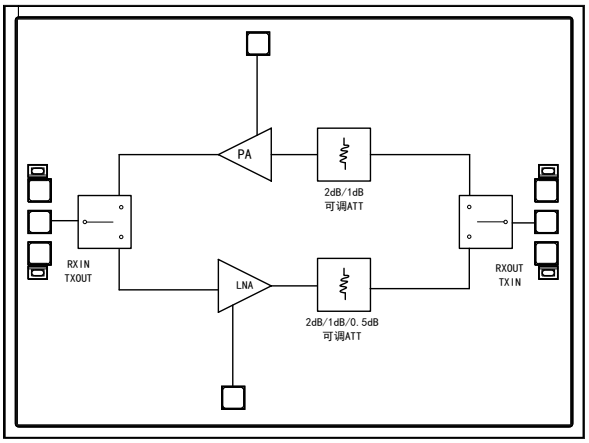
1. Description

- The M7137D is a Bi-Directional Amplifier MMIC integrated amplifier, fabricated on GaAs p-HEMT MMIC process. It operates over 10-19.5GHz, the IP-1dB of Rx is 6.5dBm with 12.5dB gain and 7dB noise figure, the Psat of Tx is 20.5dBm with 25dB gain.



M7137D-PDS-F01

Figure 1. M7137D Functional Block Diagram

2. Applications

- TX/RX Modules
- Telecommunications
- Radar
- Defense

3. Features

- Frequency Range: 10-19.5GHz
- TX Small Signal Gain: 25dB
- TX S11/S22: -13dB/-14dB
- TX Saturated Output Power: 20.5dBm
- TX Quiescent Current: 135mA
- TX Saturated Dynamic Current: 150 mA
- RX Small Signal Gain: 12.5dB
- RX S11/S22: -12dB/-15dB
- RX Noise Figure: 7dB
- RX Input P-1dB: 6.5dBm
- RX Output P-1dB: 18dBm
- RX Quiescent Current: 130mA
- Dimensions: 2.7mm x 2.0mm x 0.1mm

4. Brief Typical Performance

Table 1. Brief Typical Performance

Parameter	7-13GHz	Units
TX Small Signal Gain	25	dB
TX Saturated Output Power	20.5	dBm
TX Quiescent Current	135	mA
TX Saturated Dynamic Current (P_{IN}=0dBm)	150	mA
RX Small Signal Gain	12.5	dB
RX Noise Figure	7	dB
RX Iutput P-1dB	6.5	dBm
RX Quiescent Current	130	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
T_X / R_X Control Voltage, V1/V2	-	0/-5	-	V
R_X Supply Voltage, VR	-	5	-	V
T_X Supply Voltage, VT	-	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	24	25	26	dB
T_X S11	S11_T_X	-	-	-13	dB
T_X S22	S22_T_X	-	-	-15	dB
T_X Saturated Output Power	P_{SAT}_T_X	20	20.5	22	dBm
T_X Quiescent Current	I_{DQ}_T_X	120	135	142	mA
R_X Small Signal Gain	S21_R_X	12	12.5	13	dB
R_X S11	S11_R_X	-	-	-12	dB
R_X S22	S22_R_X	-	-	-15	dB
R_X Noise Figure	NF	-	-	7	dB
R_X Output P_{-1dB}	OP_{-1dB}_R_X	18	19	20	dBm
R_X Input P_{-1dB}	IP_{-1dB}_R_X	6.5	7.5	8.5	dB
R_X Quiescent Current	I_{DQ}_R_X	120	130	140	mA

