

Features

- FET SP2T Absorptive design
- Frequency: DC-12GHz
- Isolation: 55dB Typical
- Insertion Loss: 1.3dB Typical
- Control Voltage: 0/-5V
- Switching Speed: 10ns Typical
- Die Size: 1.37 x 1.03 x 0.1 mm

Typical Applications

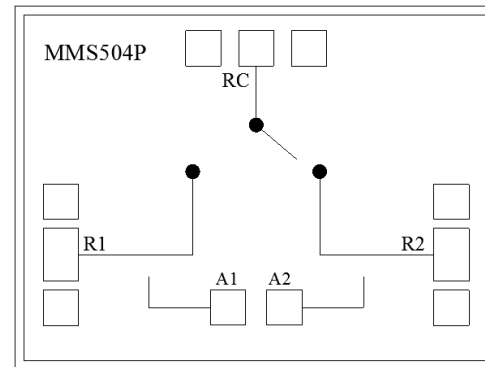
- Voltage Control
- Fast Switching Speed
- Low Insertion Loss and High Isolation
- Customization available upon request

Electrical Specifications

TA = +25°C, VCTL = 0/-5V , ICTL = 1mA Typical

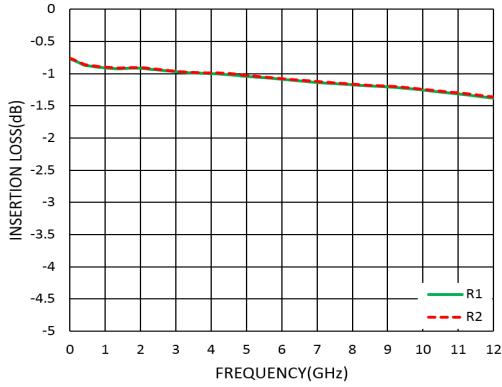
Parameters	Min.	Typ.	Max.	Units
Frequency	DC		12	GHz
Insertion Loss		1.3	1.5	dB
Isolation	50	55		dB
Input Return Loss		-14		dB
Output Return Loss		-14		dB
P1dB - Output 1dB Compression		23		dBm
IIP3-Input Third Order Intercept		33		dBm
Switching Speed		10		ns

Functional Block Diagram

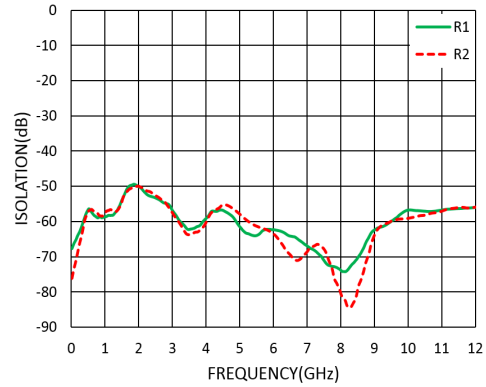




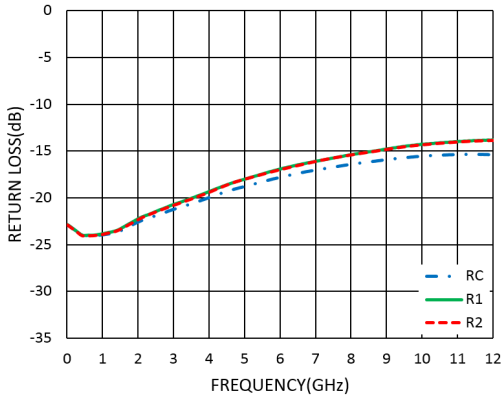
Insertion Loss vs. Frequency



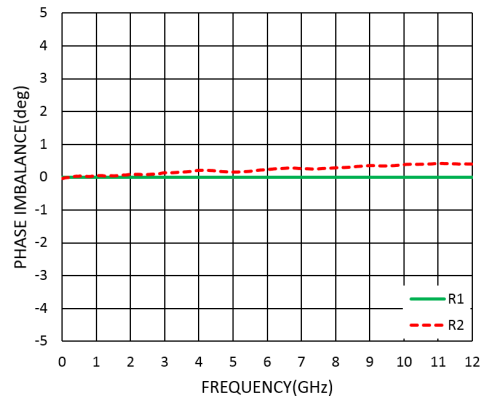
Isolation vs. Frequency



Return Loss vs. Frequency (ON State)



