RF and Microwave Power Technology

BATTLE BORN AMPLIFIERS™

RFM1.5-30-30-HSD

1.5-30MHz 30W Class A High Performance Amplifier with High Speed Disable

- **Class A 30W linear amplifier**
- **High speed output disable, <1µsec**
- **VVA with over 30dB range**
- **Analog temperature out**
- **High temperature alarm**
- **Temperature compensated bias**
- **Available with input limiter and/or heatsink and fan**

Representative image.

The RFM1.5-30-30-HSD is a 30W Class A high performance amplifier module, outstanding as a driver stage in military communication or radar systems. It features output stage bias disable control as fast as <1µsec. It exhibits excellent full power and back-off linearity, superior gain flatness, and utilizes conservatively rated LDMOS transistors for maximum reliability.

Specifications

V_{sup} = +28VDC, I_{DQ} = 4.25A, P_{out} = 30W, T_{base} = 35°C, Z_{load} = 50Ω

Parameter	Min	Typ	Max	Units
Freq. Range	1.5		30	MHz
P_{1dB} See Fig. 4 for SOA	45	See Figure 4		W
Input Power		-2	1	dBm
Gain	44	47		dB
Gain Flatness		+/-0.2	+/-0.5	dB
Drain Current		4.4	4.8	A
Efficiency	22	24		%
IRL		-30	-14	dB
f_2		-46	-28	dBc
f_3		-33	-25	dBc
IMD_3 30W PEP, Δf=10kHz and Δf=100kHz		-43	-35	dBc
Dimensions	3.32 X 7.00 X 1.60 (84.3 X 177.8 X 40.6)			inch (mm)

Maximum Ratings

Operation beyond these ratings may damage amplifier.

Parameter	Value
V_{supply}	24-28VDC
Bias Current	4.25A
Drain Current	5.0A
Load Mismatch*	5:1
Housing Base Temperature	65°C
Storage Temp.	-40°C to 85°C

*All phase angles, 30W forward power, current limited to 5.0A for 5 seconds max.

Option Ordering Info

Input limiter	RFM1.5-30-30-HSD-LIM
Heatsink and fan	RFM1.5-30-30-HSD-HSF

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MADE IN AMERICA

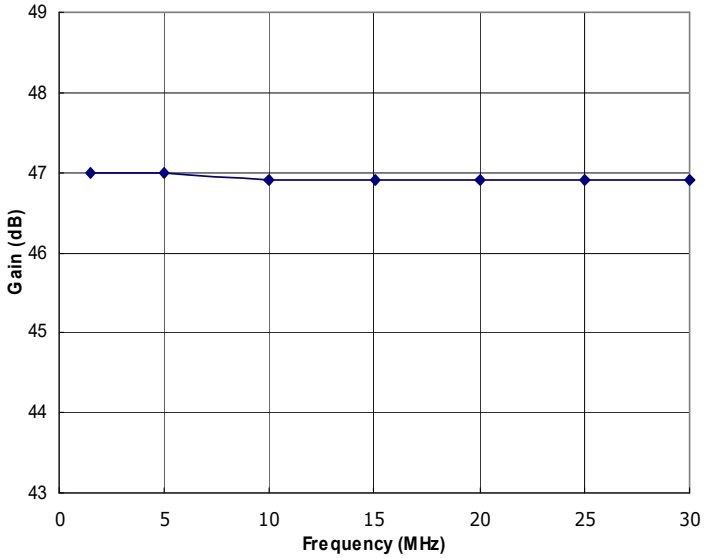


Figure 1: RFM1.5-30-30-HSD Typical Gain @ P_{out} = 30W.

