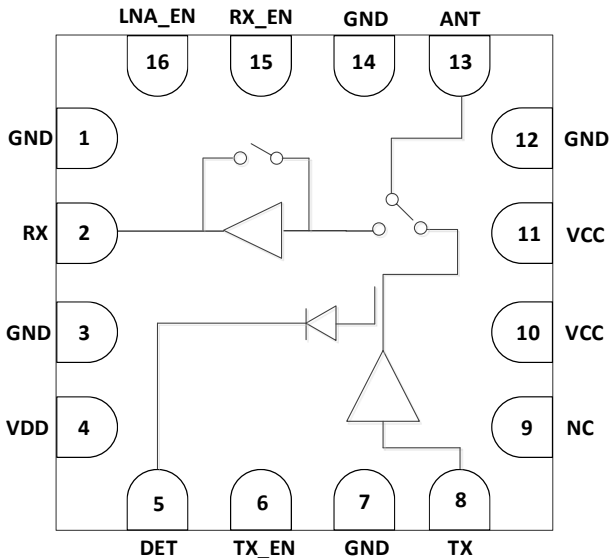




5GHz WLAN 802.11ac RFIC WITH PA, LNA AND SPDT



Description

KCT8525D 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. KCT8525D integrates a 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.

KCT8525D has simple and low-voltage control logic, and requires minimal external components. A power detector is also integrated for accurately monitoring of output power from the PA.

KCT8525D is assembled in a compact, low-profile 2.5x2.5x0.55mm 16-lead QFN package. KCT8525D 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

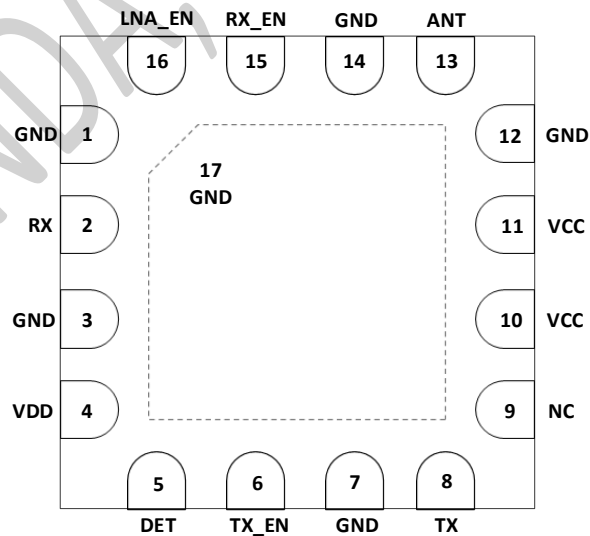
FEATURES

- ▶ Integrated high performance 5GHz PA, LNA with bypass and T/R switch
- ▶ Fully-matched input and output
- ▶ Integrated power detector
- ▶ Transmit gain: 30.5dB at 5V
- ▶ Receive gain: 13.5dB at 5V
- ▶ Noise Figure: 3.0dB at 5V
- ▶ Output power: +20.5dBm @ 1.8% DEVM, VHT80/MCS9, 5V
- ▶ Output power: +21.5dBm @ 3% DEVM, HT20/MCS7, 5V
- ▶ ESD protection circuitry on all PINs
- ▶ Minimal external components required
- ▶ Small package: QFN-16L 2.5mm x 2.5mm x0.55mm (MSL3, 260 °C per JEDEC J-STD-020)
- ▶ RoHS and REACH Compliant

PIN ASSIGNMENTS

Pin Number	Pin Name	Description
9	NC	Internally Not Connected
2	RX	RF Output Port from LNA or Bypass
4	VDD	LNA/Switch/Regulator Supply Voltage
5	DET	Detector Output Voltage
6	TX_EN	Input to Control TX Enable
8	TX	RF Input Port from the Transceiver
10,11	VCC	PA Supply Voltage
13	ANT	Antenna Port – RF Signal from the PA or RF Signal Applied to the LNA
15	RX_EN	Input to Control RX Enable
16	LNA_EN	Input to Control LNA Enable or Bypass Mode
1,3,7,12,14,17	GND	Ground – Must Be Connected to GND in the Application Circuit

PIN-OUT DIAGRAM (Top View)



