1. Description

- The M7127 is a Bi-Directional Amplifier MMIC integrated amplifier, SPDT switch and digital control circuit, fabricated on GaAs p-HEMT MMIC process. It operates over 10-15GHz (Rx) and 13-15GHz (Tx), the OP_{-1dB} of Rx is 6dBm with 15dB gain and 2.5dB noise figure, the P_{SAT} of Tx is 23dBm with 25dB gain.

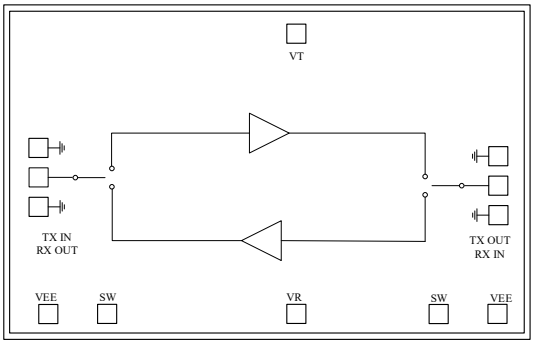


Figure 1. M7127 Functional Block Diagram

2. Applications

- TX/RX Modules
- Satellite Communications
- Defense

3. Features

- T_X Frequency Range: 13-15GHz
- T_X Small Signal Gain: 25dB
- T_X S11/S22: -15dB/-15dB
- T_X Saturated Output Power: 23dBm
- T_X Quiescent Current: 120mA
- R_X Frequency Range: 10-15GHz
- R_X Small Signal Gain: 15dB
- R_X S11/S22: -10dB/-12dB
- R_X Noise Figure: 2.5dB
- R_X Output P_{-1dB}: 6dBm
- R_X Quiescent Current: 28mA
- Dimensions: 2.5 x 2.0 x 0.1mm

4. Brief Typical Performance

Table 1. Brief Typical Performance

Parameter	Data	Unit
T_X Frequency Range	13-15	GHz
T_X Small Signal Gain	25	dB
T_X Saturated Output Power	23	dBm
T_X Quiescent Current	120	mA
R_X Frequency Range	10-15	GHz
R_X Small Signal Gain	15	dB
R_X Noise Figure	2.5	dB
R_X Output P_{-1dB}	6	dBm
R_X Quiescent Current	28	mA

Table of Contents

No.	Contents	Page
1	Description	1
2	Applications	1
3	Features	1
4	Brief Typical Performance	1
5	Recommended Operating Conditions	3
6	RF Characteristics	3
7	Typical Performance Curve	3
8	Outline Dimensions	6
9	Assembly Information	7
10	Handling Precautions	7
11	Contact Information	8
12	Disclaimer	8

5. Recommended Operating Conditions

Table 2. Recommended Operating Conditions

Parameter	Min.	Typ.	Max.	Units
Operating Temperature Range	-55	25	85	°C
T_X / R_X Control Voltage, SW	-	0/5	-	V
R_X Supply Voltage, RX_VD	-	5	-	V
T_X Supply Voltage, TX_VD	-	5	-	V

6. RF Characteristics (T_C = 25˚C)

Table 3. RF Characteristics[1]

Parameter	Symbol	Min.	Typ.	Max.	Units
T_X Frequency Range	Freq_T_X	13	-	15	GHz
T_X Small Signal Gain	S21_T_X	-	25	-	dB
T_X S11	S11_T_X	-	-15	-	dB
T_X S22	S22_T_X	-	-15	-	dB
T_X Saturated Output Power	P_{SAT}_T_X	-	23	-	dBm
T_X Quiescent Current	I_{DQ}_T_X	-	120	-	mA
R_X Frequency Range	Freq_R_X	10	-	15	GHz
R_X Small Signal Gain	S21_R_X	-	15	-	dB
R_X S11	S11_R_X	-	-10	-	dB
R_X S22	S22_R_X	-	-12	-	dB
R_X Noise Figure	NF	-	2.5	-	dB
R_X Output P_{-1dB}	OP_{-1dB}_R_X	-	6	-	dBm
R_X Quiescent Current	I_{DQ}_R_X	-	28	-	mA

[1]. Test condition: Input signal CW

7. Typical Performance Curve

■ Small-signal Characteristics Curve (T_C = 25˚C)

