Product Specification

RS1105 High Power SP10T

General Description

The RS1105 is a SP10T high power RF switch supporting wireless applications up to 1 GHz. It offers maximum power handling of 43 dBm continuous wave (CW). It delivers high linearity and excellent harmonics performance. No blocking capacitors are required if DC voltage is not present on the RF ports.

Applications

- Wireless infrastructure
- Military and high reliability applications
- Test equipment
- Pin diode replacement
- Land Mobile Radio

Features

- Low insertion loss: 0.52 dB typical to 1 GHz
- High linearity: -78dBc harmonics at 43dBm input power
- High power handling at T_{CASE} = 85°C,VDD= 5.0V
  - CW power: 43 dBm
  - Peak power: 45.5 dBm
- High ESD
  - 2kV HBM on all pins
- Single positive supply: 5 V
- Logic select pin provides maximum control logic flexibility
- Positive control, CMOS/TTL compatible
- 32-leads, 5 mm × 5 mm QFN package

Functional Block Diagram

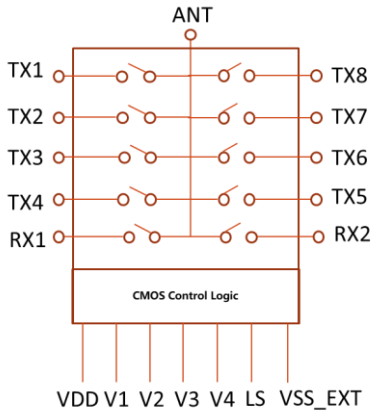


Figure 1

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Absolute Maximum Ratings

Table 1

Parameter	Min	Max	Units
VDD to GND	-0.3	5.5	V
VCTRL to GND	-0.3	5.5	V
VSS_EXT	-3.6	0	V
Maximum Junction Temperature		120	°C
Storage Temperature Range	-65	150	°C
Lead Temperature (soldering, 10s)		260	°C
ESD Voltage– HBM (Per JESD22-A114)		Class 2 (2000V)	
ESD Voltage – CDM (Per JESD22-C101)		Class IV (500V)	

Stresses above those listed above may cause permanent damage to the device. Functional operation of the device at these or any other conditions above those indicated in the operational section of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

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Recommended Operating Conditions

Table 2

Parameter	Conditions	Min	Typ	Max	Units
Supply Voltage		3		5.25	V
VSS_EXT***		-3.6		-3.2***	
Operating Temp Range	Case Temperature	-40		85	°C
RF Frequency Range		30		1000	MHz
Input CW Power, TX mode	800MHz, VDD=5.0V			43	dBm
Input pulse Power, TX mode	800MHz,10%Pulse Signal(500us-50us),VDD=5.0V			45.5	dBm
Input CW Power, RX mode	800MHz, VDD=5.0V			30	dBm
Input pulse Power, RX mode	800MHz,10%Pulse Signal(500us-50us),VDD=5.0V			33	dBm

Note:***If better spur performance is required, an external negative voltage is recommended to be applied on VSS_EXT pin. Otherwise, VSS_EXT should be connected to ground

Operation should be restricted to the limits in the Recommended Operating Conditions table. Operation between operating range maximum and absolute maximum for extended periods may reduce reliability.

Specification

Typical Application Circuit with matching in figure3 , Normal mode (VDD=5.0V), T_C = +25°C, F_{RF} = 1000MHz, Input power = 0dBm per tone unless otherwise stated. PCB board trace and connector losses are de-embedded unless otherwise noted.

