GRF2003

Broadband Gain Block
0.1—10.0 GHz

Preliminary

Features

Reference: 5V/55 mA/5.5 GHz

- Gain: 12.0 dB
- OP1dB: 15.0 dBm
- OIP3: 29.0 dBm
- Eval Board NF: 3.5 dB

- Flexible Bias Voltage and Current
- Internally Matched to 50 Ω
- Process: GaAs pHEMT

Applications

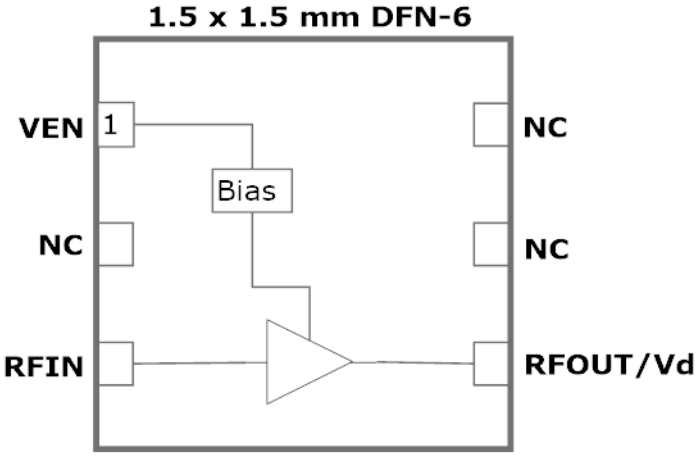
- Microwave Backhaul
- C/X -Band Amplifiers
- General Purpose Amplifiers
- Instrumentation

Product Description

GRF2003 is a broadband, low noise linear gain block designed for small cell, wireless infrastructure and other high performance RF applications. A single match will offer strong RF performance over 0.5 to 10.0 GHz. With optimized external components, the device can be operated down to 100 MHz.

The device can be operated over a range of supply voltages from 2.7 to 5.0 V with a typical Iddq range of 40 to 80 mA for optimal efficiency and linearity.

Consult with the GRF applications engineering team for custom tuning/evaluation board data and device s-parameters.



Absolute Ratings:

Parameter	Symbol	Min.	Max.	Unit
Supply Voltage	V_{DD}	0	6.0	V
RF Input Power: (Load VSWR < 2:1; V_D: 5.0 volts)	$P_{IN\ MAX}$		15	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	$P_{DISS\ MAX}$		400	mW
Electrostatic Discharge:				
Charged Device Model:	CDM	1500		V
Human Body Model:	HBM	250		V
Storage:				
Storage Temperature	T_{STG}	-65	150	°C
Moisture Sensitivity Level	MSL		1	--

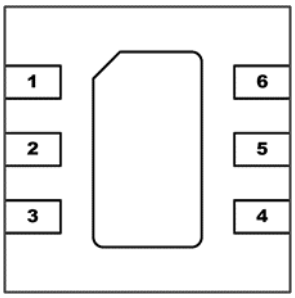
Caution! ESD Sensitive Device

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 GRF2003 landing page: Manufacturing Note—MN-001 Product Tape and Reel, Solderability and Package Outline Specification.

Link to manufacturing note

Pin Out (Top View)



