GRF2105

Released

Enhanced Gain Flatness LNA 0.4 to 5.0 GHz

Features

Reference: 5V/70mA/2.5 GHz

- Gain: 20.5 dB
- Eval Board NF: 0.77 dB
- OP1dB: 21.0 dBm
- OIP3: 37.0 dBm
- Flexible bias voltage and Current
- Process: GaAs pHEMT

Applications

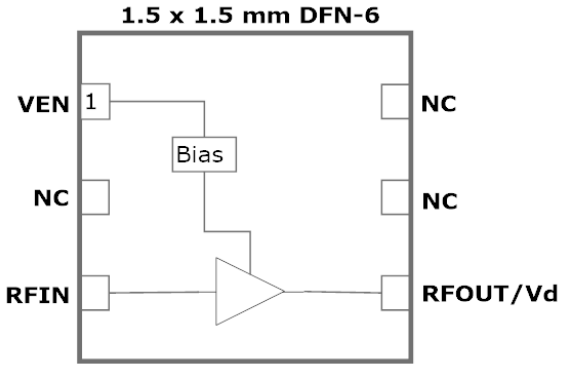
- Broadband LNA
- Linear Driver Amplifier
- Small Cells and Cellular Repeaters
- Wireless Backhaul
- C-Band Amplifier to 5.0 GHz
- 3.5 GHz CBRS
- TDD-LTE

Product Description

GRF2105 is a broadband, ultra-low noise linear amplifier designed for small cell, wireless infrastructure and other high performance RF applications. The standard tune exhibits outstanding NF and linearity, return losses and enhanced gain flatness over 0.4 to 3.8 GHz.

The device is operated from a supply voltage (Vdd) range of 2.7 to 6.0 V with a typical bias condition of 5 volts and 70 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)	$P_{IN\ MAX}$		20	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	$P_{DISS\ MAX}$		0.6	W
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	--

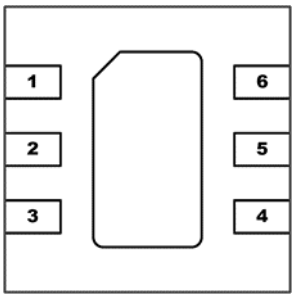
Caution! ESD Sensitive Device

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

Note: For manufacturing information, see the Guerrilla-RF.com website for the following document located on the GRF2105 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:

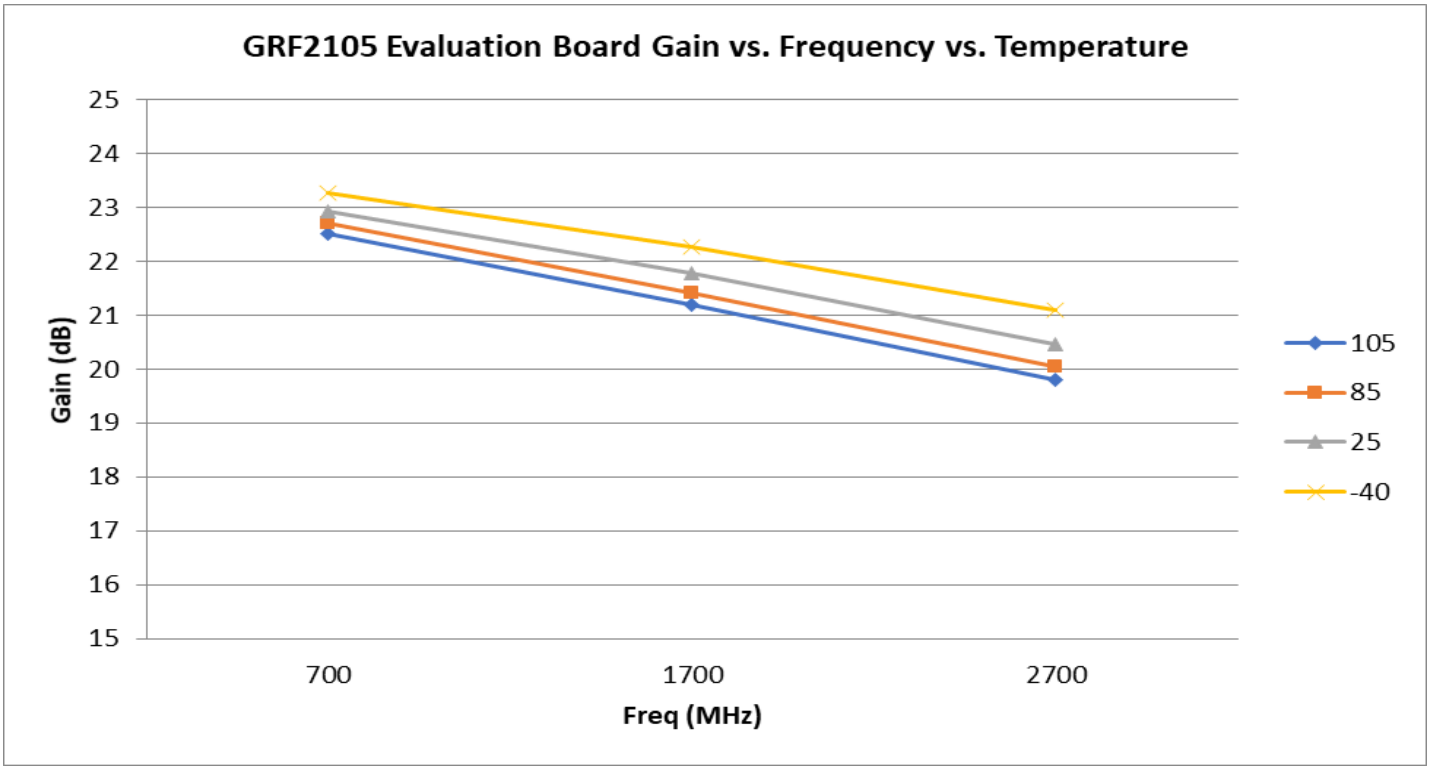
Pin	Name	Description	Note
1	V_{ENABLE}	Enable Voltage Input	V_{ENABLE} and series resistor set I_{DDQ}. V_{ENABLE} < =0.2 volts disables device. On -die pull-down resistor will turn the part off if this node is allowed to float.
2	NC	No Connect or Ground	No internal connection to die
3	RF_In	LNA RF input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

