

# **XR829MQ Module Datasheet**

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**Single-Chip IEEE 802.11 b/g/n WLAN, Bluetooth 2.1/4.0/4.1**

**Version 1.0**  
**August 13, 2018**

## Revision History

| Version | Date            | Notes           |
|---------|-----------------|-----------------|
| V1.0    | August.13, 2018 | Initial Version |
|         |                 |                 |

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# Contents

|                                          |    |
|------------------------------------------|----|
| Declaration.....                         | 3  |
| Contents.....                            | 4  |
| List of Figures .....                    | 5  |
| List of Tables .....                     | 6  |
| 1 Introduction.....                      | 7  |
| 2 Features .....                         | 7  |
| 2.1 WLAN Features.....                   | 7  |
| 2.2 Bluetooth Features.....              | 7  |
| 3 Applications .....                     | 8  |
| 4 Product appearance .....               | 8  |
| 5 Pin Assignments .....                  | 8  |
| 5.1 Pin Outline.....                     | 8  |
| 5.2 Pin Definition .....                 | 9  |
| 6 General Specification.....             | 10 |
| 6.1 General Specification .....          | 10 |
| 6.2 Voltages .....                       | 11 |
| 6.2.1 Absolute Maximum Ratings .....     | 11 |
| 6.2.2 Recommended Operating Rating ..... | 11 |
| 7 Clocks.....                            | 12 |
| 7.1 Reference Clock.....                 | 12 |
| 7.2 Low Power Clock .....                | 13 |
| 8 WLAN Specification .....               | 15 |
| 9 Bluetooth Specification .....          | 17 |
| 10 Reference design circuit.....         | 18 |
| 11 Dimensions.....                       | 20 |
| 11.1 Physical Dimensions.....            | 20 |
| 11.2 Layout Recommendation .....         | 21 |

## List of Figures

|             |                                  |    |
|-------------|----------------------------------|----|
| Figure 4-1  | XR829MQ Top and Bottom View..... | 8  |
| Figure 5-1  | XR829MQ Pin Outline .....        | 9  |
| Figure 10-1 | Reference design circuit_1 ..... | 18 |

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## List of Tables

|           |                                                     |    |
|-----------|-----------------------------------------------------|----|
| Table 5-1 | XR829MQ Pin List .....                              | 9  |
| Table 6-1 | XR829MQ Module general Specification .....          | 11 |
| Table 6-2 | Absolute Maximum Rating .....                       | 11 |
| Table 7-1 | External Reference Clock Specifications .....       | 12 |
| Table 7-2 | External Clock Requirements .....                   | 12 |
| Table 7-3 | External Crystal Characteristics Requirements ..... | 13 |
| Table 7-4 | Low Power Clock Specifications .....                | 13 |
| Table 8-1 | Wi-Fi RFSpecification .....                         | 15 |

# 1 Introduction

XR829MQ product is designed base on XR829 chipset .It is a fully integrated SoC to support 2.4G WLAN 802.11 b/g/n and Bluetooth 2.1+EDR/4.1. It is optimized for mobile applications such as PDAs and portable media players. High sensitivity and transmitting power ensure long distance and robust connection. Highest level of integration allows very compact and cost effective reference designs delivering fast time-to-market for new WLAN and Bluetooth enabled products.

## 2 Features

### 2.1 WLAN Features

- Compatible with IEEE 802.11 b/g/n standard
- 802.11n support for 20/40MHz bandwidth
- Support for Short Guard Interval
- Support for 802.11n MCS0~MCS7
- 6M~54M data rate for 802.11g
- DSSS, CCK modulation with long and short preamble
- Support frame aggregation using A-MSDU, A-MPDU
- Supports MAC enhancements including
  - 802.11d - Regulatory domain operation
  - 802.11e - QoS including WMM
  - 802.11h - Transmit power control dynamic and frequency selection
  - 802.11i - Security including WPA2 and WAPI compliance
  - 802.11r - Roaming
  - 802.11w - Management frame protection
- Support for Station, SoftAP and P2P mode
- Support for Wi-Fi Direct

### 2.2 Bluetooth Features

- Bluetooth Dual Mode support with 2.1/4.0/4.1
- Class 1, Class 2 and Class 3 transmitter operation
- Host Controller Interface using a high-speed UART, maximum baud rate of 4 Mbps
- Adaptive Frequency Hopping
- SCO and eSCO support
- 1, 3 and 5 slots all packet types support
- Audio interfaces: PCM, I2S
- Transcoders for A-law,  $\mu$ -law and CVSD voice over air

- Piconet and scatternet support
- Secure simple pairing
- Sniff/Hold/Sniff-Sub-rating low power mode support

## 3 Applications

- Tablet PC
- Smart internet TV box
- Portable media player(PMP)
- Portable gaming device(PGD)
- Internet of Thing (IOT)

