Product Specification

RS1425A High Power SPDT

General Description

The RS1425A is a silicon-based, high power, 5 MHz to 10 GHz, single-pole, double-throw (SPDT) reflective switch in a leadless, surface-mount package. The switch is ideal for high power and cellular infrastructure applications, such as long-term evolution (LTE) base stations.

The RS1425A has a low insertion loss of 0.35 dB typical to 2.0 GHz, an input third-order intercept (IP3) of 80 dBm (typical), and a 0.1 dB compression point (P0.1dB) of 43.5 dBm.

On-chip circuitry operates at a single positive supply voltage of 3.3V at a typical supply current of 252 uA. The RS1425A comes in an RoHS compliant, compact, 12-lead, 2 mm × 2 mm QFN Competitive Advantage.

Applications

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

Features

- Reflective, 50 Ω design
- Low insertion loss: 0.35dB typical to 2.0 GHz
- High linearity
  - P0.1dB: 43.5 dBm typical
  - IP3: 82 dBm typical
- Single positive supply: 3.3 V/5 V
- Positive control, 0/+3.3V control and 1.8V/1.2V compatible
- 12-lead, 2 mm × 2 mm QFN package

Functional Block Diagram

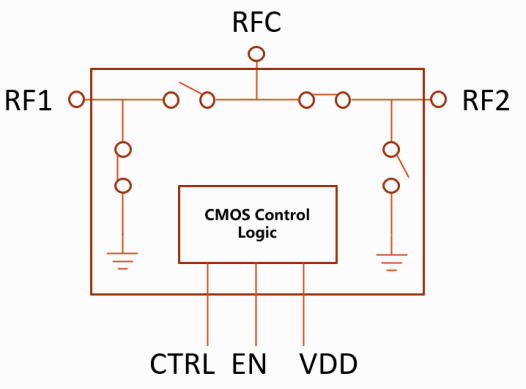


Figure 1

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Absolute Maximum Ratings

Table 1

Parameter	Conditions	Min	Max	Units
Supply Voltage		-0.3	5.5	V
CTRL/EN to GND		-0.3	3.6	V
Storage Temperature Range		-65	150	℃
Input Power for any one selected RF through port.			41	dBm
ESD Voltage – HBM			500	V
ESD Voltage – CDM			500	V

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.

Recommended Operating Conditions

Table 2

Parameter	Min	Typ	Max	Units
VDD to GND	2.7	3.3	5.25	V
CTRL/EN to GND (High)	1.17		3.6	V
CTRL/EN to GND (Low)	0		0.6	V
Input Power for any one selected RF through port.			37	dBm
Maximum Junction Temperature			125	°C
Operating Temperature Range	-40	25	105	°C

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.

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Specification

Typical Application Circuit, Normal mode (VDD=3.3V), T_C = +25°C, CTRL=0V/1.8V, Rload=50Ω, Pin=0dBm, PCB board trace and connector losses are de-embedded unless otherwise noted.

Table 3

Parameter	Conditions	Min	Typ	Max	Units
Operating frequency		0.005		10	GHz
DC Current (VDD)	EN=High		252		μA
	EN=Low		6		μA
Control current	CTRL/EN=High		3		μA
	CTRL/EN=Low		0.3		μA
Insertion Loss	5MHz – 960MHz		0.23		dB
	960MHz – 2000MHz		0.22		
	2000MHz – 2700MHz		0.20		
	2700MHz – 4200MHz		0.26		
	4200MHz – 6000MHz		0.31		
	6000MHz – 10000MHz		0.65		
RFC - RFX Isolation	5MHz – 960MHz		57		dB
	960MHz – 2000MHz		43		
	2000MHz – 2700MHz		36		
	2700MHz – 4200MHz		31		
	4200MHz – 6000MHz		25		
	6000MHz – 10000MHz		20		
RFX - RFX Isolation	5MHz – 960MHz		53		dB
	960MHz – 2000MHz		41		
	2000MHz – 2700MHz		36		
	2700MHz – 4200MHz		31		
	4200MHz – 6000MHz		25		
	6000MHz – 10000MHz		20		
Return Loss (RFC)	5MHz – 2700MHz		-36		dB
	2700MHz – 6000MHz		-25		
	6000MHz – 10000MHz		-17		
Return Loss (RFX)	5MHz – 2700MHz		-35		dB
	2700MHz – 6000MHz		-21		
	6000MHz – 10000MHz		-14		
Input 0.1dB Compression	2500MHz		43		dBm
IP2	F1=2200MHz,F2=2300MHz@33dBm		126		dBm
IP3	F1=1880MHz,F2=2000MHz@33dBm		82		dBm
Logic Input High Threshold			1.1	3.3	V
Logic Input Low Threshold		0		0.9	V
Switching Time	50% CTRL to 90% RF		1.6	2	μs
	50% CTRL to 10% RF		1	2	

