Preliminary

GRF2806

Guerrilla Bloc™ LNA
0.7 – 0.96 GHz

Features

Reference: 3.3V/15 mA/0.9 GHz

- Gain: 20.0 dB
- Module NF: 1.2 dB
- OP1dB: 13.5 dBm

- Flexible Bias Voltage and Current
- Fully Integrated (50 Ω)
- Process: GaAs pHEMT

Applications

- Small Cells and Cellular Repeaters
- Distributed Antenna Systems
- ISM and WLAN
- General Purpose Low Noise Applications

Product Description

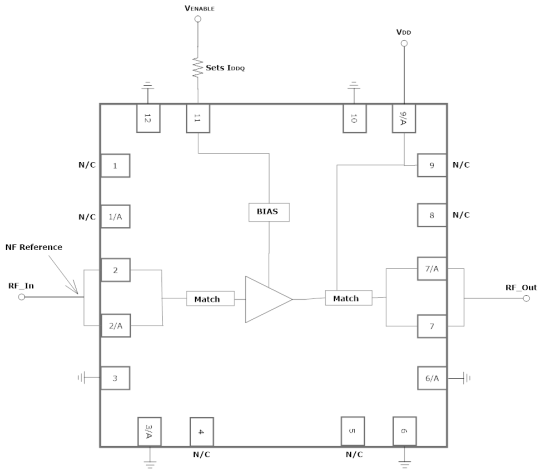
GRF2806 is a fully integrated amplifier offering low noise and high gain over 0.7 to 0.96 GHz with no external matching or bias de-coupling required. Flexible biasing allows the module linearity and efficiency to be optimized as required by a particular application.

It is a member of the new Guerrilla Bloc™ family of integrated 4x4 mm modules which integrate all external component placements with the exception of a single resistor used to set the desired bias current.

Configured as an LNA, driver or cascaded gain block, GRF2806 offers high levels of reuse both within a design and across platforms and is part of a growing family of low-cost LNA modules to include:

GRF2807: 1.6 to 2.5 GHz

Consult with the GRF applications engineering team for evaluation board data and module s-parameters.



4.0 x 4.0 mm module

Absolute Ratings:

Parameter	Symbol	Min.	Max.	Unit
Supply Voltage	V_{DD}	0	6.0	V
RF Input Power CW: (Load VSWR < 2:1; V_D: 5.0 volts)	$P_{IN\ MAX}$		16	dBm
Operating Temperature (Package Heat Sink)	T_{AMB}	-40	105	°C
Maximum Channel Temperature (MTTF > 10^6 Hours)	T_{MAX}		170	°C
Maximum Dissipated Power	$P_{DISS\ MAX}$		150	mW
Electrostatic Discharge:				
Charged Device Model:	CDM	250		V
Human Body Model: (TBD)	HBM	500		V
Storage:				
Storage Temperature	T_{STG}	-65	150	°C
Moisture Sensitivity Level	MSL		1 (TBD)	--

RoHS Compliant

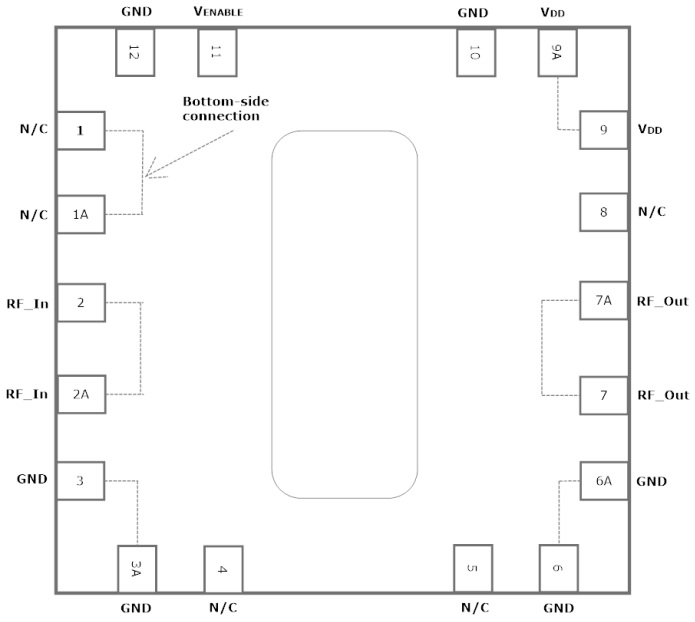
Caution! ESD Sensitive Device

Exceeding Absolute Maximum Rating conditions may cause permanent damage to the device.

Note: For package dimensions and manufacturing information, see the Guerrilla-RF.com website for the following document located on the GRF2806 landing page (coming soon): Manufacturing Note—MN-001 Product Tape and Reel, Solderability and Package Outline Specification.

