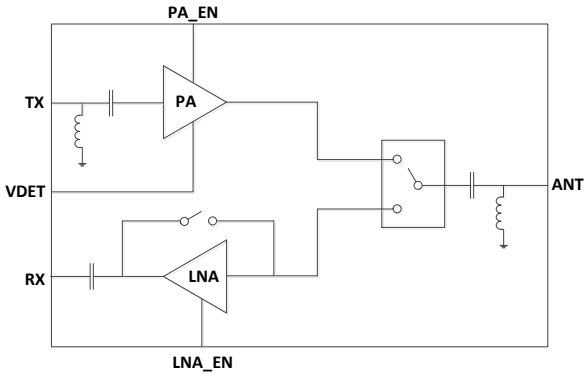
康希通信科技（上海）有限公司
Kangxi Communication Technologies (Shanghai) Co., Ltd.

KCT8535C
PRODUCT DATASHEET

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



Description

KCT8535C 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. KCT8535C 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.

KCT8535C 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.

KCT8535C is assembled in a compact, low-profile 2.0x2.0x0.75mm 12-lead LGA package. KCT8535C 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

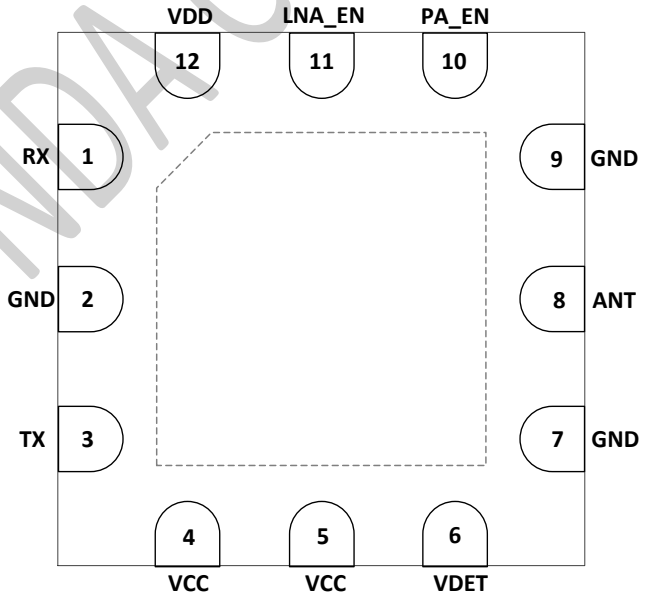
FEATURES

- Integrated high performance 5GHz PA,LNA with bypass and SPDT
- Fully-matched input and output
- Integrated power detector
- Transmit gain: 28dB at 3.3V&5V
- Receive gain: 12dB at 3.3V&5V
- Output power: +18dBm @ 1.8% DEVM, VHT80/MCS9, 3.3V
- +21.5dBm @ 1.8% DEVM, VHT80/MCS9, 5V
- Output power: +19dBm @ 3% DEVM, HT40/MCS7, 3.3V
- +22.5dBm @ 3% DEVM, HT40/MCS7, 5V
- ESD protection circuitry on all PINs
- DC decoupled RF ports
- Minimal external components required
- Small package: LGA12-pin, 2.0mm x 2.0mm x0.75mm (MSL3, 260C 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 (Top View)



ABSOLUTE MAXIMUM RATINGS

Parameters	Units	Min	Max	Conditions
DC Supply Voltage	V	-1.0	+7.5	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		+10	
LNA On Maximum RX Input Power (No Damage)	dBm		+10	
Bypass Mode Maximum RX Input Power (No Damage)	dBm		+15	
Storage Temperature	°C	-40	+150	
Junction Temperature	°C		+175	
Thermal Resistance (θ_{JC})	°C/W		+35	
Ruggedness (Pin =10dBm, No Permanent Damage)	VSWR		20:1	

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	3.0	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	μA		400		
Operation Temperature	°C	-40	+25	+85	