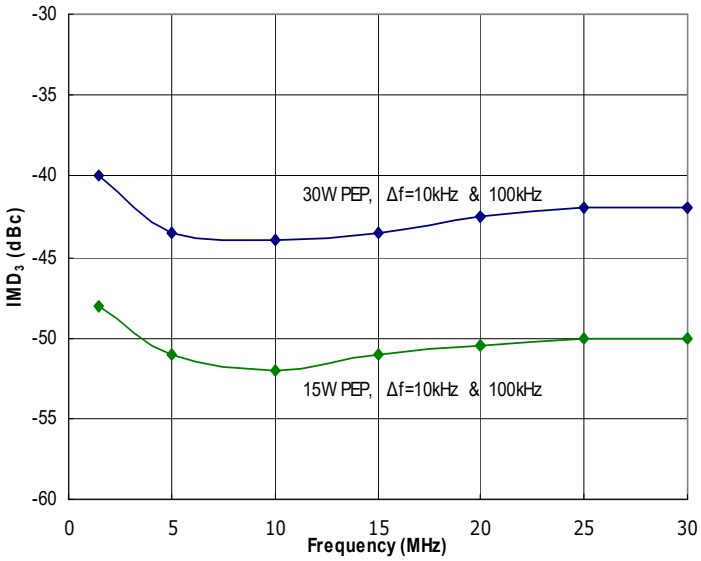


Figure 2: RFM1.5-30-30-HSD Typical IMD_3 @ 30W and 15W PEP, Δf=10kHz and Δf=100kHz.

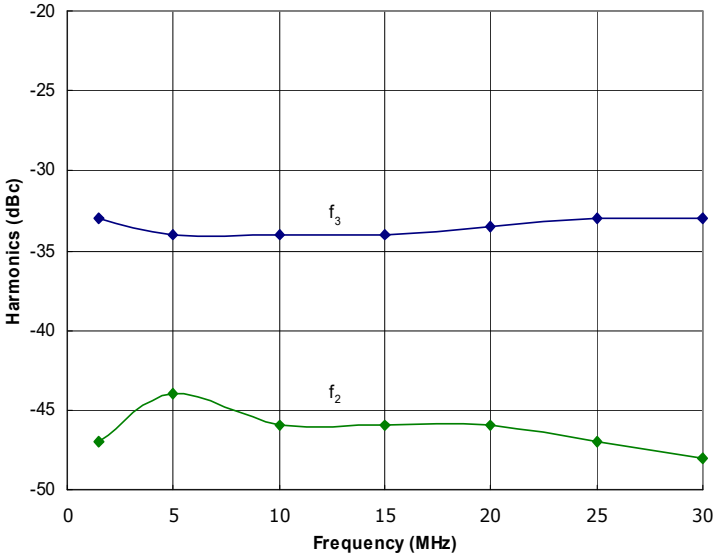


Figure 3: RFM1.5-30-30-HSD Typical f_2 and f_3 @ P_{out} = 30W.

