Product Specification

RS1321X High Isolation SPDT

General Description

The RS1321X is a silicon-based, high Isolation, 0.1 GHz to 8.5 GHz, single-pole, double-throw (SPDT) absorptive switch in a leadless, surface-mount package. The switch is ideal for high isolation and cellular infrastructure applications, such as long-term evolution (LTE) base stations.

On-chip circuitry operates at a single positive supply voltage of 5 V at a typical supply current of 200 uA, making the RS1321X an ideal alternative to GaAs switches. The RS1321X comes in an RoHS compliant, compact, 20-lead, 4 mm × 4 mm QFN Competitive Advantage.

Applications

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

Features

- Absorptive, 50 Ω design
- Low insertion loss
- High isolation
  - 79dB @ 1 GHz
  - 65dB @ 3 GHz
  - 57dB @ 6 GHz
- High linearity
  - IP3: 56 dBm typical
- Single positive supply: 5 V
- Positive control, CMOS/TTL compatible
- 20-lead, 4 mm × 4 mm QFN package
- ESD protection on all pins (HBM > 500V)
- ESD protection on all pins (CDM > 1000V)

Functional Block Diagram

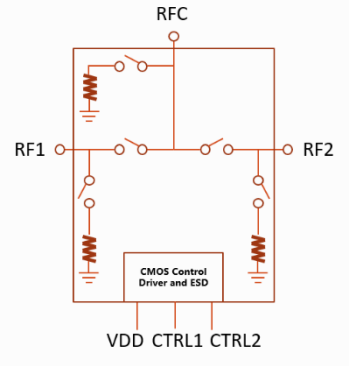


Figure 1

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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
Maximum Junction Temperature		125	°C
Storage Temperature Range	-65	150	°C
Input Power, thru		34	dBm
Input Power, terminated		24	dBm
ESD Voltage– HBM (Per JESD22-A114)		500	V
ESD Voltage – CDM (Per JESD22-C101)		1000	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	Conditions	Min	Typ	Max	Units
Supply Voltage		3	5	5.25	V
Operating Temp Range	Case Temperature	-40		105	°C
RF Frequency Range		100		8500	MHz
Input Power, thru	25°C			32	dBm
Input Power, terminated	25°C			22	dBm

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, Normal mode (V_{DD}=5V), T_C = +25°C, F_{RF} = 3500MHz, PCB board trace and connector losses are de-embedded unless otherwise noted.

Table 3

Parameter	Conditions	Min	Typ	Max	Units
Insertion Loss	1000MHz		1.1		dB
	2000MHz		1.1		
	3000MHz		1.2		
	4000MHz		1.2		
	5000MHz		1.3		
	6000MHz		1.4		
	7000MHz		1.5		
	8000MHz		1.6		
RFC - RFX Isolation	1000MHz		72		dB
	2000MHz		69		
	3000MHz		65		
	4000MHz		63		
	5000MHz		61		
	6000MHz		54		
	7000MHz		53		
	8000MHz		49		
RFX - RFX Isolation	1000MHz		71		dB
	2000MHz		65		
	3000MHz		62		
	4000MHz		60		
	5000MHz		56		
	6000MHz		55		
	7000MHz		55		
	8000MHz		50		
Return Loss (RFC)	100MHz – 8500MHz		18		dB
Return Loss (RFX)	100MHz – 8500MHz		18		dB
Return Loss (Terminated)	100MHz – 8500MHz		20		dB
Input 0.1dB Compression	2500MHz		36.5		dBm
Input IP2	Input power = 18dBm		95		dBm
Input IP3	Input power = 18dBm, Frequency Spacing=120 MHz, Frequency @1880MHz		56		dBm
Switching Time	50% CTRL to 90% RF		200	500	ns
	50% CTRL to 10% RF		200	500	
Logic Input High Threshold		1.2		VDD	V
Logic Input Low Threshold		0		0.6	V
Logic Current	For each control pin		25	TBD	μA
DC Current (VDD)	3.3V Logic		200	500	μA