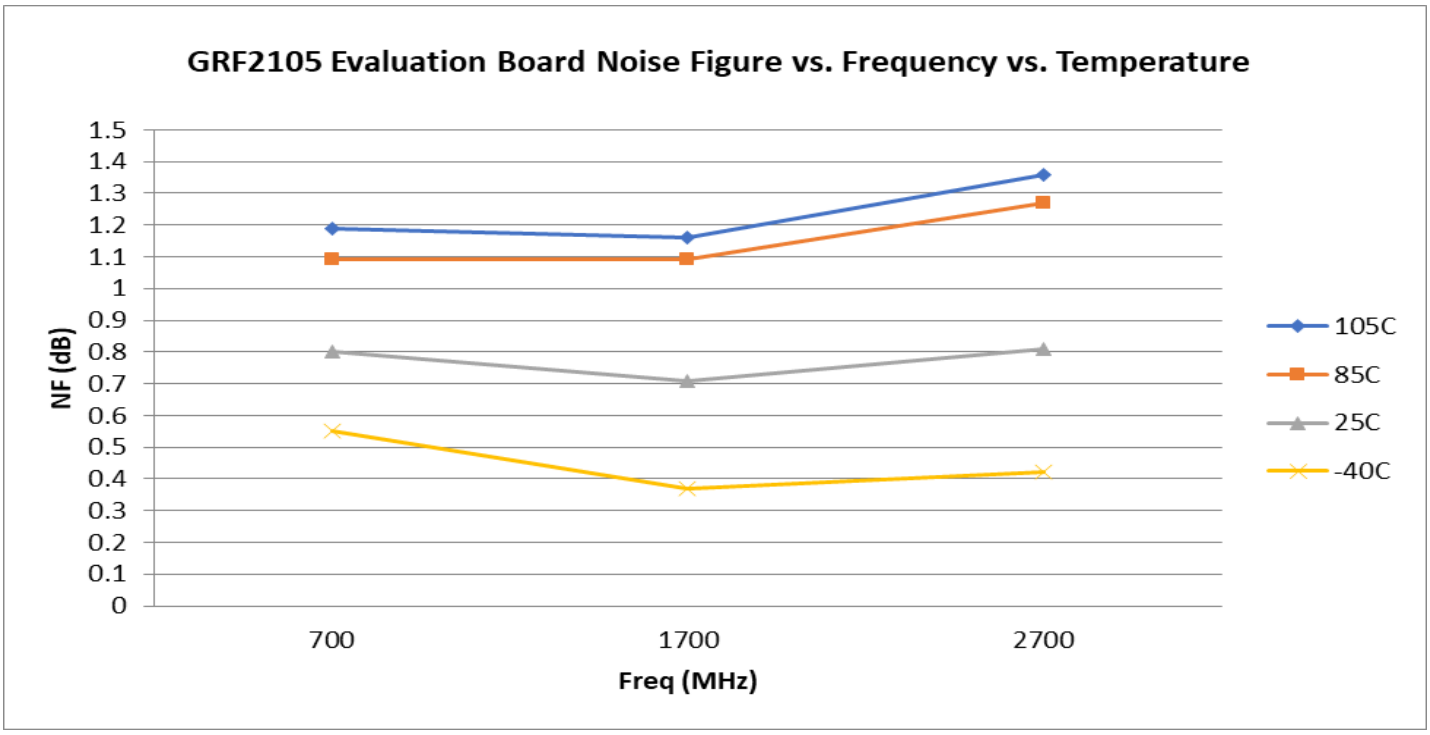
Nominal Operating Parameters:

Parameter	Symbol	Specification			Unit	Condition
		Min.	Typ.	Max.		
Test Frequency	F_{TEST}		2.5		GHz	V_{DD} = 5.0 V, T_A = 25°C
Gain	S21	19.0	20.5		dB	
Evaluation Board Noise Figure	NF		0.77		dB	
Output 1dB Compression Power	OP1dB	19.0	21.0		dBm	
Output 3rd Order Intercept	OIP3		37.0		dBm	2.0 dBm P_{OUT} per tone (2499 and 2501 MHz)
Switching Rise Time	T_{RISE}		1200		ns	
Switching Fall Time	T_{FALL}		400		ns	
Supply Current	I_{DD}		70		mA	
Enable Current	I_{ENABLE}		1.5		mA	
Disabled Mode						
Leakage Current	$I_{LEAKAGE}$		270		uA	V_{DD}: 5.0V; V_{ENABLE}: 0.0V
Thermal Data						
Thermal Resistance: (Infra-Red Scan)	θjc		55		°C/W	On standard Evaluation Board
Channel Temperature @ +85 C Reference (Package heat sink)	$T_{CHANNEL}$		104 (See note)		°C	V_{DD}: 5.0 V; I_{DDQ}: 70 mA; No RF; P_{DISS}: 350 mW

