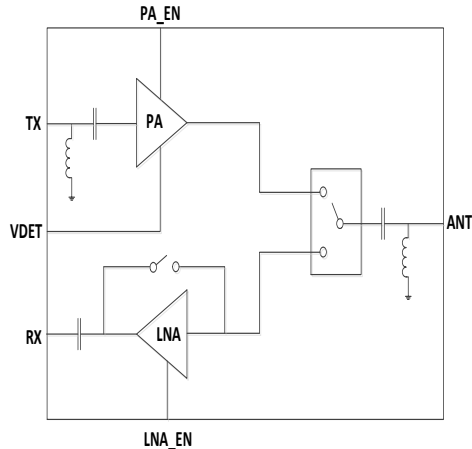




5GHz WLAN 802.11ac RFIC WITH PA, LNA AND SPDT



Description

KCT8536C is a highly integrated RF front-end integrated circuit incorporates key RF functionality needed for IEEE 802.11a/n/ac WLAN systems operating in the 5.15-5.85GHz range. KCT8536C integrates a high-efficiency, high-linearity power amplifier (PA), a low noise amplifier (LNA) with bypass, the associated matching network, LO rejection, and harmonic filters all in one device.

KCT8536C has simple and low-voltage control logic, and requires minimal external components. A power detector is also integrated for accurate monitoring of output power from the PA.

KCT8536C is assembled in a compact, low-profile 2.0x2.0x0.75mm 12-lead LGA package. KCT8536C is the ideal RF front-end solution for implementing 5GHz high-power WLAN systems supporting multiple standards including 802.11a/n/ac.

Applications

- ▶ 802.11ac Wi-Fi Devices
- ▶ Tablets / MIDs
- ▶ Wi-Fi Media Gateways
- ▶ Consumer Electronics
- ▶ Notebook / Netbook / Ultrabook
- ▶ Access Points / Routers
- ▶ Set Top Boxes / Wireless IPTVs
- ▶ Other 5GHz ISM Platforms

FEATURES

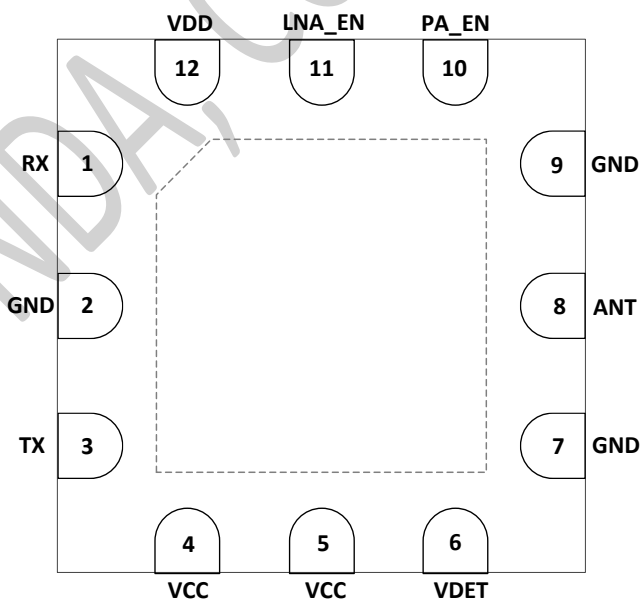
- ▶ Integrated high performance 5GHz PA, LNA with bypass and T/R switch
- ▶ Fully-matched input and output
- ▶ Integrated power detector
- ▶ Transmit gain: 27.5dB at 5V and 26 dB at 3.3V
- ▶ Receive gain: 12dB at 5V&3.3V
- ▶ Output power: +20.5dBm @ -35dB DEVM, VHT80/MCS9, 5V
+17dBm @ -35dB DEVM, VHT80/MCS9, 3.3V
+21.5dBm @ -30dB DEVM, HT20/MCS7, 5V
+18dBm @ -30dB DEVM, HT20/MCS7, 3.3V
- ▶ ESD protection circuitry on all PINs
- ▶ DC decoupled RF ports
- ▶ Minimal external components required
- ▶ Small package: LGA12, 2.0mm x 2.0mm x0.75mm (MSL3, 260 °C per JEDEC J-STD-020)
- ▶ ROHS and REACH Compliant



PIN ASSIGNMENTS

Pin Number	Pin Name	Description
1	RX	RF Output Port from LNA or Bypass – DC Shorted to GND
2,7,9	GND	Ground – Must Be Connected to GND in the Application Circuit
3	TX	RF Input Port from the Transceiver – DC Shorted to GND
4,5	VCC	Supply Voltage
6	VDET	Detector Output Voltage
8	ANT	Antenna Port – RF Signal from the PA or RF Signal Applied to the LNA – DC Shorted to GND
10	PA_EN	PA Enable
11	LNA_EN	LNA Enable
12	VDD	LNA Power Supply