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Pin Diagram

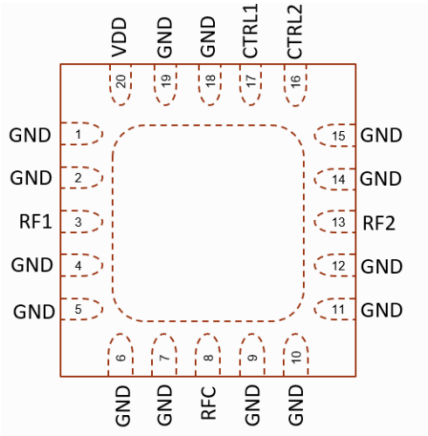


Figure 2

Pin Description

Table 4

Pin No.	Label	Description
1, 2, 4, 5, 6, 7, 9, 10, 11, 12, 14, 15, 18, 19	GND	Ground.
3	RF1	RF port 1. The RF pins do not require DC blocking capacitors for proper operation if the 0 VDC requirement is met.
8	RFC	RF common port. The RF pins do not require DC blocking capacitors for proper operation if the 0 VDC requirement is met.
13	RF2	RF port 2. The RF pins do not require DC blocking capacitors for proper operation if the 0 VDC requirement is met.
16	CTRL2	Digital control logic input 2
17	CTRL1	Digital control logic input 1
20	VDD	Positive power supply voltage.

Control Logic

Table 5

Digital Control Input (VCTL1)	Digital Control Input (VCTL2)	RF1 to RFC	RF2 to RFC
Low	Low	OFF	OFF
Low	High	OFF	ON
High	Low	ON	OFF
High	High	NA	NA