Table 3

Parameter	Conditions	Min	Typ	Max	Units
TX Insertion Loss	100kHz - 30MHz		0.24		dB
	30MHz - 1000MHz		0.4		
RX Insertion Loss	100kHz - 30MHz		0.82		dB
	30MHz - 1000MHz		0.94		
TX - TX Isolation	100kHz - 30MHz		69		dB
	30MHz - 1000MHz		45		
TX - RX Isolation	100kHz - 30MHz		72		dB
	30MHz - 1000MHz		38.2		
Return Loss (ANT)	30MHz – 1000MHz		-30		dB
Return Loss (TX1-TX8)	30MHz – 1000MHz		-28		dB
Return Loss (RX)	30MHz – 1000MHz		-26		
Input 0.1dB Compression	700MHz		46		dBm
Input IP2	F1=700MHz,F2=710MHz @ 30dBm		126		dBm
Input IP3	F1=700MHz,F2=800MHz @ 30dBm		78		dBm
2nd and 3rd Harmonic (50ohm load)	43dBm input power @ 700MHz		-78		dBc
Switching Time	50% CTRL to 90% RF		3.5		us
	50% CTRL to 10% RF		3.2		
Logic Input High Threshold		1.4		5	V
Logic Input Low Threshold		-0.3		0.6	V
Logic Current	For each control pin		7		μA
DC Current (VDD)	3.3V Logic		85		μA

Pin Diagram

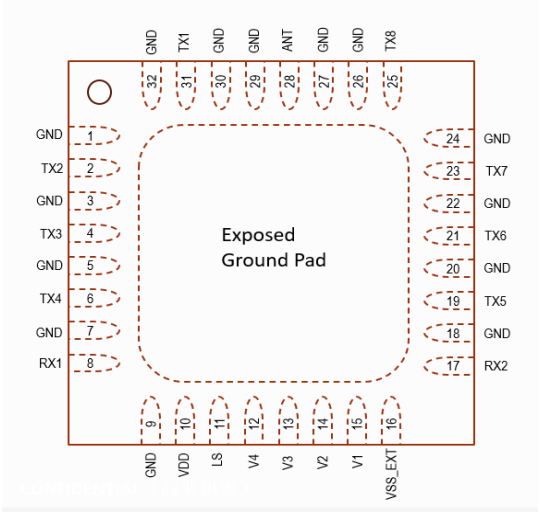


Figure 2

Pin Description

Table 4

Pin No.	Label	Description
1, 3, 5, 7, 9, 18, 20, 22, 24, 26, 27, 29, 30, 32	GND	Ground.
31	TX1	Transmit pin 1
2	TX2	Transmit pin 2
4	TX3	Transmit pin 3
6	TX4	Transmit pin 4
19	TX5	Transmit pin 5
21	TX6	Transmit pin 6
23	TX7	Transmit pin 7
25	TX8	Transmit pin 8
8	RX1	Receive pin
17	RX2	Receive pin
28	ANT	RF common port
10	VDD	Positive power supply voltage.
11	LS	Logic select. Invert logic table when pull high
12	V4	Digital control logic input 3
13	V3	Digital control logic input 3
14	V2	Digital control logic input 2
15	V1	Digital control logic input 1
16****	VSS_EXT****	external VSS negative voltage

Note:****If better spur performance is required, an external negative voltage is recommended to be applied on VSS_EXT pin. Otherwise, VSS_EXT should be connected to ground

Control Logic

Table 5

LS	V4	V3	V2	V1	Path
0	0	1	0	0	RX1
0	0	1	1	1	RX2
0	1	0	0	0	TX1
0	1	0	0	1	TX2
0	1	0	1	0	TX3
0	1	0	1	1	TX4
0	1	1	0	0	TX5
0	1	1	0	1	TX6
0	1	1	1	0	TX7
0	1	1	1	1	TX8
LS	V4	V3	V2	V1	Path
1	0	1	0	0	RX2
1	0	1	1	1	RX1
1	1	0	0	0	TX8
1	1	0	0	1	TX7
1	1	0	1	0	TX6
1	1	0	1	1	TX5
1	1	1	0	0	TX4
1	1	1	0	1	TX3
1	1	1	1	0	TX2
1	1	1	1	1	TX1

