RDA6625 DATA SHEET

Version 1.0

2011-9-13

RDA6625
Front-end Module for
Quad-Band GSM Wireless Communication

RDA6625 Front-end Module

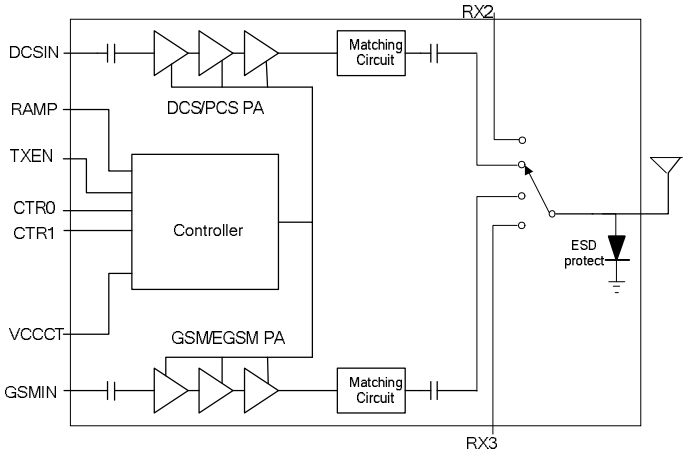
The RDA6625 is a high-power, high-efficiency quad-band front-end Module. This device is designed for GSM850, EGSM900, DCS1800, PCS1900 handheld digital cellular equipment. The module consists of quad band power amplifiers and antenna switch. The power amplifiers, switch and their controller are fabricated with GaAs HBT and CMOS respectively.

The device package is 5mm×5mm×1.1mm 32-pins LGA. The input and output are realized on-chip matched to 50Ω. The RDA6625 requires few external components, simplifying PCB layout and reducing PCB board space.

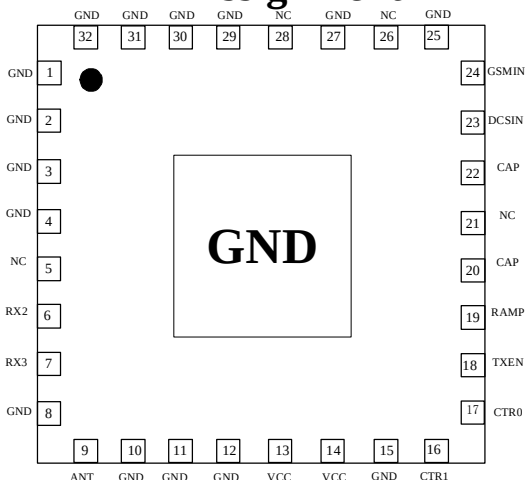
Features

- Ultra-Small 5mm×5mm Package
- Quad-Band Power Amplifier with RF switches
- ESD protection at Antenna
- Complete Power Control Solution
- High efficiency
- Low supply voltage (3~4.5V)
- Input/Output matched @ 50 Ω
- Advanced HBT/CMOS process

Function Block Diagram



Pin Assignment



Pin Name definition

Pin	Pin Name	Description		Pin	Pin Name	Description
1~4	GND	Ground		18	TXEN	TX enable pin
5	NC	Reserved		19	RAMP	Ramp control pin
6	RX2	RX port		20	CAP	Connected capacitor
7	RX3	RX port		21	NC	Reserved
8	GND	Ground		22	CAP	Connected capacitor
9	ANT	Antenna port		23	DCSIN	DCS/PCS RF input port
10~12	GND	Ground		24	GSMIN	GSM/EGSM RF input port
13~14	VCC	Power supply		25	GND	Ground
15	GND	Ground		26,28	NC	Reserved
16	CTR1	Control logic pin		27	GND	Ground
17	CTR0	Control logic pin		29~32	GND	Ground

Preliminary Electrical Target Specifications

The following tables list the electrical characteristics of the RDA6625 module. Table 1 lists the absolute maximum ratings. Table 2 shows the recommend operating conditions for this device. Table 3 shows the power truth table. Table 4 shows the electrical specifications for GSM850 mode nominal operating condition. Table 5 shows the electrical specifications for EGSM900 mode nominal operating condition. Table 6 shows the electrical specifications for DCS1800 mode nominal operating condition. Table 7 shows the electrical specifications for PCS1900 mode nominal operating condition. Table 8 shows the electrical specifications for receiver mode nominal operating condition.