## 4 Product appearance

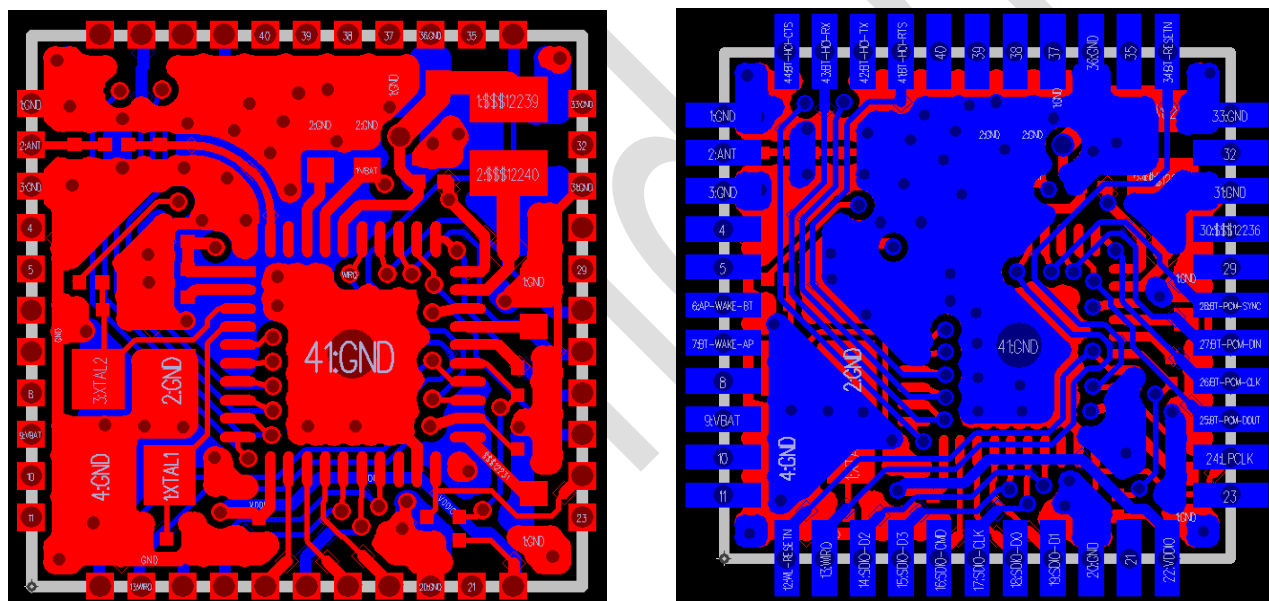


Figure 4-1 XR829MQ Top and Bottom View

## 5 Pin Assignments

### 5.1 Pin Outline



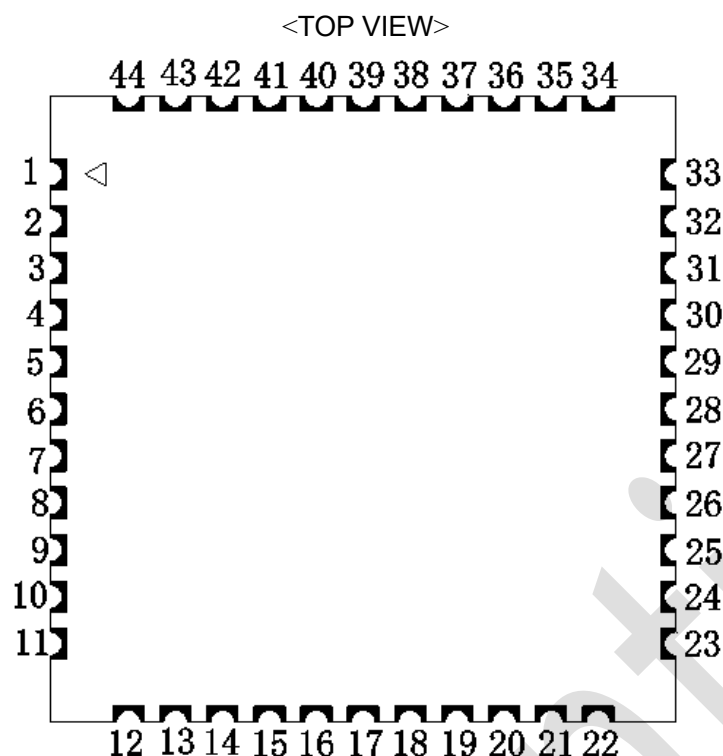


Figure 5-1 XR829MQ Pin Outline

## 5.2 Pin Definition

Table 5-1 XR829MQ Pin List

| Pin | Name          | Type | Description                         |
|-----|---------------|------|-------------------------------------|
| 1   | GND1          | -    | Ground connetctions                 |
| 2   | ANT           | I/O  | 2.4 GHz RF input/output             |
| 3   | GND2          | -    | Ground connetctions                 |
| 4   | NC1           | -    | Floating(Don't connected to ground) |
| 5   | NC2           | -    | Floating(Don't connected to ground) |
| 6   | BT-WAKE       | I    | Host wakes up Bluetooth subsystem   |
| 7   | BT-HOST-WAKE  | O    | Bluetooth subsystem wakes up host   |
| 8   | NC3           | -    | Floating(Don't connected to ground) |
| 9   | VBAT          | P    | Supply for on-chip-PMU              |
| 10  | NC4           | -    | Floating(Don't connected to ground) |
| 11  | NC5           | -    | Floating(Don't connected to ground) |
| 12  | WL-REG-ON     | I    | WLAN Reset, active low              |
| 13  | WL-HOST-WAKE  | O    | WLAN interrupt request              |
| 14  | SDIO-DATA2    | I/O  | SDIO data line2                     |
| 15  | SDIO-DATA3    | I/O  | SDIO data line3                     |
| 16  | SDIO-DATA-CMD | I/O  | SDIO command line                   |