KCT8535C ELECTRICAL SPECIFICATIONS

(T = 25 C, Unless Otherwise Noted)

Parameters	Units	Min	Typ	Max	Conditions
Frequency Range	GHz	5.15		5.85	

Parameters	Units	Min	Typ	Max	Conditions
Transmit Mode (VDD=VCC=3.3V)					
Gain	dB	26.5	28	30	CW Signal; Input Power=-20dBm
Gain Flatness	dB	-1.2		+1.2	Across any 160MHz bandwidth
Output Power	dBm	+17 +18 +21	+18 +19 +22		VHT80/MCS9/200μs, 1.8% DEVM, Preamble only HT40/MCS7/200μs, 3% DEVM, Preamble only HT20/MCS0, Mask Compliance
Current Consumption	mA	 180 230 245 320	 200 260 275 350	 220 290 305 400	Modulated signal, 100% duty cycle @ No RF @+18dBm @+19dBm @+22dBm
Harmonics	dBm/MHz		 -35 -45	 -30 -40	Pout = +22dBm, HT20/MCS0 2^{nd} harmonics 3^{rd} harmonics
Input Return Loss	dB	8	12		
Output Return Loss	dB	8	10		
Output Power of P1dB	dBm	23	25.5		
Isolation	dB	30 7	33 10		ANT to RX TX to TX
Power Detector Output	V	0.27 0.50 0.55 0.72	0.32 0.55 0.62 0.8	0.37 0.63 0.68 0.88	@ No RF @+18dBm @+19dBm @+22dBm
Power Detector Output Impedance	ohm		2K		
PA Switching Time	ns		300	400	From 50% logic level change to 90%/10% power level TX ←→ SD
Transmit Mode (VDD=VCC=5V)					
Gain	dB	27	28	32	CW Signal; Input Power=-20dBm
Gain Flatness	dB	-1.2		+1.2	Across any 160MHz bandwidth
Output Power	dBm	+20.5 +21.5 +23.5	+21.5 +22.5 +24.5		VHT80/MCS9/200μs, 1.8% DEVM, Preamble only HT40/MCS7/200μs, 3% DEVM, Preamble only HT20/MCS0, Mask Compliance
Current Consumption	mA	230	250	265	Modulated signal, 100% duty cycle @ No RF

Parameters	Units	Min	Typ	Max	Conditions
		310	330	350	@+21.5dBm
		330	360	395	@+22.5dBm
		400	440	490	@+24.5dBm
Harmonics	dBm/MHz				Pout = +24.5dBm, HT20/MCS0
			-30	-25	2nd harmonics
			-45	-40	3rd harmonics
Input Return Loss	dB	9	13		
Output Return Loss	dB	8	10		
Output Power of P1dB	dBm	26	28		
Isolation	dB	33 8	35 10		ANT to RX TX to TX
Power Detector Output	V	0.27	0.32	0.37	@ No RF
		0.46	0.58	0.65	@+21.5dBm
		0.58	0.65	0.73	@+22.5dBm
		0.68	0.78	0.85	@+24.5dBm
Power Detector Output Impedance	ohm		2K		
PA Switching Time	ns		300	400	From 50% logic level change to 90%/10% power level TX ←→ SD
Receive Mode – LNA On					
Gain	dB	11	12	15	
Input Power of P1dB	dBm	-12 -13.5	-10 -12		VCC=VDD=3.3V VCC=VDD=5.0V
Noise Figure	dB		3.5	3.8	
Input Return Loss	dB	8	10		
Output Return Loss	dB	6	10		
Isolation	dB	17 24	20 26		ANT-TX RX-TX
Switching Time	ns		400		LNA ←→ Bypass LNA ←→ TX
Current Consumption	mA		14		
Receive Bypass Mode					
Insertion Loss	dB	2.5	3.5	5	
Input Power of P1dB	dBm	+11	+13		VCC=VDD=5.0V

