



Product Description

GRF2374 is a low noise amplifier (LNA) with bypass designed for high-performance WLAN/ISM and other applications up to 3.8 GHz. The device is ideal for low power, cost sensitive bypass amplifier applications.

The LNA is operated from a single positive supply of 2.7 to 5.0 V with typical bias condition of 3.3 volts and 15 mA.

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

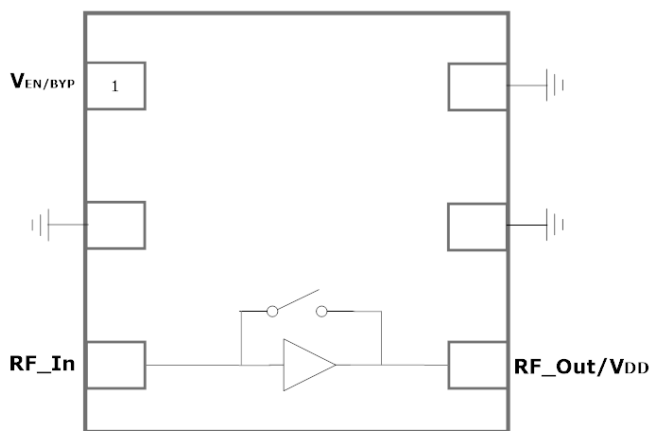
Features

Reference: 3.3V/15mA/2.4 GHz

- EVB NF: 1.4 dB
- Gain: 14.0 dB
- Bypass Gain: -1.8 dB
- OP1dB: 11.0 dBm
- Flexible voltage: 2.7 to 5.0 volts
- Simple matching to 50 ohms
- Process: InGaP HBT

Applications

- WiFi Access Points
- Mobile WiFi Devices
- Cellular Boosters
- Drones
- Set Top Boxes
- VHF/UHF/900/2400 ISM



1.5 x 1.5 mm DFN-6



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GRF2374

Low Current LNA w/Bypass
Tuning Range: 0.1 to 3.8 GHz

Absolute Ratings:

Parameter	Symbol	Min.	Max.	Unit
Supply Voltage	V _{DD}	0	5.5	V
RF Input Power: (Load VSWR < 2:1; V _c : 5.0 volts)	P _{IN MAX}		20	dBm
Operating Temperature (Package Heat Sink)	T _{AMB}	-40	85	°C
Maximum Channel Temperature (MTTF > 10 ⁶ Hours)	T _{MAX}		150	°C
Maximum Dissipated Power	P _{DISS MAX}		100	mW
Electrostatic Discharge:				
Charged Device Model: (TBD)	CDM	1500		V
Human Body Model: (TBD)	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 GRF2374 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}/BYPASS	LNA enable/Bypass Control	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 connections to die
3	RF_In	LNA RF input	Requires external DC block.
4	RF_Out/V_{CC}	LNA RF output	Requires external bias inductor followed by DC block.
5	NC	No Connect or Ground	No internal connections to die
6	NC	No Connect or Ground	No internal connections 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.

V_{ENABLE} Truth Table:

Mode	Description	V _{ENABLE} /BYPASS
High Gain	High LNA Gain	1
Bypass	High Linearity Bypass	0
Logic Level "0"	Logic Low	0.0V to 0.3V
Logic Level "1"	Logic High	1.5V to V _{CC}



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Nominal Operating Parameters:

Parameter	Symbol	Specification			Unit	Condition
		Min.	Typ.	Max.		
High Gain Mode						V _{CC} = 3.3 V; V _{ENABLE} : High
Test Frequency	F _{TEST}		2.4		GHz	
Gain	S ₂₁		14.0		dB	
Noise Figure (Evaluation Board)	NF		1.4		dB	
Input Power for 1.0% EVM (Gain Mode)	IP1%		-18		dBm	Waveform: 802.11g/n PAR: 11.6 dB
Input Power for 1.0% EVM (Bypass Mode)	IP1%		TBD		dBm	Waveform: 802.11g/n PAR: 11.6 dB
Output 1dB Compression Point	OP1dB		11.0		dBm	
Output Intercept Point	OIP3		23.5		dBm	-5.0 dBm P _{OUT} per tone (2399 and 2401 MHz)
Switching Rise Time	T _{RISE}		700		ns	Bypass to gain mode
Switching Fall Time	T _{FALL}		700		ns	Gain to bypass mode
Supply Current	I _{CC}		15		mA	
Enable Current	I _{ENABLE}		1.7		mA	
Bypass Mode						V _{CC} : 3.3 V; Ven: 0.0 V
Gain	S(2,1)		-1.8		dB	
Output 1dB Compression Point	OP1dB		6.5		dBm	
Output Intercept Point	OIP3		19.5		dBm	-5.0 dBm P _{OUT} per tone (2399 and 2401 MHz)
Supply Current	I _{CC}		4.0		mA	
Thermal Data						
Thermal Resistance (Infra-Red Scan)	Θ _{JC}		700		°C/W	
Channel Temperature @ +85 C reference (Package heat sink)	T _{CHANNEL}		120 (See note)		°C	V _{CC} : 3.3 V; I _{CCQ} : 15 mA; No RF; Dissipated Power: 50 mW

Note: MTTF >10⁶ hours for T_{CHANNEL} <=170 degrees C.