|    |                 |     |                                                   |
|----|-----------------|-----|---------------------------------------------------|
| 17 | SDIO-DATA-CLK   | I   | SDIO clock line                                   |
| 18 | SDIO-DATA-DATA0 | I/O | SDIO data line0                                   |
| 19 | SDIO-DATA-DATA1 | I/O | SDIO data line1                                   |
| 20 | GND3            | -   | Ground connetctions                               |
| 21 | NC6             | -   | Floating(Don't connected to ground)               |
| 22 | VDDIO           | P   | Supply for IO                                     |
| 23 | NC7             | -   | Floating(Don't connected to ground)               |
| 24 | LPO             | I   | Low power clock input, 32.768 kHz, or be grounded |
| 25 | PCM-OUT         | O   | Bluetooth PCM data output                         |
| 26 | PCM-CLK         | I/O | Bluetooth PCM clock                               |
| 27 | PCM-IN          | I   | Bluetooth PCM data input                          |
| 28 | PCM-SYNC        | I/O | Bluetooth PCM synchronization control             |
| 29 | NC8             | -   | Floating(Don't connected to ground)               |
| 30 | TCXO-IN         | I   | Reference clock input or XTAL inputs              |
| 31 | GND4            | -   | Ground connetctions                               |
| 32 | NC9             | -   | Floating(Don't connected to ground)               |
| 33 | GND5            | -   | Ground connetctions                               |
| 34 | BT-RST-N        | I   | Bluetooth Reset, active low                       |
| 35 | NC10            | -   | Floating(Don't connected to ground)               |
| 36 | GND6            | -   | Ground connetctions                               |
| 37 | NC11            | -   | Floating(Don't connected to ground)               |
| 38 | NC12            | -   | Floating(Don't connected to ground)               |
| 39 | NC13            | -   | Floating(Don't connected to ground)               |
| 40 | NC14            | -   | Floating(Don't connected to ground)               |
| 41 | UART-RTS-N      | O   | Bluetooth Uart RTS                                |
| 42 | UART-TXD        | O   | Bluetooth Uart transmit                           |
| 43 | UART-RXD        | I   | Bluetooth Uart receive                            |
| 44 | UART-CTS-N      | I   | Bluetooth Uart CTS                                |

## 6 General Specification

### 6.1 General Specification

Table 6-1 XR829MQ Module general Specification

| Item                | Description                                |
|---------------------|--------------------------------------------|
| Product Name        | XR829MQ                                    |
| Major Chipset       | XR829                                      |
| Product Description | Support WiFi/Bluetooth functionalities     |
| Dimension(L*W*H)    | 12 x12x 1.5mm (LxWxH) ; Tolerance: +-0.1mm |
| Working Temperature | -40°C ~ +85°C                              |
| Storage temperature | -55°C ~ +125°C                             |

## 6.2 Voltages

### 6.2.1 Absolute Maximum Ratings

Table 6-2 Absolute Maximum Rating

| Symbol | Parameter               | Min  | Max | Unit |
|--------|-------------------------|------|-----|------|
| VBAT   | Power supply for module | -0.3 | 5.8 | V    |
| VDDIO  | IO power supply         | -0.3 | 4.0 | V    |

### 6.2.2 Recommended Operating Rating

The module requires two power supplies:VBAT and VDDIO

Table 6-3 Recommended Operating Rating

| Symbol | Parameter               | Min  | Typ | Max | Unit |
|--------|-------------------------|------|-----|-----|------|
| VBAT   | Power supply for module | 2.7  | 3.6 | 5.5 | V    |
| VDDIO  | IO power supply         | 1.62 | 3.3 | 3.6 | V    |

# 7 Clocks

XR829 uses a reference clock and a low power clock.

For the reference clock, XR829 can either use an external reference clock source or generate its own reference using a XTAL and a built-in oscillator.

For the low power clock, XR829 can either use an external 32.768 KHz clock or generate its internal RCOSC. If use internal RCOSC, the LPCLK pin should be grounded. The low power clock is used during power save modes and used only for power controller module .

## 7.1 Reference Clock

**Table 7-1 External Reference Clock Specifications**

| Symbol              | Parameter                                                           | Min  | Typ | Max | Unit |
|---------------------|---------------------------------------------------------------------|------|-----|-----|------|
| F <sub>IN</sub>     | Clock input frequency list using an external clock source           | 13   | 24  | 52  | MHz  |
|                     | Clock input frequency list using a XTAL and the built-in oscillator | 19.2 | 24  | 52  | MHz  |
| F <sub>INTOL</sub>  | Tolerance on input frequency without trimming                       | -20  | -   | +20 | ppm  |
| T <sub>stable</sub> | Clock stabilization time                                            | -    | -   | 10  | ms   |
| I <sub>LEAK</sub>   | Input leakage current, both for analog and digital                  | -    | -   | 1   | uA   |

### Clock frequency detection

An integrated automatic detection algorithm detects the reference clock frequency using the low power clock after a hardware reset.

