WIFI\_RX\_EN function to control external PA and LNA. The frequency synthesizer is fully integrated, eliminating the need for any external components.

### 4.2 Bluetooth/Wi-Fi Coexistence

The built-in packet traffic arbitration (PTA) ensures stable Bluetooth and Wi-Fi dual connectivity and enables efficient sharing of over-the-air resources.

### 4.3 Clock Management

The primary clock sources available in the BK7258 are as follows:

- High-frequency clocks
  - 26 MHz crystal oscillator: it outputs clock signal XTALH
  - 26–360 MHz internal digitally controlled oscillator (DCO): it outputs clock signal CLK\_DCO
  - Digital PLL (DPLL): it generates 320 MHz clock CLK\_320M and 480 MHz clock CLK\_480M
- Low-frequency clocks
  - 32 kHz (32.768 kHz) crystal oscillator: it outputs clock signal XTALL
  - 32 kHz internal ring oscillator (ROSC): it outputs clock signal CLK\_ROSC
- Audio clock
  - Audio PLL (APLL): its default frequency is 98.304 MHz, and it outputs clock signal CLK\_APLL

The system generates a low-power clock source LPO\_CLK for standby. The LPO\_CLK can be selected from the following clocks:

- 32 kHz crystal oscillator XTALL
- 32 kHz clock signal derived from 26 MHz crystal oscillator
- 32 kHz internal oscillator ROSC

The BK7258 also has a clock output capability, which allows clock signals to be output to external components through GPIOs. GPIOs can output the following clock signals:

- CLK13M: clock derived from CLK\_XTAL (division factor 1/2/4/8)
- CLK26M: high-frequency crystal clock CLK\_XTAL, generally 26 MHz
- LPO\_CLK: LPO\_CLK clock
- I2S\_MCLK: reference clock for external audio codec, derived from APLL
- CLK\_AUXS\_CIS: reference clock for external CMOS image sensor (CIS)
- CIS\_MCLK: reference clock for external CMOS image sensor (CIS)

## 4.4 Reset

A reset can be triggered by the following sources: power-on reset, brown-out reset, watchdog reset, and wake-up from shutdown mode or deep sleep mode.

Power-on reset, brown-out reset, and AWDT watchdog reset reset the whole chip to its initial state. The DWDT watchdog reset's reset scope is configurable and can be configured to reset the whole chip.

Wake-up from shutdown mode triggers the whole system reset, while wake-up from deep sleep mode triggers the reset of digital blocks.

## 4.5 Power Management

### 4.5.1 Power Scheme

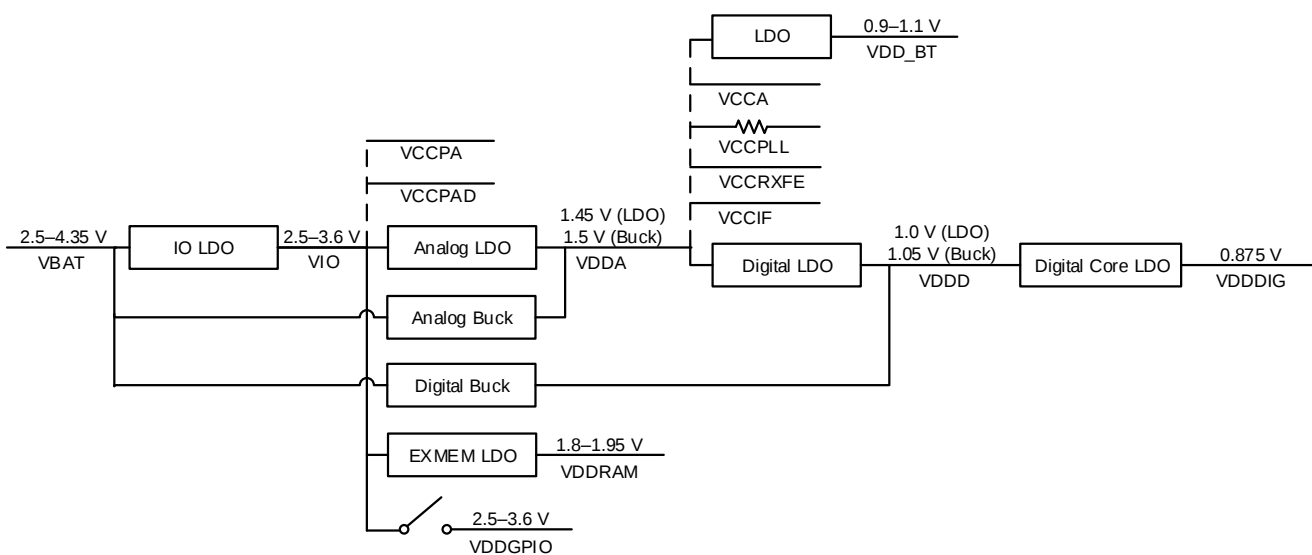
The power management system on the BK7258 includes two buck converters and several internal LDO regulators to provide voltage and noise isolation to various parts of the chip.

The VBAT is the external main chip supply ranging from 2.5 to 4.35 V. The VBAT generates VIO through the IO LDO regulator. In addition to being the power supply for Wi-Fi PA and GPIOs, the VIO is also the input supply of analog LDO and EXMEM LDO. The VBAT also generates VDDA and VDDD through the analog buck converter and the digital buck converter, respectively. The LDOs and bucks generate the following main power supplies:

- VDDA: power supply for RF/analog blocks. It is externally connected to VCCA, VCCPLL, VCCRxFE, and VCCIF to supply power to the Wi-Fi/Bluetooth transceiver, and internally provides power to XTAL and AUDIO directly. For the BK7258QN88617 and BK7258QN6868, VDDA also generates VDD\_BT through an LDO regulator to power the Bluetooth transceiver.
- VDDDIG: power supply for digital domain. It provides power supply for the processor, memories, Wi-Fi and Bluetooth basebands, as well as various peripherals.
- VDDRAM: power supply for PSRAM.

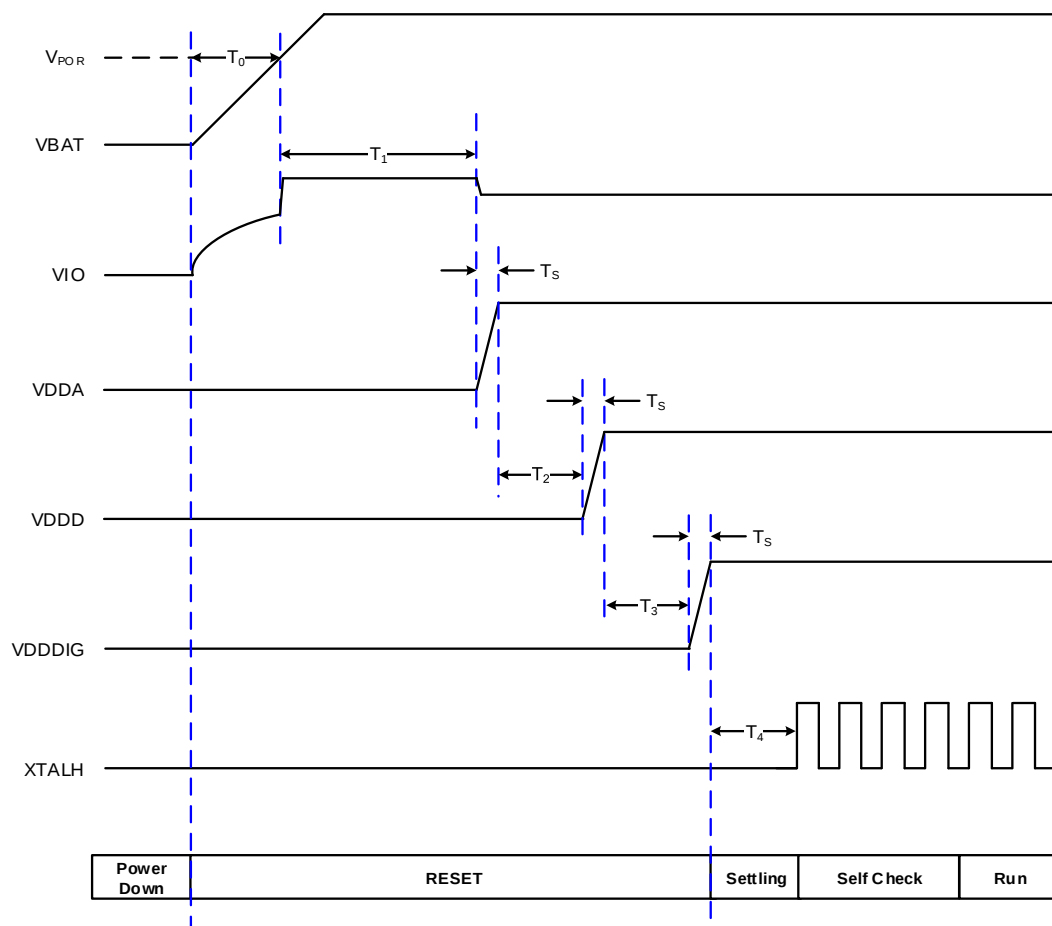
Figure 4-1 shows the power distribution of the BK7258.

**Figure 4-1 Internal Power Distribution**



**Note:** Outputs from the buck converters and LDO regulators require proper bypass capacitors to reduce supply noise. Please refer to the hardware schematic for details on selecting bypass capacitors.

Figure 4-2 shows the power-up sequence of the BK7258.

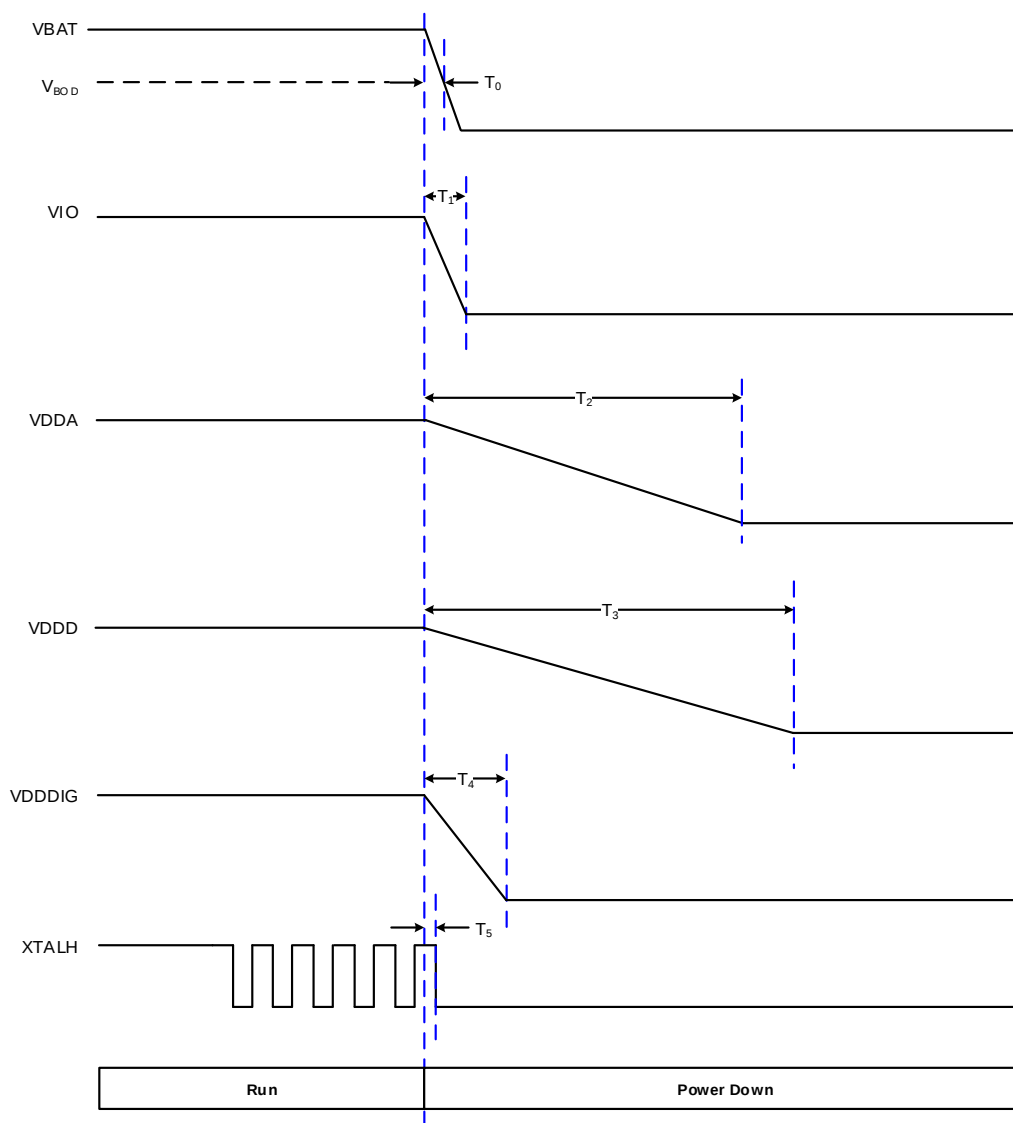
**Figure 4-2 BK7258 Power-up Sequence**

**Table 4-1 Timing Parameters of Power-up Sequence**

| Parameter   | Description                                   | Min. | Typ. | Max. | Unit    |
|-------------|-----------------------------------------------|------|------|------|---------|
| $V_{POR}$   | VBAT POR threshold                            | -    | 1.95 | -    | V       |
| $T_0$       | IO LDO settle time                            | 200  | -    | -    | $\mu s$ |
| $T_1^{(1)}$ | IO LDO ready time                             | -    | -    | 500  | $\mu s$ |
| $T_2$       | Analog buck/LDO ready time                    | -    | 240  | -    | $\mu s$ |
| $T_3$       | Digital buck/LDO ready time                   | -    | 240  | -    | $\mu s$ |
| $T_4$       | Digital core LDO ready time/XTALH stable time | 100  | -    | -    | $\mu s$ |
| $T_S$       | LDO (excl. IO LDO) settle time                | 0    | -    | -    | $\mu s$ |

(1) If the VBAT slew rate is greater than 3.3 kV/s, VIO will overshoot.

