

GSR1303S: CMOS SOI SPDT Switch

0.01 – 3.0 GHz

Applications

- WLAN 802.11a/b/g/n/ac/ax networks
- ISM band radios
- Low power T/R systems
- Low insertion loss (0.28dB @ 2.5GHz)
- High isolation (24dB @ 2.5GHz)
- Low DC current: 12uA @ 3.3V, 5uA @ 1.8V
- SOT-363 Package (MSL1, 260°C per JEDEC-J-STD-020)
- ESD: 1.5 kV HBM on all pins

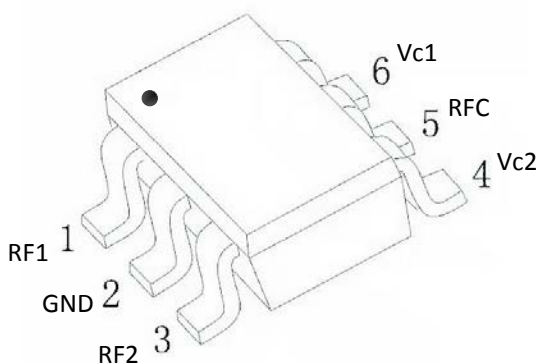
Features

- $IP_{0.1dB}$: 1.6W (+32dBm) @ 3.3V, 1.4W (+31.5dBm) @ 1.8V

Description

The GSR1303S is a CMOS SOI single pole dual throw (SPDT) high power switch in a low cost miniature SOT-363 package. The GSR1303S is ideally suited for applications where high power, low insertion loss, and small size are required. Typical applications are for handset systems that connect separate transmit and receive functions to a common antenna, as well as other related handset and general purpose applications. This part can be used in all systems operating up to 3 GHz requiring high power at low control voltage.

Function and Pin Definition



GSR products are compliant with all applicable legislation and are halogen-free. For additional information, refer to GSR Microelectronics RoHS Compliance Declaration.

Figure 1. GSR1303S Pin-Def.
(Top View)

Table 1. GSR1303S Pin Definition

Pin #	Name	Description	Pin #	Name	Description
1	RF1	RF port 1	4	Vc2	Logic control 2
2	GND	Ground	5	RFC	Common Port
3	RF2	RF port 2	6	Vc1	Logic control 1

Table 2. GSR1303S Absolute Maximum Ratings

Parameter	Absolute Maximum
Max Input Power (0.01 - 3 GHz, 3.3 V control)	+32.5 dBm
Operating Voltage	+4.2 V
Thermal resistance (Θ_{JC})	25 °C/W
Operating Temperature	-40°C to +85°C
Storage Temperature	-65°C to +150°C

Table 3. GSR1303S Recommended Operating Conditions

Parameter	Symbol	Minimum	Typical	Maximum	Units
Operating frequency	f_0	0.01		3.0	GHz
Control voltage:					
Low	Vc_L	0	0	0.4	V
High	Vc_H	1.6	3.3	3.6	V
Operating temperature	T _{oper.}		25		°C

Truth Table and Pin Out

Table 4. GSR1303S Truth Table

Vc1	Vc2	RFC—RF1	RFC—RF2
1	0	Isolation	Insertion loss
0	1	Insertion loss	Isolation

Note: “1” = 1.6V to 3.6V. “0” = 0V to 0.4V.

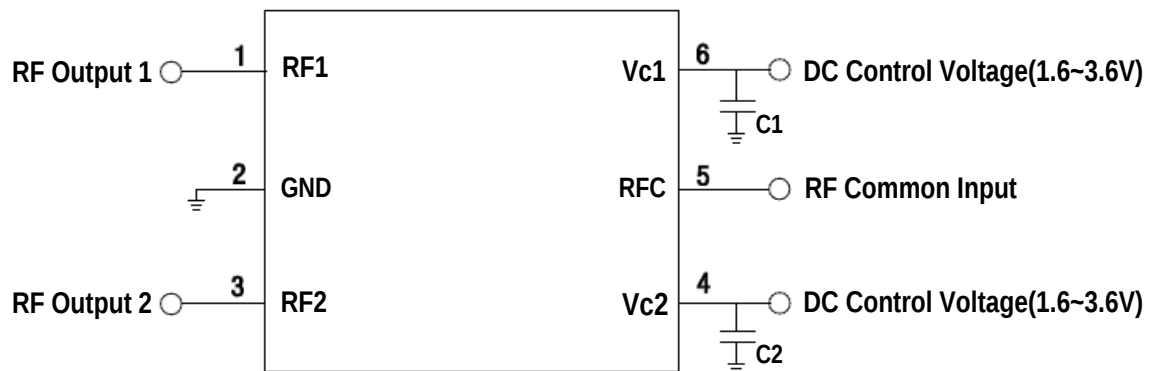


Figure 2. GSR1303S Pin Out

C1 and C2 are optional bypass capacitors (100pF). The RF path should use DC block capacitor if it's with any dc voltage.