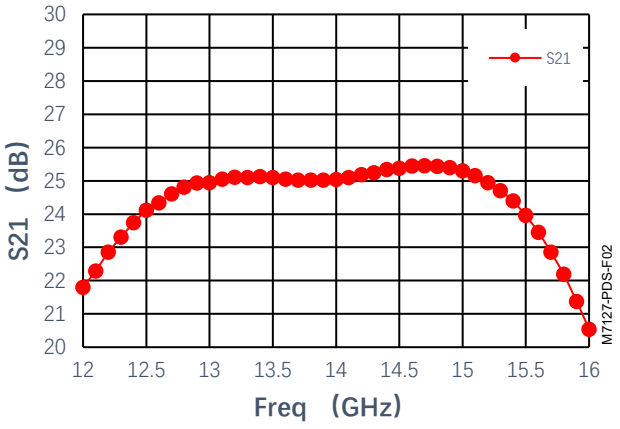


Figure 2. T_X Small-signal Gain Characteristics

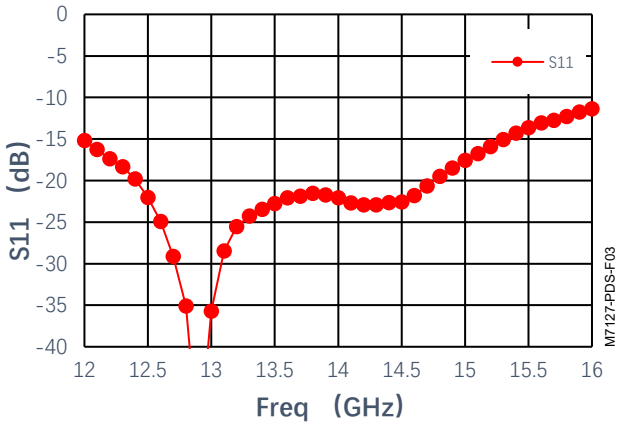


Figure 3. T_X Small-signal S11 Characteristics

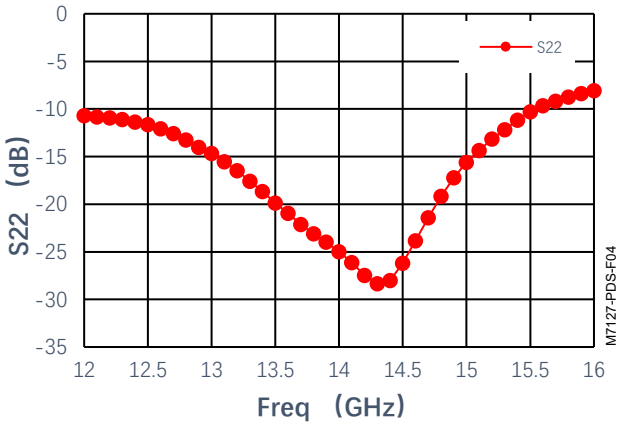


Figure 4. T_X Small-signal S22 Characteristics

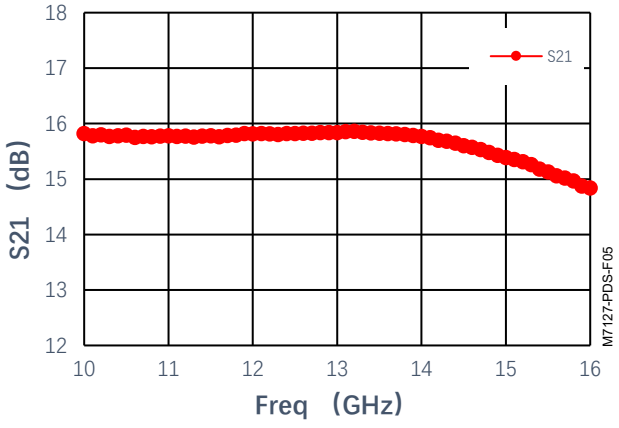


Figure 5. R_X Small-signal Gain Characteristics

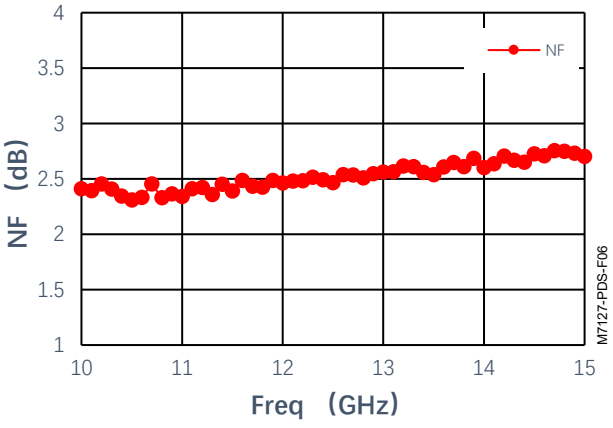