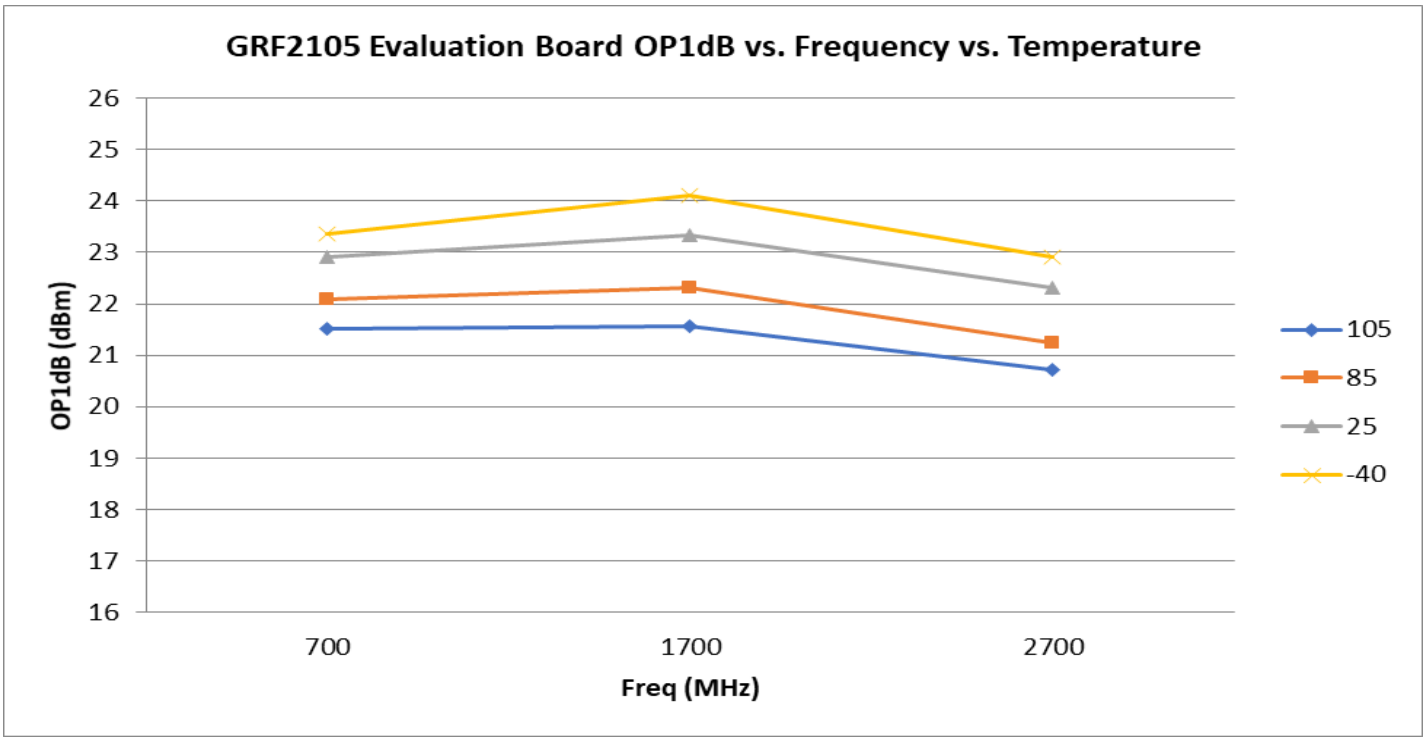
Note: MTTF >10^6 hours for $T_{CHANNEL}$ < =170 degrees C.