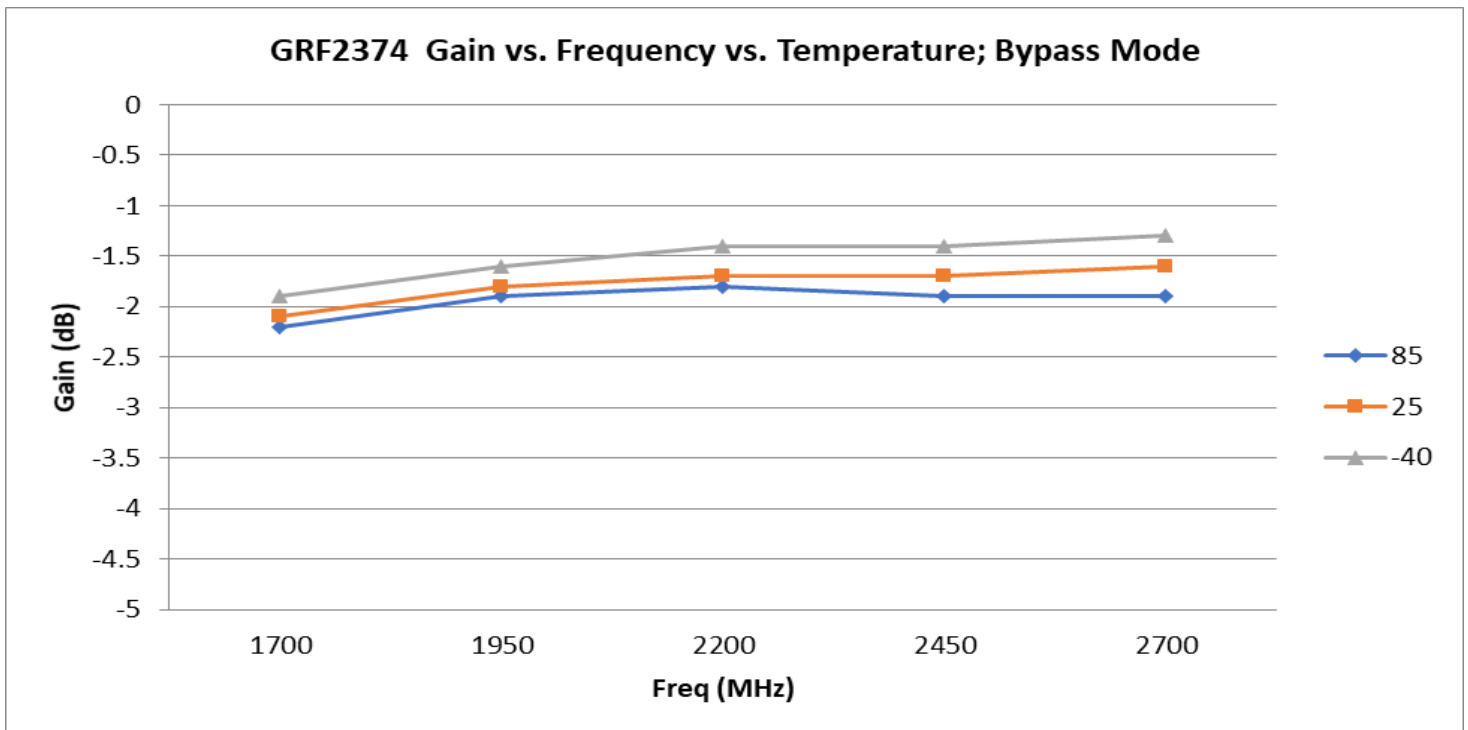
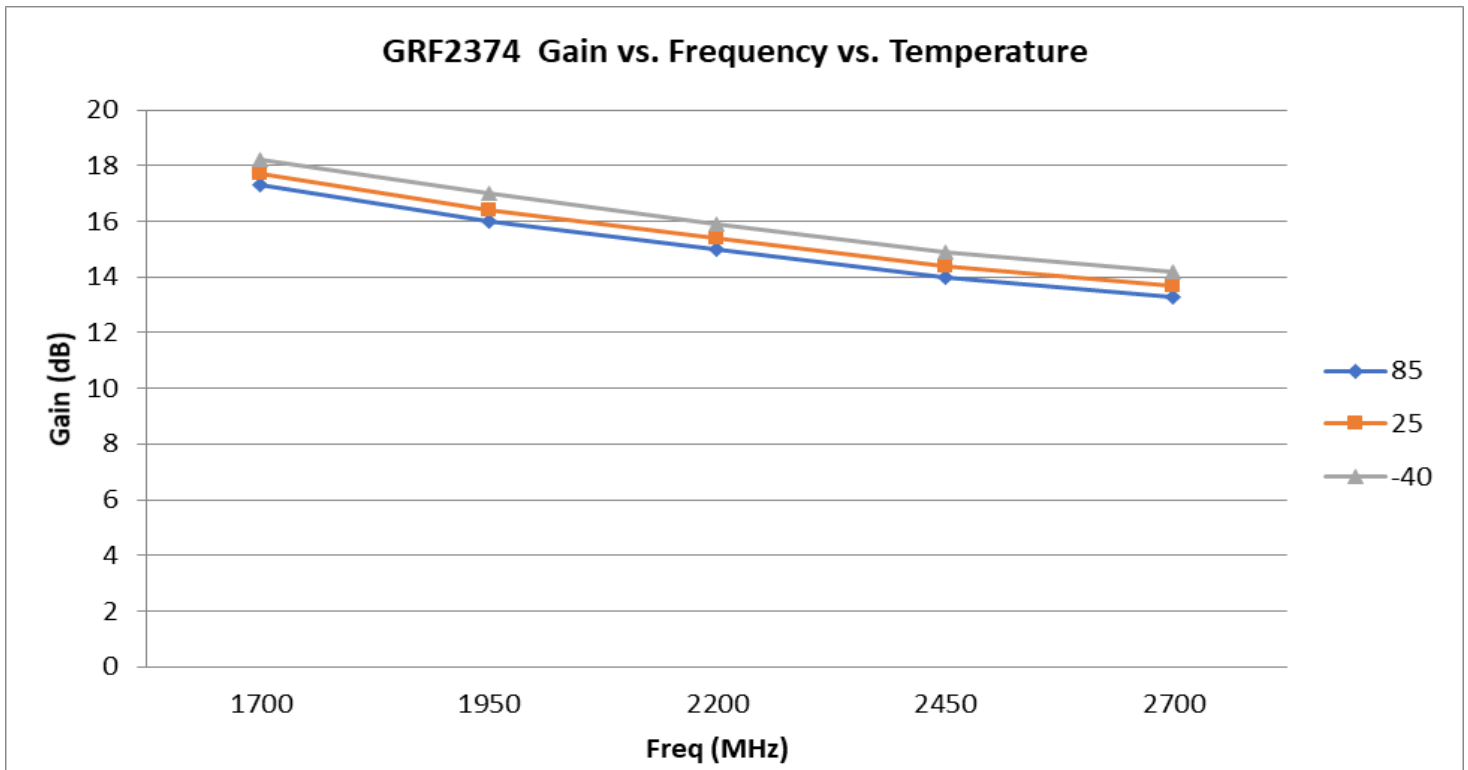


