Preliminary

GRF2873

Guerrilla Bloc™ Ultra-LNA 3.0 – 4.2 GHz

Features

Reference: 5V/70mA/3.6 GHz

- Gain: 16.9 dB
- Module NF: 0.65 dB
- OP1dB: 19.0 dBm
- OIP3: 37.0 dBm

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

Applications

- First Stage LNA for Infrastructure
- CBRS
- Distributed Antenna Systems
- General Ultra-Low Noise Applications

Product Description

GRF2873 is a fully integrated amplifier offering industry leading ultra-low noise and high linearity over 3.0 to 4.2 GHz with no external matching or bias de-coupling required.

The device belongs to the 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.

GRF2873 can be operated over a wide range of Vdd and Iddq levels for optimal linearity and efficiency. It is part of a growing family of Ultra-LNA modules to include:

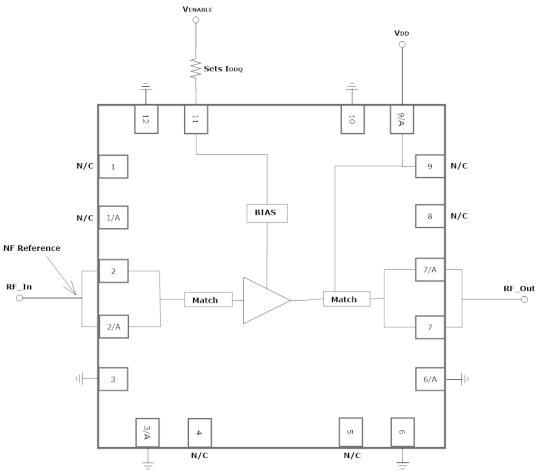
GRF2870: 0.6 to 1.0 GHz (Sampling Now)

GRF2871: 1.5 to 2.2 GHz (Sampling Now)

GRF2872: 2.0 to 3.0 GHz (Sampling Now)

GRF2873: 3.0 to 4.2 GHz (Sampling Now)

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: (Load VSWR < 2:1; V_D: 5.0 volts)	$P_{IN\ MAX}$		23	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	$P_{DISS\ MAX}$		600	mW
Electrostatic Discharge:				
Charged Device Model: (TBD)	CDM	1500		V
Human Body Model: (TBD)	HBM	500		V
Storage:				
Storage Temperature	T_{STG}	-65	150	°C
Moisture Sensitivity Level	MSL		2	--

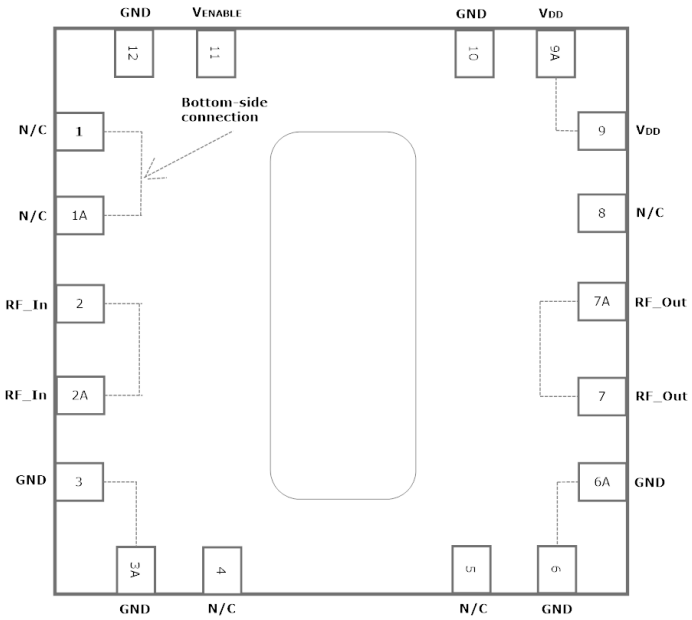
Caution! ESD Sensitive Device

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 GRF2873 landing page: Manufacturing Note—MN-001 Product Tape and Reel, Solderability and Package Outline Specification.

Link to manufacturing note

Simplified Pin Out (Top View)



Pin Assignments:

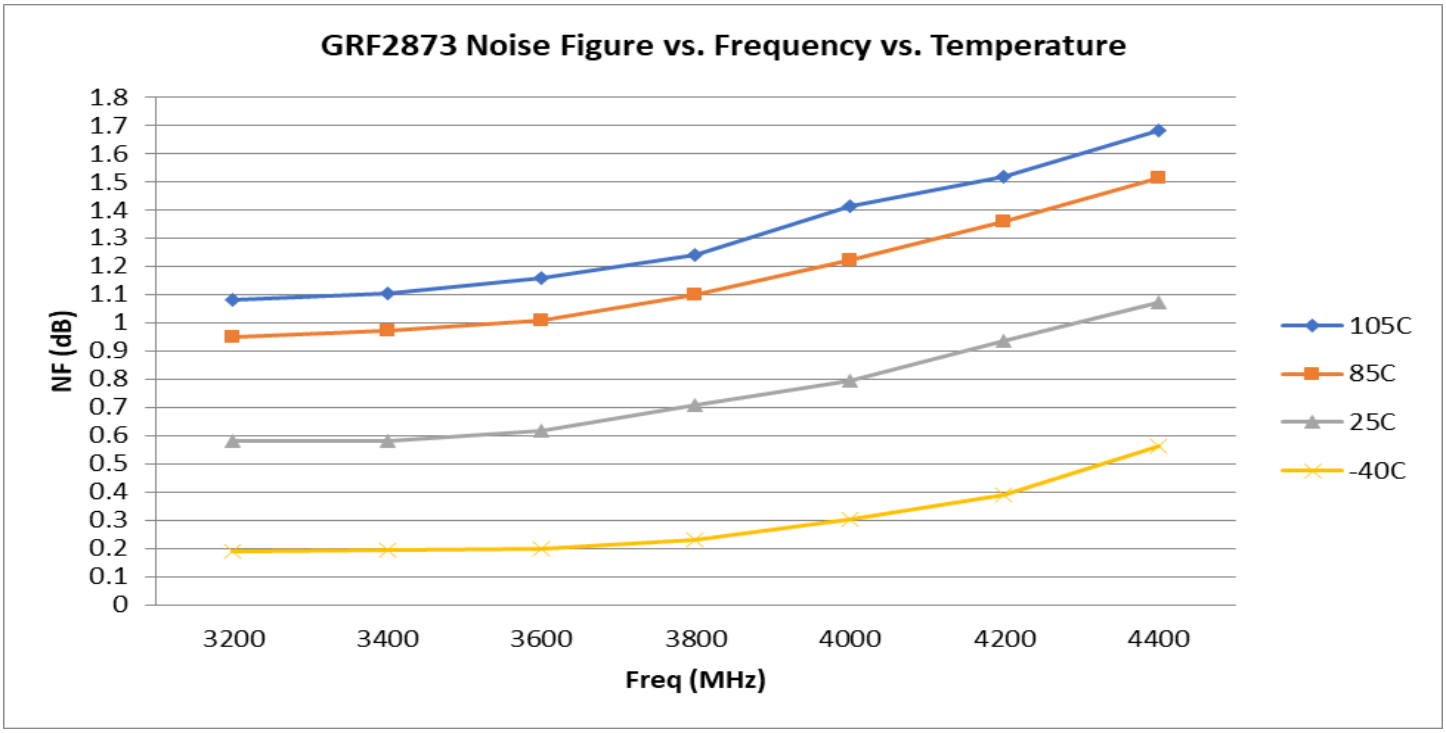
Pin(s)	Name	Description	Note
1/1A, 4, 5, 8	**N/C**	No Connect	Do not connect. Use solder resist or keep out beneath these pads as shown in the evaluation board Gerber files
2/2A	**RF_In**	RF Input	All Matching and DC Blocking Internal. Connect RF input transmission line to one or both of these pins as 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	**VDD**	Bias Supply Input	Bias inductor and de-coupling caps internal. Connect VDD to one or both of these pins as convenient
11	**VENABLE**	Enable Voltage Input	VENABLE and series resistor set IDDQ. VENABLE < =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.

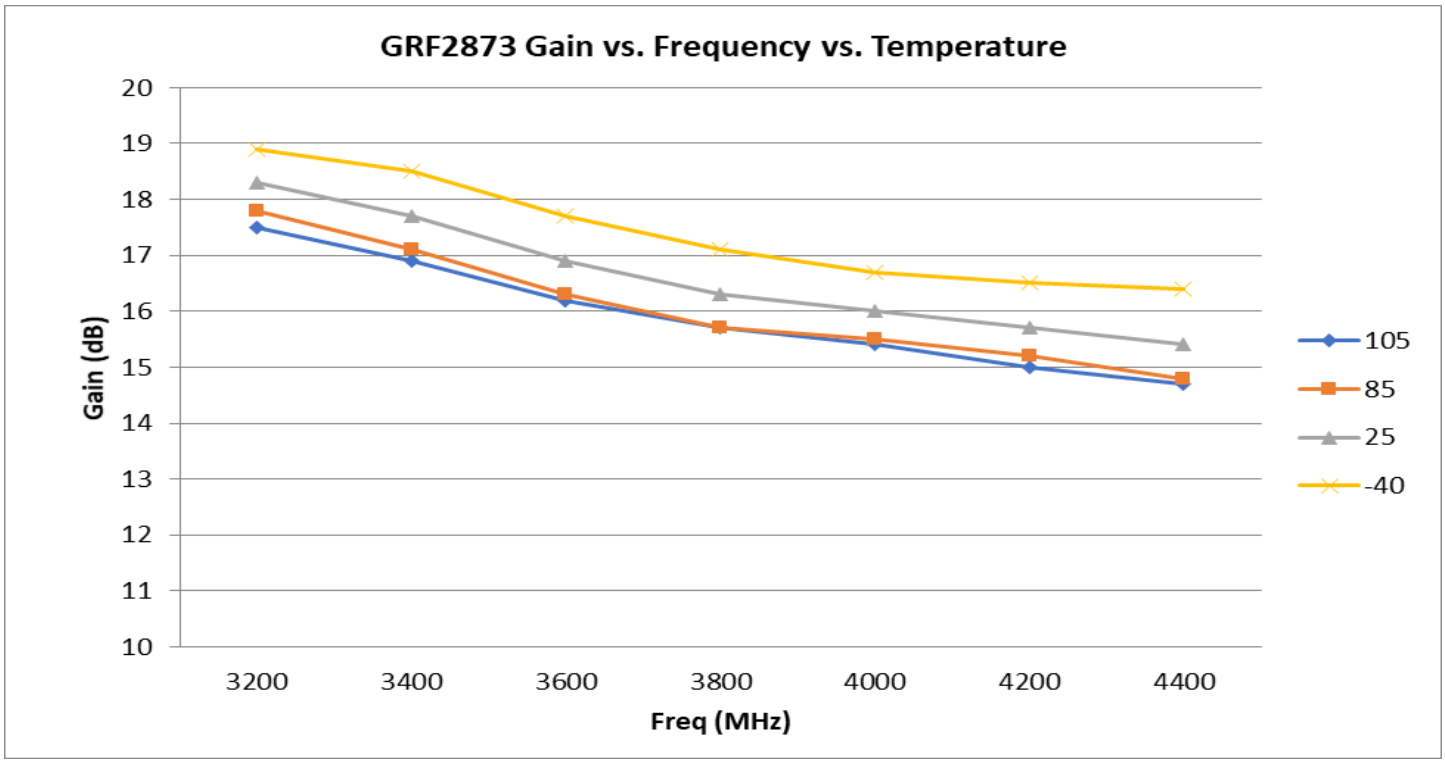
Note: Pins pairs such as 1/1A are interconnected on the bottom side of the package. These connections are also indicated by the dashed lines in the simplified pin out graphic above.

