1. Description

- The M7120 is a Bi-Directional Amplifier MMIC integrated amplifier, SPDT switch and digital control circuit, fabricated on GaAs p-HEMT MMIC process. It operates over 0.2-2GHz, the OP_{-1dB} of Rx is 18.5dBm with 20dB gain and 2.5dB noise figure, the PSAT of Tx is 21dBm with 21dB gain.

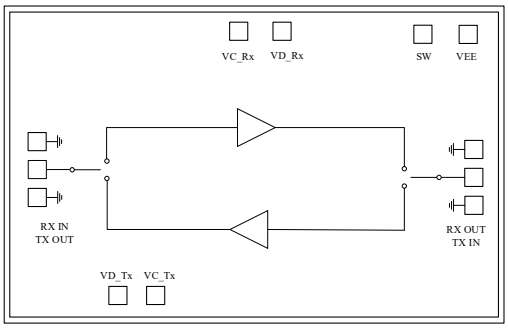


Figure 1. M7120 Functional Block Diagram

2. Applications

- TX/RX Modules
- Telecommunications
- Radar
- Defense

3. Features

- Frequency Range: 0.2-2GHz
- T_X Small Signal Gain: 21.5dB
- T_X S11/S22: -14dB/-12dB
- T_X Noise Figure: 2.3dB
- T_X Saturated Output Power: 21dBm
- T_X Quiescent Current: 103mA
- T_X Saturated Dynamic Current: 110 mA
- R_X Small Signal Gain: 20dB
- R_X S11/S22: -16dB/-10dB
- R_X Noise Figure: 2.5dB
- R_X Output P_{-1dB}: 18.5dBm
- R_X Quiescent Current: 81mA
- R_X Dynamic Current at OP_{-1dB}: 90mA
- Dimensions: 2.0 x 1.5 x 0.1mm

4. Brief Typical Performance

Table 1. Brief Typical Performance

Parameter	0.2-2GHz	Units
T_X Small Signal Gain	21.5	dB
T_X Saturated Output Power	21	dBm
T_X Quiescent Current	103	mA
TX Saturated Dynamic Current (P_{IN}=3dBm)	110	mA
R_X Small Signal Gain	20	dB
R_X Noise Figure	2.5	dB
R_X Output P_{-1dB}	18.5	dBm
R_X Quiescent Current	81	mA
R_X Dynamic Current at OP_{-1dB}	90	mA

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5. Recommended Operating Conditions

Table 2. Recommended Operating Conditions

Parameter	Min.	Typ.	Max.	Units
Operating Temperature Range	-55	25	85	°C
Supply Voltage, VEE	-	-5	-	V
T_X / R_X Control Voltage, SW	-	0/5	-	V
R_X Supply Voltage, VC_Tx, VD_Tx	-	5	-	V
T_X Supply Voltage, VC_Rx, VD_Rx	-	5	-	V

6. RF Characteristics (T_C = 25˚C)

Table 3. RF Characteristics[1]

Parameter	Symbol	Min.	Typ.	Max.	Units
T_X Small Signal Gain	S21_T_X	21.2	22	22.5	dB
T_X S11	S11_T_X	-	-	-13	dB
T_X S22	S22_T_X	-	-	-12	dB
T_X Saturated Output Power	P_{SAT}_T_X	21	21.5	22	dBm
T_X Quiescent Current	I_{DQ}_T_X	-	-	100	mA
T_X Dynamic Current at P_{SAT}	I_d_T_X	-	-	110	mA
R_X Small Signal Gain	S21_R_X	20	21	21.5	dB
R_X S11	S11_R_X	-	-	-16	dB
R_X S22	S22_R_X	-	-	-10	dB
R_X Noise Figure	NF	-	2	2.5	dB
R_X Output P_{-1dB}	OP_{-1dB}_R_X	18	19	21	dBm
R_X Quiescent Current	I_{DQ}_R_X	-	-	81	mA