Applications Information

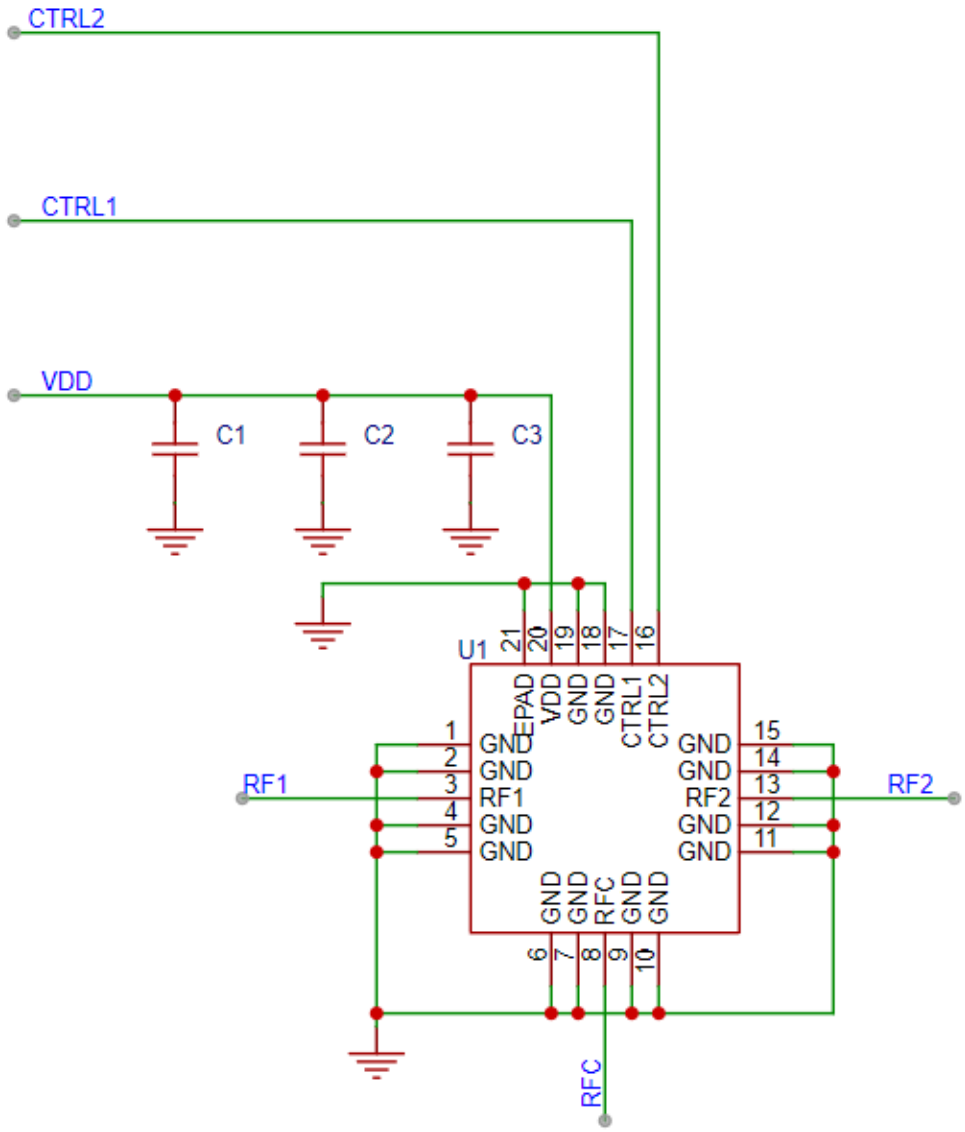


Figure 3

Table 6

Reference Designator	Value	Description
C1	10uF	C0603
C2	10nF	C0402
C3	100pF	C0402
U1	\	RS1321X