Nominal Operating Parameters:

Parameter	Symbol	Specification			Unit	Condition
		Min.	Typ.	Max.		
Gain Mode (Venable high)						V_{DD} = 5.0 V, T_A = 25 °C
Test Frequency	F_{TEST}		3600		MHz	
Gain	S21	15.9	16.9		dB	
Module Noise Figure	NF		0.65	0.85	dB	RF_In to RF_Out
Output 1dB Compression Point	OP1dB	17.5	19.0		dBm	
Output 3rd Order Intercept Point	OIP3		37.0		dBm	+3 dBm P_{OUT} per tone at 2 MHz Spacing (3599 and 3601 MHz)
Switching Rise Time	T_{RISE}		200		ns	
Switching Fall Time	T_{FALL}		200		ns	
Supply Current	I_{DD}		70		mA	Adjustable for optimal linearity
Enable Current	I_{ENABLE}		2.1		mA	
Thermal Data						
Thermal Resistance (TBD)	Θjc		TBD		°C/W	On standard evaluation board
Channel Temperature @ +85 C Reference (Package Heat Sink)	$T_{CHANNEL}$		TBD		°C	V_{DD}: 5.0 V; I_{DDQ}: 70mA; No RF; P_{DISS}: 350 mW

GRF2873 Evaluation Board Data: (5V)





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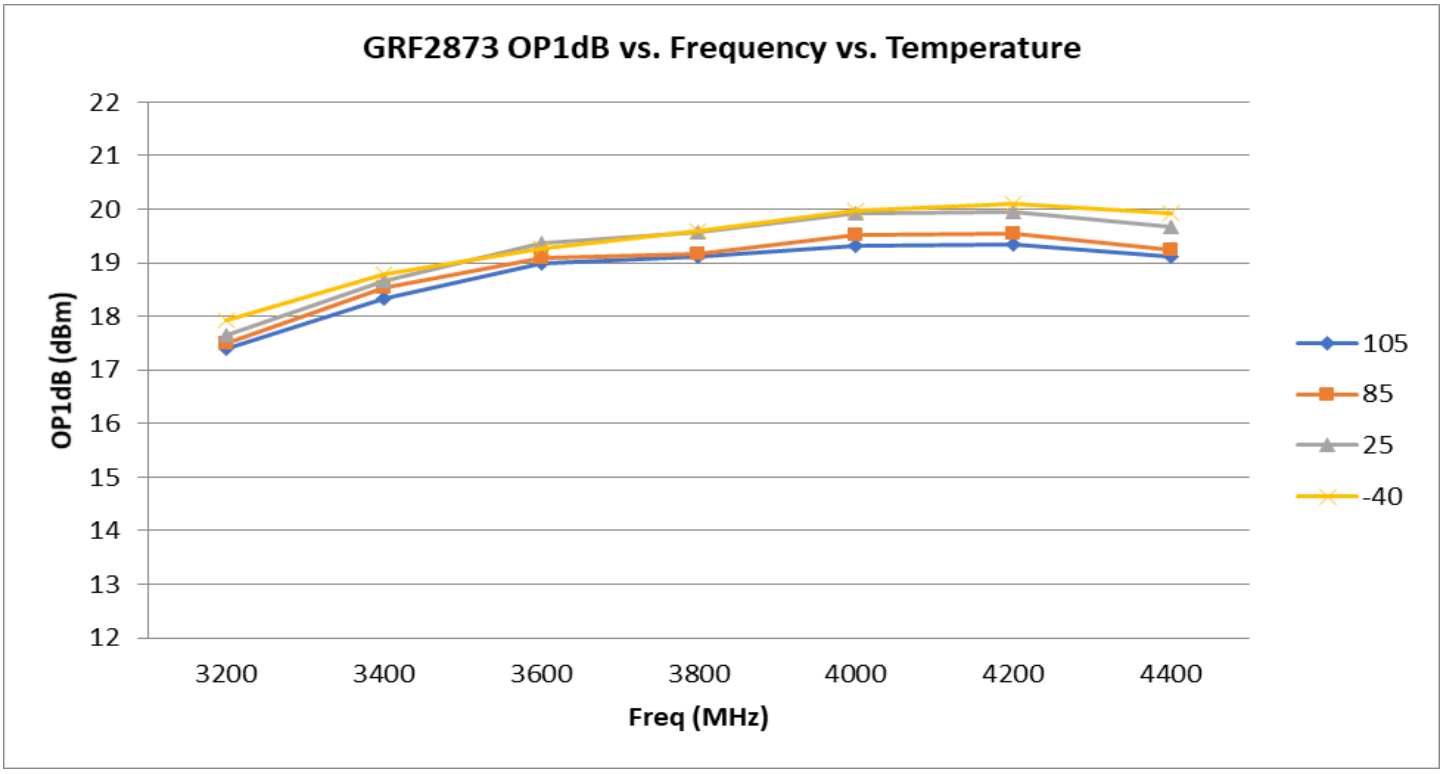