Figure 4-3 shows the power-down sequence of the BK7258.

**Figure 4-3 BK7258 Power-down Sequence**



**Table 4-2 Timing Parameters of Power-down Sequence**

| Parameter | Description                     | Min. | Typ. | Max. | Unit    |
|-----------|---------------------------------|------|------|------|---------|
| $V_{BOD}$ | VBAT BOD threshold              | -    | 1.85 | -    | V       |
| $T_0$     | VBAT power-down time            | -    | 400  | -    | $\mu$ s |
| $T_1$     | IO LDO power-down time          | -    | 600  | -    | $\mu$ s |
| $T_2$     | Analog buck/LDO power-down time | -    | 400  | -    | ms      |

| Parameter      | Description                      | Min. | Typ. | Max. | Unit |
|----------------|----------------------------------|------|------|------|------|
| T <sub>3</sub> | Digital buck/LDO power-down time | -    | 500  | -    | ms   |
| T <sub>4</sub> | Digital core LDO power-down time | -    | 3.5  | -    | ms   |
| T <sub>5</sub> | XTALH power-down time            | -    | 100  | -    | μs   |

## 4.5.2 Power Modes

The BK7258 supports three low-power modes except active mode, namely shutdown mode, deep sleep mode, and sleep mode, among which the shutdown mode has the lowest power consumption.

**Shutdown Mode:** All circuits are turned off. A high level on the CEN pin will bring the system to active mode.

**Deep Sleep Mode:** All circuits are powered down except the AON block. A GPIO event, an RTC event, or a touch sensor event can power up the system again. The retention register holds its content.

**Sleep Mode:** The MCU and all digital blocks stop their clocks. A GPIO event, an RTC event, a touch sensor event, a Wi-Fi MAC counter event, or a Bluetooth MAC counter event can bring the system back to active mode with normal voltage.

**Active Mode:** The MCU is active, and all peripherals are available.

## 4.6 General-purpose I/Os (GPIO)

The BK7258 has up to 56 GPIOs, which can be configured as either input or output. All GPIOs are shared with alternate functions. Table 3-5 Pin Multiplexing provides the mux functions of GPIOs.

The main features of GPIOs include:

- Push-pull
- Internal pull-up/down resistors
- Configurable drive strength
- Alternate function
- Interrupt generation:
  - High or low level
  - Rising or falling edge

## 4.7 SPI Interfaces (SPI)

The BK7258 integrates two SPI interfaces that can operate in master or slave mode. The SPI interfaces allow a clock frequency up to 40 MHz in both master and slave modes.

The SPI interfaces support the following features:

- 4-wire or 3-wire full-duplex synchronous communication
- Configurable 8-bit or 16-bit data width
- Programmable clock polarity and phase
- Programmable data order with MSB-first or LSB-first shifting
- Embedded 64-depth RX FIFO and 64-depth TX FIFO with DMA capability

## 4.8 Quad SPI Interfaces (QSPI)

The BK7258 embeds two Quad SPI interfaces that provide support for communicating with external flash, PSRAM, or AMOLED displays. The QSPI interfaces allow communicating up to 80 MHz.

The features of the QSPI interfaces are listed below:

- Single, dual, or quad SPI input/output
- Two functional modes: indirect mode and memory-mapped mode
- Fully programmable opcode and frame format
- Integrated RX FIFO and TX FIFO
- Supports 8, 16, and 32-bit data accesses

## 4.9 UART Interfaces (UART)

The BK7258 includes three Universal Asynchronous Receiver/Transmitter (UART) interfaces, which support full-duplex, asynchronous serial communication at a baud rate up to 6 Mbps.

The UART interfaces offer the features below:

- Configurable data length (5, 6, 7, or 8 bits)
- Even, odd, or none parity check
- Programmable stop bits (1 or 2 bits)
- Each UART embeds a 128-byte TX FIFO and a 128-byte RX FIFO. FIFO mode is disabled by default and can be enabled by software.
- Hardware flow control with RTS and CTS signals (UART0)

- Flash download (UART0)
- Programmable digital filter

## 4.10 Smart Card Controller (SC)

The Smart Card controller (SC) is a communication controller that transmits data between the superior system and the Smart Card. The controller can perform a complete smart card session, including card activation, card deactivation, cold/warm reset, Answer to Reset (ATR) response reception, data transfers, etc.

The features of the Smart Card controller (SC) are listed below:

- Supports the ISO/IEC 7816-3:2006 and EMV 4.3 specifications
- Performs functions needed for complete smart card sessions, including:
  - Card activation and deactivation
  - Cold/warm reset
  - Answer to Reset (ATR) response reception
  - Data transfers to and from the card
- Extensive interrupt support system
- Adjustable clock rate and bit (baud) rate
- Configurable automatic byte repetition
- Handles commonly used communication protocols:
  - T=0 for asynchronous half-duplex character transmission, and
  - T=1 for asynchronous half-duplex block transmission
- Automatic convention detection
- Adjustable FIFOs for Receive and Transmit buffers (64 bytes) with threshold
- Configurable timing functions:
  - Smart card activation time
  - Smart card reset time
  - Guard time
  - Timeout timers

## 4.11 SDIO Interface (SDIO)

A secure digital input/output (SDIO) host/slave interface is available on the BK7258. It can be used as a host to read external SD cards or used by an external host as a slave to communicate with chips. The SDIO interface allows a maximum clock speed of 80 MHz.

The SDIO features include the following:

- SD memory card specification version 2.0 compliant
- SDIO card specification version 2.0 compliant
- Two data bus modes: 1-bit mode (default) and 4-bit mode
- Data transfer up to 40 Mbyte/s for the host mode and 20 Mbyte/s for the slave mode
- Supports DMA capability, allowing high-speed transfer without CPU load

## 4.12 I2C Interfaces (I2C)

I2C is a popular inter-IC interface that requires only two bus lines, the serial data line (SDA) and the serial clock line (SCL). The BK7258 embeds two I2C interfaces, which can operate in master or slave mode.

The features of the I2C interfaces are listed below:

- Master and slave modes
- Standard-mode (up to 100 kbps)
- Fast-mode (up to 400 kbps)
- Fast-mode Plus (up to 1 Mbps)
- 7-bit and 10-bit addressing
- Bus idle and SCL low timeout condition detection
- Embedded 16-byte TX FIFO and 16-byte RX FIFO

## 4.13 USB Controller (USB)

The BK7258 embeds a USB high-speed (up to 480 Mbps) controller with an integrated transceiver. It can operate as a host or a device.

The USB controller features are the following:

- Compliant with the Universal Serial Bus Specification Rev 1.1 and 2.0
- Full-speed (FS) operation (up to 12 Mbps) and high-speed operation (up to 480 Mbps)
- One bidirectional control endpoint0

- Seven IN/OUT endpoints configurable to support bulk, interrupt or isochronous data transfer
- A FIFO of 8 Kbytes configurable to be allocated to 8 endpoints
- USB 2.0 Link Power Management (LPM) support

## 4.14 CAN Controller (CAN)

The BK7258 embeds a Controller Area Network (CAN) controller that uses the basic CAN principle and meets all constraints of the CAN-specification 2.0B active. Furthermore, the CAN controller can be configured to meet the specification of CAN with flexible data rate CAN FD. CAN 2.0 carries a data payload up to 8 bytes and CAN FD up to 64 bytes.

The CAN controller supports two operating modes, normal and standby, which can be selected via the CAN\_STBY pin. If a high level is applied to the CAN\_STBY pin, the external transceiver enters the standby mode.

## 4.15 LIN Controller (LIN)

The Local Interconnect Network (LIN) controller is a communication controller that performs serial communication. It implements the data link layer of the LIN Protocol Specification. The LIN protocol uses a single master/multiple slave concept for the frame transfer between nodes of the LIN network.

The LIN controller supports Sleep mode. If a low level is applied to the LIN\_SLEEP pin, the external transceiver enters the Sleep mode.

The features of the LIN controller are listed here:

- Support of LIN specification 2.2A
- Backward compatibility to LIN 1.3
- Configurable for support of master or slave functionality
- Programmable data rate between 1 kbit/s and 20 kbit/s (for master)
- Automatic bit rate detection (for slave)
- 8-byte data buffer
- 8-bit host controller interface

## 4.16 GDMA Controllers (GDMA)

The BK7258 has two general-purpose DMA controllers (GDMA) with 8 DMA channels each to unload CPU activity. The 8 channels are shared by peripherals that have DMA capabilities.

The GDMA controllers can perform single block transfers and repeated block transfers. Data width for destination and source can be configured as 8 bits (byte), 16 bits (half-word), or 32 bits (word). The GDMA controllers allow peripheral to memory, memory to memory, and memory to peripheral data transfers at a high speed.

The GDMA controllers support channel isolation. The DMA channels can be configured as secure/non-secure and as privileged/unprivileged channels:

- A non-secure channel performs non-secure DMA transfers
- A secure channel can perform secure or non-secure DMA transfers, with
  - Secure or non-secure data read from the source address
  - Secure or non-secure data write to the destination address
  - Via a TrustZone-aware DMA AHB master port
- An unprivileged channel performs unprivileged DMA transfers
- A privileged channel performs privileged DMA transfers

A selection of peripherals on the BK7258 have DMA capabilities, including UART0, UART1, UART2, SPI0, SPI1, SDIO, AUDIO, I2S0, I2S1, I2S2, JPEG encoder, DISPLAY, H.264, and DMIC.

## 4.17 DMA2D Controller (DMA2D)

The BK7258 has a specialized DMA controller (DMA2D) dedicated to image processing, offering direct memory transfer and 2D graphical acceleration without CPU intervention. It can perform the following operations:

- Filling a part or the whole of a destination image with a fixed color
- Copying a part or the whole of a source image into a part or the whole of a destination image
- Copying a part or the whole of a source image into a part or the whole of a destination image with a pixel format conversion
- Blending a part or two complete source images with a different pixel format and copying the result into a part or the whole of a destination image with a different color format

The DMA2D controller supports six operating modes:

- Register to memory
- Memory to memory
- Memory to memory with pixel format conversion
- Memory to memory with pixel format conversion and blending
- Memory to memory with pixel format conversion, blending and fixed color foreground layer
- Memory to memory with pixel format conversion, blending and fixed color background layer

Up to 12 input color modes are supported from 4-bit up to 32-bit per pixel with indexed or direct color coding. Six output color modes including RGB, ARGB, and YUV are supported. The DMA2D features dedicated memories for color lookup table (CLUT) storage.

An interrupt can be generated on the following events:

- Configuration error
- CLUT transfer completion
- CLUT access error
- Watermark on a user programmable destination line
- Transfer completion
- Transfer error

## 4.18 Rotation Module (ROTT)

The rotation module (ROTT) is capable of performing the following operations:

- Convert a YUV422 image stored in memory to a RGB565 image.
- Rotate a YUV422 or RGB565 image by 90° in either clockwise or counterclockwise direction.
- Store the converted or rotated image into the target memory.

## 4.19 Scaling Modules (SCALE)

The BK7258 has two scaling modules (SCALE) that can scale images of Y0UY1V, RGB565, or RGB888 format without changing the data format.

## 4.20 Display Controller (DISPLAY)

The TFT LCD display controller (DISPLAY) provides a 24-bit parallel digital RGB (Red, Green, Blue) and outputs all signals to interfaces of various LCD and TFT panels. It supports both RGB and Intel 8080 interfaces.

The display controller has the following features:

- Supports RGB and Intel 8080 interfaces
- RGB interface: up to 24-bit RGB parallel pixel output
- 8080 interface: up to 18-bit data output
- Three input color formats:
  - RGB888

- RGB565
  - YUV422
- Three output color formats for RGB interface:
  - RGB888
  - RGB666
  - RGB565
- Three output color formats for 8080 interface:
  - 8- or 16-bit RGB888
  - 18-bit RGB666
  - 8-bit RGB565
- RGB interface and 8080 interface share a FIFO (1K x 32-bit)
- Programmable clocks for different display panels
- Up to five programmable interrupt events
- Configurable window position and size
- AHB master interface with burst of 64 words

## 4.21 Segment LCD Controller (SLCD)

The segment LCD controller (SLCD) is a digital driver for monochrome passive-matrix liquid crystal display (LCD). The controller drives up to 8 common terminals and 32 segment terminals to drive up to 128 (4x32) or 224 (8x28) pixels. When using 4 common terminals, it supports 1/4 duty. The bias mode can be configured as 1/3 bias or 1/4 bias.

## 4.22 JPEG Encoder/Decoder

The BK7258 includes a JPEG encoder and a JPEG decoder for encoding and decoding JPEG streams. The JPEG encoder provides a small hardware compressor for JPEG images, while the decoder provides a decompression accelerator for JPEG images. Additionally, the JPEG encoder supports up to 32 programmable quantization tables.