Parameters	Units	Min	Typ	Max	Conditions
Input Return Loss	dB	8	12		
Output Return Loss	dB	6	8		
Isolation	dB	30 28	33 30		ANT-TX RX-TX
Bypass Current	μA	10	20	35	

PRODUCT QUALIFICATION

Parameters	Units	Min	Max	Conditions
ESD – Human Body Mode	V		1000	HBM
ESD – Charge Device Mode	V		500	CDM
ESD – Machine Mode	V		50	MM
HTOL	/	1000hours pass		Sample quantity ≧ 77pcs Temp = 125 °C, 1000hours, VCC=5.5V, TX_EN=3.3V, Output power =27dBm

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

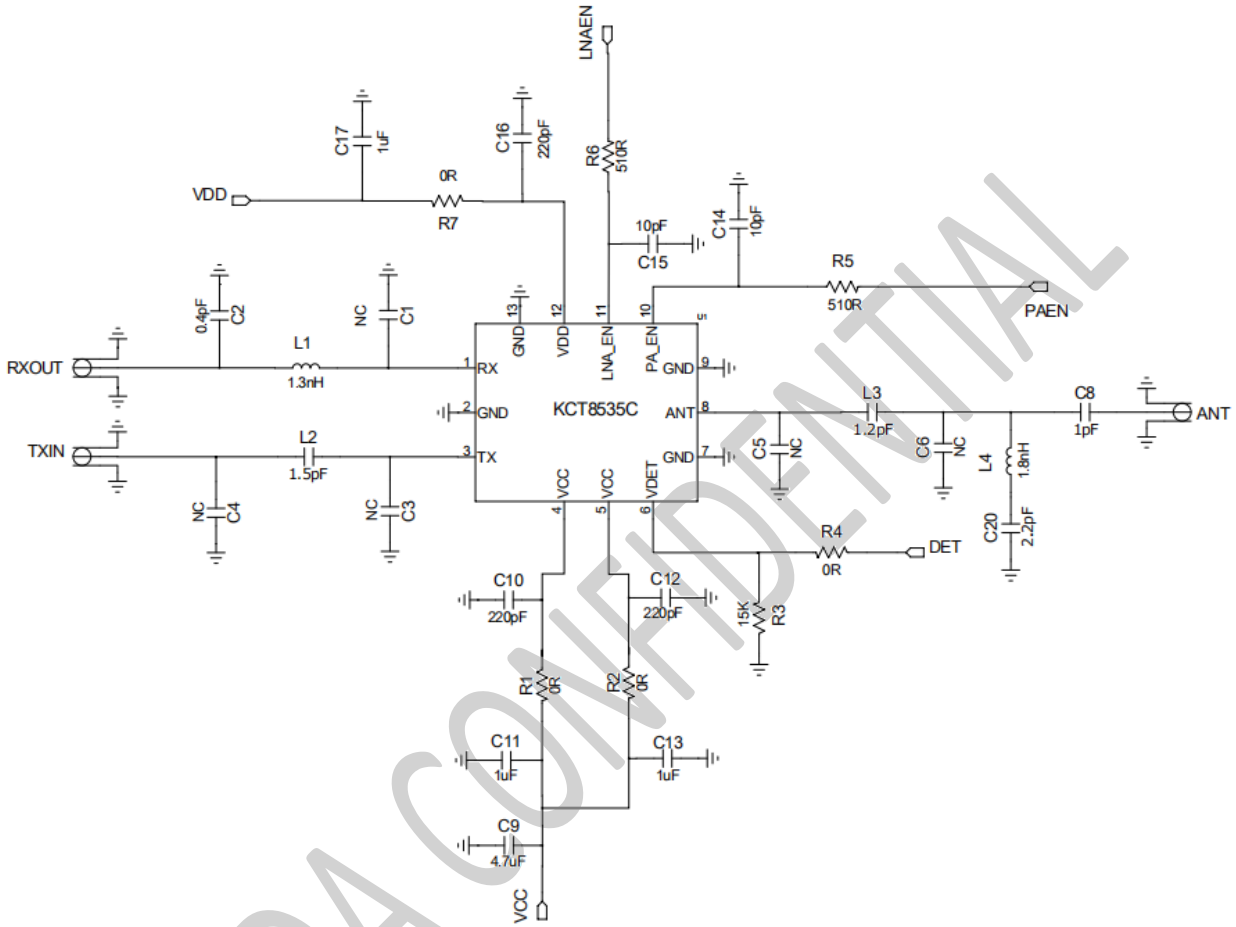
TX_EN	LNA_EN	Mode of Operation
1	0	Transmit Mode
0	1	Receive LNA Mode
0	0	Bypass Mode