Typical Performance Characteristics

Figure 4 RFC-RF1 Insertion Loss

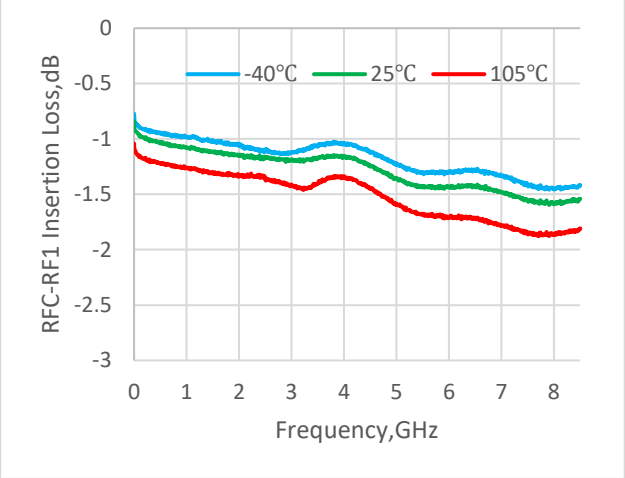


Figure 5 RFC-RF2 Insertion Loss

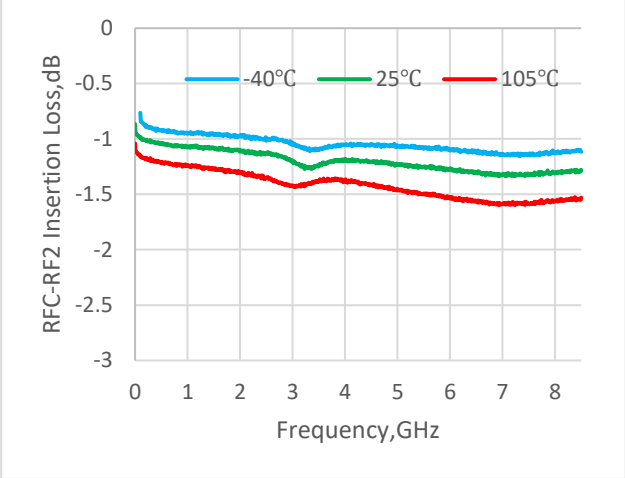


Figure 6 RFC Return Loss

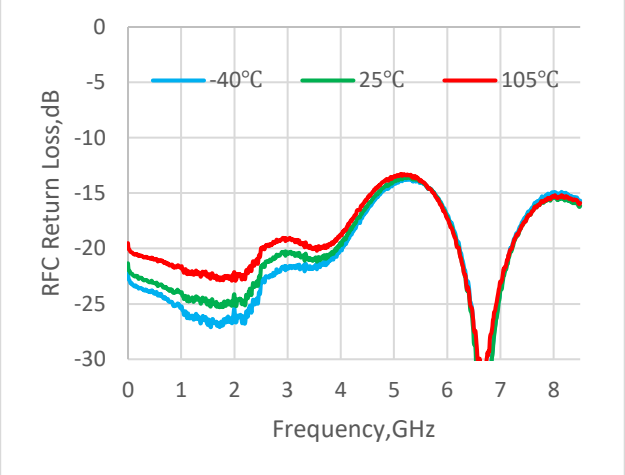


Figure 7 RF1 Return Loss

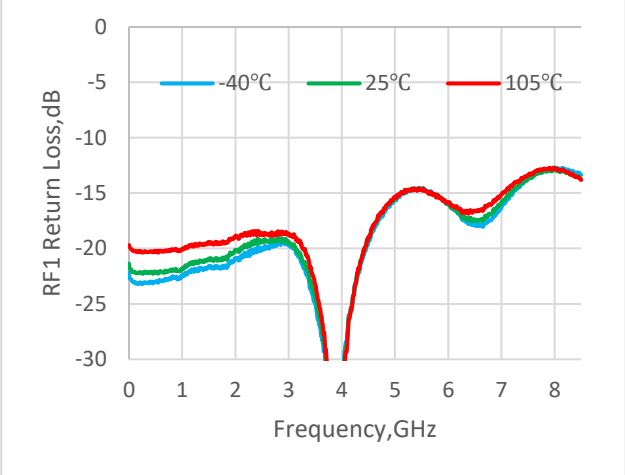


Figure 8 RF2 Return Loss

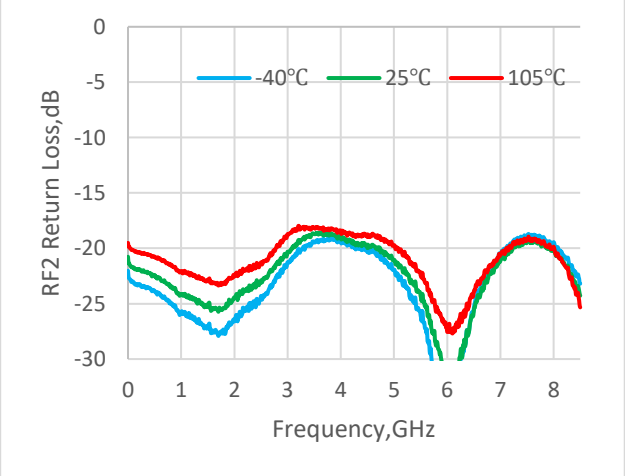
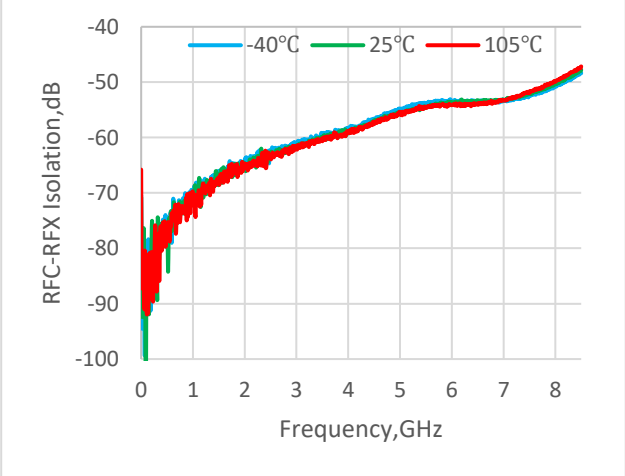