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GRF2374 Evaluation Board Measured Data (3.3V/15 mA)



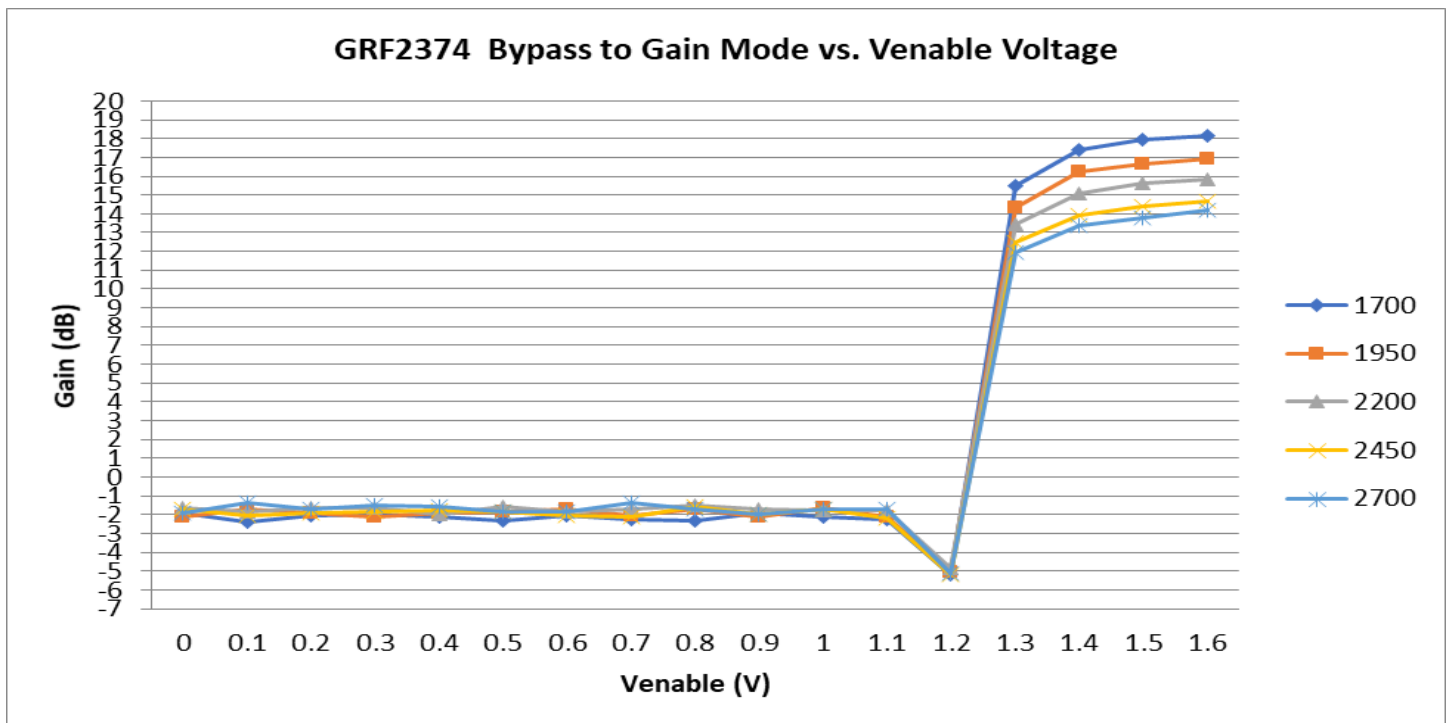
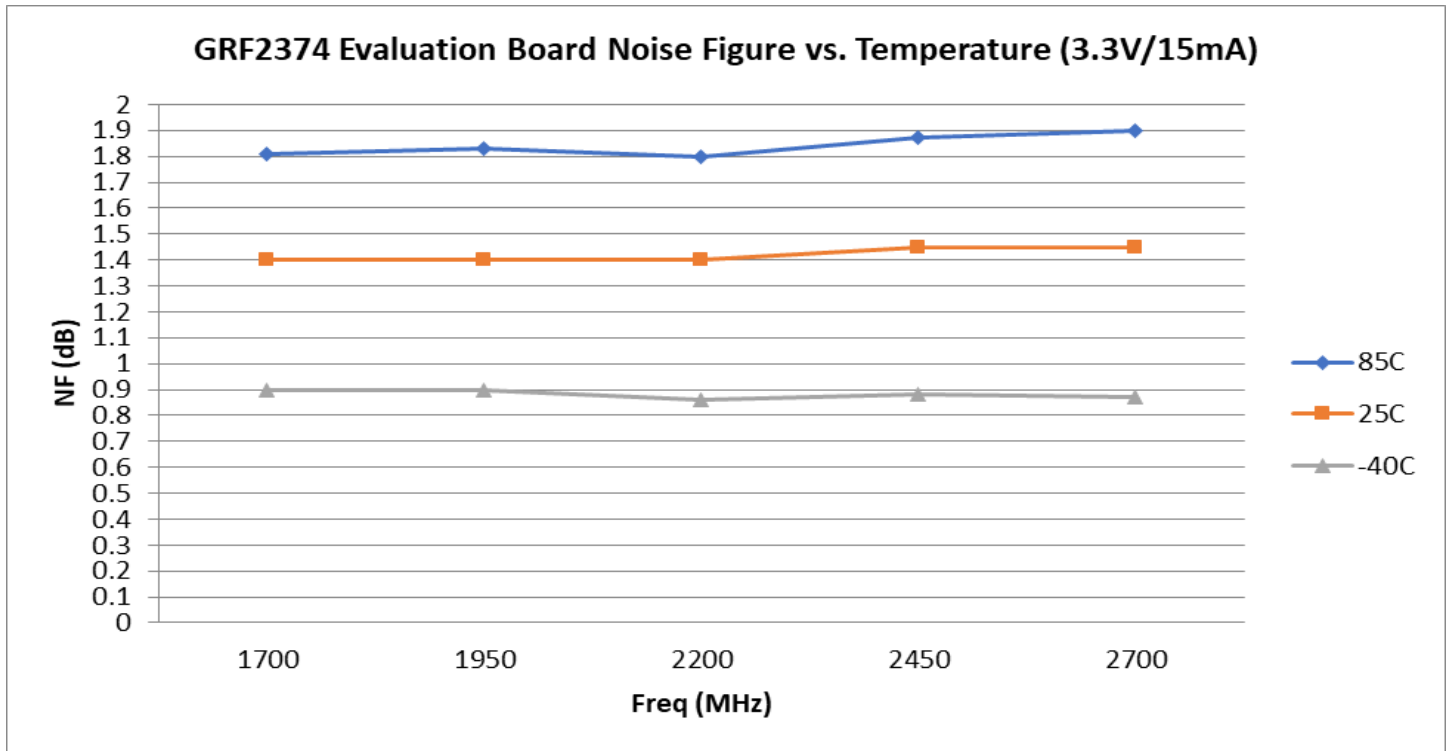


