



## **MSW2T-8512-740**

### **SP2T SMT High Power X Band Shunt PIN Diode Switch**

#### **Features:**

- Frequency Range: 8.5 GHz to 12.0 GHz
- Package Dimensions: 9mm x 6mm x 2.5mm
- Power Handling (CW): 50 dBm
- Power Handling (Peak): 53 dBm
- Low Insertion Loss: 0.75 dB
- Return Loss: 17 dB
- Isolation: 35 dB
- High IP3: 60 dB
- High Bias Voltage supports High Linearity
- RoHS Compliant

#### **Description:**

The MSW2T-8512-740 SMT High Power PIN Diode switch leverages a high reliability hybrid manufacturing processes which has yields of 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 (9mm x 6mm x 2.5mm) 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 High Power SP2T switch is 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.

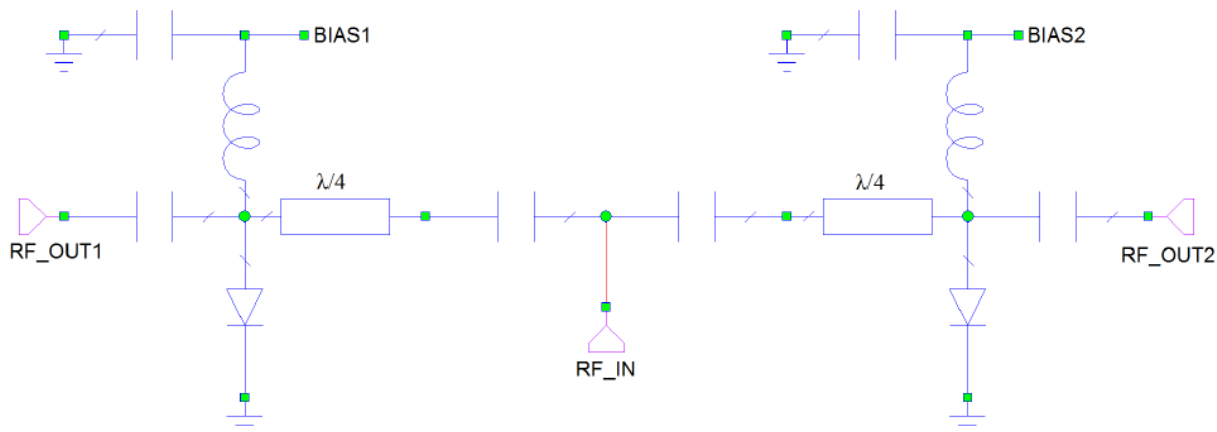
**ESD and Moisture Sensitivity Level Rating:**

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 switch is fully RoHS compliant.

**MSW2T-8512-740 Specifications @  $Z_0 = 50\Omega$ ;  $T_a = +25^\circ\text{C}$** 

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)		0.75	0.90
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		53 @ 10 uS Pulse, 1% Duty	
Switching Speed	Ts	ns	(10%-90%) RF Voltage TTL rep rate = 100 kHz		1,100	1,500

### MSW2T-8512-740 SP2T Schematic



### RF Truth Table

RF State	Bias 1	Bias 2
J1-J0 "ON" & J2-J0 "OFF"	-50 V @ 0 mA	+1 V @ +25 mA
J1-J0 "OFF" & J2-J0 "ON"	+1 V @ +25 mA	-50 V @ 0 mA

