2 Watt Cellular T/R and Antenna Changeover Switch DC - 2.0 GHz

SW-358, 359A

V2.00

Features

- Low Cost Plastic SSOP-8 Package[1]
- Both Positive and/or Negative 3 to 10 V Control
- Low Insertion Loss: 0.4 dB
- Very High Intercept Point: 55 dBm IP_3
- Very Low Power Consumption: 50µW
- For AMPS, NAMPS, ETACS, NMT, GSM, PCN, PDC, and DECT Applications

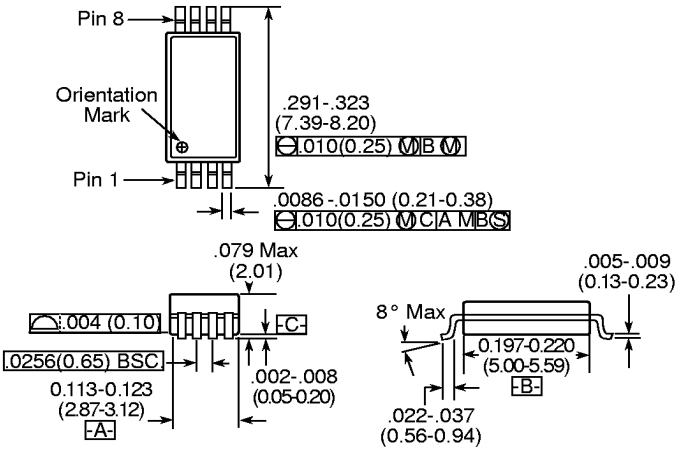
Description

The SW-358[3] and SW-359A[4] are GaAs MMIC SPDT switches in low cost SSOP 8-lead surface mount plastic packages.

These switches are ideally suited for use where very low distortion and low loss are required. The SW-358 and the SW-359A can be operated with negative, positive, or a combination of positive/negative control voltages. Typical application is an internal/external antenna select switch for portable telephones and data radios. In addition, because of its low loss, good isolation and inherent speed, the SW-358 can be used as a conventional T/R switch, or as an antenna diversity switch. Both switches can be used for power applications up to 2 watts in systems such as cellular, PCM, GSM, and other analog/digital wireless communication systems.

The SW-358 and SW-359A are fabricated with monolithic GaAs MMICs using a mature 1 micron process. The process features full passivation for increased performance and reliability.

SSOP-8



Dimensions in ( ) are in mm.
Unless otherwise noted:
.xxx = ± 0.010 (.xx = ±0.25)

Electrical Specifications, T_A = +25°C[2]

Parameter	Test Conditions		SW-358 Units	SW-358 Min.	SW-358 Typ.	SW-358 Max.	SW-359A Min.	SW-359A Typ.	SW-359A Max.
Insertion Loss		DC - 0.5 GHz	dB		0.35	0.4		0.35	0.4
		DC - 1.0 GHz	dB		0.45	0.6		0.45	0.6
		DC - 2.0 GHz	dB		1.0	1.2		1.0	1.2
Isolation		DC - 0.5 GHz	dB	20	23		20	23	
		DC - 1.0 GHz	dB	15	17		15	17	
		DC - 2.0 GHz	dB	8	10		8	10	
VSWR		DC - 1.0 GHz			1.2:1	1.4:1		1.2:1	1.4:1
		DC - 2.0 GHz			1.6:1	1.8:1		1.6:1	1.8:1
Trise, Tfall	10%-90% RF, 90% - 10% RF		nS		38			38	
Ton , Toff	50% Control to 90% RF, 50% Control to 10% RF		nS		42			42	
Transients	In-Band		mV		30			30	
1 dB Compression	Input Power, (5V Supply/Control)	0.9 GHz	dBm		35			35	
	Input Power, (8V Supply/Control)	0.9 GHz	dBm		37			37	
Input IP_3	2-Tone, 5 MHz spacing, +10 dBm (+13 dBm total)	0.9 GHz	dBm		55			55	
Input IP_2	2-Tone, 5 MHz spacing, +10 dBm (+13 dBm total)	0.9 GHz	dBm		98			98	
T/R Intermodulation Products[5]	TX Tone +30 dBm @ 830 MHz	(5V Supply/Control)	dBm		-45			-45	
	RX Spurious +10 dBm @ 785 MHz	(8.5V Supply/Control)	dBm		-78			-78	

1. Available in Tape and Reel packaging.
2. All specifications apply when operated with bias voltages of 0 and 5V at 1 GHz in a 50 ohm system, unless otherwise specified
3. SW-358 replaces SW-031.
4. SW-359A replaces SW-030.
5. See diagram on following page for test set up.