Table 1. Absolute Maximum Ratings

Parameter	Rating	Unit
Supply Voltage (RF off)	-0.3 to 5	V
Power Control Voltage (Vramp)	-0.3 to 3	V
Input RF Power	+10	dBm
Max Duty Cycle	50	%
Operating Case Temperature	-30 to +110	℃
Storage Temperature	-30 to +150	℃

Table 2. Recommended Operating Conditions

Parameter	Minimum	Nominal	Maximum	Unit
Supply Voltage	3	3.6	4.5	V
Power Control Voltage (V_{RAMP})	0.23		1.7	V
TX Enable “ON”	1.5			V
TX Enable “OFF”			0.5	V
Logic control “High”	1.5			V
Logic control “Low”			0.5	V
Input RF Power	1		6	dBm
Operating Temperature	-20	+25	+80	℃

Table 3. Truth Table

	CTR1	CTR0	TXEN	RAMP
Default	0	0	0	-
Power Down	0	0	0	
GSM TX On	1	0	1	-
DCS TX On	1	1	1	-
RX2 On	1	0	0	-
RX3 On	1	1	0	-

Note 1:

‘0’ denotes logic low which is typical 0V~0.5V. ‘1’ denotes logic high which is typical 1.5V~3V.

Table 4. Electrical Specifications for GSM850 Mode Application (1)

Parameters	Condition	Min.	Typ.	Max.	Unit
Frequency Range	-	824		849	MHz
Input Power Range	-	1	3	6	dBm
Maximum Output Power	V_{RAMP}=1.7V	33	33.5		dBm
Total Efficiency	V_{RAMP}=1.7V; Pout=33dBm		40		%
Output Noise Power	RBW=100kHz; 20MHz offset; Pout≤33dBm		-83	-80	dBm
Harmonics	Pout≤33dBm		-35	-30	dBm
Forward Isolation 1	TXENA='0'; Pin=6dBm		-65		dBm
Forward Isolation 2	TXENA='1'; Pin=6dBm; V_{RAMP}≤0.10V		-40		dBm
Total Supply Current	V_{RAMP}=1.7V; Pout=33dBm		1.4		A
Input VSWR		-	1.8:1	-	-
Stability (Spurious output) (2)	12:1 VSWR	-	-	-70	dBc
Ruggedness (No damage) (3)	20:1 VSWR	-	-	-	-
Power Control Range	V_{RAMP}=0.23V to 1.7V	40			dB

Notes:

(1). V_{CC}=3.6V, Freq = 835MHz, Tc = 25℃, unless otherwise specified

(2). Vcc=3.6V, Pin=3dBm, tested on evaluation board

(3). All phase, time=10s

Table 5. Electrical Specifications for EGSM900 Mode Application (4)

Parameters	Condition	Min.	Typ.	Max.	Unit
Frequency Range	-	880		915	MHz
Input Power Range	-	1	3	6	dBm
Maximum Output Power	V_{RAMP}=1.7V	33	33.5		dBm
Total Efficiency	V_{RAMP}=1.7V; Pout=33dBm		40		%
Output Noise Power	RBW=100kHz; 20MHz offset; Pout≤33dBm		-83	-80	dBm
Harmonics	Pout≤33dBm		-35	-30	dBm
Forward Isolation 1	TXENA='0'; Pin=6dBm		-65		dBm
Forward Isolation 2	TXENA='1'; Pin=6dBm; V_{RAMP}≤0.10V		-40		dBm
Total Supply Current	V_{RAMP}=1.7V; Pout=33dBm		1.4		A
Input VSWR		-	1.8:1	-	-
Stability (Spurious output) (5)	12:1 VSWR	-	-	-70	dBc
Ruggedness (No damage) (6)	20:1 VSWR	-	-	-	-
Power Control Range	V_{RAMP}=0.23V to 1.7V	40			dB

Notes:

(4). V_{CC}=3.6V, Freq = 900MHz, Tc = 25℃, unless otherwise specified

(5). Vcc=3.6V, Pin=3dBm, tested on evaluation board

(6). All phase, time=10s

Table 6. Electrical Specifications for DCS1800 Mode Application (7)

