

RELEASED



RFuW Engineering Pte. Ltd.

## MSW2T-8512-740

# SP2T SMT High Power X Band Shunt PIN Diode Switch

### Features:

- Frequency Range: 6.0 GHZ to 11.0 GHZ
- Power Handling (Peak): 53 dBm
- Power Handling (CW): 50 dBm
- Package Dimensions: 9mm x 6mm x 2.5mm
- Low Insertion Loss: 1.0 dB
- Return Loss: 17 dB @ 10 GHz
- Isolation: 19 dB @ 10 Ghz
- 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 process which yields proven superior high power performance relative 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 efficient utilization of real estate while providing world class power handling, low insertion loss, and high isolation relative to all competing 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 6.0 GHz to 11.0 GHz Band frequency ranges. The manufacturing process has been proven through years of extensive use in high reliability applications.

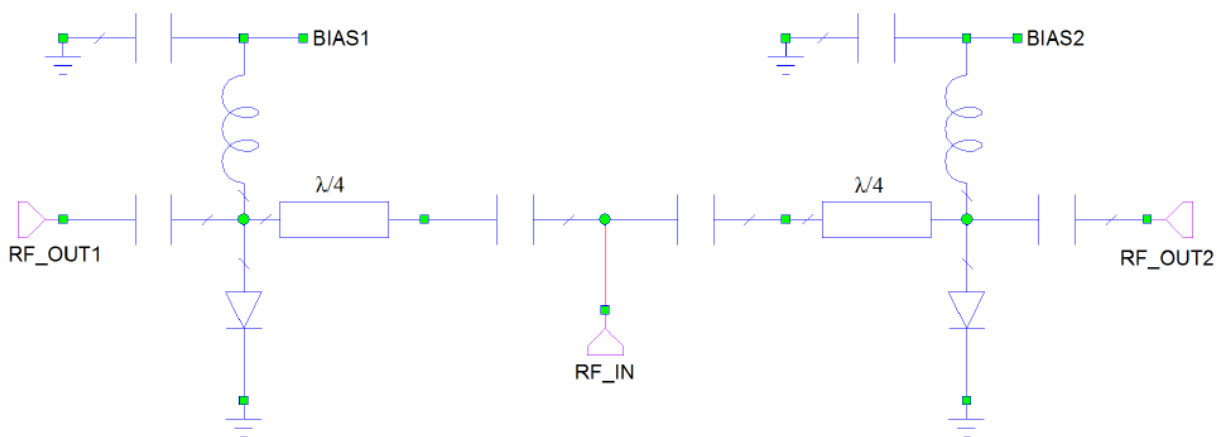
### ESD and Moisture Sensitivity Level Rating:

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 @  $Z_o = 50\Omega$ ;  $T_a = +25^\circ\text{C}$**

Parameter	Symbol	Unit	Test Conditions	Min Value	Typical Value	Max Value
Frequency	F	GHz		6.0		11.0
J0-J1 or J0-J2 Insertion Loss @ 10 GHz	IL	dB	-180V @ -50mA (ON) +1V @ +25 mA (OFF)		0.75	1.0
J0-J1 or J0-J2 Return Loss @ 10 GHz	RL	dB	-180V @ -50mA (ON) +1V @ +25 mA (OFF)	17	19	
J0-J1 or J0-J2 Isolation @ 10 GHz	ISO	dB	-180V @ -50mA (ON) +1V @ +25 mA (OFF)	17	19	
CW Incident Power	P inc (CW)	dBm	-180V @ -50mA (ON) +1V @ +25 mA (OFF) 1.5:1 Source & Load VSWR		50	
Peak Incident Power	P inc (Pk)	dBm	-180V @ -50mA (ON) +1V @ +25 mA (OFF) 1.5:1 Source & Load VSWR		53 @ 10 $\mu\text{s}$ Pulse, 1% Duty	
Switching Speed	Ts	ns	(10%-90%) RF Voltage TTL rep rate = 100 kHz		1,000	