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Pin Diagram

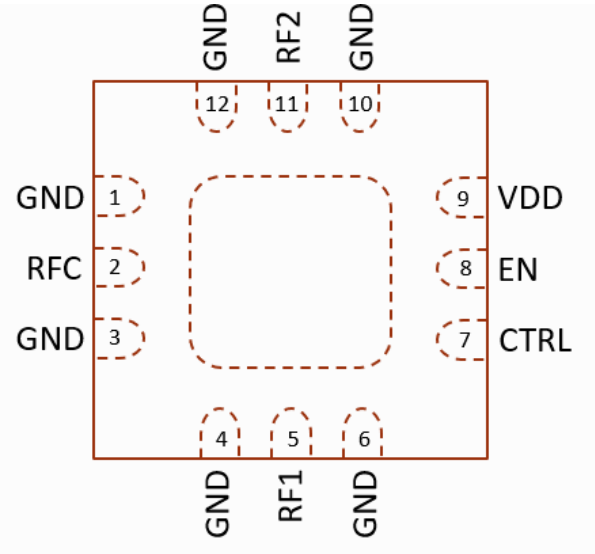


Figure 2

Pin Description

Table 4

Pin No.	Label	Description
1, 3, 4, 6, 10, 12	GND	Ground.
2	RFC	RF common port.
5	RF1	RF port 1.
7	CTRL	Digital control logic input.
8	EN	Digital control logic input.
9	VDD	Positive power supply voltage.
11	RF2	RF port 2.