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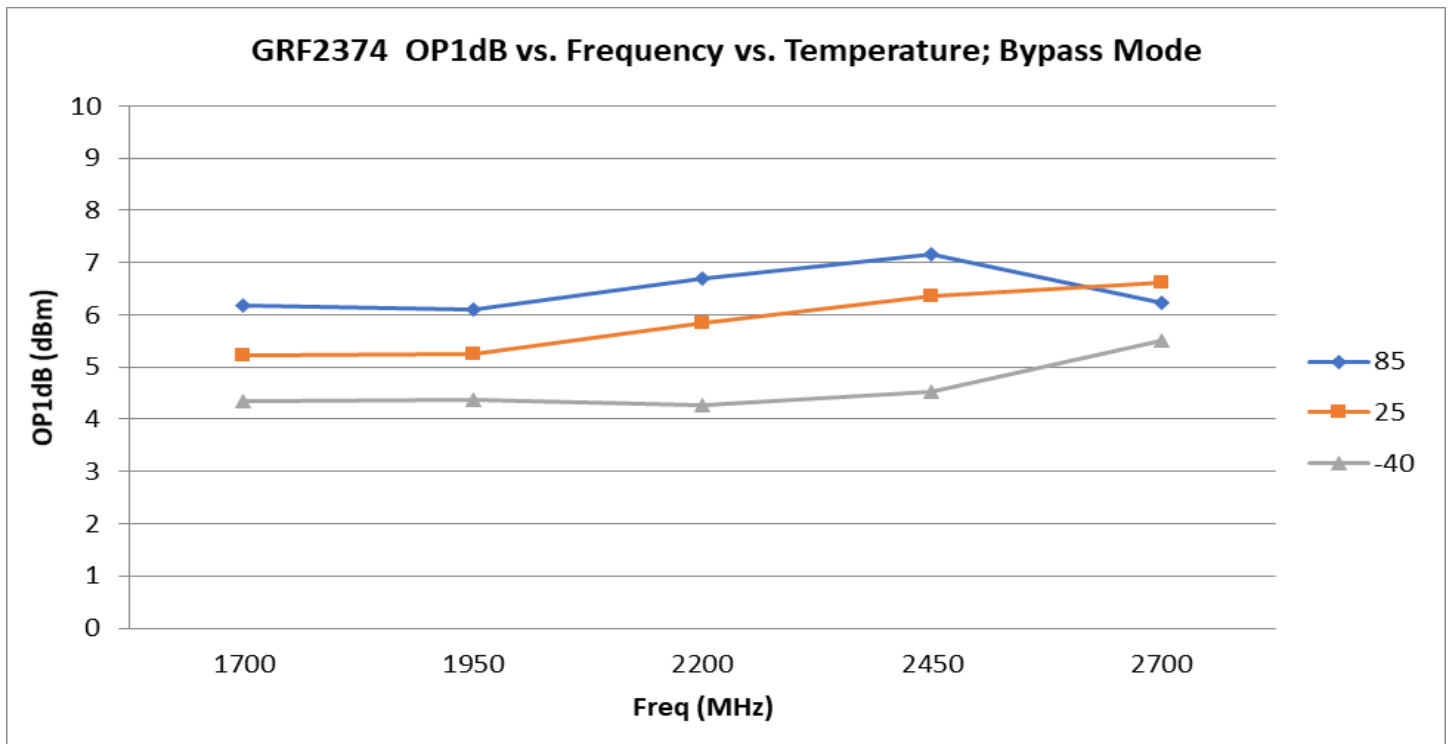
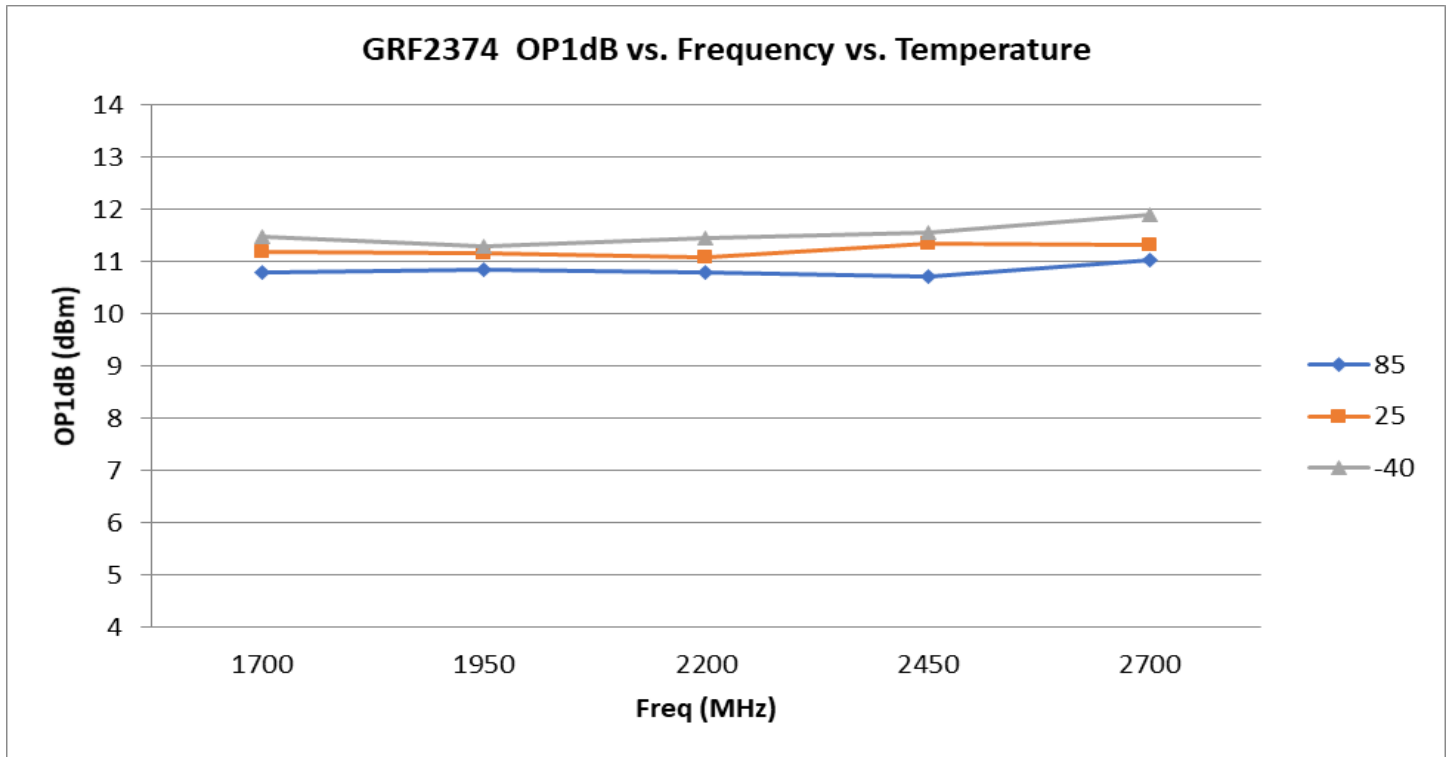