Parameters	Condition	Min.	Typ.	Max.	Unit
Frequency Range	-	1710		1785	MHz
Input Power Range	-	1	3	6	dBm
Maximum Output Power	V_{RAMP}=1.7V	30	30.5		dBm
Total Efficiency	V_{RAMP}=1.7V; Pout=30dBm		35		%
Output Noise Power	RBW=100kHz; 20MHz offset; Pout≤30dBm		-83	-80	dBm
Harmonics	Pout≤30dBm		-35	-30	dBm
Forward Isolation 1	TXENA='0'; Pin=6dBm		-65		dBm
Forward Isolation 2	TXENA='1'; Pin=6dBm; V_{RAMP}≤0.10V		-40		dBm
Total Supply Current	V_{RAMP}=1.7V; Pout=30dBm		0.9		A
Input VSWR		-	1.3:1	-	-
Stability (Spurious output) (8)	12:1 VSWR	-	-	-70	dBc
Ruggedness (No damage) (9)	20:1 VSWR	-	-	-	-
Power Control Range	V_{RAMP}=0.23V to 1.7V	40			dB

Notes:

(7). V_{CC}=3.6V, Freq = 1750MHz, Tc = 25℃, unless otherwise specified

(8). Vcc=3.6V, Pin=3dBm, tested on evaluation board

(9). All phase, time=10s

Table 7. Electrical Specifications for PCS1900 Mode Application (10)

Parameters	Condition	Min.	Typ.	Max.	Unit
Frequency Range	-	1850		1910	MHz
Input Power Range	-	1	3	6	dBm
Maximum Output Power	V_{RAMP}=1.7V	30	30.5		dBm
Total Efficiency	V_{RAMP}=1.7V; Pout=30dBm		35		%
Output Noise Power	RBW=100kHz; 20MHz offset; Pout≤30dBm		-83	-80	dBm
Harmonics	Pout≤30dBm		-35	-30	dBm
Forward Isolation 1	TXENA='0'; Pin=6dBm		-65		dBm
Forward Isolation 2	TXENA='1'; Pin=6dBm; V_{RAMP}≤0.10V		-40		dBm
Total Supply Current	V_{RAMP}=1.7V; Pout=30dBm		0.9		A
Input VSWR		-	1.3:1	-	-
Stability (Spurious output) (11)	12:1 VSWR	-	-	-70	dBc
Ruggedness (No damage) (12)	20:1 VSWR	-	-	-	-
Power Control Range	V_{RAMP}=0.23V to 1.7V	40			dB

