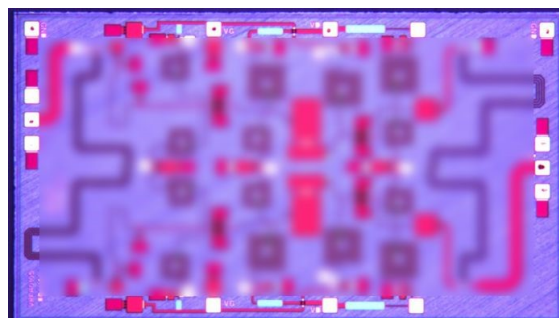


Robust 5-18GHz GaN HEMT Low-Noise Amplifier MMIC

Datasheet v1

Features

- Integrated balanced low noise amplifier
- Frequency range: 5GHz to 18GHz
- 50Ω matched RF ports
- Typical 4dB Noise figure
- 12dB small signal gain
- Die size: 3.5mm x 2mm x 0.1mm



Description

The VRFA0105-BD is a low noise amplifier MMIC which operates over the frequency range of 5GHz to 18GHz. The return loss is greater than 10dB with a typical gain of 12dB across the same band with a typical noise figure of 4dB. VRFA0105-BD exhibits a P1dB greater than 10dBm and a saturated output power limited to 15dBm up to input powers of 36dBm. The RF ports are DC blocked and matched to 50Ω. VRFA0105-BD is supplied as a Known Good Die as standard. Typical applications for the VRFA0105-BD include point to point radios, VSAT, radar and test & instrumentation.

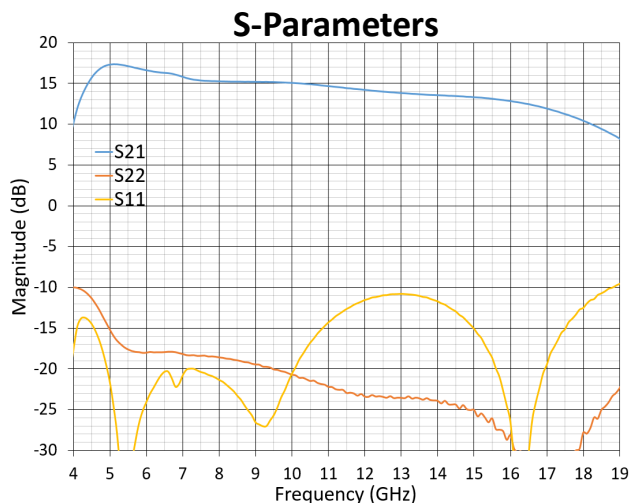
Electrical Specifications

Parameter	Specification				Unit
	Conditions	Min	Typical	Max	
Operating Frequency Range	-	-	5 - 18	-	GHz
Linear Gain	-	8	12	-	dB
Return Loss @ RF IN port	Linear Region	10	15	-	dB
Return Loss @ RF OUT port	Linear Region	10	15	-	dB
Noise Figure	Linear Region	-	4	7	dB
Output Power	1dB compression	10	-	-	dBm
Output Power Leakage	Pin ≤36dBm	-	-	15	dBm
Drain Supply Voltage	-	-	12	-	V
Gate Supply Voltage	-	-	-2	-	V
Gate Supply Current	Pin ≤36dBm	-	-	10	mA
Total DC Power Consumption	Linear Region	-	-	2.5	W
Total DC Power Consumption	Pin ≤36dBm	-	-	4	W
Settling Time, t _{on} , t _{off} , from 50% Ctrl to 90% RF steady state (control applied on VG pad)	Id = 50mA min Linear Region	T _{off} = 25ns typ. T _{on} = 70ns typ.			ns