Electrical Specification

Table 5. GSR1303S electrical specifications at 25 °C (0 , +3.3 V)

Parameter	Test Condition	Min.	Typ.	Max.	Units
Insertion Loss	0.01GHz — 0.5GHz		0.20	0.30	dB
	0.5GHz — 1.5GHz		0.25	0.35	dB
	1.5GHz — 2.7GHz		0.28	0.38	dB
	2.7GHz — 3.0GHz		0.30	0.40	dB
Isolation	0.01GHz — 0.5GHz	35	40		dB
	0.5GHz — 1.5GHz	25	30		dB
	1.5GHz — 2.7GHz	22	24		dB
	2.7GHz — 3.0GHz	20	22		dB

Return Loss	0.01GHz — 0.5GHz	25	30		dB
	0.5GHz — 1.5GHz	20	25		dB
	1.5GHz — 2.7GHz	20	25		dB
	2.7GHz — 3.0GHz	20	25		dB
2 nd Hamonic	2.45GHz, Pin=+20dBm. Vc = 0V/3.3V		-48		dBm
	2.45GHz, Pin=+25dBm. Vc = 0V/3.3V		-40		dBm
3 rd Hamonic	2.45GHz, Pin=+20dBm. Vc = 0V/3.3V		-67		dBm
	2.45GHz, Pin=+25dBm. Vc = 0V/3.3V		-47		dBm
IP _{0.1dB}	0.01 – 3 GHz, Vc = 0V/3.3V		1.6		W
			32		dBm
	0.01 – 3 GHz, Vc = 0V/1.8V		1.4		W
			31.5		dBm
IP _{1dB}	0.01 – 3 GHz, Vc = 0V/3.3V		1.8		W
			32.5		dBm
	0.01 – 3 GHz, Vc = 0V/1.8V		1.6		W
			32		dBm
Control Current	V _{low} = 0 to 0.2 V V _{high} = 3.3 V		12	20	uA
	V _{low} = 0 to 0.2 V V _{high} = 1.8 V		5	10	uA
Trise, Tfall	10% to 90% RF, 90% to 10% RF		30		ns
	50% control to 90% RF, and 50% control to 10% RF		125		ns

Note 1: Performance is guaranteed only under the conditions listed in this Table.

2: Board loss de-embedded.