Note: "1" denotes high voltage state (> 1.8V) at Control Pins
"0" denotes low voltage state (<0.4V) at Control Pins
1KΩ – 10KΩ series resistor may be required for each control line

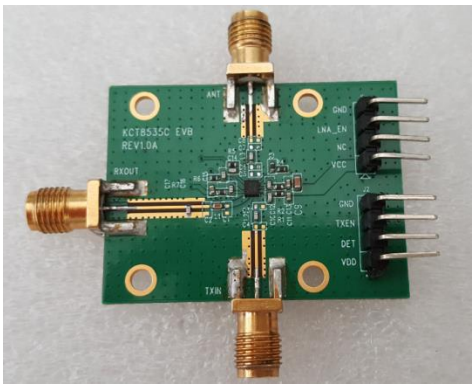
ORDERING INFORMATION

Product Description	Product Part Number	Package Type	Package Quantity
KCT8535C: 5GHz WLAN Front-End Module	KCT8535C	7'' tape and reel	3000pcs / reel

APPLICATION SCHEMATIC (VDD=3.3V)



EVB PICTURE and EVB BOM (VDD=3.3V)

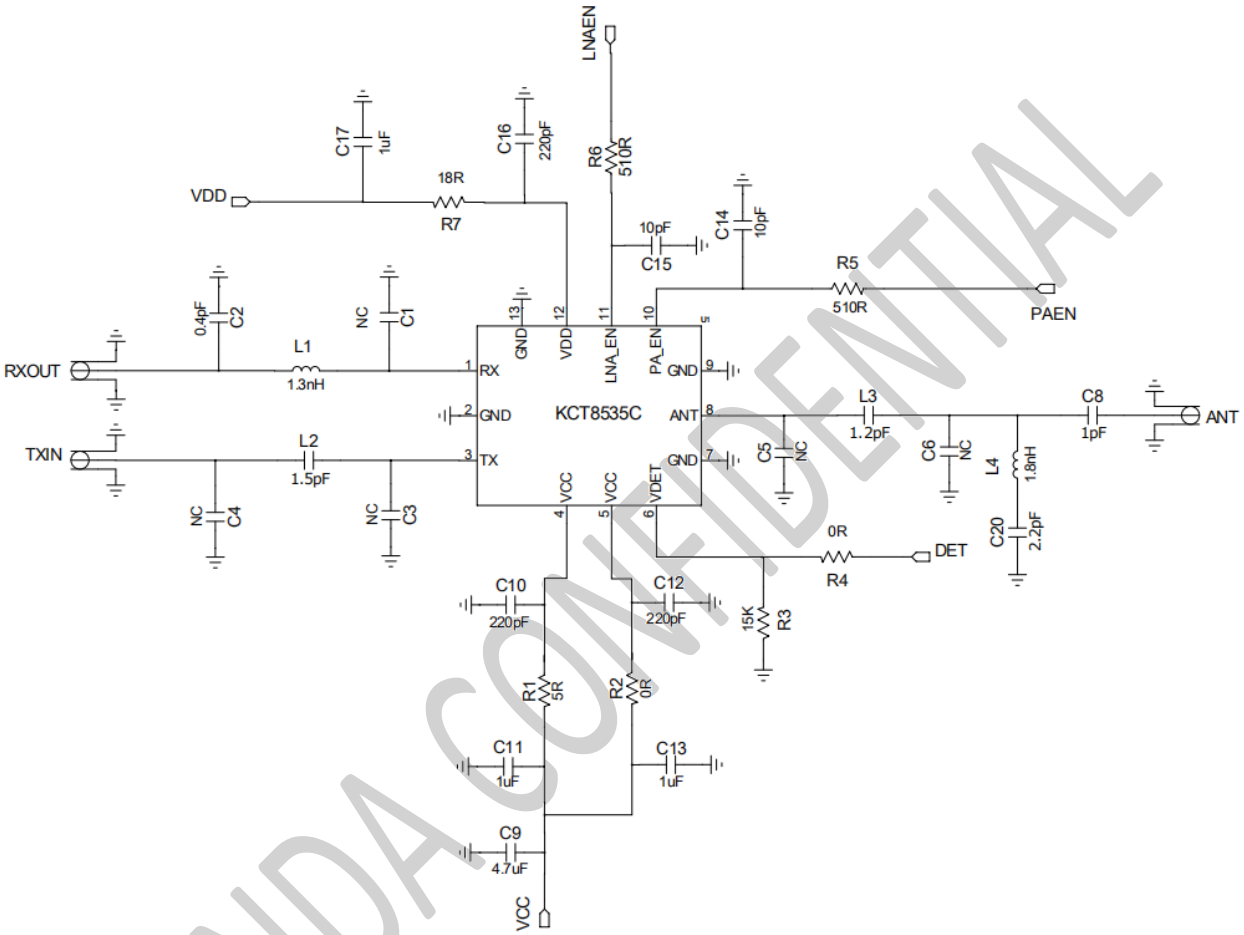


[EVB Assembly]

