Product Specification

RS1351X High Isolation SP5T

General Description

The RS1351X is a general-purpose, single-pole, five-throw (SP5T), absorptive switch manufactured using a silicon process. The RS1351X is available in a 4 mm × 4 mm, 24-lead QFN and provides high isolation and low insertion loss from 100 MHz to 8.5 GHz.

The RS1351X incorporates a negative voltage generator to operate with a single positive supply voltage from 3.0 V to 5.5 V applied to the VDD pin. The RS1351X provides a 1.8 V logic-compatible, 3-pin control interface.

Applications

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

Features

- **Excellent RF Performance**
  - Absorptive, 50 Ω design
  - Low insertion loss: 1.05 dB at 2.1GHz
  - High isolation: ＞50 dB at 2.1 GHz
- **High input linearity**
  - P0.1dB: 33 dBm typical
  - Third-order intercept (IP3): 55 dBm typical
- **High power handling**
  - 30 dBm through path
  - 24 dBm terminated path

Functional Block Diagram

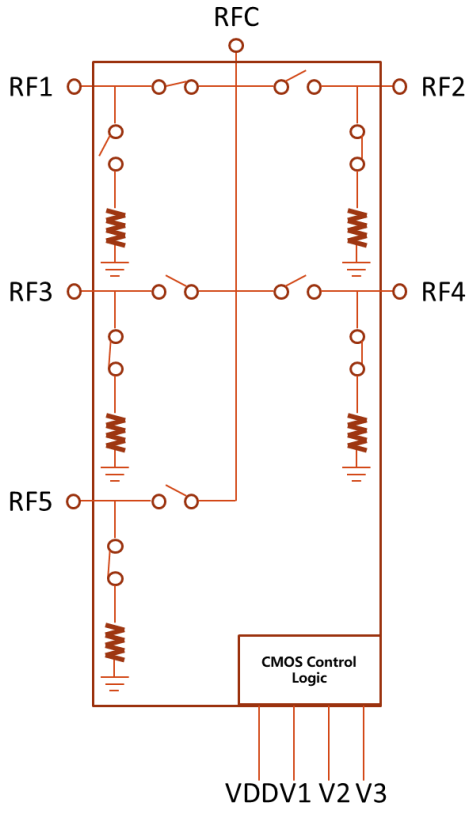


Figure 1

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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
Input Power for any one selected RF through port.		33	dBm
Input Power, internal 50ohm terminated		24	dBm
Maximum Junction Temperature		140	°C
Storage Temperature Range	-65	150	°C
Lead Temperature (soldering, 10s)		260	°C
ESD Voltage– HBM (Per JESD22-A114)	500		

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	5.5	V
Operating Temp Range	Case Temperature	-40	25	105	°C
RF Frequency Range		100		8500	MHz
Input Power	3.5GHz			30	dBm
Input Power, internal 50ohm terminated	3.5GHz			24	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.

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Specification

Typical Application Circuit, Normal mode (VDD=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	100 - 450MHz		0.95		dB
	450 - 1000MHz		1.00		
	1000 - 3000MHz		1.05		
	3000 - 5000MHz		1.10		
	5000 - 6000MHz		1.30		
	6000 - 8500MHz		1.50		
RFC - RFX Isolation	100 - 450MHz		65		dB
	450 - 1000MHz		55		
	1000 - 3000MHz		52		
	3000 - 5000MHz		48		
	5000 - 6000MHz		40		
	6000 - 8500MHz		35		
RFX - RFX Isolation	100 - 450MHz		65		dB
	450 - 1000MHz		55		
	1000 - 3000MHz		52		
	3000 - 5000MHz		45		
	5000 - 6000MHz		40		
	6000 - 8500MHz		35		
Return Loss (RFC)	100MHz – 6000MHz		18		dB
	6000MHz – 8500MHz		15		
Return Loss (RFX)	100MHz – 6000MHz		20		dB
	6000MHz –8500MHz		15		
Return Loss (Terminal)	100MHz – 6000MHz		22		dB
	6000MHz –8500MHz		20		
Input 0.1dB Compression	3.5GHz		33		dBm
Input IP3	400MHz – 6000MHz		55		dBm
Switching Time	50% CTRL to 90% RF		200		ns
	50% CTRL to 10% RF		200		
Logic Input High Threshold		1.2		VDD	V
Logic Input Low Threshold		0		0.6	V
Logic Current	For each control pin		25		µA
DC Current (V_{DD})	3.3V Logic		230		µA