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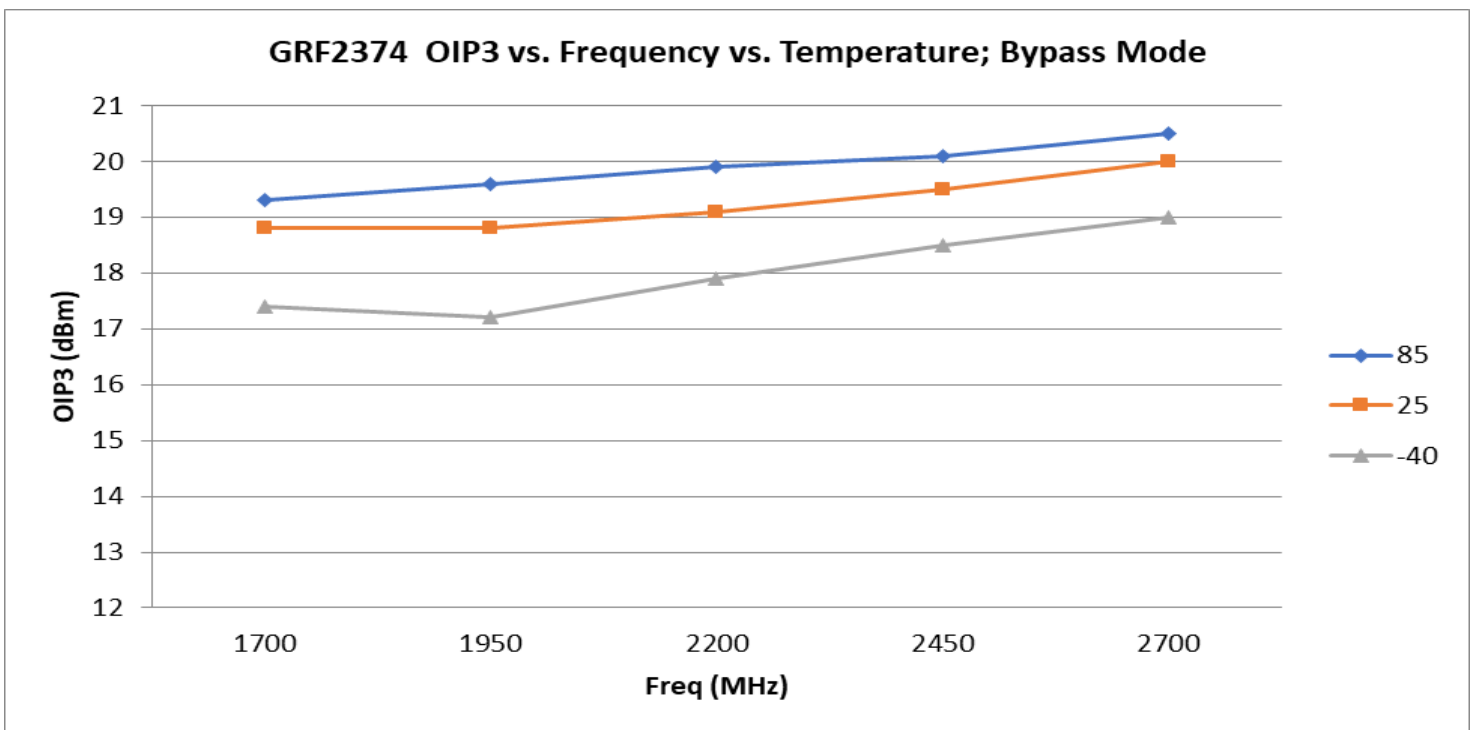
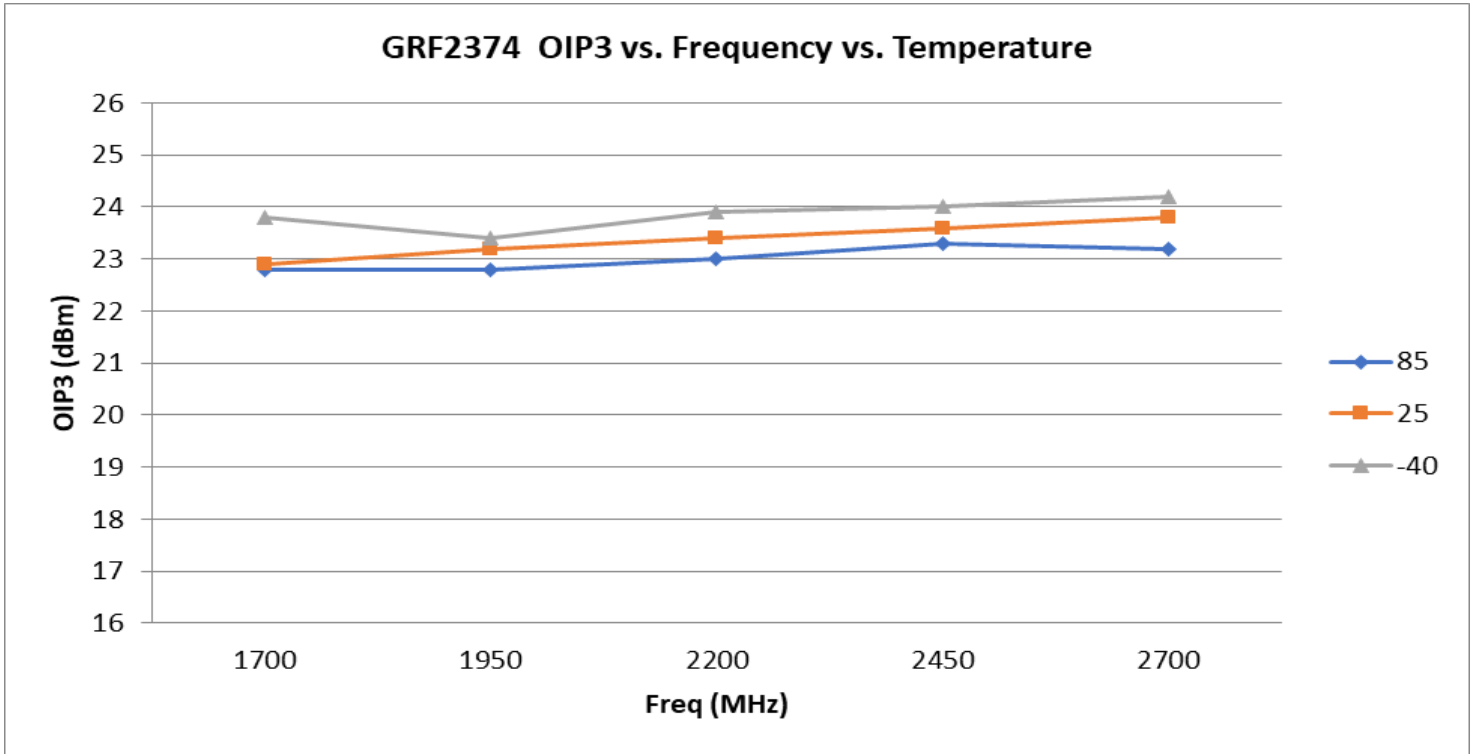