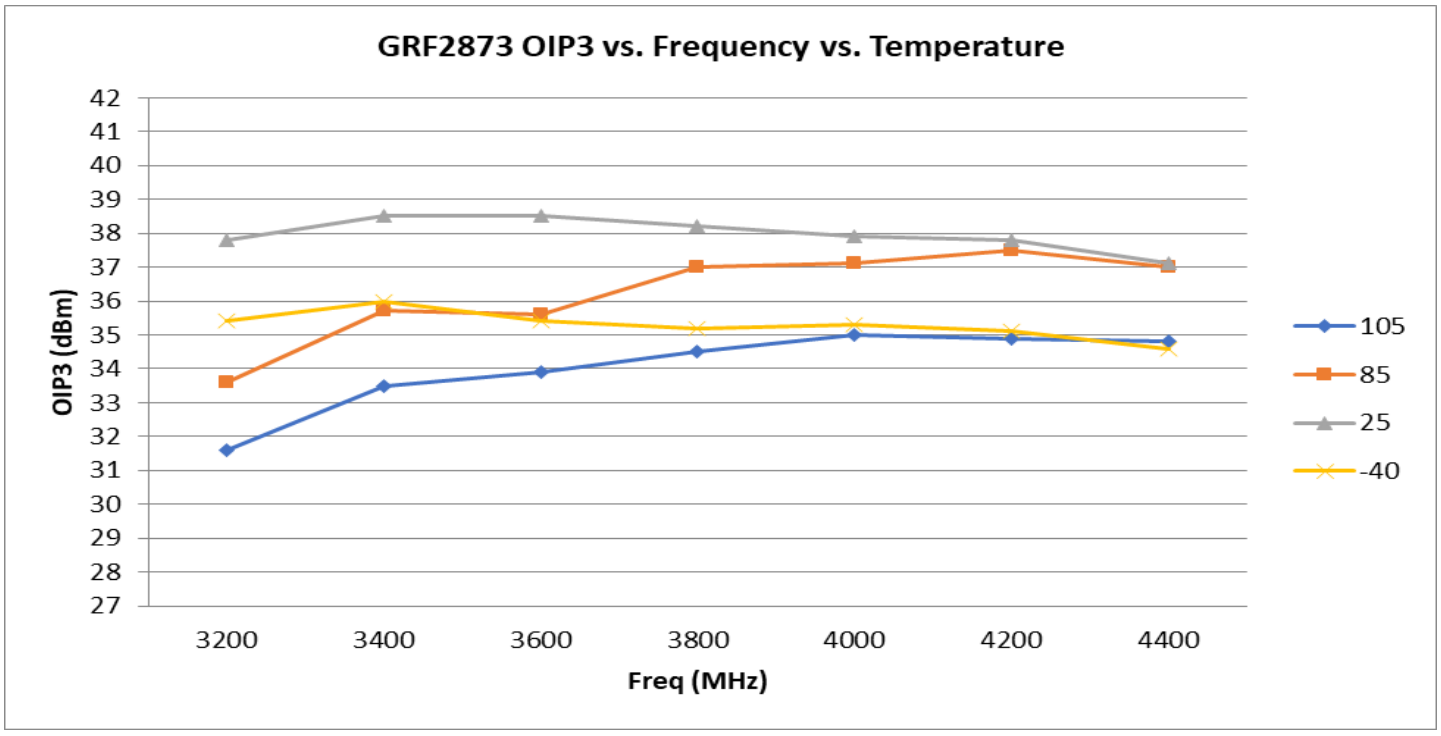

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