Figure 6. R_X Noise Figure Characteristics

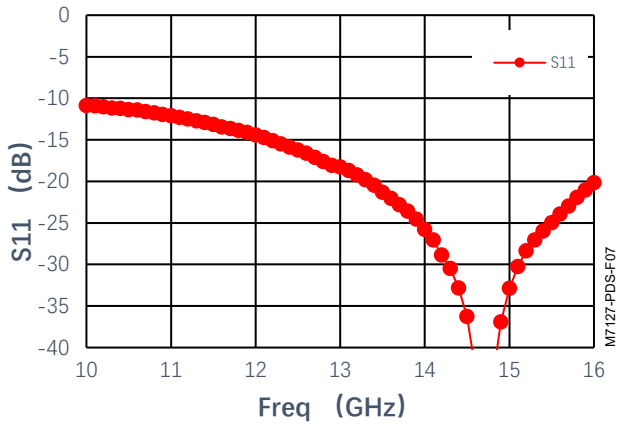


Figure 7. R_X Small-signal S11 Characteristics

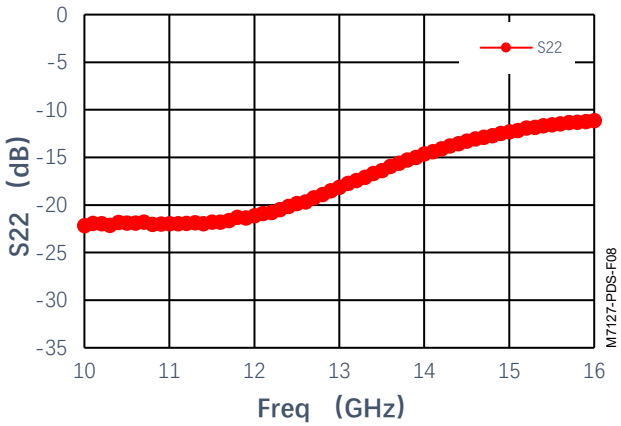


Figure 8. R_X Small-signal S22 Characteristics

■ Power Characteristic Curve (25℃)

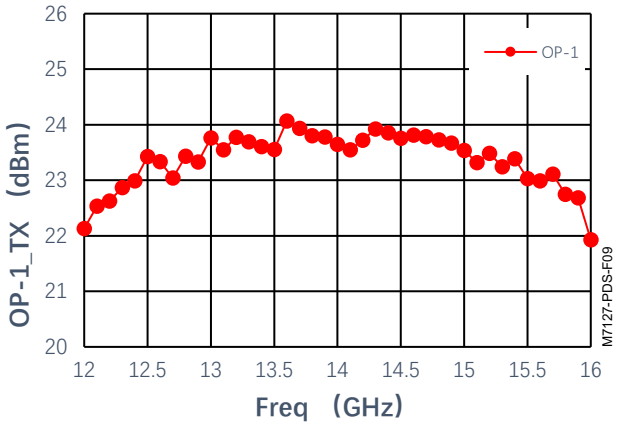


Figure 9. T_X P_{SAT} Characteristics

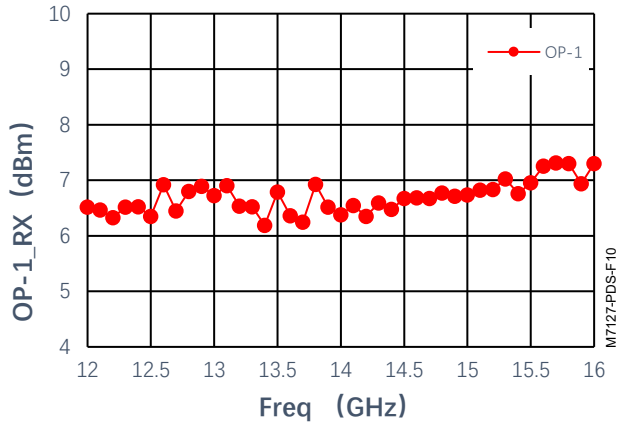
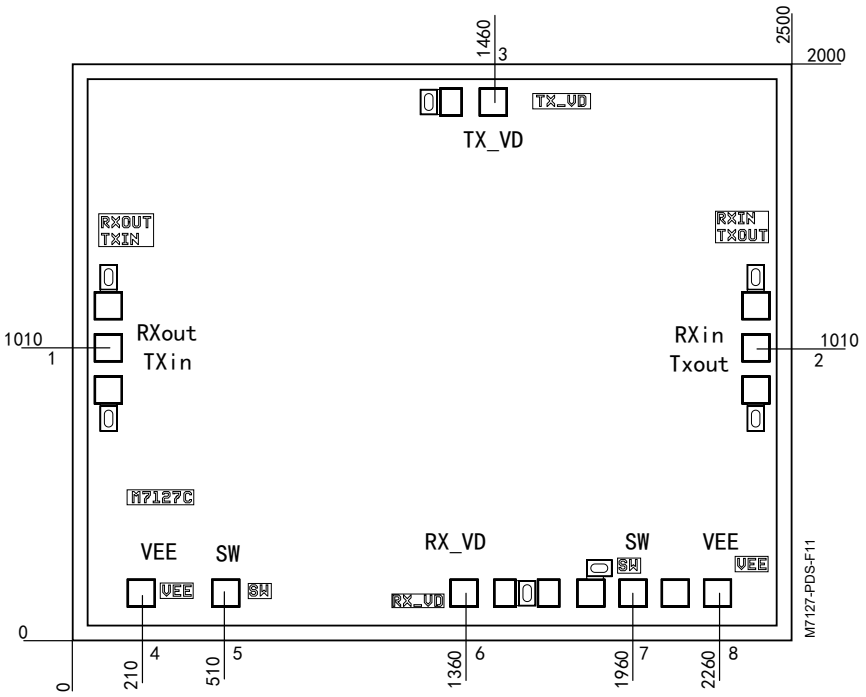