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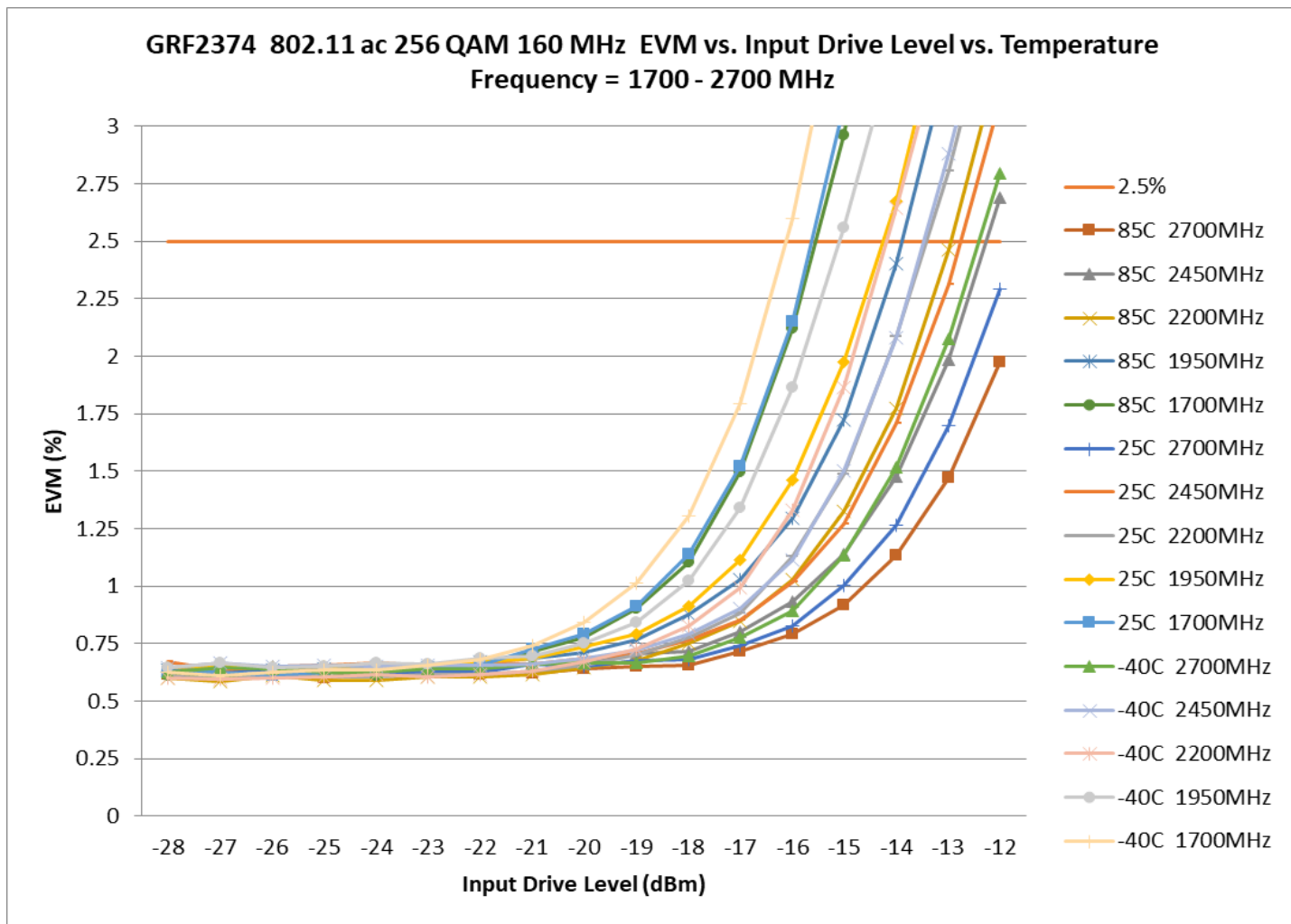