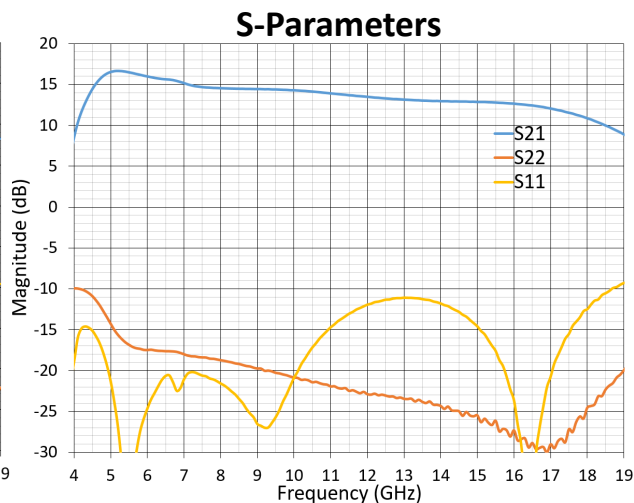
Robust 5-18GHz GaN HEMT Low-Noise Amplifier MMIC

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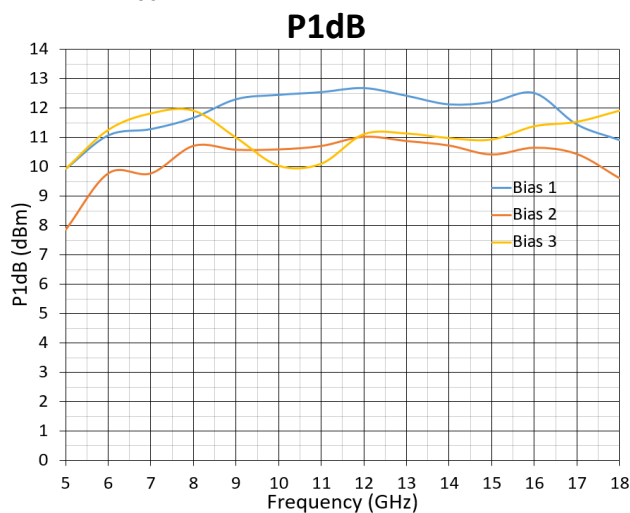
Measured Performance