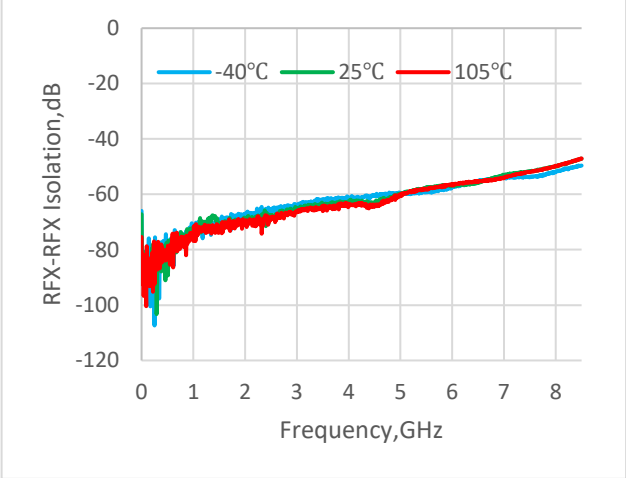
Figure 9 RFC-RFX Isolation



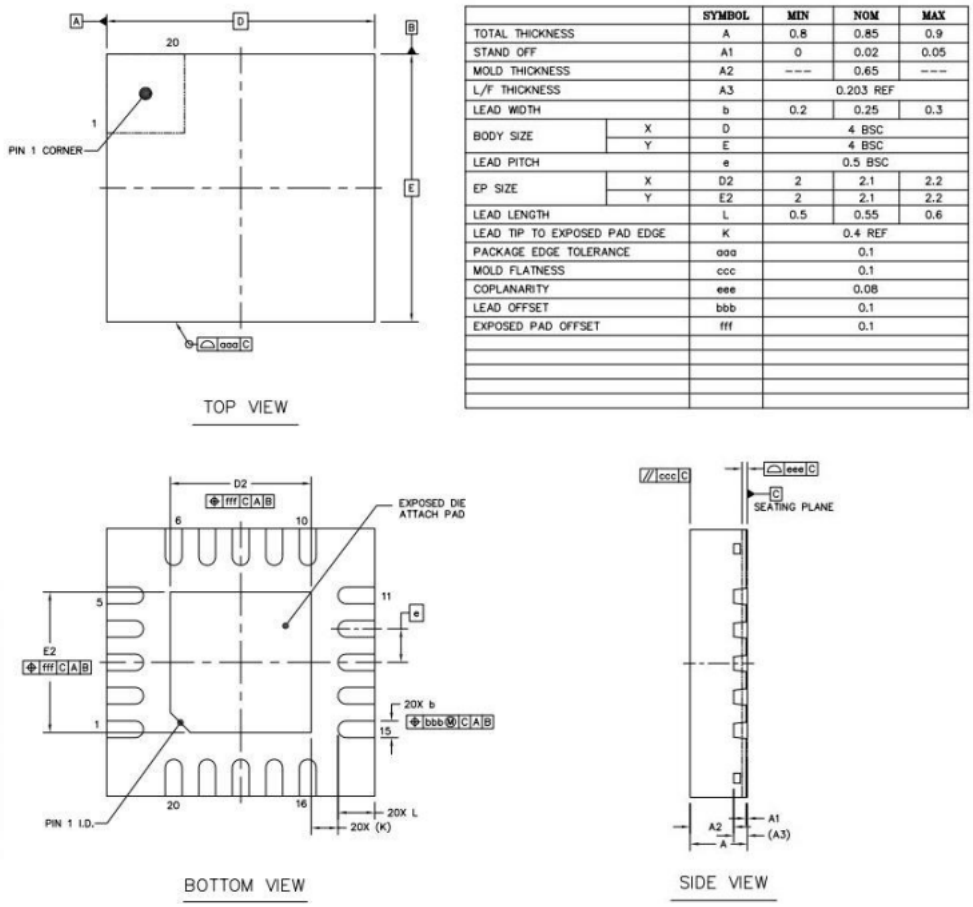
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Typical Performance Characteristics

Figure 10 RFX-RFX Isolation



Package Drawing



		SYMBOL	MIN	NOM	MAX
TOTAL THICKNESS		A	0.8	0.85	0.9
STAND OFF		A1	0	0.02	0.05
MOLD THICKNESS		A2	---	0.65	---
L/F THICKNESS		A3		0.203 REF	
LEAD WIDTH		b	0.2	0.25	0.3
BODY SIZE	X	D		4 BSC	
	Y	E		4 BSC	
LEAD PITCH		e		0.5 BSC	
EP SIZE	X	D2	2	2.1	2.2
	Y	E2	2	2.1	2.2
LEAD LENGTH		L	0.5	0.55	0.6
LEAD TIP TO EXPOSED PAD EDGE		K		0.4 REF	
PACKAGE EDGE TOLERANCE		aaa		0.1	
MOLD FLATNESS		ccc		0.1	
COPLANARITY		eee		0.08	
LEAD OFFSET		bbb		0.1	
EXPOSED PAD OFFSET		fff		0.1	

Figure 11

Revision History

Table 6

Revision Number	Revision Date	Description	Modifications
0.0	2020/11/7	Draft	—
0.1	2021/3/8	Initial release	
0.2	2021/7/8		Add Chart
1.0	2021/8/3	Release	
1.1	2022/3/25	Release	Update Chart
1.2	2022/8/15	Release	Modify Package Drawing
1.3	2025/06/03	Release	General Description/Features/Functional Block Diagram/Absolute Maximum Ratings/Recommended Operating Conditions/Specification/Pin Diagram /Applications Information/ Typical Performance Characteristics /Package Drawing

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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