VRFA0078-BD

4-8GHz GaAs MMIC Low Noise Amplifier

Datasheet v1

Features

- Frequency Range: 4 to 8 GHz
- Single supply 3V
- 1.2dB Noise Figure Typical
- 22dB small signal gain
- 50Ω matched RF ports
- Die size: 2.0 mm x 1.6 mm x 0.1mm



Description

The VRFA0078-BD is a low noise amplifier MMIC which operates over the frequency range of 4GHz to 7GHz. The device demonstrates a typical noise figure of 0.9dB with small signal gain of 22dB across the frequency band. VRFA0078-BD is biased from a +3V DC supply and the current can be set between 80 mA and 100 mA through optional connection of the transistor sources to ground, in order to adjust the desired gain and compression response. The RF ports are DC blocked and matched to 50Ω. Typical applications for the VRFA0078-BD include Electronic Warfare (EW), C Band Radar, Space, Satellite Communications (Satcom), and Phased Arrays.

Electrical Specifications

Parameter	Specification			Unit
	Min.	Typical	Max.	
Frequency Bandwidth		4-8		GHz
Small Signal Gain	21	22	24	dB
Noise Figure	-	1.2	1.3	dB
I/P Return Loss	-	-7	-6	dB
O/P return Loss	-	-12	-7	dB
P1dB Output Power	-	11	-	dBm

The bias current may be set by optionally wirebonding Sources 1 / 2 / 3 to Ground.

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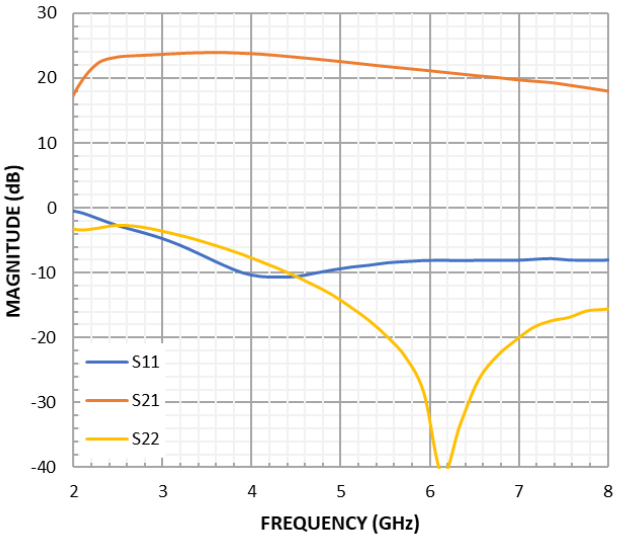
Measured Performance

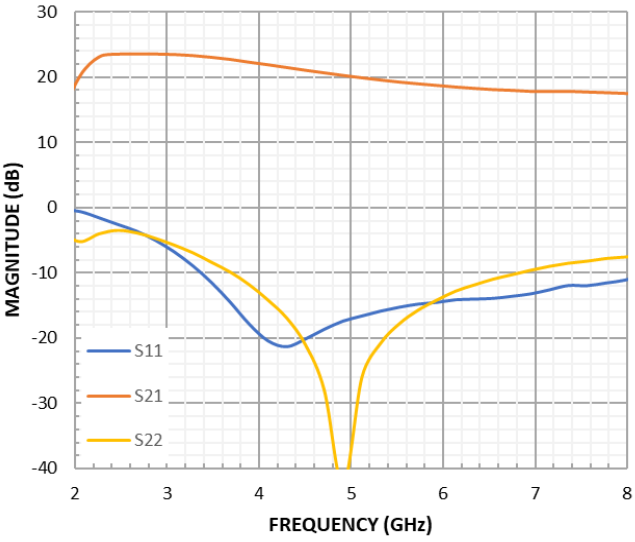
T=+25°C baseplate. The bias current may be changed by optionally connecting Sources 1 / 2 / 3 to Ground.