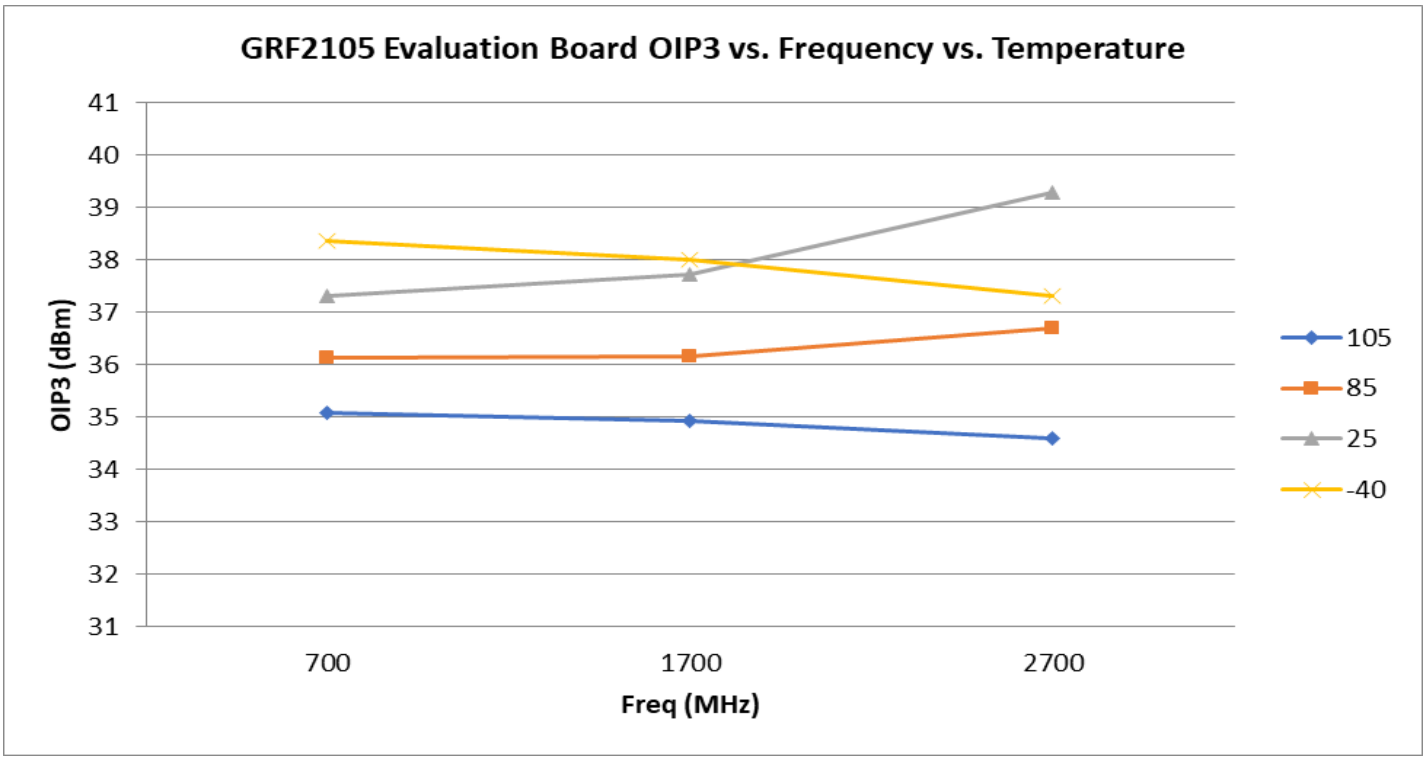
GRF2105 Evaluation Board Measured Data: (0.4 to 3.8 GHz Tune)





GRF2105 Evaluation Board Data: (0.4 to 3.8 GHz Tune)