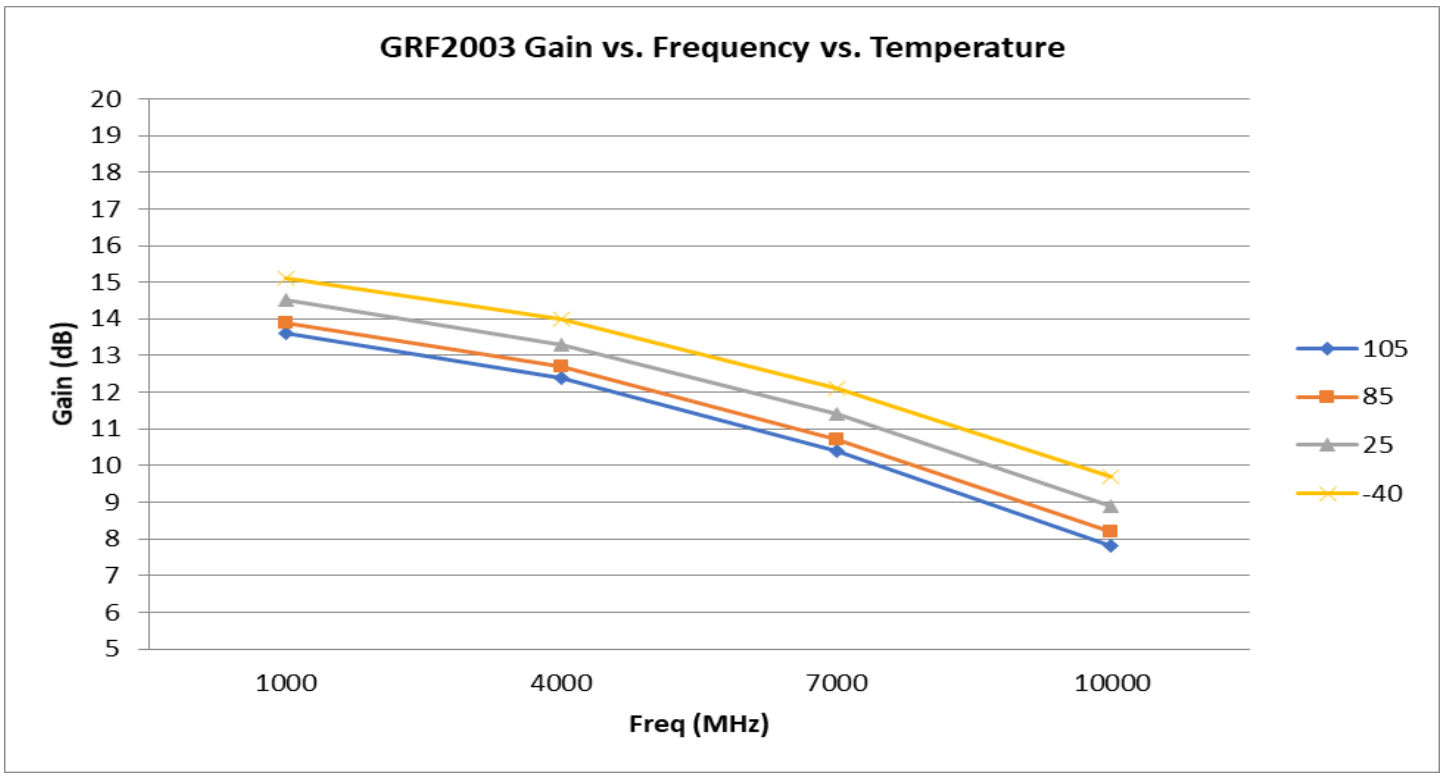
Pin Assignments:

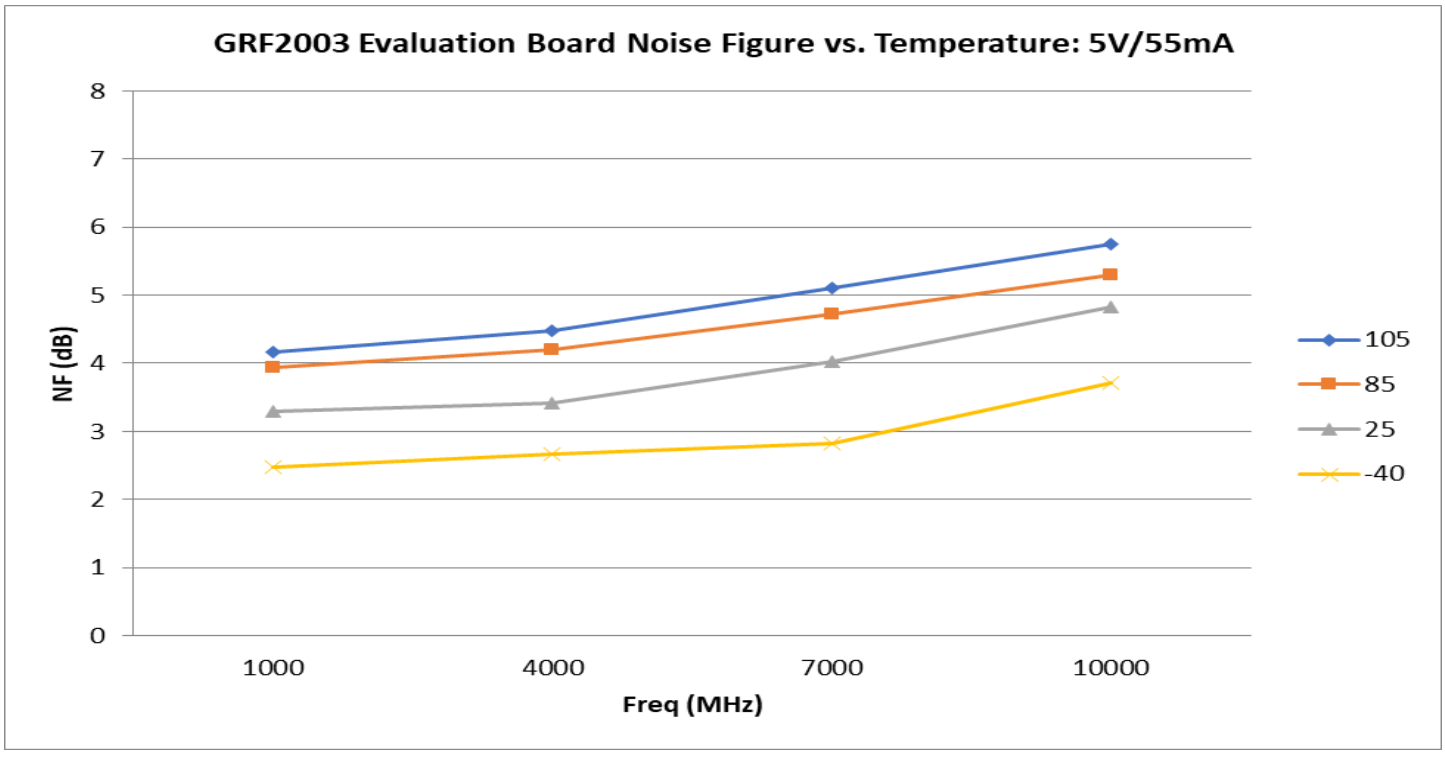
Pin	Name	Description	Note
1	V_{ENABLE}	Enable Voltage Input	V_{ENABLE} and series resistor set I_{DDQ}. V_{ENABLE} < 0.2 volts disables device. On-die pull-down resistor will turn the part off if this node is allowed to float.
2	NC	No Connect or Ground	No internal connection to die
3	RF_In	LNA RF input	Internally matched 50Ω. An external DC blocking cap must be used.
4	RF_Out/V_{DD}	LNA RF output	Internally matched 50Ω. V_{DD} must be applied through a choke to this pin
5	NC	No Connect or Ground	No internal connection to die
6	NC	No Connect or Ground	No internal connection to die
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.

Nominal Operating Parameters:

Parameter	Symbol	Specification			Unit	Condition
		Min.	Typ.	Max.		
Test Frequency	F_{TEST}		5.5		GHz	V_{DD} = 5.0 V, T_A = 25°C
Gain	S21	11.0	12.0		dB	
Eval Board Noise Figure	NF		3.5		dB	
Output 3rd Order Intercept	OIP3		29.0		dBm	0 dBm P_{OUT} per tone at 2 MHz Spacing (5499 and 5501 MHz)
Output 1dB Compression Point	OP1dB	12.5	15.0		dBm	
Switching Rise Time	T_{RISE}		1600		ns	
Switching Fall Time	T_{FALL}		1000		ns	
Supply Current	I_{DD}		55		mA	
Enable Current	$I_{ENSABLE}$		1.5		mA	
Leakage Current	$I_{LEAKAGE}$		1		uA	V_{DD}: 5.0V; V_{ENABLE}: 0.0V
Thermal Data						
Thermal Resistance: (Infra-Red Scan)	Θjc		198		°C/W	On standard Evaluation Board
Channel Temperature @ +85 C Reference (Package heat sink)	$T_{CHANNEL}$		140		°C	V_{DD}: 5.0 V; I_{DDQ}: 55 mA; No RF; P_{DISS}: 275 mW

GRF2003 Measured Data: (5.0 volts; 55 mA)