[1]. Test condition: CW Test

7. Typical Performance Curve

■ Small-signal Characteristics Curve

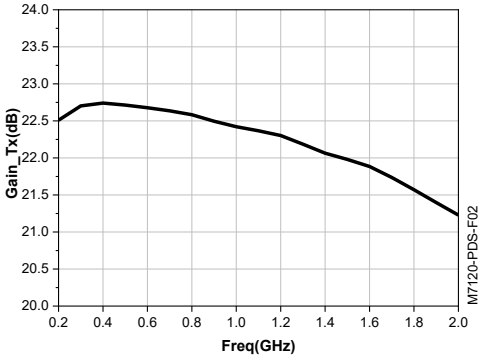


Figure 2. T_X Small-signal Gain Characteristics

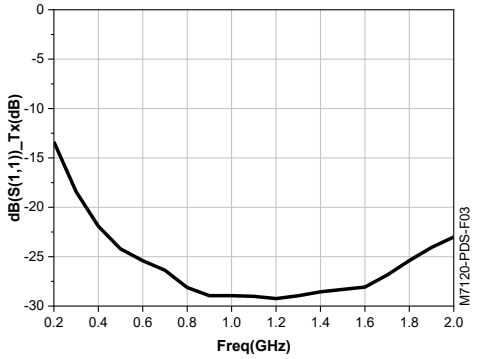


Figure 3. T_X Small-signal S11 Characteristics

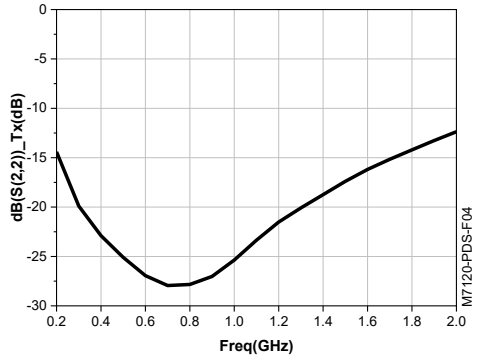


Figure 4. T_X Small-signal S22 Characteristics

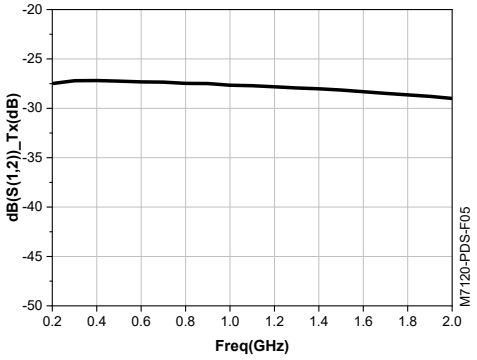


Figure 5. T_X Small-signal S12 Characteristics

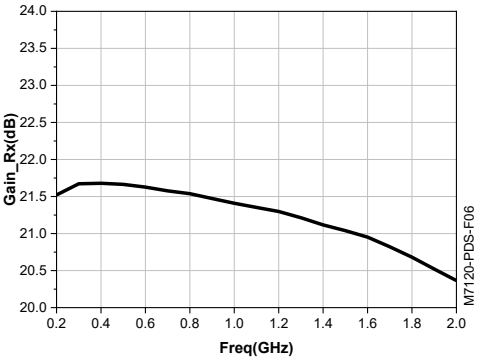


Figure 6. R_X Small-signal Gain Characteristics

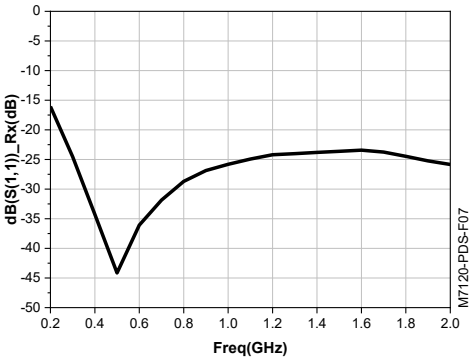


