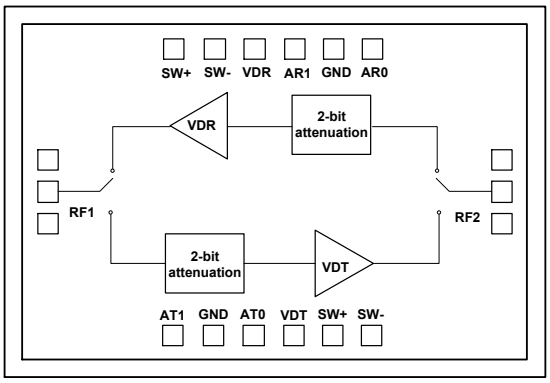
1. Description

- The M7132 is a Bi-Directional Amplifier MMIC integrated amplifier, SPDT switch and digital control circuit, fabricated on GaAs p-HEMT MMIC process. It operates over 14-19.5GHz, the OP-1dB of Rx is 19dBm with 8.5dB gain and 3.5dB noise figure, the OP-1dB of Tx is 17dBm with 20dB gain.



M7132-PDS-F01

Figure 1. M7132 Functional Block Diagram

2. Applications

- TX/RX Modules
- Telecommunications
- Radar
- Defense

3. Features[1]

- Frequency Range: 14-19.5GHz
- Tx Small Signal Gain: 20dB
- Tx S11/S22: -12dB/-12dB
- Tx Output P-1dB: 17dBm
- Tx Quiescent Current: 85mA
- Tx Dynamic Current at OP-1dB: 88mA
- Rx Small Signal Gain: 8.5dB
- Rx S11/S22: -15dB/-15dB
- Rx Noise Figure: 6dB
- Rx Output P-1dB: 19dBm
- Rx Quiescent Current: 105mA
- Rx Dynamic Current at OP-1dB:110mA
- Die Size: 1.6 x 1.25 x 0.1mm

[1] On-wafer Test

4. Brief Typical Performance

Table 1. Brief Typical Performance

Parameter	14-19.5GHz	Units
Tx Small Signal Gain	20	dB
Tx Output P-1dB	17	dBm
Tx Quiescent Current	85	mA
Tx Dynamic Current at OP-1dB	88	mA
Rx Small Signal Gain	8.5	dB
Rx Noise Figure	6	dB
Rx Output P-1dB	19	dBm
Rx Quiescent Current	105	mA
Rx Dynamic Current at OP-1dB	110	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	4
8	Outline Dimensions	7
9	Assembly Information	8
10	Handling Precautions	8
11	Contact Information	9
12	Disclaimer	9

5. Recommended Operating Conditions

Table 2. Recommended Operating Conditions

Parameter	Min.	Typ.	Max.	Units
Operating Temperature Range	-55	25	150	°C
R_X Supply Voltage, VDR	-	5	-	V
T_X Supply Voltage, VDT	-	5	-	V
T_X / R_X Control Voltage, SW+/ SW-	-	0/5	-	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	-	20	-	dB
T_X S11	S11_T_X	-	-12	-	dB
T_X S22	S22_T_X	-	-12	-	dB
T_X Output P_{-1dB}	OP_{-1dB}_T_X	-	17	-	dBm
T_X Quiescent Current	I_{DQ}_T_X	-	85	-	mA
T_X Dynamic Current at OP_{-1dB}	I_d_T_X	-	88	-	mA
R_X Small Signal Gain	S21_R_X	-	8.5	-	dB
R_X S11	S11_R_X	-	-15	-	dB
R_X S22	S22_R_X	-	-15	-	dB
R_X Noise Figure	NF	-	6	-	dB
R_X Output P_{-1dB}	OP_{-1dB}_R_X	-	19	-	dBm
R_X Quiescent Current	I_{DQ}_R_X	-	105	-	mA
R_X Dynamic Current at OP_{-1dB}	I_d_R_X	-	110	-	mA