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Pin Diagram

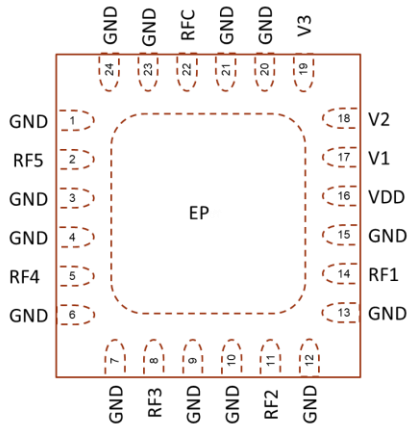


Figure 2

Pin Description

Table 4

Pin No.	Label	Description
1, 3, 4, 6, 7, 9, 10, 12, 13, 15, 20, 21, 23, 24, EP	GND	DC and RF ground, connect to low inductive path to PCB ground
2	RF5	RF Port 5
5	RF4	RF Port 4
8	RF3	RF Port 3
11	RF2	RF Port 2
14	RF1	RF Port 1
16	VDD	DC Supply Voltage Input
17	V1	Control Input 1
18	V2	Control Input 2
19	V3	Control Input 3
22	RFC	RF Common Port

Control Logic

Table 5

Mode	V3	V2	V1
All off	0	0	0
RF1 on	0	0	1
RF2 on	0	1	0
RF3 on	0	1	1
RF4 on	1	0	0
RF5 on	1	0	1
All off	1	1	0
Unsupported	1	1	1

