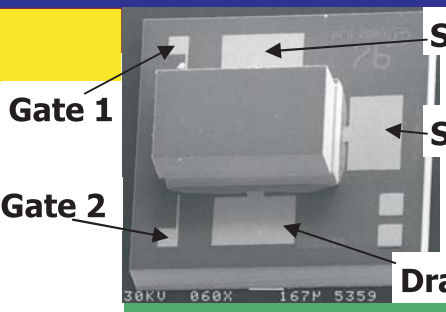
SPDT, High Power, RF-MEMS Switch, DC to 40 GHz

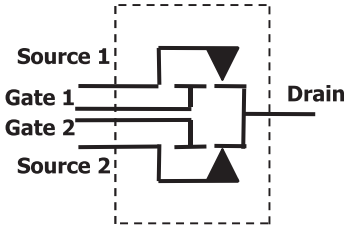


RMSW040220HP™

Features

- **Long Life at High Power (typical >10 billion cycles @ 36 dBm cold-switched, >1 billion cycles @ 40 dBm cold-switched)**
- **High Isolation (typical 20 dB @ 10 GHz, 13 dB @ 35 GHz)**
- **Low Insertion Loss (<0.5 dB typical @ 20 GHz)**
- **Near Zero Harmonic Distortion**
- **No Quiescent Power Dissipation**
- **Hermetically sealed die designed for die-attach and wire-bond to board. Please contact us for other packaging options.**

Functional Block Diagram



Description

The RMSW040220HP™ is a Single Pole Double Throw (SPDT) Reflective RF Switch utilizing Radant's break-through MEMS technology that de-livers high linearity, high isolation and low insertion loss in a chip-scale package configuration.

This device is ideally suited for use in many applications such as RF and microwave multi-throw switch-ing, radar beam steering antennas, phase shifters, RF test instrumenta-tion, ATE, cellular, and broadband wireless access.

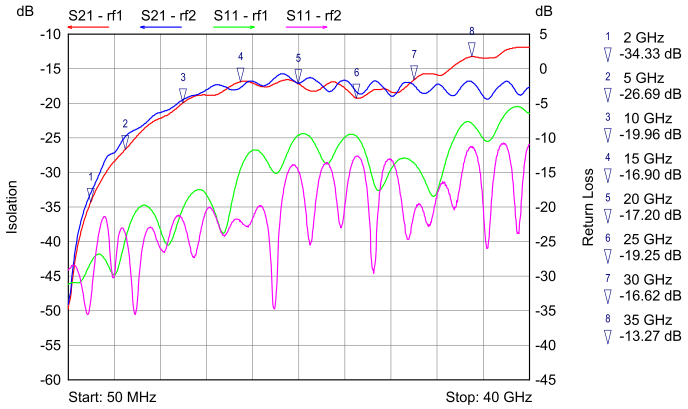
Typical Device Specifications

Insertion Loss		**Lifecycle**	
DC	< 4 Ω	Cold-switched, 36 dBm	> 10^{10} cycles
10 GHz	< 0.45 dB	Cold-switched, 40 dBm	> 10^{9} cycles
20 GHz	< 0.5 dB	Cold-switched, 42 dBm	> 10^{3} cycles
35 GHz	< 0.8 dB	Hot-switched, -20 dBm	> 10^{11} cycles
		Hot-switched, -10 dBm	> 10^{9} cycles
		Hot-switched, 20 dBm	> 10^{3} cycles
Isolation		**Control**	
DC	> 1 GΩ	Gate-Source Voltage (on)	+/- 90 V
10 GHz	> 19 dB	Gate-Source Voltage (off)	0 V
20 GHz	> 17 dB	Control Power, steady-state	< 1 nW
35 GHz	> 12 dB	Control Power, 1 KHz cycle rate	< 2 µW
Return Loss		**Switching speed**	
10 GHz	< -25 dB	On	< 10 µs
20 GHz	< -18 dB	Off	< 2 µs
35 GHz	< -15 dB		
Input IP3 (Two-tone inputs 900 MHz and 901 MHz up to +5 dBm)	> 65 dBm	**Operating temperature**	
		Maximum	85 °C
		Minimum	-40 °C
		Storage temperature	
		Maximum	150 °C
		Minimum	-55 °C