**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)

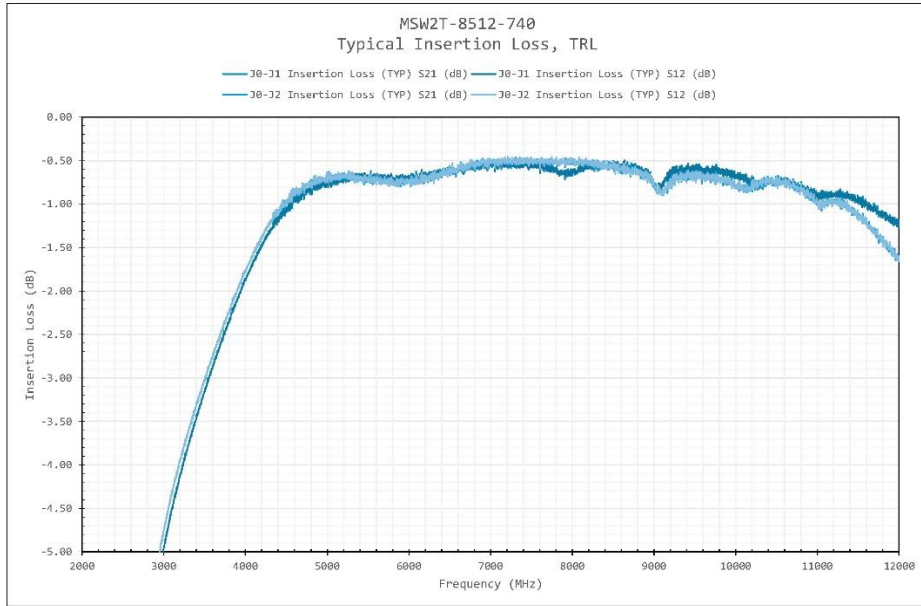
Parameter	Absolute Maximum Value
Forward Current @ J1, J2, B1, B2	+/- 250 mA
Reverse Voltage @ J1, J2, B1, B2	-300 V
Forward Diode Voltage	1.2 V @ 250 mA
Operating Temperature	-65 °C to +125 °C
Storage Temperature	-65 °C to +150°C
Junction Temperature	+175 °C
Assembly Temperature	+260 °C for 10 seconds
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:

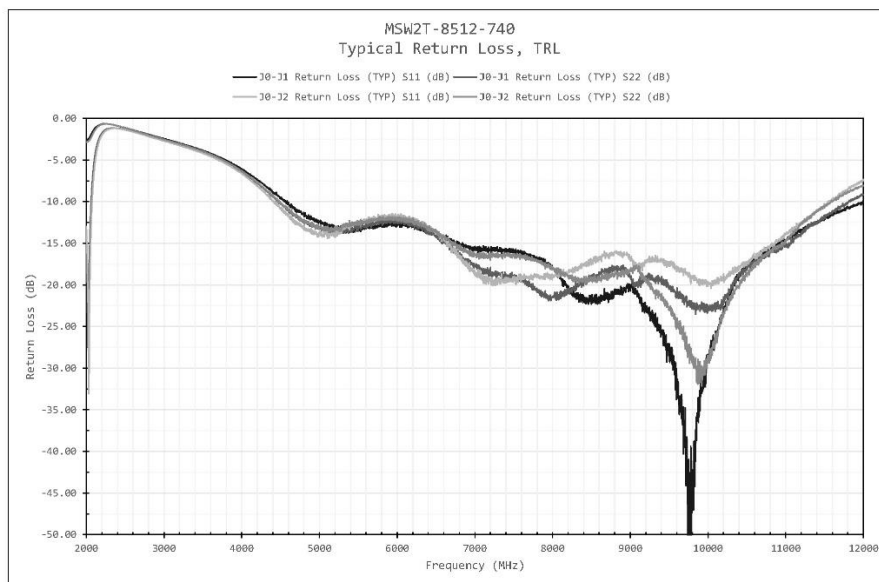
- 1) For Hot Switching, PIN Diode Drivers must transition between states in less than 100nsec with a parallel RC spiking network at the Driver Output.
- 2) Backside RF and DC grounding area of the MSW2T-8512-740 must be completely solder attached to the RF Circuit board for proper electrical and thermal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