## 4.23 CMOS Image Sensor Interface (CIS)

The CMOS Image Sensor (CIS) Digital Video Port (DVP) interface provides an 8-bit parallel interface to sensors, together with master clock (MCLK), pixel clock (PCLK), horizontal SYNC (HSYNC), and vertical SYNC (VSYNC) signals.

The input from the YUV sensor is directly fed to the hardware JPEG encoder, and the output of the JPEG encoder is directly written to the data memory by a dedicated DMA channel.

The CIS interface features include:

- 8-bit parallel interface
- Programmable polarity for pixel clock and synchronization signals
- Crop feature
- Data formats supported:
  - YCbCr 4:2:2 (YUYV, UYVY, YYUV, and UYVY)
  - RGB565

## 4.24 H.264 Encoder (H.264)

The H.264 video encoder allows fast and simple video compression. It performs the H.264 video compression algorithm on an incoming video stream. The encoded bitstream can be decoded by a Baseline, Mainprofile decoder. The input is raster 4:2:0 YUV video data. This data is compressed into H.264-compliant byte stream NAL units.

The H.264 supports the following features:

- Fully compatible with the ITU-T H.264 specification
- Level 1 to 4.1, encoded stream can be decoded by Baseline, Main profile decoder
- Supports up to 720p (1280x720 @ 30 fps)
- Constant Bit Rate and partial Variable Bit Rate mode support
- Motion vector up to  $-16.00/+15.75$  pixels (search area is 32x32 pixels wide down to quarter pixel)
- Support for all intra16x16 and all but two of intra4x4 prediction modes
- Block skipping logic for lower bitrate
- Supports picture cropping for image sizes that are not a multiple of 16 pixels
- Supports Chroma Quantization Parameter offset for increased compression
- Requires no external memory by using Compressed framestore (CFS) for reference frame storage

## 4.25 Ethernet MAC Interface (ENET)

The BK7258 provides a media access controller (MAC) for Ethernet LAN communications through a reduced medium-independent interface (RMII). The Ethernet MAC interface (ENET) is compliant with the IEEE 802.3-2015 specification and can be used in applications such as network interface cards, and data center bridges and nodes. The BK7258 requires an external physical interface device (PHY) to connect to the physical LAN bus. The PHY is connected to the device RMII port using 9 signals, and can be clocked using the 25 MHz from BK7258 or 25/50 MHz from an external crystal oscillator.

The ENET includes the following features:

- 10 and 100 Mbps data transfer rates
- Half-duplex (CSMA/CD) and full-duplex operation
- 32-bit CRC generation and removal
- Tagged MAC frame support (VLAN support)
- Dedicated DMA controller allowing high-speed transfers between the system memory and the internal FIFOs
- Embedded TX FIFO and RX FIFO to buffer transmit and receive frames. Both FIFOs are 2 Kbytes.
- MAC control sublayer (control frames) support
- Different types of address filtering for physical and multicast address (multicast and group addresses)
- 32-bit status code for each transmitted or received frame
- Supports hardware PTP (precision time protocol) in accordance with IEEE 1588-2008 (version 2)
- Triggers interrupt when system time becomes greater than target time

## 4.26 PWM Groups (PWMG)

The BK7258 has two advanced-control PWM groups (PWMG). Each PWMG consists of four independent 32-bit auto-reload counters driven by four programmable prescalers. The PWMGs can generate pulse width modulated signals for a variety of purposes, including input capture, pulse edge counting, or generation of output waveforms (output compare).

The features of one PWMG are listed here:

- Four 32-bit up, down, or up-and-down auto-reload counters:
  - PWM0 has a counter.
  - PWM1 has a counter (up-counting mode only).
  - PWM2 and PWM3 share a counter.
  - PWM4 and PWM5 share a counter.

- Four 8-bit programmable prescalers capable of dividing the clock frequency of each counter by any factor between 1 and 256
- Four independent channels, among which:
  - PWM0/2/4
    - Input capture
    - Pulse edge counting
    - PWM generation (edge or center-aligned mode)
  - PWM1
    - Independent simple waveform generation (up-counting mode)
    - Coupled waveform (reverse or identical) generation when coupled with PWM0
- Two channels PWM3/5 capable of generating coupled waveforms (reverse or identical) when coupled with PWM2/4 respectively
- Complementary outputs with programmable dead-time and configurable dead-time mode
- Synchronization circuit to control the counter with external signals and to interconnect several counters together
- Repetition counter to update the registers only after a given number of cycles of the counter
- Interrupt generation on the following events:
  - Update: counter overflow or underflow, counter initialization (by software or internal/external trigger)
  - Counter start
  - Input capture
  - Output compare
- Change of polarity, duty cycle, and base frequency on every PWM period
- Supports incremental (quadrature) encoder and Hall-sensor circuitry for positioning purposes

Table 4-3 below provides the description of PWM signals.

**Table 4-3 PWM Signals**

| GPIO         | PWM Pin Name | Signal Type | Description                                                                                                                                                                         |
|--------------|--------------|-------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>PWMG0</b> |              |             |                                                                                                                                                                                     |
| GPIO6/GPIO18 | PWMG0_PWM0   | I/O         | PWM0 channel of PWMG0                                                                                                                                                               |
| GPIO7/GPIO19 | PWMG0_PWM1   | I/O         | PWM1 channel of PWMG0<br>PWM1 can work independently to generate simple waveforms or couple with PWM0 (with deadtime insertion) to generate reverse or identical waveforms of PWM0. |

| GPIO         | PWM Pin Name | Signal Type | Description                                                                                                                                                                         |
|--------------|--------------|-------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| GPIO8/GPIO22 | PWMG0_PWM2   | I/O         | PWM2 <sup>(1)</sup> channel of PWMG0                                                                                                                                                |
| GPIO9/GPIO23 | PWMG0_PWM3   | I/O         | PWM3 <sup>(1)</sup> channel of PWMG0<br>PWM3 can couple with PWM2 (with deadtime insertion) to generate reverse or identical waveforms of PWM2.                                     |
| GPIO24       | PWMG0_PWM4   | I/O         | PWM4 <sup>(2)</sup> channel of PWMG0                                                                                                                                                |
| GPIO25       | PWMG0_PWM5   | I/O         | PWM5 <sup>(2)</sup> channel of PWMG0<br>PWM5 can couple with PWM4 (with deadtime insertion) to generate reverse or identical waveforms of PWM4.                                     |
| <b>PWMG1</b> |              |             |                                                                                                                                                                                     |
| GPIO32       | PWMG1_PWM0   | I/O         | PWM0 channel of PWMG1                                                                                                                                                               |
| GPIO33       | PWMG1_PWM1   | I/O         | PWM1 channel of PWMG1<br>PWM1 can work independently to generate simple waveforms or couple with PWM0 (with deadtime insertion) to generate reverse or identical waveforms of PWM0. |
| GPIO34       | PWMG1_PWM2   | I/O         | PWM2 <sup>(1)</sup> channel of PWMG1                                                                                                                                                |
| GPIO35       | PWMG1_PWM3   | I/O         | PWM3 <sup>(1)</sup> channel of PWMG1<br>PWM3 can couple with PWM2 (with deadtime insertion) to generate reverse or identical waveforms of PWM2.                                     |
| GPIO36       | PWMG1_PWM4   | I/O         | PWM4 <sup>(2)</sup> channel of PWMG1                                                                                                                                                |
| GPIO37       | PWMG1_PWM5   | I/O         | PWM5 <sup>(2)</sup> channel of PWMG1<br>PWM5 can couple with PWM4 (with deadtime insertion) to generate reverse or identical waveforms of PWM4.                                     |

(1) When PWM2 and PWM3 are enabled simultaneously, they cannot generate waveforms with different duty cycles.

(2) When PWM4 and PWM5 are enabled simultaneously, they cannot generate waveforms with different duty cycles.

## 4.27 I2S Interfaces (I2S)

The BK7258 integrates three I2S interfaces that support master and slave modes with sampling rates from 8 kHz to 384 kHz. The I2S interfaces support both PCM mono channel mode and I2S stereo channel mode.

Listed here are the I2S features:

- Master or slave mode

- Full duplex or half-duplex communication
- Various sampling rates
- 12-bit programmable prescaler
- Multiple I2S protocols supported:
  - I2S Philips standard
  - MSB-Justified standard (Left-Justified)
  - LSB-Justified standard (Right-Justified)
  - PCM standard
- Programmable data order with LSB first or MSB first
- Programmable data width between 1 and 32 bits
- Programmable clock polarity
- Integrated 32-bit RX FIFO and 32-bit TX FIFO, both with a depth of 32 x 3 channels
- Master clock can be output to drive external audio devices.

## 4.28 Audio Peripherals

The BK7258 comes with a rich set of audio peripherals to enhance the listening experience. The chip includes a four-band digital equalizer, two analog-to-digital converters (ADC), a digital-to-analog converter (DAC), two microphone input amplifiers and a bias generator, an audio amplifier, a DMIC interface, an SBC decoder accelerator, etc.

### 4.28.1 Four-band Digital Equalizer (EQ)

A dedicated four-band digital equalizer is implemented prior to digital-to-analog conversion, allowing the user to customize the frequency response of the audio output. The equalizer is implemented in hardware to reduce overall chip power consumption.

### 4.28.2 Audio ADCs and DAC

The BK7258 contains two 16-bit ADCs with sampling rates of 8 kHz, 16 kHz, 44.1 kHz, or 48 kHz. The chip also integrates a 16-bit DAC with sampling rates of 8 kHz, 16 kHz, 44.1 kHz, or 48 kHz.

### 4.28.3 Microphone Input Amplifiers and Bias Generator

The BK7258 contains two fully differential analog microphone input amplifiers and a low-noise microphone bias generator, allowing the microphone to interface with passive resistors and capacitors.

The microphone signal can be amplified with the amplifier over a 0 to 32 dB gain range with a 2 dB step size.

### 4.28.4 Audio Amplifier

The BK7258 provides a high-quality audio amplifier capable of driving a 16  $\Omega$  speaker with load capacitance up to 30 pF.

### 4.28.5 Digital Microphone Interface (DMIC)

The BK7258 has a digital microphone interface that supports two digital microphones. The PDM performs 8:1 CIC decimation, and the PCM sampling rate can be up to 384 kHz when the PDM clock frequency is 3.072 MHz.

## 4.29 Auxiliary ADC (AUX ADC)

The auxiliary ADC (AUX ADC) is a 12-bit successive approximation analog-to-digital converter. The AUX ADC has multiple external analog input channels and internal dedicated channels. The AUX ADC supports A/D conversion performed in one-shot, software control, or continuous mode.

The AUX ADC module has the following features:

- Programmable sampling rate from 12.5 kHz to 812.5 kHz
- 12-bit resolution
- Up to 11 external analog input channels: ADC1/2/3/4/5/6/10/12/13/14/15
- Five internal dedicated channels:
  - VBAT monitoring channel (VBAT/2, VBAT/3, VBAT/5, or VBAT/7), connected to ADC0
  - Internal temperature sensor (TEMP), connected to ADC7
  - TSSIO, connected to ADC8
  - Touch OUT\_TD, connected to ADC9
  - Internal debug channel, connected to ADC11
- Conversion modes:
  - One-shot mode
  - Software control mode

- Continuous mode

## 4.30 Timer Groups (TIMG)

The BK7258 includes two general-purpose timer groups (TIMG). Each group has three 32-bit timers. Each group consists of three 32-bit counters driven by a 4-bit prescaler.

Each TIMG module has the following features:

- Three timers (Timer0/1/2)
- Three 32-bit up counters
- 4-bit prescaler, division factor between 1 and 16
- Capable of reading the real-time value of the counter

## 4.31 Watchdog Timers (WDT)

The BK7258 has two watchdog timers, the digital power domain watchdog timer (DWDT) and the AON power domain watchdog timer (AWDT). The purpose of the watchdog timers is to detect and recover from failures or malfunctions. The watchdog timers trigger a reset on expiry of a specified time period.

The DWDT runs on the 32 kHz LPO\_CLK clock (division factor 2/4/8/16) and has a maximum programmable period of up to 32.768 ( $2^{16}/2$  kHz) seconds. The AWDT runs on the ROSC and has a maximum programmable period of up to 65.536 ( $2^{16}/1$  kHz) seconds.

## 4.32 Real-time Counter (RTC)

The real-time counter (RTC) module features a 64-bit counter and a tick event generator. The RTC runs on the 32 kHz LPO\_CLK clock. It is used for low-power timing, and it can keep running even when the system is in deep sleep mode.

## 4.33 IrDA Interface (IRDA)

The BK7258 embeds a hardware IrDA interface that supports waveform analysis and waveform generation. It monitors the start of infrared signals, records the sequence of infrared waveforms, stores the waveforms in the RX FIFO for software analysis, and writes the waveforms to be sent to the TX FIFO when sending, thereby enabling the analysis and transmission of any infrared protocol.

The IrDA has the following features:

- Single-duplex mode
- Carrier modulation for transmission
- Integrated 512-byte RX FIFO and 512-byte TX FIFO

## 4.34 Temperature Sensor

The BK7258 integrates an on-chip temperature sensor that can measure on-chip temperature over -40 to +125 °C with an accuracy of  $\pm 5$  °C. The digital results can be read from the AUX ADC.

Usually, the software initiates the calibration of a specific module based on the temperature value, narrowing the difference in chip performance at different temperatures. The host can also read the on-chip temperature and decide whether to reduce transmit power or suspend operation at high temperatures.