Figure 7. R_X Small-signal S11 Characteristics

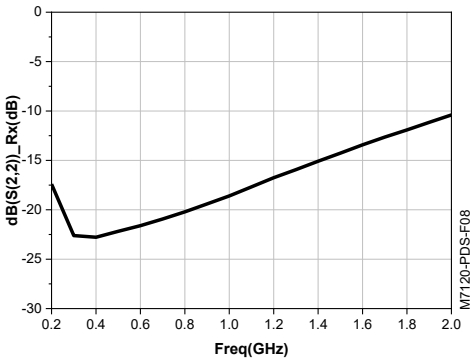


Figure 8. Rx Small-signal S22 Characteristics

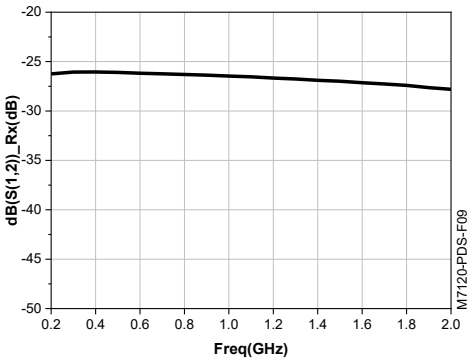


Figure 9. Rx Small-signal S12 Characteristics

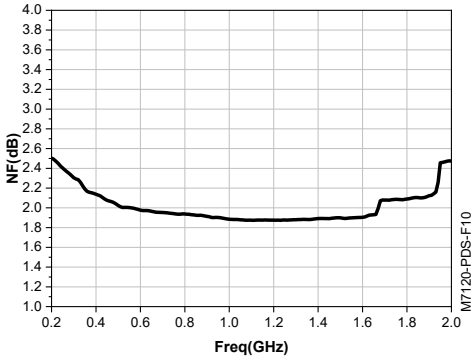


Figure 10. Rx NF Characteristics

■ Power Characteristic Curve (25℃)

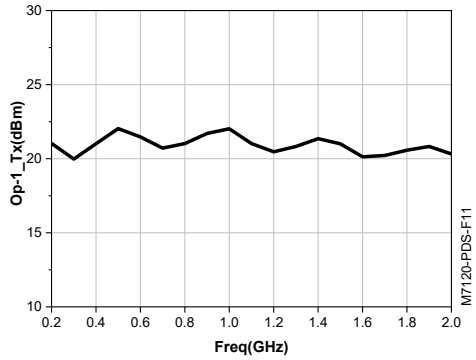


Figure 11. Tx OP-1dB Characteristics

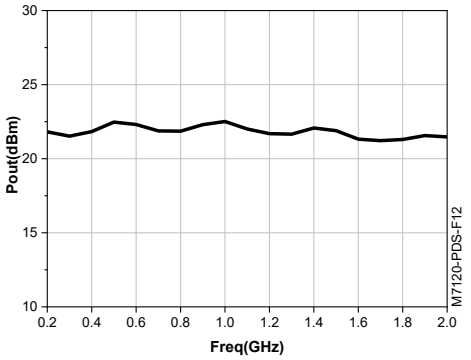


Figure 12. Tx PSAT Characteristics

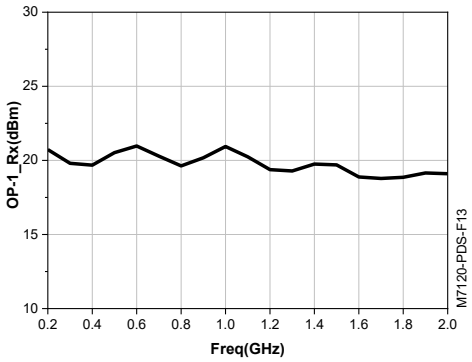
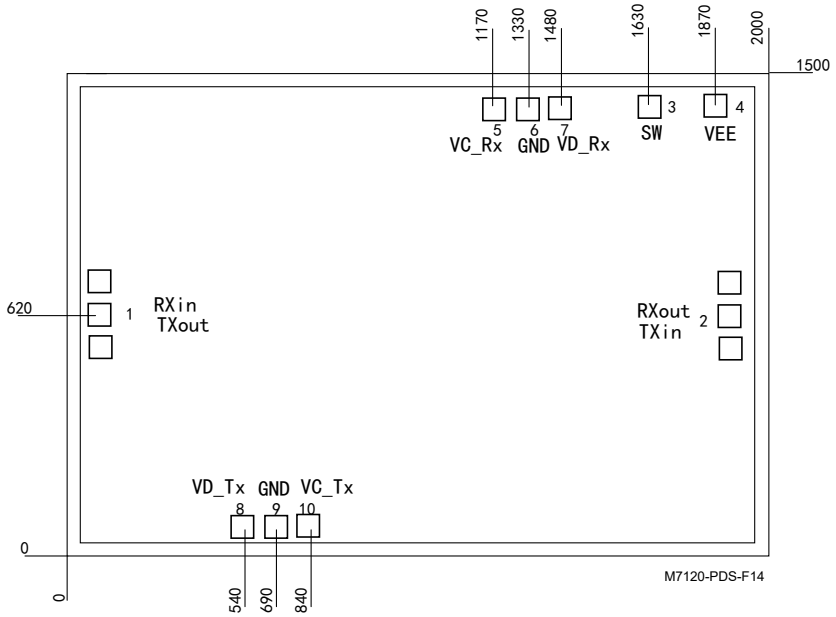