Application Information

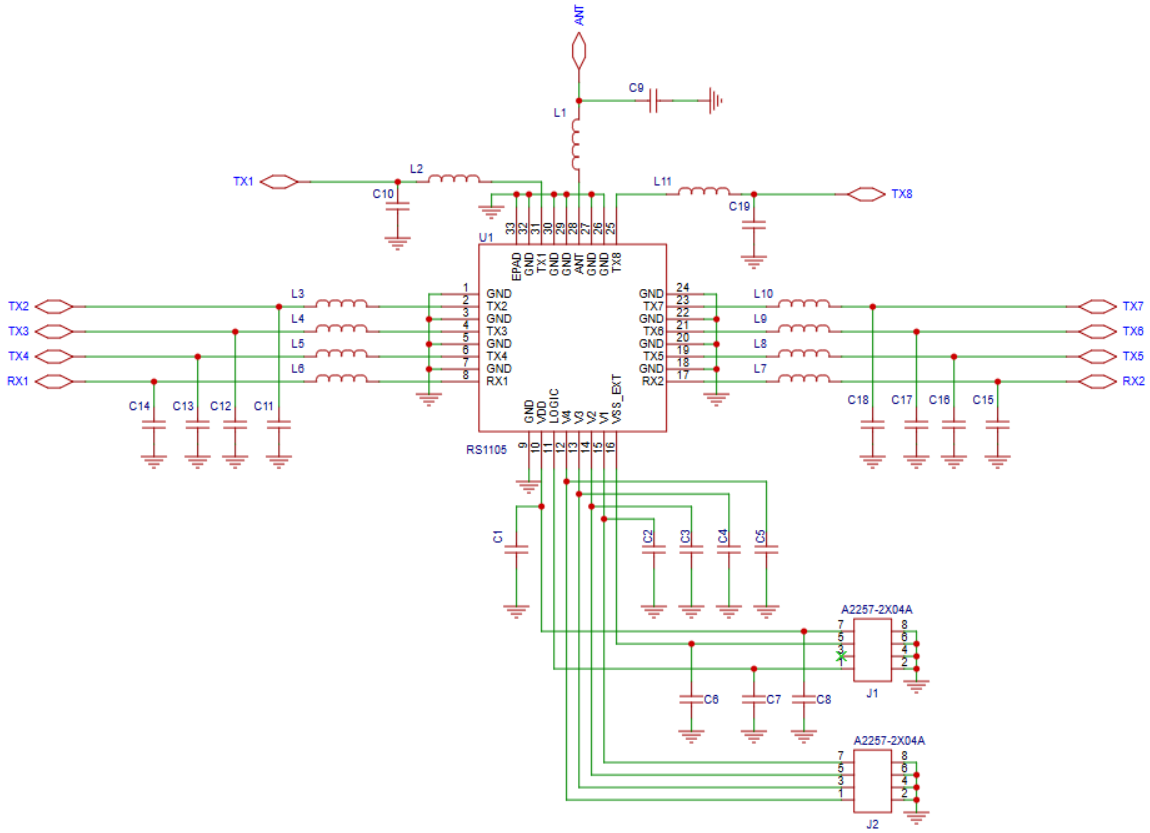


Figure 3

Note: The interval between the matching capacitors and RF pins is about 80 to 100mil, and the interval between the matching capacitors and the inductors is about 10mil.

BOM LIST

Table 6

No.	Quantity	Part Lable	Value	Footprint
1	1	C1	10 nF	C0402
2	4	C2,C3,C4,C5	100pF	C0402
3	1	C9	1pF	C0402
4	5	C6-C8,C14,C15	NC	C0402
5	8	C10-C13,C16-C19	0.5pF	C0402
6	1	L1	5.8nH	L0402
7	2	L2,L11	4.5nH	L0402
8	2	L6,L7	2.2nH	L0402
9	6	L3-L5,L8-L10	4nH	L0402
10	2	J1,J2		A2257-2X04A
11	1	U1	RS1105	