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Absolute Maximum Ratings[1]

Parameter	Absolute Maximum
Max. Input Power (0.5 - 2.5GHz)	
3 V Control and Supply	+34dBm
5 V Control and Supply	+37dBm
9 V Control and Supply	+40dBm
Power Dissipation	1.0W
Operating Temperature	-40°C to +85°C
Storage Temperature	-65°C to +150°C
Thermal Resistance[2]	θ_{jc} = 87°C/W

Note: 1. Operation of this device above any one of these parameters may cause permanent damage.
2. Thermal resistance is given for T_A = +25° C. Tcase is the temperature of leads 1 and 4.

Ordering Information

Part Number	Package
SW-358 PIN	SSOP 8 Lead Plastic
SW-358TR	Forward Tape & Reel*
SW-358RTR	Reverse Tape & Reel*
SW-359A PIN	SSOP 8 Lead Plastic
SW-359ATR	Forward Tape & Reel*
SW-359ARTR	Reverse Tape & Reel*

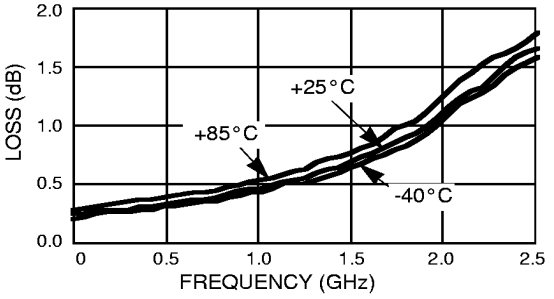
* If Specific reel size is required, consult factory for part number assignment.

Two Tone IP_3 Measurements

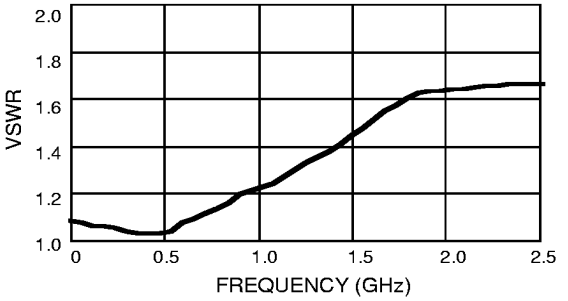
Supply & Control Voltage	Input Power (dBm)	3rd Order Intermodulation Products (dBc)	IP_3 (dBm)	Second Harmonic (dBc)
0, 3 V	+27	-33	+43	-54
0, 5 V	+27	-38	+46	-63
0, 8 V	+27	-66	+60	-65
0, 10 V	+27	-65	+60	-67
0, 3 V	+28	-33	+45	-55
0, 5 V	+28	-35	+45	-63
0, 8 V	+28	-64	+60	-68
0, 10 V	+28	-63	+60	-66
0, 3 V	+29	-32	+45	-51
0, 5 V	+29	-36	+47	-64
0, 8 V	+29	-62	+60	-67
0, 10 V	+29	-63	+61	-67
0, 3 V	+30	-33	+46	-51
0, 5 V	+30	-31	+45	-59
0, 8 V	+30	-54	+57	-67
0, 10 V	+30	-62	+61	-67

Typical Performance @ +25°C

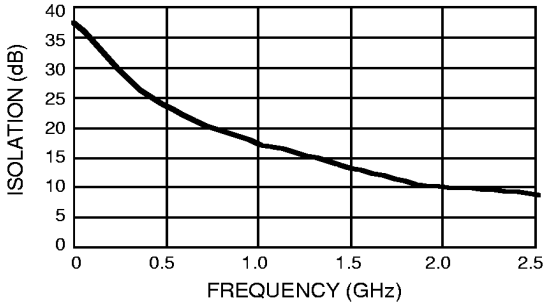
INSERTION LOSS vs FREQUENCY



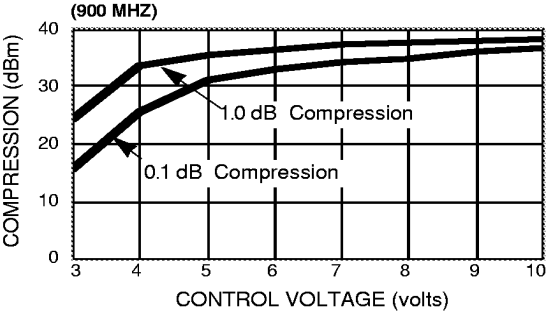
VSWR vs FREQUENCY



ISOLATION vs FREQUENCY



COMPRESSION vs CONTROL VOLTAGE
(900 MHZ)



