



MSW2T-8512-740

SP2T Drop-in High Power X Band Shunt PIN Diode Switch

Features:

- Frequency Range: 8.5 GHz to 12.0 GHz
- Drop-in Package Dimensions: 0.870 x 0.520 inch
- Power Handling (CW): 50 dBm CW
- Power Handling (Peak): 56 dBm
- Low Insertion Loss: < 0.85 dB
- Return Loss: > 15 dB
- Isolation: > 30 dB
- High IP3: 60 dBm
- High Bias Voltage supports High Linearity
- RoHS Compliant

Description:

The MSW2T-8512-740 Drop-in High Power PIN Diode switches leverage high reliability hybrid manufacturing processes which yield proven superior performance to both MMIC and Glass Carrier based technologies. The hybrid design approach permits precise PIN Diode selection to optimize RF performance while maintaining competitive cost targets. The small form factor (12mm x 12mm x 5mm) offers world class power handling, low insertion loss, and superior intermodulation performance exceeding all competitive technologies.

Typical Applications:

- Radar T/R Modules
- Switch Bank Filters
- Mil-Com Radios

The MSW2T-8512-740 series of High Power SP2T switches are intended for use in high power, high reliability, mission critical applications across the 8.5 GHz to 12.0 GHz Band frequency ranges. The manufacturing process has been proven through years of extensive use in high reliability applications.

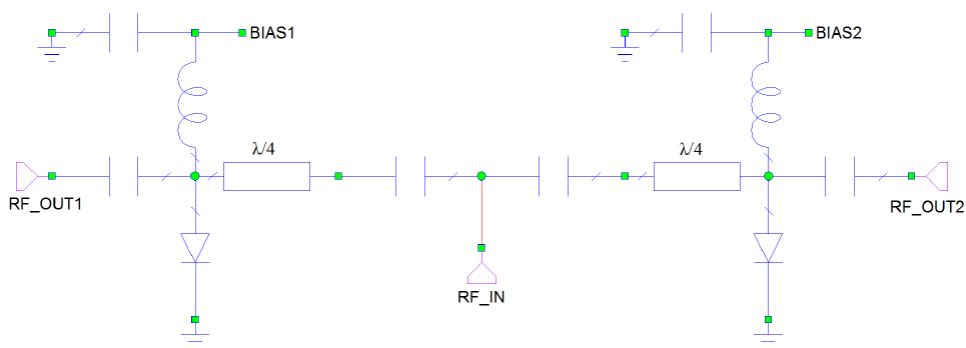
ESD and Moisture Sensitivity Level Rating:

The MSW2T-8512-740 carries an ESD rating of Class 1C, Human Body Model (HBM) and a moisture sensitivity rating of MSL 1. The MSW2T-8512-740 SP2T switches are fully RoHS compliant.

MSW2T-8512-740 Specifications @ $Z_o = 50\Omega$; $T_a = +25^\circ\text{C}$

Parameter	Symbol	Unit	Test Conditions	Min Value	Typical Value	Max Value
Frequency	F	GHz		8.5		12.0
J0-J1 or J0-J2 Insertion Loss (Note 1)	IL	dB	-180V @ -50mA (ON) +1V @ +25 mA (OFF)		0.7	0.85
J0-J1 or J0-J2 Return Loss (Note 1)	RL	dB	-180V @ -50mA (ON) +1V @ +25 mA (OFF)	15	17	
J0-J1 or J0-J2 Isolation (Note 1)	ISO	dB	-180V @ -50mA (ON) +1V @ +25 mA (OFF)	30	35	
CW Incident Power (Note 1)	P inc (CW)	dBm	-180V @ -50mA (ON) +1V @ +25 mA (OFF) 1.5:1 Source & Load VSWR		50	
Peak Incident Power (Note 1)	P inc (Pk)	dBm	-180V @ -50mA (ON) +1V @ +25 mA (OFF) 1.5:1 Source & Load VSWR		56 @ 10 μs Pulse, 1% Duty	
Switching Speed	Ts	ns	(10%-90%) RF Voltage TTL rep rate = 100 kHz		1,100	1,500
Input 3 rd Order Intercept Point	IIP3	dBm	F1 = 2,000 MHz F2 = 2,010 MHz P1 = P2 = +40 dBm -180V @ -50 mA (ON) +1V @ +25 mA (OFF)	60	65	