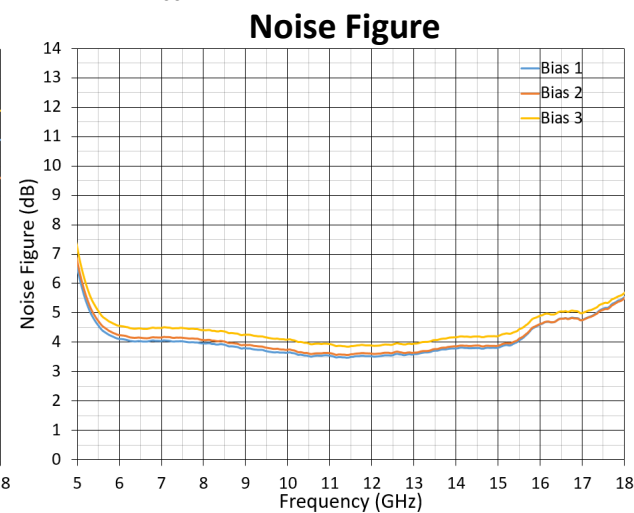
Bias Conditions:
VD=12V ID=90mA



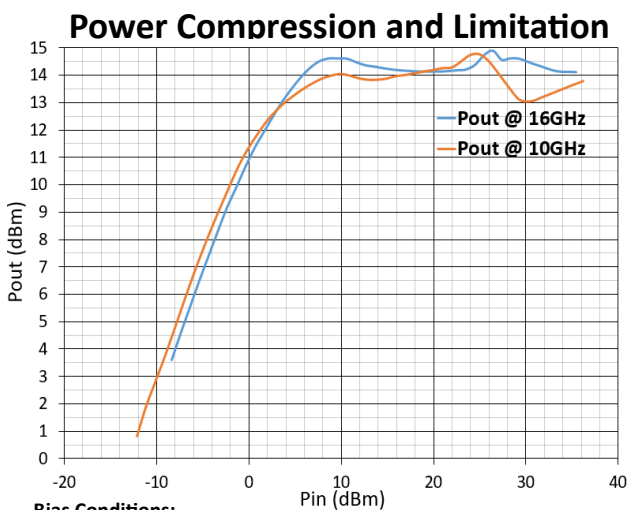
Bias Conditions:
VD=12V ID=60mA



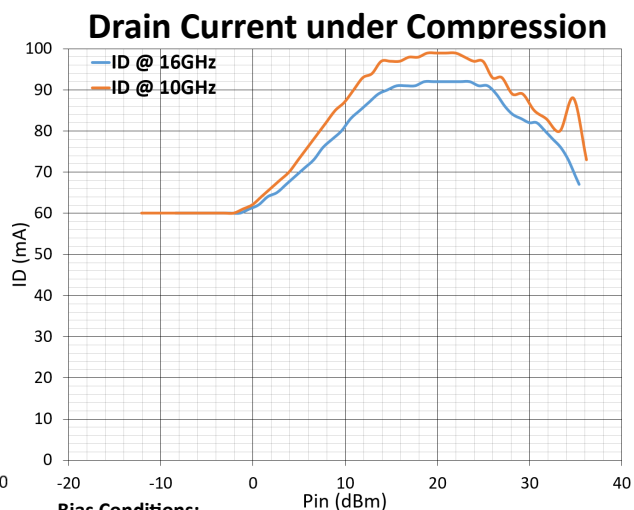
Bias Conditions:
Bias 1: VD=12V ID=90mA Bias 3: VD=12V ID=43mA
Bias 2: VD=12V ID=60mA



Bias Conditions:
Bias 1: VD=12V ID=62mA Bias 3: VD=12V ID=31mA
Bias 2: VD=12V ID=46mA