### Clock source detection

An integrated automatic detection mechanism detects the clock source from the connections of the XTAL1 and XTAL2 pins:

- When an external reference clock source is used, the clock input pin is XTAL2. The XR829 supports both an analog and digital source. An analog source shall be AC coupled to XTAL2 while a digital source shall be DC coupled to XTAL2. In both cases, XTAL1 shall be DC grounded.
- When a XTAL and the built-in oscillator are used, the XTAL shall be DC coupled to XTAL1 and XTAL2.

### External Clock Source

- Requirements

**Table 7-2 External Clock Requirements**

| Symbol                   | Parameter                                                 | Min | Typ | Max | Unit            |
|--------------------------|-----------------------------------------------------------|-----|-----|-----|-----------------|
| <b>AC coupled signal</b> |                                                           |     |     |     |                 |
| F <sub>IN</sub>          | Frequency                                                 | 13  | 24  | 52  | MHz             |
| V <sub>APP</sub>         | Peak-to-peak voltage range of the AC coupled analog input | 0.4 | 0.5 | 1.2 | V <sub>pp</sub> |
| N <sub>H</sub>           | Total harmonic content of the input signal                | -   | -   | -25 | dBc             |

| DC coupled signal               |                                                                                              |                    |     |                              |        |
|---------------------------------|----------------------------------------------------------------------------------------------|--------------------|-----|------------------------------|--------|
| $V_{IL}$                        | input low voltage on XTAL2                                                                   | 0                  | -   | $0.3 \cdot V_{18}$           | V      |
| $V_{IH}$                        | input high voltage on XTAL2                                                                  | $0.7 \cdot V_{18}$ | -   | $V_{18}$                     | V      |
| $T_r/T_f$                       | 10%-90% rise and fall time                                                                   | -                  | -   | 5                            | ns     |
| Duty cycle                      | Cycle-to-cycle                                                                               | 40                 | 50  | 60                           | %      |
| Both analog and digital signals |                                                                                              |                    |     |                              |        |
| $Z_{INRE}$                      | Real part of parallel AC input impedance at the pin                                          | 30                 | -   | -                            | KOhm   |
| $Z_{INIM}$                      | Imaginary part of parallel AC input impedance at the pin                                     | -                  | 3.5 | 5                            | pF     |
| $Z_{DC}$                        | DC input impedance                                                                           | 1                  | -   | -                            | MOhm   |
| Phase noise                     | Ref clock @ 24 MHz, 2.4 GHz 802.11b/g/n operation<br>@1 kHz<br>@10 kHz<br>@100 kHz<br>@1 MHz | -                  | -   | -123<br>-133<br>-138<br>-138 | dBc/Hz |

## External XTAL and Built-in Oscillator

Table 7-3 External Crystal Characteristics Requirements

| Parameter                                         | Conditions       | Min   | Typ   | Max   | Unit   |
|---------------------------------------------------|------------------|-------|-------|-------|--------|
| Frequency range                                   |                  | 13    | -     | 52    | MHz    |
| ESR                                               |                  | -     | -     | 60    | Ohm    |
| $C_{in\_xtal}^{(1)}$                              | Single-ended     | 3.5   | 18    | 36    | pF     |
| Load capacitance <sup>(1)</sup>                   |                  | -     | 16    | 27    | pF     |
| Oscillator tuning range <sup>(2)</sup>            |                  | +/-20 | +/-50 | +/-70 | ppm    |
| Crystal frequency accuracy at nominal temperature | 25 °C            | -10   | -     | +10   | ppm    |
| Crystal drift due to temperature                  | -20 °C to +85 °C | -10   | -     | +10   | ppm    |
| Crystal pull ability                              |                  | 10    | -     | 150   | ppm/pF |

(1). The load capacitance value ( $C_{load}$ ) depends on XTAL model, XTAL1 and XTAL2 pin have extra capacitance( $C_{in\_xtal}$ ), so external added load capacitance value  $C_{load\_ext}=C_{load}-C_{in\_xtal}$ .  $C_{in\_xtal}$  has tuning range about 7pF, which is controlled by software, for details please go to software user manual.

(2). Tuning range depends on XTAL load capacitance requirement, typical case is based on 26MHz XTAL, 8pF  $C_{load}$ .

## 7.2 Low Power Clock

Table 7-4 Low Power Clock Specifications

| Symbol | Parameter | Min | Typ | Max | Unit |
|--------|-----------|-----|-----|-----|------|
|--------|-----------|-----|-----|-----|------|

|            |                             |                  |        |            |      |
|------------|-----------------------------|------------------|--------|------------|------|
| $F_{IN}$   | Frequency                   | -                | 32.768 | -          | KHz  |
| $F/F_{IN}$ | Frequency accuracy          | -250             | -      | +250       | ppm  |
| Duty cycle |                             | 30               | -      | 70         | %    |
| Jitter     | Cycle-to-cycle              | -40              | -      | +40        | ns   |
| $R_{in}$   | Input resistance            | 1                | -      | -          | MOhm |
| $C_{in}$   | Input capacitance           | -                | -      | 5          | pF   |
| $V_{IL}$   | Input low voltage on LPCLK  | 0                | -      | 0.4        | V    |
| $V_{IH}$   | Input high voltage on LPCLK | $VDD_{IO} - 0.4$ | -      | $VDD_{IO}$ | V    |

