1. Description

- The M3516 is a low noise amplifier fabricated on GaAs p-HEMT MMIC process. It operates over 8-18GHz and provides 25dB gain and achieves 1.2dB noise figure. It also provides power down mode in each channel. It can be biased from a single positive supply of 3.3V.

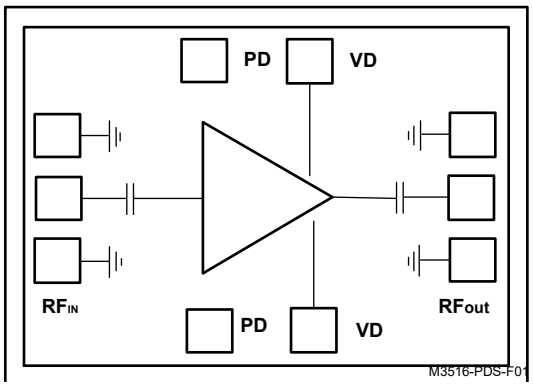


Figure 1. M3516 Functional Block Diagram

2. Applications

- Precision Guidance
- RX Modules

3. Features[1]

- Frequency Range: 8-18GHz
- Typical Gain: 25dB
- Noise Figure: 1.2dB
- Output P_{-1dB}: 4.5dBm
- Input/Output Return Loss: -20dB/-15dB
- Single Positive Supply: +3.3V (I_{DQ}=14mA)
- Power Down Control Voltage: 0V/+3.3V
- 50Ohm Matched Input/Output
- Die Size: 1.60 x 1.10 x 0.10mm

[1] On-wafer Test

4. Brief Typical Performance

Table 1. Brief Typical Performance

Parameter	8-18GHz	Units
Small-Signal Gain	25	dB
Noise Figure	1.2	dB
Input Return Loss	-20	dB
Output Return Loss	-15	dB
Output P_{-1dB}	4.5	dBm

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5. Absolute Maximum Ratings

Table 3. Absolute Maximum Ratings

Parameter	Symbol	Rating	Units
Operating Voltage Range	V_D	0 ~ +6	V
Maximum Input Power	P_{IN}	16	dBm
Storage Temperature Range	T_{STG}	-55 ~ 150	°C

6. Recommended Operating Conditions

Table 4. Recommended Operating Conditions

Parameter	Min.	Typ.	Max.	Units
Operating Temperature Range	-55	25	125	°C
Supply Voltage, V_D	-	5	-	V
Quiescent Current, I_{DQ}	-	14	-	mA

7. RF Characteristics (V_D=5V, T_C = 25˚C)

Table 5. RF Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Units
Small-Signal Gain	Gain	24.5	25	26	dB
Noise Figure	NF	-	1.2	1.3	dB
Input Return Loss	RL_{IN}	-25	-20	-10	dB
Output Return Loss	RL_{OUT}	-20	-15	-13	dB
Output Power for 1dB Compression	OP_{-1dB}	4	4.5	5.5	dBm

