

# MD212

## SP3T reflective switch



- frequency range 0.2...40 GHz
- insertion loss < 0.7 dB
- isolation < 35 dB

### Application

- telecommunications
- radars
- test and measurement equipment

The MD212 is a Single-Pole Three-Throw (SP3T) reflective switch, based on AlGaAs / GaAs PIN diode technology.

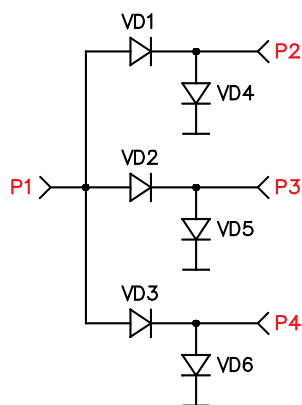
### Electrical specifications (T = 25 °C)

Symbol	Parameter	Min.	Typ.	Max.	Unit
$\Delta F$	Frequency range	0.2	—	40	GHz
$IL_{ON}$	Insertion loss	—	—	0.7	dB
$IL_{OFF}$	Isolation	35	—	—	dB
$T_{SW}$	Switching speed	—	—	20	ns

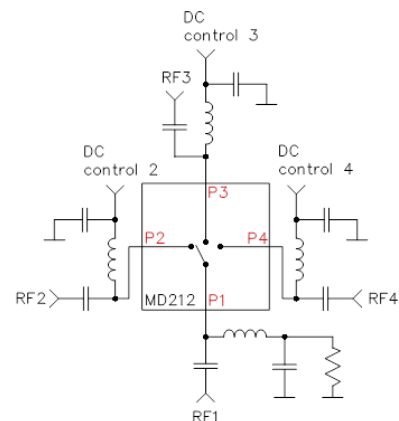
### Absolute maximum ratings

Parameter	Value	Unit
RF Input Power	+24	dBm
Breakdown voltage	-20	V
Bias current	$\pm 30$	mA
Operating temperature	-40...+85	°C
Storage temperature	-55...+150	°C

### circuit diagram



### Application circuit



Specifications are subject to change without notice.

## Operation

The switch is controlled by using external power circuits in accordance with the MMIC switching diagram and the state table. To comply with the required operating frequency range, the values of external capacitances and inductances should be selected. Resistor is installed to limit the forward current through diodes. To obtain a forward current in the range of +5...+15 mA (-5...-15 mA), it is necessary to apply a total voltage in the range of +1.1...+1.5 V (-1.1...-1.5 V) to the outputs of ports P2, P3 and P4. To control the microwave signal with power exceeding 7 dBm, use external power circuits with reverse voltage supplied to:

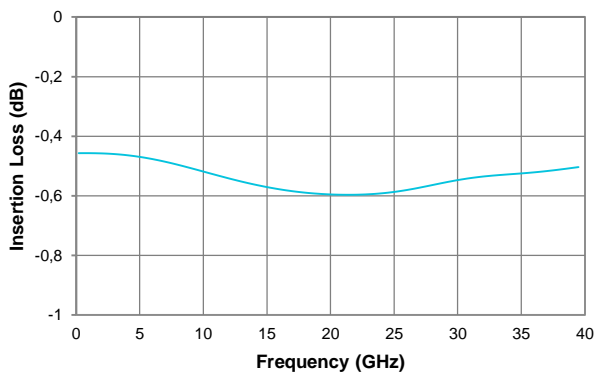
- diodes VD2, VD3 and VD4 for the St1 state;
- diodes VD1, VD3 and VD5 for the St2 state;
- diodes VD1, VD2 and VD6 for the St3 state.

## State table

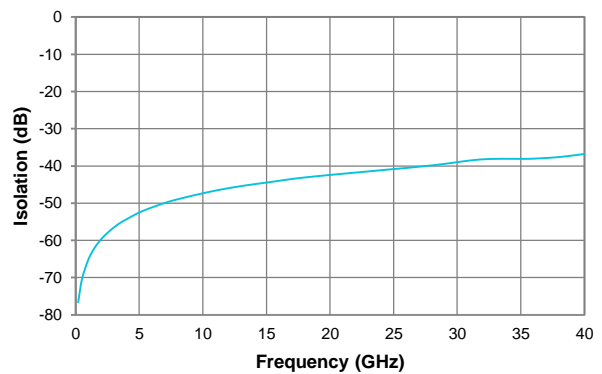
MMIC state	Control signal, mA			State description		
	CTRL 2	CTRL 3	CTRL 4	P1↔P2	P1↔P3	P1↔P4
St1	-5...-15	+5...+15	+5...+15	Low loss	Isolation	Isolation
St2	+5...+15	-5...-15	+5...+15	Isolation	Low loss	Isolation
St3	+5...+15	+5...+15	-5...-15	Isolation		Low loss