ABSOLUTE MAXIMUM RATINGS

Parameters	Units	Min	Max	Conditions
DC Supply Voltage	V	-1	+8.0	VDD and VCC
Control Pin Voltage	V	-1	3.6	All Control Pins
Maximum TX Input Power (50 ohm load, No Damage)	dBm		+18	
LNA On Maximum RX Input Power (No Damage)	dBm		+18	
Bypass Mode Maximum RX Input Power (No Damage)	dBm		+18	
Storage Temperature	°C	-40	+150	
Junction Temperature	°C		+170	
Ruggedness (Pin =18dBm, No Permanent Damage)	VSWR		20:1	
Thermal Resistance(θ_{JC})	°C/W		+37	

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	Typical	Max	Conditions
DC Supply Voltage	V	4.75	5	5.25	VDD and VCC
Extended Operation Voltage	V	4.5		5.5	Functional with reduced performance
Control Pin Voltage "High"	V	1.8		3.6	
Control Pin Voltage "Low"	V	0		0.4	
Control Pin DC Current	μ A		260		
Operation Temperature	°C	-20	+25	+85	
Extended Operation Temperature	°C	-40		+85	Functional with reduced performance

KCT8525D ELECTRICAL SPECIFICATIONS

(VCC = VDD = 5V, T = 25°C, All Unused Ports Terminated with 50 Ω , 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	29	30.5	33	CW Signal; Input Power=-20dBm
Gain Flatness		-0.25		+0.25	Across any 80MHz bandwidth
Output Power	dBm	+19.5 +20.5 +23.5	+20.5 +21.5 +24.5		VHT80/MCS9/200μs, 1.8% DEVM, Preamble only HT20/MCS7/200μs, 3% DEVM, Preamble only HT20/MCS0, Mask Compliance
EVM Floor	dB		-41	-38	Pout=0dBm~16dBm, VHT80/MCS9, DEVM, Preamble only
Current Consumption	mA	165 250 260 340	180 280 300 390	195 310 340 440	Modulated signal, 100% duty cycle @ No RF @+20.5dBm @+21.5dBm @+24.5dBm
Harmonics	dBm/MHz		-35 -48	-30 -43	Pout = +24.5dBm, HT20/MCS0 2 nd harmonics 3 rd harmonics
Input Return Loss	dB	6	9		
Output Return Loss	dB	7	10		
Output Power of P1dB	dB	27	28.5	30	
Power Detector Output	V	0.15 0.53 0.80	0.2 0.60 0.87	0.25 0.67 0.94	Modulated signal, 100% duty cycle @ No RF @+20.5dBm @+24.5dBm
Power Detector Variations	dB	-0.5 -1.5		+0.5 +1.5	Power Range from 0dBm~+24dBm Nominal Load VSWR=3:1
Power Detector Output Impedance	ohm		2K		
Isolation	dB	37 8	40 11		ANT-RX TX-RX
PA Switching Time	ns		300		
PA Turn-On Time from TX_EN edge	ns		350		
PA Turn-Off Time from TX_EN edge	ns		350		
Receive Mode – LNA On					
Gain	dB	12	13.5	16	
Input Power of P1dB	dBm	-11	-9		
Noise Figure	dB		3.0	3.2	
Input Return Loss	dB	4	6		
Output Return Loss	dB	6	10		
2.4GHz Notch Filter Rejection	dB	18	22		



Parameters	Units	Min	Typ	Max	Conditions
Isolation	dB	28 39	31 42		ANT-TX RX-TX
Switching Time	ns		200		LNA \leftrightarrow Bypass
LNA Turn On Time	ns		300		
Current Consumption	mA	15	20	25	
Receive Bypass Mode					
Insertion Loss	dB	3	4.5	6	
Input Power of P1dB	dBm	18	20		CW
Input Return Loss	dB	7	10		
Output Return Loss	dB	7	10		
Isolation	dB	40 40	45 49		ANT-TX RX-TX
Bypass Current	μ A	200	400	600	

PRODUCT QUALIFICATION

Parameters	Units	Min	Max	Conditions
ESD – Human Body Mode	V		2500	HBM
ESD – Charge Device Mode	V		2000	CDM
ESD – Machine Mode	V		50	MM
HTOL	/	1000hours pass		Sample quantity=80pcs Temp = 125°C, 1000hours VCC=5.5V, TX_EN=3.3V Output power=25dBm

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.