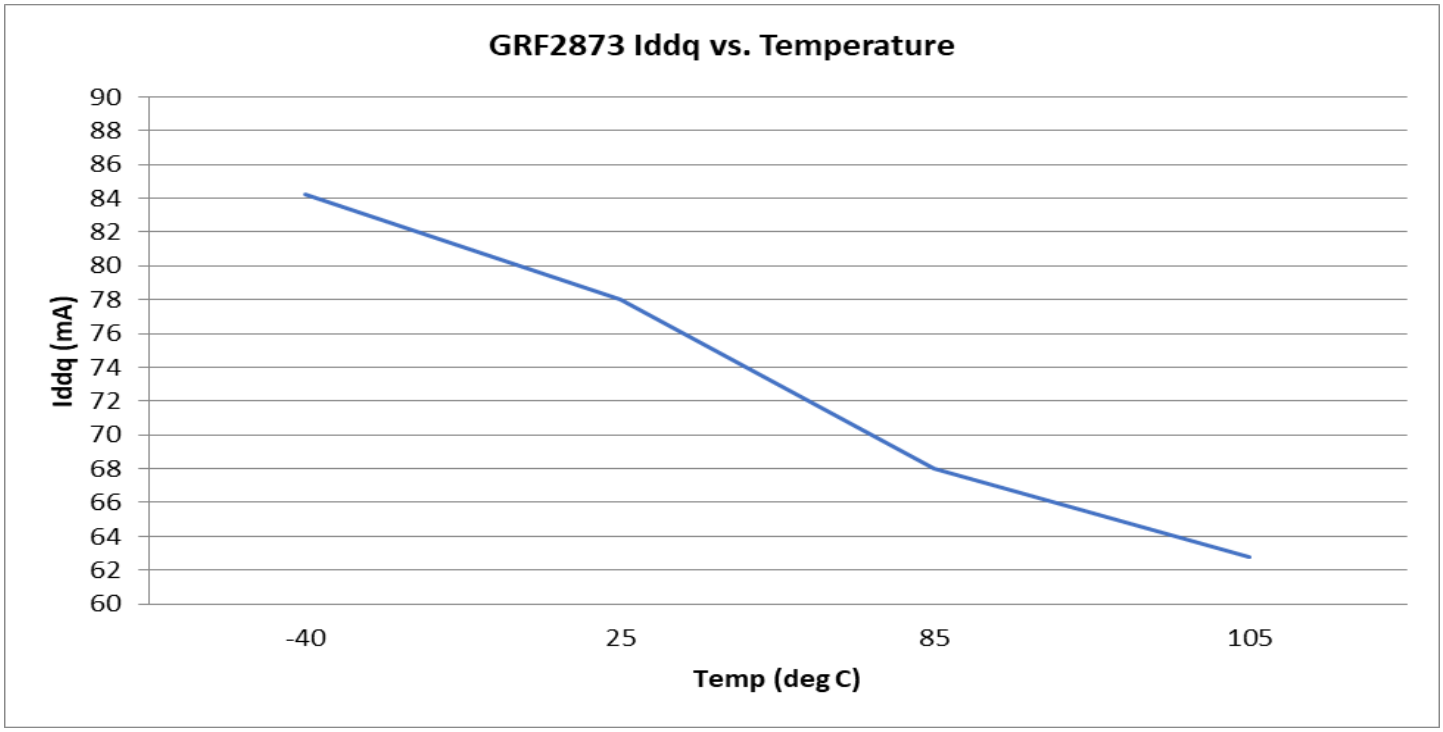
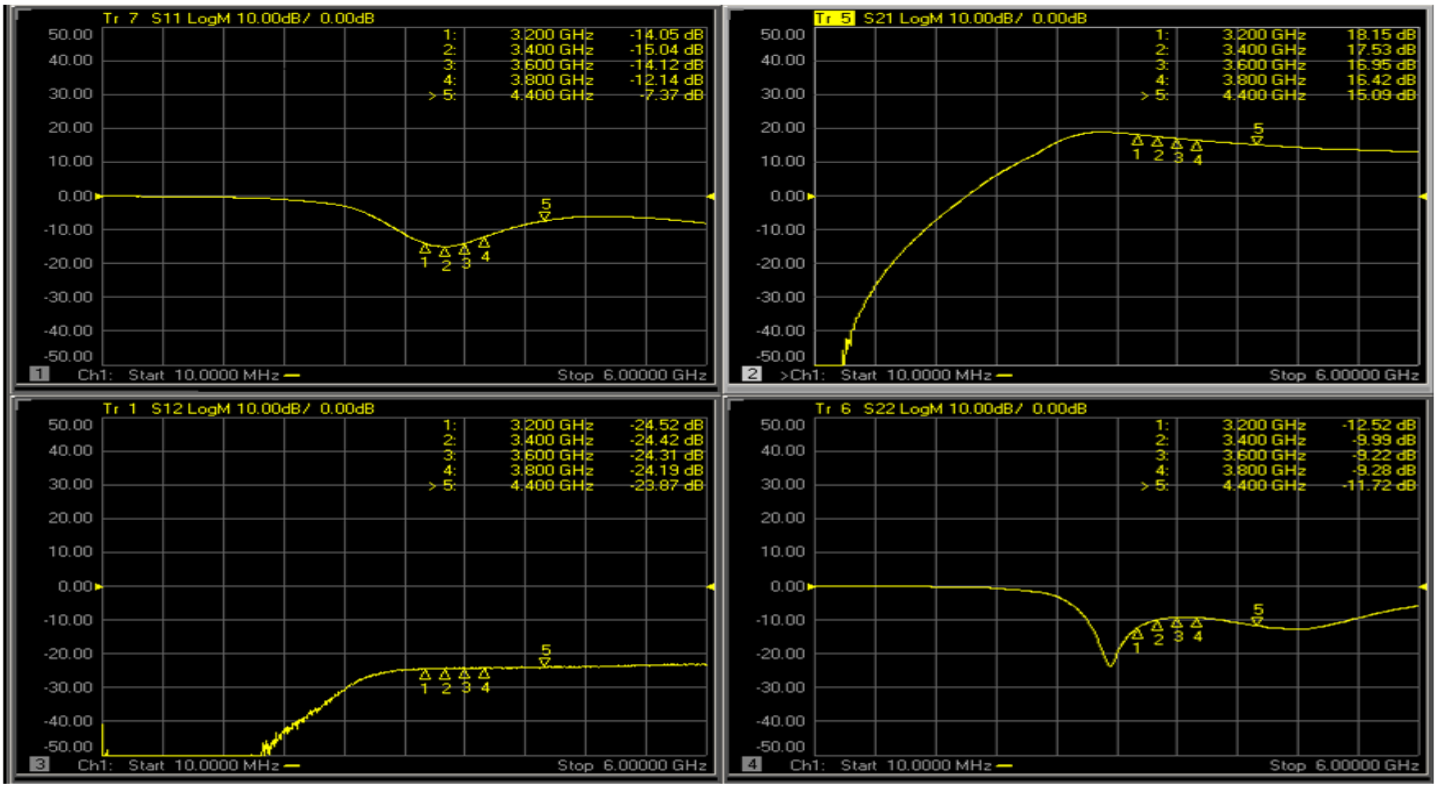
