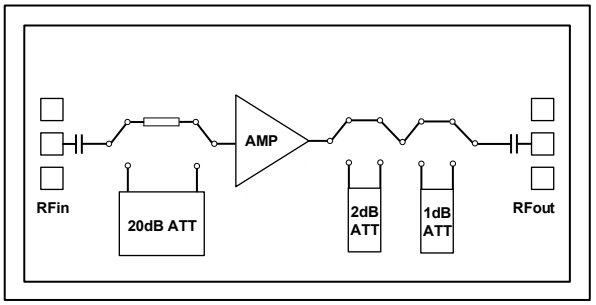
1. Description

- The M7119 is a low noise amplifier (LNA) with adjustable attenuator fabricated on GaAs p-HEMT MMIC process, integrated Amplifier, Automatic Gain Control (AGC) and 1dB/2dB Adjustable Attenuator. It operates over 7-13GHz, provides 3dB noise figure with 6dB gain and OP-1dB of 12dBm.



M7119(M)-PDS-F01

Figure 1. M7119 Functional Block Diagram

2. Applications

- TX/RX Modules
- Commercial and Military Radar

3. Features[1]

- Frequency Range: 7-13GHz
- Typical Gain: 6dB
- Noise Figure: 3dB
- Input/Output Return Loss: -15dB
- Output P_{-1dB}: 12dBm
- Automatic Gain Control: -20dB
- Adjustable Attenuation:1/2/3dB
- Single Positive Supply: +5V (I_{DQ}=22mA)
- Die Size: 1.6 x 1.2 x 0.1mm

[1] On-wafer Test

4. Brief Typical Performance

Table 1. Brief Typical Performance

Parameter	7-13GHz	Units
Small-Signal Gain	6	dB
Noise Figure	3	dB
Input/Output Return Loss	-15	dB
Output P_{-1dB}	12	dBm
Automatic Gain Control	-20	dB
Adjustable Attenuation	1/2/3	dB

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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
Supply Voltage, VEE	-	-5	-	V
Supply Voltage, VD	-	5	-	V
Control Voltage, C1	-	0/5	-	V

6. RF Characteristics (T_C = 25˚C)

Table 3. RF Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Units
Small-Signal Gain	Gain	-	6	-	dB
Gain Flatness	ΔG	-	±0.7	-	dB
Noise Figure	NF	-	3	3.2	dB
Input Return Loss	RL_{IN}	-	-15	-	dB
Output Return Loss	RL_{OUT}	-	-18	-	dB
Output Power for 1dB Compression	OP_{-1dB}	-	12	-	dBm
Automatic Gain Control	AGC	-19	-20	-20.5	dB
1dB Attenuation	A_{1dB}		-1		dB
2dB Attenuation	A_{2dB}		-2		dB