CONTROL LOGIC TABLE

TX_EN	LNA_EN	RX_EN	Mode of Operation
1	0	0	Transmit Mode
0	1	1	Receive LNA Mode
0	0	1	Bypass Mode
0	0	0	Shutdown Mode
All Others			Unsupported (No Damage)

Note: "1" denotes high voltage state (>1.8V)
"0" denotes low voltage state (<0.4V) at Control Pins

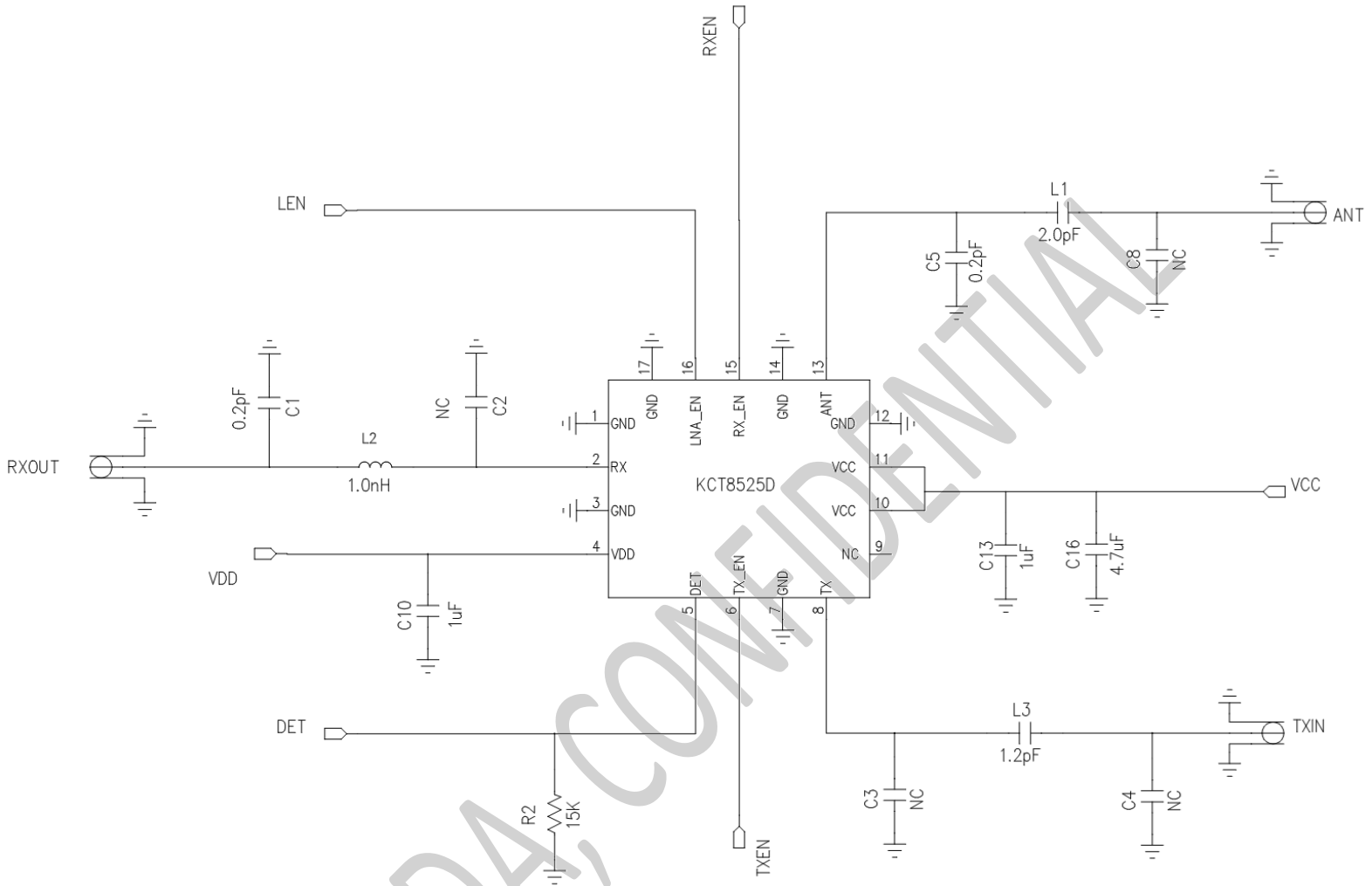
ORDERING INFORMATION

Product Description	Product Part Number	Package Type	Package Quantity
KCT8525D: 5GHz WLAN Front-End Module	KCT8525D	7" tape and reel	3000pcs / reel