## 8 WLAN Specification

Conditions: VBAT=3.6V; VDDIO=3.3V; Temp:25° C

**Table 8-1 Wi-Fi RFSpecification**

| Parameter                                     | Description                                                    |
|-----------------------------------------------|----------------------------------------------------------------|
| Host Interface                                | SDIO 2.0                                                       |
| Standard                                      | IEEE 802.11b,IEEE 802.11g,IEEE 802.11n                         |
| Frequency range                               | 2.412GHZ~2.484GHZ                                              |
| Modulation Type                               | 802.11b: CCK,DQPSK,DBPSK<br>802.11g/n: 64-QAM,16-QAM,QPSK,BPSK |
| Data Transfer Rate                            | 1,2,5.5,6,11,12,18,22,24,30,36,48,54,SGL/HT40,65Mbps           |
| RX Sensitivity (802.11b)<br>@8% PER           | 1Mbps PER@-97dBm,typical                                       |
|                                               | 2Mbps PER@-95dBm,typical                                       |
|                                               | 5.5Mbps PER@-93dBm,typical                                     |
|                                               | 11Mbps PER@-90dBm,typical                                      |
| RX Sensitivity (802.11g)<br>@10% PER          | 6Mbps PER@-92dBm,typical                                       |
|                                               | 9Mbps PER@-92dBm,typical                                       |
|                                               | 12Mbps PER@-91dBm,typical                                      |
|                                               | 18Mbps PER@-88dBm,typical                                      |
|                                               | 24Mbps PER@-86dBm,typical                                      |
|                                               | 36Mbps PER@-82dBm,typical                                      |
|                                               | 48Mbps PER@-78dBm,typical                                      |
|                                               | 54Mbps PER@-76dBm,typical                                      |
| RX Sensitivity<br>(802.11n,20MHz)<br>@10% PER | MCS0 PER@-91dBm,typical                                        |
|                                               | MCS1 PER@-87dBm,typical                                        |
|                                               | MCS2 PER@-85dBm,typical                                        |
|                                               | MCS3 PER@-83dBm,typical                                        |
|                                               | MCS4 PER@-79dBm,typical                                        |
|                                               | MCS5 PER@-75dBm,typical                                        |
|                                               | MCS6 PER@-74dBm,typical                                        |
|                                               | MCS7 PER@-72dBm,typical                                        |
| RX Sensitivity<br>(802.11n,40MHz)<br>@10% PER | MCS0 PER@-89dBm,typical                                        |
|                                               | MCS1 PER@-87.5dBm,typical                                      |
|                                               | MCS2 PER@-84.5dBm,typical                                      |

|                     |                  |                                     |
|---------------------|------------------|-------------------------------------|
|                     | MCS3             | PER@-81.5dBm,typical                |
|                     | MCS4             | PER@-78dBm,typical                  |
|                     | MCS5             | PER@-74dBm,typical                  |
|                     | MCS6             | PER@-72dBm,typical                  |
|                     | MCS7             | PER@-71dBm,typical                  |
| Maximum Input Level | 802.11b:         | -10dBm                              |
|                     | 802.11g/n:       | -20dBm                              |
| TX Power            | 802.11b/11Mbps : | 16dBm $\pm$ 1.5dB @EVM $\leq$ -9dB  |
|                     | 802.11g/54Mbps : | 15dBm $\pm$ 1.5dB @EVM $\leq$ -25dB |
|                     | 802.11n/64Mbps:  | 14dBm $\pm$ 1.5dB @EVM $\leq$ -28dB |



## 9 Bluetooth Specification

Conditions: VBAT=3.6V; VDDIO=3.3V; Temp:25° C

**Table 9-1 Bluetooth Specification**

| Parameter            | Description                                             |
|----------------------|---------------------------------------------------------|
| Host Interface       | UART/PCM                                                |
| Standard             | Bluetooth 2.1/4.0/4.1                                   |
| Frequency range      | 2.402GHZ~2.480GHZ                                       |
| Modulation Type      | GFSK, $\pi/4$ -DQPSK, 8DPSK, GFSK                       |
| RX Sensitivity (BR)  | 1Mbps GFSK: -91dBm, typical                             |
| RX Sensitivity (EDR) | 2Mbps $\pi/4$ -DQPSK: -93dBm, typical                   |
|                      | 3Mbps 8DPSK: -85dBm, typical                            |
| RX Sensitivity (BLE) | 1Mbps GFSK : -93dBm, typical                            |
| TX Power             | Class1, Class2, Class3@BR, EDR: -17~7dBm;<br>BLE: 7dBm. |
| Maximum Input Level  | 1Mbps GFSK: -20dBm                                      |
|                      | 2Mbps $\pi/4$ -DQPSK: -20dBm                            |
|                      | 3Mbps 8DPSK: -10dBm                                     |