Typical Performance Characteristics

Figure 4. TX Insertion Loss

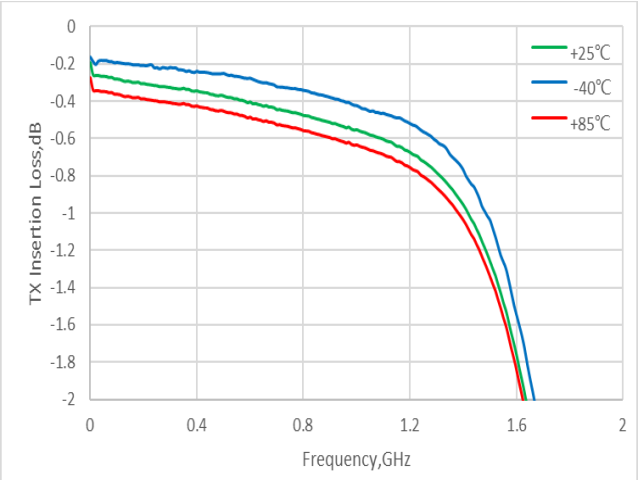


Figure 5. RX Insertion Loss

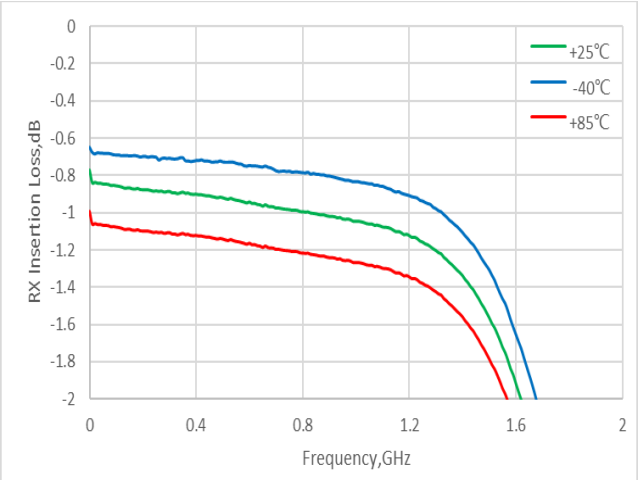


Figure 6. TX Return Loss

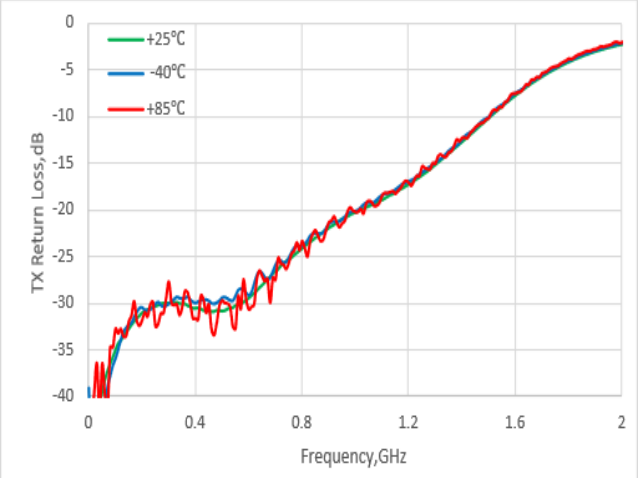


Figure 7. RX Return Loss

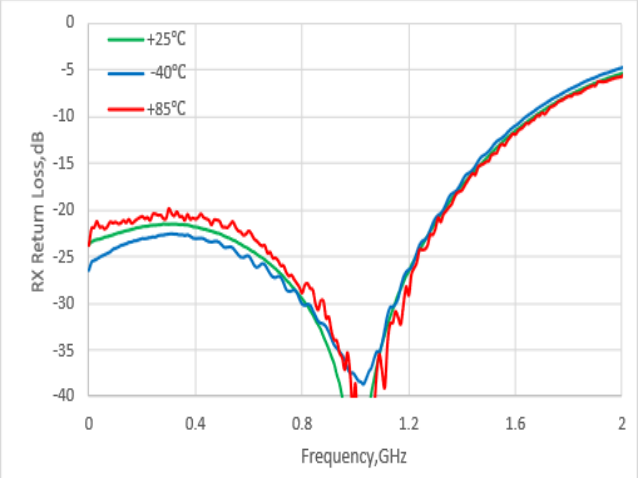


Figure 8. TX_TX Isolation

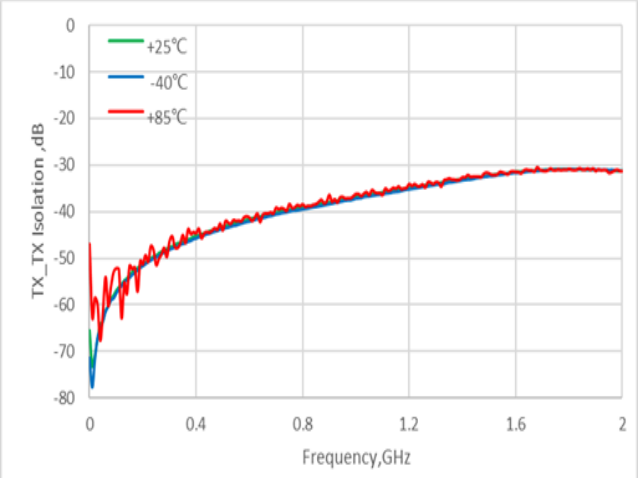
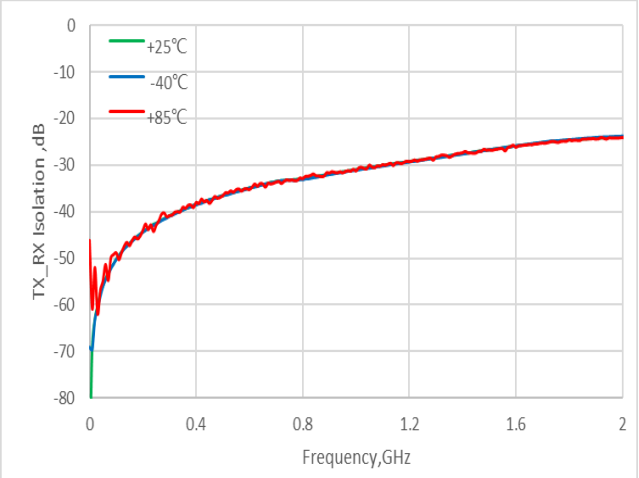