Link to manufacturing note

Simplified Pin Out (Top View)



Pin Assignments:

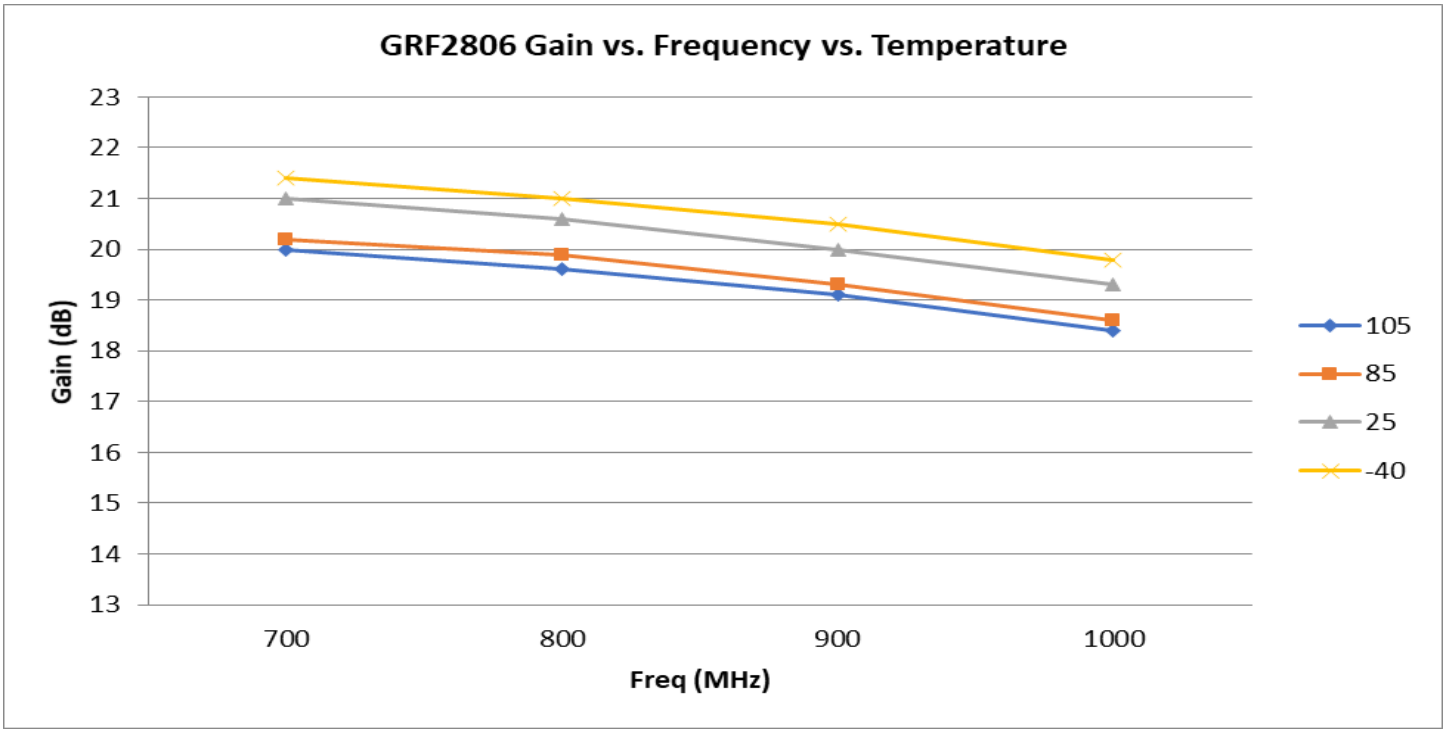
Pin(s)	Name	Description	Note
1/1A, 4, 5, 8	N/C	No Connect	Do not connect. Use solder resist or keep out beneath these pads as shown in the evaluation board Gerber files
2/2A	RF_In	RF Input	All Matching and DC Blocking Internal. Connect RF input transmission line to one or both of these pins as convenient
3/3A, 6/6A, 10, 12	GND	Ground	Connect to system board ground
7/7A	RF_Out	RF Output	All Matching and DC Blocking Internal. Connect RF output transmission line to one or both of these pins as convenient
9/9A	V_{DD}	Bias Supply Input	Bias inductor and de-coupling caps internal. Connect V_{DD} to one or both of these pins as convenient
11	V_{ENABLE}	Enable Voltage Input	V_{ENABLE} and series resistor set I_{DDQ}. V_{ENABLE} < =0.2 volts disables device. On-die pull-down resistor will turn the part off if this node is allowed to float.
PKG BASE	GND	Ground	Provides DC and RF ground for LNA, as well as thermal heat sink. Recommend multiple 8 mil vias beneath the package for optimal RF and thermal performance. Refer to evaluation board top layer graphic on schematic page.