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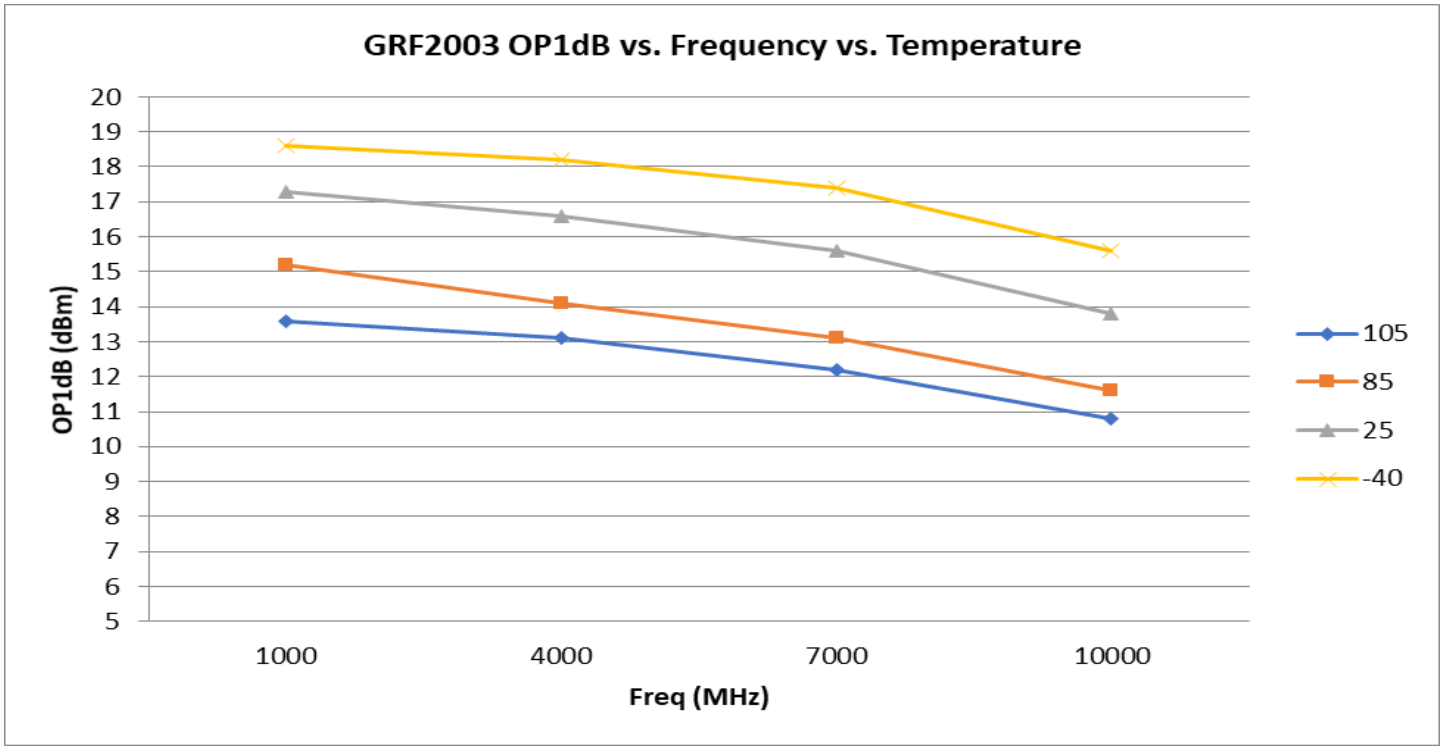
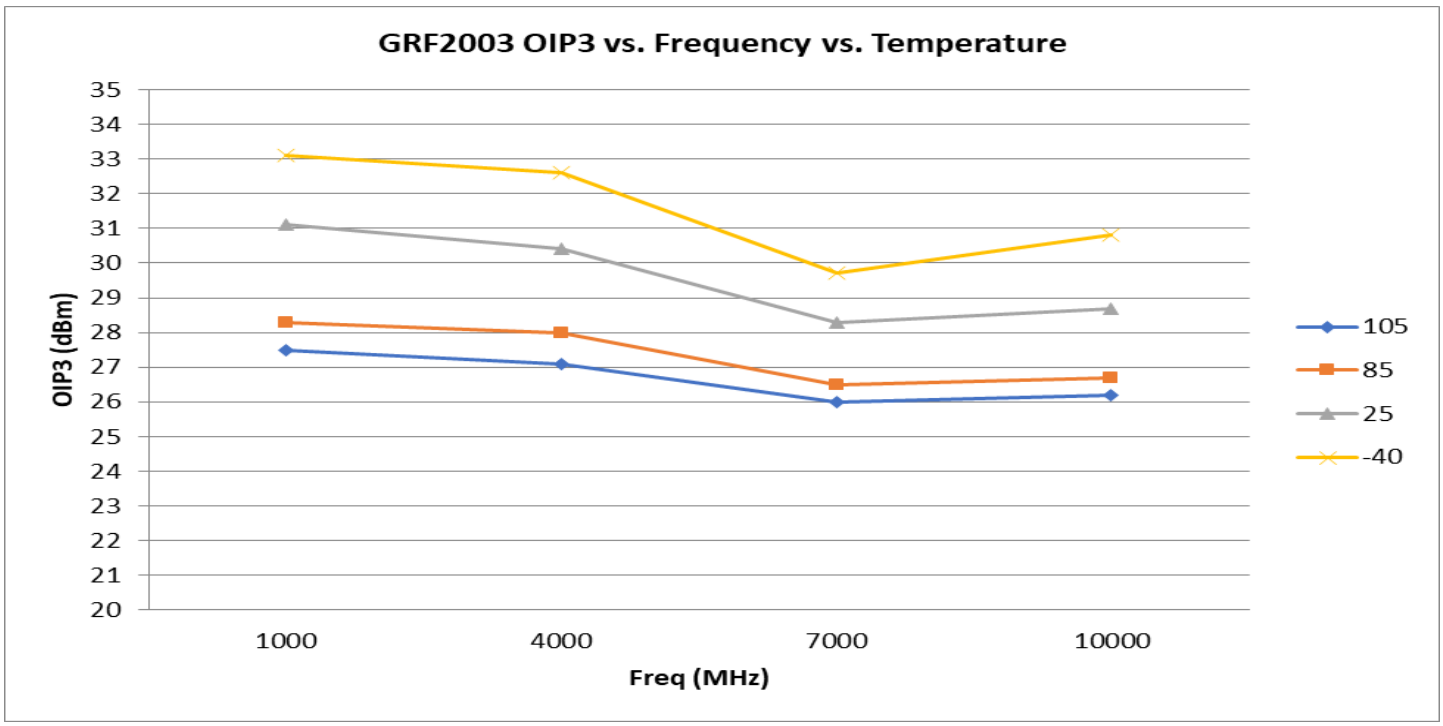
