1. Description

- The M5309 is a 27dBm ($IP_{-0.1dB}$) wideband SPDT switch fabricated on GaAs p-HEMT MMIC process. It operates over DC-13GHz with a 0/-5V control voltage.
-

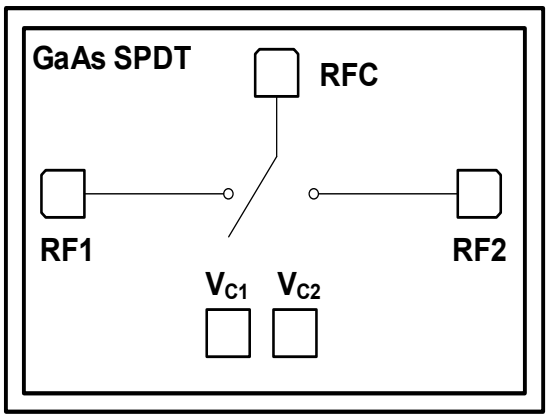


Figure 1. M5309 Functional Block Diagram

2. Applications

- TX/RX Modules
- Communications
- Test Instruments

3. Features[1]

- Frequency Range: DC-13GHz
- Insertion Loss: 1.0dB
- Isolation: 35dB
- Input/Output Return Loss: -17dB
- Input Power ($IP_{-0.1dB}$): 27dBm
- Control Voltage: 0/-5V
- Die Size: 1.5 x 1.1 x 0.1mm

[1] On-wafer Test

4. Brief Typical Performance

Table 1. Brief Typical Performance

Parameter	DC-13GHz	Units
Insertion Loss	1.0	dB
Isolation	35	dB
Input/Output Return Loss	-17	dB
Input Power for 0.1dB Compression	27	dBm

- Test condition: Input signal Pulsed, Pulse width = 50μs, Duty cycle = 5%

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5. Recommended Operating Conditions

Table 2. Recommended Operating Conditions

Parameter	Min.	Typ.	Max.	Units
Operating Temperature Range	-55	25	125	°C
Control Voltage, V_{C1}/V_{C2}	-	0/-5V	-	V

6. RF Characteristics (T_C = 25°C)

Table 3. RF Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Units
Insertion Loss	IL	-	1.0	-	dB
Isolation	ISO	-	35	-	dB
Input/Output Return Loss	RL_{IN}/ RL_{OUT}	-	-17	-	dB
Input Power for 0.1dB Compression	$IP_{-0.1dB}$	-	27	-	dBm