S-Parameters VRFA0078-BD



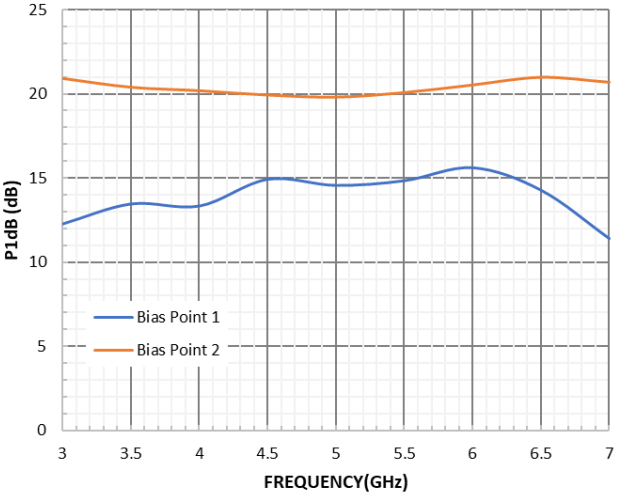
Bias Conditions:
VD=3V, ID=83mA

S-Parameters VRFA0078-BD



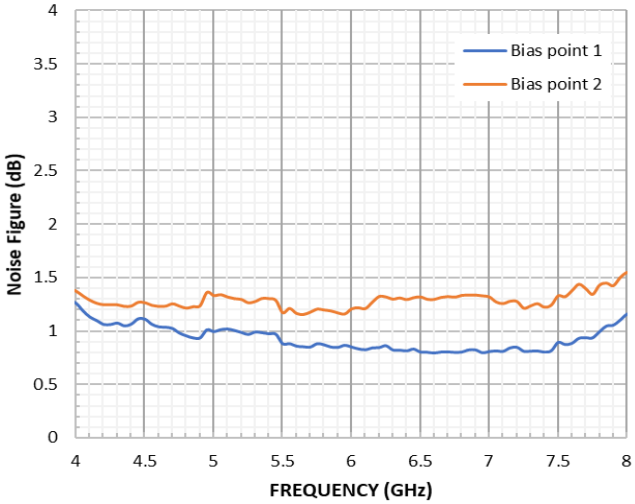
Bias Conditions:
VD=8V, ID=91mA

P1dB VRFA0078-BD



Bias Conditions:
Bias point 1: VD = 3V ID = 83mA
Bias point 2: VD = 8V ID = 91mA

Noise Figure VRFA0078-BD



Bias Conditions:
Bias point 1: VD = 3V ID = 84mA
Bias Point 2: VD = 8V ID = 91mA

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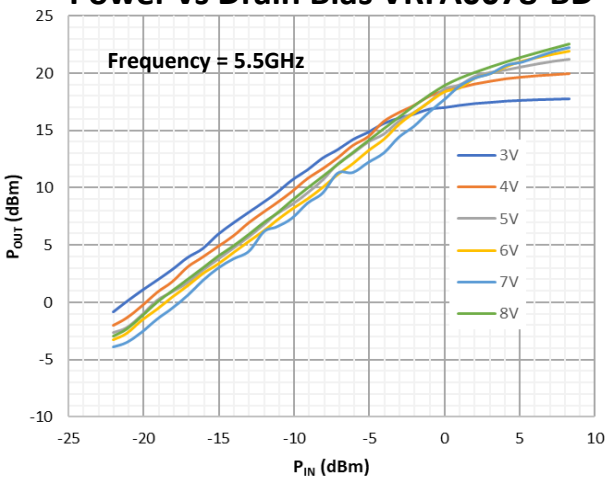
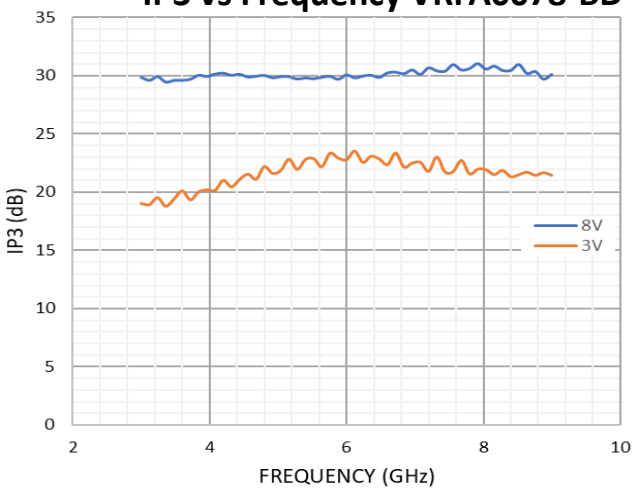
Measured Performance vs Drain Bias