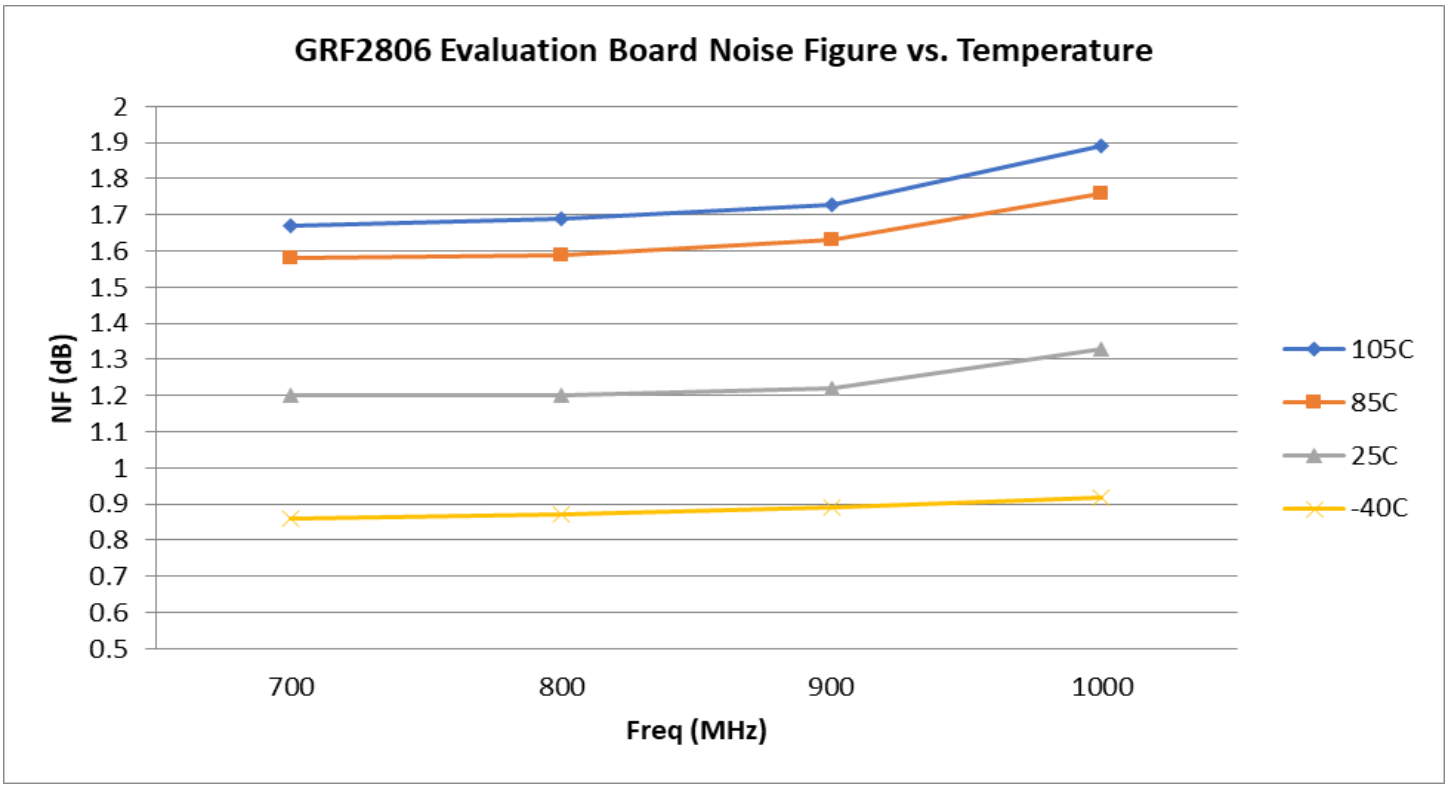
Note: Pins pairs such as 1/1A are interconnected on the bottom side of the package. These connections are also indicated by the dashed lines in the simplified pin out graphic above.

Nominal Operating Parameters:

Parameter	Symbol	Specification			Unit	Condition
		Min.	Typ.	Max.		
Gain Mode (Venable high)						V_{DD} = 3.3 V, T_A = 25 °C
Test Frequency	F_{TEST}		900		MHz	
Gain	S21		20.0		dB	
Module Noise Figure	NF		1.2		dB	RF_In to RF_Out
Output 1dB Compression Point	OP1dB		13.5		dBm	
Output 3rd Order Intercept Point	OIP3		23.5		dBm	-5.0 dBm P_{OUT} per tone at 2 MHz Spacing (899 and 901 MHz)
Switching Rise Time	T_{RISE}		700		ns	
Switching Fall Time	T_{FALL}		200		ns	
Supply Current	I_{DD}		15		mA	
Enable Current	I_{ENABLE}		0.5		mA	
Thermal Data						
Thermal Resistance (TBD)	Θ_{jc}		235		°C/W	On standard evaluation board
Channel Temperature @ +85 C Reference (Package Heat Sink)	$T_{CHANNEL}$		97		°C	V_{DD}: 3.3 V; I_{DDQ}: 15mA; No RF; P_{DISS}: 50 mW