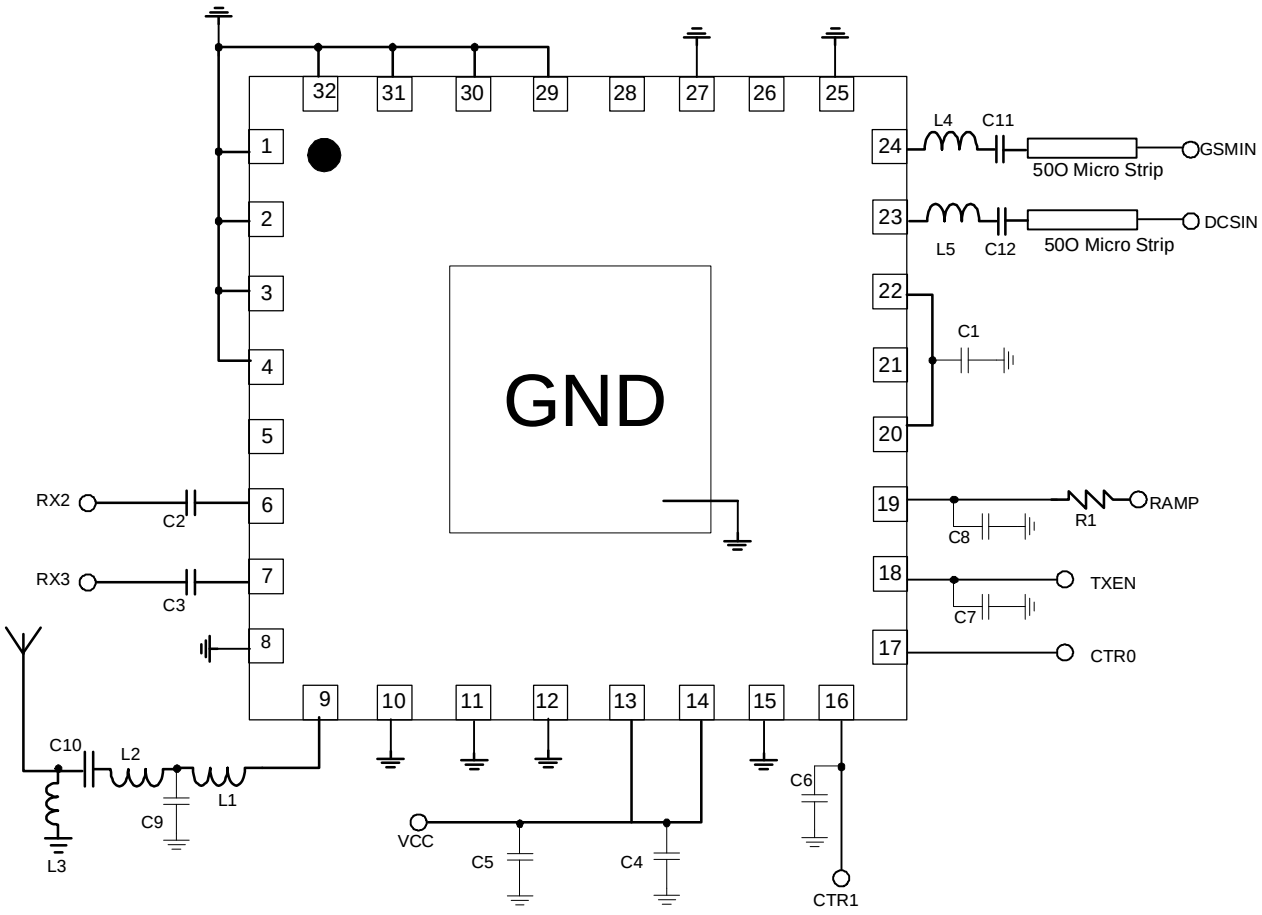
Notes:
(7). V_{CC}=3.6V, Freq = 1880MHz, Tc = 25℃, unless otherwise specified
(8). Vcc=3.6V, Pin=3dBm, tested on evaluation board
(9). All phase, time=10s

Table 6. Electrical Specifications for Receive Mode Application

Parameters	Condition	Min.	Typ.	Max.	Unit
Frequency Range(13)	-	869	-	1990	MHz
RX Insertion Loss(14)	-	-	1.3	-	dB
Leakage Pout at RX3 port, GSM/EGSM TX mode ON	GSM/EGSM TX mode on, Pout=33dBm at ANT port		-5	1	dBm
Leakage Pout at RX2 port, DCS/PCS TX mode ON	DCS/PCS TX mode on, Pout=30dBm at ANT port		-5	1	dBm
Input VSWR		-	2:1	-	-

Note:
(13). GSM850=869~894MHz,EGSM900=925~960MHz,DCS1800=1805~1880MHz,PCS1900=1930~1990MHz
(14). Tested on evaluation board