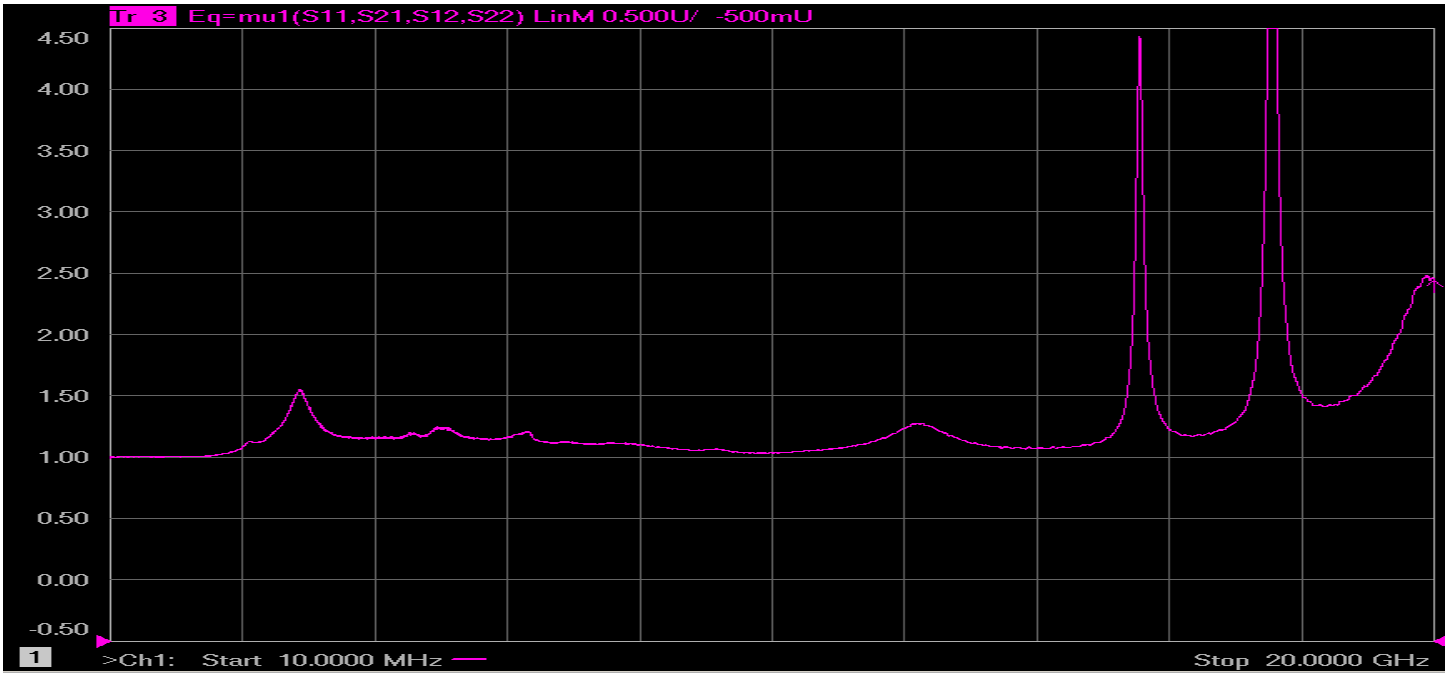
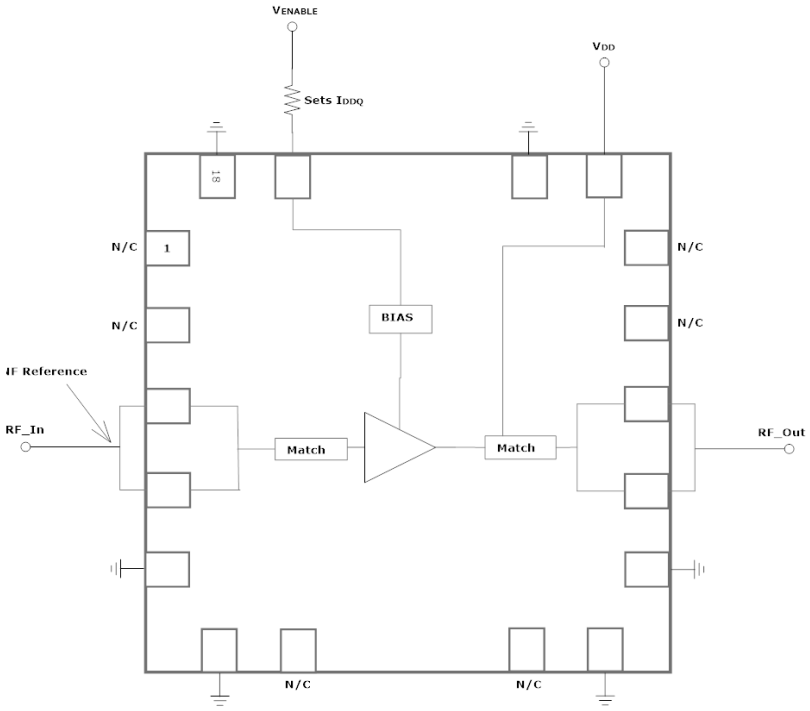