GRF2806 Evaluation Board Data:





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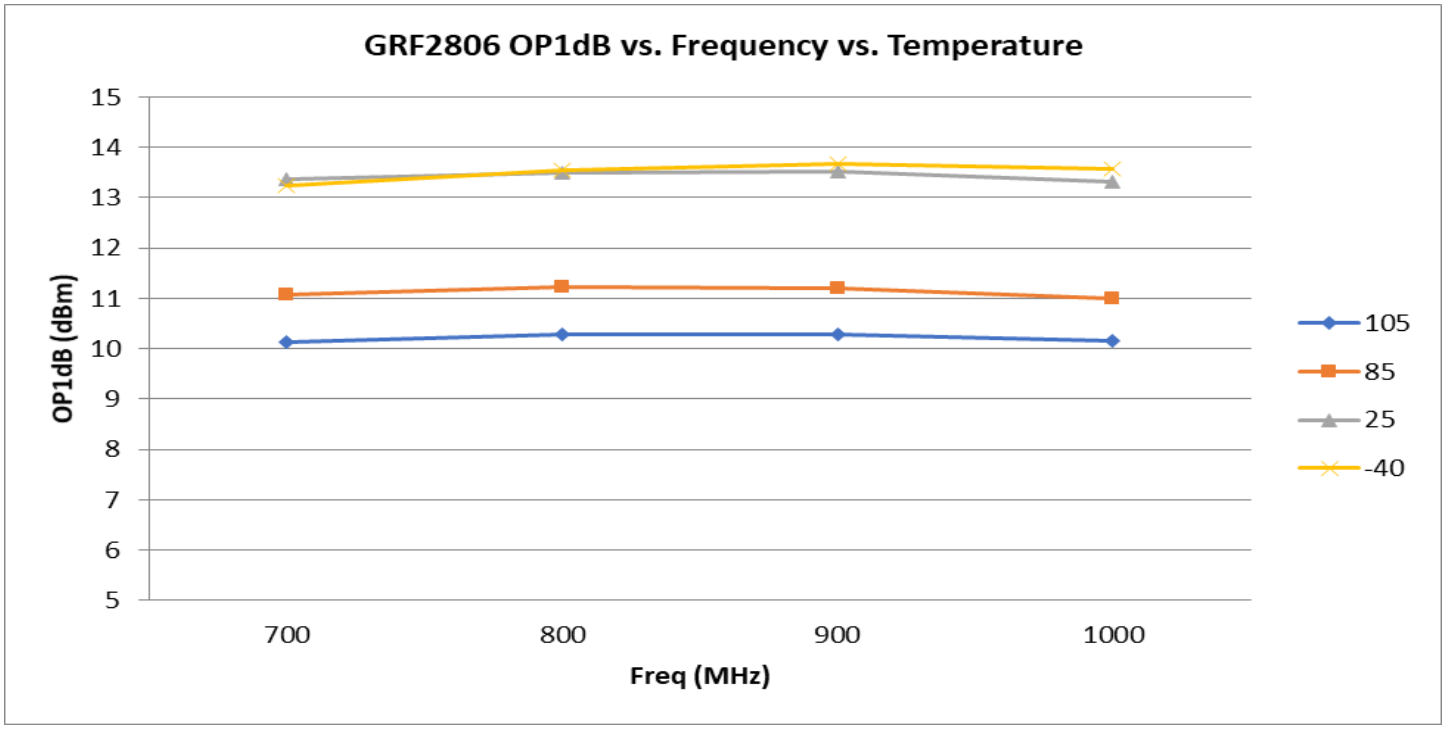
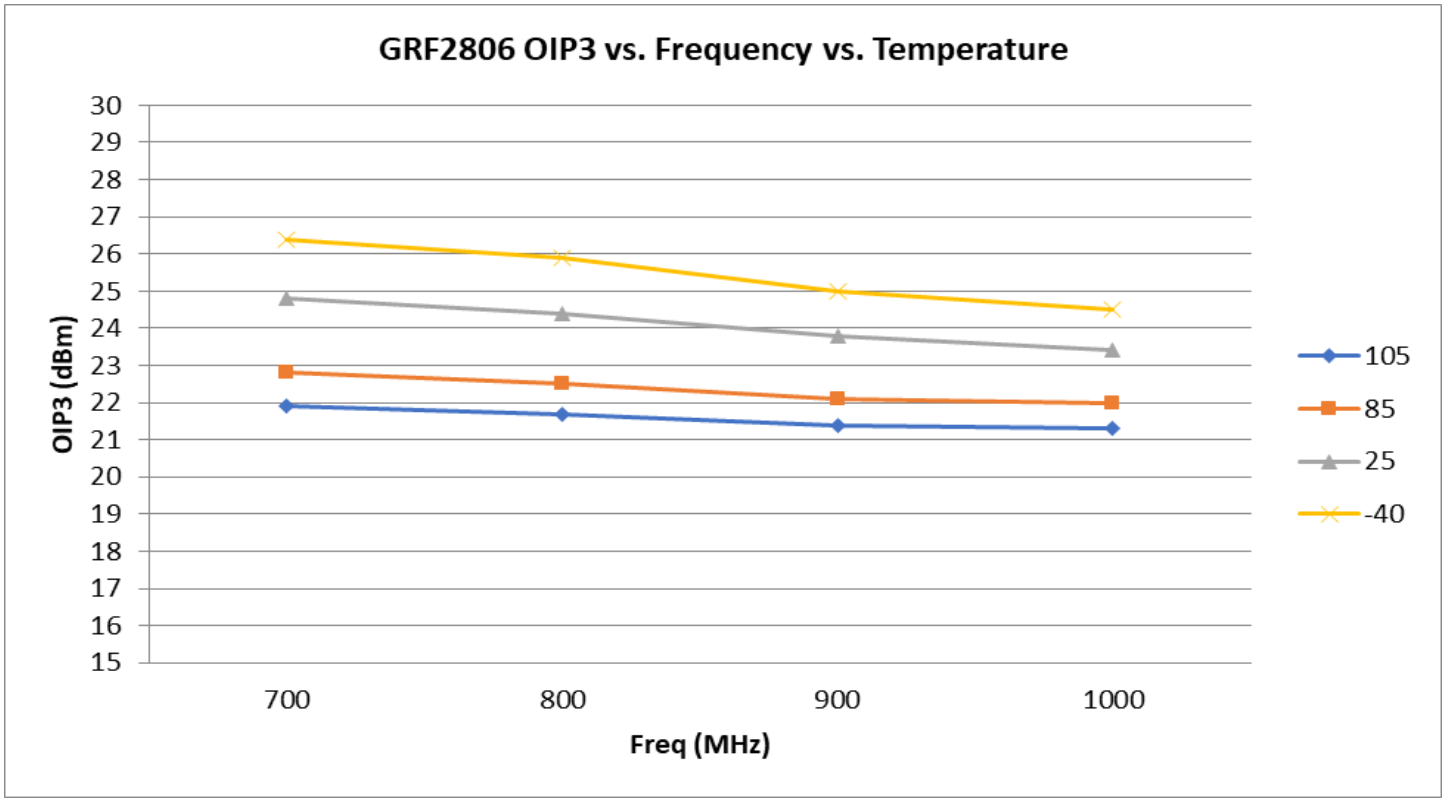