## 10 Reference design circuit

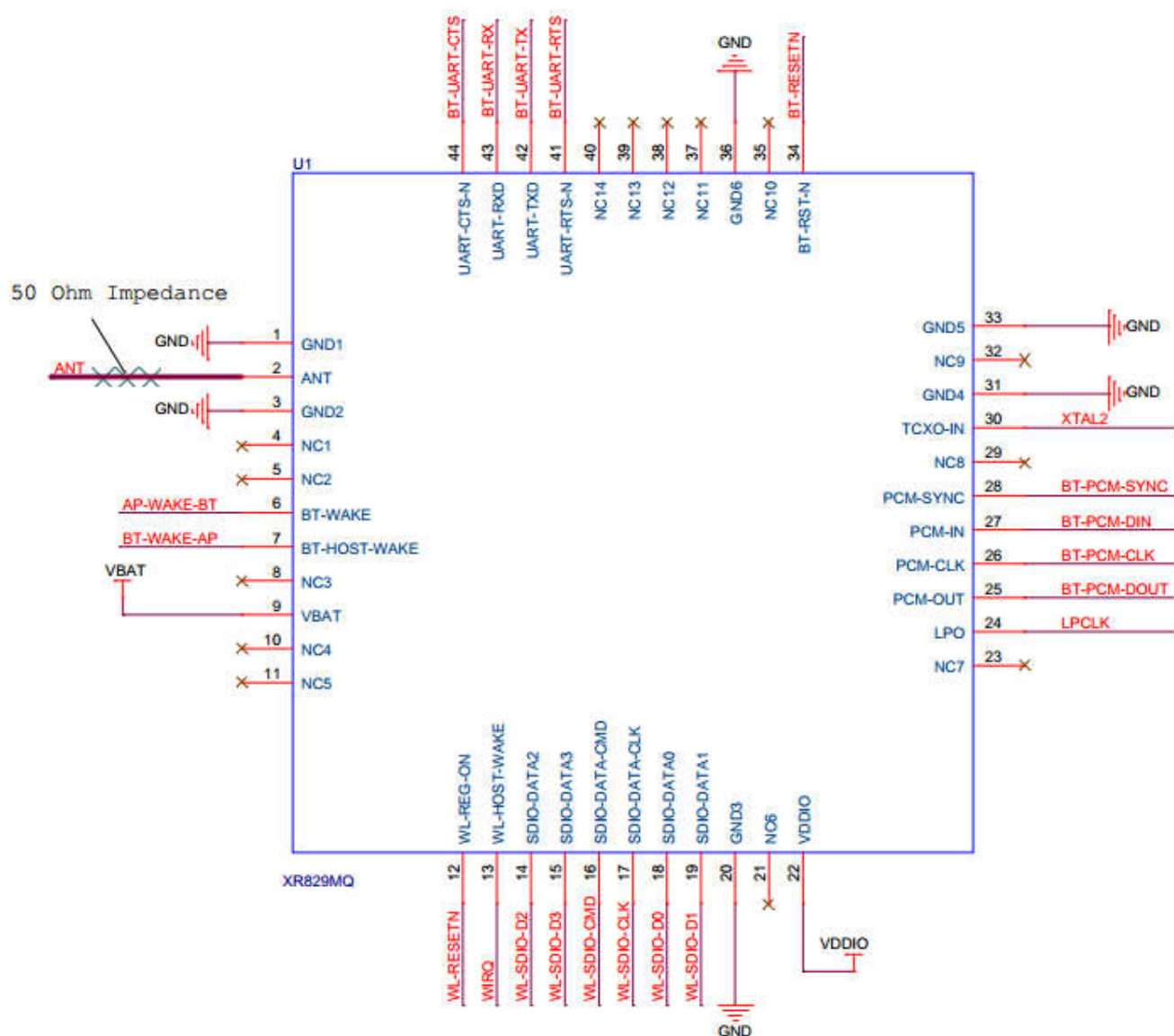
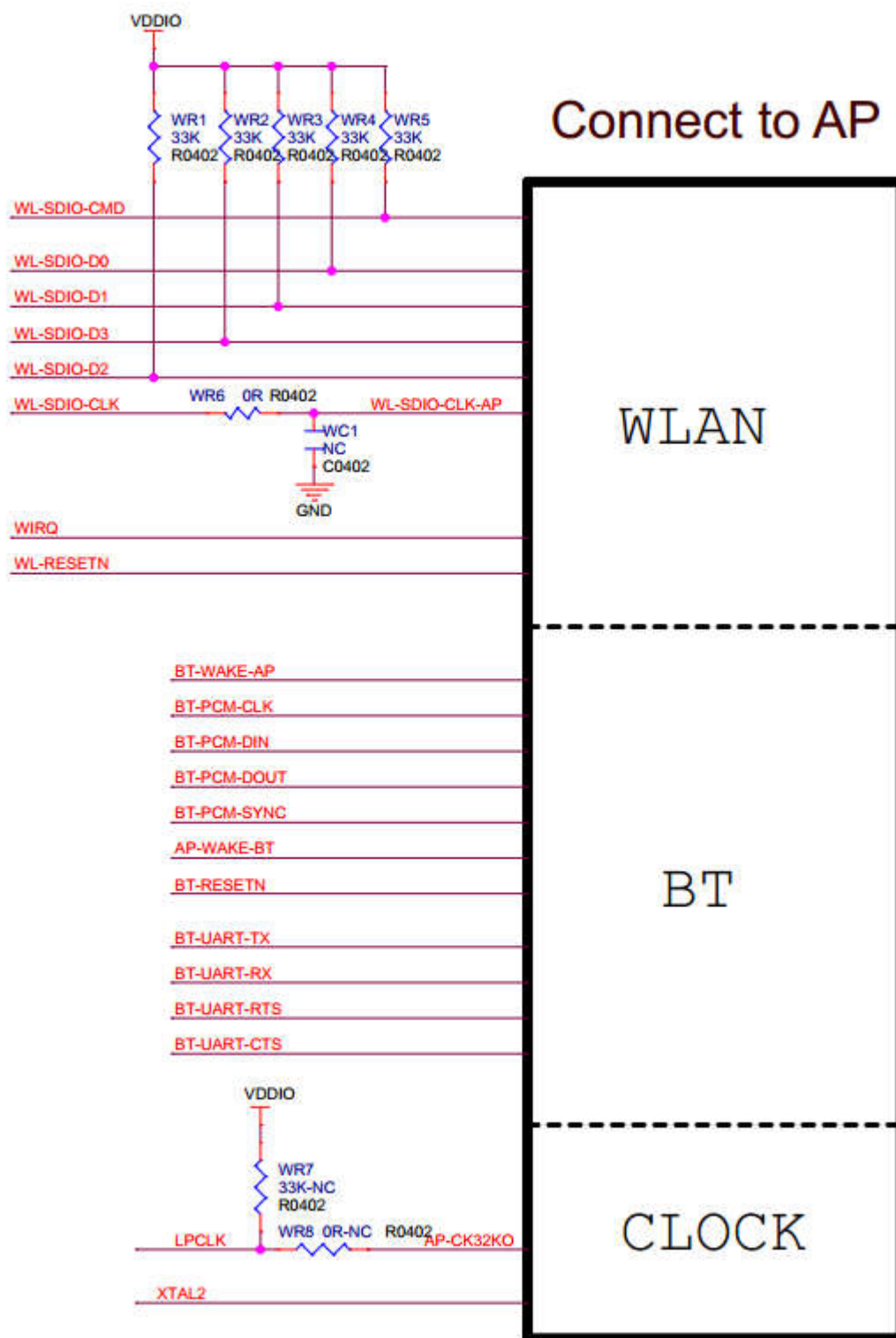


