Advance Information

RS1843 9kHz – 40GHz SP4T

General Description

The RS1843 is a general-purpose, broadband, nonreflective single-pole, four-throw (SP4T) switch in a LGA package. Covering the 9 kHz to 35.0 GHz range, the switch offers high isolation and low insertion loss. The switch features >55 dB isolation, 1.7 dB insertion loss up to 20.0 GHz, and a 7.5 µs switching time.The RS1843 can cover the same operating frequency range with positive supply voltage applied and the negative supply voltage (VSS). The RS1843 is packaged in a 4 mm × 4 mm, surface mount LGA 24 leads package.

Features

❖ **Excellent RF Performance**

- 9KHz – 35GHz broadband
- Nonreflective 50 Ω design
- Low insertion loss: 1.7 dB at 20 GHz
- High isolation: 55 dB at 20 GHz

❖ **High input linearity**

- P0.1dB: 28 dBm typical
- Third-order intercept (IP3): 50 dBm typical

Applications

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

Functional Block Diagram

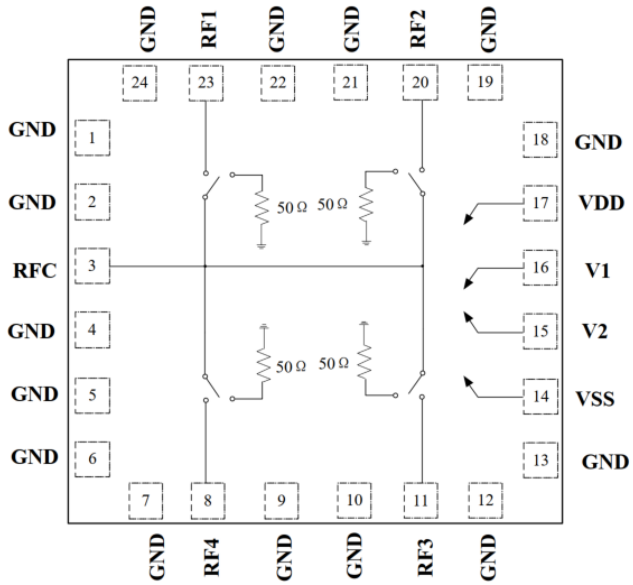


Figure 1

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Absolute Maximum Ratings

Table 1

Parameter	Min	Max	Units
V_{DD} to GND	-0.3	5.5	V
V_{SS} to GND	-3.4	0.3	V
Logic pinl to GND	-0.3	5.5	V
Input Power for any one selected RF through port.		27	dBm
Input Power, internal 50ohm terminated		24	dBm
Input Power, hot switching		TBD	dBm
Maximum Junction Temperature		140	°C
Storage Temperature Range	-65	150	°C
Lead Temperature (soldering, 10s)		260	°C
ESD Voltage– HBM (Per JESD22-A114)		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.

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Recommended Operating Conditions

Table 2

Parameter	Conditions	Min	Typ	Max	Units
Supply Voltage		3	3.3	5.25	V
Supply Voltage, VSS		-3.3	-3	-2.7	V
Operating Temp Range	Case Temperature	-40		105	^{O}C
Input Power			25		dBm
Input Power, internal 50ohm terminated			23		dBm
Input Power, hot switching			TBD		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}=3.3V), T_C = +25°C, F_{RF} = 2000MHz, 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
Insertion Loss	10MHz - 10GHz		1.5		dB
	10 - 20GHz		2		
	20 - 30GHz		2.5		
	30 - 35GHz		2.9		
RFC - RFX Isolation	10MHz - 10GHz		65		dB
	10 - 20GHz		65		
	20 - 30GHz		60		
	30 - 35GHz		51		
Return Loss (thru)	10MHz - 10GHz		-20		dB
	10 - 20GHz		-17		
	20 - 30GHz		-13		
	30 - 35GHz		-11		
Input 0.1dB Compression			28		dBm
Input IP3	Two-tone input power = 14 dBm at each tone, 1 MHz to 13.0 GHz		50		dBm
Switching Time	50% CTRL to 90% RF		7		µs
	50% CTRL to 10% RF		4		
Logic Input High Threshold		1.4		5	V
Logic Input Low Threshold		-0.3		0.6	V
Logic Current	For each control pin		TBD		µA
DC Current (V_{DD})	3.3V Logic		40		µA