Bias Conditions:
VD= 12V ID= 60mA

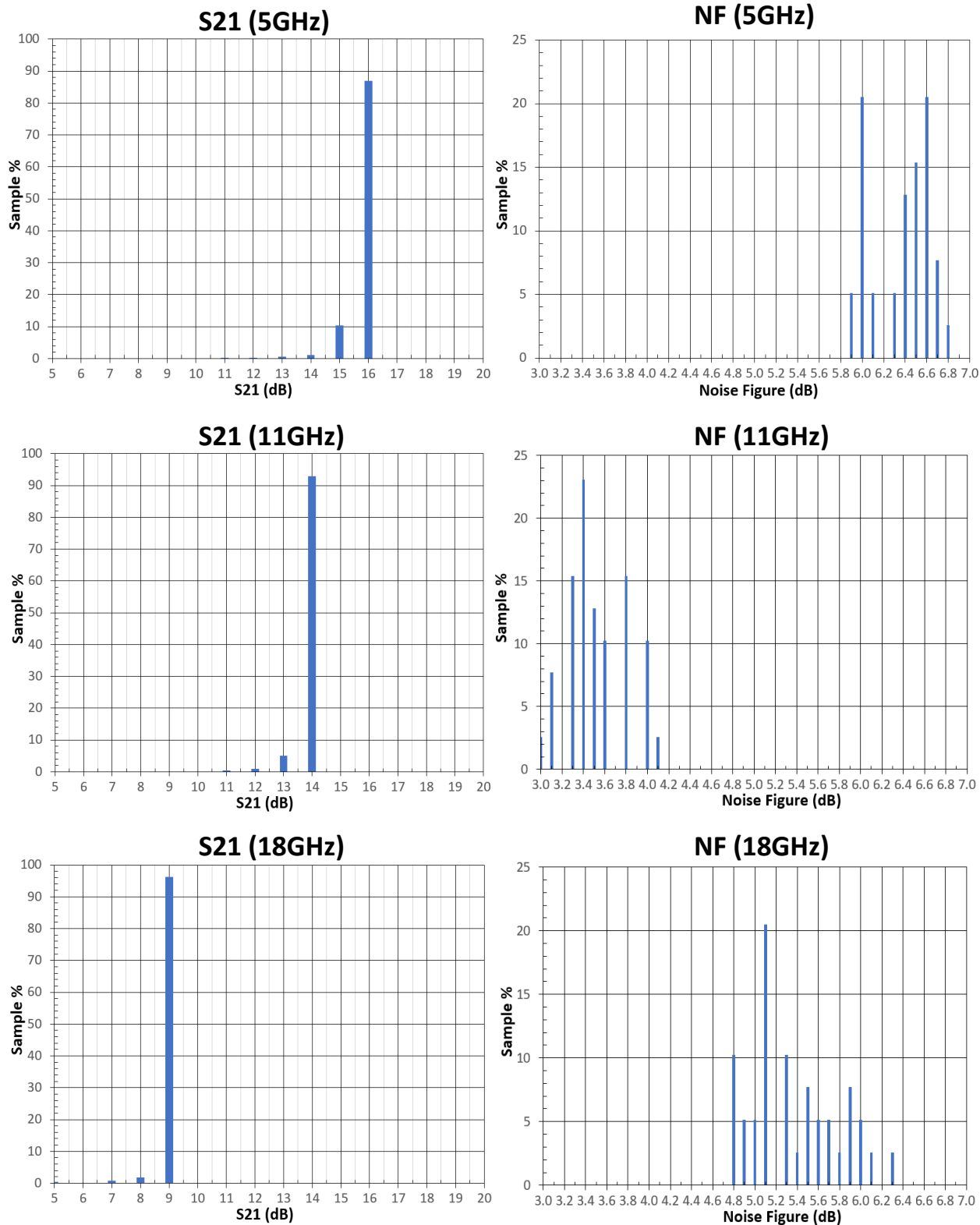


Bias Conditions:
VD= 12V ID= 60mA

Robust 5-18GHz GaN HEMT Low-Noise Amplifier MMIC

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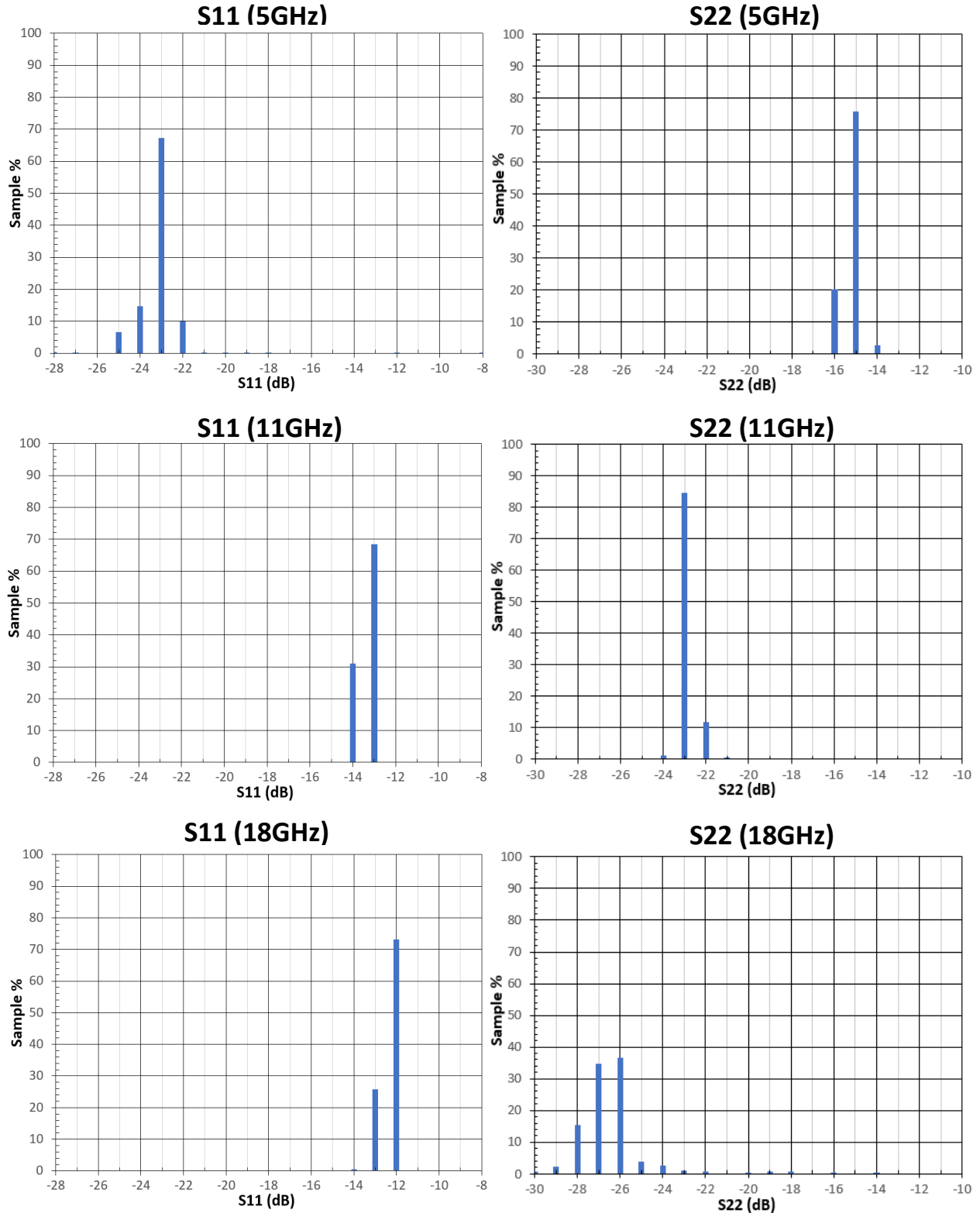
Production Test Data