GRF2873 Module S-Pars:

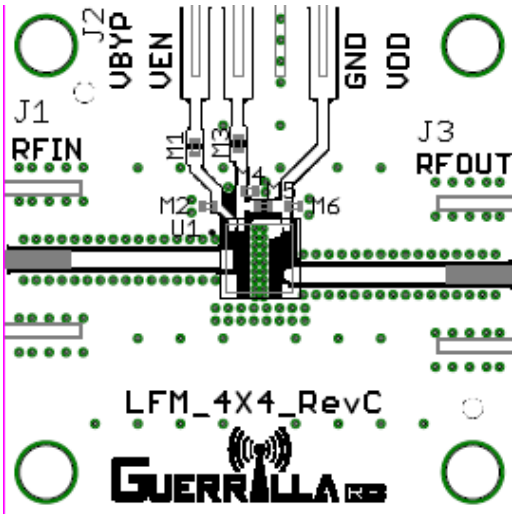




Note: Mu factor >= 1.0 implies unconditional stability.



GRF2873 EVB Application Schematic

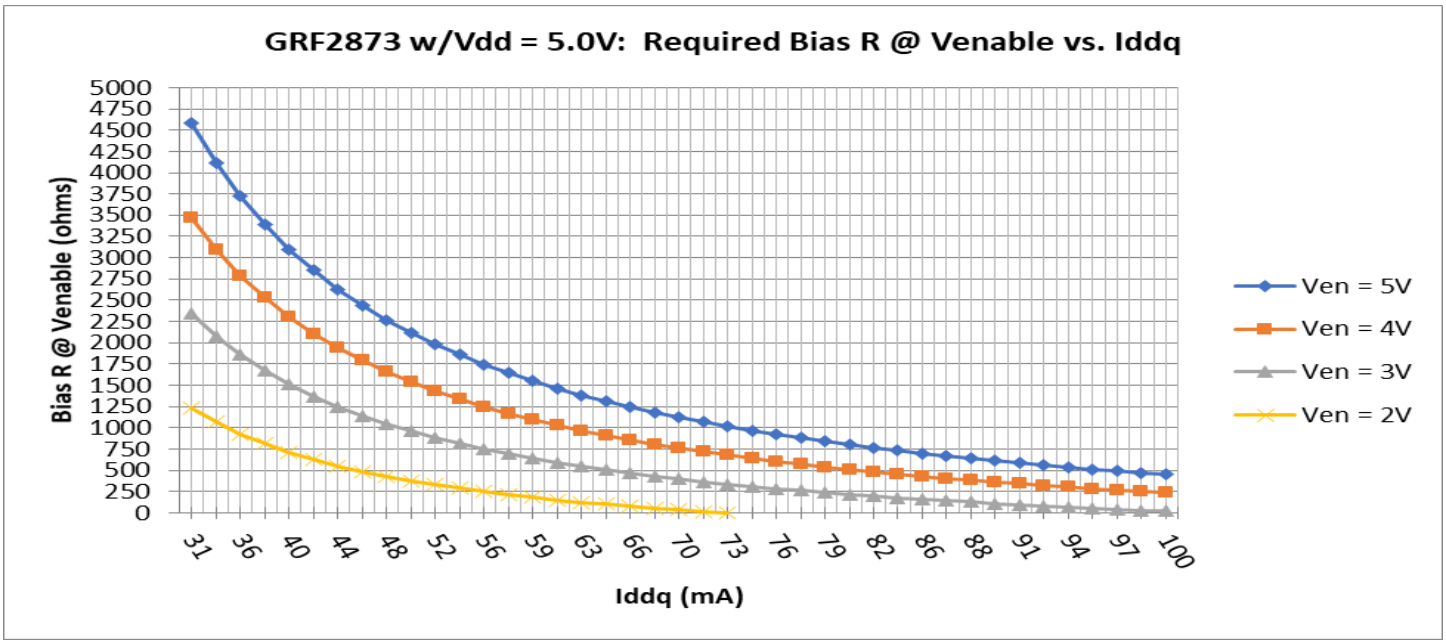


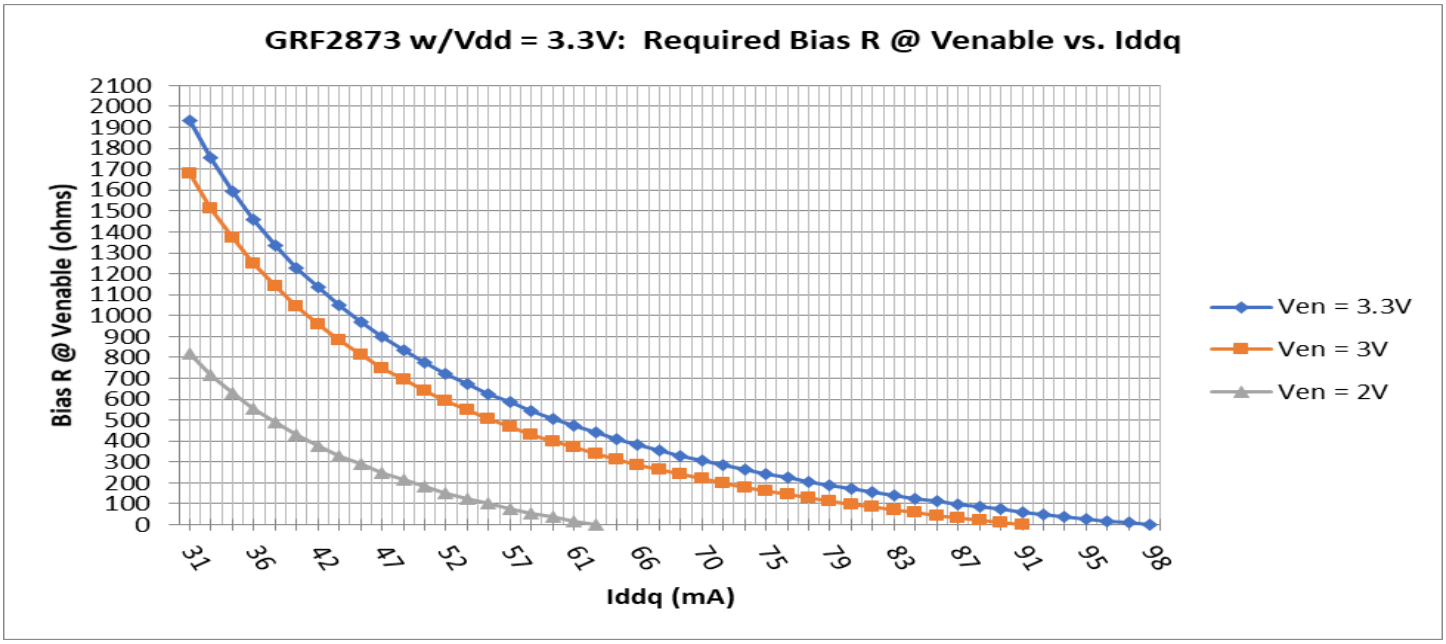
GRF2873 EVB Assembly Diagram

GRF2873 Evaluation Board BOM:

Component	Type	Manufacturer	Family	Value	Package Size	Substitution
M3 (See curves)	Resistor: 5%	Various	—	—	0402	ok
Evaluation Board	LFM_4X4_RevC					

GRF2873 Bias Resistor Selection Curves:

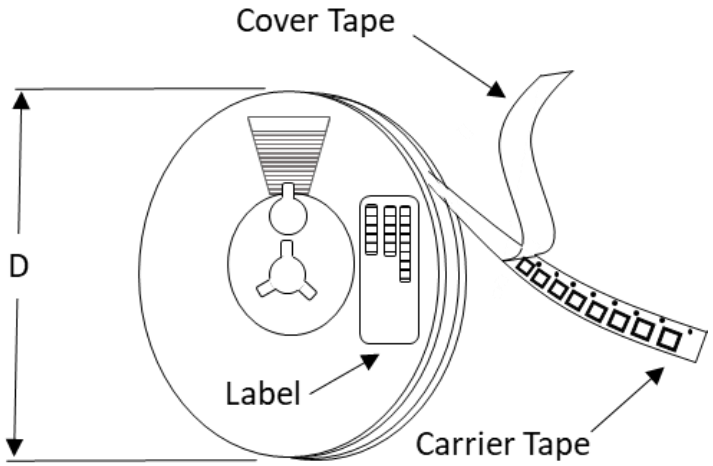




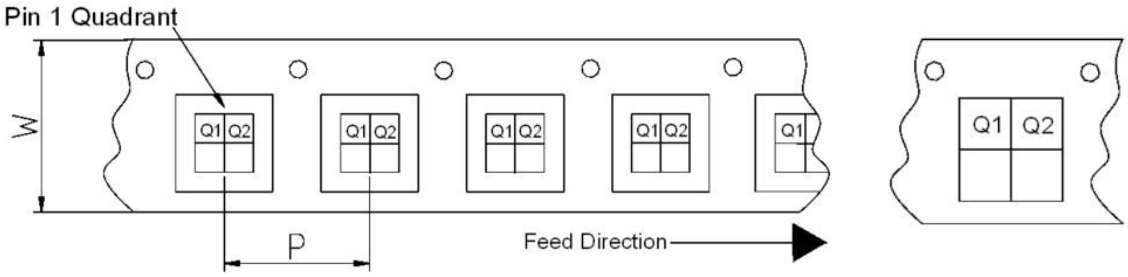
Tape and Reel Information:

Guerrilla RF's Tape and Reel specification complies with the Electronics Industries Association (EIA) standards for 'Embossed Carrier Tape of Surface Mount Components for Automatic Handling". Reference EIA-481. See the table on the following page for Tape and Reel specifications along with units per reel.