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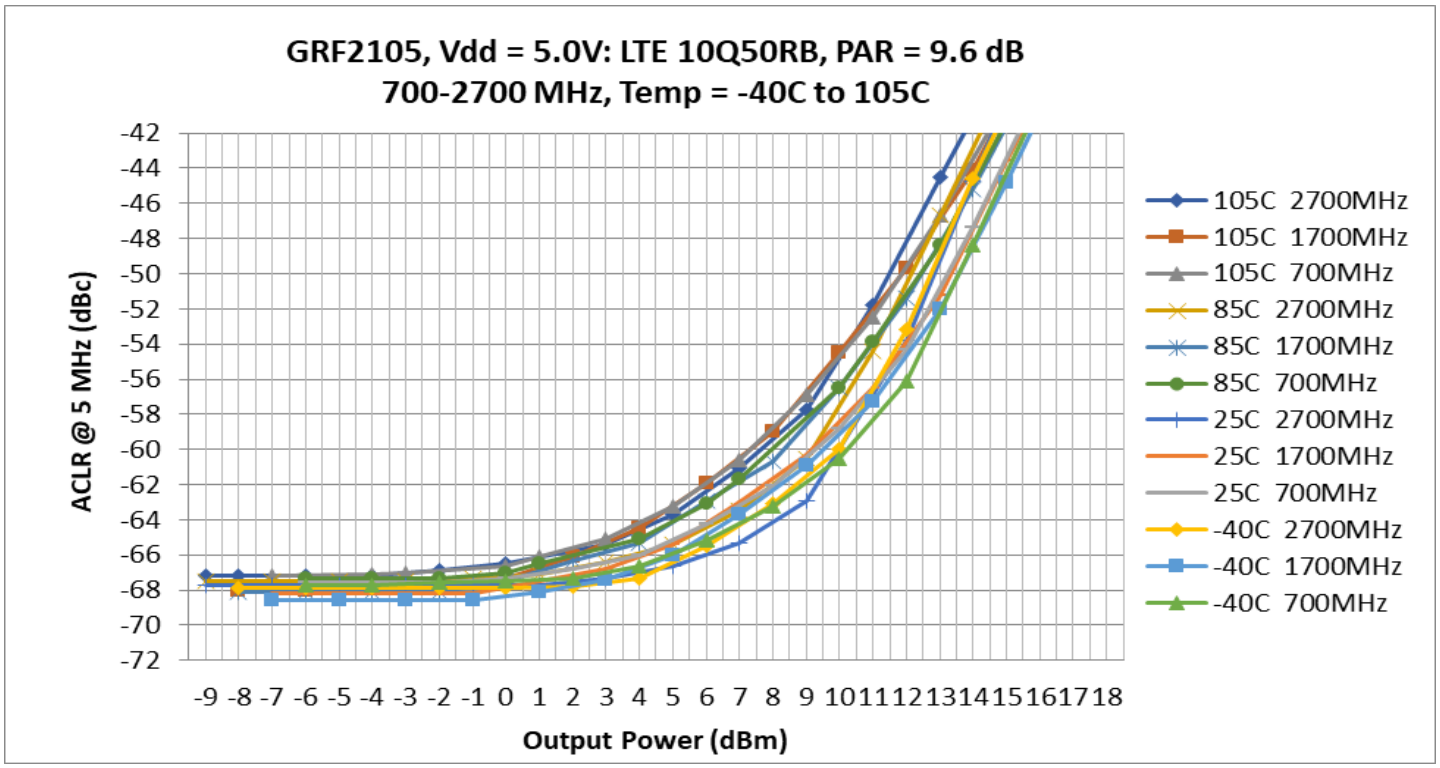