8. Typical Performance Curve

■ Small-signal Characteristics Curve

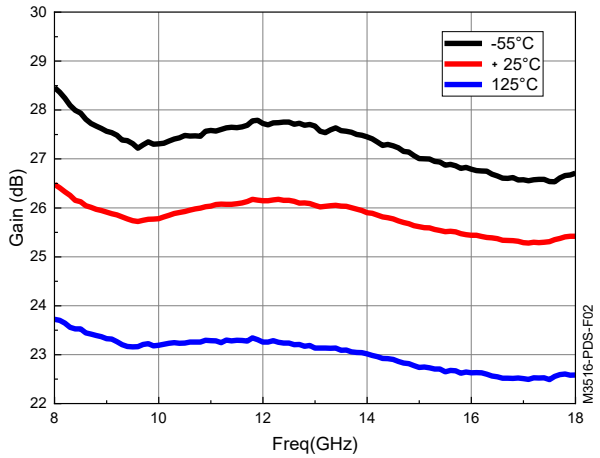


Figure 2. Small-signal Gain Characteristics

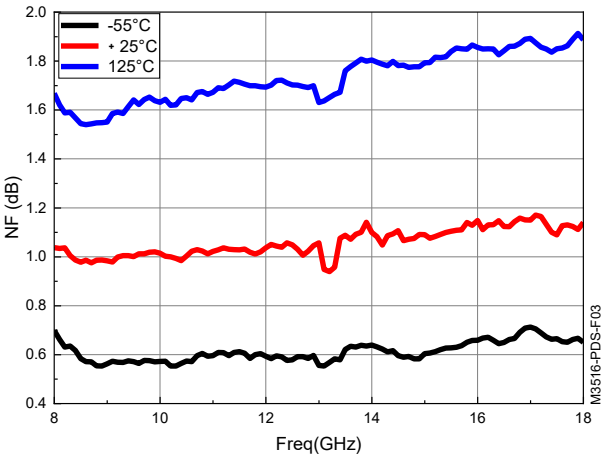


Figure 3. Noise Figure Characteristics

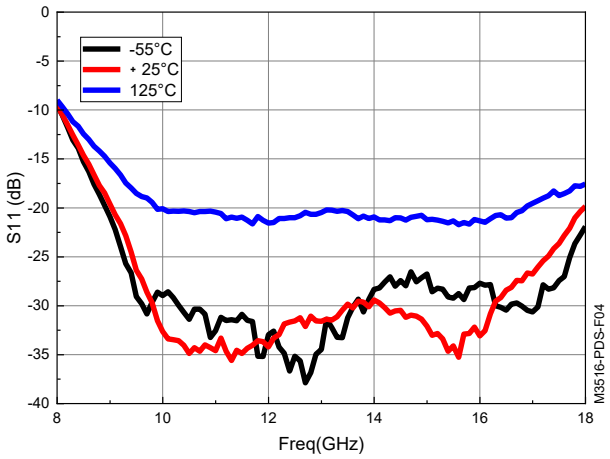


Figure 4. Input Return Loss Characteristics

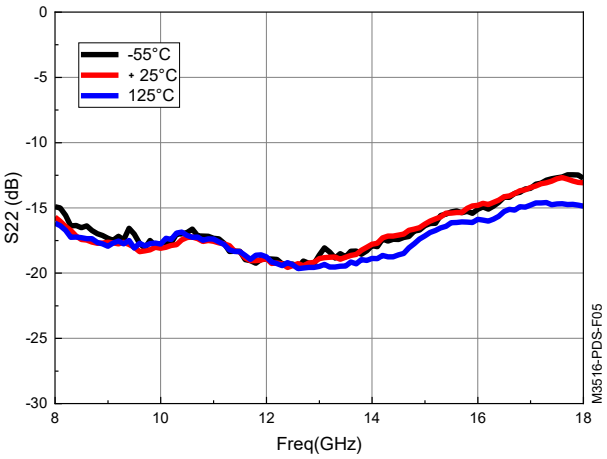


Figure 5. Output Return Loss Characteristics

■ Power Characteristics Curve

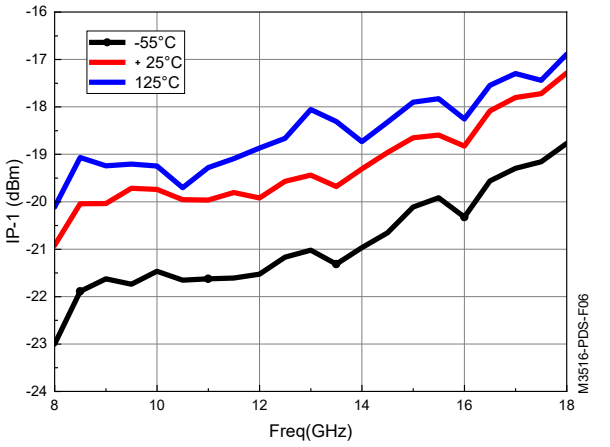


Figure 6. IP-1dB Characteristics

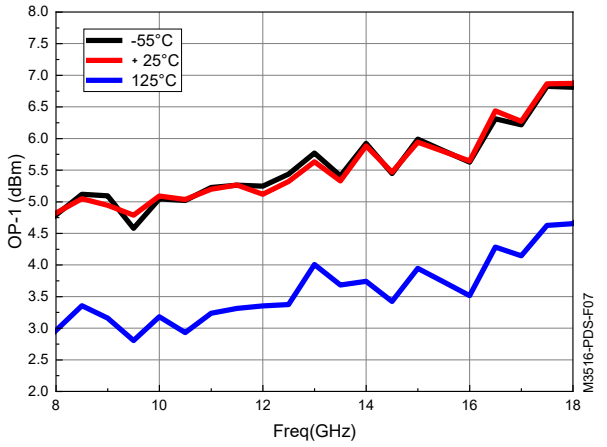
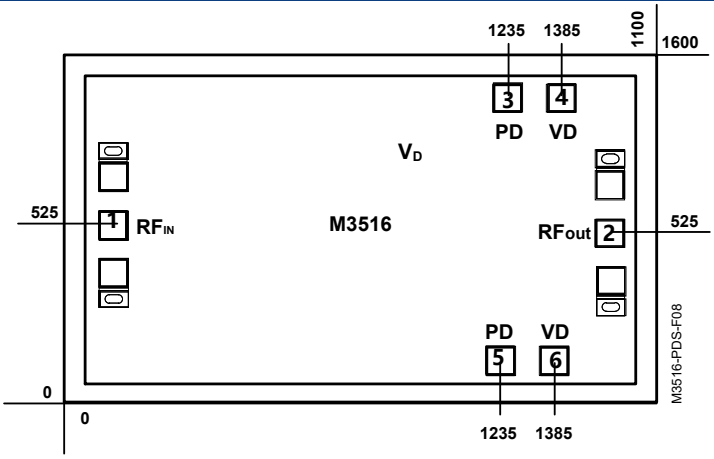


Figure 7. OP-1dB Characteristics

9. Outline Dimensions



- Dimensions shown in micrometre

Figure 8. M3516 Outline Dimensions

Table 6. Pad Description