[1]. Test condition: CW Test

7. Typical Performance Curve

■ Small-signal Characteristics Curve

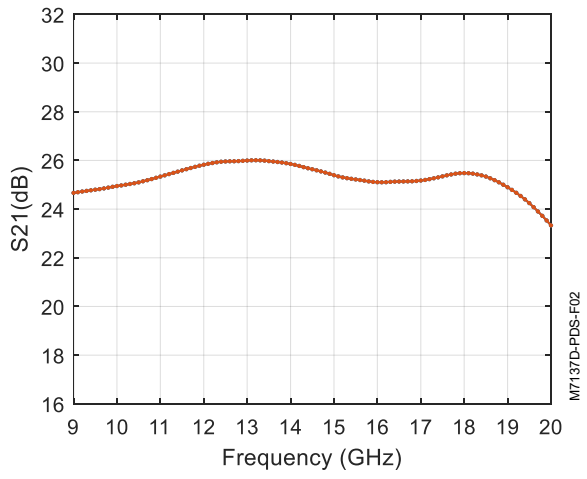


Figure 2. T_X Small-signal Gain Characteristics

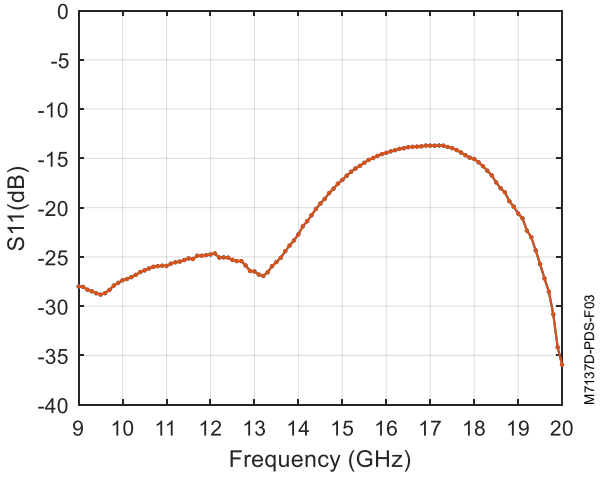


Figure 3. T_X Small-signal S11 Characteristics

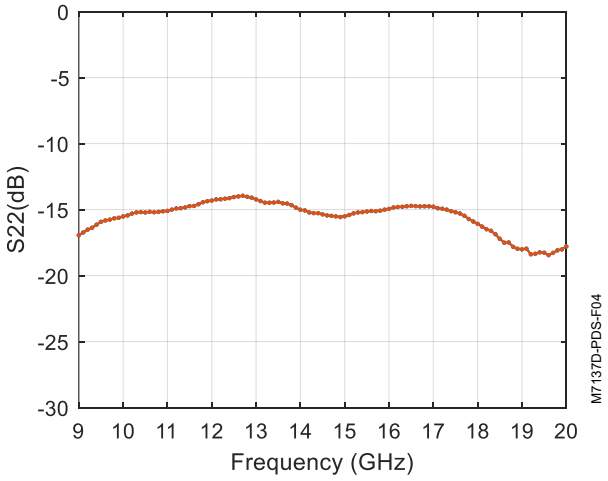


Figure 4. T_X Small-signal S22 Characteristics