Figure 10. R_X OP_{-1dB} Characteristics

8. Outline Dimensions



- Dimensions shown in micrometre

Figure 11. M7127 Outline Dimensions

Table 4. Pad Description

Pad	Symbol	Description
1	RXout/TXin	T_X Input / R_X Output
2	RXin/TXout	T_X Output / R_X Input
3	TX_VD	T_X Supply Voltage
4/8	VEE	Supply Voltage (Arbitrary pad can be selected)
5/7	SW	T_X / R_X Control Voltage (Arbitrary pad can be selected)
6	RX_VD	R_X Supply Voltage

Table 5. Truth Table

VEE	SW	VT	VR	Channel Selection
-5	5	5	0	T_X Channel
-5	0	0	5	R_X Channel

9. Assembly Information

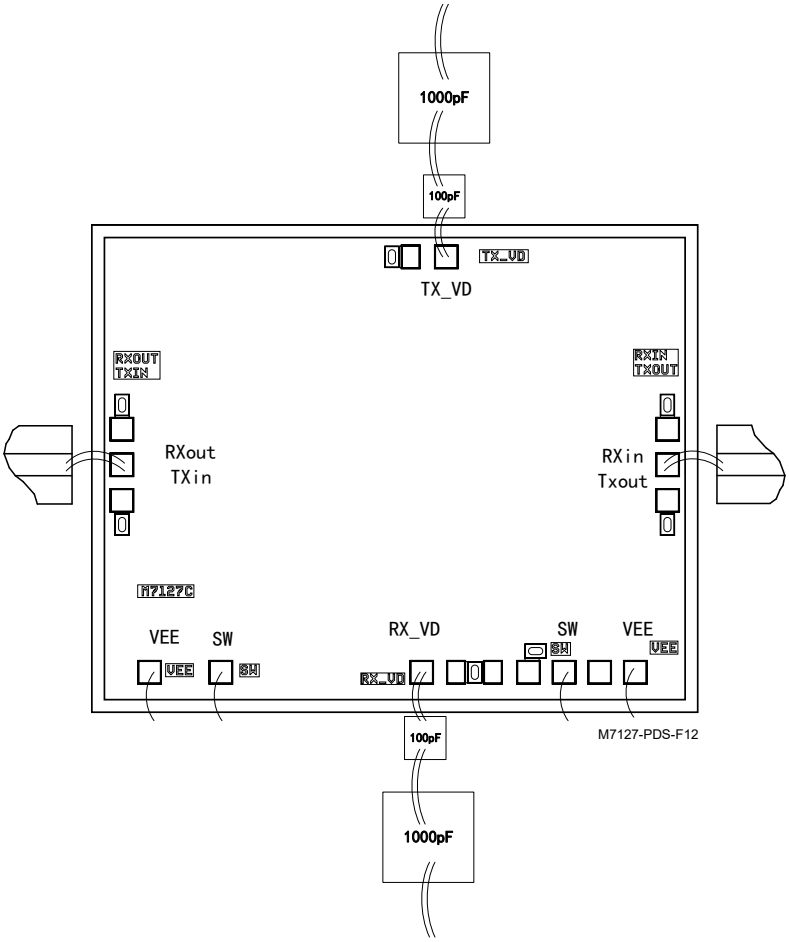


Figure 12. M7127 Assembly Diagram

- **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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