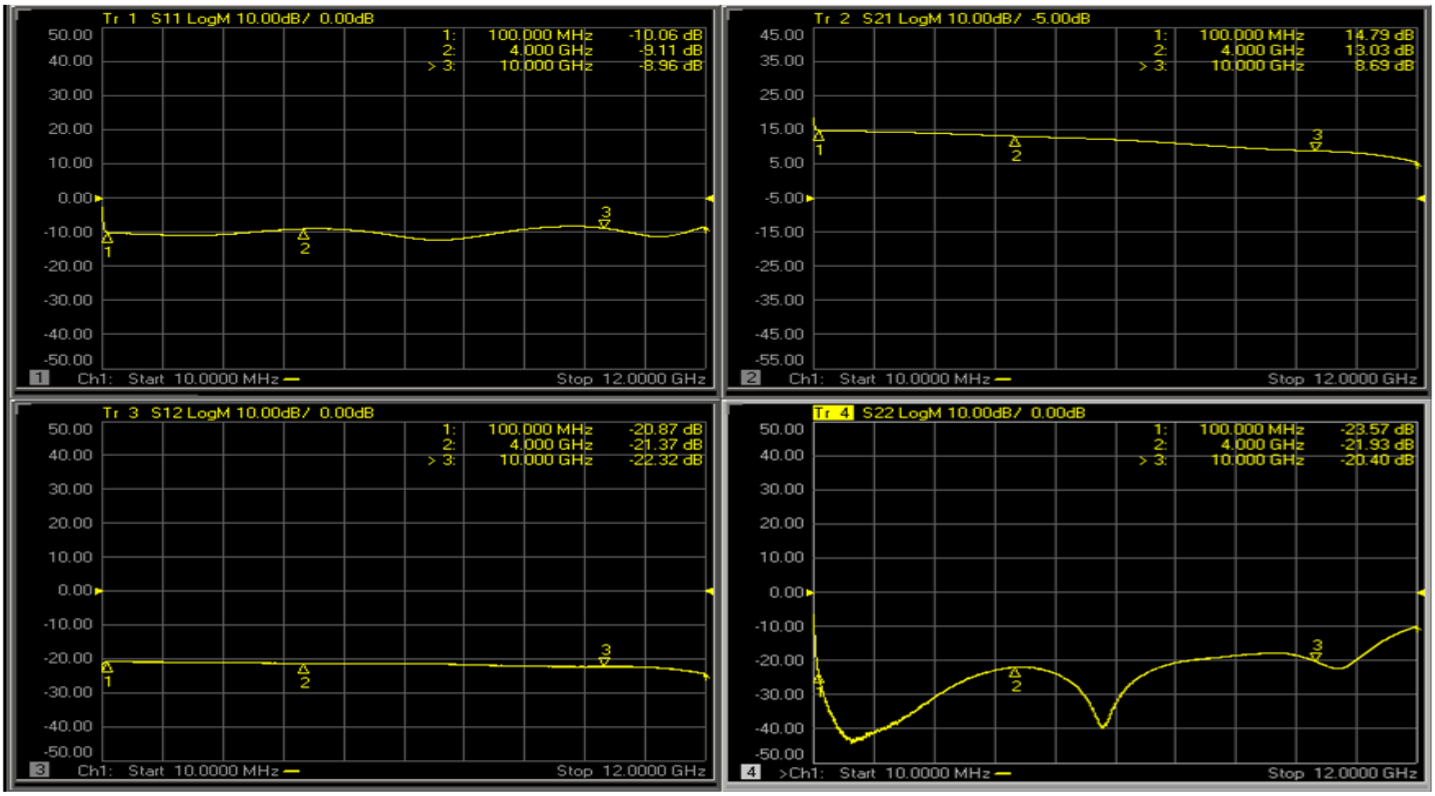
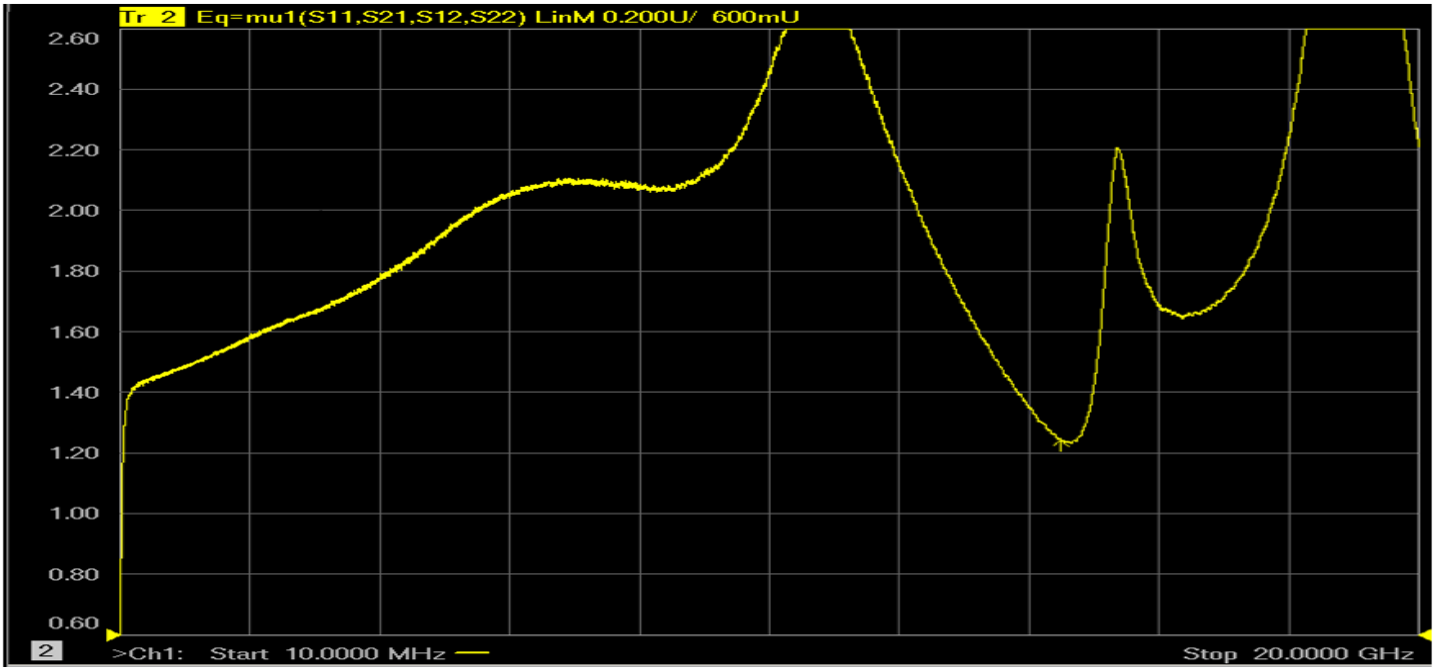