MSW2T-8512-740 SP2T Schematic



RF Truth Table

RF State	Bias 1	Bias 2
J1-J0 "ON" & J2-J0 "OFF"	-180 V @ -50 mA	+1 V @ +25 mA
J1-J0 "OFF" & J2-J0 "ON"	+1 V @ +25 mA	-180 V @ -50 mA

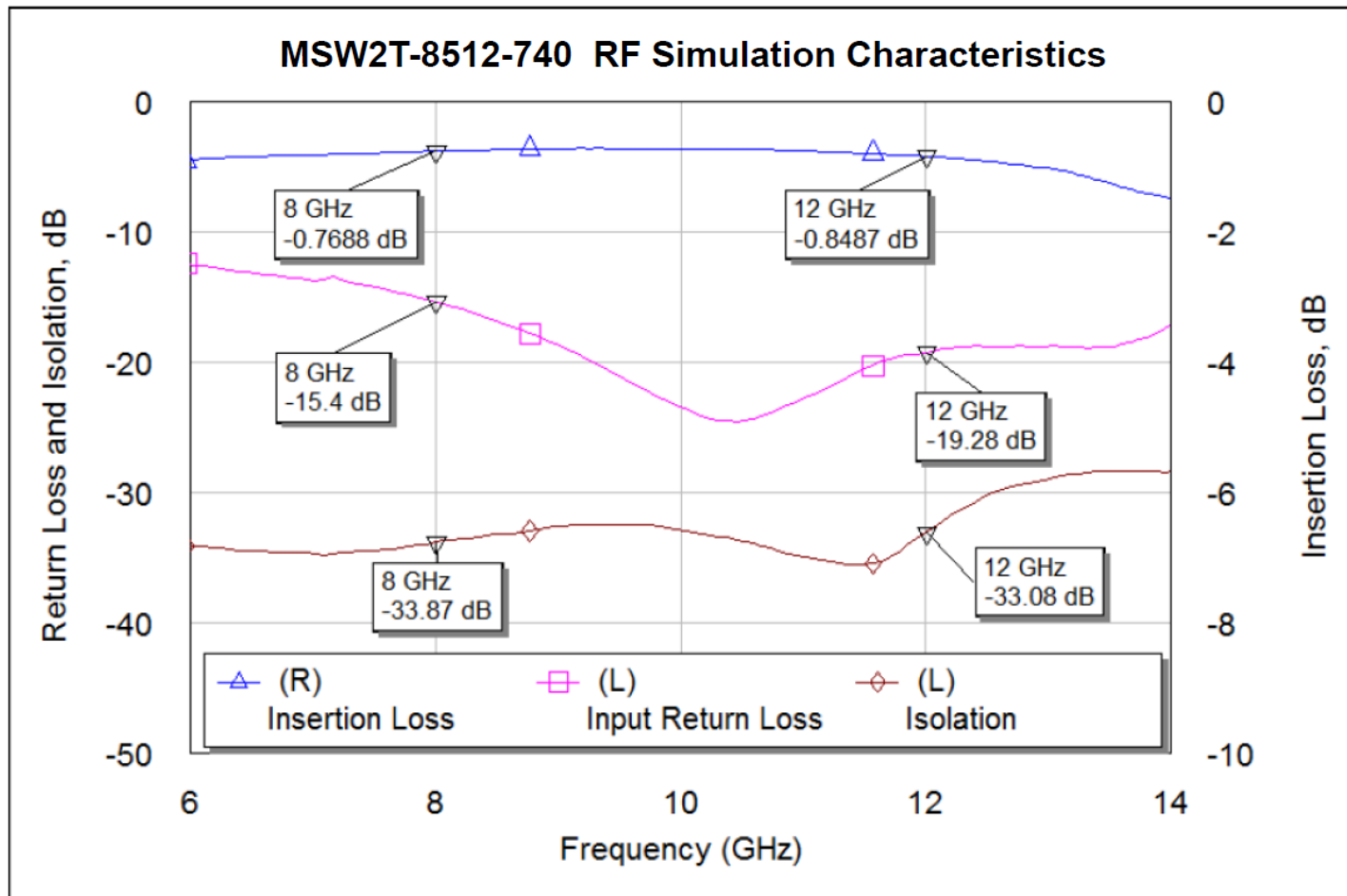
MSW2T-8512-740 Absolute Maximum Ratings @ $T_A = +25\text{ }^\circ\text{C}$ (unless otherwise denoted)