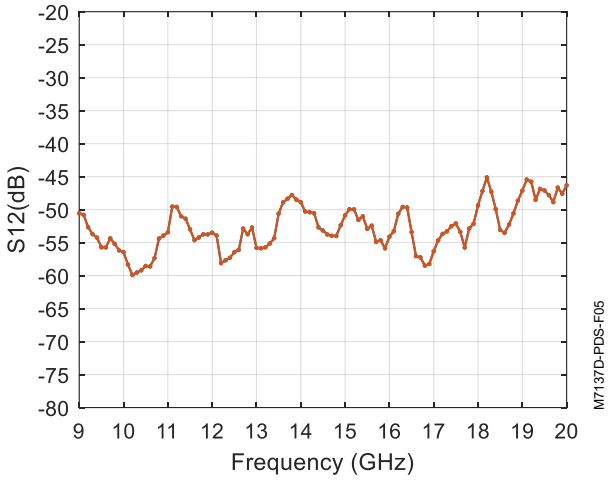


Figure 5. T_X Small-signal S12 Characteristics

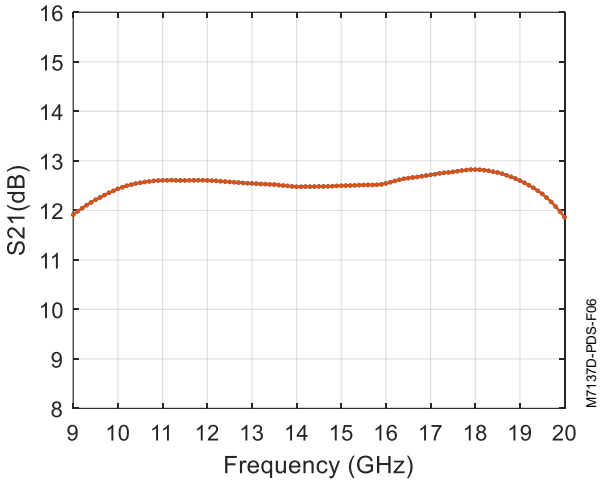


Figure 6. R_X Small-signal Gain Characteristics

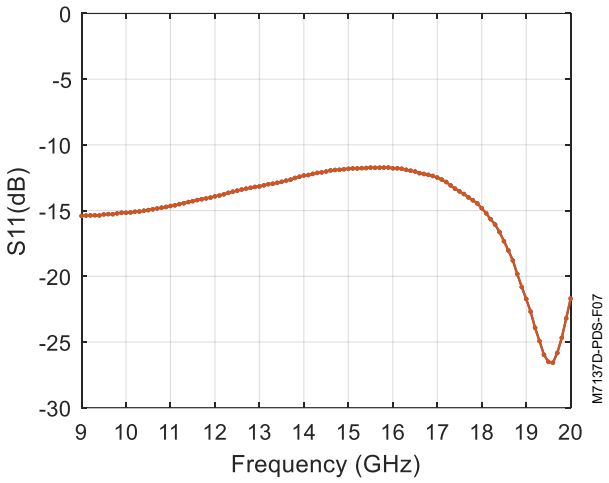


Figure 7. R_X Small-signal S11 Characteristics

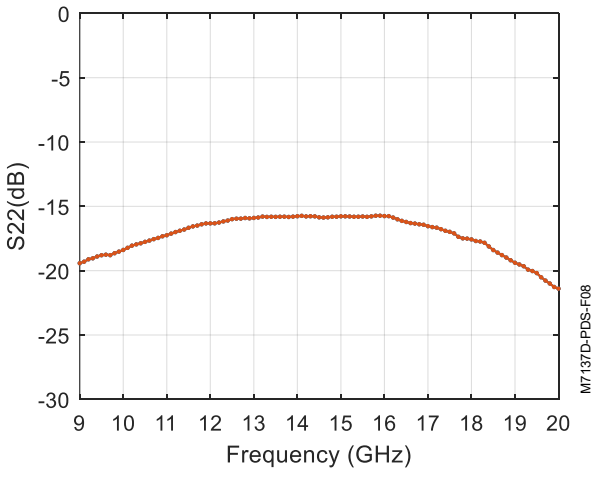


Figure 8. R_X Small-signal S22 Characteristics