• Test condition: Input signal Pulsed, Pulse width = 50μs, Duty cycle = 5%

7. Typical Performance Curve (T_C = 25°C)

■ Small-signal Characteristics Curve（On-Wafer Test）

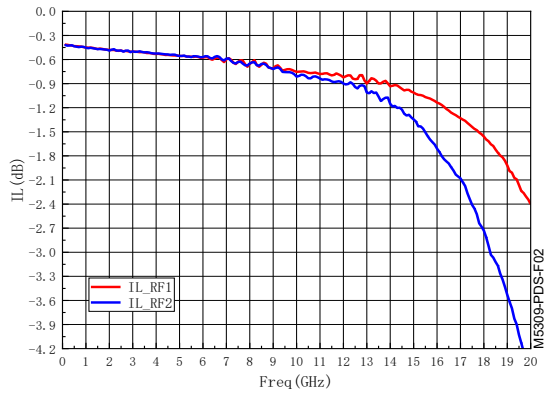


Figure 2. Insertion Loss Characteristics

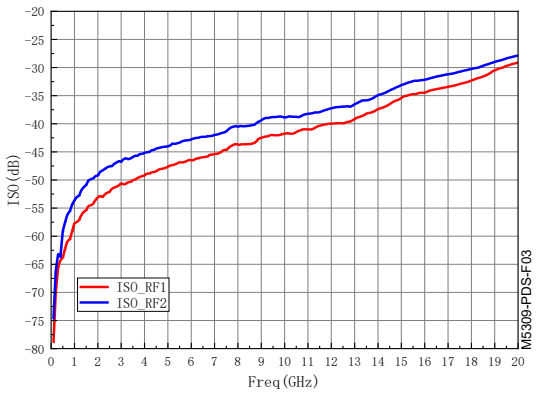


Figure 3. Isolation Characteristics

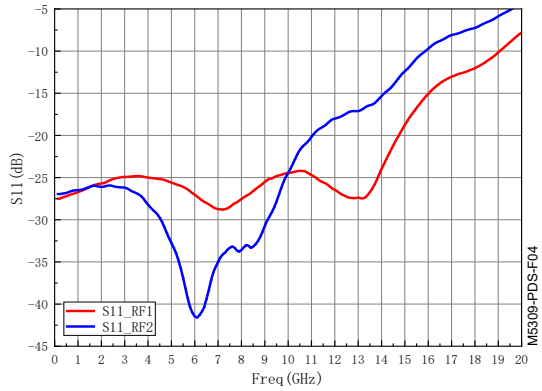


Figure 4. Input Return Loss Characteristics

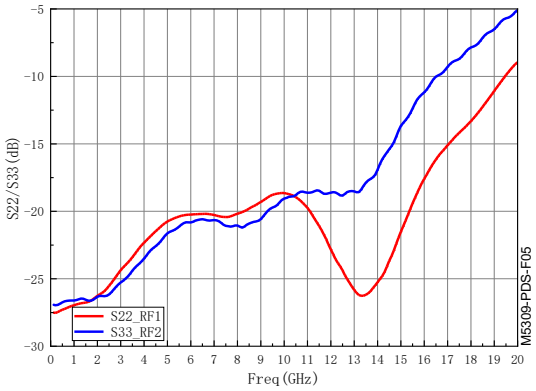


Figure 5. Output Return Loss Characteristics

■ Power Characteristic Curve（On-Wafer Test）

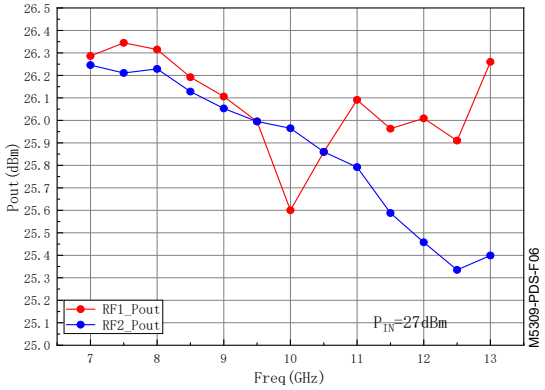


Figure 6. P_{out} at P_{in}=27dBm

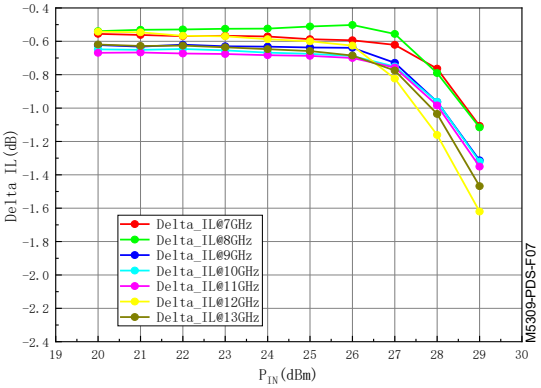
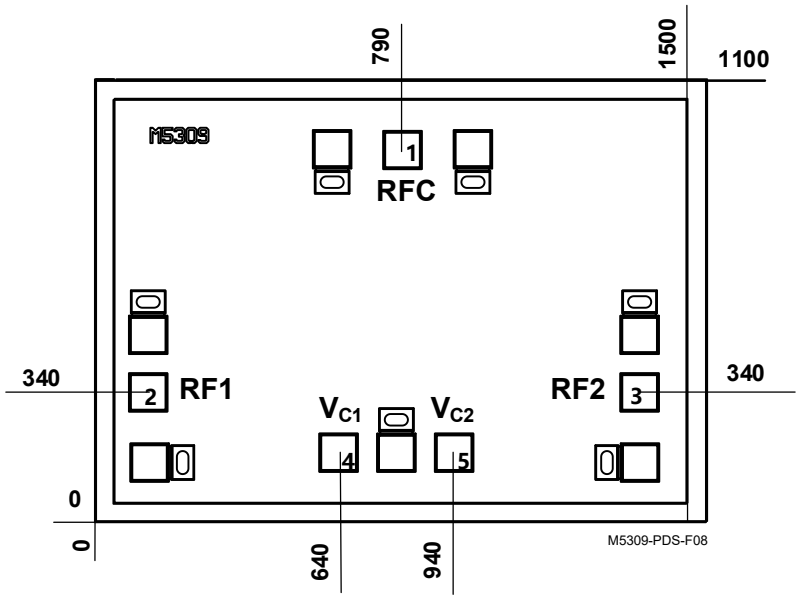


