1. Description

- The M0901 is a 1-bit digital attenuator fabricated on GaAs MMIC process. It operates over 0.1-20GHz and provides 30dB of attenuation coverage. The device maintains an insertion loss of <1.6dB and achieves return loss better than 15dB.

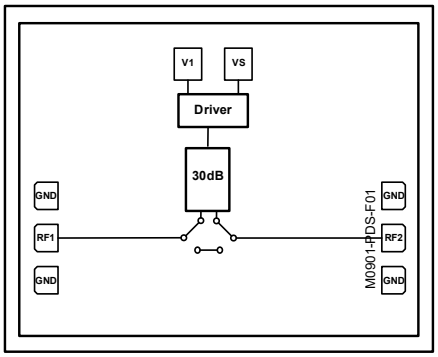


Figure 1. M0901 Functional Block Diagram

2. Applications

- TX/RX Modules
- Telecommunications
- Radar
- Defense

3. Features

- Frequency Range: 0.1-20GHz
- 1-Bit Digital Attenuator: 30dB
- Insert Loss: 1.6dB (typ.)
- RMS Relative Phase: 3°
- Control Voltage: 0/+5V
- Die size: 1.25 x 0.90 x 0.10mm

4. Brief Typical Performance

Table 1. Brief Typical Performance

Parameter	0.1GHz-20GHz	Units
Insert Loss	1.6	dB
Input Return Loss	-16	dB
Output Return Loss	-16	dB
Attenuation Error	0.4	dB
Relative Phase	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, VC	-	0/5	-	V
Reference Voltage, VE	-	-5	-	V

6. RF Characteristics (T_C = 25˚C)

Table 3. RF Characteristics[1]

Parameter	Symbol	Min.	Typ.	Max.	Units
Insertion Loss	IL	-	-1.6	-	dB
Input Return Loss	RL_{IN}	-	-16	-	dB
Output Return Loss	RL_{OUT}	-	-16	-	dB
Attenuation Error	AE	-	0.4	-	dB
Relative Phase	RP	-	-	5	°