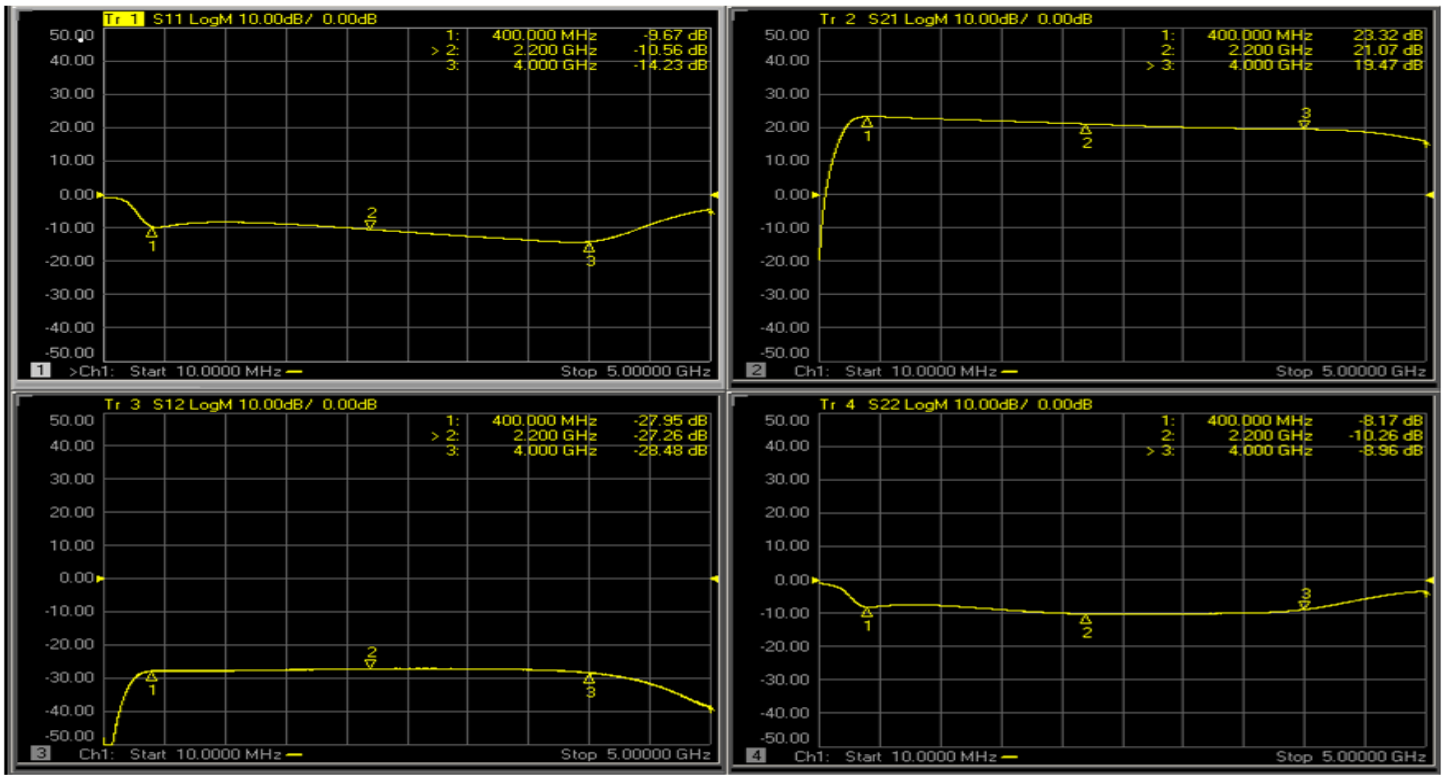
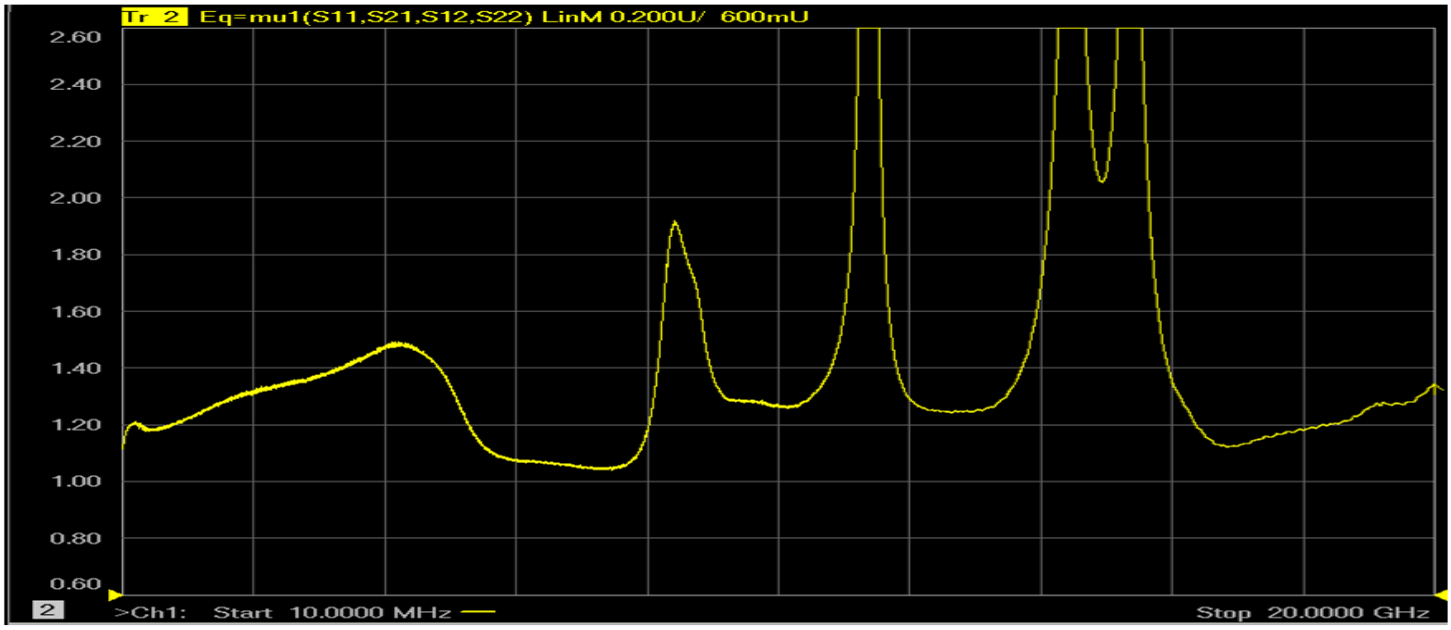
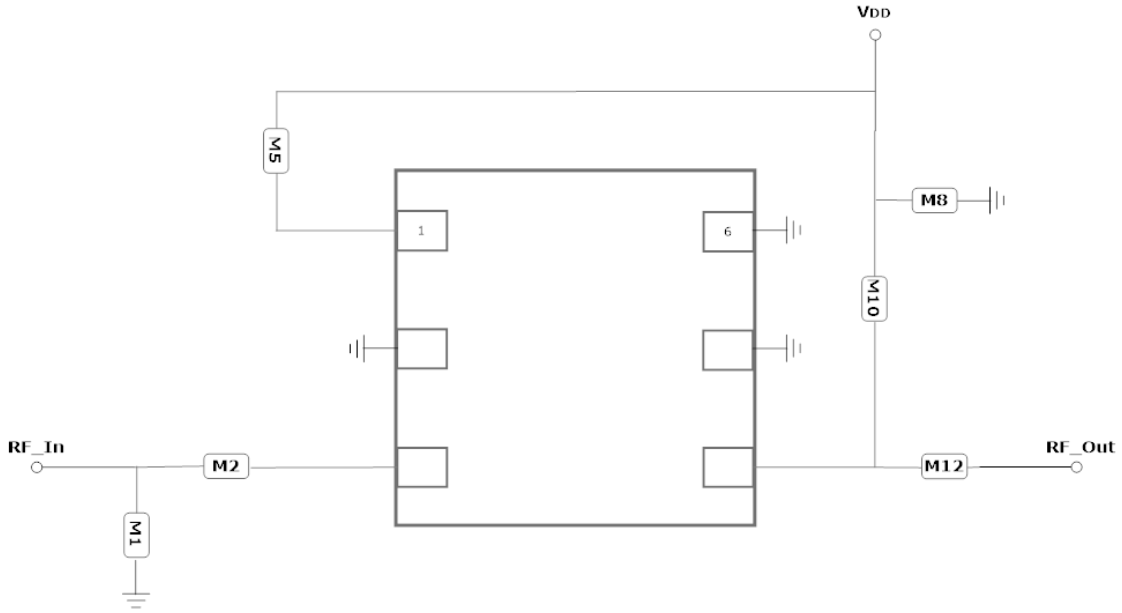