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

■ Small-signal Characteristics Curve

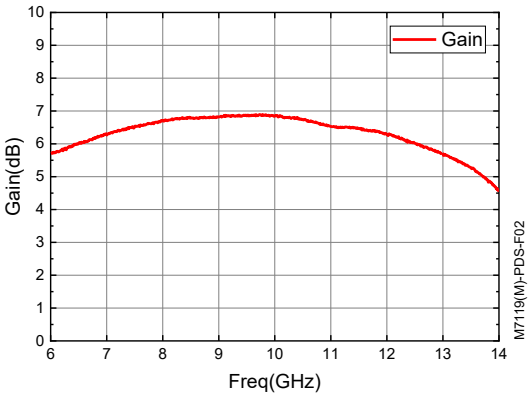


Figure 2. Small-signal Gain Characteristics

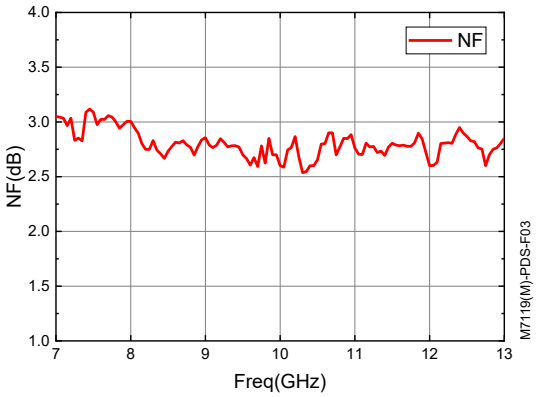


Figure 3. Noise Figure Characteristics

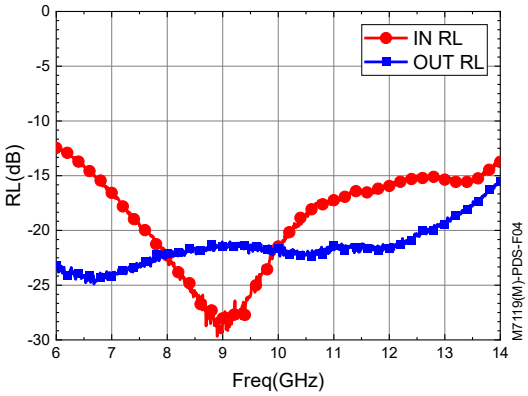


Figure 4. Input\Output Return Loss Characteristics

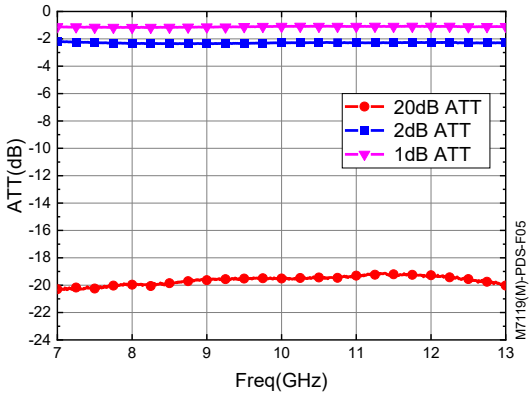


Figure 5. Attenuation Characteristics

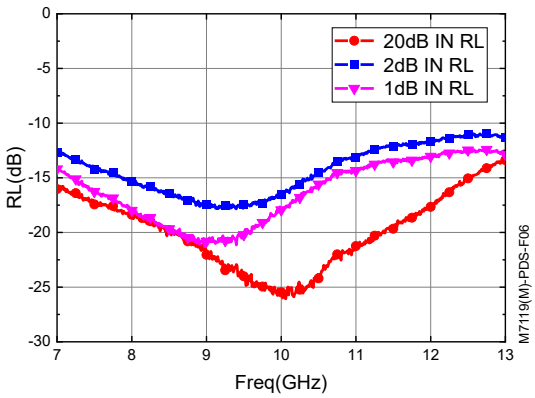


Figure 6. Input Return Loss Characteristics of Attenuation State

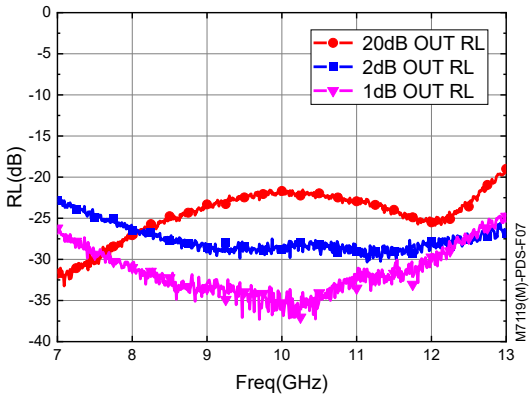


Figure 7. Output Return Loss Characteristics of Attenuation State

■ Power Characteristic Curve

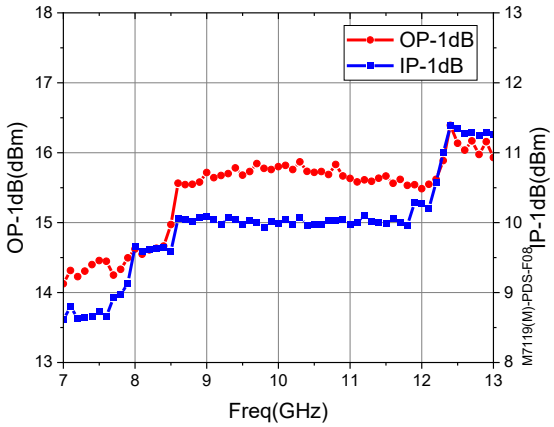
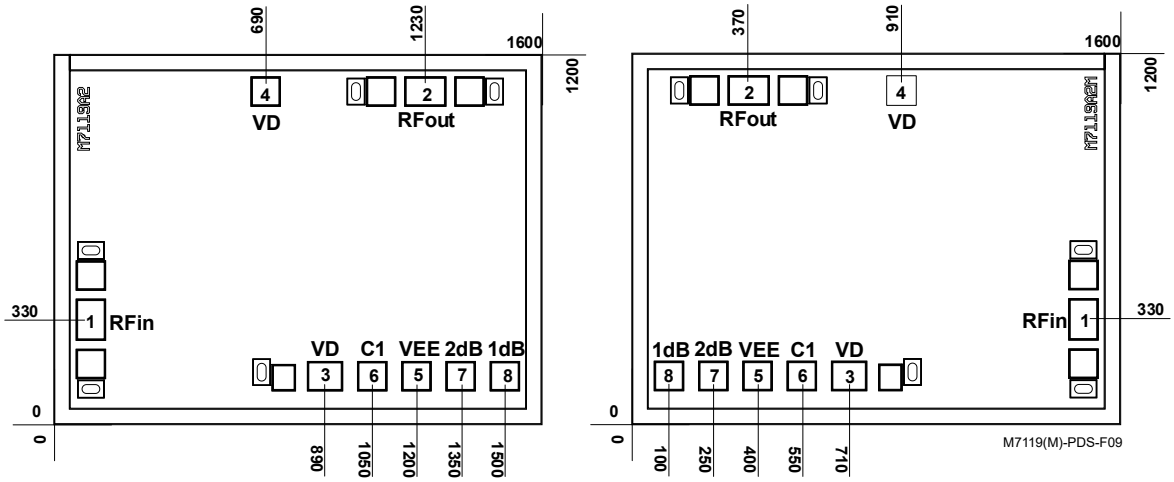