7. Typical Performance Curve

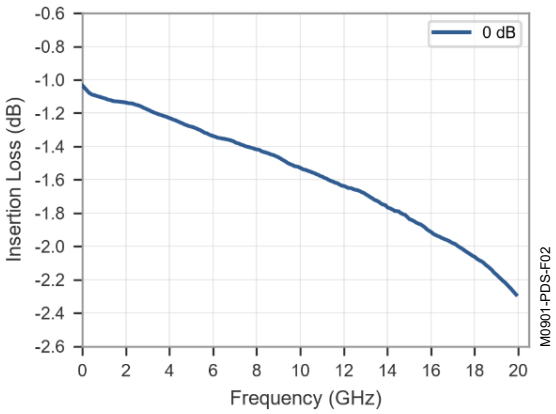


Figure 2. Reference State Insertion Loss Characteristics

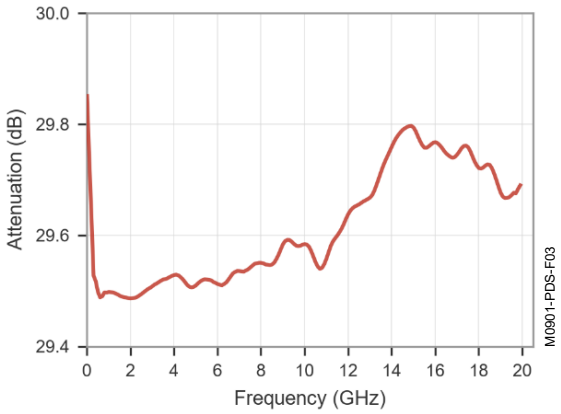


Figure 3. Basic State Attenuation Characteristics

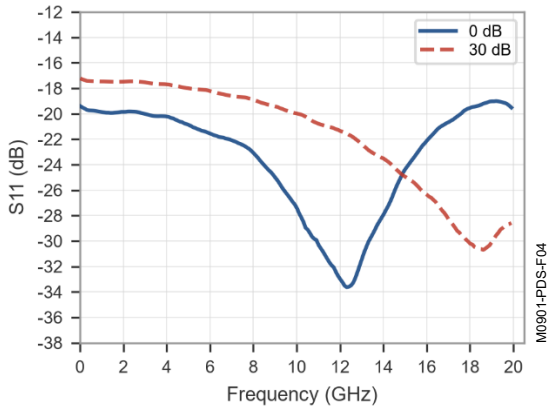


Figure 4. Full State Input Return Loss Characteristics

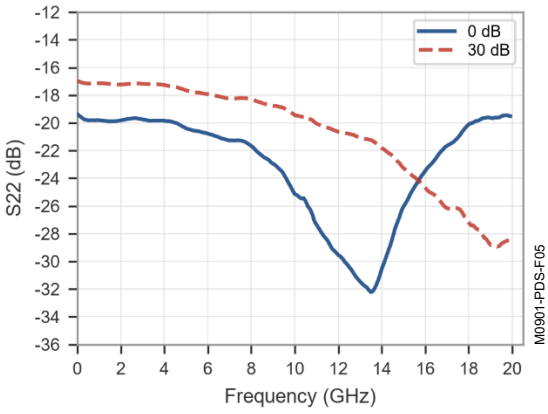


Figure 5. Full State Output Return Loss Characteristics

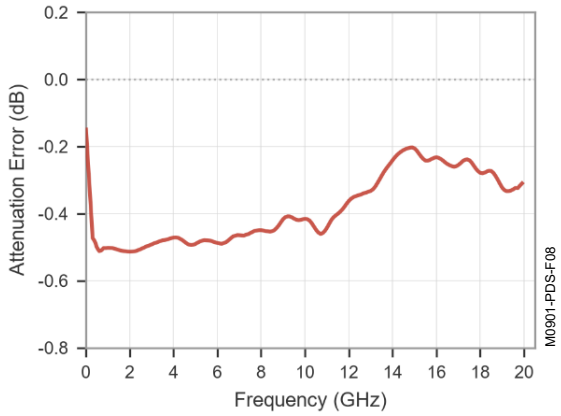


Figure 6. Basic State Attenuation Error Characteristics

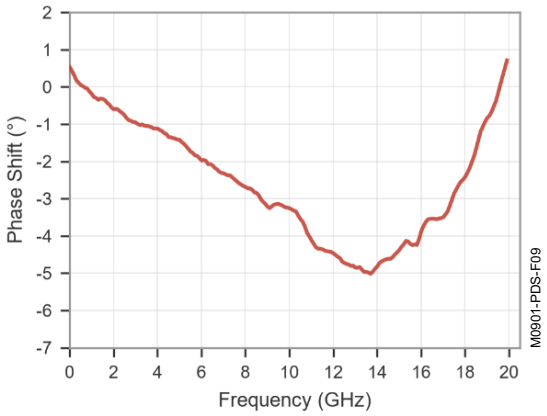
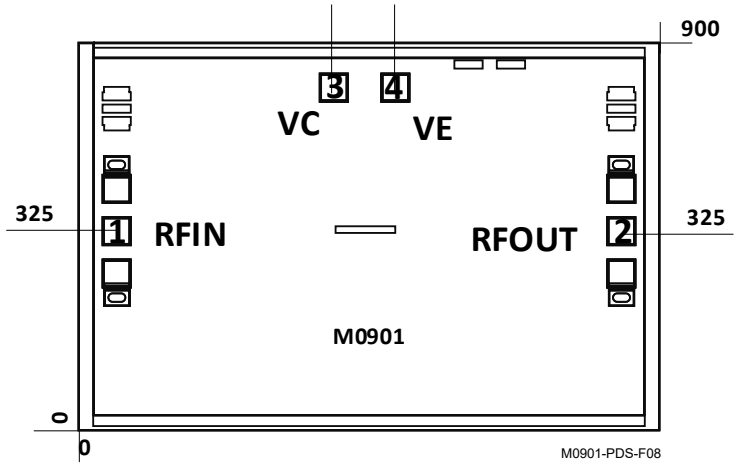


Figure 7. Basic State Relative Phase Characteristics

8. Outline Dimensions



- Dimensions shown in micrometre

Figure 8. M0901 Outline Dimensions

Table 4. Pad Description

Pad	Symbol	Description
1	RFIN	RF Input
2	RFOUT	RF Output
3	VC	Control Voltage
4	VE	-5V Driver Power Supply

Table 5. Truth Table

	V1	VS
0dB (Reference)	0V	-5V
30 dB	5V	-5V

9. Assembly Information

■ Assembly Diagram

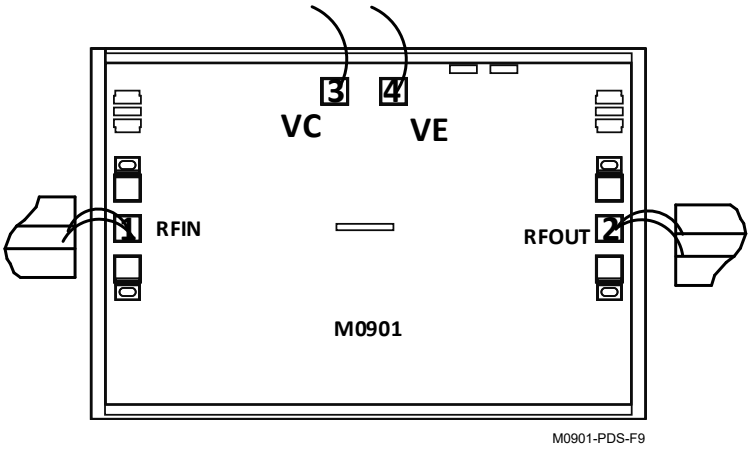


Figure 9. M0901 Assembly Diagram

- **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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