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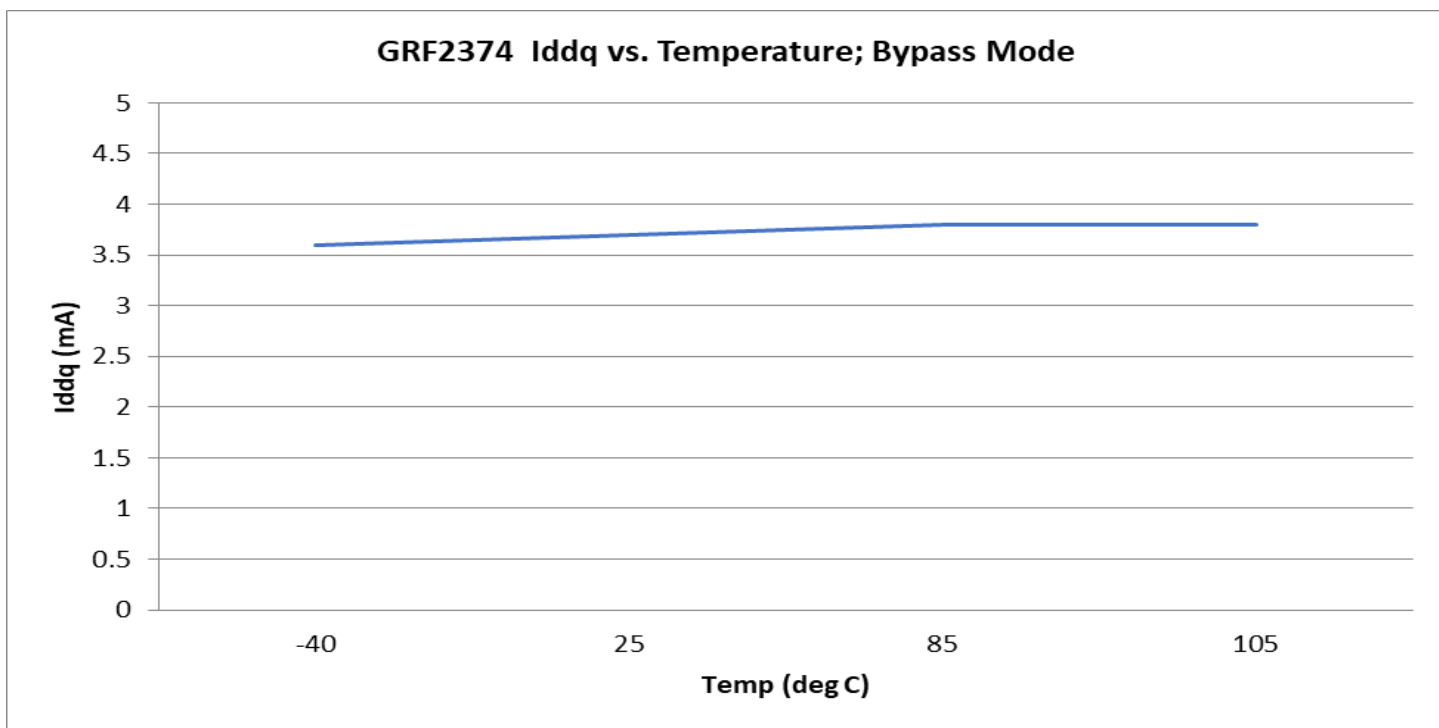
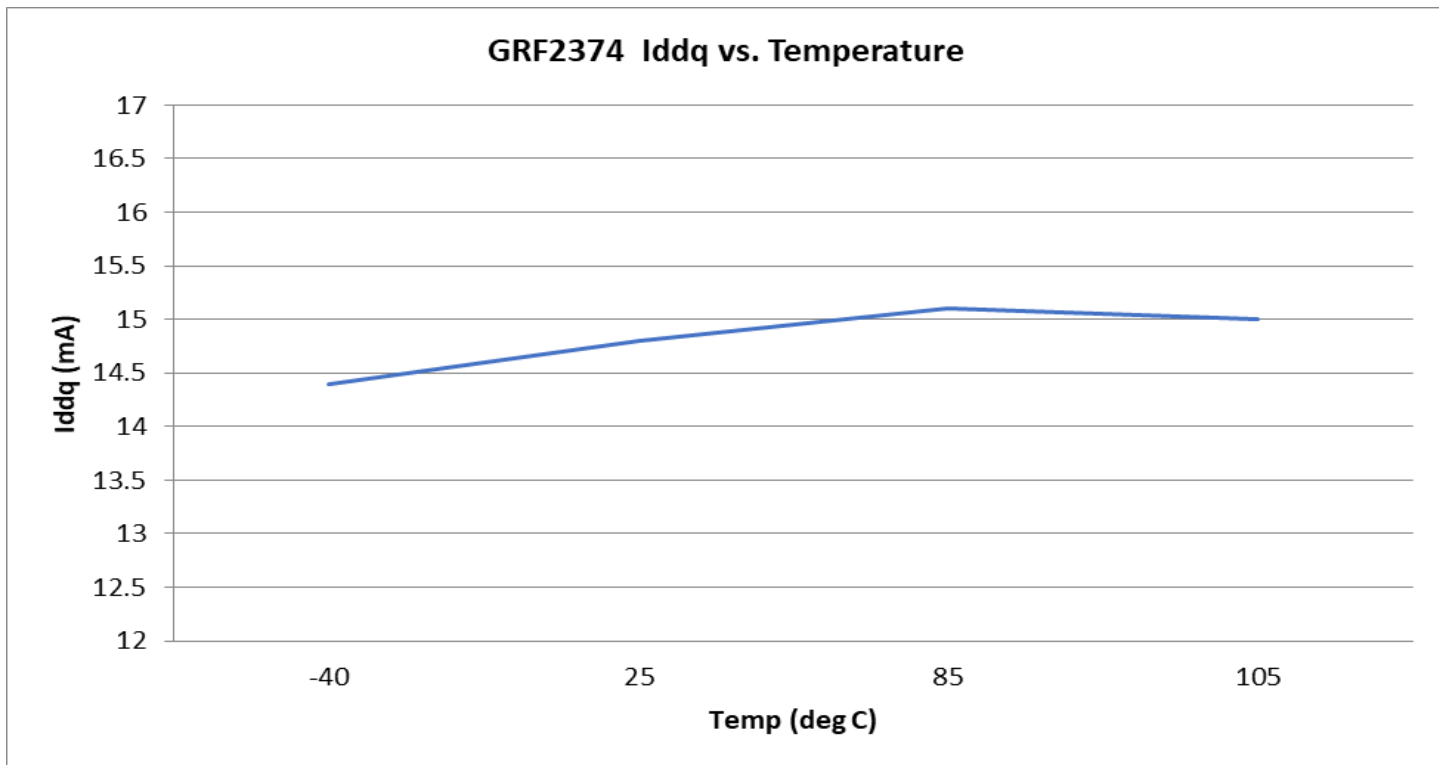