## 4.35 Touch Sensor (TOUCH)

The BK7258 has up to 16 capacitive sensing I/Os, which immediately detect capacitance changes induced by touch or proximity of objects.

## 5. Electrical Characteristics

### 5.1 Absolute Maximum Ratings

Stresses beyond those listed under *Absolute Maximum Ratings* may cause permanent damage to the device. Exposure to absolute-maximum-rated conditions for prolonged periods may affect the reliability of the device.

| Parameter        | Description                        | Min. | Max. | Unit |
|------------------|------------------------------------|------|------|------|
| VBAT             | Chip power supply voltage          | -0.3 | 4.35 | V    |
| VIO              | IO LDO output voltage              | -0.3 | 4.0  | V    |
| VCCPA            | Supply voltage for PA              | -0.3 | 4.0  | V    |
| VCCPAD           | Supply voltage for PA driver       | -0.3 | 4.0  | V    |
| VCCIF            | Supply voltage for IF              | -0.3 | 1.8  | V    |
| VCCRXFE          | Supply voltage for RX              | -0.3 | 1.8  | V    |
| VCCPLL           | Supply voltage for RF PLL          | -0.3 | 1.8  | V    |
| VCCA             | Supply voltage for analog          | -0.3 | 1.8  | V    |
| VDD_BT           | Bluetooth LDO output voltage       | -0.3 | 1.2  | V    |
| VDDA             | Analog LDO output voltage          | -0.3 | 1.8  | V    |
|                  | Analog buck output voltage         | -0.3 | 1.8  | V    |
| VDDD             | Digital LDO output voltage         | -0.3 | 1.2  | V    |
|                  | Digital buck output voltage        | -0.3 | 1.2  | V    |
| VDDDIG           | Digital core LDO output voltage    | -0.3 | 1.1  | V    |
| VDDGPIO          | Supply voltage for GPIOs           | -0.3 | 4.0  | V    |
| VDDRAM           | EXMEM LDO output voltage           | -0.3 | 2.1  | V    |
| SWA              | Analog buck switch output voltage  | -0.3 | 4.35 | V    |
| SWD              | Digital buck switch output voltage | -0.3 | 4.35 | V    |
| MICBIAS          | Microphone bias output voltage     | -0.3 | 4.0  | V    |
| P <sub>RX</sub>  | RX input power                     | -    | 10   | dBm  |
| T <sub>STR</sub> | Storage temperature range          | -55  | 150  | °C   |

## 5.2 ESD Ratings

| Parameter | Description                                                                       | Test Condition | Value | Unit |
|-----------|-----------------------------------------------------------------------------------|----------------|-------|------|
| ESD HBM   | Electrostatic discharge voltage (human body model), per ANSI/ESDA/JEDEC JS-001    | -              | ±3000 | V    |
| ESD CDM   | Electrostatic discharge voltage (charge device model), per ANSI/ESDA/JEDEC JS-002 | -              | ±500  | V    |

## 5.3 Recommended Operating Conditions

| Parameter             | Description                     | Min. <sup>(1)</sup> | Typ.  | Max. | Unit  |
|-----------------------|---------------------------------|---------------------|-------|------|-------|
| VBAT <sup>(2)</sup>   | Chip power supply voltage       | 2.5                 | 3.3   | 4.35 | V     |
| VBAT slew rate        | -                               | 300                 | -     | -    | mV/ms |
| VIO                   | IO LDO output voltage           | 2.5                 | -     | 3.6  | V     |
| VCCPA <sup>(2)</sup>  | Supply voltage for PA           | 2.5                 | -     | 3.6  | V     |
| VCCPAD <sup>(2)</sup> | Supply voltage for PA driver    | 2.5                 | -     | 3.6  | V     |
| VCCIF                 | Supply voltage for IF           | -                   | 1.45  | -    | V     |
| VCCRXFE               | Supply voltage for RX           | -                   | 1.45  | -    | V     |
| VCCPLL                | Supply voltage for RF PLL       | -                   | 1.45  | -    | V     |
| VCCA                  | Supply voltage for analog       | -                   | 1.45  | -    | V     |
| VDD_BT                | Bluetooth LDO output voltage    | 0.9                 | -     | 1.1  | V     |
| VDDA                  | Analog LDO output voltage       | -                   | 1.45  | -    | V     |
|                       | Analog buck output voltage      | -                   | 1.5   | -    | V     |
| VDDD                  | Digital LDO output voltage      | -                   | 1.0   | -    | V     |
|                       | Digital buck output voltage     | -                   | 1.05  | -    | V     |
| VDDDIG                | Digital core LDO output voltage | -                   | 0.875 | -    | V     |
| VDDGPIO               | Supply voltage for GPIOs        | 2.5                 | -     | 3.6  | V     |
| VDDRAM                | EXMEM LDO output voltage        | 1.8                 | -     | 1.95 | V     |
| MICBIAS               | Microphone bias output voltage  | 1.8                 | -     | 2.4  | V     |
| T <sub>OPR</sub>      | Operating temperature range     | -40                 | -     | 85   | °C    |

| Parameter | Description | Min. <sup>(1)</sup> | Typ. | Max. | Unit |
|-----------|-------------|---------------------|------|------|------|
|-----------|-------------|---------------------|------|------|------|

- (1) The minimum voltage specified includes the ripple on the supply voltage and all other transient dips. Care must be taken when operating at the minimum specified voltage.
- (2) To ensure WLAN performance, the ripple on the supply must be less than  $V_{pp} = 100$  mV.

## 5.4 Digital I/O Characteristics

| Symbol | Parameter                 | Conditions                           | Min.    | Typ. | Max.      | Unit |
|--------|---------------------------|--------------------------------------|---------|------|-----------|------|
| VIH    | High-level input voltage  | -                                    | 0.7 VIO | -    | VIO + 0.3 | V    |
| VIL    | Low-level input voltage   | -                                    | -0.3    | -    | 0.3 VIO   | V    |
| VOH    | High-level output voltage | -                                    | 0.8 VIO | -    | -         | V    |
| VOL    | Low-level output voltage  | -                                    | -       | -    | 0.1 VIO   | V    |
| IOH    | High-level source current | VOH = 0.8 VIO,<br>GPIO_CAPACITY = 3  | -       | 40   | -         | mA   |
|        |                           | VOH = 0.8 VIO,<br>GPIO_CAPACITY = 2  | -       | 30   | -         | mA   |
|        |                           | VOH = 0.8 VIO,<br>GPIO_CAPACITY = 1  | -       | 18   | -         | mA   |
|        |                           | VOH = 0.8 VIO,<br>GPIO_CAPACITY = 0  | -       | 10   | -         | mA   |
| IOL    | Low-level sink current    | VOH = 0.15 VIO,<br>GPIO_CAPACITY = 3 | -       | 36   | -         | mA   |
|        |                           | VOH = 0.15 VIO,<br>GPIO_CAPACITY = 2 | -       | 29   | -         | mA   |
|        |                           | VOH = 0.15 VIO,<br>GPIO_CAPACITY = 1 | -       | 16   | -         | mA   |
|        |                           | VOH = 0.15 VIO,<br>GPIO_CAPACITY = 0 | -       | 8    | -         | mA   |
| RPU    | Weak pull-up resistor     | -                                    | -       | 40   | -         | kΩ   |
| RPD    | Weak pull-down resistor   | -                                    | -       | 44   | -         | kΩ   |

## 5.5 IO LDO

| Parameter | Description           | Min. | Typ. | Max. | Unit |
|-----------|-----------------------|------|------|------|------|
| VIO       | IO LDO output voltage | 2.5  | 3.3  | 3.6  | V    |

| Parameter    | Description | Min. | Typ. | Max. | Unit |
|--------------|-------------|------|------|------|------|
| Load current | -           | -    | -    | 500  | mA   |

## 5.6 Analog LDO

| Parameter    | Description               | Min. | Typ. | Max. | Unit |
|--------------|---------------------------|------|------|------|------|
| VDDA         | Analog LDO output voltage | -    | 1.45 | -    | V    |
| Load current | -                         | -    | -    | 150  | mA   |

## 5.7 Digital LDO

| Parameter    | Description                | Min. | Typ. | Max. | Unit |
|--------------|----------------------------|------|------|------|------|
| VDDD         | Digital LDO output voltage | -    | 1.0  | -    | V    |
| Load current | -                          | -    | -    | 100  | mA   |

## 5.8 Core LDO

| Parameter    | Description                     | Min. | Typ.  | Max. | Unit |
|--------------|---------------------------------|------|-------|------|------|
| VDDDIG       | Digital core LDO output voltage | -    | 0.875 | -    | V    |
| Load current | -                               | -    | -     | 100  | mA   |

## 5.9 EXMEM LDO

| Parameter    | Description              | Min. | Typ. | Max. | Unit |
|--------------|--------------------------|------|------|------|------|
| VDDRAM       | EXMEM LDO output voltage | 1.8  | -    | 1.95 | V    |
| Load current | -                        | -    | -    | 50   | mA   |

## 5.10 Analog Buck

| Parameter | Description                | Min. | Typ. | Max. | Unit |
|-----------|----------------------------|------|------|------|------|
| VDDA      | Analog buck output voltage | -    | 1.5  | -    | V    |

| Parameter                           | Description               | Min. | Typ. | Max. | Unit |
|-------------------------------------|---------------------------|------|------|------|------|
| Load current                        | -                         | -    | -    | 150  | mA   |
| Switching frequency                 | Buck modulation frequency | 0.5  | 1    | 2    | MHz  |
| Output filter capacitor capacitance | -                         | -    | 4.7  | -    | μF   |
| Inductor inductance                 | -                         | -    | 4.7  | -    | μH   |
| Inductor DC resistance              | -                         | -    | -    | 500  | mΩ   |
| Inductor saturation current         | -                         | 200  | -    | -    | mA   |

## 5.11 Digital Buck

| Parameter                           | Description                 | Min. | Typ. | Max. | Unit |
|-------------------------------------|-----------------------------|------|------|------|------|
| VDDD                                | Digital buck output voltage | -    | 1.05 | -    | V    |
| Load current                        | -                           | -    | -    | 100  | mA   |
| Switching frequency                 | Buck modulation frequency   | 0.5  | 1    | 2    | MHz  |
| Output filter capacitor capacitance | -                           | -    | 4.7  | -    | μF   |
| Inductor inductance                 | -                           | -    | 4.7  | -    | μH   |
| Inductor DC resistance              | -                           | -    | -    | 500  | mΩ   |
| Inductor saturation current         | -                           | 200  | -    | -    | mA   |

## 5.12 26 MHz Crystal Characteristics

| Symbol | Parameter                                      | Conditions            | Min. | Typ. | Max. | Unit |
|--------|------------------------------------------------|-----------------------|------|------|------|------|
| F0     | Nominal frequency                              | -                     | -    | 26   | -    | MHz  |
| ΔF/F0  | Frequency tolerance                            | 25 °C                 | -10  | -    | +10  | ppm  |
| TC     | Frequency stability over operating temperature | -40 to 105 °C crystal | -20  | -    | +20  | ppm  |
|        |                                                | -30 to 85 °C crystal  | -10  | -    | +10  | ppm  |
| CL     | Load capacitance                               | -                     | 7    | 7.3  | 12   | pF   |

| Symbol | Parameter        | Conditions            | Min. | Typ. | Max. | Unit   |
|--------|------------------|-----------------------|------|------|------|--------|
| TS     | Trim sensitivity | -40 to 105 °C crystal | -    | 32   | -    | ppm/pF |
|        |                  | -30 to 85 °C crystal  | -    | 17   | -    | ppm/pF |

## 5.13 32.768 kHz Crystal Characteristics

| Symbol           | Parameter                    | Conditions | Min. | Typ.   | Max. | Unit       |
|------------------|------------------------------|------------|------|--------|------|------------|
| F0               | Nominal frequency            | -          | -    | 32.768 | -    | kHz        |
| $\Delta F/F0$    | Frequency tolerance          | 25 °C      | -20  | -      | +20  | ppm        |
| T <sub>OPR</sub> | Operating temperature range  | -          | -40  | -      | 85   | °C         |
| CL               | Load capacitance             | -          | -    | 12.5   | -    | pF         |
| ESR              | Equivalent series resistance | 25 °C      | -    | -      | 70   | k $\Omega$ |

## 5.14 Current Consumption

Measured with T = 25 °C, VBAT = 3.3 V unless otherwise stated.