[1] Test condition: Input signal Pulsed, Pulse width = 10μs, Duty cycle = 40%

7. Typical Performance Curve

■ Small-signal Characteristics Curve

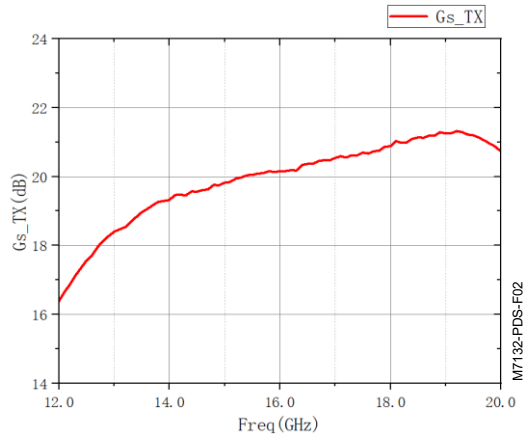


Figure 2. T_X Small-signal Gain Characteristics

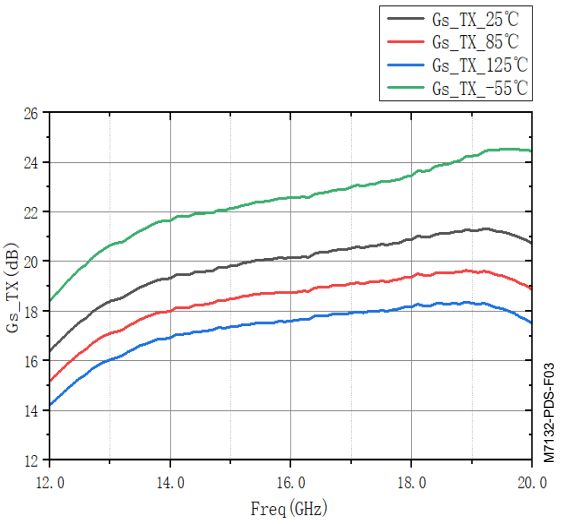


Figure 3. T_X Small-signal S11/S22 Characteristics

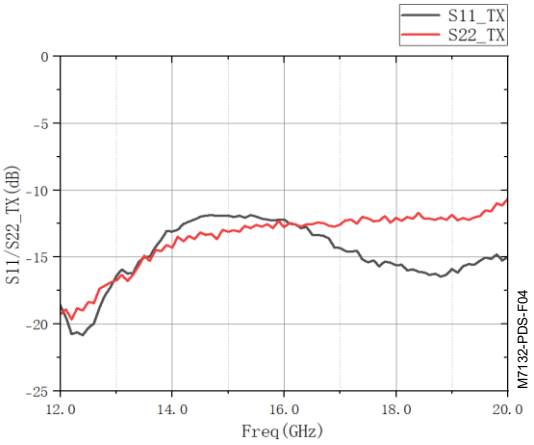


Figure 4. T_X Small-signal S11/S22 Characteristics

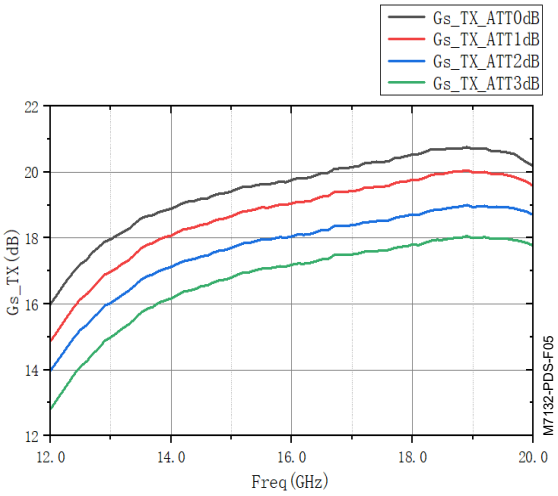


Figure 5. T_X Attenuation-State Characteristics