Control Logic

Table 5

State	EN	CTRL
Shutdown	0	X
RF1 to RFC	1	0
RF2 to RFC	1	1

Applications Information

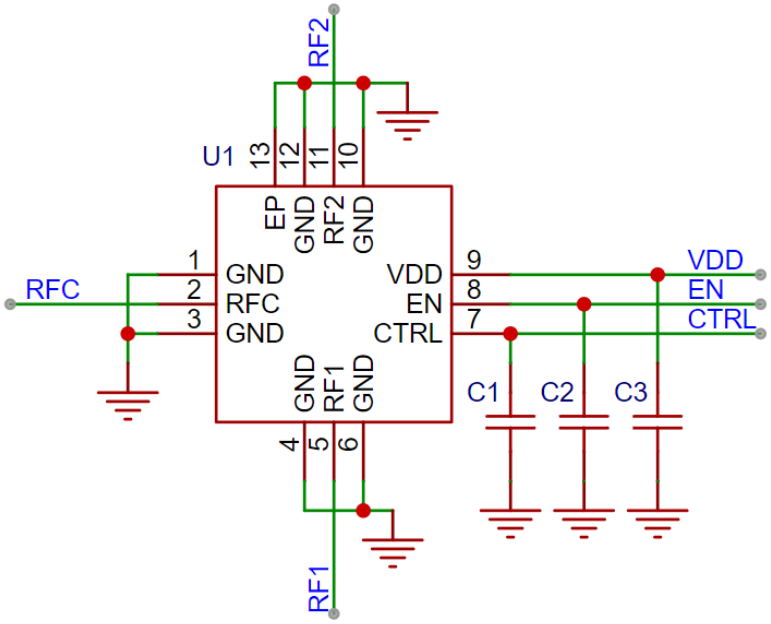


Figure 3 RF Port is 0V

Note： 1. When the DC operating point of the peripheral circuit is 0V, no blocking capacitor is required for each RF port .
2. When the DC operating point of peripheral circuit is not 0V， a blocking capacitor must be added to each RF port, a 10K ohm resistor or a large inductor is connected in parallel to the RFC port .
3. The resistance of the control port to the ground is about 1M ohm, and the EN port has a built-in pull-up resistance .