# MSW2T-8512-740 Small Signal Parametric Performance

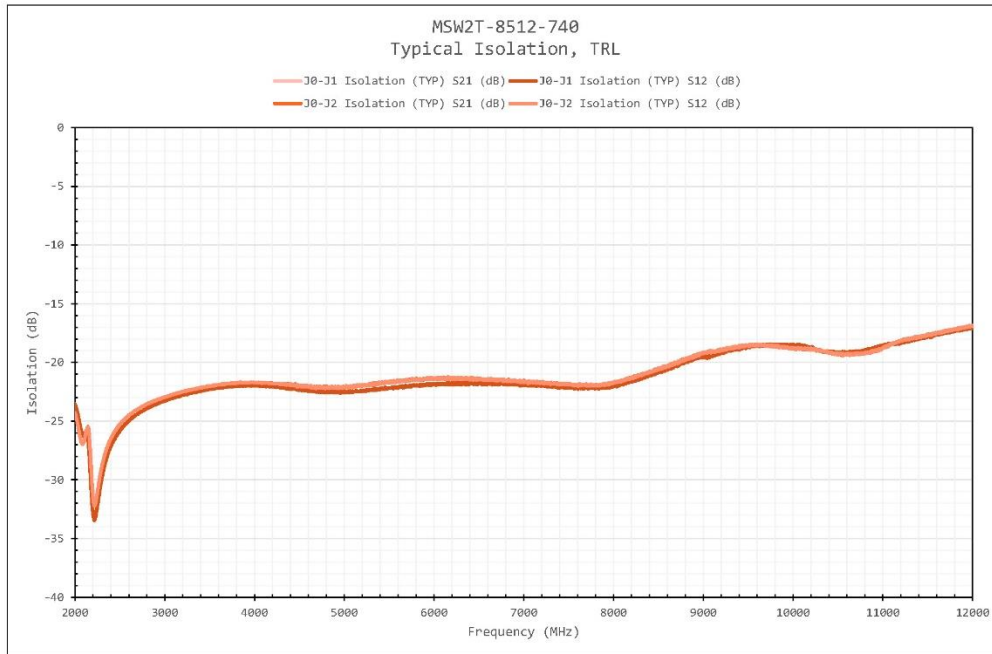
## Insertion Loss



## Return Loss



### ISOLATION

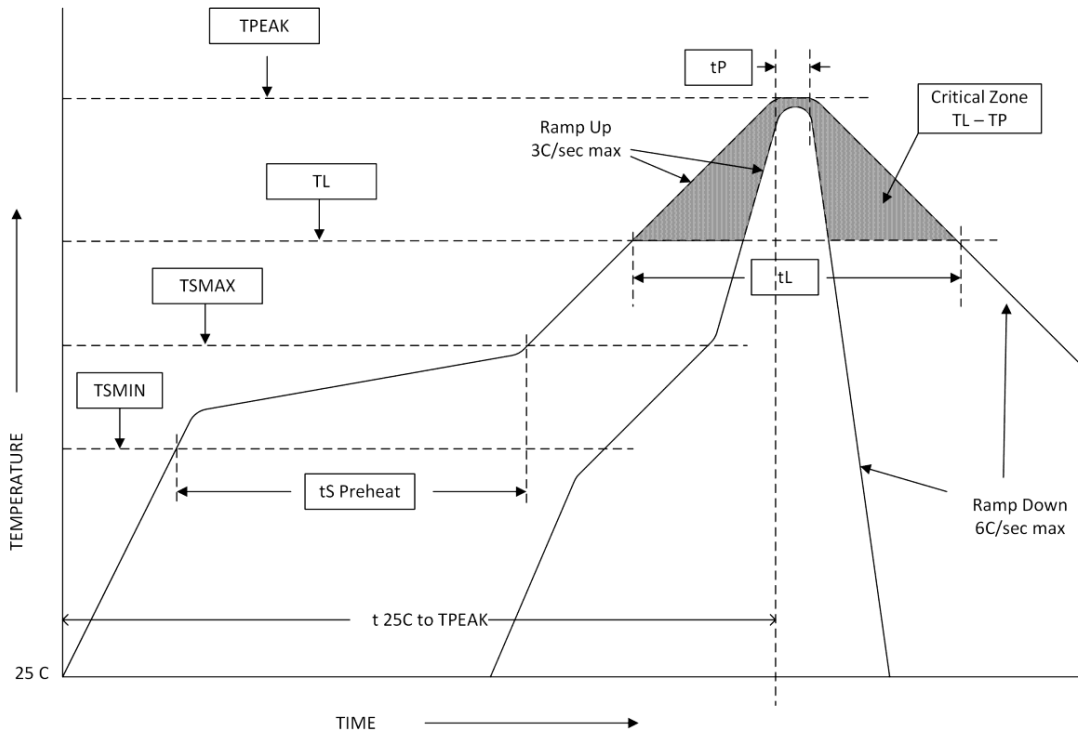


### Assembly Instructions

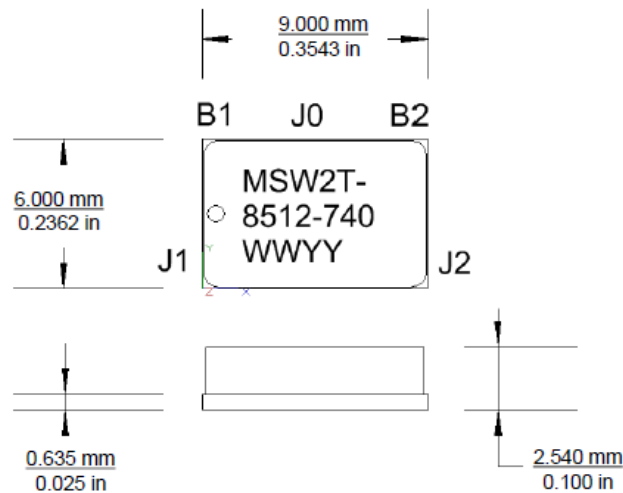
The MSW2T-8512-740 may be attached to the printed circuit card using solder reflow procedures using either RoHS or Sn63/ Pb37 type solders per the Table and Temperature Profile Graph shown below:

Profile Parameter	Sn-Pb Assembly Technique	RoHS Assembly Technique
Average ramp-up rate (T <sub>L</sub> to T <sub>P</sub> )	3°C/sec (max)	3°C/sec (max)
Preheat		
Temp Min (T <sub>smin</sub> )	100°C	100°C
Temp Max (T <sub>smax</sub> )	150°C	150°C
Time (min to max) (t <sub>s</sub> )	60 – 120 sec	60 – 120 sec
T <sub>smax</sub> to T <sub>L</sub>		
Ramp up Rate		3°C/sec (max)