GRF2105 Evaluation Board S-Pars and Stability Mu Factor: (0.4 to 3.8 GHz Tune)

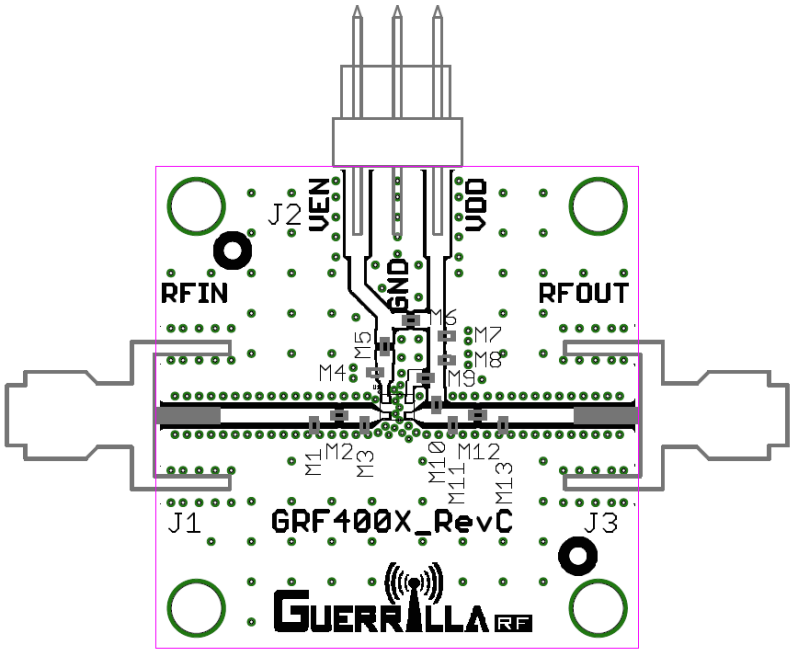




Note: Mu factor >= 1.0 implies unconditional stability.



GRF2105 Application Schematic

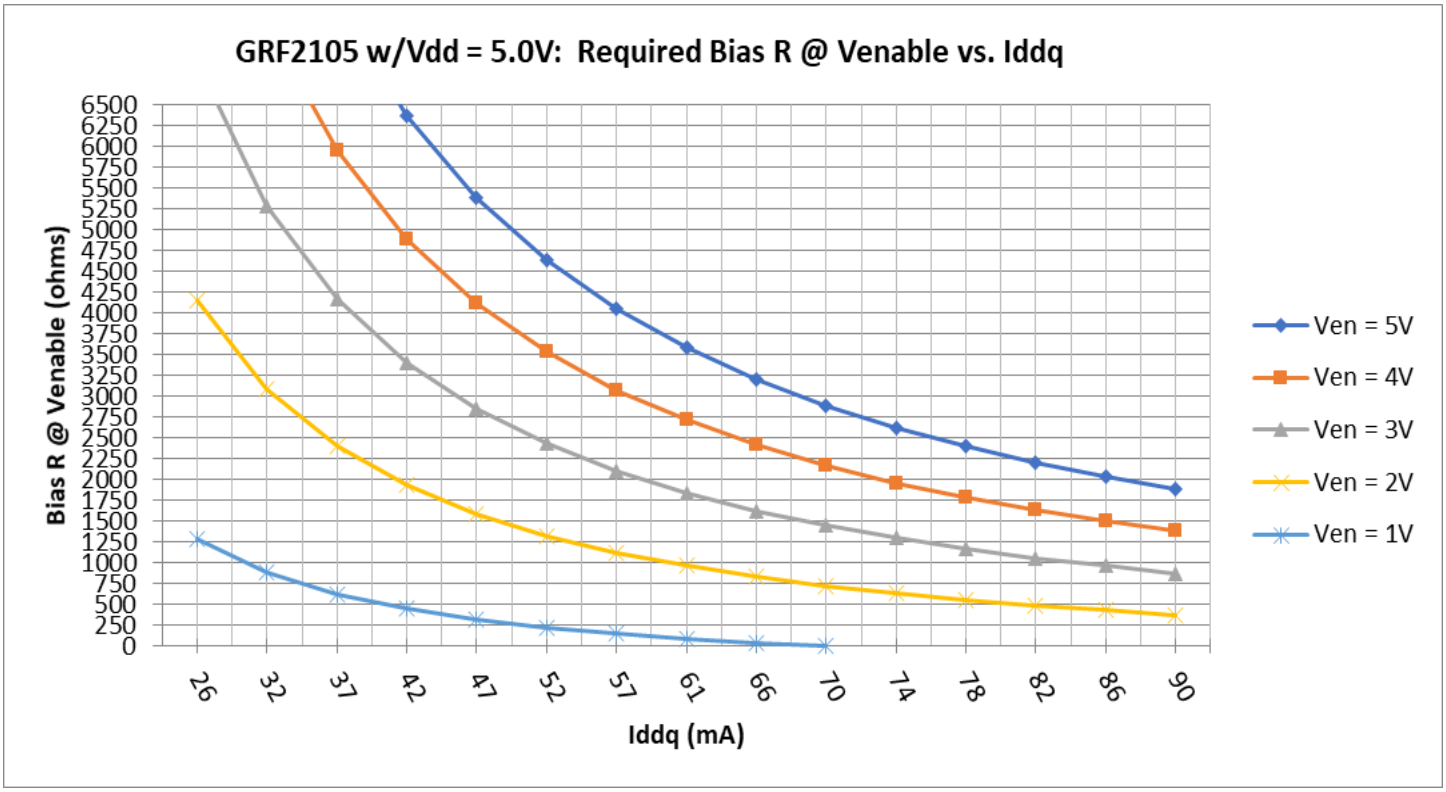


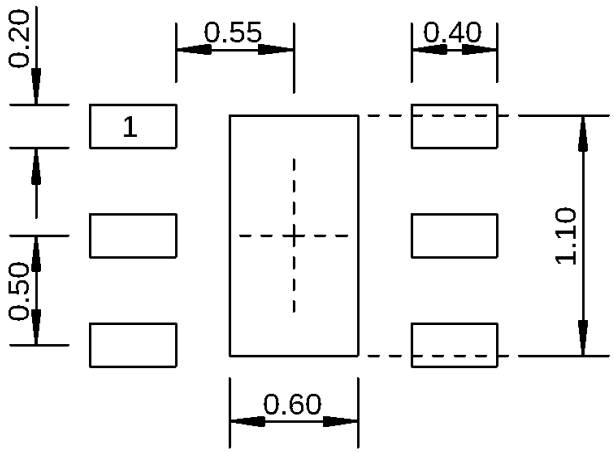
GRF2105 Evaluation Board Assembly Diagram