| Parameter                | Condition                  | Min. | Typ. | Max. | Unit |
|--------------------------|----------------------------|------|------|------|------|
| <b>Wi-Fi Active Mode</b> |                            |      |      |      |      |
| RX current               | 11b: 11 Mbps DSSS          | -    | 17.5 | -    | mA   |
|                          | 11g: 54 Mbps OFDM          | -    | 17.5 | -    | mA   |
|                          | 11n: MCS7, HT20            | -    | 17.5 | -    | mA   |
|                          | 11n: MCS7, HT40            | -    | 18.5 | -    | mA   |
|                          | 11ax: MCS7, HE20           | -    | 17.5 | -    | mA   |
| TX current               | 11b: 11 Mbps DSSS @ 19 dBm | -    | 235  | -    | mA   |
|                          | 11g: 54 Mbps OFDM @ 17 dBm | -    | 200  | -    | mA   |
|                          | 11n: MCS7, HT20 @ 16 dBm   | -    | 189  | -    | mA   |
|                          | 11n: MCS7, HT40 @15 dBm    | -    | 182  | -    | mA   |
|                          | 11ax: MCS7, HE20 @ 16 dBm  | -    | 188  | -    | mA   |

| Parameter                                                                        | Condition        | Min. | Typ. | Max. | Unit |
|----------------------------------------------------------------------------------|------------------|------|------|------|------|
| <b>Bluetooth Active Mode</b>                                                     |                  |      |      |      |      |
| For BK7258QN88617 and BK7258QN6868 only, dedicated Bluetooth transceiver enabled |                  |      |      |      |      |
| Bluetooth LE RX current                                                          | -                | -    | 12   | -    | mA   |
| Bluetooth LE TX current                                                          | 2 dBm            | -    | 19   | -    | mA   |
| Bluetooth LE advertising                                                         | Interval: 2 s    | -    | 61   | -    | μA   |
| Bluetooth LE connection slave                                                    | Interval: 1 s    | -    | 76   | -    | μA   |
| Classic Bluetooth A2DP music streaming                                           | -                | -    | 13   | -    | mA   |
| <b>Bluetooth Sniff Mode</b>                                                      |                  |      |      |      |      |
| For BK7258QN88617 and BK7258QN6868 only, dedicated Bluetooth transceiver enabled |                  |      |      |      |      |
| Classic Bluetooth sniff                                                          | Interval: 500 ms | -    | 137  | -    | μA   |
| <b>Sleep Mode</b>                                                                |                  |      |      |      |      |
| Sleep                                                                            | -                | -    | 43   | -    | μA   |
| Deep sleep                                                                       | -                | -    | 16   | -    | μA   |
| <b>Shutdown Mode</b>                                                             |                  |      |      |      |      |
| Shutdown                                                                         | -                | -    | 2.5  | -    | μA   |

## 5.15 WLAN RF Receiver Characteristics

Measured with T = 25 °C, VBAT = 3.3 V unless otherwise stated.

| Parameter                                                  | Condition     | Min. | Typ.  | Max. | Unit |
|------------------------------------------------------------|---------------|------|-------|------|------|
| <b>General</b>                                             |               |      |       |      |      |
| Frequency range                                            | -             | 2412 | -     | 2484 | MHz  |
| <b>Sensitivity</b>                                         |               |      |       |      |      |
| Sensitivity - IEEE 802.11b<br>(8% PER for 1024 octet PSDU) | 1 Mbps DSSS   | -    | -98   | -    | dBm  |
|                                                            | 2 Mbps DSSS   | -    | -94.5 | -    | dBm  |
|                                                            | 5.5 Mbps DSSS | -    | -92   | -    | dBm  |
|                                                            | 11 Mbps DSSS  | -    | -89   | -    | dBm  |

| Parameter                                                                        | Condition    | Min. | Typ.  | Max. | Unit |
|----------------------------------------------------------------------------------|--------------|------|-------|------|------|
| Sensitivity - IEEE 802.11g<br>(10% PER for 1000 octet PSDU)                      | 6 Mbps OFDM  | -    | -92   | -    | dBm  |
|                                                                                  | 9 Mbps OFDM  | -    | -91.5 | -    | dBm  |
|                                                                                  | 12 Mbps OFDM | -    | -90.5 | -    | dBm  |
|                                                                                  | 18 Mbps OFDM | -    | -88   | -    | dBm  |
|                                                                                  | 24 Mbps OFDM | -    | -85   | -    | dBm  |
|                                                                                  | 36 Mbps OFDM | -    | -82   | -    | dBm  |
|                                                                                  | 48 Mbps OFDM | -    | -77.5 | -    | dBm  |
|                                                                                  | 54 Mbps OFDM | -    | -76.5 | -    | dBm  |
| Sensitivity - IEEE 802.11n,<br>20 MHz<br>(10% PER for 4096 octet PSDU,<br>LDPC)  | HT20, MCS0   | -    | -92   | -    | dBm  |
|                                                                                  | HT20, MCS1   | -    | -91   | -    | dBm  |
|                                                                                  | HT20, MCS2   | -    | -88   | -    | dBm  |
|                                                                                  | HT20, MCS3   | -    | -86   | -    | dBm  |
|                                                                                  | HT20, MCS4   | -    | -82   | -    | dBm  |
|                                                                                  | HT20, MCS5   | -    | -78   | -    | dBm  |
|                                                                                  | HT20, MCS6   | -    | -76.5 | -    | dBm  |
|                                                                                  | HT20, MCS7   | -    | -75   | -    | dBm  |
| Sensitivity - IEEE 802.11n,<br>40 MHz<br>(10% PER for 4096 octet PSDU,<br>LDPC)  | HT40, MCS0   | -    | -87.5 | -    | dBm  |
|                                                                                  | HT40, MCS1   | -    | -87   | -    | dBm  |
|                                                                                  | HT40, MCS2   | -    | -85   | -    | dBm  |
|                                                                                  | HT40, MCS3   | -    | -82.5 | -    | dBm  |
|                                                                                  | HT40, MCS4   | -    | -79   | -    | dBm  |
|                                                                                  | HT40, MCS5   | -    | -75   | -    | dBm  |
|                                                                                  | HT40, MCS6   | -    | -74   | -    | dBm  |
|                                                                                  | HT40, MCS7   | -    | -71.5 | -    | dBm  |
| Sensitivity - IEEE 802.11ax,<br>20 MHz<br>(10% PER for 4096 octet PSDU,<br>LDPC) | HE20, MCS0   | -    | -92   | -    | dBm  |
|                                                                                  | HE20, MCS1   | -    | -90.5 | -    | dBm  |
|                                                                                  | HE20, MCS2   | -    | -87.5 | -    | dBm  |
|                                                                                  | HE20, MCS3   | -    | -85   | -    | dBm  |

| Parameter                                                                                                                                              | Condition                                  | Min.    | Typ.  | Max. | Unit |
|--------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|---------|-------|------|------|
|                                                                                                                                                        | HE20, MCS4                                 | -       | -81   | -    | dBm  |
|                                                                                                                                                        | HE20, MCS5                                 | -       | -77.5 | -    | dBm  |
|                                                                                                                                                        | HE20, MCS6                                 | -       | -75.5 | -    | dBm  |
|                                                                                                                                                        | HE20, MCS7                                 | -       | -74   | -    | dBm  |
| Sensitivity - IEEE 802.11ax,<br>40 MHz<br>(10% PER for 4096 octet PSDU,<br>LDPC)                                                                       | HE40, MCS0                                 | -       | -88.5 | -    | dBm  |
|                                                                                                                                                        | HE40, MCS1                                 | -       | -87.5 | -    | dBm  |
|                                                                                                                                                        | HE40, MCS2                                 | -       | -85.5 | -    | dBm  |
|                                                                                                                                                        | HE40, MCS3                                 | -       | -82   | -    | dBm  |
|                                                                                                                                                        | HE40, MCS4                                 | -       | -77   | -    | dBm  |
|                                                                                                                                                        | HE40, MCS5                                 | -       | -75   | -    | dBm  |
|                                                                                                                                                        | HE40, MCS6                                 | -       | -74   | -    | dBm  |
|                                                                                                                                                        | HE40, MCS7                                 | -       | -72   | -    | dBm  |
| <b>Maximum Receive Level</b>                                                                                                                           |                                            |         |       |      |      |
| Maximum receive level @<br>2.4 GHz                                                                                                                     | 11b: 1, 2 Mbps (8% PER,<br>1024 octets)    | -       | 10    | -    | dBm  |
|                                                                                                                                                        | 11b: 5.5, 11 Mbps (8% PER,<br>1024 octets) | -       | 10    | -    | dBm  |
|                                                                                                                                                        | 11g: 6–54 Mbps (10% PER,<br>1000 octets)   | -       | 0     | -    | dBm  |
|                                                                                                                                                        | 11n: MCS0–7 (10% PER,<br>4096 octets)      | -       | 0     | -    | dBm  |
|                                                                                                                                                        | 11ax: MCS0–7 (10% PER,<br>4096 octets)     | -       | 0     | -    | dBm  |
| <b>Adjacent Channel Rejection</b>                                                                                                                      |                                            |         |       |      |      |
| Adjacent channel ( $\pm 30$ MHz)<br>rejection - IEEE 802.11b<br>(8% PER for 1024 octet PSDU<br>with desired signal level as<br>specified in Condition) | 1 Mbps DSSS                                | -74 dBm | -     | 50   | dB   |
|                                                                                                                                                        | 2 Mbps DSSS                                | -74 dBm | -     | 45   | dB   |
| Adjacent channel ( $\pm 25$ MHz)<br>rejection - IEEE 802.11b                                                                                           | 5.5 Mbps<br>DSSS                           | -70 dBm | -     | 43   | dB   |

| Parameter                                                                         | Condition    |         | Min. | Typ. | Max. | Unit |
|-----------------------------------------------------------------------------------|--------------|---------|------|------|------|------|
| (8% PER for 1024 octet PSDU with desired signal level as specified in Condition)  | 11 Mbps DSSS | -70 dBm | -    | 40   | -    | dB   |
| Adjacent channel ( $\pm 25$ MHz) rejection - IEEE 802.11g                         | 6 Mbps OFDM  | -79 dBm | -    | 43   | -    | dB   |
| (10% PER for 1000 octet PSDU with desired signal level as specified in Condition) | 54 Mbps OFDM | -62 dBm | -    | 27   | -    | dB   |
| Adjacent channel ( $\pm 25$ MHz) rejection - IEEE 802.11n                         | HT20, MCS0   | -79 dBm | -    | 43   | -    | dB   |
| (10% PER for 4096 octet PSDU with desired signal level as specified in Condition) | HT20, MCS7   | -61 dBm | -    | 21   | -    | dB   |
| Adjacent channel ( $\pm 40$ MHz) rejection - IEEE 802.11n                         | HT40, MCS0   | -76 dBm | -    | 34   | -    | dB   |
| (10% PER for 4096 octet PSDU with desired signal level as specified in Condition) | HT40, MCS7   | -58 dBm | -    | 25   | -    | dB   |
| Adjacent channel ( $\pm 20$ MHz) rejection - IEEE 802.11ax                        | HE20, MCS0   | -79 dBm | -    | 43   | -    | dB   |
| (10% PER for 4096 octet PSDU with desired signal level as specified in Condition) | HE20, MCS7   | -61 dBm | -    | 26   | -    | dB   |
| Adjacent channel ( $\pm 40$ MHz) rejection - IEEE 802.11ax                        | HE40, MCS0   | -76 dBm | -    | 32   | -    | dB   |
| (10% PER for 4096 octet PSDU with desired signal level as specified in Condition) | HE40, MCS7   | -58 dBm | -    | 27   | -    | dB   |
| <b>Spurious Emissions</b>                                                         |              |         |      |      |      |      |
| Spurious emissions                                                                | < 1 GHz      |         | -    | -60  | -    | dBm  |
|                                                                                   | > 1 GHz      |         | -    | -50  | -    | dBm  |

## 5.16 WLAN RF Transmitter Characteristics

Measured with T = 25 °C, VBAT = 3.3 V unless otherwise stated.

| Parameter                                       | Condition    | Min. | Typ. | Max. | Unit |
|-------------------------------------------------|--------------|------|------|------|------|
| <b>General</b>                                  |              |      |      |      |      |
| Frequency range                                 | -            | 2412 | -    | 2484 | MHz  |
| <b>TX Power</b>                                 |              |      |      |      |      |
| TX power - IEEE 802.11b<br>(SEM compliant)      | 1 Mbps DSSS  | -    | 20   | -    | dBm  |
|                                                 | 11 Mbps DSSS | -    | 20   | -    | dBm  |
| TX power - IEEE 802.11g<br>(EVM compliant)      | 6 Mbps OFDM  | -    | 18   | -    | dBm  |
|                                                 | 54 Mbps OFDM | -    | 18   | -    | dBm  |
| TX power - IEEE 802.11n<br>(EVM compliant)      | HT20, MCS0   | -    | 17   | -    | dBm  |
|                                                 | HT20, MCS7   | -    | 17   | -    | dBm  |
|                                                 | HT40, MCS0   | -    | 16   | -    | dBm  |
|                                                 | HT40, MCS7   | -    | 16   | -    | dBm  |
| TX power - IEEE 802.11ax<br>(EVM compliant)     | HE20, MCS0   | -    | 17   | -    | dBm  |
|                                                 | HE20, MCS7   | -    | 17   | -    | dBm  |
|                                                 | HE40, MCS0   | -    | 16   | -    | dBm  |
|                                                 | HE40, MCS7   | -    | 16   | -    | dBm  |
| <b>Spurious Emissions</b>                       |              |      |      |      |      |
| Spurious emissions (at maximum<br>output power) | < 1 GHz      | -    | -50  | -    | dBm  |
|                                                 | > 1 GHz      | -    | -45  | -    | dBm  |

## 5.17 Bluetooth LE RF Receiver Characteristics

Measured with T = 25 °C, VBAT = 3.3 V unless otherwise stated.