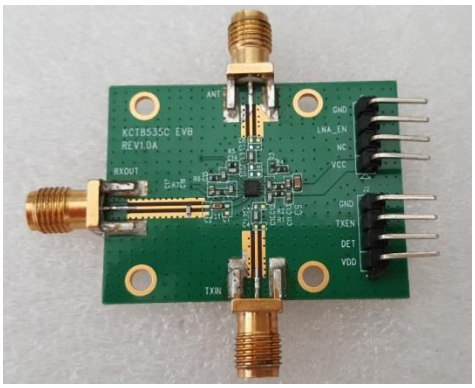
Reference	Value	Footprint	Notes
L1	1.3nH	0402	LQG15HS
L2	1.5PF	0402	X5R/X7R
L3	1.2PF	0402	X5R/X7R
L4	1.8nH	0402	X5R/X7R
C2	0.4PF	0402	X5R/X7R
C8	1PF	0402	X5R/X7R
C9	4.7UF	0603	X5R/X7R
C10,C12,C16	220PF	0402	X5R/X7R
C11,C13,C17	1UF	0402	X5R/X7R
C14,C15	10PF	0402	X5R/X7R
C20	2.2PF	0402	X5R/X7R
R1,R2,R4,R7	0ohm	0402	Series Pad
R3	15Kohm	0402	Det. load
R5,R6	510ohm	0402	ROHM

[EVB BOM]

APPLICATION SCHEMATIC (VDD=5V)



EVB PICTURE and EVB BOM (VDD=5V)

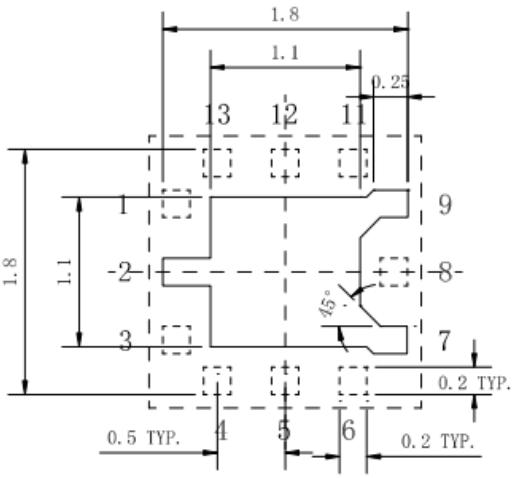


[EVB Assembly]