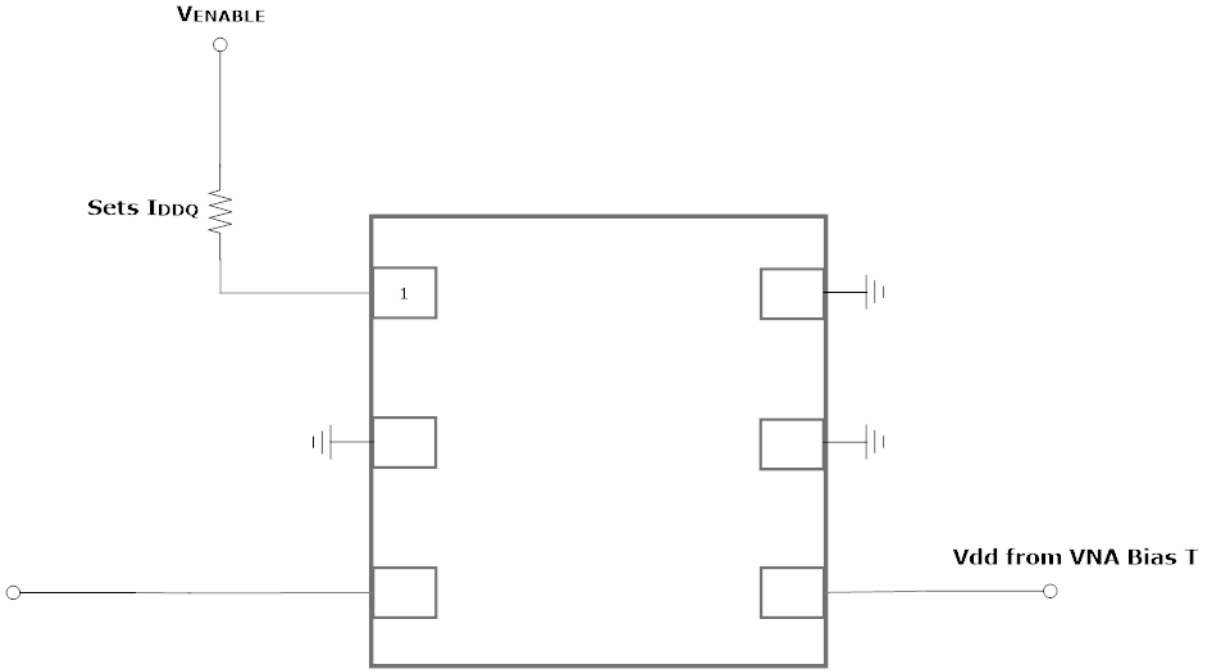


GRF2003 Evaluation Board S-Pars and Stability Mu Factor: (0.5 to 10.0 GHz Tune)

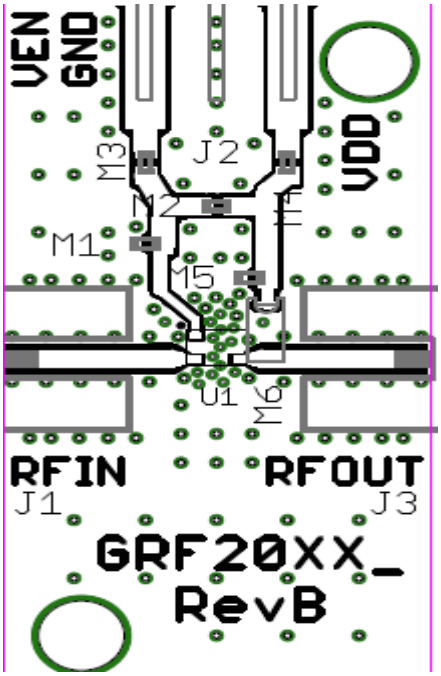




Note: Mu factor >= 1.0 implies unconditional stability.