Figure 10-1 Reference design circuit\_1



**Figure 10-2 Reference design circuit\_2**

design note:

- 1、The impedance of ANT line must be 50 ohm.
- 2、The voltage supplied through the pin VBAT should be between 2.7V-5.5V.
- 3、SDIO line cannot be longer than 150mm.
- 4、VCCIO voltage to be consistent with the HOST I/O voltage between 1.62V-3.6V

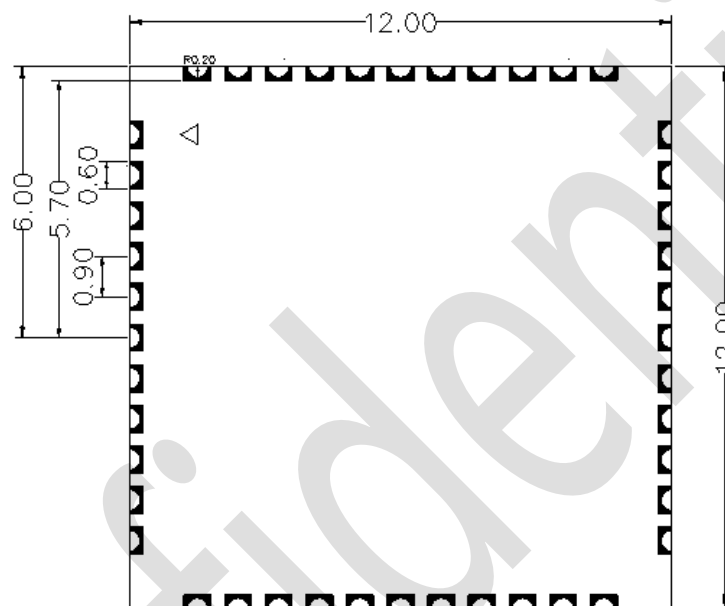
# 11 Dimensions

## 11.1 Physical Dimensions

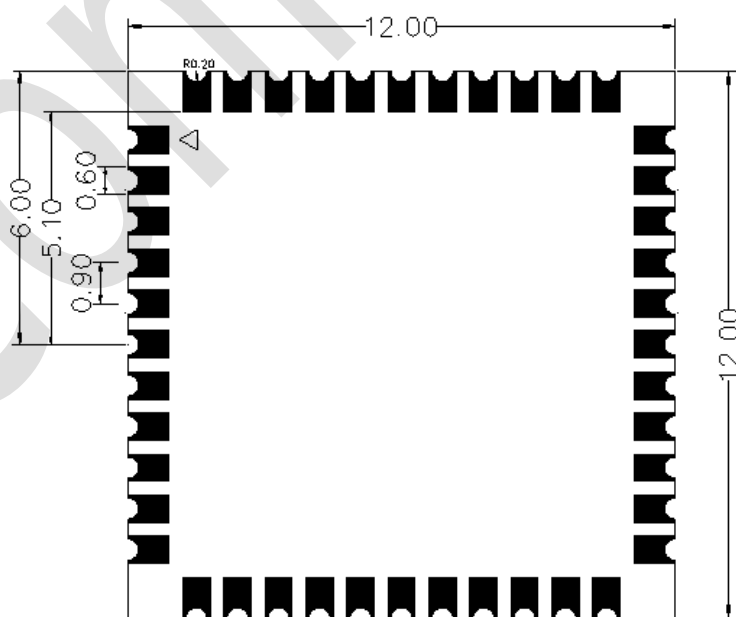
