

GSR1385S: CMOS SOI SPDT Switch

0.01 – 7.2 GHz

Applications

- WLAN 802.11a/b/g/n/ac/ax networks
- ISM band radios
- Low power T/R systems
- Low insertion loss (0.25dB @ 2.5GHz, 0.35dB @ 5.8GHz)
- High isolation (37dB @ 2.5GHz)

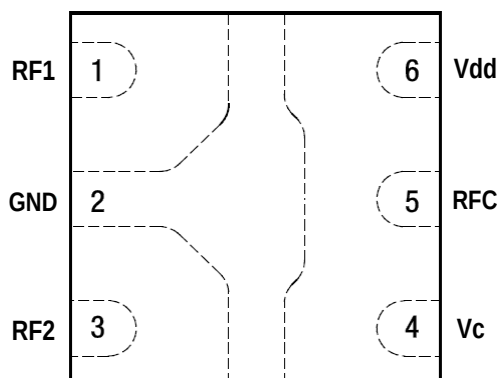
Features

- $P_{0.1dB}$ +32dBm typical @ +3.3V
- Low delay, switch time: 125ns
- 1.0mm × 1.0mm QFN Package (MSL3, 260°C per JEDEC-J-STD-020)

Description

Using advanced switching technologies, the GSR1385S is a single pole dual throw (SPDT) high power switch in a low cost miniature 1.0 mm × 1.0 mm package. The GSR1385S 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 7.2 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. GSR1385S Pin-Def.
(Top View)

Table 1. GSR1385S Pin Definition

Pin #	Name	Description	Pin #	Name	Description
1	RF1	RF port 1	4	Vc	Logic control
2	GND	Ground	5	RFC	Common Port
3	RF2	RF port 2	6	Vdd	DC supply

Table 2. GSR1385S Absolute Maximum Ratings

Parameter	Absolute Maximum
Max Input Power (0.01 – 7.2 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. GSR1385S Recommended Operating Conditions

Parameter	Symbol	Minimum	Typical	Maximum	Units
Operating frequency	f_0	0.01		7.2	GHz
Supply Voltage	Vdd	1.6	1.8 or 3.3	3.6	V
Control voltage: Low (Vdd=1.8V)	Vc_L	0	0	0.45	V
High (Vdd=1.8V)	Vc_H	0.6	1.8	Vdd	V
Control voltage: Low (Vdd=3.3V)	Vc_L	0	0	0.6	V
High (Vdd=3.3V)	Vc_H	0.9	3.3	Vdd	V
Operating temperature	T _{oper.}		25		°C

Truth Table and Pin Out

Table 4. GSR1385S Truth Table

Mode	Vdd	Vc	RFC—RF1	RFC—RF2
1	Vdd	0	Isolation	Insertion loss
2	Vdd	1	Insertion loss	Isolation

Note: Vdd = 1.6 to 3.6 V, "1" indicates = 1.2 V to Vdd. "0" indicates 0 to 0.45 V.

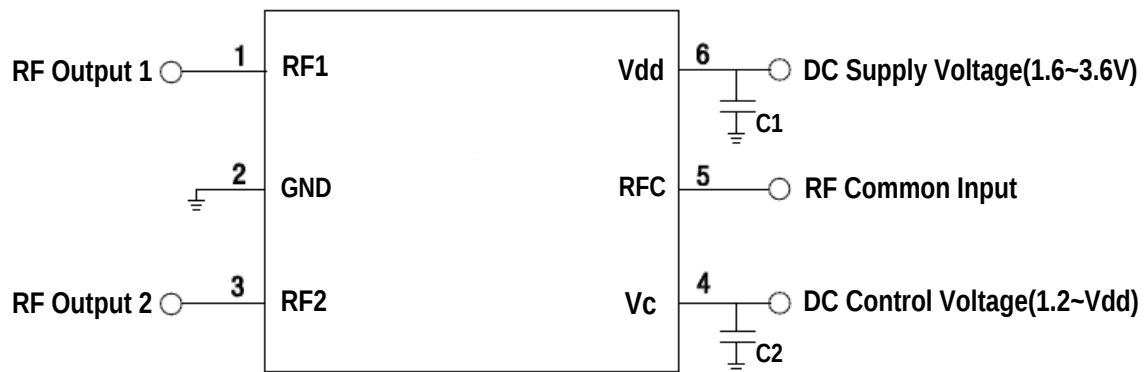


Figure 2. GSR1385S Pin Out

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. GSR1385S electrical specifications at 25 °C (Vc = 0 or 3.3 V, Vdd = 3.3 V)