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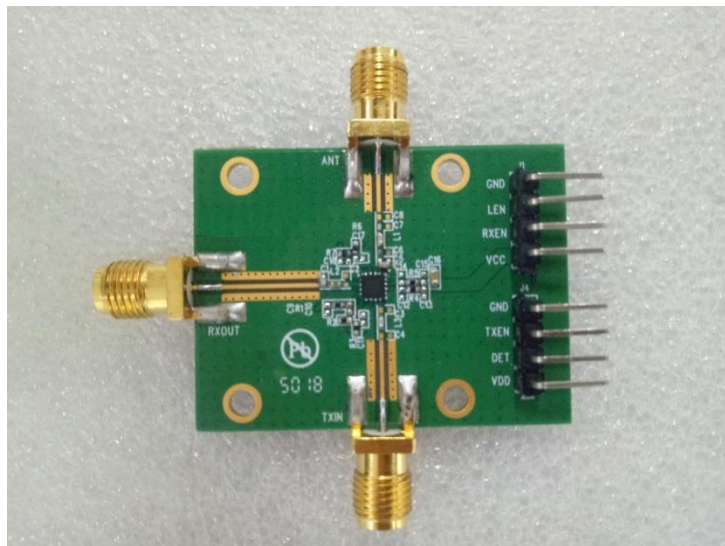


APPLICATION SCHEMATIC





EVB PICTURE and EVB BOM



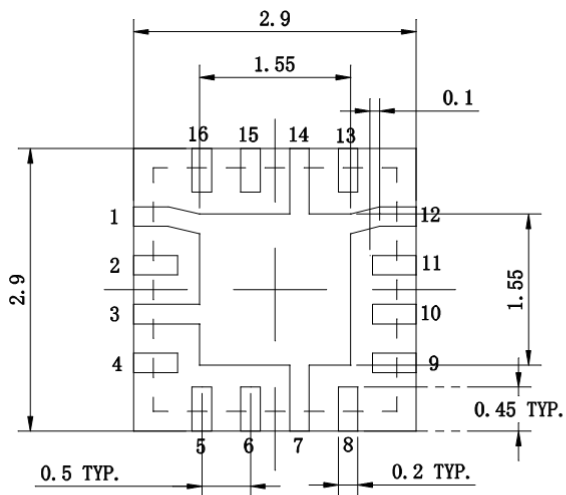
[EVB Assembly]

Reference	Value	Footprint	Notes
C1,C5	0.2PF	0402	X5R/X7R
L1	2.0PF	0402	X5R/X7R
C10,C13	1 μ F	0402	X5R/X7R
C16	4.7 μ F	0603	X5R/X7R
R2	15K	0402	Det. load
L2	1.0nH	0402	LQG15HS
L3	1.2PF	0402	X5R/X7R

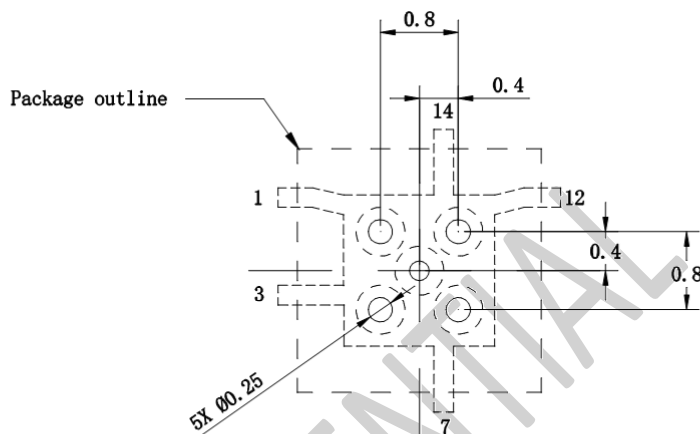
[EVB BOM]



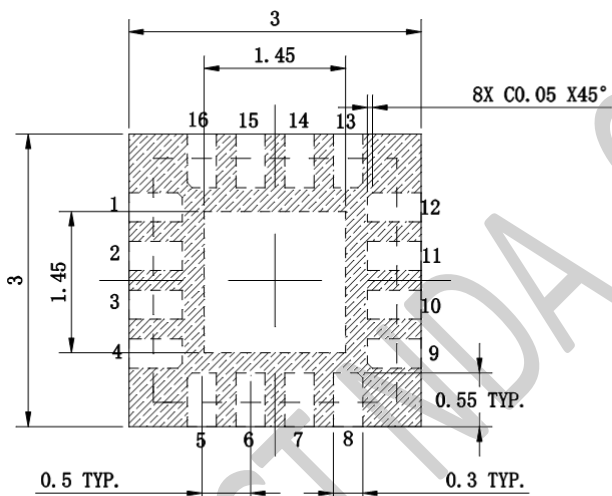
PCB LAYOUT FOOTPRINT (All Dimensions in mm)