Figure 8. OP-1dB / IP-1dB Characteristics

8. Outline Dimensions



- Dimensions shown in micrometre

Figure 9. M7119(M) Outline Dimensions

Table 4. Pad Description

Pad	Symbol	Description
1	RF_{in}	RF Input
2	RF_{ouy}	RF Output
3/4	VD	Supply Voltage (Arbitrary pad can be selected)
5	VEE	Supply Voltage
6	C_1	Control Voltage for 20dB Attenuation
7	2dB	Attenuation Bit 2dB, Enabled When Bond-wire to GND
8	1dB	Attenuation Bit 1dB, Enabled When Bond-wire to GND

9. Assembly Information

■ Assembly Diagram

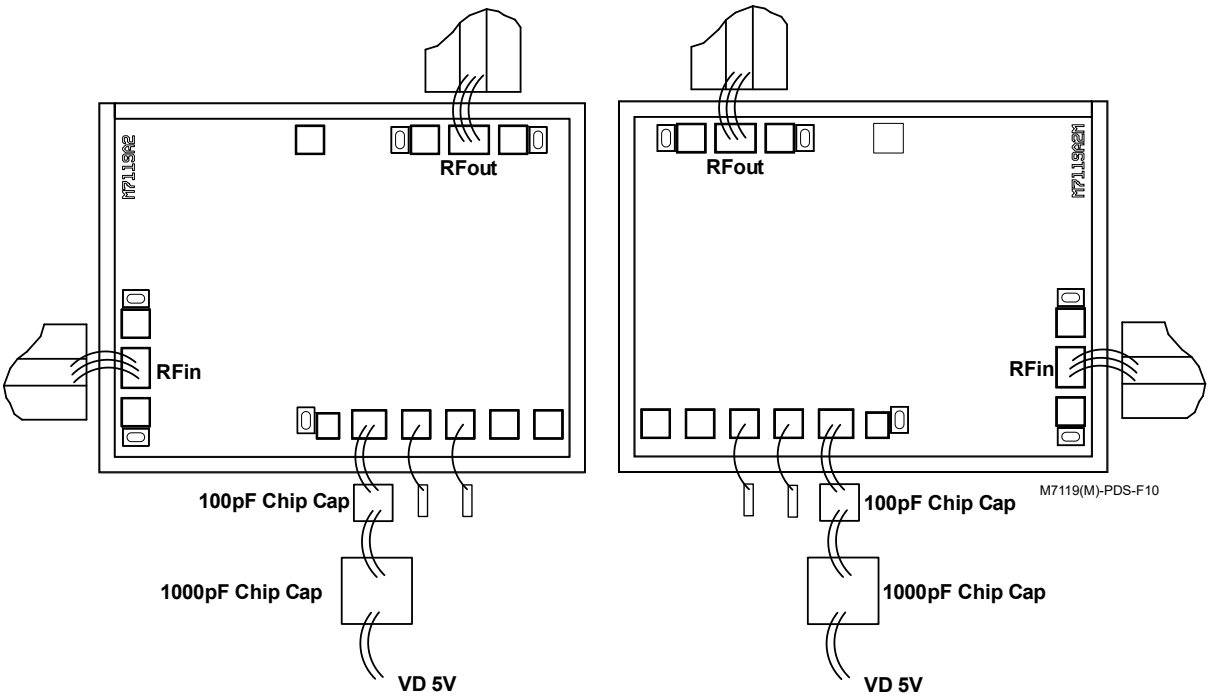


Figure 10. M7119(M) Assembly Diagram

- **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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