Figure 7. IL vs. P_{in} Characteristics

8. Outline Dimensions



- Dimensions shown in micrometre

Figure 8. M5309 Outline Dimensions

Table 4. Pad Description

Pad	Symbol	Description
1	RFC	RF Input
2,3	RF1/RF2	RF Output 1 / RF Output 2
4,5	V_{C1}/V_{C2}	Control Voltage

Table 5. Truth Table[1]

V_{C1}	V_{C2}	RFC to RF1	RFC to RF2
0V	-5V	ON	OFF
-5V	0V	OFF	ON

[1]. Any state other than described in this table places the switch into an undefined state. An undefined state will damage the device.

9. Assembly Information

■ Assembly Diagram

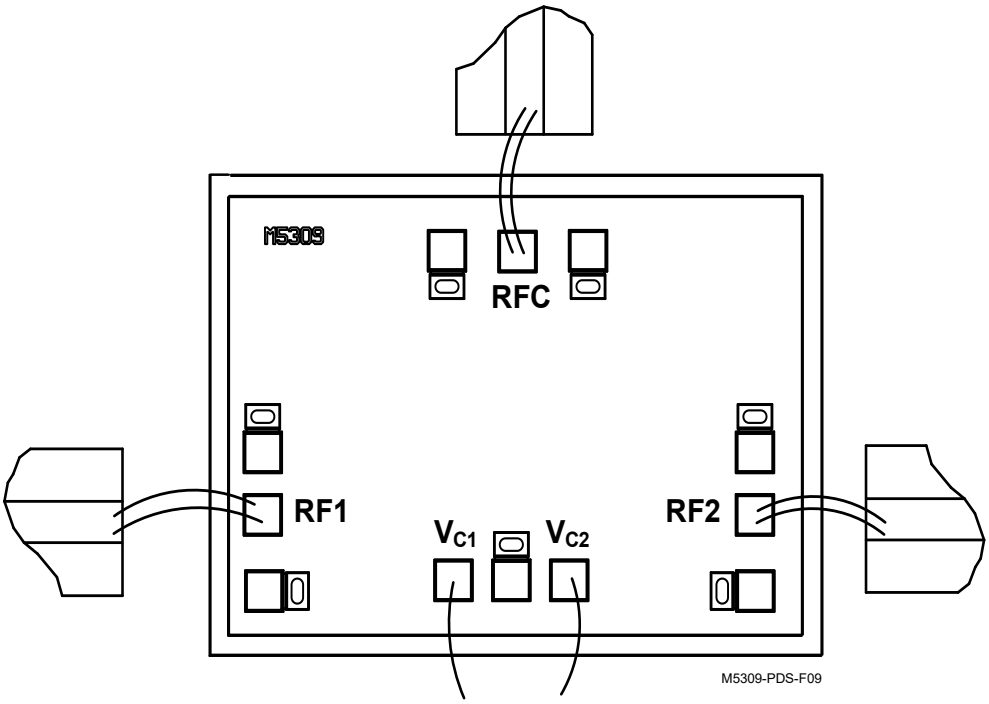


Figure 9. M5309 Assembly Diagram

- **Eutectic Die Attach:** It is best to use an 80% Au/20% Sn preform. Do not expose the chip to a temperature greater than 300°C for more than 30sec.
- **Wire Bonding:** RF bonds made with 1mil gold wire are recommended for the RF ports. Keep all bonds as short as possible, less than 0.35mm.

10. Handling Precautions

- **Storage**
  All bare dies ship in either Waffle or Gel Pak, which is an ESD protective container, and then sealed in an ESD protective bag. After opening the sealed ESD protective bag, all dies must be stored in a dry nitrogen environment.
- **Cleanliness**
  Handle the dies in a clean environment. Never use liquid cleaning systems to clean the dies.
- **ESD Caution**
  ESD (electrostatic discharge) sensitive device. Charged devices and circuit boards can discharge without detection. Although this product features patented or proprietary protection circuitry, damage may occur on devices subjected to high energy ESD. Therefore proper ESD precautions should be taken to avoid performance degradation or loss of functionality.



11. Contact Information

For the latest specifications, additional product information, technical support and sales support, please contact:

- **Email:** RF.support@raytrontek.com
- **Web:** www.raytrontek.com

12. Disclaimer

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