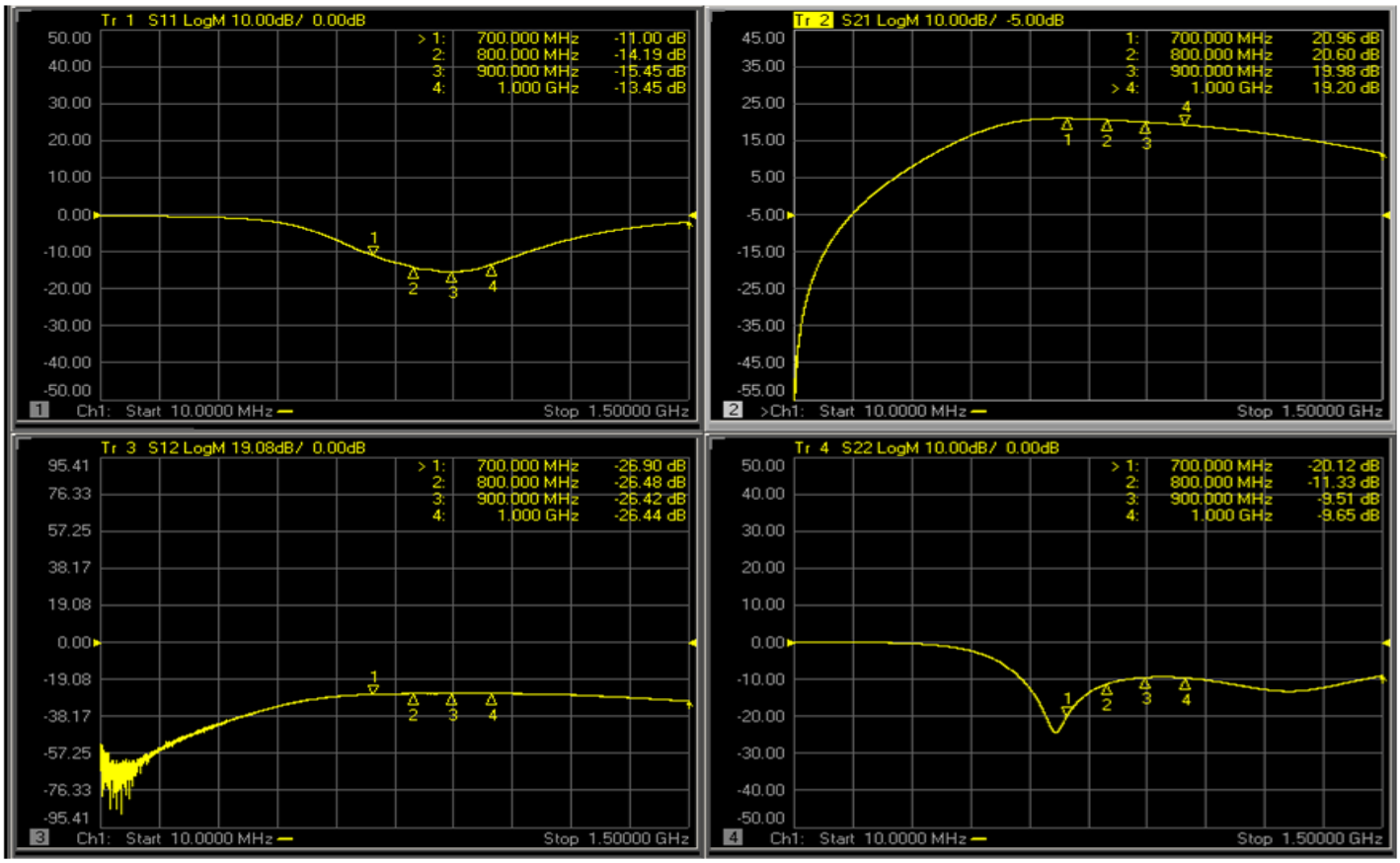
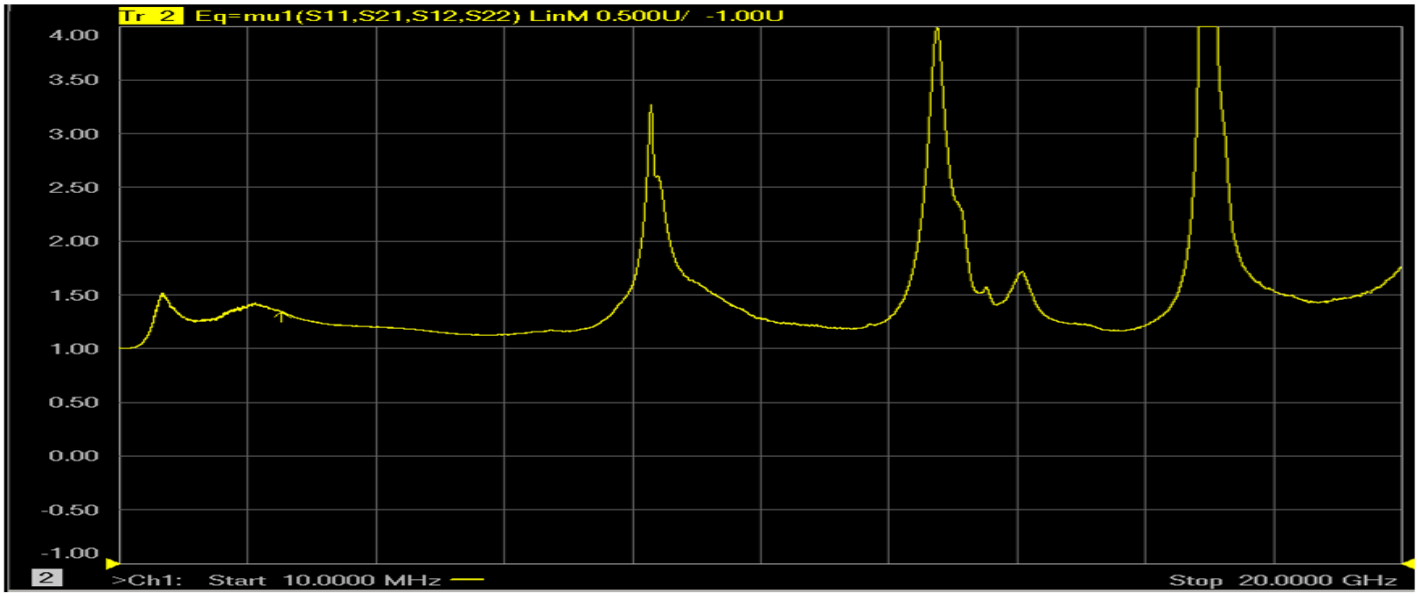