Peak Temp (T <sub>P</sub> )	225°C +0°C / -5°C	260°C +0°C / -5°C
Time within 5°C of Actual Peak Temp (T <sub>P</sub> )	10 to 30 sec	20 to 40 sec
Time Maintained Above:		
Temp (T <sub>L</sub> )	183°C	217°C
Time (t <sub>L</sub> )	60 to 150 sec	60 to 150 sec
Ramp Down Rate	6°C/sec (max)	6°C/sec (max)
Time 25°C to T <sub>P</sub>	6 minutes (max)	8 minutes (max)

### Solder Re-Flow Time-Temperature Profile



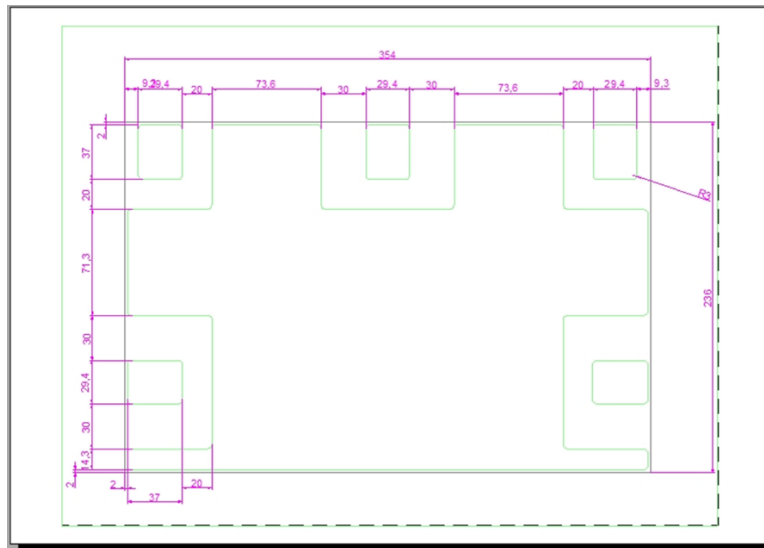
### MSW2T-8512-740 SP2T Package Outline Drawing – 9mm x 6mm x 2.5mm



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



Note: Dimensions in mils

## Part Number Ordering Details

The MSW2T-8512-740 High Power Switch are available in the following format.

Part Number	Packaging
MSW2T-8512-740	Gel Pack
MSW2T-8512-740 SS EVB	Box
MSW2T-8512-740 HP EVB	Box