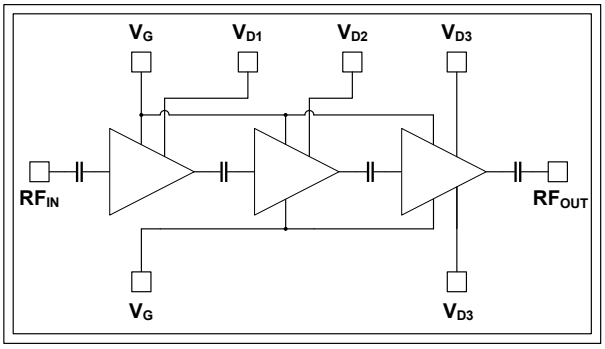
1. Description

- The M1706 is an 8-12GHz power amplifier manufactured using a 0.25μm gate-length gallium arsenide high electron mobility transistor (HEMT) process. The M1706 is grounded through backside metal via holes. All chips undergo 100% RF measurement.



M1706-PDS-F01

Figure 1. M1706 Functional Block Diagram

2. Applications

- TX/RX Modules
- Wireless Communications

3. Features

- Frequency Range: 8-12GHz
- Output Power (P_{SAT}): 39dBm (8W)
- Power Gain: 18dB
- Typical Power Added Efficiency: 30%
- Operating Bias: 8V (V_D), I_{DQ}=3A
- Small Signal Gain: 24dB
- Input Return Loss: -13dB
- Die Size: 3.20 x 4.00 x 0.08mm

4. Brief Typical Performance

Table 1. Brief Typical Performance

Parameter	8-12GHz	Units
Output Power	39	dBm
Power Gain	18	dB
Power Added Efficiency	30	%
Drain Dynamic Current	3	A
Small Signal Gain	24	dB
Input Return Loss	-13	dB

- Test condition: Input signal and V_D Pulsed, Pulse width=10μs, Duty cycle=10%

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5. Absolute Maximum Ratings

Table 2. Absolute Maximum Ratings

Parameter	Symbol	Rating	Units
Drain-Source Voltage	V_{DS}	9	V
Gate-Source Voltage	V_{GS}	-2	V
Maximum Input Power	P_{IN}	25	dBm
Maximum Forward Gate Current	$I_{G\ Max}$	10	mA
Storage Temperature Range	T_{STG}	- 65 ~ +150	°C

6. Recommended Operating Conditions

Table 3. Recommended Operating Conditions

Parameter	Min.	Typ.	Max.	Units
Operating Temperature Range	-55	25	85	°C
Drain-Source Voltage Range, V_{DS}	-	8	-	V
Drain Bias Current, I_{DQ}	-	3	-	A
Gate-Source Voltage, V_{GS}	-	-0.5	-	V

7. RF Characteristics (T_C = 25˚C)

Table 4. RF Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Units
Output Power	P_{SAT}	39	39	40	dBm
Power Gain	G_P	18	18	19	dB
Power Added Efficiency	PAE	30	30	38	%
Drain Dynamic Current	Id	-	5	-	A
Small Signal Gain	Glin	24	24	26	dB
Input Return Loss	S11	-	-13	-	dB

• Test condition: Input signal pulsed and V_D Pulsed, Pulse width=10μs, Duty cycle=10%

8. Typical Performance Curve

■ Small signal Characteristics Curve (TC = 25˚C)

(V_D=8V, V_G=-0.6V, I_{DQ}=3A, P_{IN}=-15dBm, Pulse width=100μs, Duty cycle=10%)