Typical Performance Characteristics

Figure 3 Insertion Loss

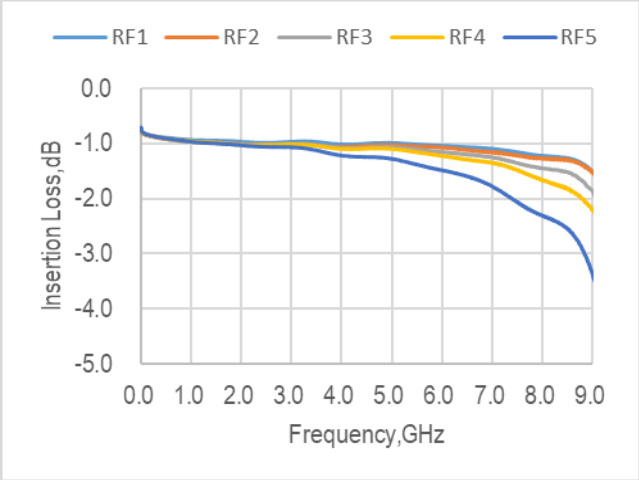


Figure 4 Insertion Loss VS Temperature

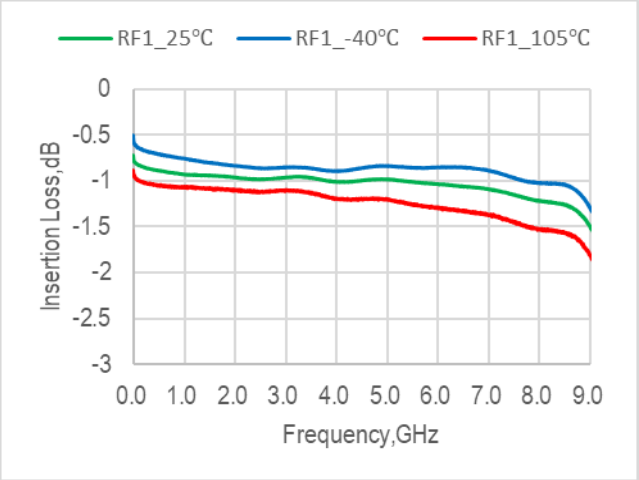


Figure 5 RFX-RFX Isolation

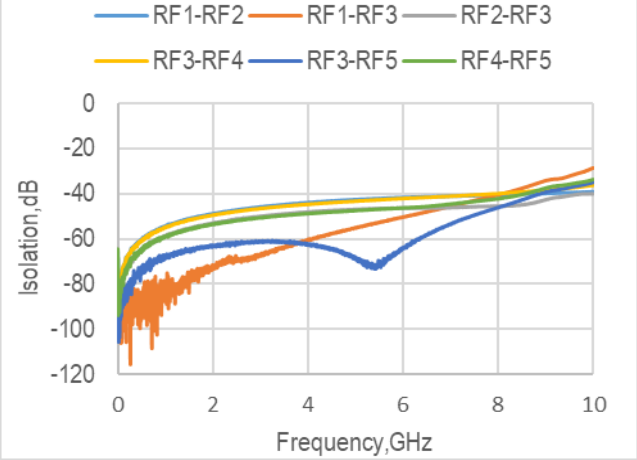


Figure 6 RFC-RFX Isolation

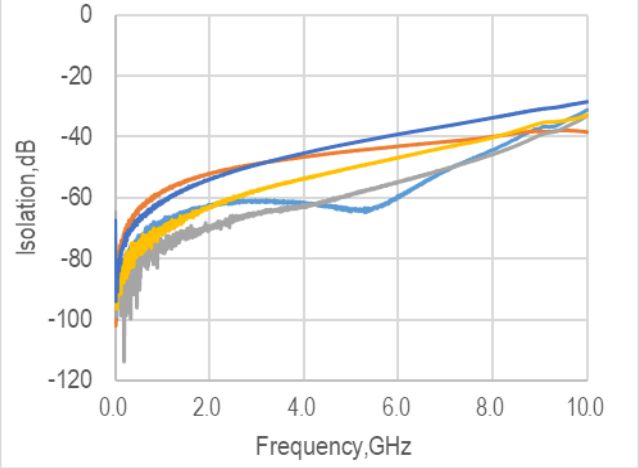
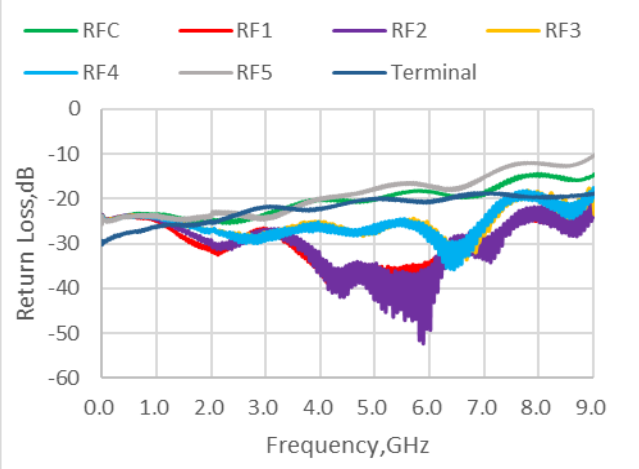