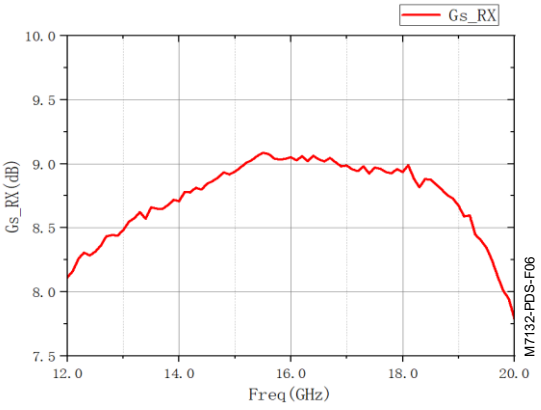


Figure 6. R_X Small-signal Gain Characteristics

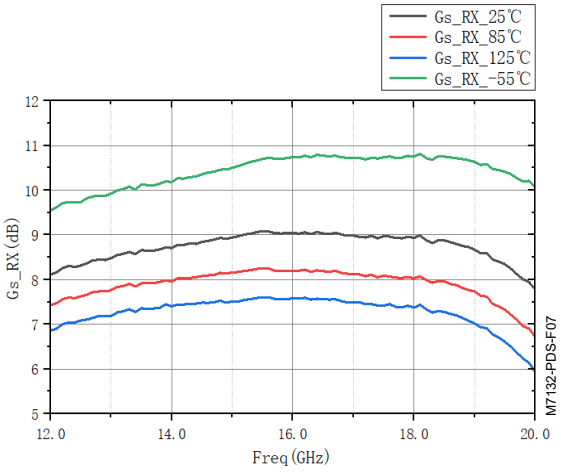


Figure 7. R_X Small-signal Gain Characteristics

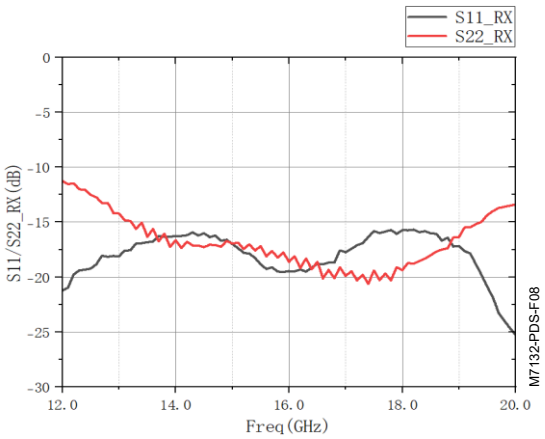


Figure 8. R_X Small-signal S11/S22 Characteristics

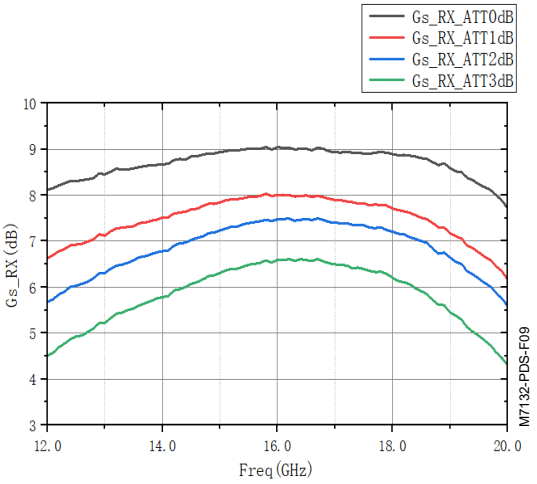


Figure 9. R_X Attenuation-State Characteristics

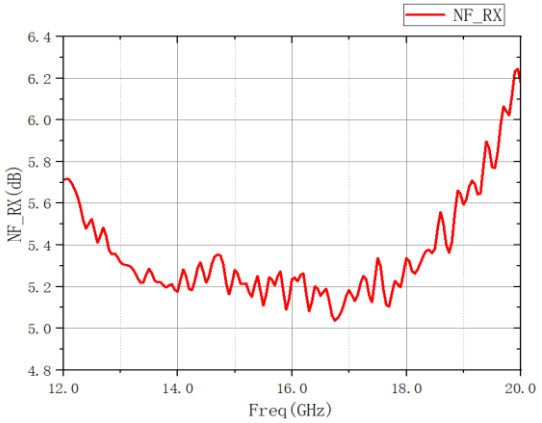


Figure 10. R_X Noise Figure Characteristics

■ Power Characteristic Curve (25℃)