Test Circuitry for RDA6625 Module

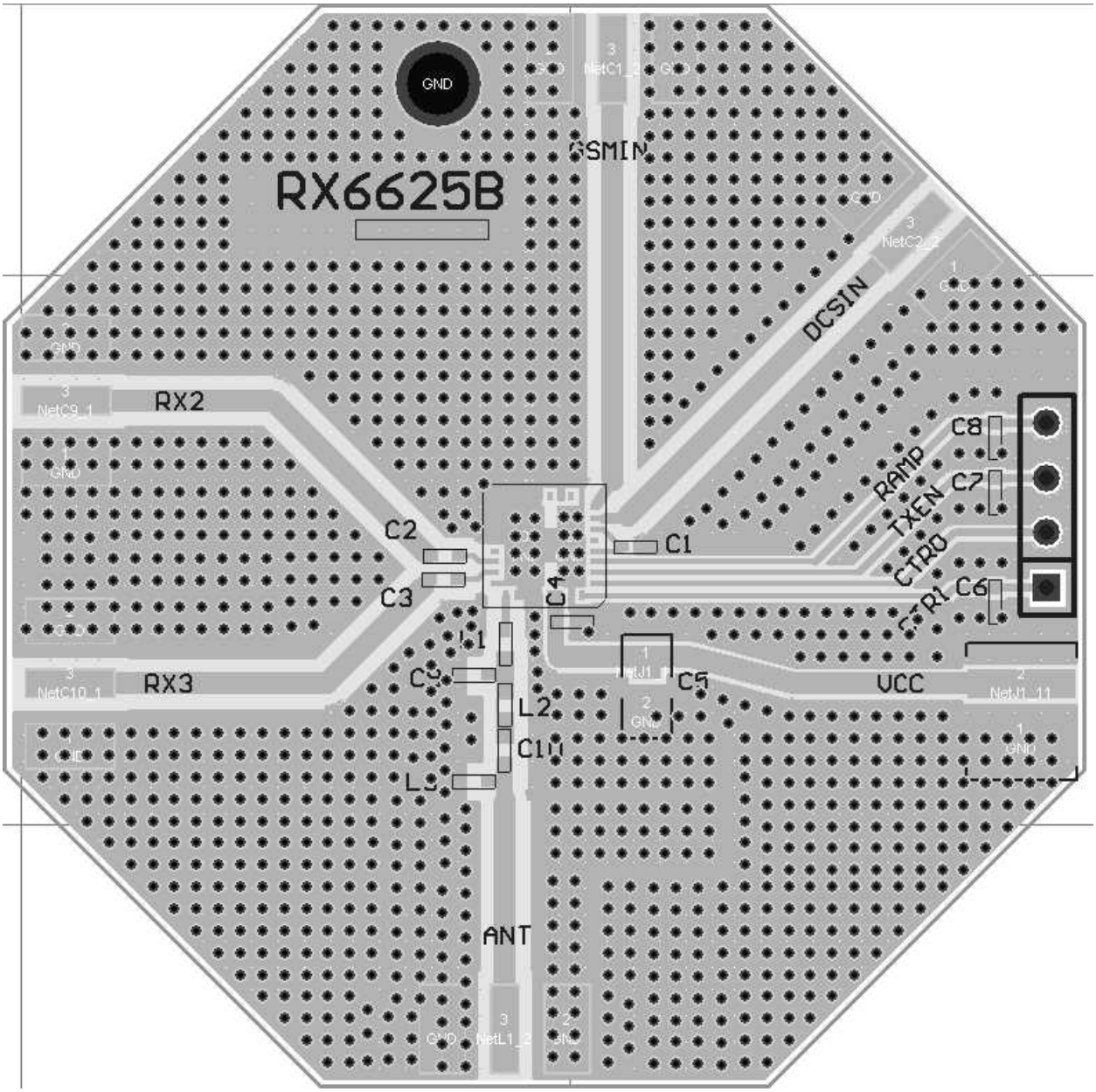


Component Value of Test Circuitry

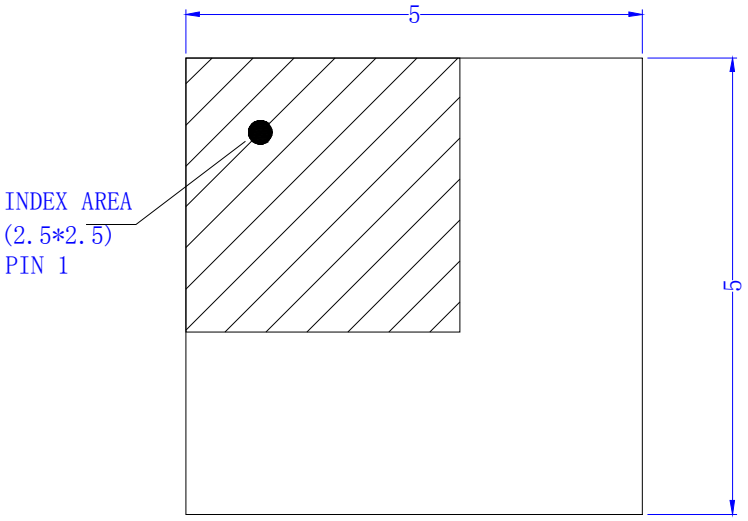
Component	Value		Component	Value
C1	1000pF		C6	1000pF
C2	10pF		C7	1000pF
C3	10pF		C8	1000pF
C4	1000pF		C9	1.2pF
C5	22uF		C10	4.7pF
R1	10K		L2	3.9nH
L1	2nH		L3	27nH
L4	9.1nH		C11	3.9pF
L5	6.8nH		C12	1.2pF