Parameter	Test Condition	Min.	Typ.	Max.	Units
Insertion Loss	0.01GHz — 2.0GHz		0.22	0.32	dB
	2.0GHz — 2.5GHz		0.25	0.35	dB
	4.8GHz — 6.0GHz		0.35	0.50	dB
	6.0GHz — 7.2GHz		0.55	0.75	dB
Isolation	0.01GHz — 2.0GHz	37	40		dB
	2.0GHz — 2.5GHz	30	37		dB
	4.8GHz — 6.0GHz	22	26		dB
	6.0GHz — 7.2GHz	20	22		dB
Return Loss	0.01GHz — 2.0GHz	20	25		dB
	2.0GHz — 2.5GHz	18	25		dB
	4.8GHz — 7.2GHz	14	20		dB
2 nd Hamonic	2.4GHz, Pin=+24dBm. Vc = 0V/3.3V	-65	-70		dBm
3 rd Hamonic	2.4GHz, Pin=+24dBm. Vc = 0V/3.3V	-58	-63		dBm
IP _{0.1dB}	0.01 – 7.2 GHz, Vc = 0V/3.3V	30	32		dBm
IP _{1dB}	0.01 – 7.2 GHz, Vc = 0V/3.3V	30.5	32.5		dBm
Vdd	Supply voltage	1.6	3.3	3.6	V
Vc	Control voltage	1.2	1.8	Vdd	V
I _{dd}	Vdd=3.3V, Vdd pin current		13	20	uA
I _{vc}	Vc=1.8V, Vdd=3.3V, Vc pin current		1	5	uA
	Vc=3.3V, Vdd=3.3V, Vc pin current		1	5	uA
T _{rise} , T _{fall}	10% to 90% RF, 90% to 10% RF		30	50	ns
T _{sw}	Switching Time: 50% control to 90% RF, and 50% control to 10% RF		125	180	ns
T _{start}	50% Vdd to 90% RF		2	4	uS

Table 6. GSR1385S electrical specifications at 25 °C (Vc = 0 or 1.8 V, Vdd = 1.8 V)

Parameter	Test Condition	Min.	Typ.	Max.	Units
Insertion Loss	0.01GHz — 2.0GHz		0.27	0.37	dB
	2.0GHz — 2.5GHz		0.30	0.40	dB
	4.8GHz — 6.0GHz		0.40	0.55	dB
	6.0GHz — 7.2GHz		0.60	0.85	dB
Isolation	0.01GHz — 2.0GHz	36	39		dB
	2.0GHz — 2.5GHz	29	36		dB
	4.8GHz — 6.0GHz	21	25		dB
	6.0GHz — 7.2GHz	19	22		dB
Return Loss	0.01GHz — 2.0GHz	20	25		dB
	2.0GHz — 2.5GHz	18	25		dB
	4.8GHz — 7.2GHz	14	20		dB
2 nd Hamonic	2.4GHz, Pin=+24dBm. Vc = 0V/1.8V	-62	-67		dBm
3 rd Hamonic	2.4GHz, Pin=+24dBm. Vc = 0V/1.8V	-55	-60		dBm
IP _{0.1dB}	0.01 – 7.2 GHz, Vc = 0V/1.8V	30	31.5		dBm
IP _{1dB}	0.01 – 7.2 GHz, Vc = 0V/1.8V	30	32		dBm
Vdd	Supply voltage	1.6	1.8	3.6	V
Vc	Control voltage	1.2	1.8	Vdd	V
I _{dd}	Vdd=1.8V, Vdd pin current		4	6	uA
I _{vc}	Vc=1.8V, Vc pin current		1	5	uA
T _{rise} , T _{fall}	10% to 90% RF, 90% to 10% RF		25	45	ns
T _{sw}	Switching Time: 50% control to 90% RF, and 50% control to 10% RF		115	170	ns
T _{start}	50% Vdd to 90% RF		2	4	uS

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

2: Board loss de-embedded.