Robust 5-18GHz GaN HEMT Low-Noise Amplifier MMIC

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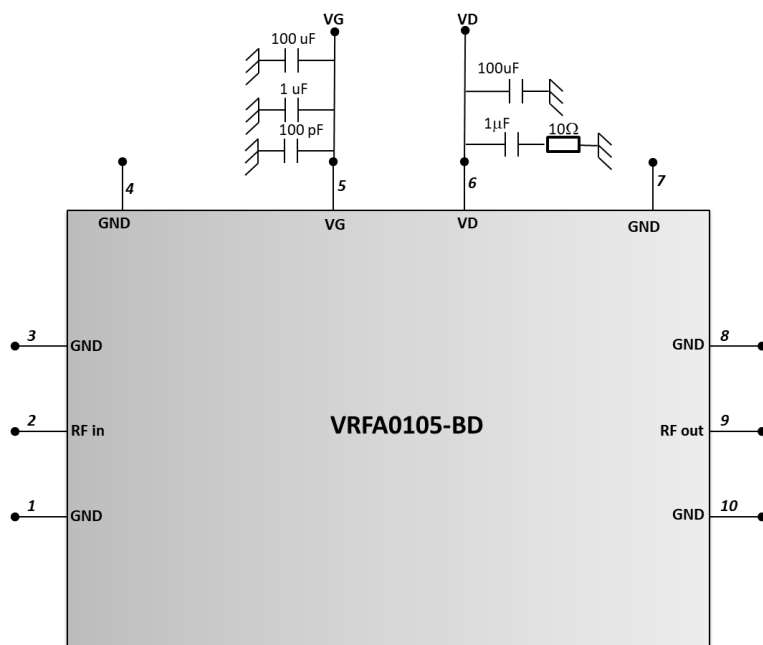
Production Test Data



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Recommended Application Circuit - Bias Circuits



Pad	Function	Comment
1	RF Probe GND	No connection required
2	RF in	DC blocked
3	RF Probe GND	No connection required
4	DC GND	No connection required
5	VG	Typical: -2V
6	VD	Typical: 12V @ 60mA
7	DC GND	No connection required
8	RF Probe GND	No connection required
9	RF out	DC blocked
10	RF Probe GND	No connection required

Notes:

- Bias filtering may be amended depending on customer module environment. Please consult the factory if changes are required.