Figure 7 Return Loss



Application Information

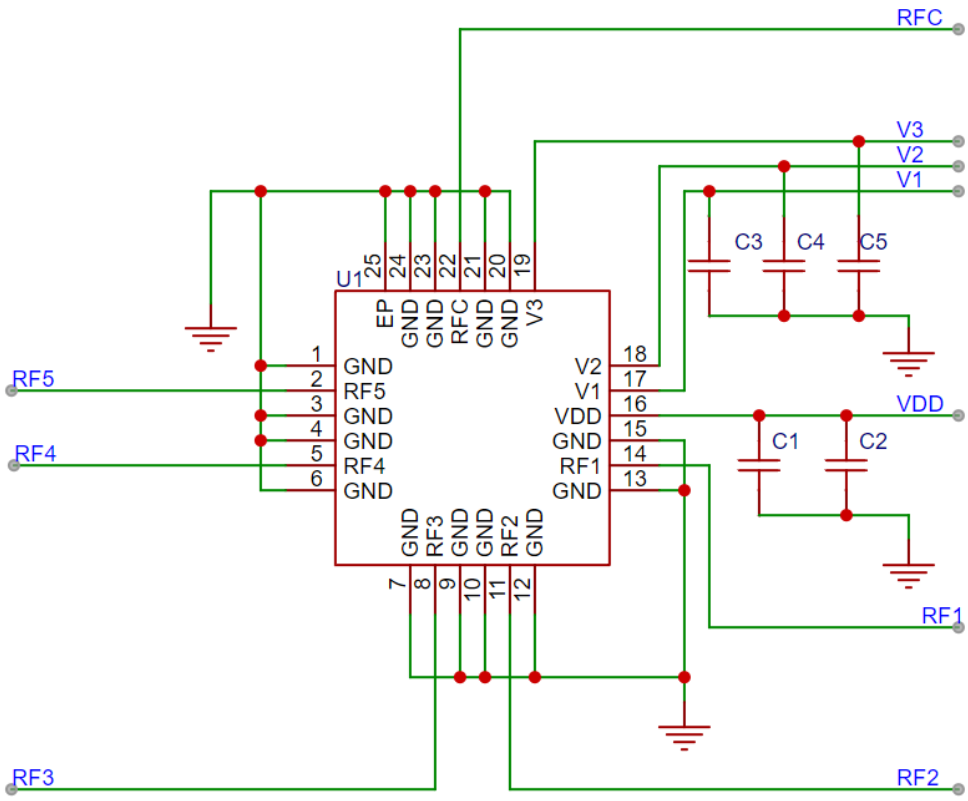


Figure 8

Table 6

Reference Designator	Value	Description
C1	100nF	0402
C2	1uF or NC	0402
C3-5	100pF or NC	0402

Package Drawing

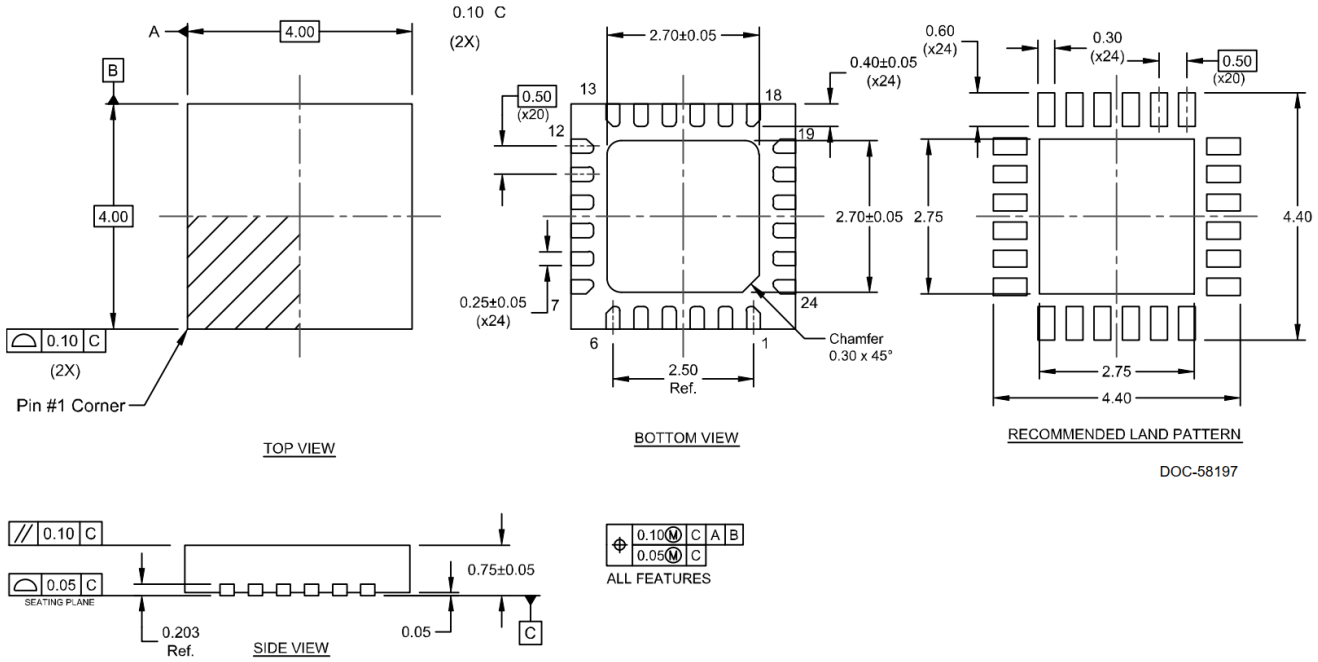


Figure 9

Revision History

Table 7

Revision Number	Revision Date	Description	Modifications
0	2020/11/7	Draft	—
0.1	2020/12/8	Initial release	
1.0	2021/10/26	release	
1.1	2022/3/25	release	Update Figure 3
1.2	2025/8/25	release	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

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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