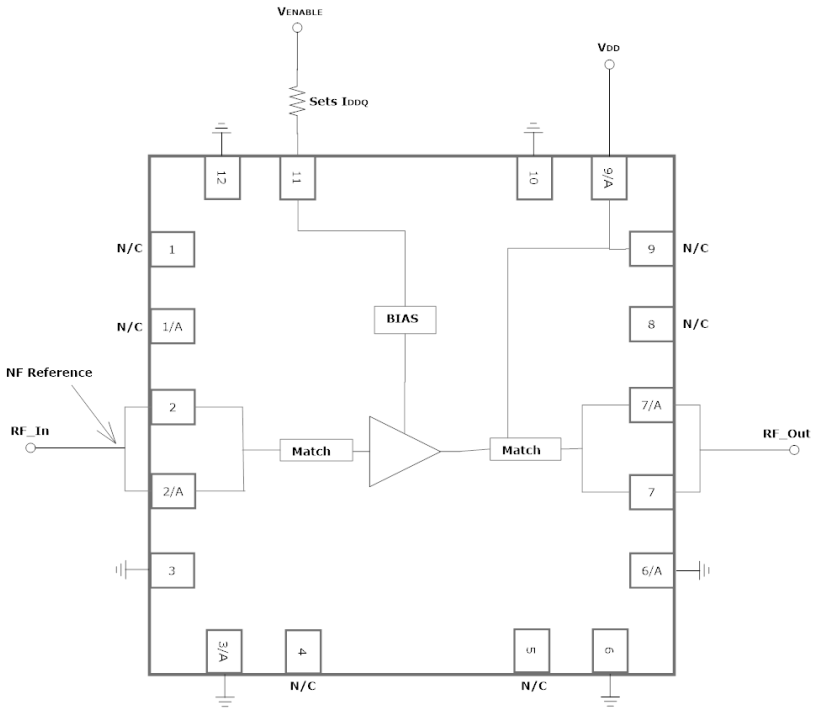


GRF2806 Module S-Pars:

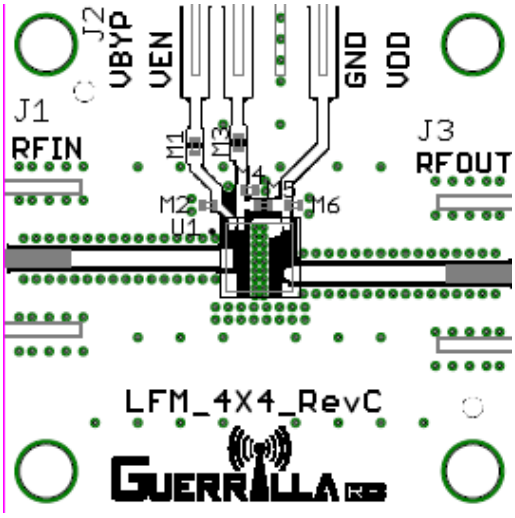




Note: Mu factor >= 1.0 implies unconditional stability.