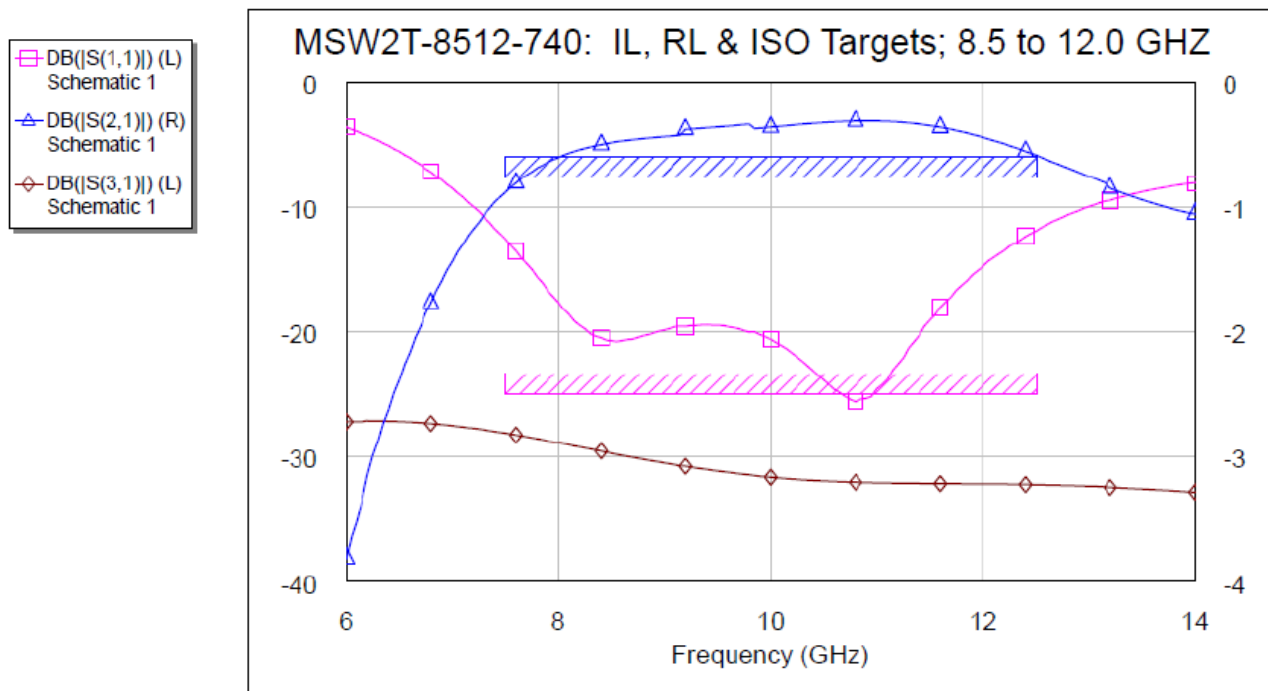
### MSW2T-8512-740 Absolute Maximum Ratings @ T<sub>A</sub> = +25 °C (unless otherwise denoted)

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	+53 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**