BOM LIST

Table 6

Reference Designator	Value	Footprint
C3	10nF	C0402
C1,C2	100pF	C0402
U1	RS1425A	

Typical Performance Characteristics

Figure 4. Insertion Loss

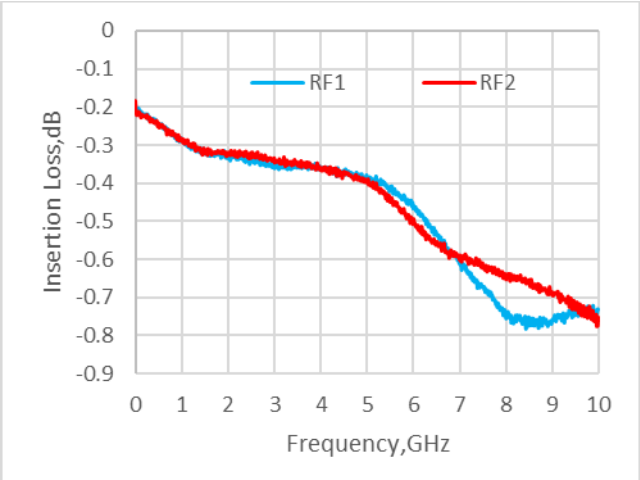


Figure 5. Return Loss

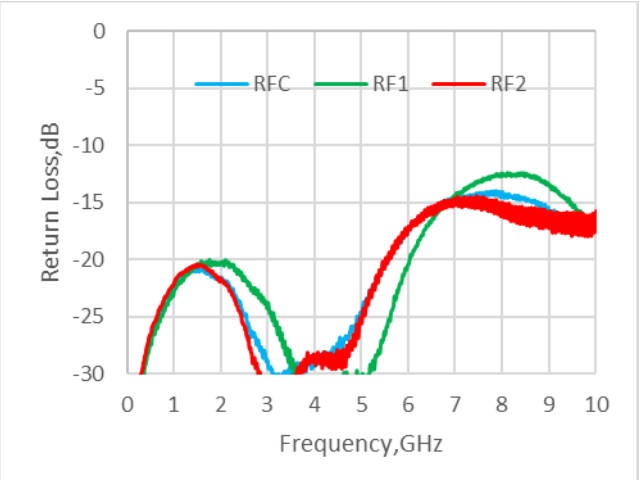


Figure 6. RFC-RFX Isolation

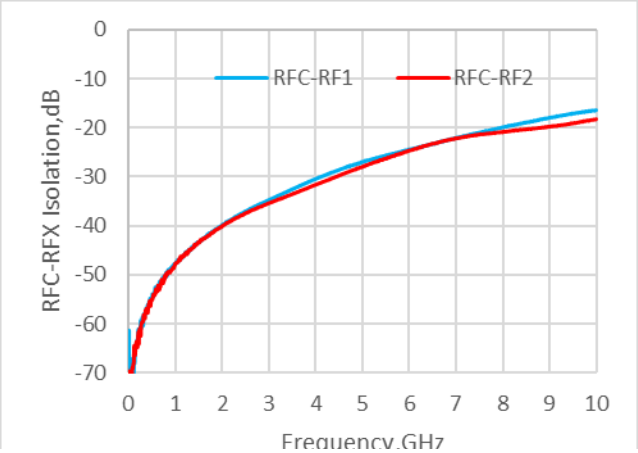


Figure 7. RF2 Insertion Loss

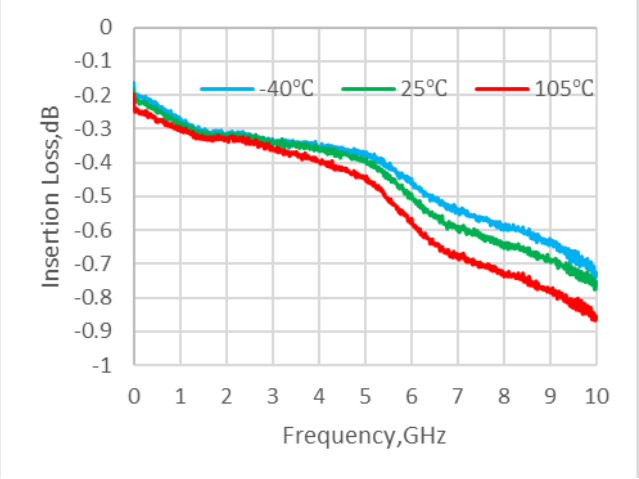


Figure 8. RF2 Return Loss

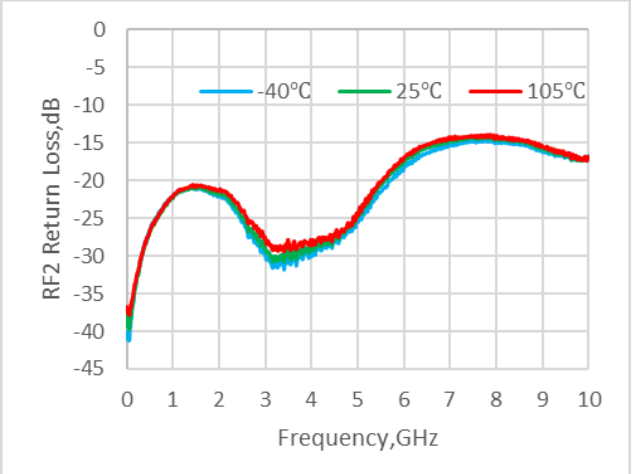
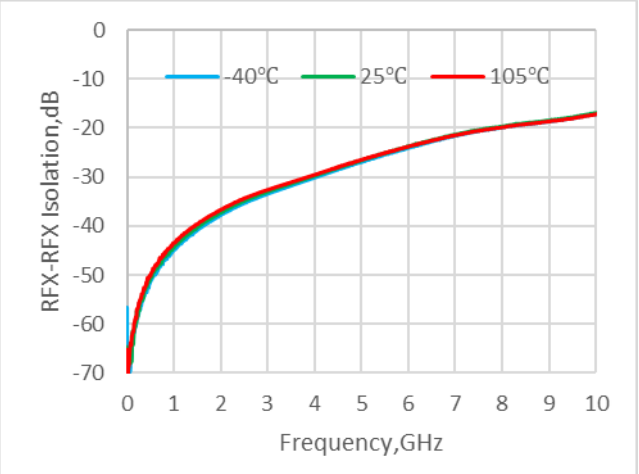