Phase Imbalance vs. Frequency





Absolute Maximum Ratings

RF Input Power (RFIN)	+27dBm
Control Voltage	-7.5V to +0.5V
Operating Temperature	-55°C to +85 °C
Storage Temperature	-65°C to +150 °C
Junction Temperature to Maintain 1,000,000 Hour Mean Time to Failur (MTTF)	+125°C
Maximum Channel Temperature	+150°C



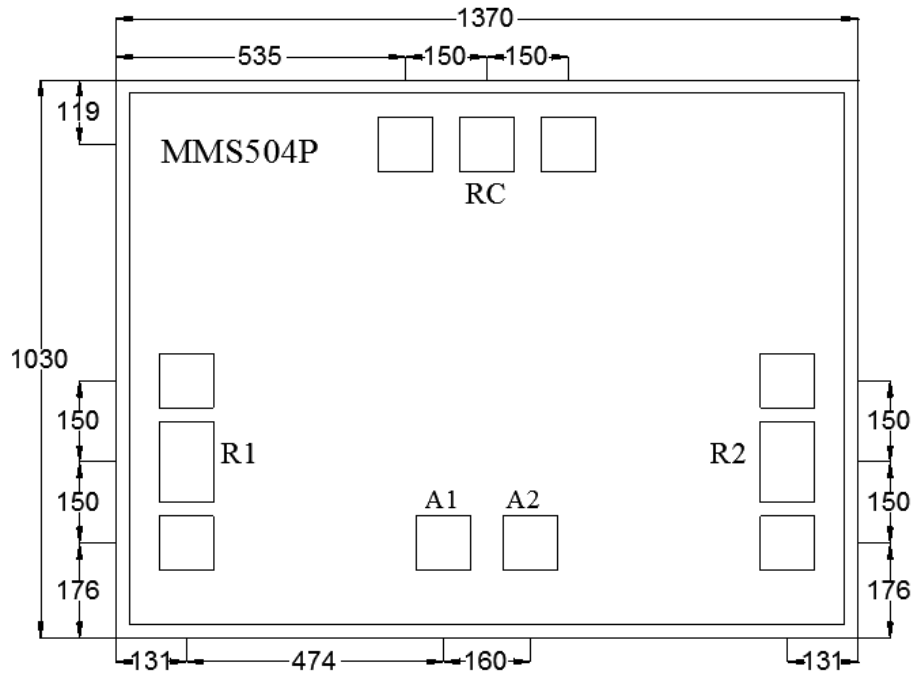
ELECTROSTATIC SENSITIVE DEVICE
OBSERVE HANDLING PRECAUTIONS

MMS504P

GaAs MMIC FET SP2T Absorptive Switch DC – 12GHz

Outline Drawing:

All Dimensions in μm

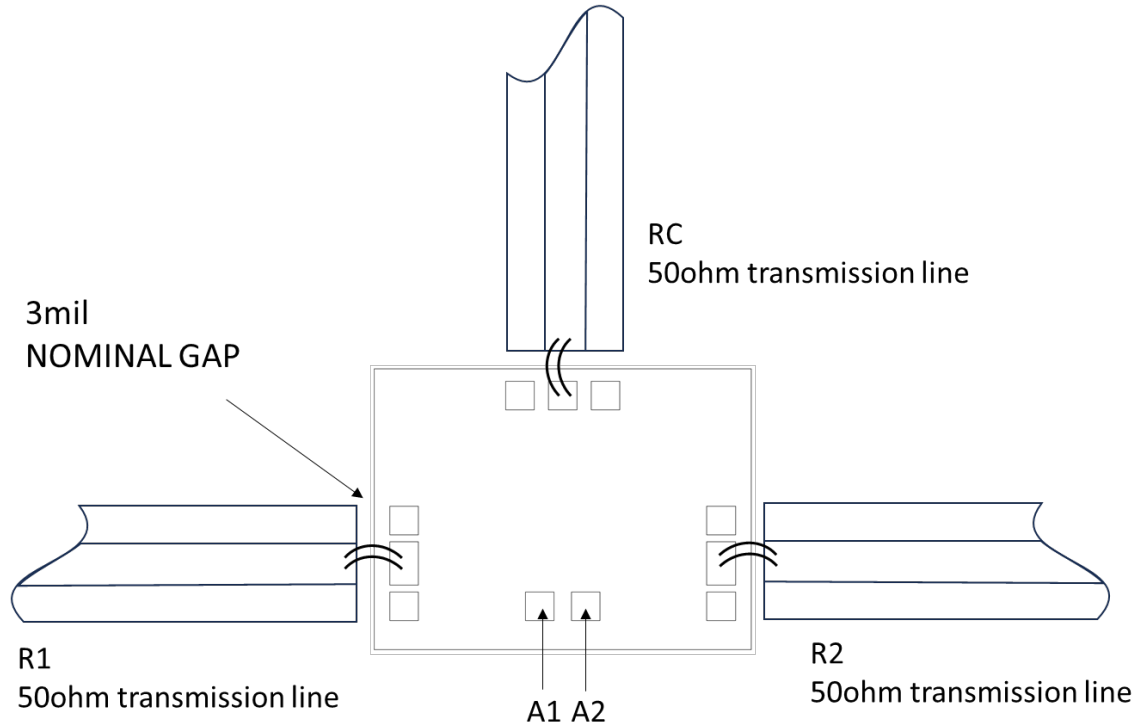


Notes:

1. Die thickness:100 μm
2. A1,A2 bond pad is 100*100 μm^2
3. RC bond pad is 100*100 μm^2
4. R1,R2 bond pad is 100*145 μm^2
5. Bond pad mentalization: Gold
6. Backside metallization: Gold
7. No connection required for unlabeled bond pads



Assembly Drawing



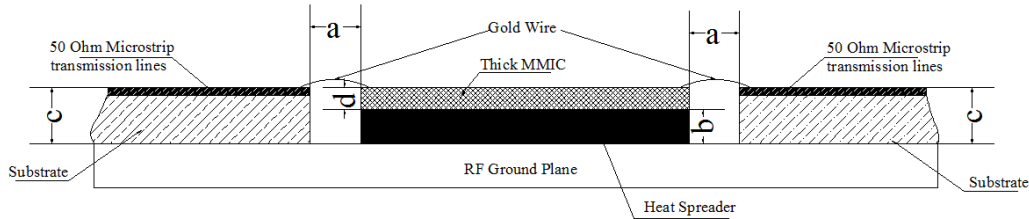
Truth Table

Control Voltage		State	
A1	A2	R1	R2
-5V	0V	ON	OFF
0V	-5V	OFF	ON

No	Function	Description
1	RC	RF signal input terminal; no blocking capacitor required.
2	R1,R2	RF signal output terminal; no blocking capacitor required.
3	A1,A2	Control Port
4	Die Bottom	Die bottom must be connected to RF and dc ground.



Mounting & Bonding Techniques for MMICs



Direct Mounting

1. Typically, the die is mounted directly on the ground plane.
2. If the thickness difference between the substrate (thickness c) and the die (thickness d) exceeds 0.05 mm (i.e., $c - d > 0.05$ mm), it is recommended to first mount the die on a heat spreader, then attach the heat spreader to the ground plane.
3. Heat Spreader Material: Molybdenum-copper (MoCu) alloy is commonly used.
4. Heat Sink Thickness (b): Should be within the range of $(c - d - 0.05$ mm) to $(c - d + 0.05$ mm).
5. Spacing (a): The gap between the bare die and the 50Ω transmission line should typically be 0.05 mm to 0.1 mm. If the application frequency is higher than 40GHz, then this gap is recommended to be 0.05mm

Wire Bonding Interconnection

The connection between the die and the 50Ω transmission line is usually made using 25 μm diameter gold (Au) wires, bonded via wedge bonding or ball bonding processes.

Die Attachment Methods

1. Conductive Epoxy:

After adhesive application, cure according to the manufacturer’s recommended temperature profile.

2. Au-Sn80/20 Eutectic Bonding:

Use preformed Au-Sn80/20 solder preforms.

Perform bonding in an inert atmosphere (N_2 or forming gas: 90% N_2 + 10% H_2).

Keep the time above 320°C to less than 20 seconds to prevent excessive intermetallic formation.

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