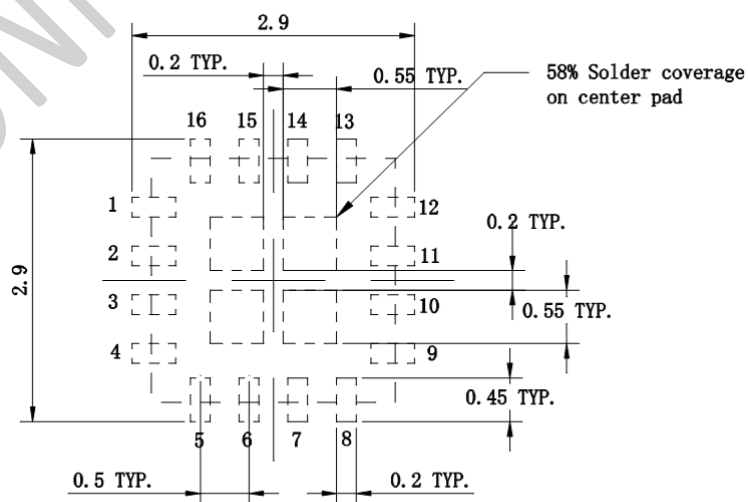
Board Metal



Via Pattern



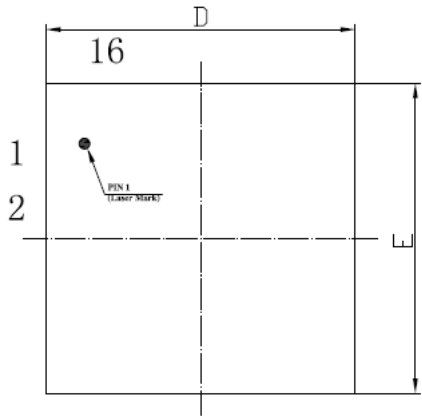
Solder Mask Pattern



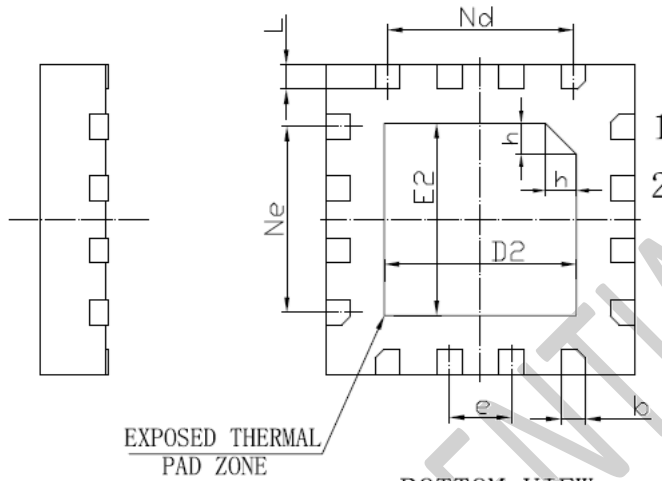
Stencil Pattern



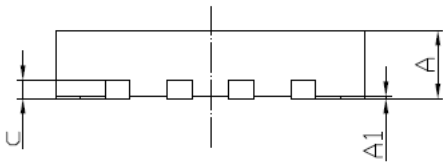
Package Dimensions (All dimensions are in millimeters):



TOP VIEW



BOTTOM VIEW



SIDE VIEW

SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	0.50	0.55	0.60
A1	0	0.02	0.05
b	0.15	0.20	0.25
c	0.10	0.15	0.20
D	2.40	2.50	2.60
D2	1.45	1.55	1.65
e	0.50BSC		
Ne	1.50BSC		
Nd	1.50BSC		
E	2.40	2.50	2.60
E2	1.45	1.55	1.65
L	0.15	0.20	0.25
h	0.20	0.25	0.30
L/序数体尺寸 (mil)	73X73		

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