## Typical characteristics (T = 25 °C)

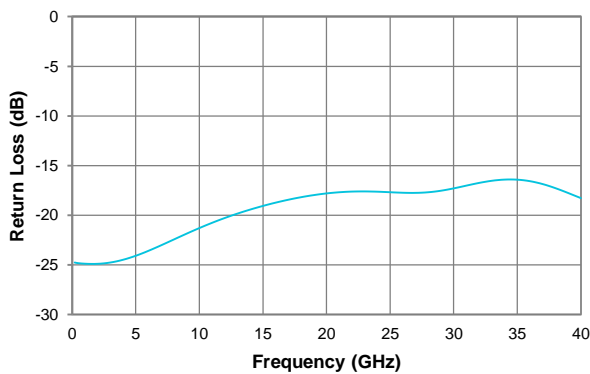
Insertion Loss



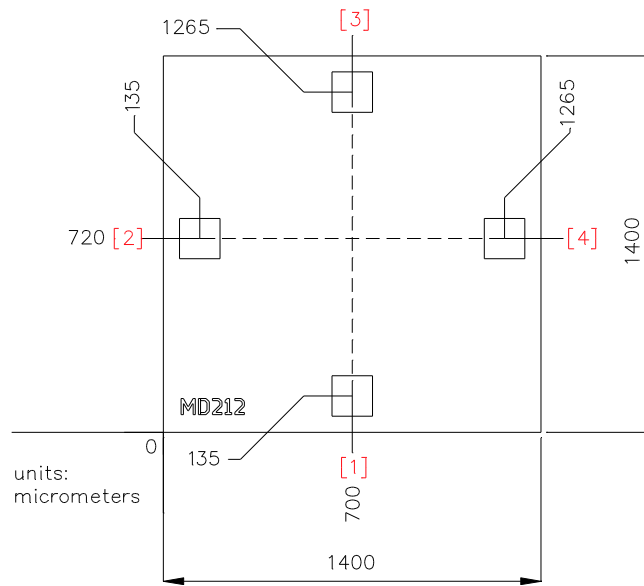
Isolation



Return Loss



### Mechanical data



- These parameters are specified for the switch before wafer dicing. The following deviations should be taken into account: -30...-40  $\mu\text{m}$  for size measurement of die and 0...-40  $\mu\text{m}$  for pad coordinates.
- Die thickness: 100  $\mu\text{m}$ .
- Bond pad and backside are metallized with gold.
- RF pads: 100  $\times$  100  $\mu\text{m}$ .

Pad number	Port	Description	Pad size (X, Y), $\mu\text{m}^2$
1	P1	RF COM	150 $\times$ 150
2	P2	RF input 1	
3	P3	RF input 2	
4	P4	RF input 3	

**Application notes**

**Mounting**

The chip is back-metallized with gold and can be die mounted with AuSn eutectic alloy or with electrically conductive adhesive. The mounting surface should be clean and flat. The 50 Ohm Microstrip transmission, mounted on 0.127 mm thick alumina and thin film substrates, is recommended for bringing RF to and from the chip (Figure 1). One way to accomplish this is to attach the 0.102 mm thick die to a 0.150 mm thick molybdenum heat spreader (molytab) which is then attached to the ground plane (Figure 2). Microstrip substrates should be located as close to the die as possible in order to minimize bond wire length. Typical die-to-substrate spacing is 0.1mm. Do not expose die to a temperature above 300 degrees for more than 10 seconds.

**Wire Bonding**

It is recommended for RF pads to use two wires 25 µm in diameter or a foil stripe with minimal length.

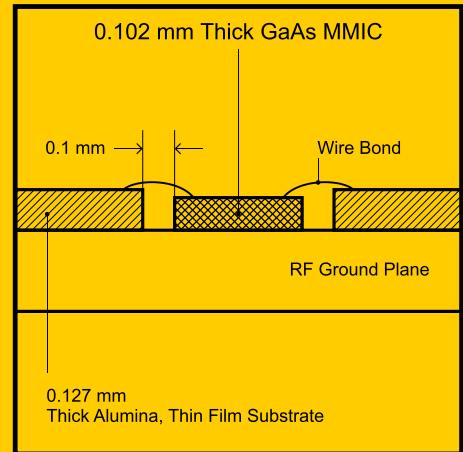


Figure 1.

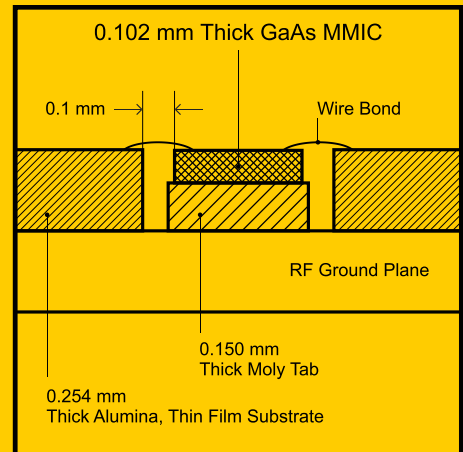


Figure 2.

**Recommended ESD Management**

This device is susceptible to electrostatic and mechanical damage. Dies are supplied in antistatic containers, which should be opened in cleanroom conditions at an appropriately grounded antistatic workstation. Devices need careful handling using correctly designed collets, vacuum pickups or, with care, sharp tweezers.