Pin Diagram

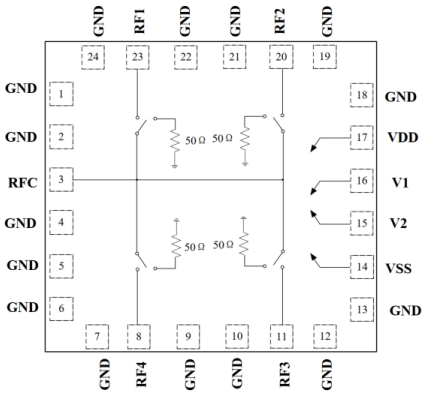


Figure 2

Pin Description

Table 4

Pin No.	Label	Description
1,4,5,6,7,9,10,12,13,18,19,21,22,24	GND	Ground. These pins must be connected to the RF and dc ground of the PCB.
3	RFC	RF Common Port. This pin is dc-coupled to 0 V and ac matched to 50 Ω. No dc blocking capacitor is required when the RF line potential is equal to 0 V dc.
8	RF4	RF Throw Port 4. This pin is dc-coupled to 0 V and ac matched to 50 Ω. No dc blocking capacitor is required when the RF line potential is equal to 0 V dc.
11	RF3	RF Throw Port 3. This pin is dc-coupled to 0 V and ac matched to 50 Ω. No dc blocking capacitor is required when the RF line potential is equal to 0 V dc.
14	VSS	Negative Supply Voltage Pin.
15	V2	Control Input Pin.
16	V1	Control Input Pin.
17	VDD	Positive Supply Voltage Pin.
20	RF2	RF Throw Port 2. This pin is dc-coupled to 0 V and ac matched to 50 Ω. No dc blocking capacitor is required when the RF line potential is equal to 0 V dc.
23	RF1	RF Throw Port 1. This pin is dc-coupled to 0 V and ac matched to 50 Ω. No dc blocking capacitor is required when the RF line potential is equal to 0 V dc.

Control Logic

Table 5

Digital Control Inputs		RF Paths			
V1	**V2**	**RF1 to RFC**	**RF2 to RFC**	**RF3 to RFC**	**RF4 to RFC**
Low	Low	Insertion loss (on)	Isolation (off)	Isolation (off)	Isolation (off)
High	Low	Isolation (off)	Insertion loss (on)	Isolation (off)	Isolation (off)
Low	High	Isolation (off)	Isolation (off)	Insertion loss (on)	Isolation (off)
High	High	Isolation (off)	Isolation (off)	Isolation (off)	Insertion loss (on)