* C1, C4 and L4 should be placed as close as possible to the chip.

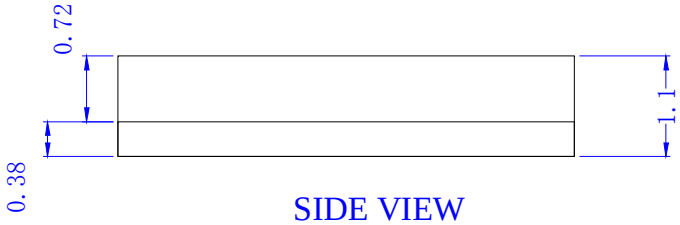
Demo Board for RDA6625 Module



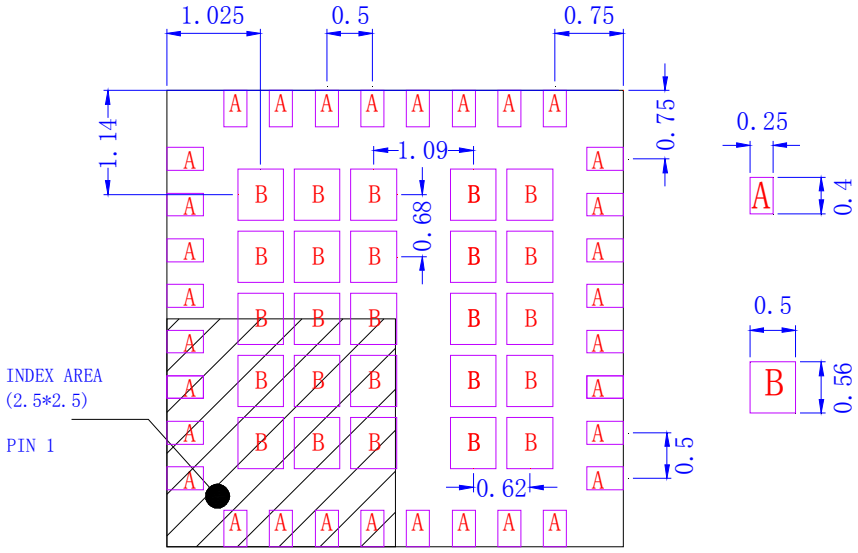
Package Dimensions and Pin Descriptions



TOP VIEW



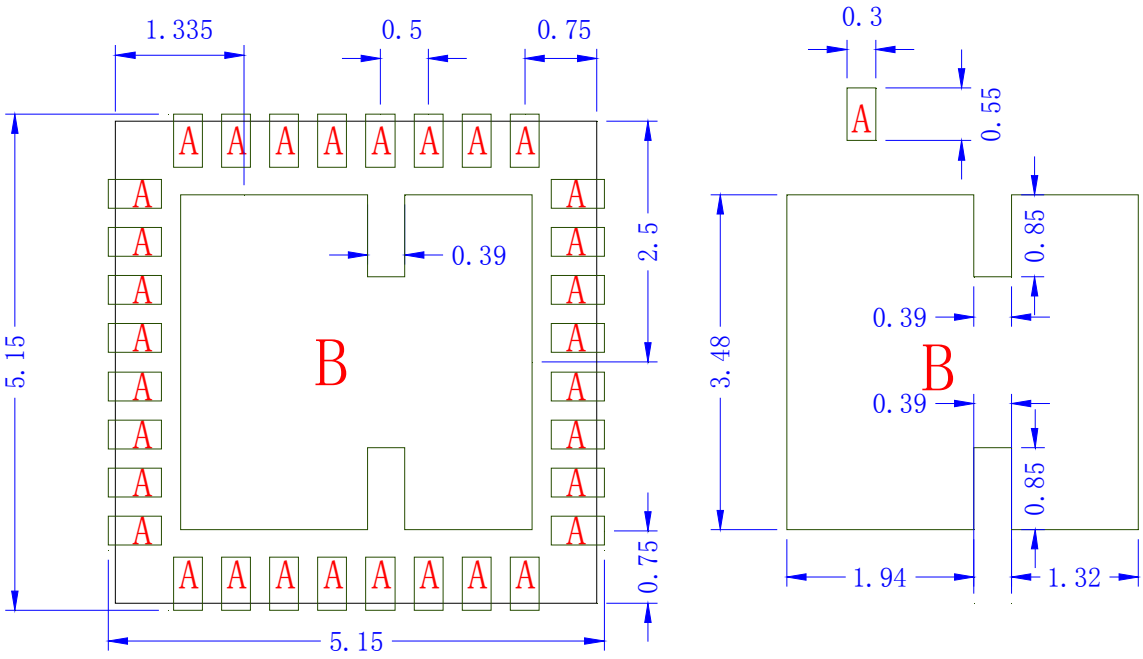
SIDE VIEW



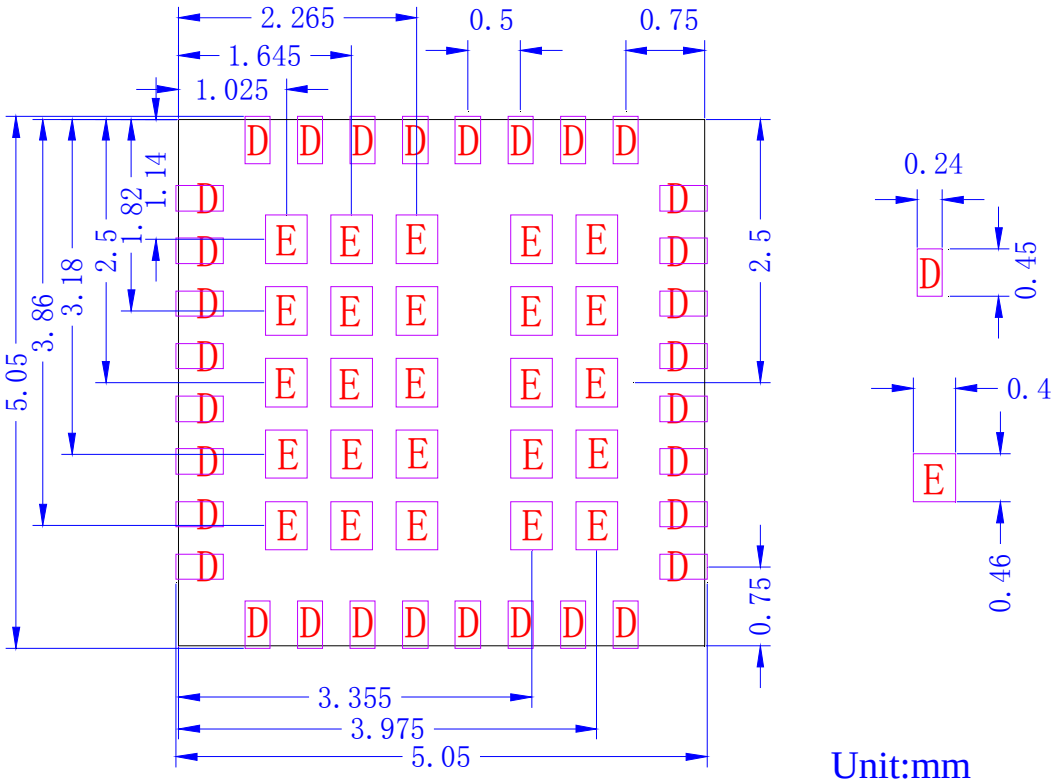
BOTTOM VIEW

Unit:mm

Suggested PCB Design



PCB Metal Land Pattern Unit:mm



Unit:mm

PCB Stencil Pattern

RoHS Compliant

The product does not contain lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls (PBB) or polybrominated diphenyl ethers (PBDE), and are therefore considered RoHS compliant.

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