Parameter	Absolute Maximum Value
Forward Current @ J1 or J2	+/- 250 mA
Reverse Voltage @ J1 or J2	-300 V
Forward Diode Voltage	1.2 V @ 250 mA
Operating Temperature	-65 °C to +125 °C
Storage Temperature	-65 °C to +150 °C
Junction Temperature	+175 °C
Assembly Temperature	+260 °C for 10 seconds
CW Incident Power Handling Source & Load VSWR = 1.5 : 1 (Cold and Hot Switching) See Notes below: 1 & 2	+50 dBm @ +85 °C Case Temp
Peak Incident Power Handling Source & Load VSWR = 1.5 : 1 (Cold and Hot Switching) See Notes below: 1 & 2	+56 dBm @ 20 usec pulse, 1% duty cycle @ +85 °C Case Temp
Total Dissipated RF & DC Power (Cold Switching) See Notes below: 1 & 2	6 W @ +85 °C Case Temp

Notes:

- 1) For Hot Switching, PIN Diode Drivers must transition between states in less than 100 nsec with a parallel RC spiking network at the Driver Output.
- 2) Backside RF and DC grounding area of the MSW2T-8512-740 must be completely solder attached to the RF Circuit board for proper electrical and thermal circuit grounding.

MSW2T-8512-740 Small Signal Parametric Performance



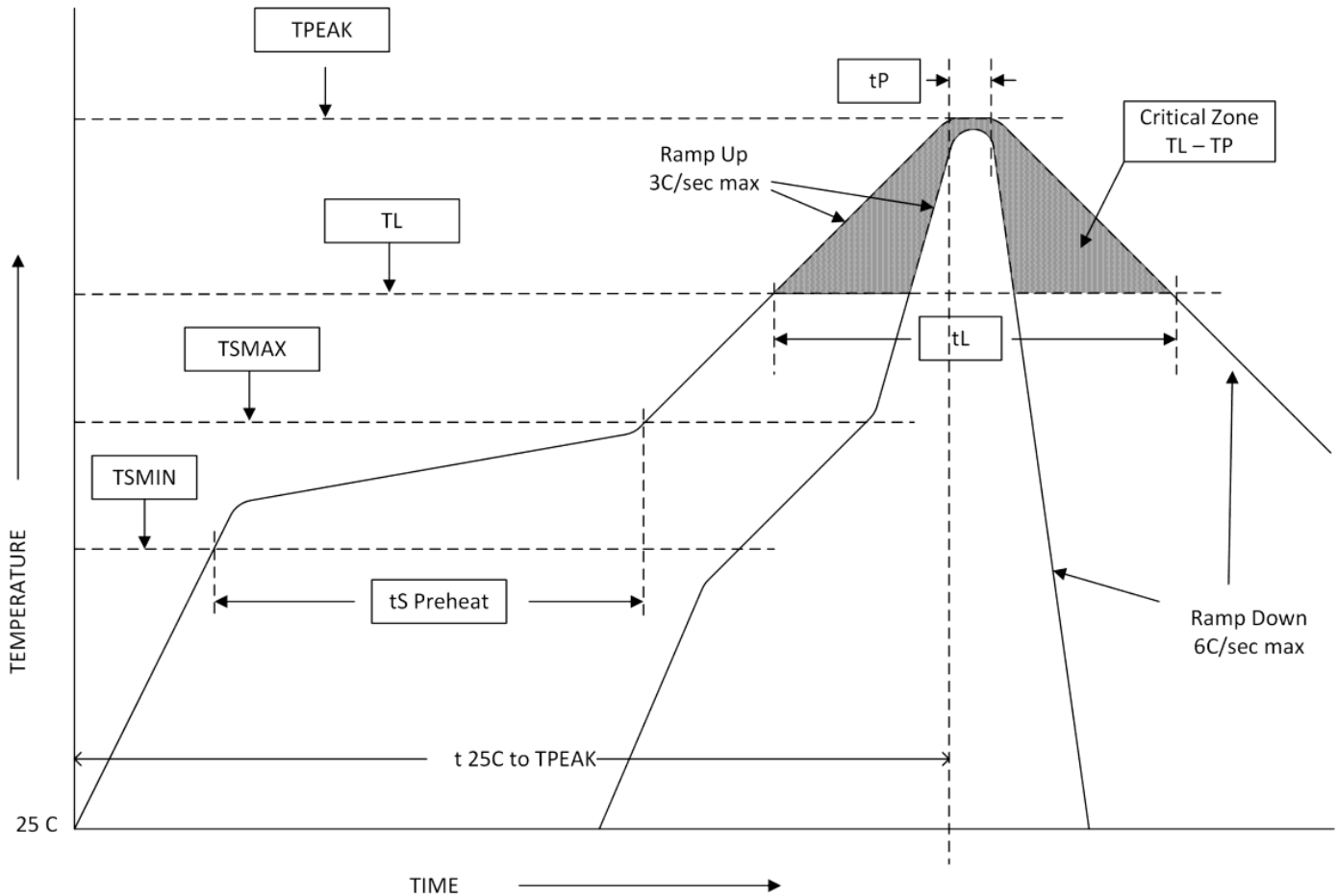
Assembly Instructions

The MSW2T-8512-740 High Power Switch are available in either tube or tray format. The MSW2T-8512-740 may be attached to the printed circuit card using solder reflow procedures using either RoHS or Sn63/ Pb37 type solders per the Table and Temperature Profile Graph shown below:

Profile Parameter	Sn-Pb Assembly Technique	RoHS Assembly Technique
Average ramp-up rate (T_L to T_P)	3°C/sec (max)	3°C/sec (max)
Preheat		
Temp Min (T_{smin})	100°C	100°C
Temp Max (T_{smax})	150°C	150°C
Time (min to max) (t_s)	60 – 120 sec	60 – 120 sec
T_{smax} to T_L		
Ramp up Rate		3°C/sec (max)
Peak Temp (T_P)	225°C +0°C / -5°C	260°C +0°C / -5°C
Time within 5°C of Actual		

Peak Temp (T_p)	10 to 30 sec	20 to 40 sec
Time Maintained Above: Temp (T_L)	183°C	217°C
Time (t_L)	60 to 150 sec	60 to 150 sec
Ramp Down Rate	6°C/sec (max)	6°C/sec (max)
Time 25°C to T_p	6 minutes (max)	8 minutes (max)