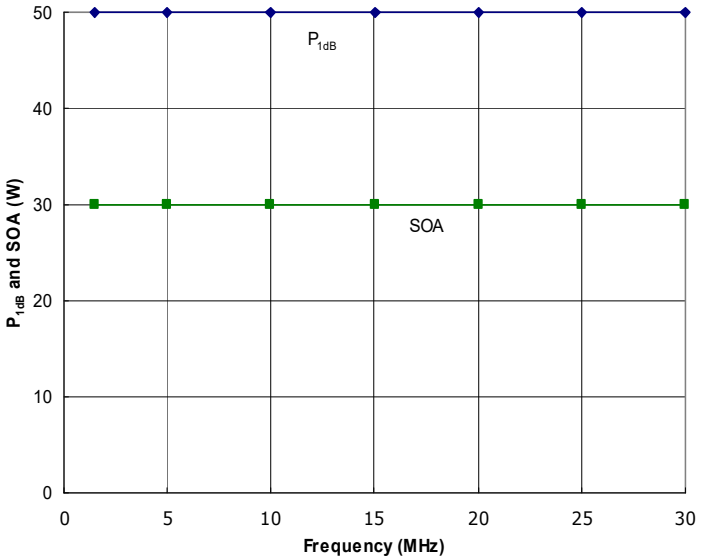
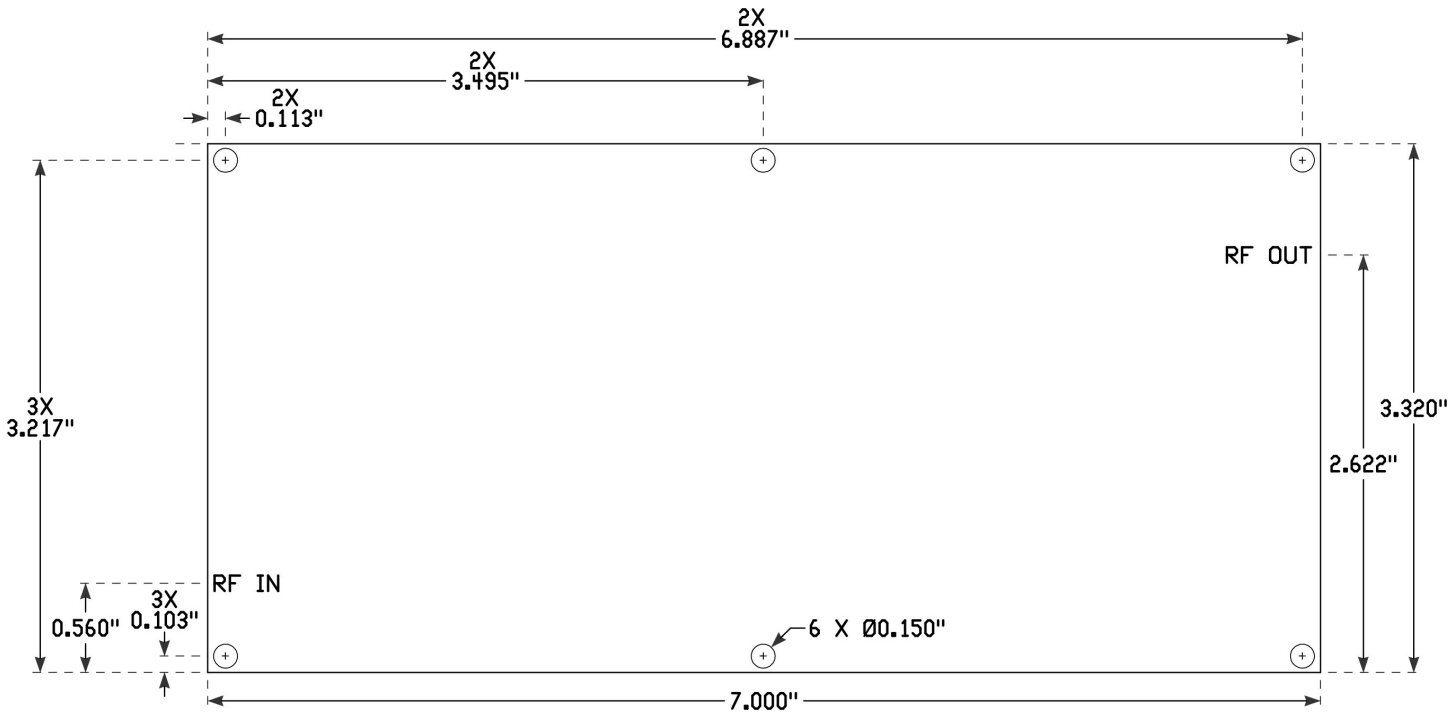


Figure 4: RFM1.5-30-30-HSD Typical P_{1dB} and Safe Operating Area (SOA). The amplifier is capable of delivering much more power than it is safe to generate. Do not exceed the SOA shown above without first contacting RFMPT to discuss your application.

Amplifier Mounting Hole and RF Locations



Interface Pins and Functions

1: VVA The voltage variable attenuator has a slope of approximately 13dB/volt, from 1.4 to 3.6VDC. Maximum attenuation is reached by 4.4VDC. The acceptable control range is 0 to 5.0VDC. Do not exceed 5.0VDC on this pin. The VVA control voltage should be set to zero volts during amplifier power up and power down. Maximum RF input power is +1dBm, without the limiter option. Do not exceed the SOA in Figure 4, with or without the limiter option.