GRF2105 Standard Evaluation Board BOM: (0.4 to 3.8 GHz Tune)

Component	Type	Manufacturer	Family	Value	Package Size	Substitution
M1	Inductor	Murata	LQW/LQP	27 nH	0402	ok
M2	Capacitor	Murata	GJM	15 pF	0402	ok
M5	Resistor	Various	5%	Sets Iddq	0402	ok
M8	Capacitor	Murata	GRM	0.1 uF	0402	ok
M10	Inductor	Murata	LQW/LQP	27 nH	0402	ok
M12	Capacitor	Murata	GRM	1000pF	0402	ok

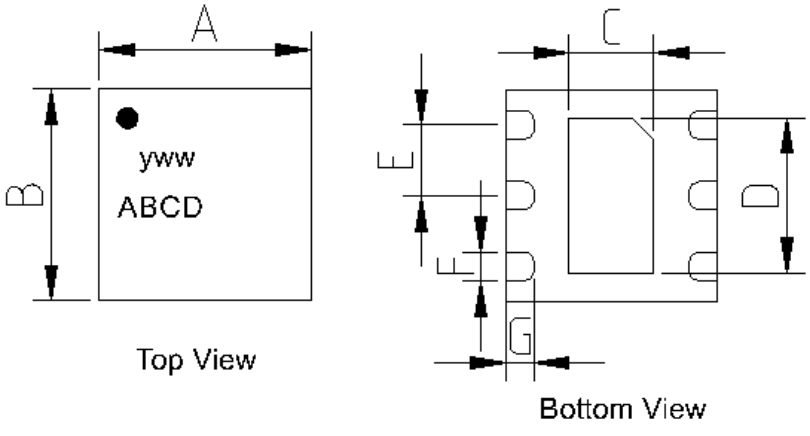
GRF2105 Bias R vs. Iddq:





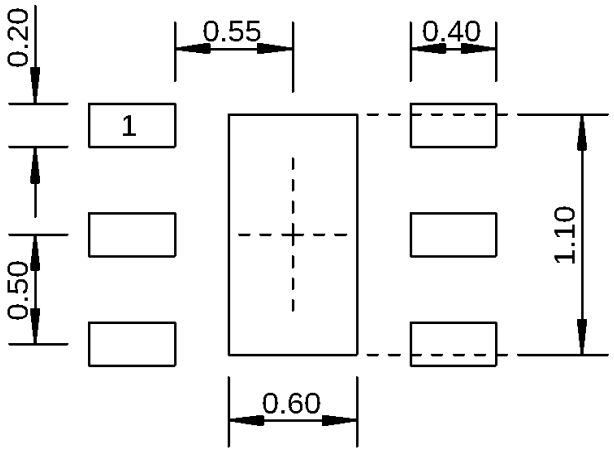
Dimensions in millimeters

1.5 mm DFN-6 Suggested PCB Footprint (Top View)



Dimensions (MM)	
A	1.5 +/- 0.050
B	1.5 +/- 0.050
C	.6 +/- 0.050
D	1.1 +/- 0.050
E	.5 Bsc
F	.2 +/- 0.050
G	.2 +/- 0.050
H	.45 +/- 0.050
J	.12 Ref.

1.5 mm DFN-6 Package Dimensions



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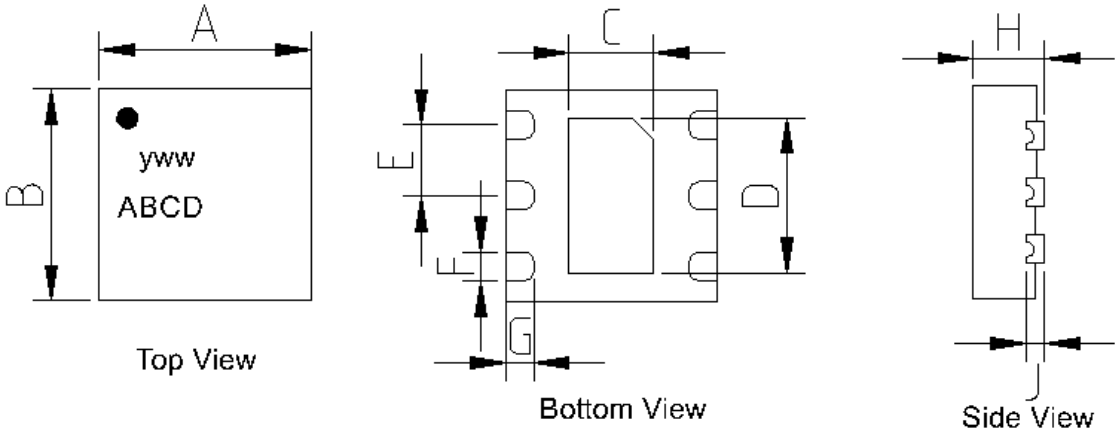

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1.5 mm DFN-6 Package Dimensions

Released

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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