Pad	Symbol	Description
1	RF_{IN}	RF Input. 50ohm. DC blocking capacitor is not required.
2	RF_{OUT}	RF Output. 50ohm. DC blocking capacitor is not required.
3/5	V_{PD}	Power Down Control Voltage. Power is off when 3.3V, refer to Table 7.
4/6	V_D	Supply Voltage. External bypass capacitors are required, refer to Figure 7.

Table 7. Power Down Mode Truth Table

V_D	V_{PD}	RF_{IN}	RF_{OUT}
3.3V	Floating	ON	ON
3.3V	3.3V	OFF	OFF
0V	Floating	OFF	OFF
0V	3.3V	OFF	OFF

10. Assembly Information

■ Assembly Diagram

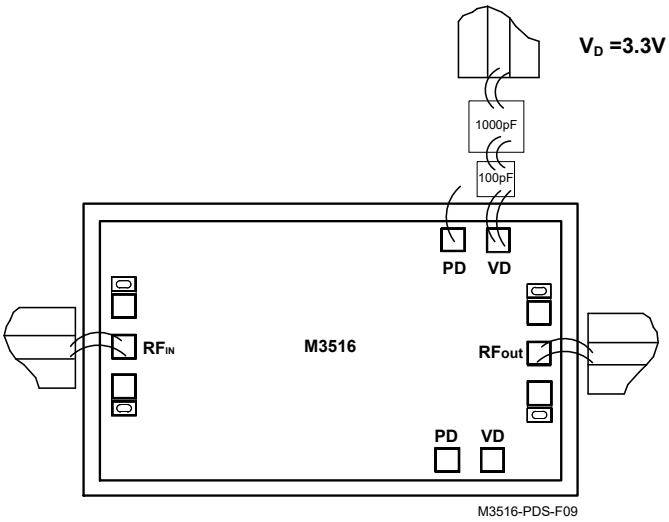


Figure 9. M3516 Assembly Diagram

- **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.

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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