| Parameter       | Condition | Min. | Typ. | Max. | Unit |
|-----------------|-----------|------|------|------|------|
| <b>General</b>  |           |      |      |      |      |
| Frequency range | -         | 2402 | -    | 2480 | MHz  |

| Parameter                     | Condition          | Min. | Typ. | Max. | Unit |
|-------------------------------|--------------------|------|------|------|------|
| <b>Bluetooth LE 1 Mbps</b>    |                    |      |      |      |      |
| Sensitivity                   | 30.8% PER          | -    | -97  | -    | dBm  |
| Maximum input level           | 30.8% PER          | -    | 0    | -    | dBm  |
| C/I co-channel                | -                  | -    | 8    | -    | dB   |
| C/I 1 MHz adjacent channel    | -                  | -    | 0    | -    | dB   |
| C/I -1 MHz adjacent channel   | -                  | -    | 0    | -    | dB   |
| C/I 2 MHz adjacent channel    | -                  | -    | -26  | -    | dB   |
| C/I -2 MHz adjacent channel   | -                  | -    | -27  | -    | dB   |
| C/I 3 MHz adjacent channel    | -                  | -    | -28  | -    | dB   |
| C/I -3 MHz adjacent channel   | -                  | -    | -29  | -    | dB   |
| C/I > 3 MHz adjacent channel  | -                  | -    | -50  | -    | dB   |
| C/I < -3 MHz adjacent channel | -                  | -    | -50  | -    | dB   |
| Out-of-band blocking          | 30–2000 MHz        | -10  | -    | -    | dBm  |
|                               | 2003–2399 MHz      | -12  | -    | -    | dBm  |
|                               | 2484–2997 MHz      | -12  | -    | -    | dBm  |
|                               | 3000 MHz–12.75 GHz | -2   | -    | -    | dBm  |
| Intermodulation               | -                  | -    | -32  | -    | dBm  |
| <b>Bluetooth LE 2 Mbps</b>    |                    |      |      |      |      |
| Sensitivity                   | 30.8% PER          | -    | -94  | -    | dBm  |
| Maximum input level           | 30.8% PER          | -    | 0    | -    | dBm  |
| C/I co-channel                | -                  | -    | 7    | -    | dB   |
| C/I 2 MHz adjacent channel    | -                  | -    | 0    | -    | dB   |
| C/I -2 MHz adjacent channel   | -                  | -    | 3    | -    | dB   |
| C/I 4 MHz adjacent channel    | -                  | -    | -26  | -    | dB   |
| C/I -4 MHz adjacent channel   | -                  | -    | -30  | -    | dB   |
| C/I 6 MHz adjacent channel    | -                  | -    | -30  | -    | dB   |
| C/I -6 MHz adjacent channel   | -                  | -    | -39  | -    | dB   |
| C/I > 6 MHz adjacent channel  | -                  | -    | -22  | -    | dB   |

| Parameter                     | Condition          | Min. | Typ. | Max. | Unit |
|-------------------------------|--------------------|------|------|------|------|
| C/I < -6 MHz adjacent channel | -                  | -    | -22  | -    | dB   |
| Out-of-band blocking          | 30–2000 MHz        | -    | -30  | -    | dBm  |
|                               | 2003–2399 MHz      | -    | -35  | -    | dBm  |
|                               | 2484–2997 MHz      | -    | -35  | -    | dBm  |
|                               | 3000 MHz–12.75 GHz | -    | -17  | -    | dBm  |
| Intermodulation               | -                  | -    | -32  | -    | dBm  |
| <b>Bluetooth LE 125 kbps</b>  |                    |      |      |      |      |
| Sensitivity                   | 30.8% PER          | -    | -102 | -    | dBm  |
| Maximum input level           | 30.8% PER          | -    | 0    | -    | dBm  |
| C/I co-channel                | -                  | -    | 3    | -    | dB   |
| C/I 1 MHz adjacent channel    | -                  | -    | -15  | -    | dB   |
| C/I -1 MHz adjacent channel   | -                  | -    | -16  | -    | dB   |
| C/I 2 MHz adjacent channel    | -                  | -    | -34  | -    | dB   |
| C/I -2 MHz adjacent channel   | -                  | -    | -40  | -    | dB   |
| C/I 3 MHz adjacent channel    | -                  | -    | -42  | -    | dB   |
| C/I -3 MHz adjacent channel   | -                  | -    | -43  | -    | dB   |
| C/I > 3 MHz adjacent channel  | -                  | -    | -41  | -    | dB   |
| C/I < -3 MHz adjacent channel | -                  | -    | -42  | -    | dB   |
| <b>Bluetooth LE 500 kbps</b>  |                    |      |      |      |      |
| Sensitivity                   | 30.8% PER          | -    | -99  | -    | dBm  |
| Maximum input level           | 30.8% PER          | -    | 0    | -    | dBm  |
| C/I co-channel                | -                  | -    | 5    | -    | dB   |
| C/I 1 MHz adjacent channel    | -                  | -    | -2   | -    | dB   |
| C/I -1 MHz adjacent channel   | -                  | -    | -3   | -    | dB   |
| C/I 2 MHz adjacent channel    | -                  | -    | -30  | -    | dB   |
| C/I -2 MHz adjacent channel   | -                  | -    | -31  | -    | dB   |
| C/I 3 MHz adjacent channel    | -                  | -    | -31  | -    | dB   |
| C/I -3 MHz adjacent channel   | -                  | -    | -40  | -    | dB   |

| Parameter                     | Condition | Min. | Typ. | Max. | Unit |
|-------------------------------|-----------|------|------|------|------|
| C/I > 3 MHz adjacent channel  | -         | -    | -36  | -    | dB   |
| C/I < -3 MHz adjacent channel | -         | -    | -36  | -    | dB   |

## 5.18 Bluetooth LE RF Transmitter Characteristics

Measured with T = 25 °C, VBAT = 3.3 V unless otherwise stated.

| Parameter                          |                                                          | Condition | Min. | Typ. | Max. | Unit      |
|------------------------------------|----------------------------------------------------------|-----------|------|------|------|-----------|
| <b>General</b>                     |                                                          |           |      |      |      |           |
| Frequency range                    |                                                          | -         | 2402 | -    | 2480 | MHz       |
| TX power                           |                                                          | -         | -20  | 6    | 15   | dBm       |
| <b>Bluetooth LE 1 Mbps</b>         |                                                          |           |      |      |      |           |
| In-band emissions                  | ±2 MHz offset                                            | -         | -    | -47  | -    | dBm       |
|                                    | ±3 MHz offset                                            | -         | -    | -49  | -    | dBm       |
|                                    | >±3 MHz offset                                           | -         | -    | -50  | -    | dBm       |
| Modulation characteristics         | Δf1avg                                                   | -         | 225  | 245  | 275  | kHz       |
|                                    | Δf2max                                                   | -         | 185  | 235  | -    | kHz       |
|                                    | Δf2avg/Δf1avg                                            | -         | 0.8  | 0.93 | -    | -         |
| Carrier frequency offset and drift | Max  f <sub>n</sub>   n = 0, 1, 2, 3...k                 | -         | -    | 3    | 150  | kHz       |
|                                    | Max  f <sub>0</sub> - f <sub>n</sub>   n = 2, 3, 4...k   | -         | -    | 2.5  | 50   | kHz       |
|                                    | f <sub>1</sub> - f <sub>0</sub>                          | -         | -    | 2    | 23   | kHz       |
|                                    | Max  f <sub>n</sub> - f <sub>n-5</sub>   n = 6, 7, 8...k | -         | -    | 2.5  | 20   | kHz/50 μs |
| <b>Bluetooth LE 2 Mbps</b>         |                                                          |           |      |      |      |           |
| In-band emissions                  | ±4 MHz offset                                            | -         | -    | -50  | -    | dBm       |
|                                    | ±5 MHz offset                                            | -         | -    | -51  | -    | dBm       |
|                                    | >±5 MHz offset                                           | -         | -    | -52  | -    | dBm       |
| Modulation characteristics         | Δf1avg                                                   | -         | -    | 488  | -    | kHz       |
|                                    | Δf2max                                                   | -         | -    | 469  | -    | kHz       |
|                                    | Δf2avg/Δf1avg                                            | -         | -    | 0.93 | -    | -         |

| Parameter                          |                                                            | Condition | Min. | Typ. | Max. | Unit           |
|------------------------------------|------------------------------------------------------------|-----------|------|------|------|----------------|
| Carrier frequency offset and drift | $\text{Max }  f_n  \text{ } n = 0, 1, 2, 3 \dots k$        | -         | -    | 3    | 150  | kHz            |
|                                    | $\text{Max }  f_0 - f_n  \text{ } n = 2, 3, 4 \dots k$     | -         | -    | 2.5  | 50   | kHz            |
|                                    | $ f_1 - f_0 $                                              | -         | -    | 1.5  | 23   | kHz            |
|                                    | $\text{Max }  f_n - f_{n-5}  \text{ } n = 6, 7, 8 \dots k$ | -         | -    | 2.5  | 20   | kHz/50 $\mu$ s |
| <b>Bluetooth LE 125 kbps</b>       |                                                            |           |      |      |      |                |
| In-band emissions                  | $\pm 2$ MHz offset                                         | -         | -    | -47  | -    | dBm            |
|                                    | $\pm 3$ MHz offset                                         | -         | -    | -49  | -    | dBm            |
|                                    | $> \pm 3$ MHz offset                                       | -         | -    | -50  | -    | dBm            |
| Modulation characteristics         | $\Delta f_{1\text{avg}}$                                   | -         | 225  | 245  | 275  | kHz            |
|                                    | $\Delta f_{1\text{max}}$                                   | -         | 185  | 246  | -    | kHz            |
| Carrier frequency offset and drift | $\text{Max }  f_n  \text{ } n = 0, 1, 2, 3 \dots k$        | -         | -    | 1.5  | 150  | kHz            |
|                                    | $\text{Max }  f_0 - f_n  \text{ } n = 1, 2, 3 \dots k$     | -         | -    | 1.5  | 50   | kHz            |
|                                    | $ f_0 - f_3 $                                              | -         | -    | 1.5  | 19.2 | kHz            |
|                                    | $ f_n - f_{n-3}  \text{ } n = 7, 8, 9 \dots k$             | -         | -    | 1.5  | 19.2 | kHz/48 $\mu$ s |
| <b>Bluetooth LE 500 kbps</b>       |                                                            |           |      |      |      |                |
| In-band emissions                  | $\pm 2$ MHz offset                                         | -         | -    | -47  | -    | dBm            |
|                                    | $\pm 3$ MHz offset                                         | -         | -    | -49  | -    | dBm            |
|                                    | $> \pm 3$ MHz offset                                       | -         | -    | -50  | -    | dBm            |

## 5.19 Audio Characteristics

| Parameter                   | Condition                         | Min. | Typ. | Max. | Unit |
|-----------------------------|-----------------------------------|------|------|------|------|
| DAC differential output     | With 600 $\Omega$ load            | -    | 1    | -    | Vrms |
|                             | With 16 $\Omega$ load             | -    | 0.8  | -    | Vrms |
| DAC differential output THD | With 0.7 Vrms @ 600 $\Omega$ load | -    | -    | -80  | dB   |
|                             | With 0.65 Vrms @ 16 $\Omega$ load | -    | -    | -80  | dB   |
| DAC output SNR              | 1 kHz sine wave                   | -    | 104  | -    | dB   |

| Parameter         | Condition       | Min. | Typ. | Max. | Unit |
|-------------------|-----------------|------|------|------|------|
| DAC sampling rate | -               | 8    | -    | 48   | kHz  |
| ADC SNR           | 1 kHz sine wave | -    | 100  | -    | dB   |
| ADC sampling rate | -               | 8    | -    | 48   | kHz  |

## 5.20 AUX ADC Characteristics

| Parameter              | Condition | Min. | Typ.  | Max.                | Unit  |
|------------------------|-----------|------|-------|---------------------|-------|
| Conversion clock       | -         | 0.2  | -     | 13                  | MHz   |
| Conversion time        | -         | -    | 16    | -                   | Cycle |
| $V_{REF}$              | Internal  | -    | 1.1   | -                   | V     |
|                        | External  | -    | VIO/3 | -                   | V     |
| Input voltage range    | -         | 0    | -     | $V_{REF} * N^{(1)}$ | V     |
| Input impedance        | -         | 10   | -     | -                   | MΩ    |
| Input capacitance (Cs) | -         | -    | 1     | -                   | pF    |
| DNL                    | -         | -1   | -     | 3                   | LSB   |
| INL                    | -         | -5   | -     | 5                   | LSB   |
| ENOB                   | -         | -    | 10    | -                   | Bit   |
| SNDR                   | -         | -    | 62    | -                   | dB    |
| SFDR                   | -         | -    | 77    | -                   | dB    |
| $T_{STARTUP}$          | -         | -    | 5     | -                   | μs    |
| Current consumption    | -         | -    | 200   | -                   | μA    |

(1) N is the input voltage division factor. N=1, 2, 3, or 4.