Figure 9. RF1-RF2 Isolation



Typical Performance Characteristics

Figure 10. RFC-RF1 Isolation

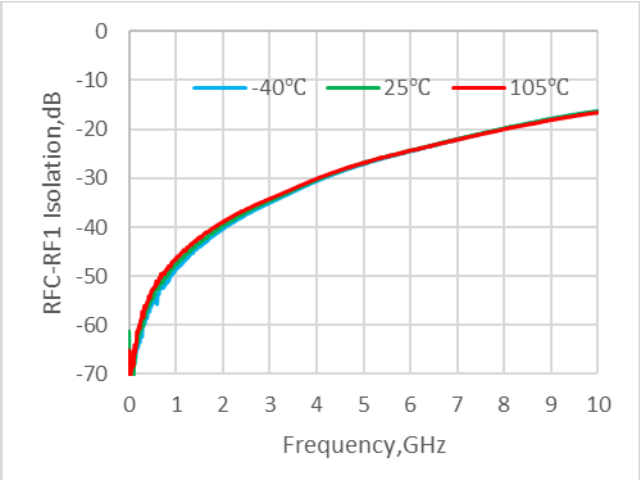


Figure 11. Noise Figure

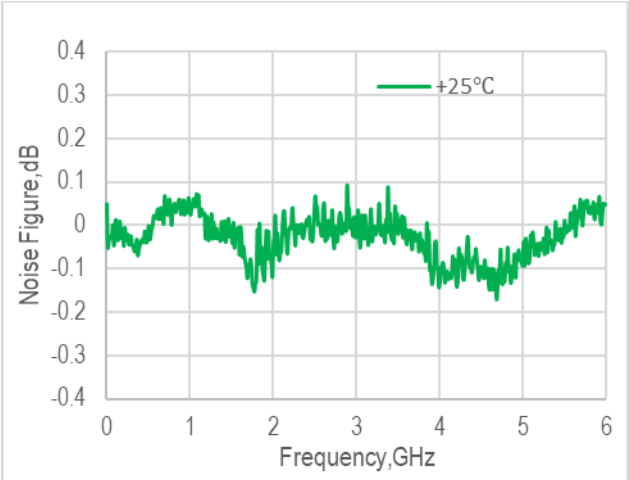


Figure 12. Spur_0.1GHz***

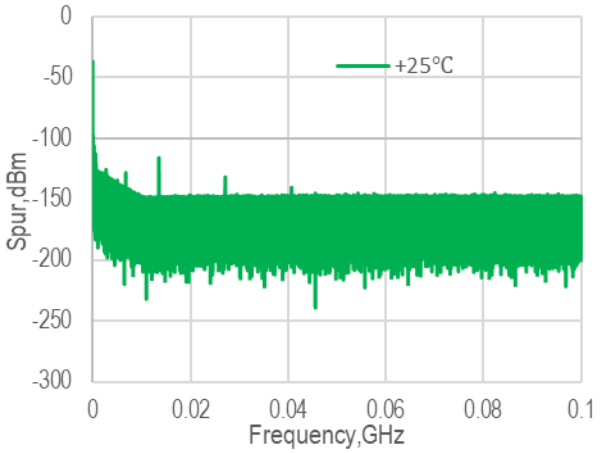


Figure 13. Spur_0.1~0.5GHz***

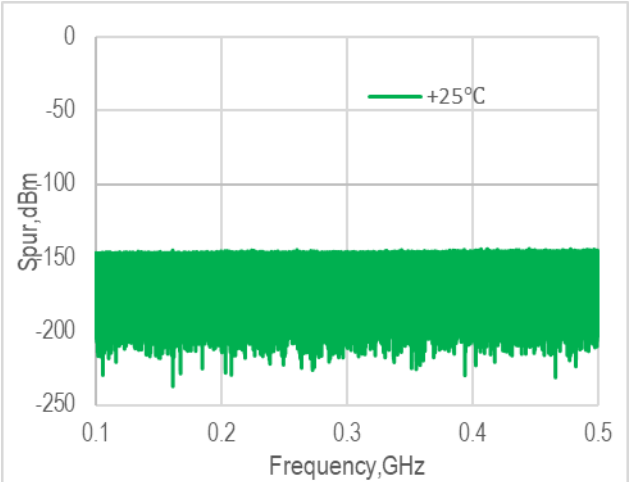
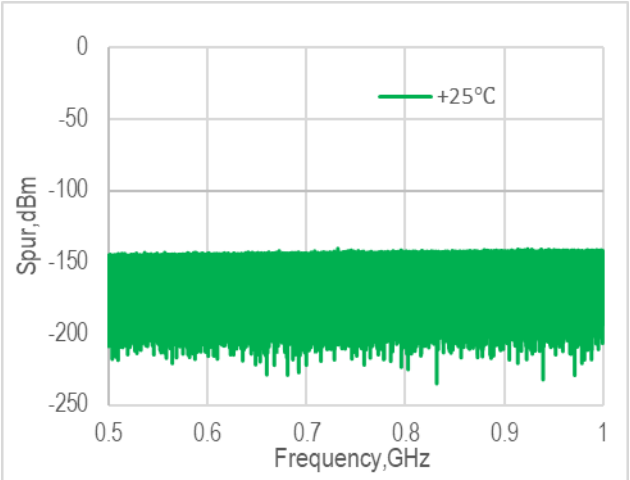
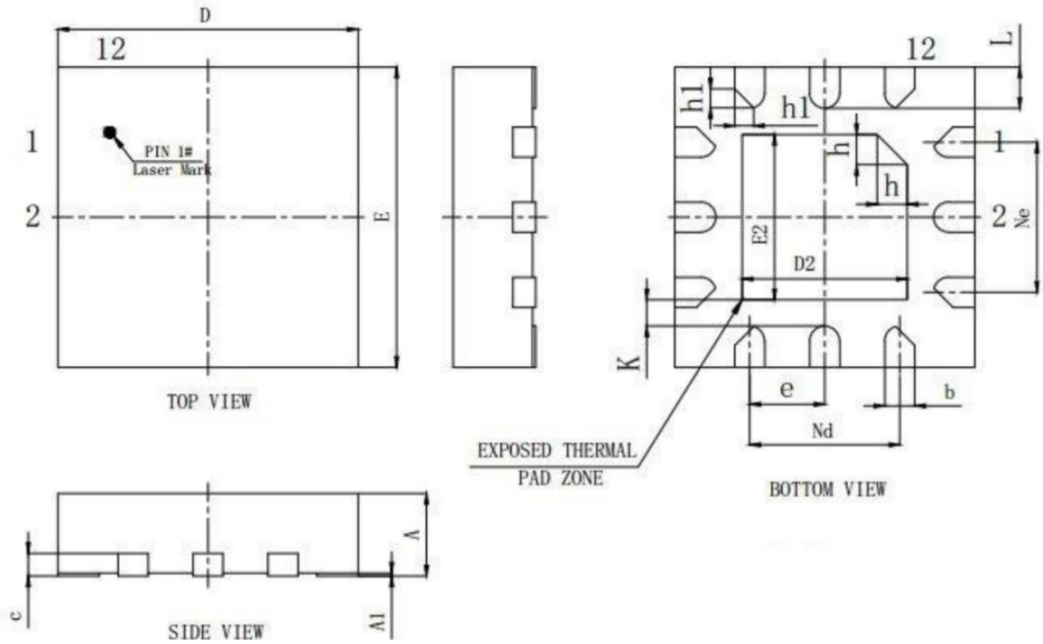


Figure 14. Spur_0.5~1GHz***



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

Package Drawing



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		0.152REF	
D	1.90	2.00	2.10
D2	1.00	1.10	1.20
Ne		1.00BSC	
Nd		1.00BSC	
e		0.50BSC	
E	1.90	2.00	2.10
E2	1.00	1.10	1.20
L	0.225	0.275	0.325
h	0.15	0.20	0.25
h1	0.09	0.14	0.19
K		0.175REF	

Figure 15

Revision History

Table 7

Revision Number	Revision Date	Description	Modifications
0	2020/11/10	Draft	—
0.1	2020/12/11	Initial release	
0.2	2021/1/15	Preliminary	Modify the format
0.3	2021/2/27	Preliminary	Add applications information
1.0	2021/8/5		
1.1	2021/11/20	Update	Update information
1.2	2022/5/19	Update	Update figure
1.3	2024/12/12	Update	Update operating temperature
1.4	2025/06		

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

The datasheet contains final data. In the event RFone Technology decides to change the specifications, RFone Technology will notify customers of the intended changes by issuing a CNF (Customer Notification Form).

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