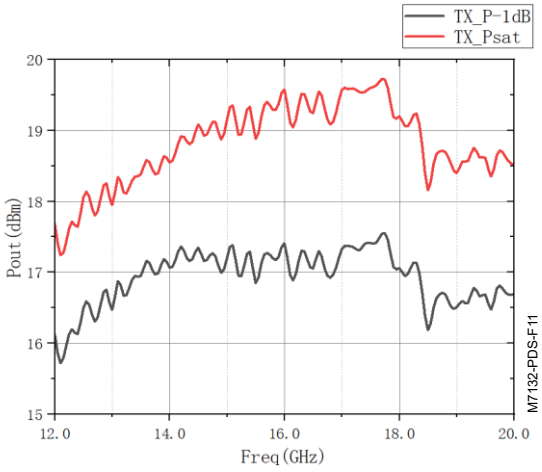


Figure 11. T_X OP_{-1dB} Characteristics

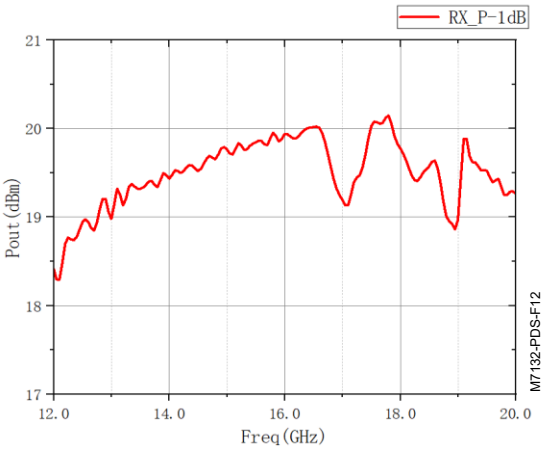
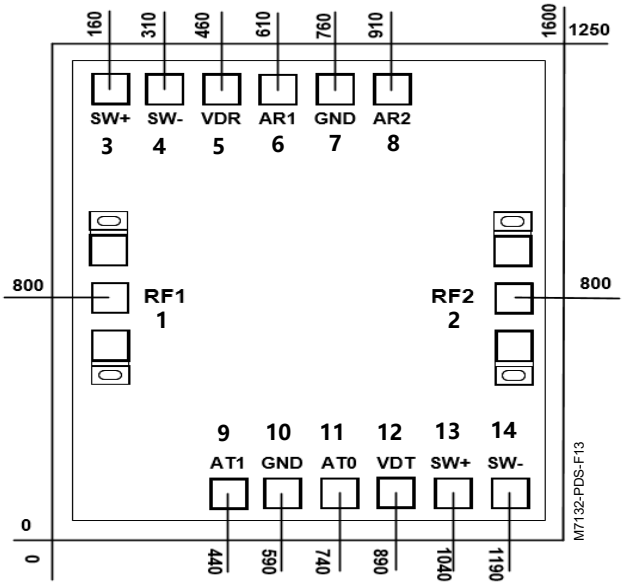


Figure 12. R_X OP_{-1dB} Characteristics

8. Outline Dimension



- Dimensions shown in micrometre

Figure 13. M7132 Outline Dimensions

Table 4. Pad Description

Pad	Symbol	Description
1	RF1	T_X Input / R_X Output
2	RF2	T_X Output / R_X Input
3/13	SW+	T_X / R_X Control Voltage (Arbitrary pad can be selected)
4/14	SW-	T_X / R_X Control Voltage (Arbitrary pad can be selected)
5	VDR	R_X Supply Voltage
12	VDT	T_X Supply Voltage
6	AR1	R_X Attenuation Bit 1dB, Enabled When Bond-wire to GND
8	AR2	R_X Attenuation Bit 2dB, Enabled When Bond-wire to GND
11	AT0	T_X Attenuation Bit 1dB, Enabled When Bond-wire to GND
9	AT1	T_X Attenuation Bit 2dB, Enabled When Bond-wire to GND
7/10	GND	Ground

Table 5. Truth Table

VDT	VDR	SW+	SW-	RF1 to RF2	RF2 to RF1
5	0	0	-5	ON	OFF
0	5	-5	0	OFF	ON

9. Assembly Information

■ Assembly Diagram

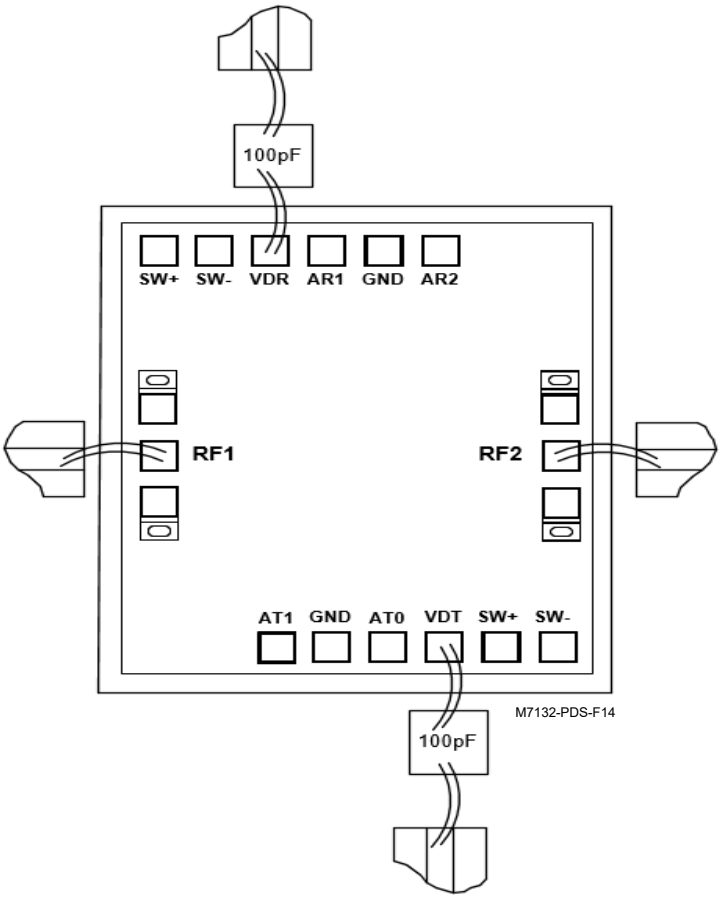


Figure 14. M7132 Assembly Diagram

- **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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