Figure 9. TX_RX Isolation



Typical Performance Characteristics

Figure 10. Noise Figure

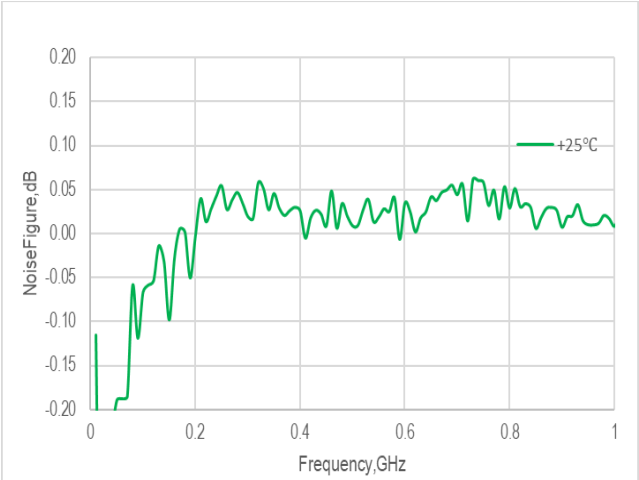


Figure 11. Spur-0.1GHz

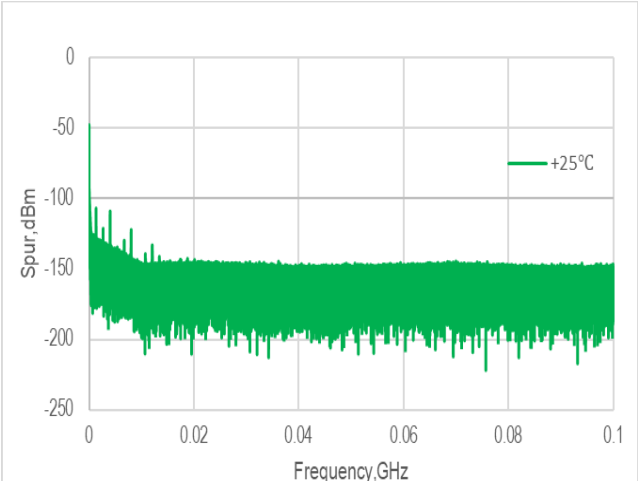


Figure 12. Spur-0.5GHz

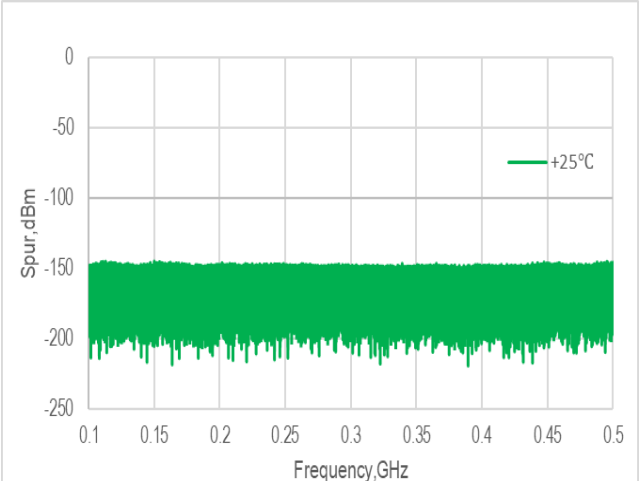
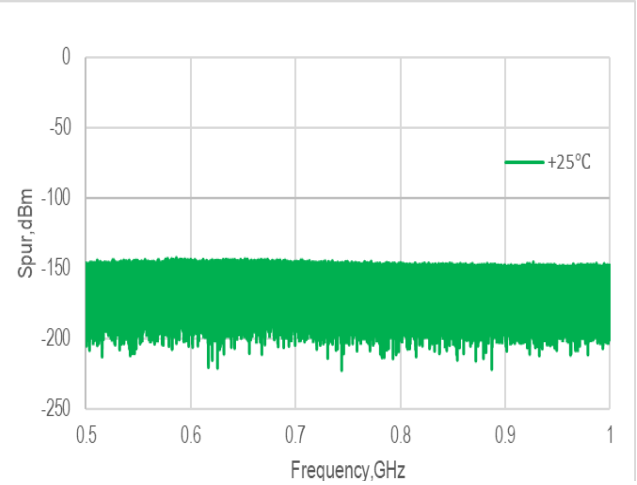
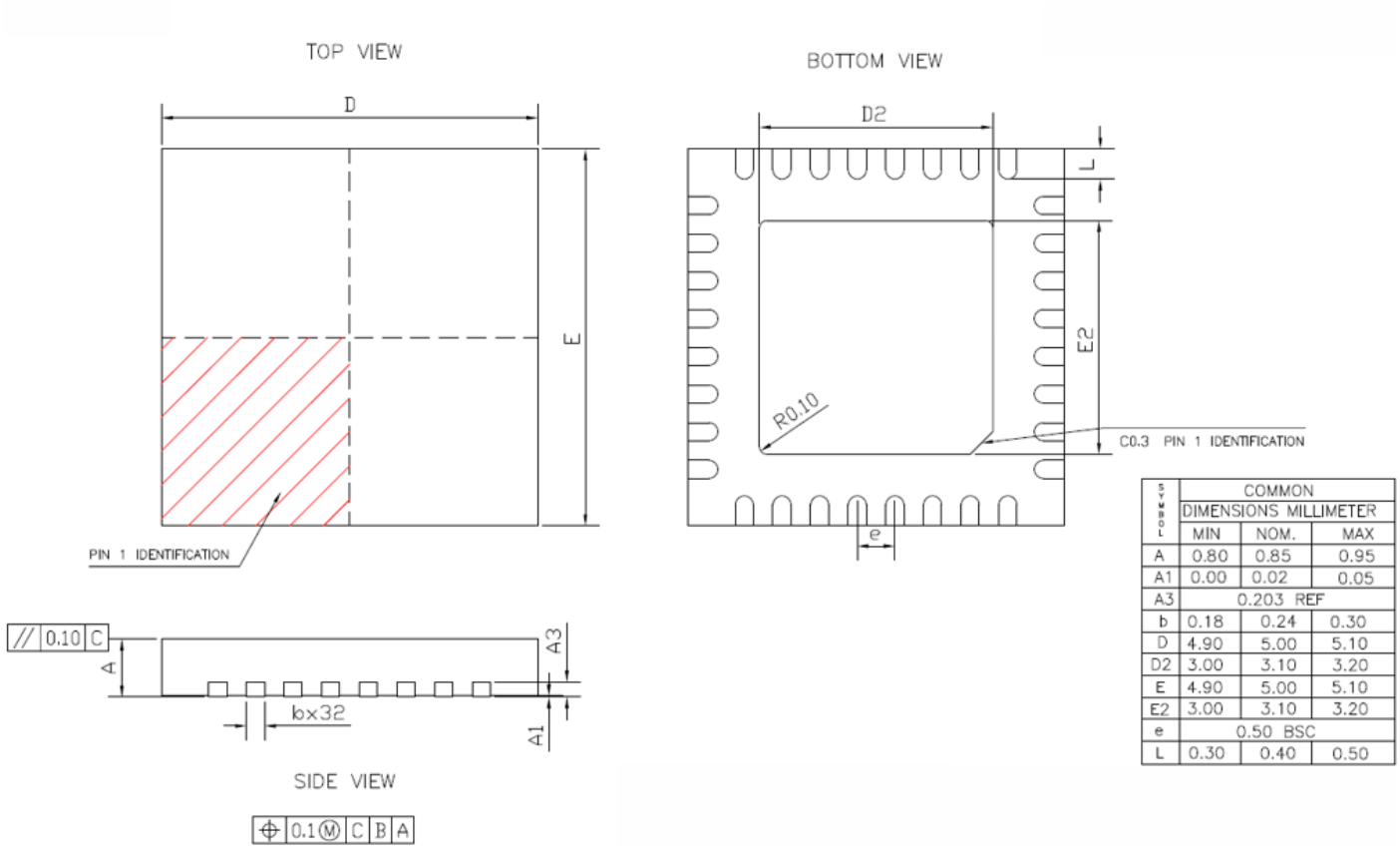