Figure 3. Insertion Loss

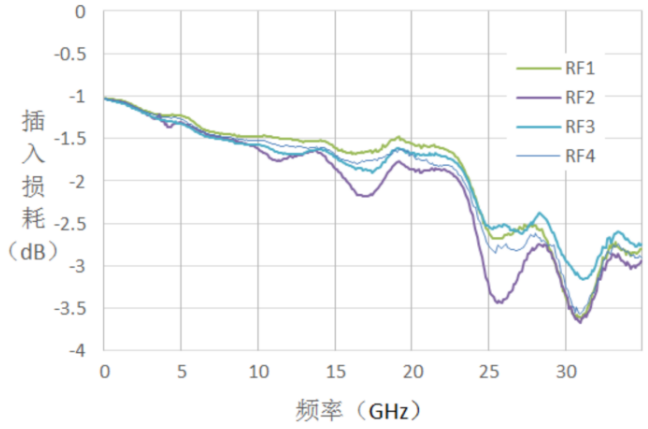


Figure 4. RFC On State Return Loss

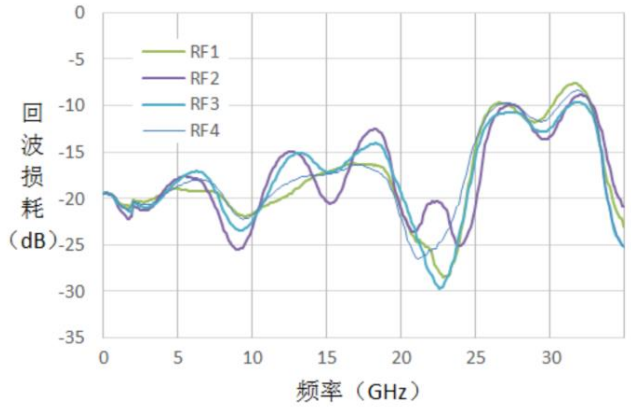


Figure 5. RF1 On RFC to RFX Isolation

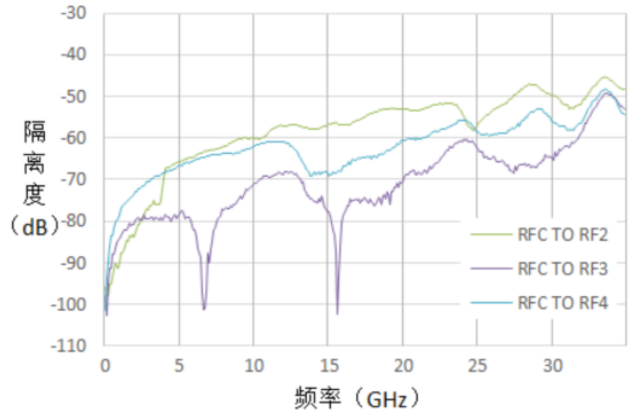


Figure 6. RF2 On RFC to RFX Isolation

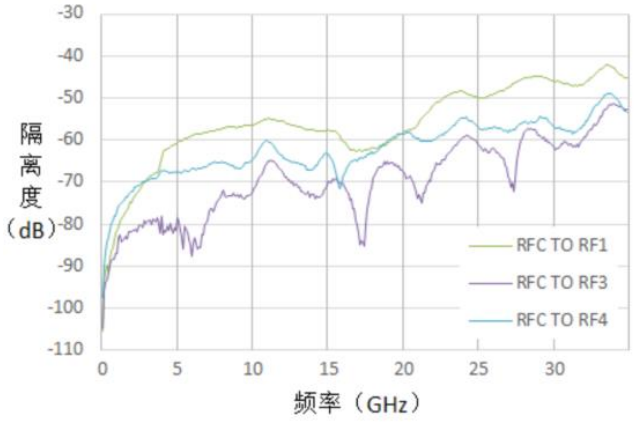


Figure 7. RF3 On RFC to RFX Isolation

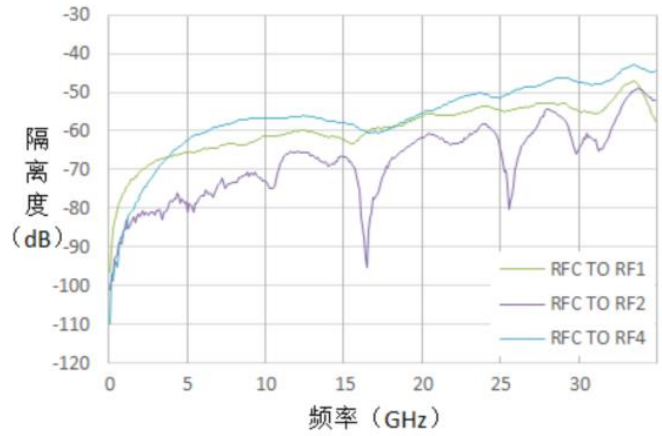
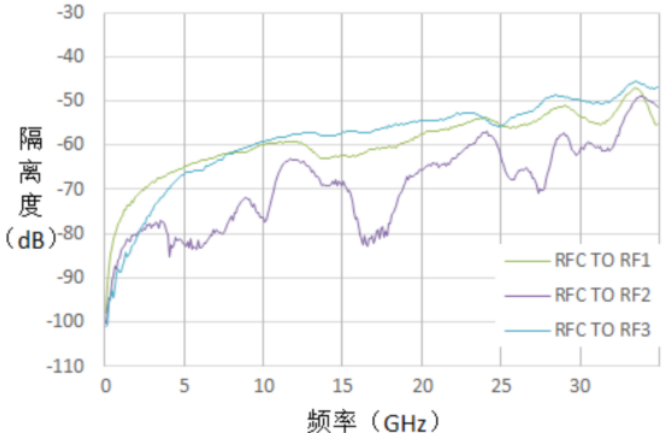
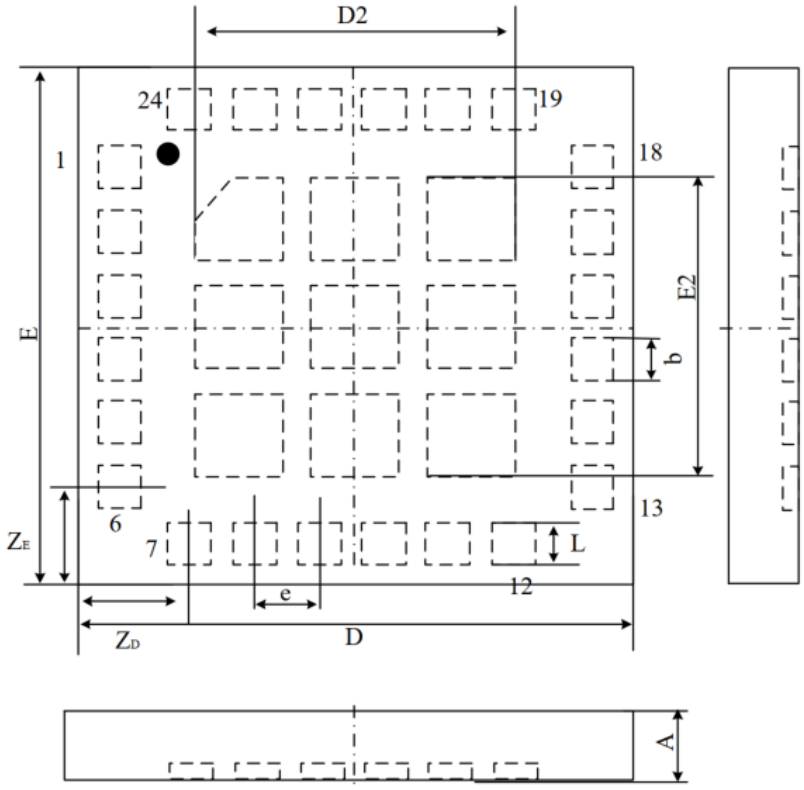


Figure 8. RF4 On RFC to RFX Isolation



Package Drawing



	Min	Typ	Max
A	0.78	—	0.88
D	3.9	—	4.1
b	0.2	—	0.3
D2	2.3	—	2.5
Z_D	—	0.75	—
e	—	0.5	—
E	3.9	—	4.1
E2	2.3	—	2.5
L	0.25	—	0.35
Z_E	—	0.75	—

Figure 9

Revision History

Table 6

Revision Number	Revision Date	Description	Modifications
0.1	2022/9/7	Draft	—
0.2	2023/10/24		Add plots

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).

Sales Contact

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