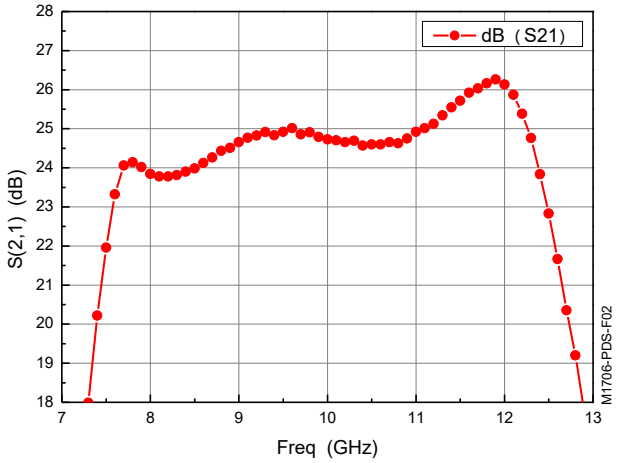


Figure 2. Small Signal Gain vs. Frequency

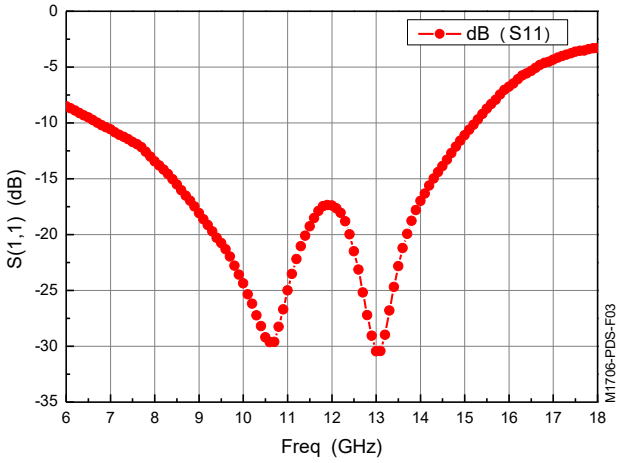


Figure 3. Input Return Loss vs. Frequency

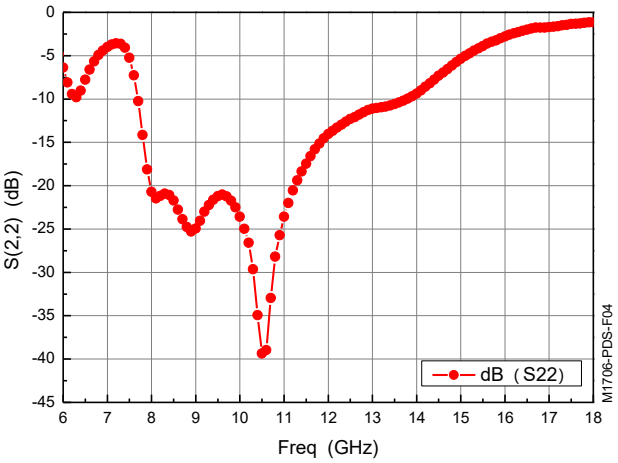


Figure 4. Output Return Loss vs. Frequency

■ Power Characteristic Curve

（ V_D=8V，V_G=-0.5V，I_{DQ}=3A，P_{IN}=21dBm，Pulse width=10μs，Duty cycle=10%）