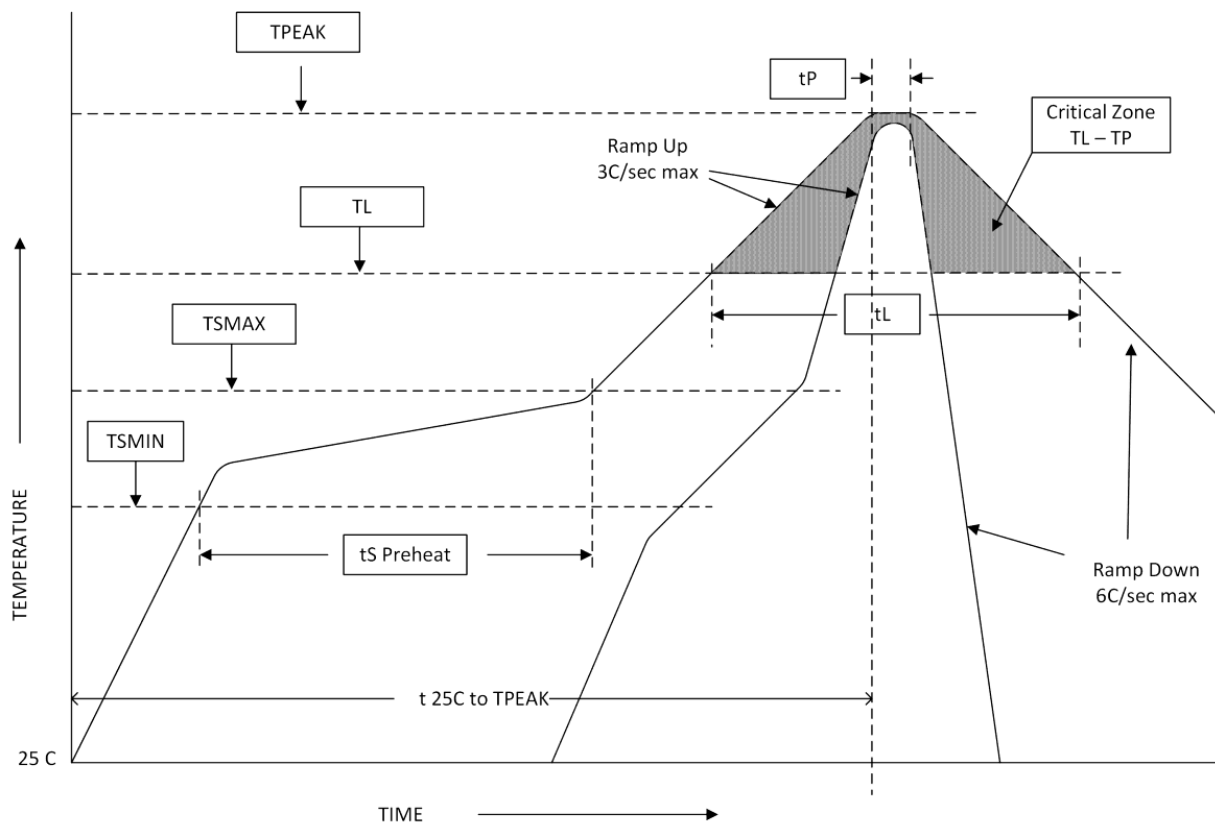


**Assembly Instructions**

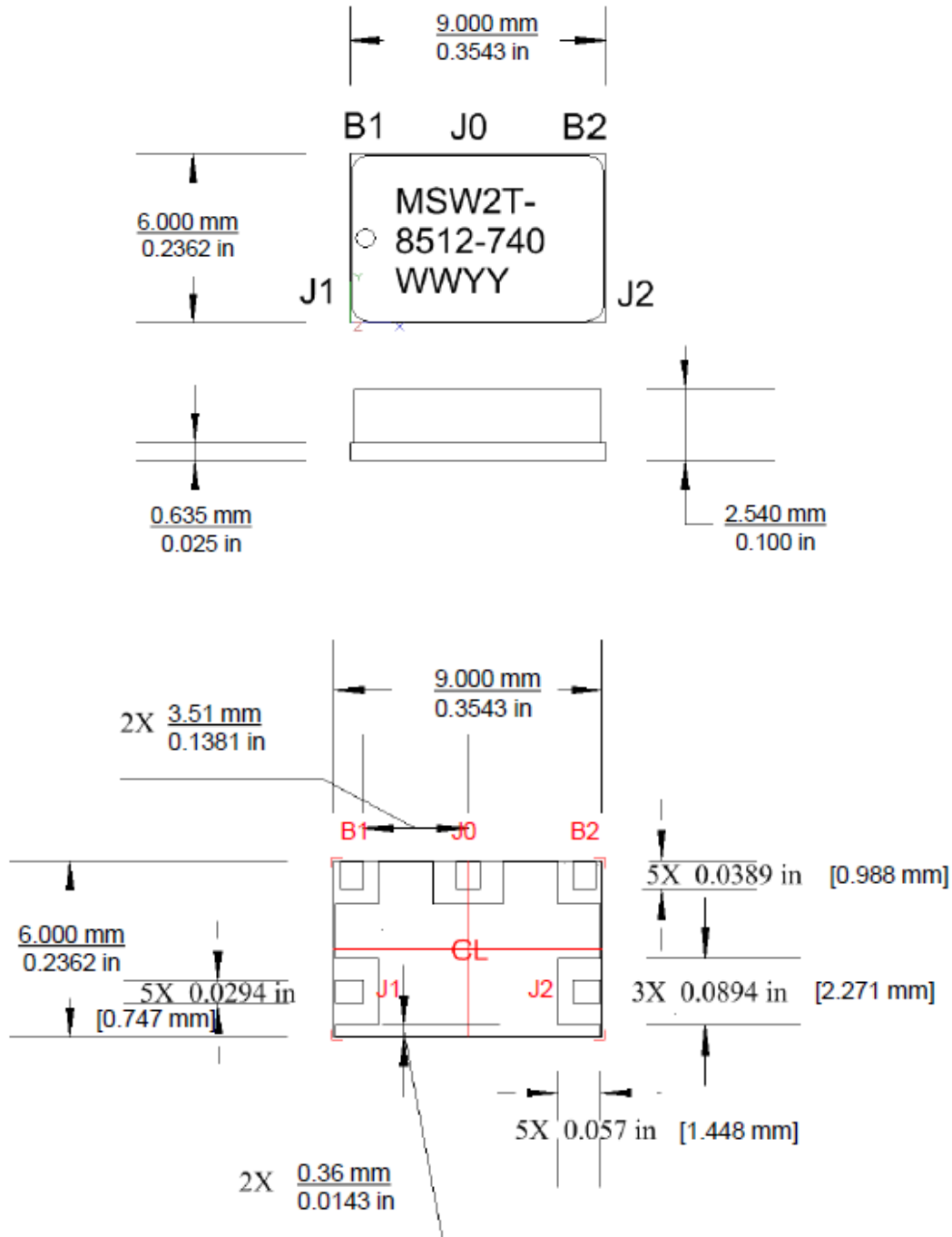
The MSW2T-8512-740 High Power Switch are available in either tube or tray format. The MSW2T-8512-740 may be attached to the printed circuit card using solder reflow procedures using either RoHS or Sn63/ Pb37 type solders per the Table and Temperature Profile Graph shown below:

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 – 6mm x 9mm x 2.5mm

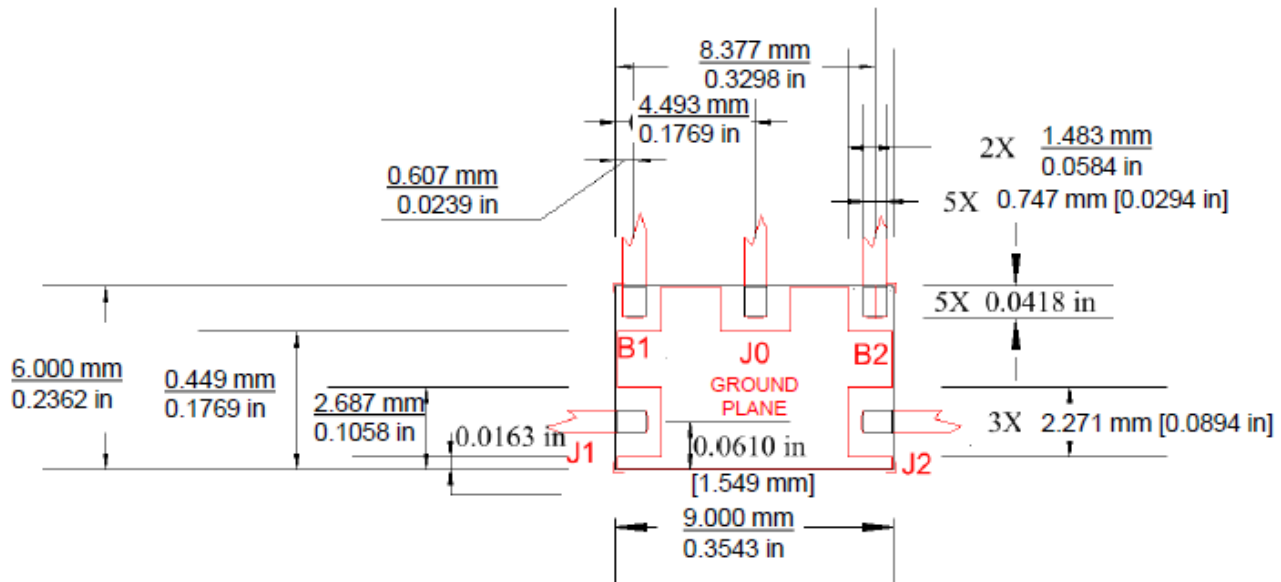


Note:

- 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.

**MSW2T-8512-740 Suggested Solder Foot Print**

TOP VIEW OF SOLDER FOOT PRINT



**Part Number Ordering Details**

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