2: Temp Alarm This indicates an over-temperature condition, and is set to trip at a housing base temperature of approximately +65°C. It is an open drain output, pulled up internally to +15VDC, and will pull down to 0V at +65°C. The end user may either scale this range to suitable voltages with a simple resistive divider, or use an analog or digital input capable of handling +15VDC. This signal exhibits 5°C of hysteresis, and will reset to +15VDC at approximately +60°C.

3: Output Disable This is active high at +5VDC. It disables the bias of *only* the output stage of the amplifier, and will reduce full rated output power to near zero* in less than 1µsec. When set to 0VDC, the amplifier will return to full power in approximately 95µsec.

* Due to feedback paths around the output transistor, there will be a miniscule amount of RF still present at the output even when the output stage bias has been disabled. For additional RF quieting, the VVA may be set to maximum attenuation simultaneously with the Output Disable signal.

4: GND Amplifier ground. Connect to power supply return/ground. Use in parallel with pin #8. A minimum of 20 gauge wire is recommended.

5: +28VDC Nominal supply voltage is +28VDC. As low as +24VDC may be used, with a reduction in P_{1dB} and linearity. Use in parallel with pin #9. A minimum of 20 gauge wire is recommended.

6: Temp Out This is an analog signal that is a nominal +0.75VDC at 25°C. It has a positive slope of 10mV/°C with increasing temperature. However, a temperature gradient and an offset will exist between the temperature reported on this pin and the actual housing base temperature directly under the output transistor. It is up to the end user to properly characterize this signal's response with their chosen cooling configuration.

7: N/C (Old MMIC Disable) The previous version of this amplifier incorporated a MMIC, which is not used in this amplifier, due to the much higher gain of the new LDMOS transistors. Provisions for a MMIC and MMIC disable exist on the PCB, and the amplifier can be configured with them. Contact RFMPT for details.

8: GND Amplifier ground. Connect to power supply return/ground. Use in parallel with pin #4. A minimum of 20 gauge wire is recommended.

9: +28VDC Nominal supply voltage is +28VDC. As low as +24VDC may be used, with a reduction in P_{1dB} and linearity. Use in parallel with pin #5. A minimum of 20 gauge wire is recommended.

Limiter Option

The limiter option significantly impacts amplifier linearity. Please contact RFMPT to learn more.

Instructions for Amplifier Use

1) If not supplied with a heatsink, apply a layer of high quality thermal grease (Wakefield Type 120 or equivalent) to the underside of the amplifier housing. Thinner is better, but ensure that when mounted to your heatsink, contact across the *entire* module base is made. Gaps and air bubbles will significantly reduce cooling, leading to possible amplifier damage. Use six #6-32 screws to mount the amplifier to your heatsink.
2) Guarantee sufficient airflow through the heatsink fins to keep the maximum housing base temperature at or less than that specified in the Maximum Ratings section. Contact RFMPT for details on how to qualify your heatsink's performance, if needed.
3) Connect a proper signal source to the RF IN connector, and desired load to the RF OUT connector. Torque connectors to industry standards for the type supplied with the amplifier.
4) Connect DC V_{supply} to pins 5 and 9 of the interface connector. Connect power supply return/ground to pins 4 and 8 of the interface connector. Ensure that V_{supply} is within the voltage range in the Maximum Ratings section.
5) Apply desired signals/monitoring lines to remainder of interface pins. Refer to the Interface Pins and Functions section for signal descriptions, limits, and timing requirements.
6) Apply DC power and sufficient RF drive to achieve desired output level. Ensure that the Safe Operating Area (SOA) power level indicated in Figure 4 is not exceeded, or amplifier damage may occur, and will void the warranty.
7) To disconnect the amplifier, first remove the RF drive, then DC power, then the RF connections.

Contact the factory at sales@rfmpt.com with any questions, or for special options, testing requirements, and/or operating conditions not specified in this document.

Document Control

Revision	Date	Notes
A	8-25-2022	Initial release.