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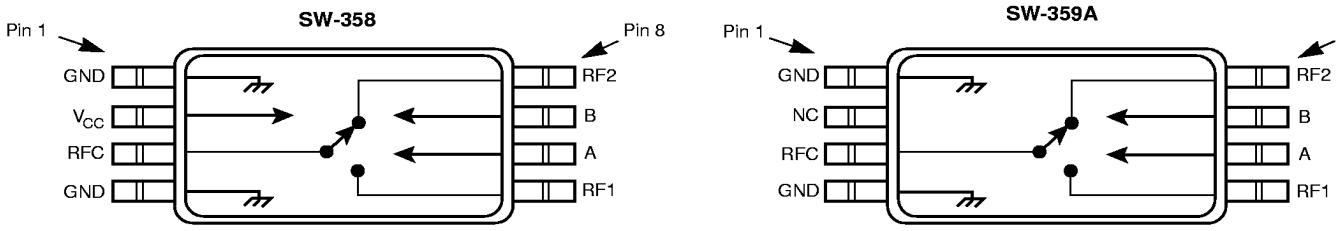
Functional Schematics



SW-358 Voltage Selection Truth Table

Mode	V_{CC}	Control Input A	Control Input B	RFC - RF1	RFC - RF2
Positve Control and Supply[1]	+3 to +8.5 V	0 ±0.2 V V_{CC} ±0.2 V	V_{CC} ±0.2 V 0 ±0.2 V	On Off	Off On
Positive Supply and Positive/Negative Control[1,2]	+3 to +8.5 V	-V V_{CC}	V_{CC} -V	On Off	Off On
Negative Control[3]	0 V (GND)	0 ±0.2 V -3 V -8.5 V	-3 V to -8.5 V 0 ±0.2 V	Off On	On Off

Note: 1. External DC blocking capacitors are required on all RF ports.
2. $|-V| + V_{CC} \leq 8.5$ volts.
3. If negative control is used, DC blocking capacitors are not required on the RF ports.

SW-359A Voltage Selection Truth Table

Mode	Control Input A	Control Input B	RFC - RF1	RFC - RF2
Positve Control[1]	0 ±0.2 V +3 to +8.5 V	+3 to +8.5 V 0 ±0.2 V	On Off	Off On
Positive/Negative Control[1,2]	-V +V	+V -V	On Off	Off On
Negative Control[3]	0 ±0.2 V -3 V to -8.5 V	-3 V to -8.5 V 0 ±0.2 V	Off On	On Off

Note: 1. External DC blocking capacitors are required on all RF ports.
2. $| -V | + V \leq 8.5$.
3. If negative control is used, DC blocking capacitors are not required on the RF ports.

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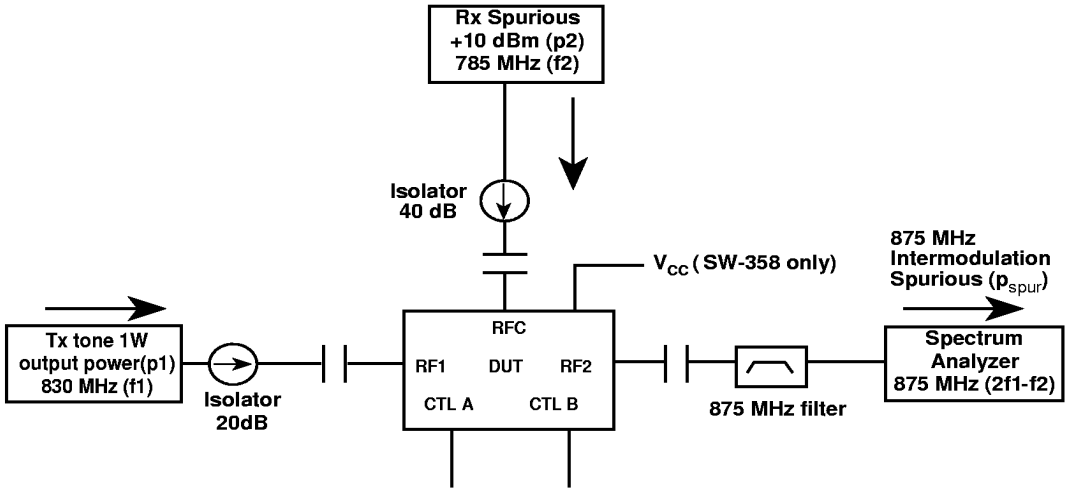
T/R Intermodulation Products Test Set-Up



This set-up tests the intermodulation product at the receiver frequency of 875 MHz generated by the intermodulation of the 1W Tx signal at 830 MHz (f1) and a Rx spurious at 785 MHz (f2). A +10 dBm spurious signal is used in order to overcome measurement sensitivity.

To calculate the intermodulation product, at the RF2 port, for a different Tx power level (p1) and a different Rx spurious level (p2), use the following formula:

p_{spur} (@ RF2) = (2p1 + p2) - 148 dBm

To calculate the intermodulation product, at the RF1 port, for a different Tx power level (p1) and a different Rx spurious level (p2), use the following formula:

p_{spur} (@ RF1) = (2p1 + p2) - 130 dBm

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