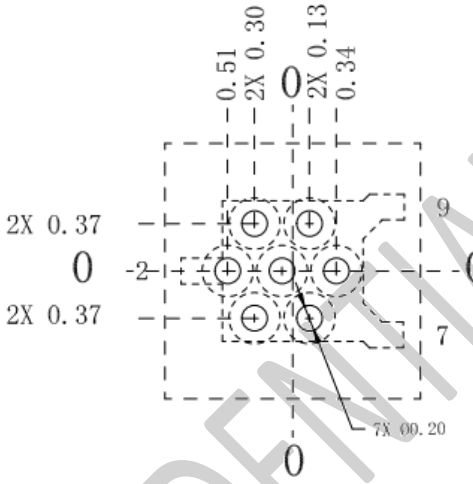
Reference	Value	Footprint	Notes
L1	1.3nH	0402	LQG15HS
L2	1.5PF	0402	X5R/X7R
L3	1.2PF	0402	X5R/X7R
L4	1.8nH	0402	X5R/X7R
C2	0.4PF	0402	X5R/X7R
C8	1PF	0402	X5R/X7R
C9	4.7UF	0603	X5R/X7R
C10,C12,C16	220PF	0402	X5R/X7R
C11,C13,C17	1UF	0402	X5R/X7R
C14,C15	10PF	0402	X5R/X7R
C20	2.2PF	0402	X5R/X7R
R1	5ohm	0402	Series Pad
R2,R4	0ohm	0402	Series Pad
R3	15Kohm	0402	Det. load
R5,R6	510ohm	0402	ROHM
R7	18ohm	0402	Series Pad

[EVB BOM]

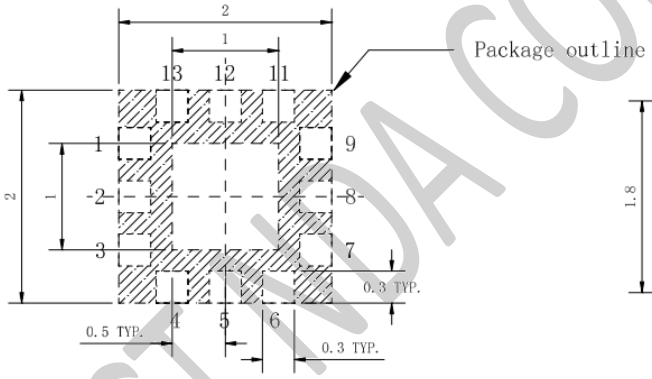
PCB LAYOUT FOOTPRINT (All dimensions are in millimeters)