T=+25°C baseplate. The bias current may be changed by optionally connecting Sources 1 / 2 / 3 to Ground.

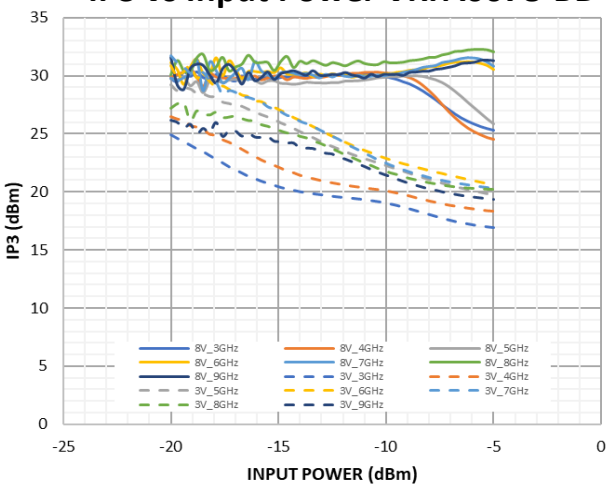
Power vs Drain Bias VRFA0078-BD



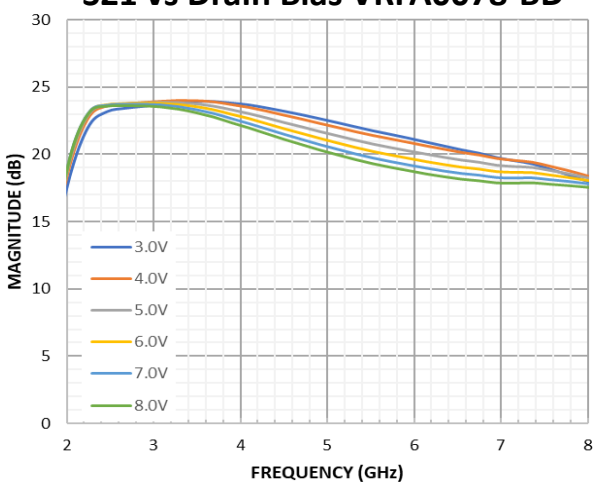
IP3 vs Frequency VRFA0078-BD



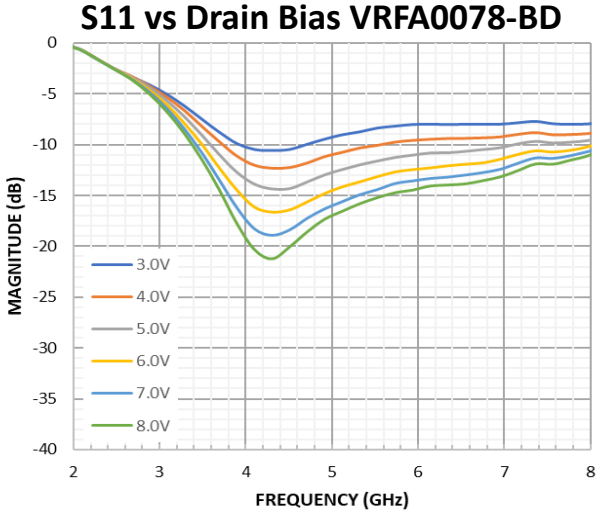
IP3 vs Input Power VRFA0078-BD



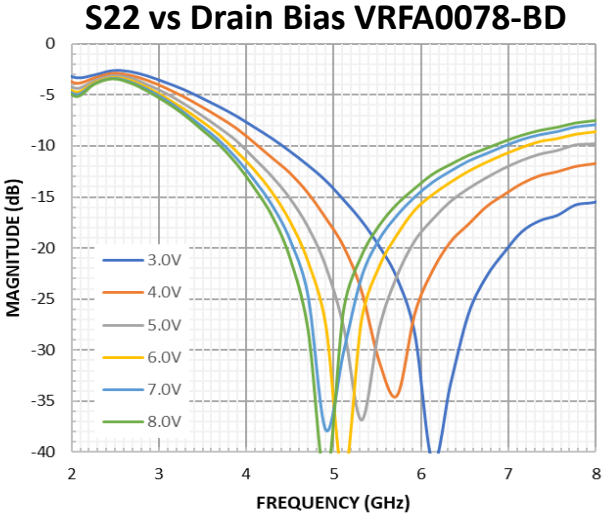
S21 vs Drain Bias VRFA0078-BD



S11 vs Drain Bias VRFA0078-BD



S22 vs Drain Bias VRFA0078-BD



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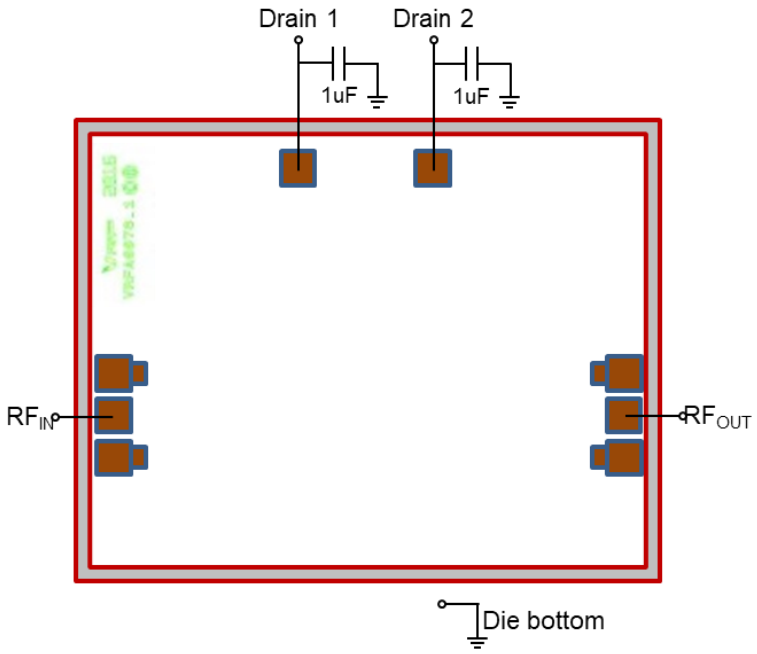
Assembly & Bonding Diagram



PAD	CONNECTION
Vd1, Vd2	Device is self-biased
Die bottom	GND

Die Size	2.0mm x 1.6mm
Die Thickness	100µm
Minimum Bondpad opening	100µm x 100µm

Minimal length (0.15nH) are recommended for RF bond wires. The RF input and output ports are DC blocked.

GaAs devices are ESD sensitive and precautions should be observed during storage, handling, assembly and testing.



Recommended Absolute Maximum Ratings [1]

Parameter	Symbol	Value	Notes
Drain Bias Voltage	V_d	+8V	
Junction Temperature	T_j	175°C	For maximum median device lifetime, T_j should be minimised
Storage Temperature	$T_{storage}$	-55 to 150°C	

[1] Operation outside these conditions may cause permanent damage to the device. Combination of maximum rating conditions may reduce the values. Device performance at these ratings is not implied.