Figure 13. Spur-1GHz



*Note:*** spur's test condition in noise floor:RBW=VBW=100Hz*

Package Drawing



SYMBOL	COMMON DIMENSIONS MILLIMETER		
	MIN	NOM.	MAX
A	0.80	0.85	0.95
A1	0.00	0.02	0.05
A3		0.203 REF	
b	0.18	0.24	0.30
D	4.90	5.00	5.10
D2	3.00	3.10	3.20
E	4.90	5.00	5.10
E2	3.00	3.10	3.20
e		0.50 BSC	
L	0.30	0.40	0.50

Figure 14

Ordering Information

Table 6

Order Code	Part Marking	Package	Shipping Method
RS1105-250	1105	QFN5X5_32PIN	250 units
RS1105-3000	1105	QFN5X5_32PIN	3000 units

Revision History

Table 7

Revision Number	Revision Date	Description	Modifications
0	2021/3/7	Draft	—
0.1	2021/6/29	Initial release	
0.2	2021/11/20	Update	Modify the format
0.3	2022/2/7	Update	Update pin map
1.0	2023/1/31	Released	
1.1	2023/3/6	Released	Modify table 4 GND pin number
1.2	2024/11/29	Update	Update Package Drawing
1.3	2025/05/26	Update	

Document Categories

Advance Information

The product is in a formative or design stage. The datasheet contains design target specifications for product development. Specifications and features may change in any manner without notice.

Preliminary Specification

The datasheet contains preliminary data. Additional data may be added at a later date. RFone Technology reserves the right to change specifications at any time without notice in order to supply the best possible product.

Product Specification

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Sales Contact

For additional information, contact Sales at sales@rfonetech.com.

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