Package Dimensions

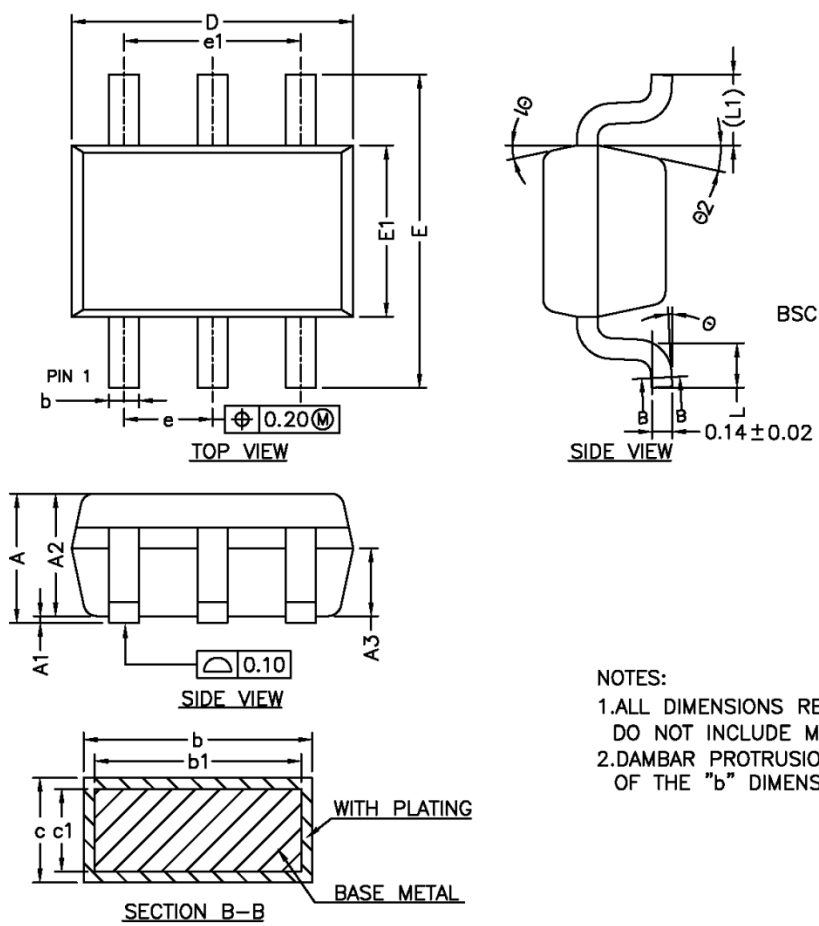


Figure 3. GSR1303S Package Dimensions

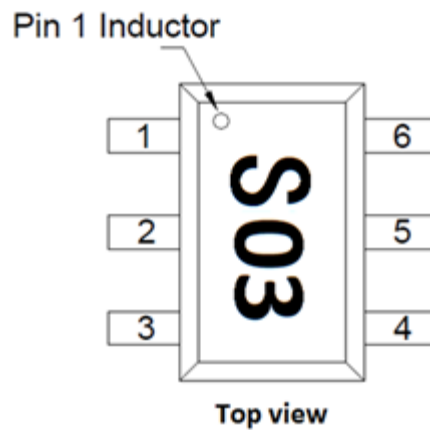