GRF2806 EVB Application Schematic

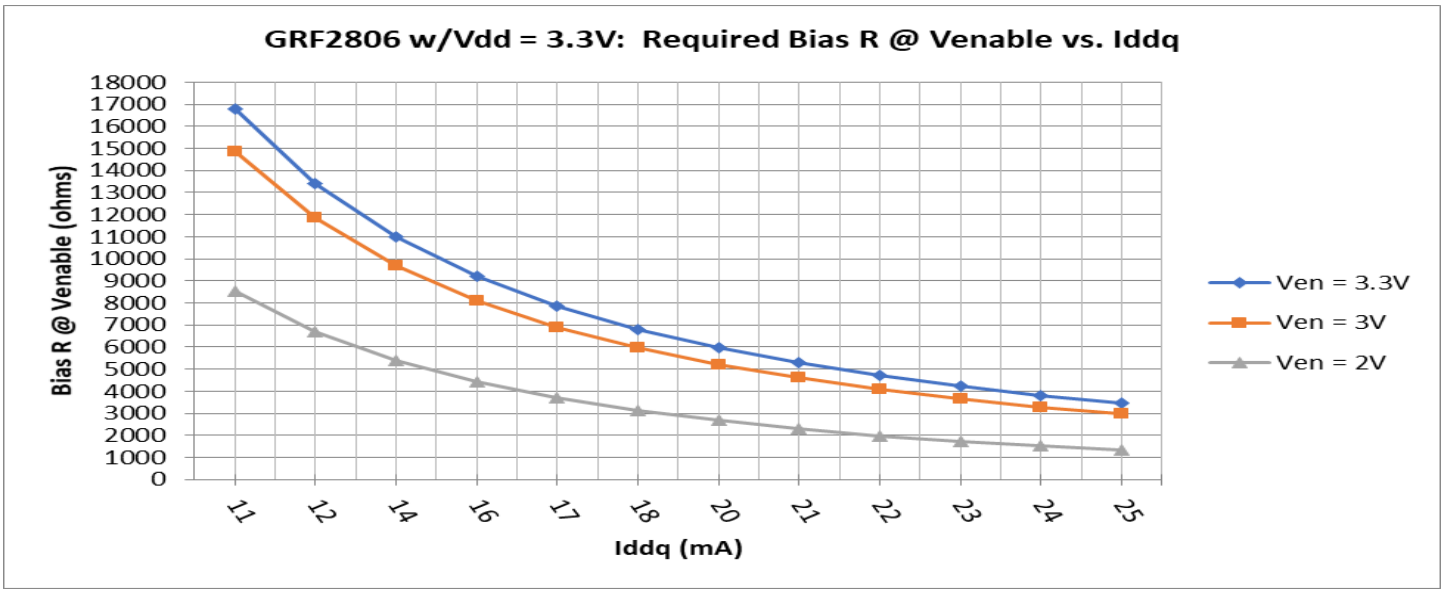


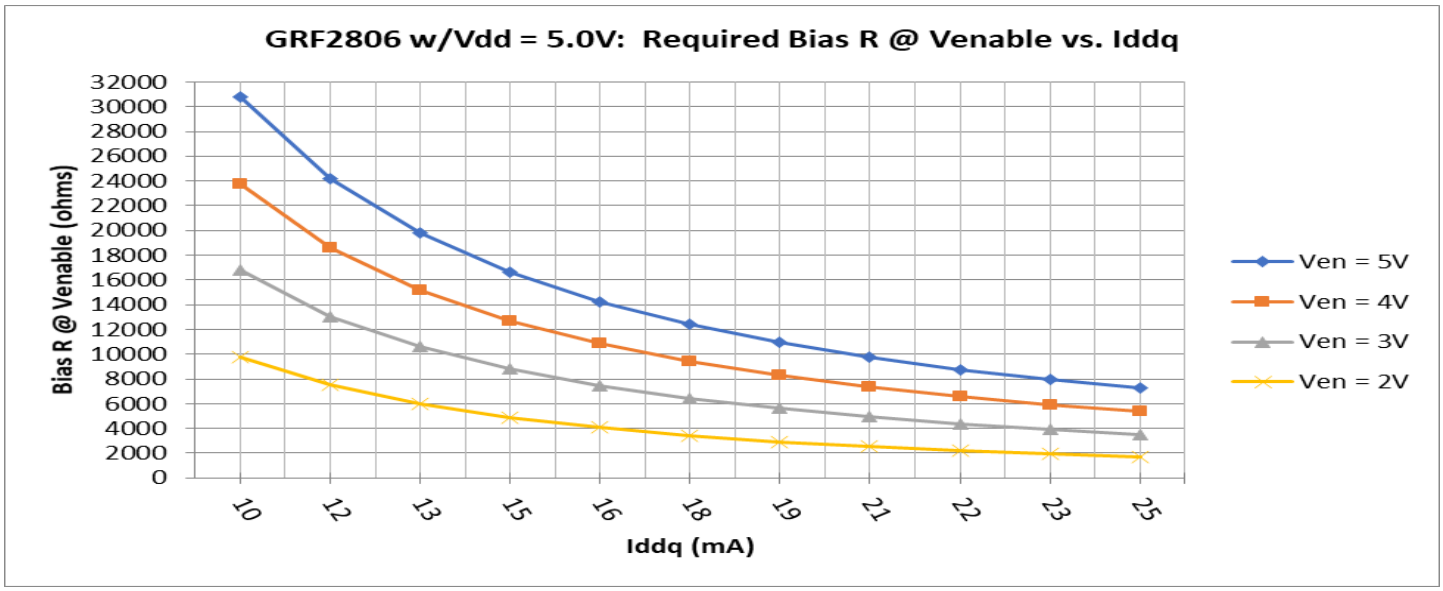
GRF2806 EVB Assembly Diagram

GRF2806 Evaluation Board BOM:

Component	Type	Manufacturer	Family	Value	Package Size	Substitution
M1	Resistor	Various	—	—	0402	ok
Evaluation Board	LFM_4x4_RevC	—	—	—	—	—

Bias Resistor (M1) vs. Iddq





Data Sheet Release Status:	Notes
Advance	S-parameter and NF data based on EM simulations for the fully packaged device using foundry supplied transistor s-parameters. Linearity estimates based on device size, bias condition and experience with related devices.
Preliminary	All data based on evaluation board measurements in the Guerrilla RF Applications Lab.
Released	All data based on device qualification data. Typically, this data is nearly identical to the data found in the preliminary version. Max and min values for key RF parameters are included.