Figure 13. R_X OP_{-1dB} Characteristics

8. Outline Dimensions



- Dimensions shown in micrometre

Figure 14. M7120 Outline Dimensions

Table 4. Pad Description

Pad	Symbol	Description
1	RXin/TXout	R_X Input / T_X Output
2	RXout/TXin	R_X Output / T_X Input
3	VEE	T_X / R_X Control Voltage
4	SW	Supply Voltage
5	VC_Rx	R_X Supply Voltage
7	VD_Rx	R_X Supply Voltage
8	VC_Tx	T_X Supply Voltage
12	VD_Tx	T_X Supply Voltage

Table 5. Truth Table

VEE	SW	VC_Tx, VD_Tx	VC_Rx, VD_Rx	Channel Selection
-5	0	5	0	T_X Channel
-5	5	0	5	R_X Channel

9. Assembly Information

■ Assembly Diagram

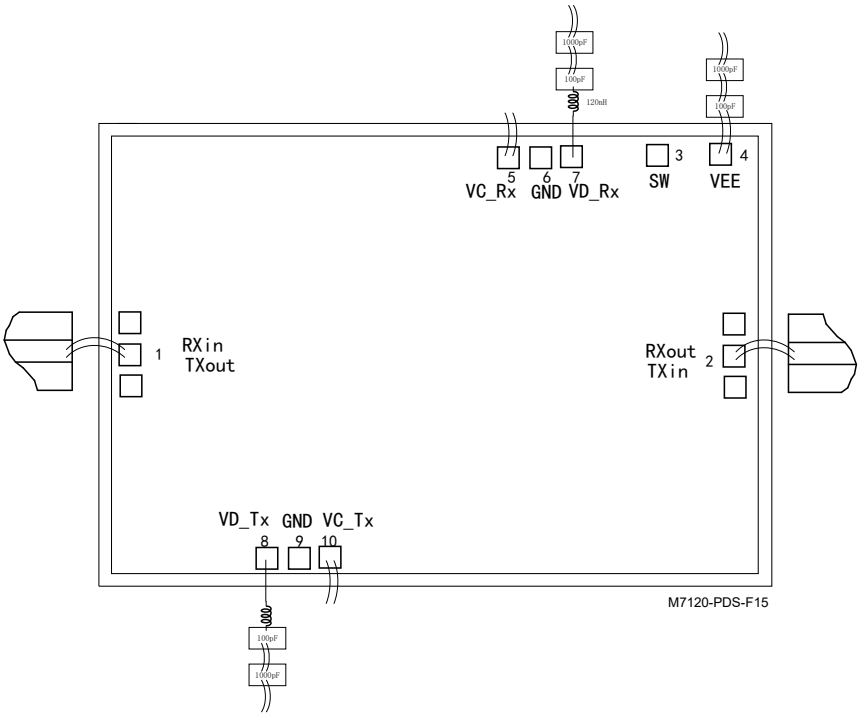


Figure 15. M7120 Assembly Diagram

- **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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