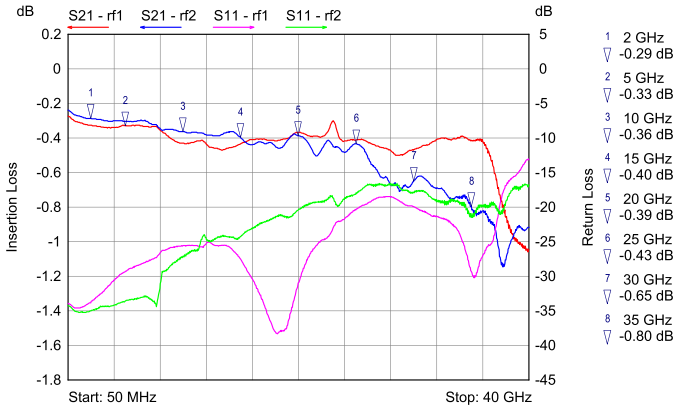
Notes:

1. All RF measurements were made in a 50 Ω system.
2. Measurements include bond-wires from die to test-board.

Typical RF Performance



Isolation



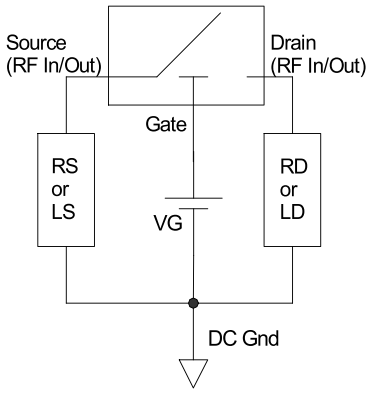
Insertion Loss

* Measurement results include bond wires

Absolute Maximum Ratings

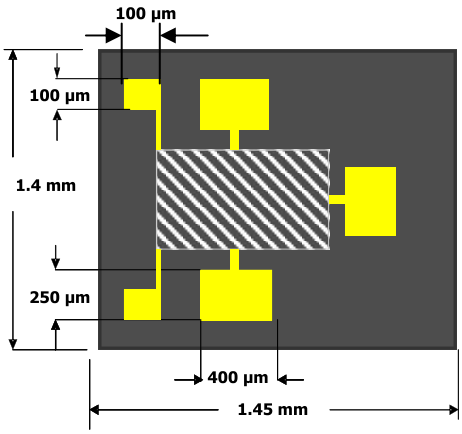
Maximum Temperature (10 seconds) (120 seconds)	 290 °C 250 °C
Maximum Voltage, Gate-Source	+/- 110 V
Maximum Voltage, Drain-Source	+/- 100 V

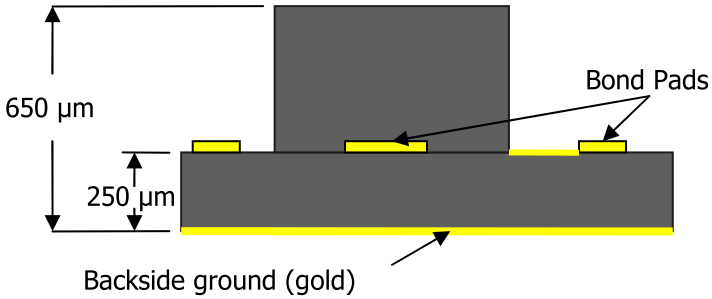
Recommended Application



1. Figure shows one half of the SPDT switch. The Drain terminal is common to both halves.
2. A resistor RS (40 KΩ-100 KΩ) or inductor LS should be used to provide a path to DC Ground from each Source. Similarly, a resistor RD (40 KΩ-100 KΩ) or inductor LD should be used to provide a path to DC Ground from the common Drain.
3. VG may be of either polarity.
4. VG rise-time should be at least 10 μs for optimal lifetime.
5. Please refer to "Application Note for Test and Handling of SPST RF-MEMS Switches" for more information. Contact us for driver solutions.

Nominal Device Dimensions





Please contact us for a footprint in .gds or .dxf format.

Static sensitivity

This device has an ESD (HBM) sensitivity of 100 V. Use proper ESD precautions when handling. Please refer to "Application Note for Test and Handling of SPST RF-MEMS Switches" for more information.

Die Assembly

The gold backside-metallization on the die is designed to be mounted with electrically conductive silver epoxy, or with a lower temperature solder which does not consume gold. Bond pads on the die are made of gold. Ball-bonds should be utilized to attach gold or Aluminum 1 mil wires. Please refer to "Application Note for Test and Handling of SPST RF-MEMS Switches" for more information.