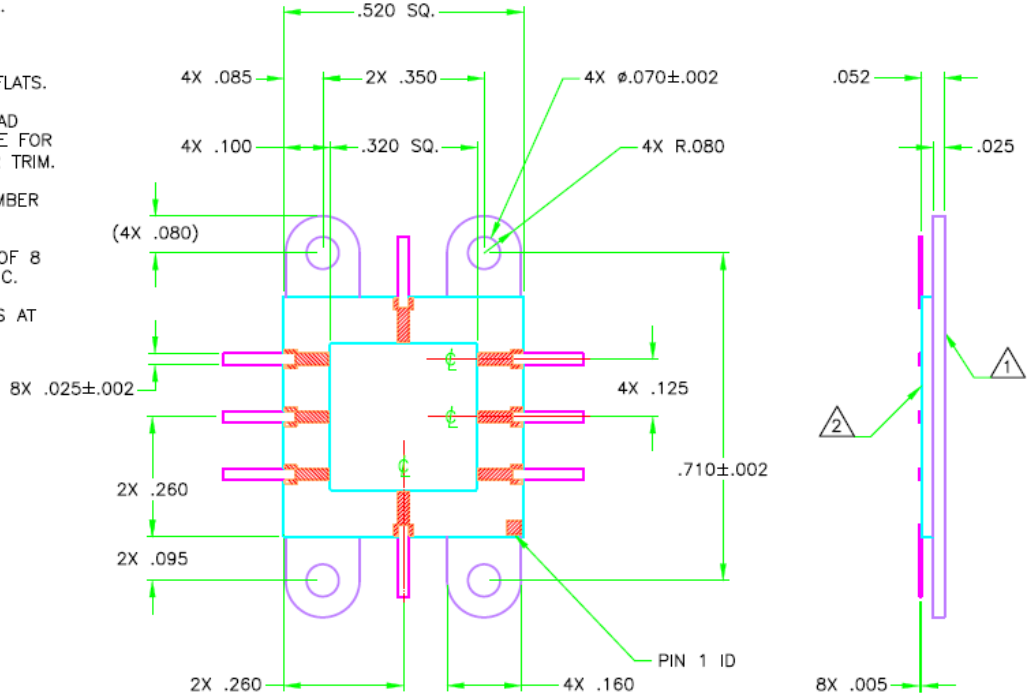
Solder Re-Flow Time-Temperature Profile



MSW2T-8512-740 SP2T Package Outline Drawing

NOTES, UNLESS OTHERWISE SPECIFIED:

- 1. BASE MATERIAL IS COPPER COMPOSITE METAL.
- 2. CERAMIC SHALL BE 96% Al_2O_3 .
- 3. LEAD, BASE, AND CERAMIC GOLD PLATING THICKNESS SHALL BE 50 MICROINCHES MINIMUM, MEASURED ON MAJOR FLATS.
- 4. LEAD, BASE, AND CERAMIC NICKEL UNDERPLATE SHALL BE 100 TO 350 MICROINCHES, MEASURED ON MAJOR FLATS.
- 5. PACKAGE WILL BE SUPPLIED ON A LEAD FRAME. LEAD FRAME WILL BE SUITABLE FOR MINIMUM LEAD LENGTH OF .10" AFTER TRIM.
- 6. LID: REFERENCE STRATEDGE PART NUMBER 200064.
- 7. LEAD PULL TEST MINIMUM STRENGTH OF 8 OZ. AT 90° TO THE PLANE OF CERAMIC.
- 8. LEAD FATIGUE TEST TO PASS 2 BENDS AT 90° ARC WITH A 4 OZ. WEIGHT.
- 9. NO BLISTERING OF METALLIZATION ALLOWED AFTER EXPOSURE TO 400° C FOR 5 MINUTES IN AIR INSPECTION TO BE DONE AT 10X MAGIFICATION.



Note:

- 1) Metalized area on backside is the RF, DC and Thermal ground. In user's end application this surface temperature must be managed to meet the power handling requirements.
- 2) All dimensions in inches.

Part Number Ordering Details

Part Number	Packaging
MSW2T-8512-740	Tube (25 pcs)
MSW2T-8512-740TY	Tray (100 pcs)