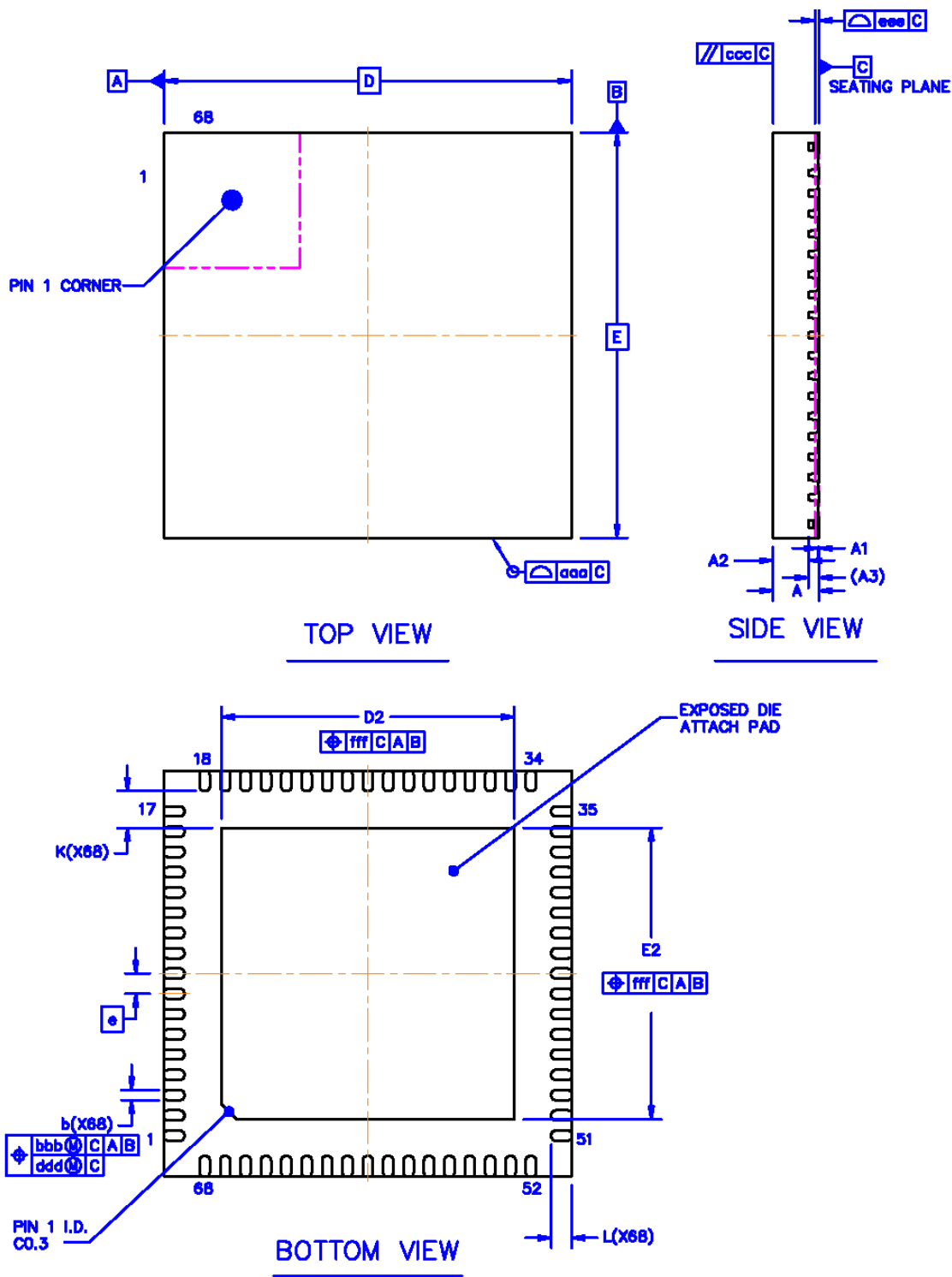


**Table 6-1 QFN88 9 x 9 x 0.9 mm Package Dimensions**

| Symbol | Dimensions in Millimeters |      |      |
|--------|---------------------------|------|------|
|        | Min.                      | Nom. | Max. |
| A      | 0.85                      | 0.90 | 0.95 |
| A1     | 0.00                      | 0.02 | 0.05 |
| A2     | -                         | 0.70 | -    |
| A3     | 0.203 REF                 |      |      |
| b      | 0.12                      | 0.17 | 0.22 |
| D      | 9.00 BSC                  |      |      |
| E      | 9.00 BSC                  |      |      |
| e      | 0.35 BSC                  |      |      |
| D2     | 5.40                      | 5.50 | 5.60 |
| E2     | 6.40                      | 6.50 | 6.60 |
| L      | 0.30                      | 0.40 | 0.50 |
| K      | 1.35 REF                  |      |      |
| K1     | 0.35 REF                  |      |      |
| aaa    | 0.10                      |      |      |
| ccc    | 0.10                      |      |      |
| eee    | 0.08                      |      |      |
| bbb    | 0.07                      |      |      |
| ddd    | 0.05                      |      |      |
| fff    | 0.10                      |      |      |

## 6.2 QFN68 8 x 8 x 0.9 mm Package

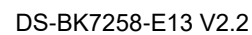
### Figure 6-2 QFN68 8 x 8 x 0.9 mm Package Outline



**Table 6-2 QFN68 8 x 8 x 0.9 mm Package Dimensions**

| Symbol | Dimensions in Millimeters |      |      |
|--------|---------------------------|------|------|
|        | Min.                      | Nom. | Max. |
| A      | 0.85                      | 0.90 | 0.95 |
| A1     | 0.00                      | 0.02 | 0.05 |
| A2     | -                         | 0.70 | -    |
| A3     | 0.203 REF                 |      |      |
| b      | 0.15                      | 0.20 | 0.25 |
| D      | 8.00 BSC                  |      |      |
| E      | 8.00 BSC                  |      |      |
| e      | 0.40 BSC                  |      |      |
| D2     | 5.65                      | 5.75 | 5.85 |
| E2     | 5.65                      | 5.75 | 5.85 |
| L      | 0.30                      | 0.40 | 0.50 |
| K      | 0.725 REF                 |      |      |
| aaa    | 0.10                      |      |      |
| ccc    | 0.10                      |      |      |
| eee    | 0.08                      |      |      |
| bbb    | 0.07                      |      |      |
| ddd    | 0.05                      |      |      |
| fff    | 0.10                      |      |      |

### Figure 6-3 QFN68 7 x 7 x 0.9 mm Package Outline

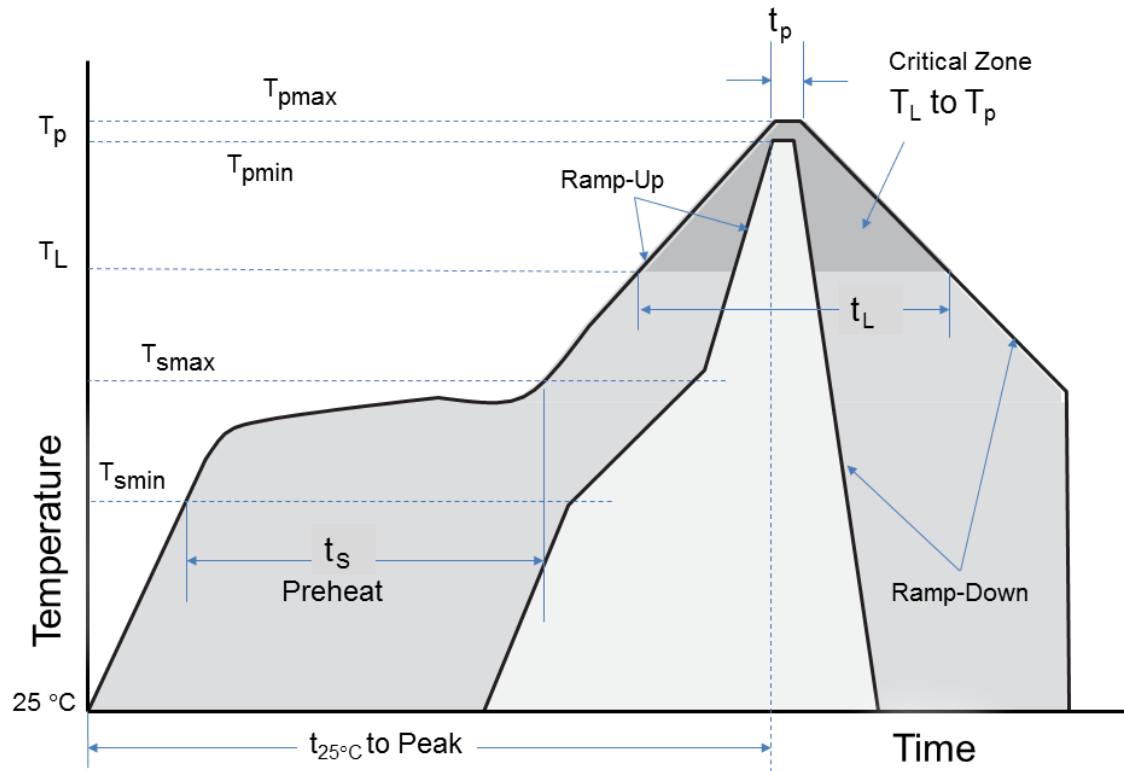


**Table 6-3 QFN68 7 x 7 x 0.9 mm Package Dimensions**

| Symbol | Dimensions in Millimeters |      |      |
|--------|---------------------------|------|------|
|        | Min.                      | Nom. | Max. |
| A      | 0.85                      | 0.90 | 0.95 |
| A1     | 0.00                      | 0.02 | 0.05 |
| A2     | -                         | 0.70 | -    |
| A3     | 0.203 REF                 |      |      |
| b      | 0.12                      | 0.17 | 0.22 |
| D      | 7.00 BSC                  |      |      |
| E      | 7.00 BSC                  |      |      |
| e      | 0.35 BSC                  |      |      |
| D2     | 5.39                      | 5.49 | 5.59 |
| E2     | 5.39                      | 5.49 | 5.59 |
| L      | 0.30                      | 0.40 | 0.50 |
| K      | 0.355 REF                 |      |      |
| aaa    | 0.10                      |      |      |
| ccc    | 0.10                      |      |      |
| eee    | 0.08                      |      |      |
| bbb    | 0.07                      |      |      |
| ddd    | 0.05                      |      |      |
| fff    | 0.10                      |      |      |

## 7. Reflow Soldering Profile

Figure 7-1 Reflow Soldering Profile



| Profile Feature                                       |                                 | Specification |
|-------------------------------------------------------|---------------------------------|---------------|
| Average ramp-up rate ( $T_{smax}$ to $T_p$ )          |                                 | 3 °C/s max.   |
| Preheat                                               | Temperature min. ( $T_{smin}$ ) | 150 °C        |
|                                                       | Temperature max. ( $T_{smax}$ ) | 200 °C        |
|                                                       | Time ( $t_s$ )                  | 60 s to 180 s |
| Time maintained above                                 | Temperature ( $T_L$ )           | 217 °C        |
|                                                       | Time ( $t_L$ )                  | 60 s to 150 s |
| Peak/classification temperature ( $T_p$ )             |                                 | 260 °C        |
| Time within 5 °C of actual peak temperature ( $t_p$ ) |                                 | 20 s to 40 s  |

| Profile Feature                | Specification  |
|--------------------------------|----------------|
| Ramp-down rate                 | 6 °C/s max.    |
| Time 25 °C to peak temperature | 8 minutes max. |

### RoHS Compliant

The product does not contain lead, mercury, cadmium, hexavalent chromium, PBB, PBDE, DEHP, BBP, DBP, or DIBP content in accordance with EU RoHS Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU.

### ESD Sensitivity

Integrated circuits are ESD sensitive and can be damaged by static electricity. Proper ESD techniques should be used when handling these devices.



### Moisture Sensitivity Level

The product is qualified to moisture sensitivity level MSL3 in accordance with IPC/JEDEC J-STD-020.

## 8. Ordering Information

Figure 8-1 Ordering Code Scheme

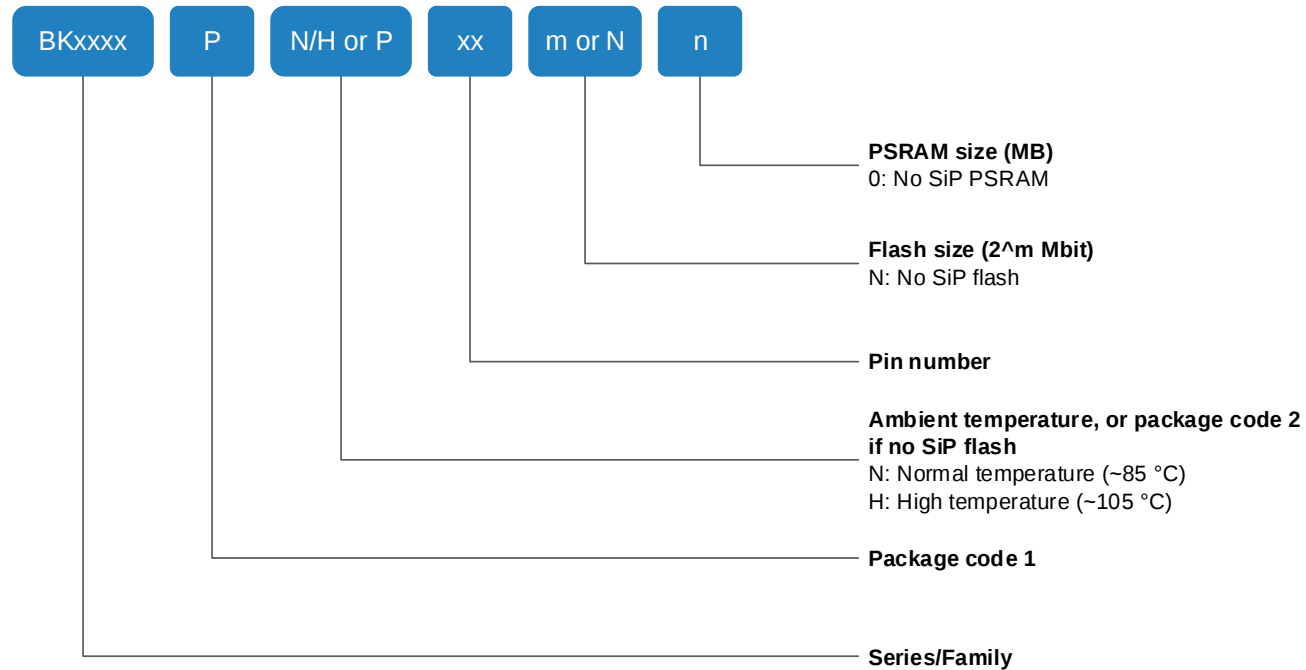


Table 8-1 Ordering Information

| Ordering Code | Package                    | SiP <sup>(1)</sup> Flash | SiP PSRAM | Dedicated Bluetooth Transceiver | Packing       | Minimum Ordering Qty (MOQ) <sup>(2)</sup> |
|---------------|----------------------------|--------------------------|-----------|---------------------------------|---------------|-------------------------------------------|
| BK7258QN8868  | 9 mm x 9 mm x 0.9 mm QFN88 | 8 MB                     | 8 MB      | -                               | Tape and Reel | 3000                                      |



| Ordering Code                | Package                    | SiP <sup>(1)</sup> Flash | SiP PSRAM | Dedicated Bluetooth Transceiver | Packing       | Minimum Ordering Qty (MOQ) <sup>(2)</sup> |
|------------------------------|----------------------------|--------------------------|-----------|---------------------------------|---------------|-------------------------------------------|
| BK7258QN88616                | 9 mm x 9 mm x 0.9 mm QFN88 | 8 MB                     | 16 MB     | -                               | Tape and Reel | 3000                                      |
| BK7258QN88617 <sup>(3)</sup> | 9 mm x 9 mm x 0.9 mm QFN88 | 8 MB                     | 16 MB     | Yes                             | Tape and Reel | 3000                                      |
| BK7258QN6854                 | 8 mm x 8 mm x 0.9 mm QFN68 | 4 MB                     | 4 MB      | -                               | Tape and Reel | 3000                                      |
| BK7258QN6855 <sup>(4)</sup>  | 8 mm x 8 mm x 0.9 mm QFN68 | 4 MB                     | 4 MB      | -                               | Tape and Reel | 3000                                      |
| BK7258QN6868                 | 7 mm x 7 mm x 0.9 mm QFN68 | 8 MB                     | 8 MB      | Yes                             | Tape and Reel | 3000                                      |