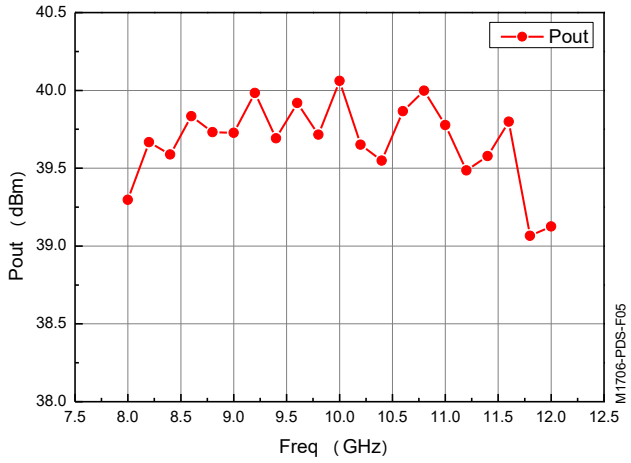


Figure 5. Output Power vs. Frequency

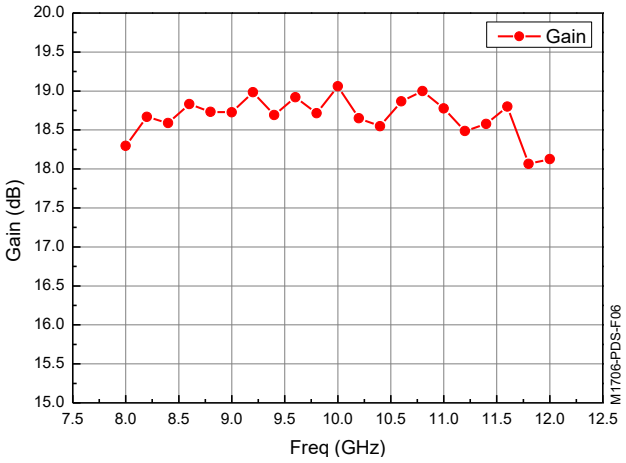


Figure 6. Power Gain vs. Frequency

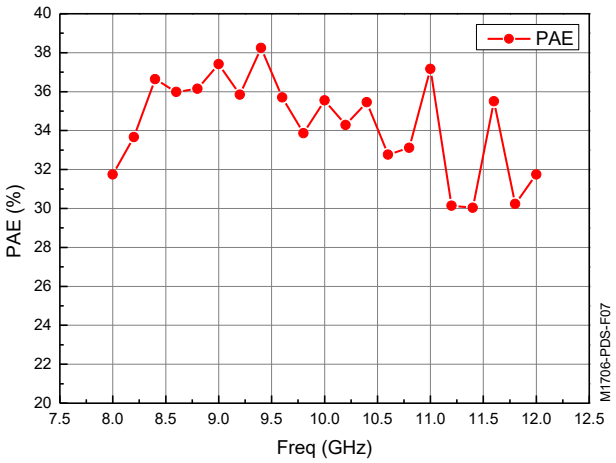


Figure 7. Power Added Efficiency vs. Frequency

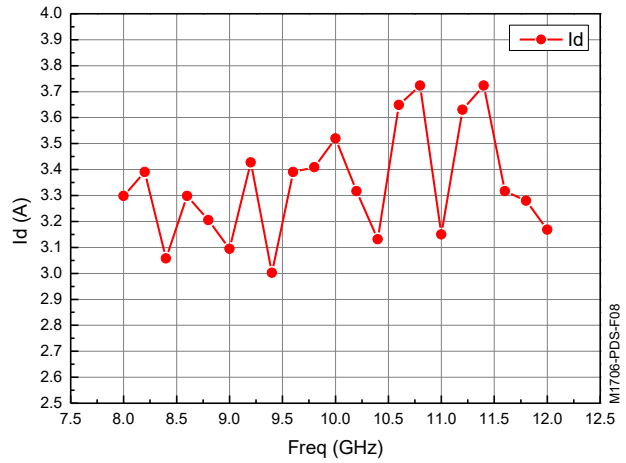
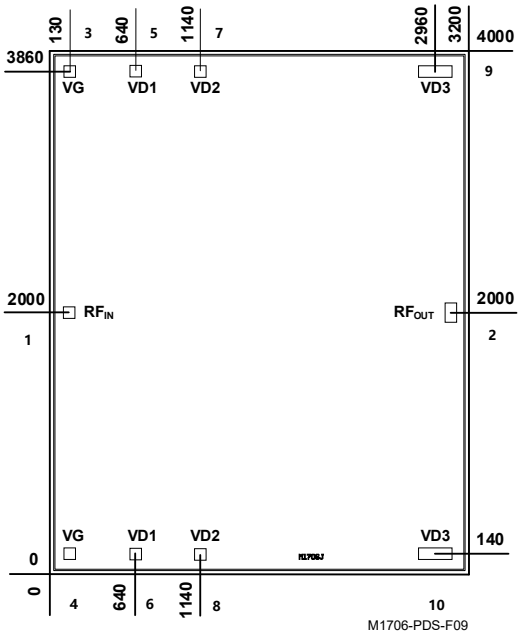