Specific Biasing Requirements

- Nominal bias is obtained by first applying a gate voltage of -2V, followed by a drain voltage of 12V (Note sequence). Minor adjustment of the gate voltage may be necessary to obtain the required quiescent drain current, depending on the desired gain / noise figure / compression characteristic.
- Sequence for turning off the device is first disabling the drain voltage, followed by the gate voltage.

Robust 5-18GHz GaN HEMT Low-Noise Amplifier MMIC

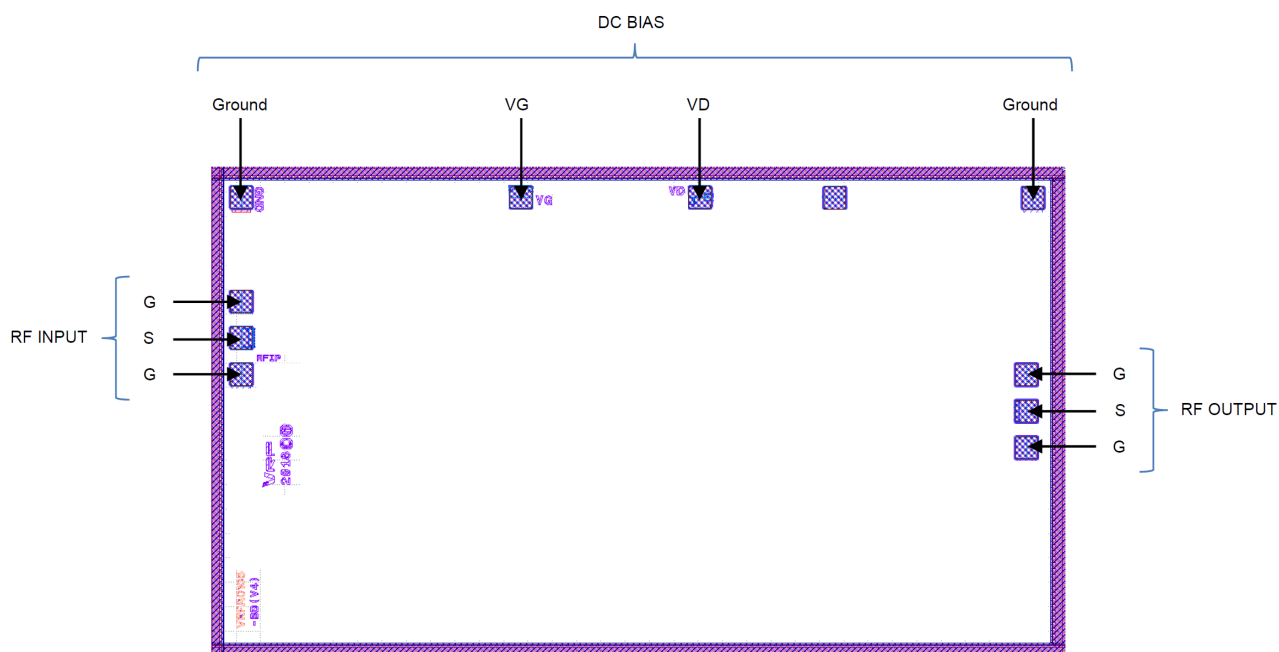
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Recommended Absolute Maximum Ratings ^[1]

Parameter	Symbol	Value	Notes
Drain Bias Voltage	V_d	18V	
Gate Current	I_g	10mA	
RF input power	RF_{in}	36dBm	
Junction Temperature	T_j	225 °C	
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.

Die and Pad Out Overview:



Die Size	3.5mm x 2mm
Die Thickness	100um
Minimum Bondpad opening	91um x 91um

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

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