Package Dimensions

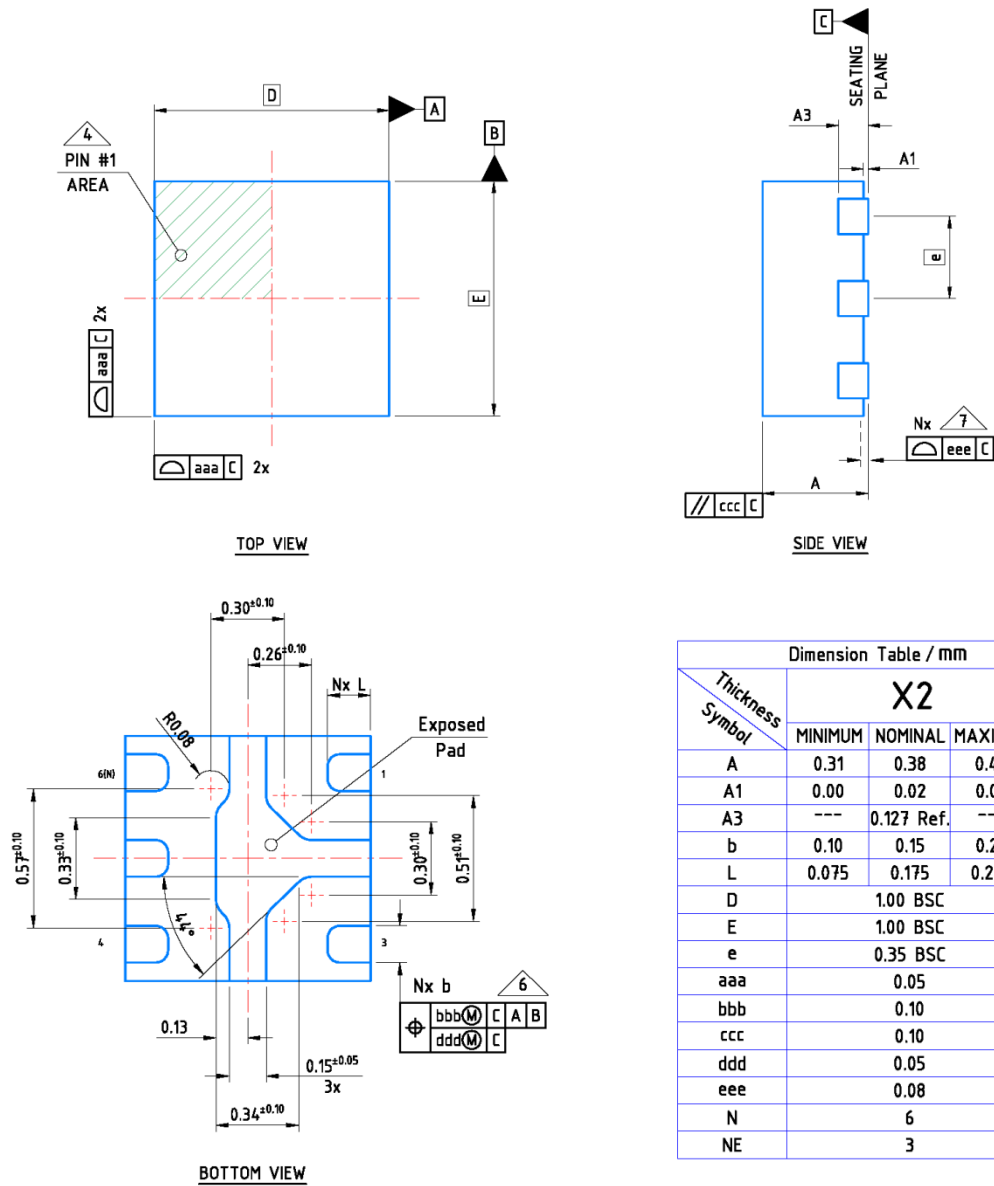


Figure 3. GSR1385S Package Dimensions