Figure 8. Drain Dynamic Current vs. Frequency

9. Outline Dimensions



- Dimensions shown in micrometre

Figure 9. M1706 Outline Dimensions

Table 5. Pad Description

Pad	Symbol	Description
1	RF_{IN}	RF Input. 50Ohms. DC blocking capacitor is not required.
2	RF_{OUT}	RF Output. 50Ohms. DC blocking capacitor is not required.
3,4	V_G	Gate Voltage stage1&2&3. Bypass network required, refer to Figure 10.
5,6	V_{D1}	Drain Voltage stage1. Bypass network required, refer to Figure 10.
7,8	V_{D2}	Drain Voltage stage2. Bypass network required, refer to Figure 10.
9,10	V_{D3}	Drain Voltage stage3. Bypass network required, refer to Figure 10.

10. Assembly Information

■ Assembly Diagram

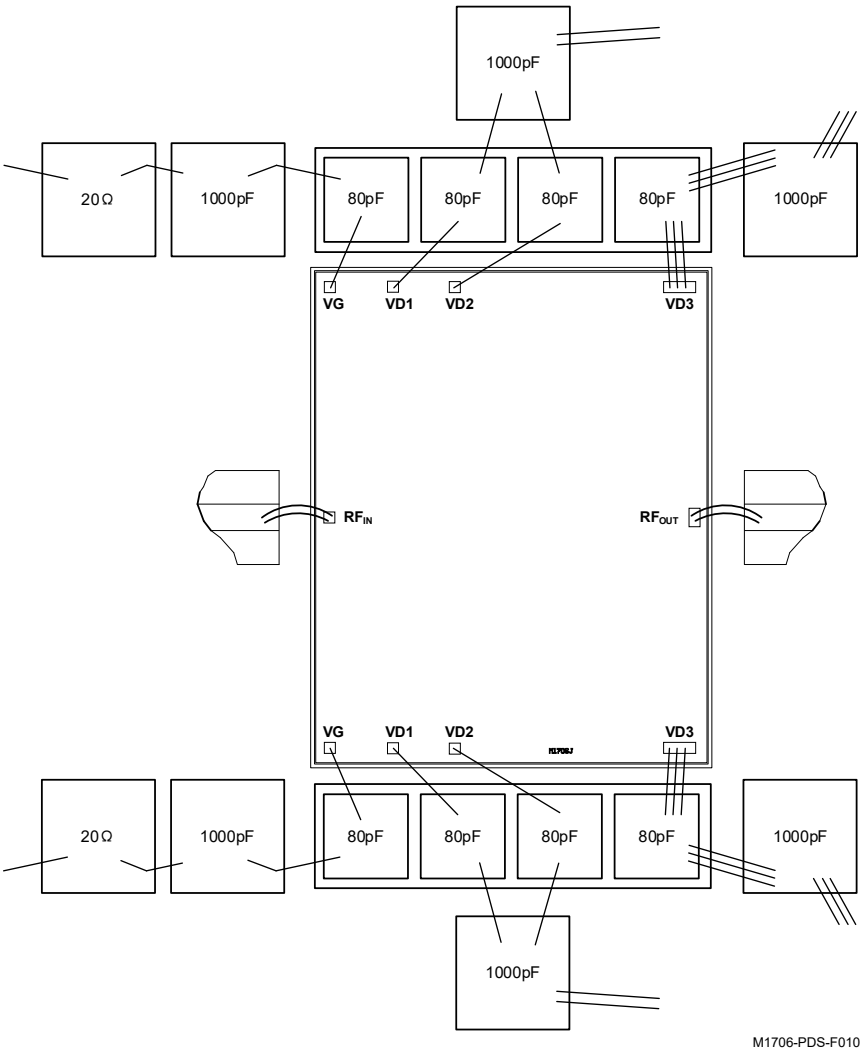


Figure 10. M1706 Assembly Diagram

- **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.

11. 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.



12. 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

13. Disclaimer

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