Figure 4. Typical Case Markings

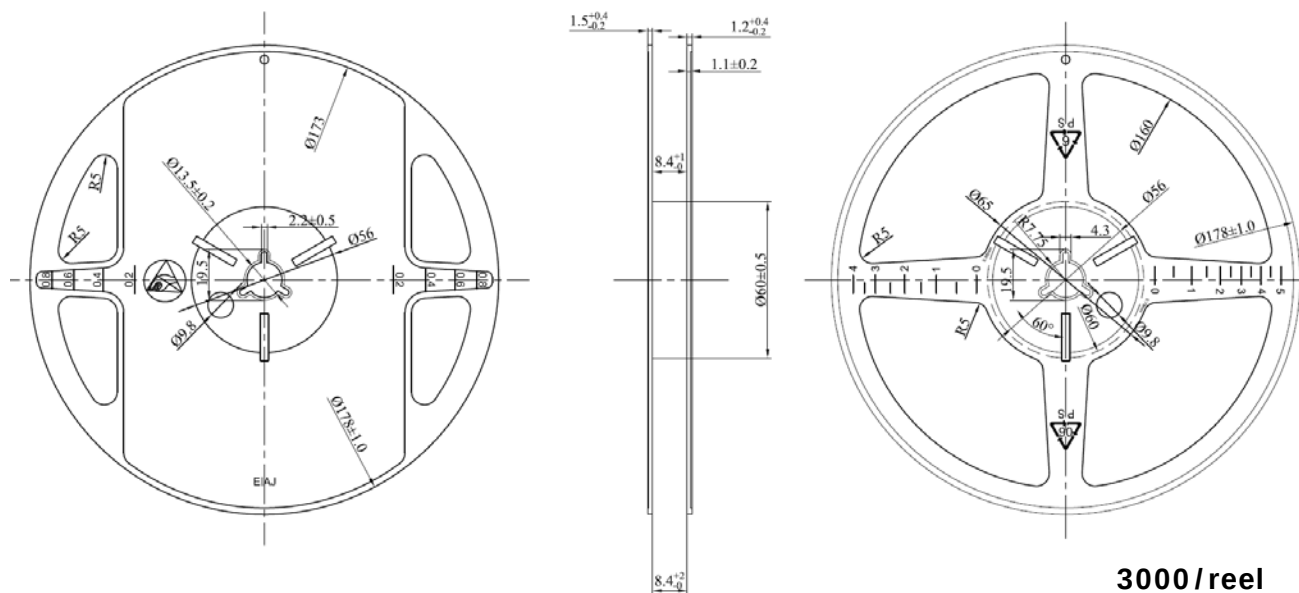
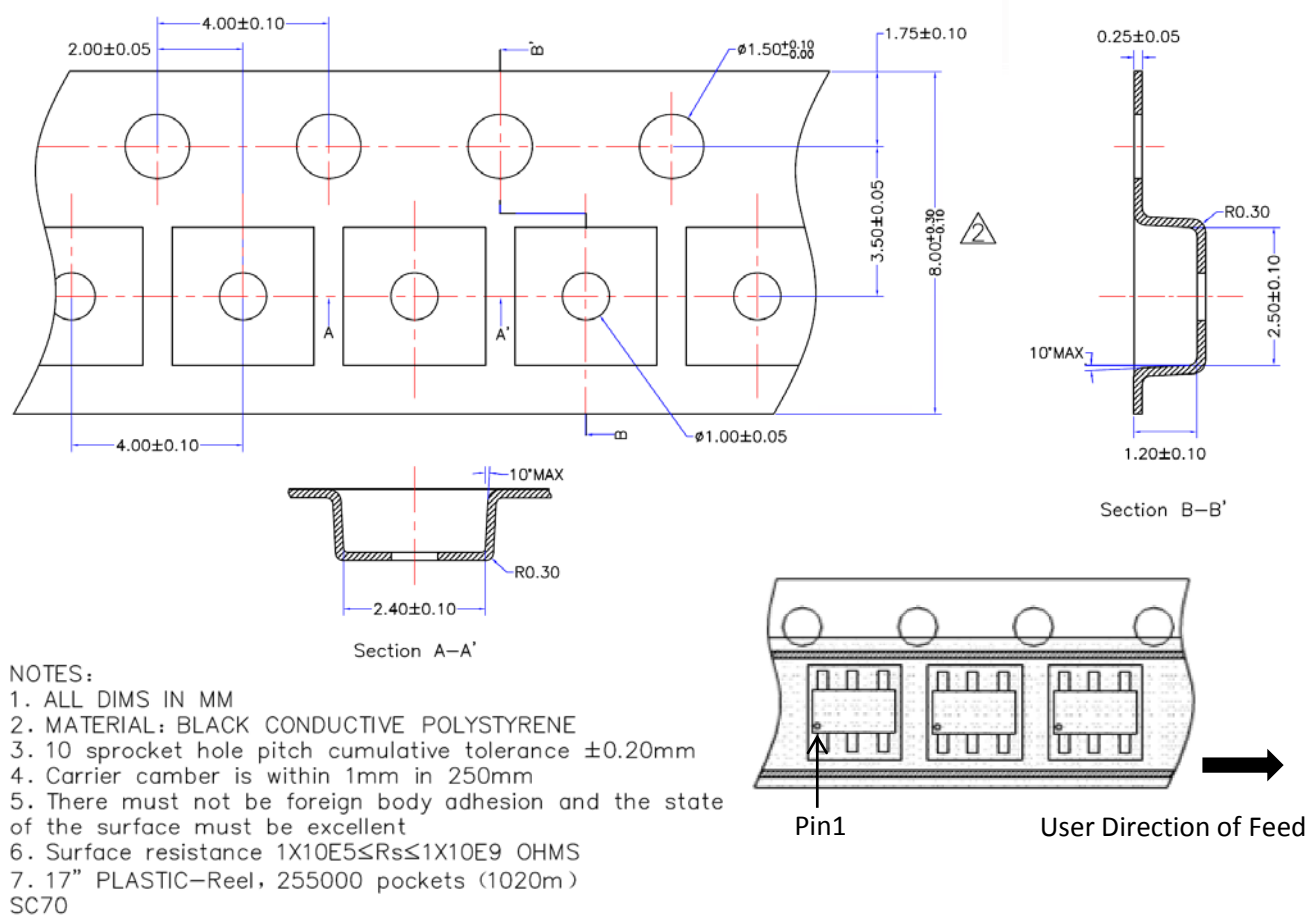
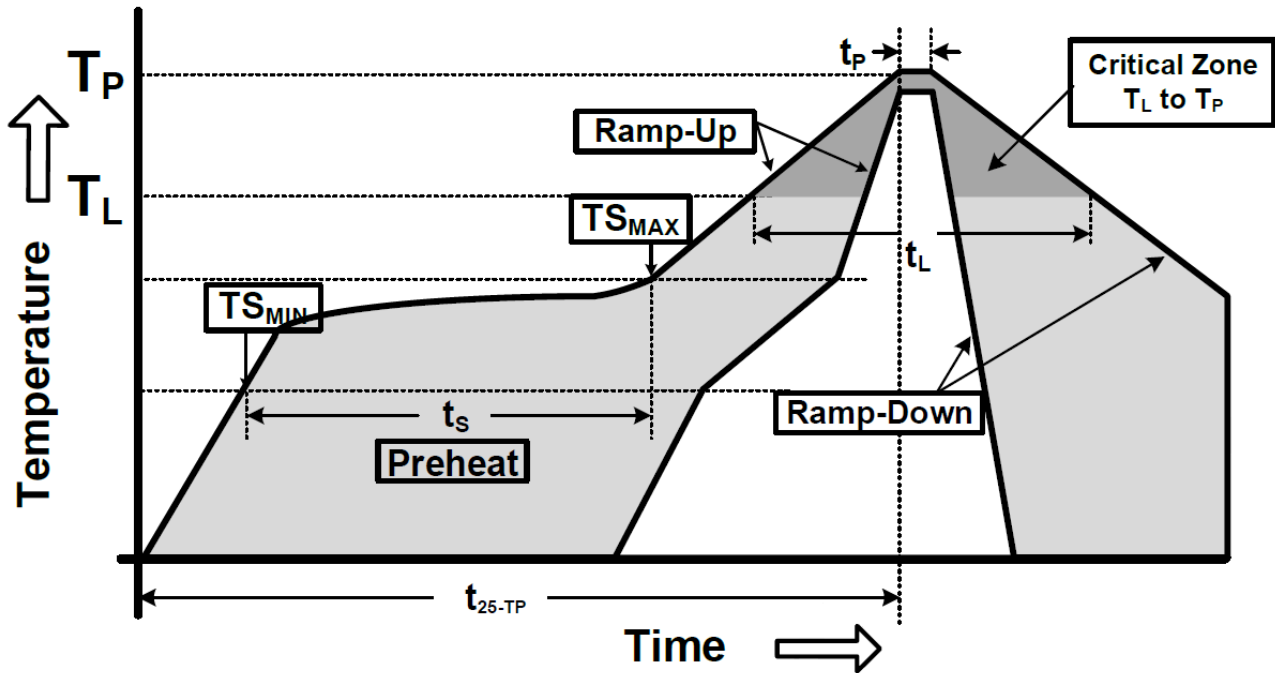