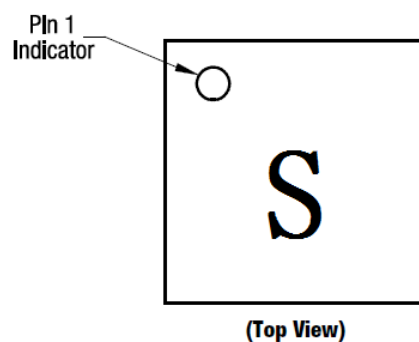
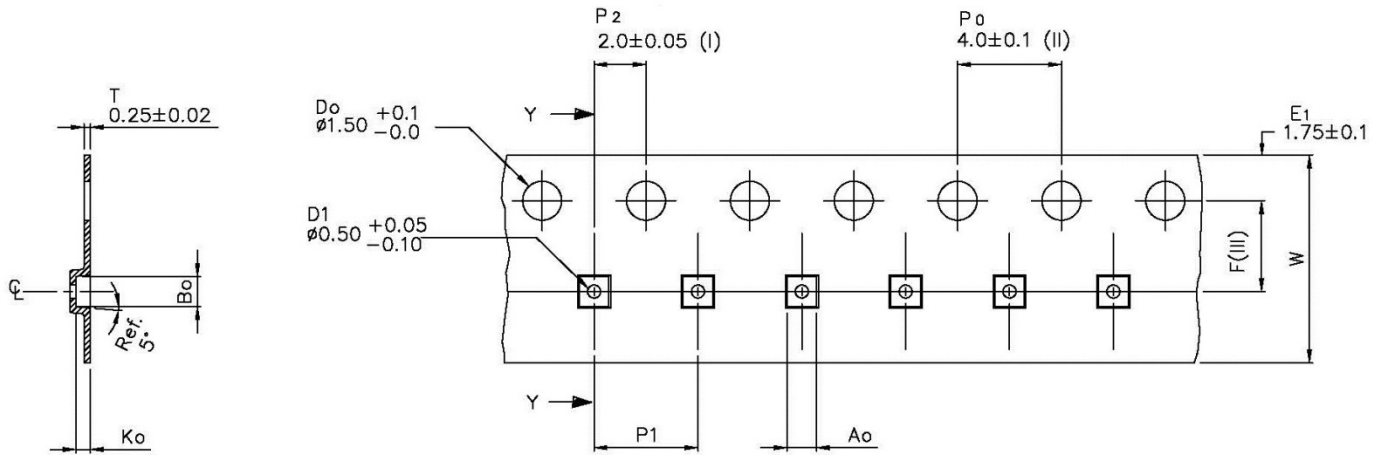