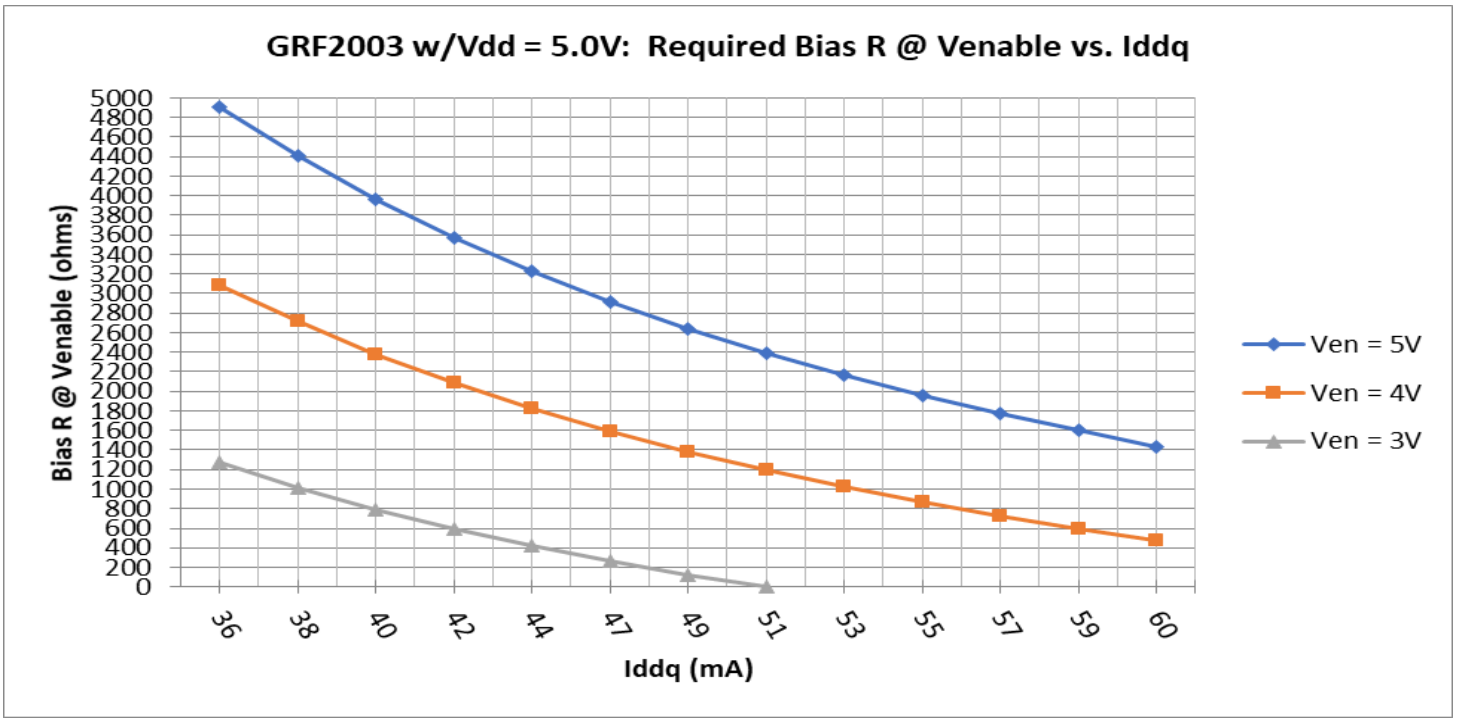


GRF2003 Broadband Measurement Schematic



GRF2003 Evaluation Board Assembly Drawing

GRF2003 Bias Resistor Selection Curves



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.

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GRF2003 GRF2003-EVB