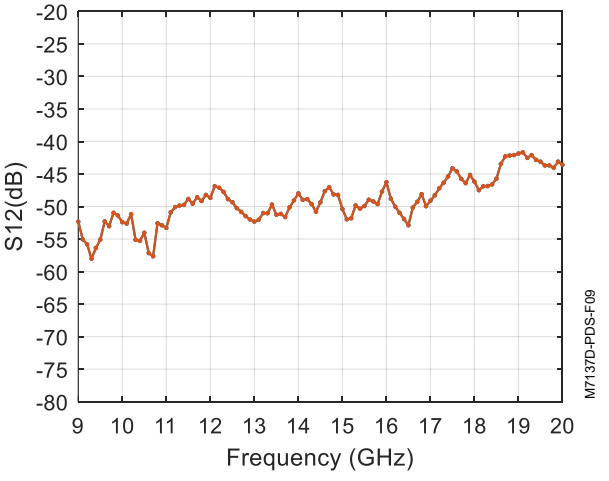


Figure 9. R_X Small-signal S12 Characteristics

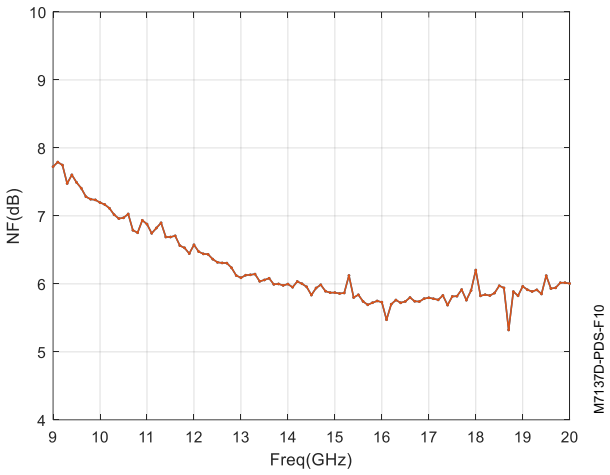


Figure 10. R_X NF Characteristics

■ Power Characteristic Curve

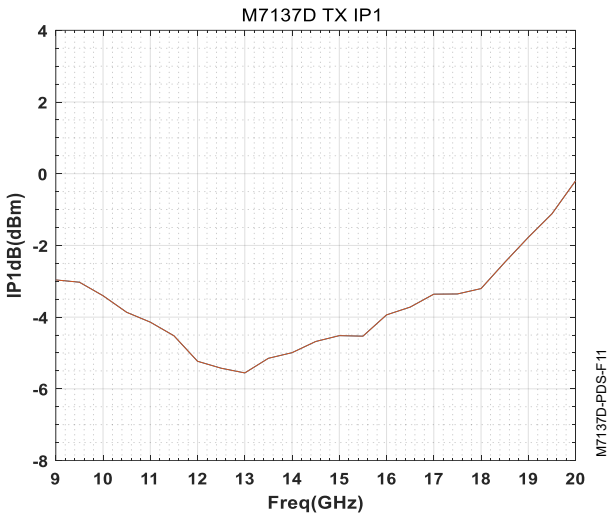


Figure 11. T_X IP-1dB Characteristics

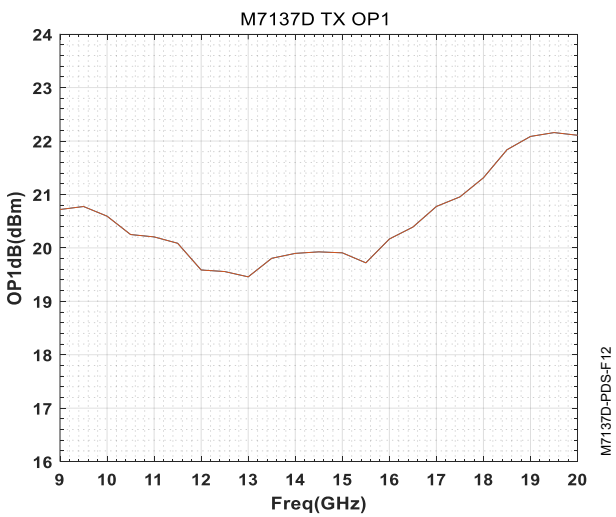