Figure 4. Typical Case Markings

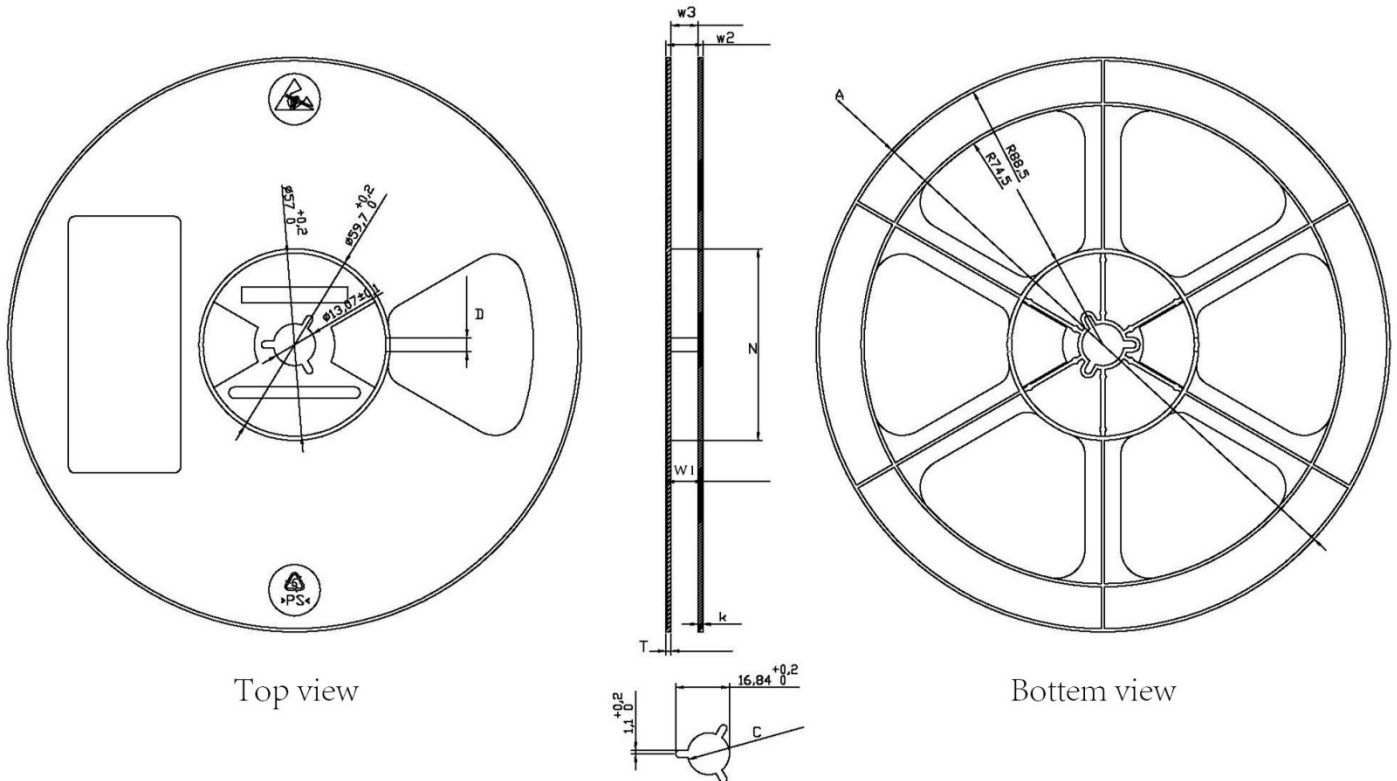


SECTION Y-Y

Ao	1.14 +/ -0.05
Bo	1.17 +/ -0.05
Ko	0.56 +/ -0.05
F	3.50 +/ -0.05
P1	4.00 +/ -0.10
W	8.00 +0.3/-0.1

- (I) Measured from centreline of sprocket hole to centreline of pocket.
- (II) Cumulative tolerance of 10 sprocket holes is ± 0.20 .
- (III) Measured from centreline of sprocket hole to centreline of pocket.
- (IV) Other material available.

ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE STATED.



TYPE	A	N	C	D	w1	w2	w3	T	k
8MM	$\phi 180^{+2}_{-2}$	$\phi 60^{+1}_{-1}$	$\phi 13.1^{+0.2}_{-0.2}$	4,2±0,5	8,4 ⁺¹ ₋₀	11,6 ⁺¹ ₋₁	8,75 ⁺¹ ₋₁	1,5±0,15	1,25 ^{+0.1} _{-0.05}
12MM	$\phi 180^{+2}_{-2}$	$\phi 60^{+1}_{-1}$	$\phi 13.1^{+0.2}_{-0.2}$	4,2±0,5	12,5 ⁺¹ ₋₀	15,7 ⁺¹ ₋₁	12,7 ⁺¹ ₋₁	1,5±0,15	1,2±0,1

5000 / reel

Figure 5. GSR1385S Tape and Reel Dimensions

ESD Precautions

The GSR1385S is a static-sensitive electronic device. Do not operate or store near strong electrostatic fields. ESD protection circuitry is contained in this device, but special handling precautions are required.

Electrostatic discharge	Symbol	Typ.
Human Body Model (HBM), Class-1C	ESD	1500 V
Charged Device Model (CDM), Class_C3 (All Pins)	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. 22, 2021	Initial Release
1.1	Apr. 22, 2022	Modify Package Dimensions
1.2	May. 6, 2022	Modify Electrical Specifications
1.3	July. 21, 2022	Add Parameter Description
1.4	Sep. 7, 2024	Modify Electrical Specifications
1.5	Sep. 23, 2024	Add Parameter Description
1.6	Sep. 27, 2025	Add Parameter Description