Figure 5. GSR1303S Tape and Reel Dimensions

Reflow Chart



Reflow Profile	Parameter
Preheat Temperature (TS_{MIN} to TS_{MAX})	150°C to 200°C
Preheat Time (t_s)	60 to 180 Seconds
Ramp-Up Rate (TS_{MAX} to T_P)	3°C/s MAX
Time Above T_L 217°C (t_L)	60 to 150 Seconds
Peak Temperature (T_P)	260°C
Time within 5°C of Peak Temperature (t_P)	20 to 40 Seconds
Ramp-Down Rate (TS_{MAX} to T_P)	6°C/s MAX
Time for 25°C to Peak Temperature (t_{25-TP})	8 Minutes MAX

ESD Precautions

The GSR1303S is a static-sensitive electronic device. Do not operate or store near strong electrostatic fields. ESD protection circuitry is contended in this device, but special handling precautions are required.

Human Body Model (HBM), Class-1C	HBM	1500 V
Charged Device Model (CDM), Class_C3	CDM	2000V

RoHS Compliant

The product does not contain lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls (PBB) or polybrominated diphenyl ethers (PBDE), and are therefore considered RoHS compliant.

Revision History

Rev.	Date	Description
1.0	Dec. 1, 2022	Initial Release
1.1	Feb. 10, 2023	Modify Electrical Specifications
1.2	May. 22, 2024	Add Tape and Reel Information
1.3	Nov. 4, 2024	Modify Electrical Specifications
1.4	Mar.12, 2025	Add Reflow Chart
1.5	Jun.26, 2025	Modify Electrical Specifications