Figure 12. T_X OP-1dB Characteristics

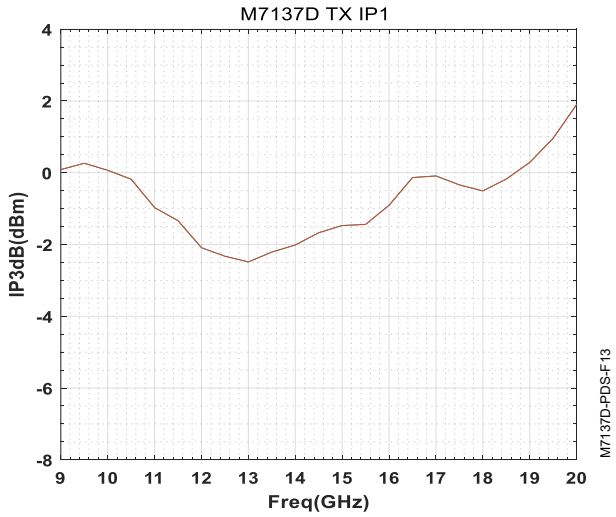


Figure 13. T_X IP-3dB Characteristics

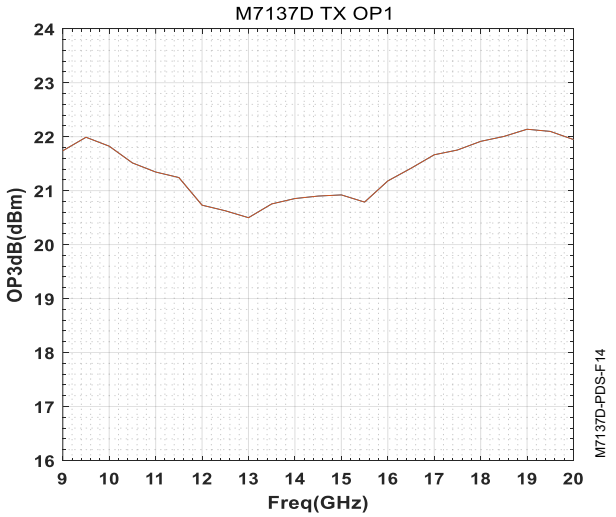


Figure 14. T_X OP-3dB Characteristics

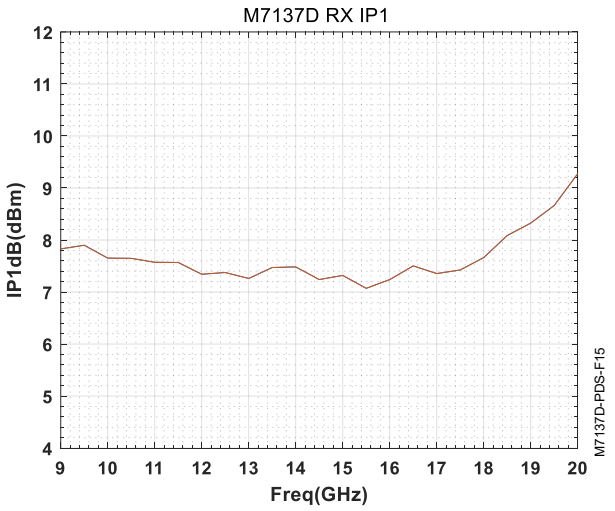


Figure 15. R_X IP_{-1dB} Characteristics

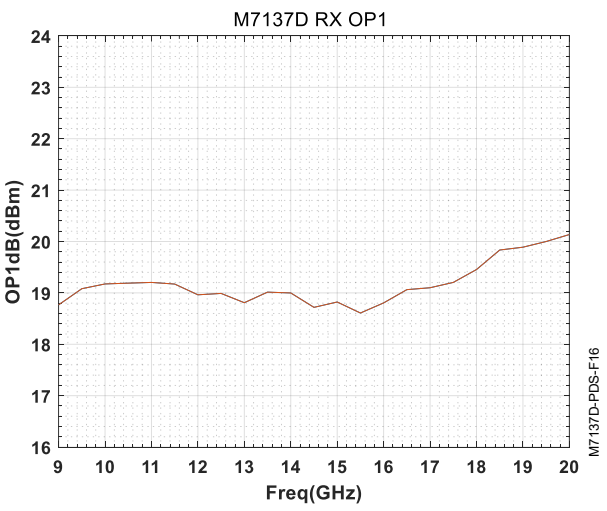
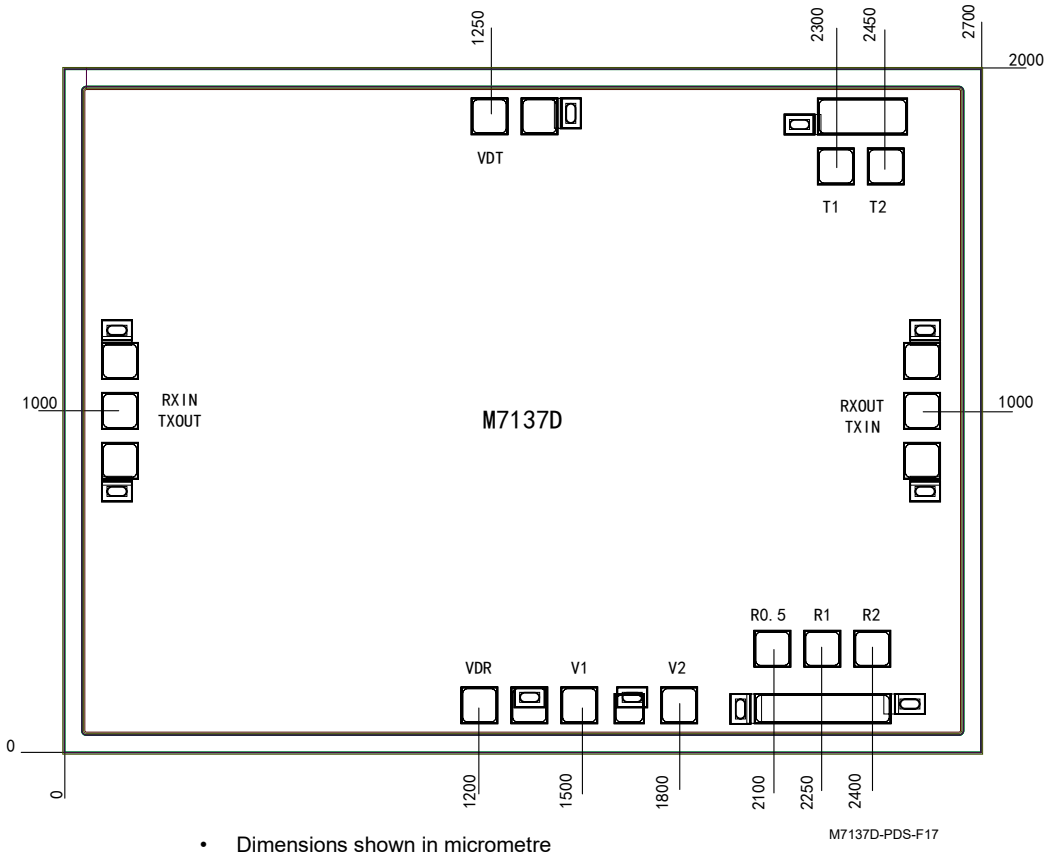