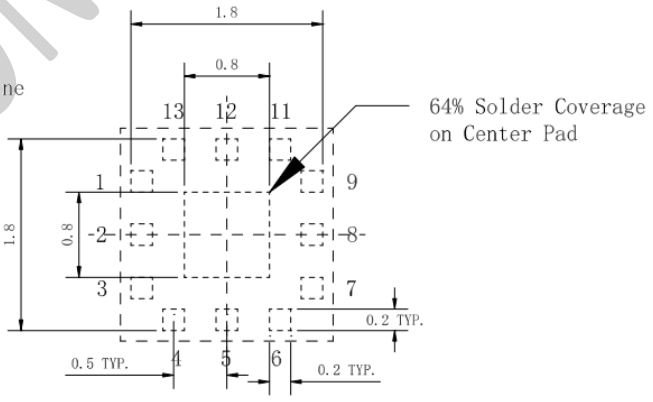
Board Metal



Via Pattern

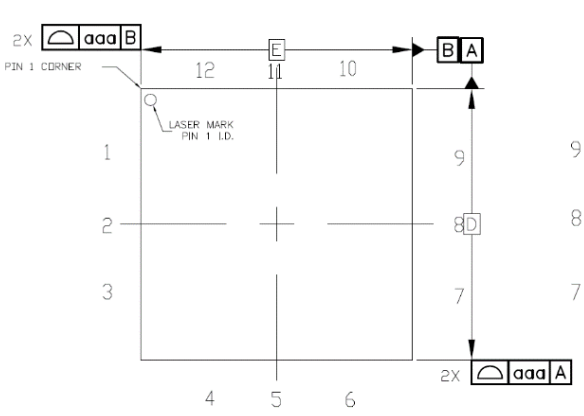


Solder Mask Pattern

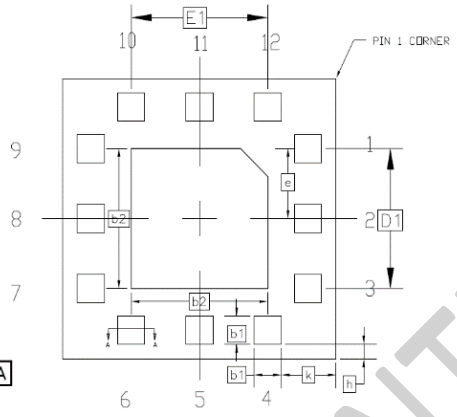


Stencil Pattern

PACKAGE DIMENSIONS (All Dimensions in mm)

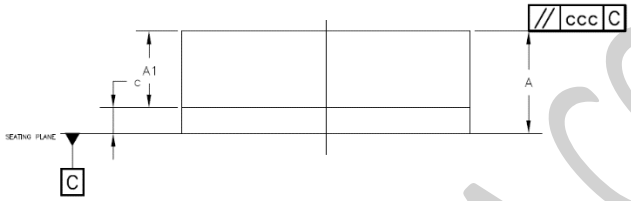


TOP VIEW



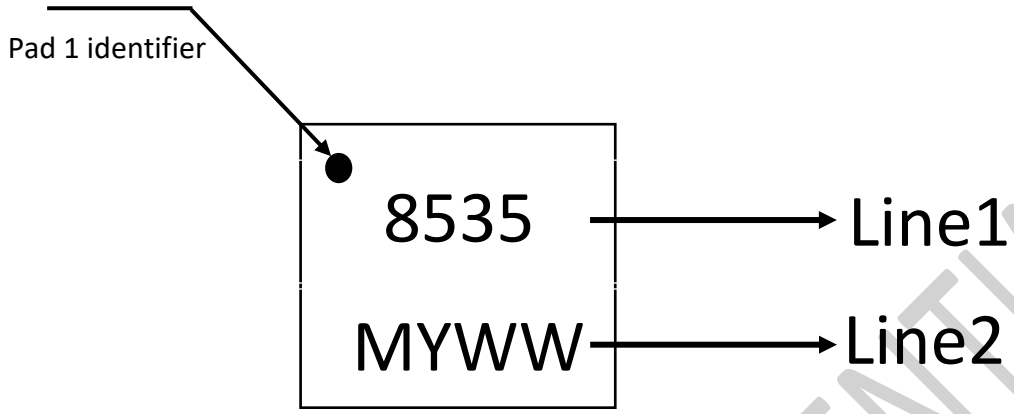
BOTTOM VIEW

SYMBOL	MILLIMETER		
	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	0.15	0.20	0.25
b2	0.95	1.00	1.05
k	0.400 REF		
h	0.105 REF		
aaa	0.10		
ccc	0.20		



SIDE VIEW

PART MARKING



Line	Marking	Description
1	8535	Product name
2	MYWW	M: Manufacturer Code YWW: Y year WW week