PIN-OUT DIAGRAM





ABSOLUTE MAXIMUM RATINGS

Parameters	Units	Min	Max	Conditions
DC Supply Voltage	V	0	+6.0	VDD and VCC
Control Pin Voltage	V	0	+3.6	All Control Pins
DC Current Consumption	mA		600	
Maximum TX Input Power (50 ohm load, No Damage)	dBm		+12	
LNA On Maximum RX Input Power (No Damage)	dBm		+12	
Bypass Mode Maximum RX Input Power (No Damage)	dBm		+25	
Storage Temperature	°C	-40	+150	
Junction Temperature	°C		+200	
Thermal Resistance (θ_{JC})	C/W		+35	
Ruggedness (Pin =10dBm, No Permanent Damage)	VSWR		10:1	

NOTE: Sustained operation at or above the Absolute Maximum Ratings for any one or combinations of the above parameters may result in permanent damage to the device and is not recommended.

All Maximum RF Input Power Ratings assume 50-ohm terminal impedance.

NOMINAL OPERATING CONDITIONS

Parameters	Units	Min	Typ	Max	Conditions
DC Supply Voltage	V	3	3.3/5	5.5	VDD and VCC
Control Pin Voltage "High"	V	1.8		3.6	
Control Pin Voltage "Low"	V	0		0.4	
Control Pin DC Current	uA		60		
Operating Temperature	°C	-40	+25	+85	

KCT8536C ELECTRICAL SPECIFICATIONS

(VDD = VCC = 5V, T = 25 °C, Unless Otherwise Noted)

Parameters	Units	Min	Typ	Max	Conditions
Frequency Range	GHz	5.15		5.85	
Transmit Mode					



Parameters	Units	Min	Typ	Max	Conditions
Gain	dB	26	27.5	30	
Output Power	dBm		+20.5 +21.5 +25		VHT80/MCS9, -35dB DEVM, Preamble only HT20/MCS7, -30dB DEVM, Preamble only HT20/MCS0, Mask Compliance
Current Consumption	mA		135 195 260 350	140 205 270 370	Modulated Signal, 100% duty cycle @ No RF @+18dBm @+22dBm @+25dBm
Harmonics	dBm/MHz		-32 -44		Pout = +25dBm, HT20/MCS0 2 nd harmonics 3 rd harmonics
Input Return Loss	dB		10		
Output Return Loss	dB		10		
Power Detector Output	V		0.25 0.6 0.8 0.92		@ No RF @+18dBm @+22dBm @+25dBm
Power Detector Output Impedance	ohm		2K		
ANT-RX Isolation	dB		TBD		Transmit Mode; TX_EN=High; Maximum Power
PA Switching Time	ns		TBD		
PA Turn-On Time from TX_EN edge	ns		TBD		
PA Turn-Off Time from TX_EN edge	ns		TBD		
Receive Mode – LNA On					
Gain	dB		12	14	
Input Power of P1dB	dBm		TBD		
Noise Figure	dB		3.3	3.5	
Input Return Loss	dB		10		
Output Return Loss	dB		10		
Switching Time	ns		400		LNA ↔ Bypass



Parameters	Units	Min	Typ	Max	Conditions
LNA _EN Control Current	μA		35		
LNA Turn On Time	ns		TBD		
Current Consumption	mA		14		
Receive Bypass Mode					
Insertion Loss	dB		5		
Input Power of P1dB	dBm		TBD		
Input Return Loss	dB		12		
Output Return Loss	dB		8		
ANT-RX Isolation	dB		TBD		Transmit Mode; TX_EN=High; Maximum Power
Bypass Current	μA		20		

(VDD = VCC = 3.3V, T = 25 °C, Unless Otherwise Noted)

Parameters	Units	Min	Typ	Max	Conditions
Frequency Range	GHz	5.15		5.85	
Transmit Mode					
Gain	dB	25	26	30	
Output Power	dBm		+17 +18 +21		VHT80/MCS9, -35dB EVM, Preamble only HT20/MCS7, -30dB EVM, Preamble Only HT20/MCS0, Mask Compliance
Current Consumption	mA		105 165 175 225	170 185 235	Modulated Signal, 100% duty cycle @ No RF @ +17dBm @ +18dBm @ +21dBm
Harmonics	dBm/MHz		-35 -50		Pout = +21dBm, HT20/MCS0 2 nd harmonics 3 rd harmonics
Input Return Loss	dB		8		
Output Return Loss	dB		10		