- (1) A system in a package (SiP) refers to flash/PSRAM enclosed in the package.
- (2) The MOQ for customized or exclusive ordering codes is one wafer lot. Please consult your sales representative for the exact quantity.
- (3) The BK7258QN88617 deviates from the standard naming convention to distinguish it from the BK7258QN88616. The only difference between them is that the BK7258QN88617 features a dedicated Bluetooth transceiver.
- (4) The BK7258QN6855 deviates from the standard naming convention to distinguish it from the BK7258QN6854, which has the same memory and package configuration but different pin assignments.

# Revision History

| Version | Date      | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|---------|-----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1.0     | 2023/1/17 | Initial release                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 1.1     | 2023/5/6  | <ul style="list-style-type: none"> <li>Removed 802.11ac support</li> <li>Updated compliance with Bluetooth Specification to Bluetooth 5.4 throughout the document</li> <li>Removed cache information from subsection Memory of Section 1 Features</li> <li>Changed USB OTG to USB throughout the document</li> <li>Corrected the number of external input channels for the SAR ADC throughout the document</li> <li>Updated pin assignments for QFN80 package in Section 3 Pin Descriptions</li> <li>Added parameter MICBIAS to Section 5.3 Recommended Operating Conditions</li> <li>Corrected <math>V_{REF}</math> values for AUX ADC in Section 5.20 AUX ADC Characteristics</li> </ul> |
| 1.2     | 2023/6/9  | <ul style="list-style-type: none"> <li>Renamed some interfaces and peripherals</li> <li>Replaced QFN80 package with QFN88 package</li> <li>Updated Section 1 Features</li> <li>Updated Section 2 Overview</li> <li>Updated Section 3 Pin Descriptions</li> <li>Updated Section 4 Functional Description</li> <li>Updated and added measurement data in Section 5 Electrical Characteristics</li> <li>Added Section 5.2 ESD Ratings, Section 5.4 Digital I/O Characteristics, and Section 5.19 Audio Characteristics</li> <li>Updated Section 8 Ordering Information</li> </ul>                                                                                                             |
| 1.3     | 2023/6/16 | <ul style="list-style-type: none"> <li>Updated Bluetooth support</li> <li>Updated core description</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| 1.4     | 2023/8/30 | <ul style="list-style-type: none"> <li>General wording fixes</li> <li>Updated OFDMA and TWT support, added Bluetooth LE features, and updated MCU frequency in Section 1 Features</li> <li>Added Flash support and updated PSRAM size</li> <li>Renamed low-voltage sleep mode to sleep mode and removed normal sleep mode</li> <li>Changed pin assignments for QFN88 package and updated</li> </ul>                                                                                                                                                                                                                                                                                        |

| Version | Date      | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
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|         |           | <p>information for QFN88 package</p> <ul style="list-style-type: none"> <li>Corrected pin assignments for UART0 CTS and RTS in Section 3 Pin Descriptions</li> <li>Updated Section 4.3 Clock Management</li> <li>Updated the description of Section 4.20 Display Controller (DISPLAY)</li> <li>Added FIFO feature for IrDA interface in Section 4.33 IrDA Interface (IRDA)</li> <li>Corrected absolute maximum ratings for VDDD and VDDDIG in Section 5.1 Absolute Maximum Ratings</li> <li>Added package outline and dimensions for QFN88 package in Section 6 Package Information</li> <li>Updated ordering information in Section 8 Ordering Information</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 1.5     | 2023/9/4  | <ul style="list-style-type: none"> <li>Update pin assignments for QFN88 package in Section 3 Pin Descriptions</li> <li>Corrected dimensions for D and E symbols of QFN88 package in Section 6 Package Information</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 1.6     | 2023/9/25 | Changed pin # 73 to VDD_BT for QFN88 package                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 1.7     | 2024/4/22 | <ul style="list-style-type: none"> <li>Updated Wi-Fi operating mode support, Wi-Fi TX power, and Wi-Fi RX sensitivity, maximum VBAT voltage, and updated and added current values in Section 1 Features</li> <li>Corrected GDMA channel number and maximum number of pixels the segment LCD can drive throughout the document</li> <li>Updated maximum operating temperature throughout the document</li> <li>Updated the description of VDDGPIO throughout the document</li> <li>Updated the description of Section 4.4 Reset</li> <li>Updated the note on selecting bypass capacitors, updated Figure 4-1, Figure 4-2, and Table 4-1, and added Figure 4-3 and Table 4-2 in Section 4.5.1 Power Scheme</li> <li>Updated UART baud rate in Section 4.9 UART Interfaces (UART)</li> <li>Updated SDIO clock frequency in Section 4.11 SDIO Interface (SDIO)</li> <li>Updated the description of Section 4.26 PWM Groups (PWMG)</li> <li>Updated the introduction to IrDA interface in Section 4.33 IrDA Interface (IRDA)</li> <li>Removed note “Values currently listed in this section are objective data and are subject to change.” from Section 5 Electrical Characteristics</li> <li>Updated maximum voltages for power supplies in Section 5.1 Absolute Maximum Ratings</li> </ul> |

| Version | Date       | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
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|         |            | <ul style="list-style-type: none"> <li>Added HBM and CDM values in Section 5.2 ESD Ratings</li> <li>Added VBAT slew rate and notes in Section 5.3 Recommended Operating Conditions</li> <li>Updated voltage ranges for VBAT, VDDA, VDDD, VDDGPIO, and VDDRAM in Section 5.3 Recommended Operating Conditions</li> <li>Added Section 5.5 IO LDO</li> <li>Updated VDDA (LDO output) minimum and maximum voltages in Section 5.6 Analog LDO</li> <li>Updated VDDA (buck output) minimum voltage and minimum inductor saturation current in Section 5.10 Analog Buck</li> <li>Updated maximum load capacitance of the 26 MHz crystal in Section 5.12 26 MHz Crystal Characteristics</li> <li>Updated and added current values in Section 5.14 Current Consumption</li> <li>Updated and added RF characteristic values in Section 5.15 WLAN RF Receiver Characteristics to Section 5.18 Bluetooth LE RF Transmitter Characteristics</li> <li>Updated RoHS compliance statement in Section 7 Reflow Soldering Profile</li> </ul> |
| 1.8     | 2024/7/15  | <ul style="list-style-type: none"> <li>General wording fixes</li> <li>Updated core name</li> <li>Updated the description of flash/PSRAM size in Section 1 Features</li> <li>Updated the minimum operating voltage of VBAT, VIO, VCCPA, VCCPAD, and VDDGPIO to 2.5 V</li> <li>Updated the description of wake-up from deep sleep mode in Section 4.4 Reset</li> <li>Updated the description of VIO in Section 4.5.1 Power Scheme</li> <li>Added I2C FIFO feature in Section 4.12 I2C Interfaces (I2C)</li> <li>Corrected maximum sampling rate and VBAT monitoring channel input voltage for AUX ADC in Section 4.29 Auxiliary ADC (AUX ADC)</li> <li>Added minimum conversion clock frequency, and updated <math>V_{REF}</math> and input voltage range for AUX ADC in Section 5.20 AUX ADC Characteristics</li> </ul>                                                                                                                                                                                                     |
| 1.9     | 2024/11/21 | <ul style="list-style-type: none"> <li>Added flash XIP support and flash/PSRAM expansion in Section 1 Features</li> <li>Added BK7258QN6854 QFN68 package</li> <li>Renamed pin # 24, 25, 72 of QFN88 package</li> <li>Corrected the description of the ENET_REF_CLK pin in Section 3.1 QFN88 Pin Descriptions</li> <li>Updated the description of Section 4.1 RF Transceiver</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |

| Version | Date      | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
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|         |           | <ul style="list-style-type: none"> <li>Updated the description of Section 4.4 Reset</li> <li>Updated Figure 4-1 and power-up sequence timing parameter <math>T_4</math> values in Section 4.5.1 Power Scheme</li> <li>Updated the description of sleep mode in Section 4.5.2 Power Modes</li> <li>Updated the voltages of VCCIF, VCCRFXFE, VCCPLL, VCCA, VDDA, VDDD, and VDDDIG in Section 5.3 Recommended Operating Conditions</li> <li>Updated VIO typical voltage in Section 5.5 IO LDO</li> <li>Updated VDDA (LDO output) voltage in Section 5.6 Analog LDO</li> <li>Updated VDDD (LDO output) voltage in Section 5.7 Digital LDO</li> <li>Updated VDDDIG voltage in Section 5.8 Core LDO</li> <li>Updated VDDA (buck output) typical voltage in Section 5.10 Analog Buck</li> <li>Updated VDDD (buck output) voltage in Section 5.11 Digital Buck</li> </ul>                                                                                                                                                                                                                                                                                                                              |
| 2.0     | 2025/2/12 | Added BK7258QN6855 QFN68 package                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| 2.1     | 2025/5/23 | <ul style="list-style-type: none"> <li>Added BK7258QN6868 QFN68 package</li> <li>Added two footnotes regarding the usage of specific GPIOs to Table 3-5 Pin Multiplexing in Section 3.5 Pin Multiplexing</li> <li>Updated Figure 4-1 Internal Power Distribution and removed maximum values for <math>T_2</math> and <math>T_3</math> in Table 4-1 Timing Parameters of Power-up Sequence in Section 4.5.1 Power Scheme</li> <li>Updated the description of deep sleep and sleep modes in Section 4.5.2 Power Modes</li> <li>Added description for 128 (4x32) pixel driving capability in Section 4.21 Segment LCD Controller (SLCD)</li> <li>Updated the minimum value of VOH in Section 5.4 Digital I/O Characteristics</li> <li>Added Section 5.9 EXMEM LDO</li> <li>Added Section 5.13 32.768 kHz Crystal Characteristics</li> <li>Added adjacent channel rejection values for IEEE 802.11n and IEEE 802.11ax in Section 5.15 WLAN RF Receiver Characteristics</li> <li>Added Intermodulation values for Bluetooth LE 1 Mbps and 2 Mbps in Section 5.17 Bluetooth LE RF Receiver Characteristics</li> <li>Added a note about MOQ in Table 8-1 in Section 8 Ordering Information</li> </ul> |
| 2.2     | 2025/8/4  | <ul style="list-style-type: none"> <li>Added six Wi-Fi feature items and Wi-Fi Direct support in Section 1 Features</li> <li>Added support for Bluetooth BR/EDR</li> <li>Added description of dedicated low-power Bluetooth transceiver for</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |

| Version | Date | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
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|         |      | <p>BK7258QN88617 and BK7258QN6868</p> <ul style="list-style-type: none"><li>• Added Bluetooth current values for BK7258QN88617 and BK7258QN6868 in Section 1 Features and Section 5.14 Current Consumption</li><li>• Renamed pin name VDDPA_BT to VDD_BT</li><li>• Corrected the description of WIFI_RX_EN and WIFI_TX_EN pins in Section 3 Pin Descriptions</li><li>• Corrected VDDA pin description in Section 3.2 BK7258QN6854 QFN68 Pin Descriptions</li><li>• Added I2C Fast-mode Plus feature in Section 4.12 I2C Interfaces (I2C)</li><li>• Corrected the description of VIO and added the description about VDDA generating VDD_BT in Section 4.5.1 Power Scheme</li><li>• Removed AUX ADC from the list of peripherals with DMA capabilities in Section 4.16 GDMA Controllers (GDMA)</li><li>• Updated output current values of digital I/Os in Section 5.4 Digital I/O Characteristics</li><li>• Added ordering code BK7258QN88617 to Table 8-1 in Section 8 Ordering Information</li></ul> |

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