**Table 11-1 Physical Dimensions**

|                | Length                   | Width                    | Height                    |
|----------------|--------------------------|--------------------------|---------------------------|
| Dimensions(mm) | 12<br>(Tolerance:±0.1mm) | 12<br>(Tolerance:±0.1mm) | 1.5<br>(Tolerance:±0.1mm) |

(Unit:mm)



**Figure 11-1 XR829MQ Dimensions<TOP VIEW>**



**Figure 11-2 XR829MQ Dimensions<Bottom VIEW>**

## 11.2 Layout Recommendation

(Unit:mm)

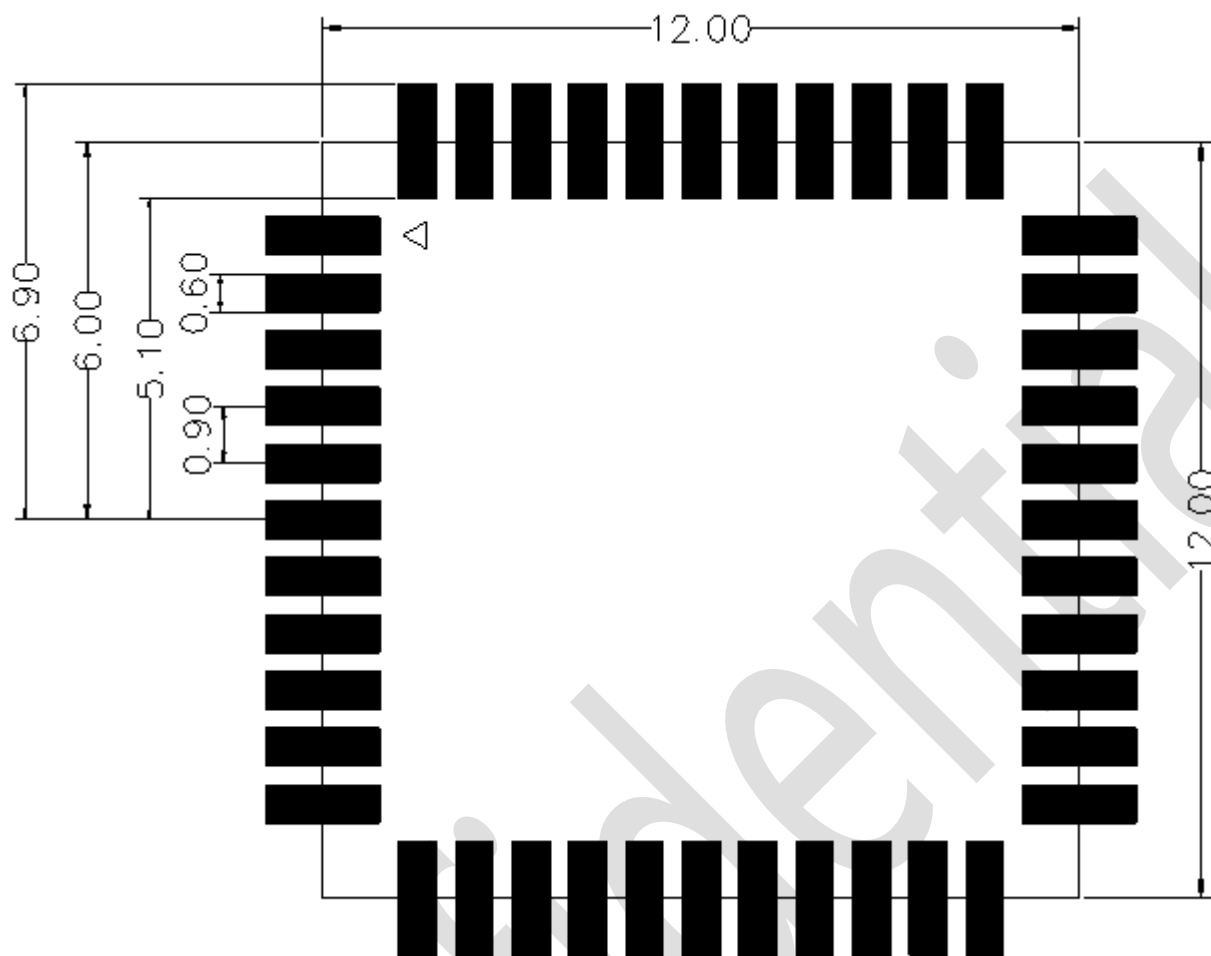


Figure 11-3 XR829MQ layout recommendation<TOP VIEW>