Parameters	Units	Min	Typ	Max	Conditions
Power Detector Output	V		0.25 0.55 0.6 0.75		@ No RF @+17dBm @+18dBm @+21dBm
Power Detector Output Impedance	ohm		1K		
ANT-RX Isolation	dB		TBD		Transmit Mode; TX_EN=High; Maximum Power
PA Switching Time	ns		TBD		
PA Turn-On Time from TX_EN edge	ns		TBD		
PA Turn-Off Time from TX_EN edge	ns		TBD		
Receive Mode – LNA On					
Gain	dB	9	12		
Input Power of P1dB	dBm		TBD		
Noise Figure	dB		3.5		
Input Return Loss	dB		10		
Output Return Loss	dB	6	8		
Switching Time	ns		400		LNA ↔ Bypass
LNA_EN Control Current	μA		35		
LNA Turn On Time	ns		TBD		
Current Consumption	mA		14		
Receive Bypass Mode					
Insertion Loss	dB		4.5		
Input Power of P1dB	dBm		TBD		
Input Return Loss	dB		10		
Output Return Loss	dB	6	8		
ANT-RX Isolation	dB		TBD		Transmit Mode; TX_EN=High; Maximum Power
Bypass Current	μA		20		



PRODUCT QUALIFICATION

Parameters	Units	Min	Max	Conditions
ESD – Human Body Mode	V		TBD	HBM
ESD – Charge Device Mode	V		TBD	CDM

ESD HANDLING:

Although this device is designed to be as robust as possible, electrostatic discharge (ESD) can damage this device. This device must be protected at all times from ESD when handling or transporting. Static charges may easily produce potentials of several kilovolts on the human body or equipment, which can discharge without detection.

Industry-standard ESD handling precautions should be used at all times.

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CONTROL LOGIC TABLE

TX_EN	LNA_EN	Mode of Operation
1	0	Transmit Mode
0	1	Receive LNA Mode
0	0	Bypass Mode

Note: "1" denotes high voltage state ($> 1.8V$)
"0" denotes low voltage state ($< 0.4V$) at Control Pins
"X" denotes the don't care state
1K Ω – 10K Ω series resistor may be required for each control line

ORDERING INFORMATION

Product Description	Product Part Number	Package Type	Package Quantity
KCT8536C: 5GHz WLAN Front-End Module	KCT8536C	7" tape and reel	3000pcs / reel

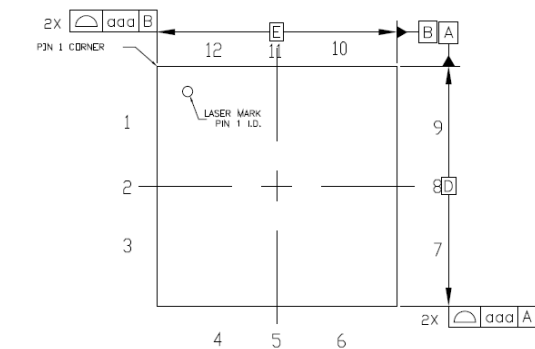


PCB LAYOUT FOOTPRINT (All Dimensions in mm)

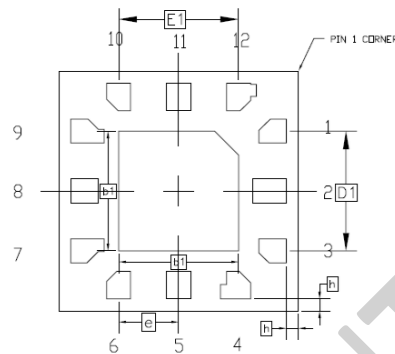




PACKAGE DIMENSIONS (All Dimensions in mm):

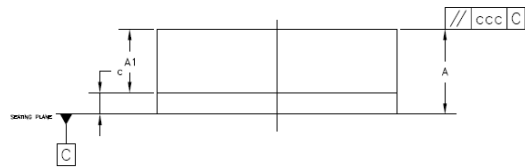


TOP VIEW



BOTTOM VIEW

SYMBOL	MIN	NOM	MAX
A	---	0.71	0.76
A1	---	0.53 BASIC	---
c	0.15	0.18	0.21
D	1.95	2.00	2.05
D1	---	1.00 BASIC	---
E	1.95	2.00	2.05
E1	---	1.00 BASIC	---
e	---	0.50 BASIC	---
b1	0.95	1.00	1.05
h	---	0.100 REF	---
aaa	---	0.10	---
ccc	---	0.20	---



SIDE VIEW

LAND SIZE(mm):

0.20x0.28: 2,5,7,9;

0.20x0.23: 1,3,4,6,8,10,11,12;