Figure 16. R_X OP_{-1dB} Characteristics

8. Outline Dimensions



- Dimensions shown in micrometre

Figure 17. M7137D Outline Dimensions

Table 4. Pad Description

Symbol	Description
TX_{IN} / RX_{OUT}	T_X Input / R_X Output
TX_{OUT} /RX_{IN}	T_X Output / R_X Input
V1/V2	T_X / R_X Control Voltage
R0.5	Attenuation Bit 0.5dB, Enabled When Bond-wire to GND
R1/T1	Attenuation Bit 1dB, Enabled When Bond-wire to GND
R2/T2	Attenuation Bit 2dB, Enabled When Bond-wire to GND
VDT	T_X Supply Voltage
VDR	R_X Supply Voltage

Table 5. Truth Table

V1	V2	VDT	VDR	Channel Selection
-5V	0	5V	0	T_X Channel
0	-5V	0	5V	R_X Channel

9. Assembly Information

■ Assembly Diagram

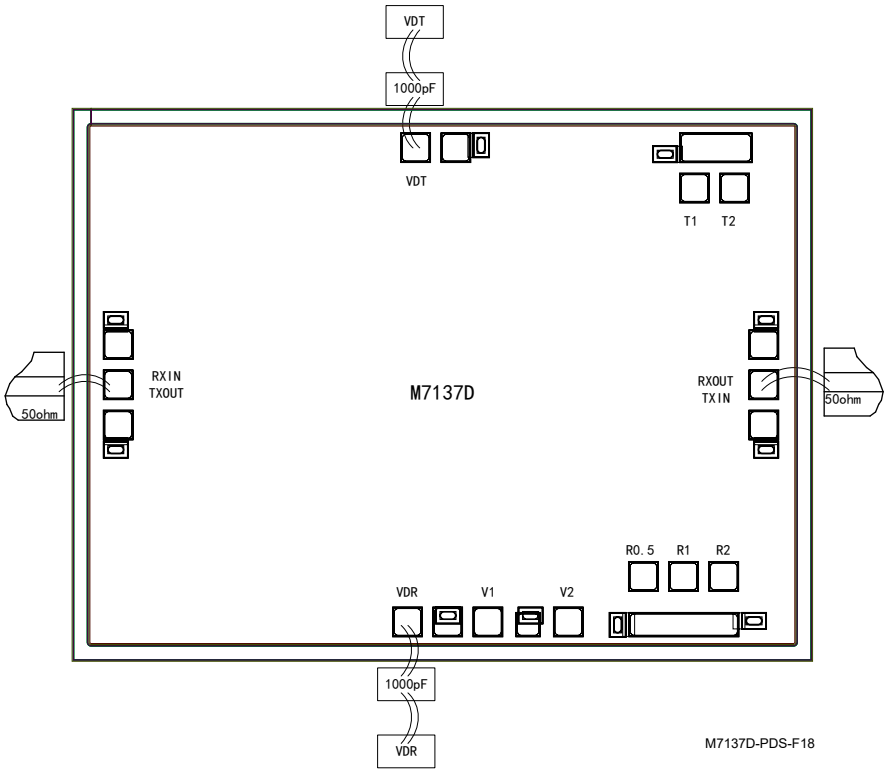


Figure 18. M7137D Assembly Diagram

- **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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