Devices are loaded with pins down into the carrier pocket with protective cover tape, wound into a plastic reel. Each reel will be packaged in a cardboard box. There will be product labels on the reel, the protective ESD bag and the outside surface of the box.



Tape and Reel Packaging with Reel Diameter Noted (D)



Carrier Tape Width (W), Pitch (P), Feed Direction and Pin 1 Quadrant Information

Tape and Reel Specification and Device Package Information Table

Package				Carrier Tape			Reel	
Type	Dimensions (mm)	Leads	Weight (mg)	Width (W) (mm)	Pocket Pitch (P) (mm)	Pin 1 Quad-rant	Diameter (D) (inches)	Units per Reel
QFN	2.0 x 2.0 x 0.50	12	7	8	4	Q1	7	2500
QFN	3.0 x 3.0 x 0.85	16	24	12	8	Q1	7	1500
DFN	1.5 x 1.5 x 0.45	6	4	8	4	Q1	7	2500
DFN	2.0 x 2.0 x 0.75	8	12	8	4	Q1	7	2500
LFM	3.5 x 3.5 x 0.75	See	TBD	12	8	Q2	7	1500
LFM	4.0 x 4.0 x 0.75	See note	TBD	12	8	Q2	7	1500

Note: Lead count may vary. Reference applicable product data sheet

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.