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GRF2374 Evaluation Board Measured Data (3.3V/15mA)



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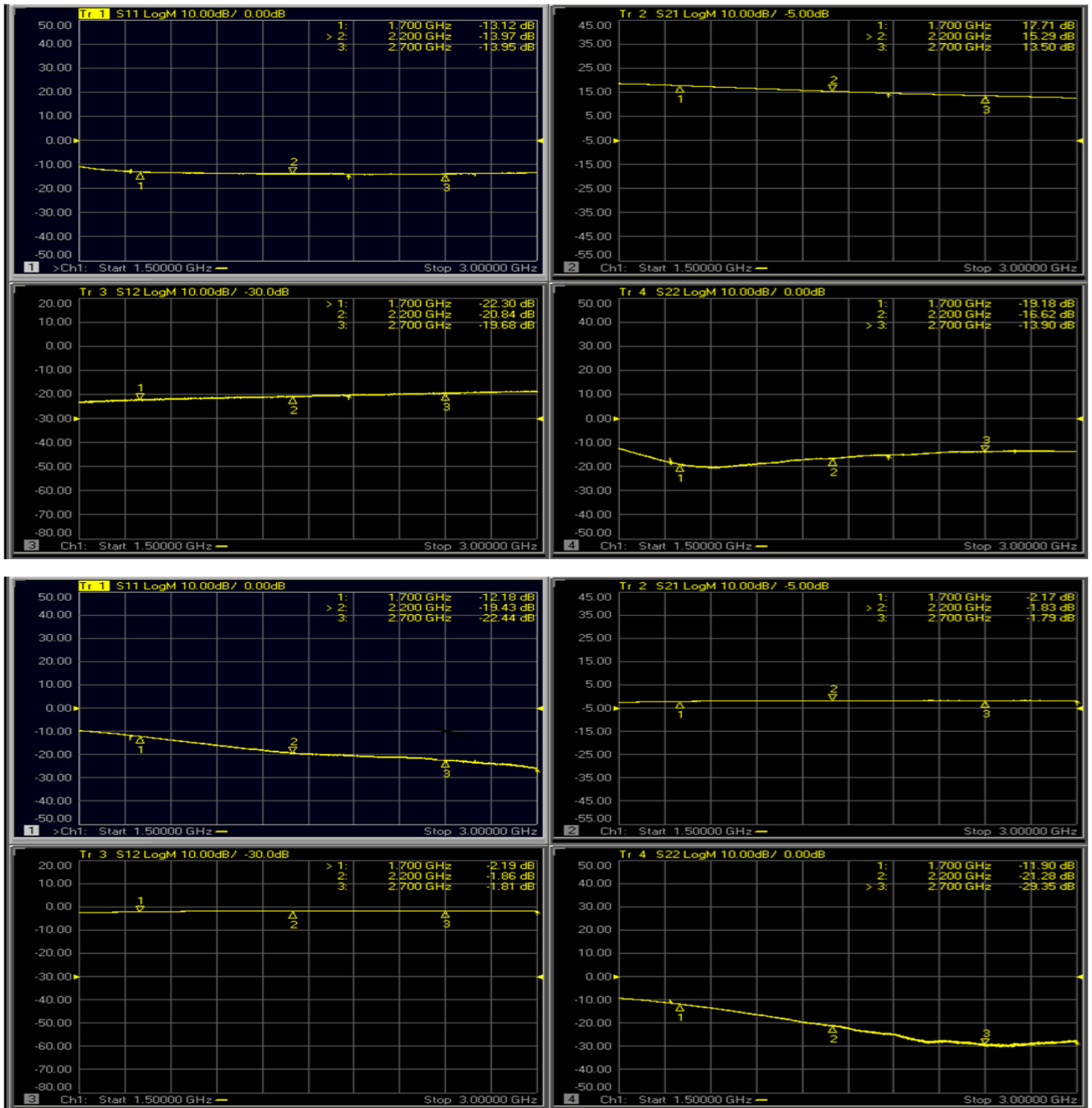


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Low Current LNA w/Bypass
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GRF2374 Evaluation Board S-Parms: (Gain and Bypass Modes)



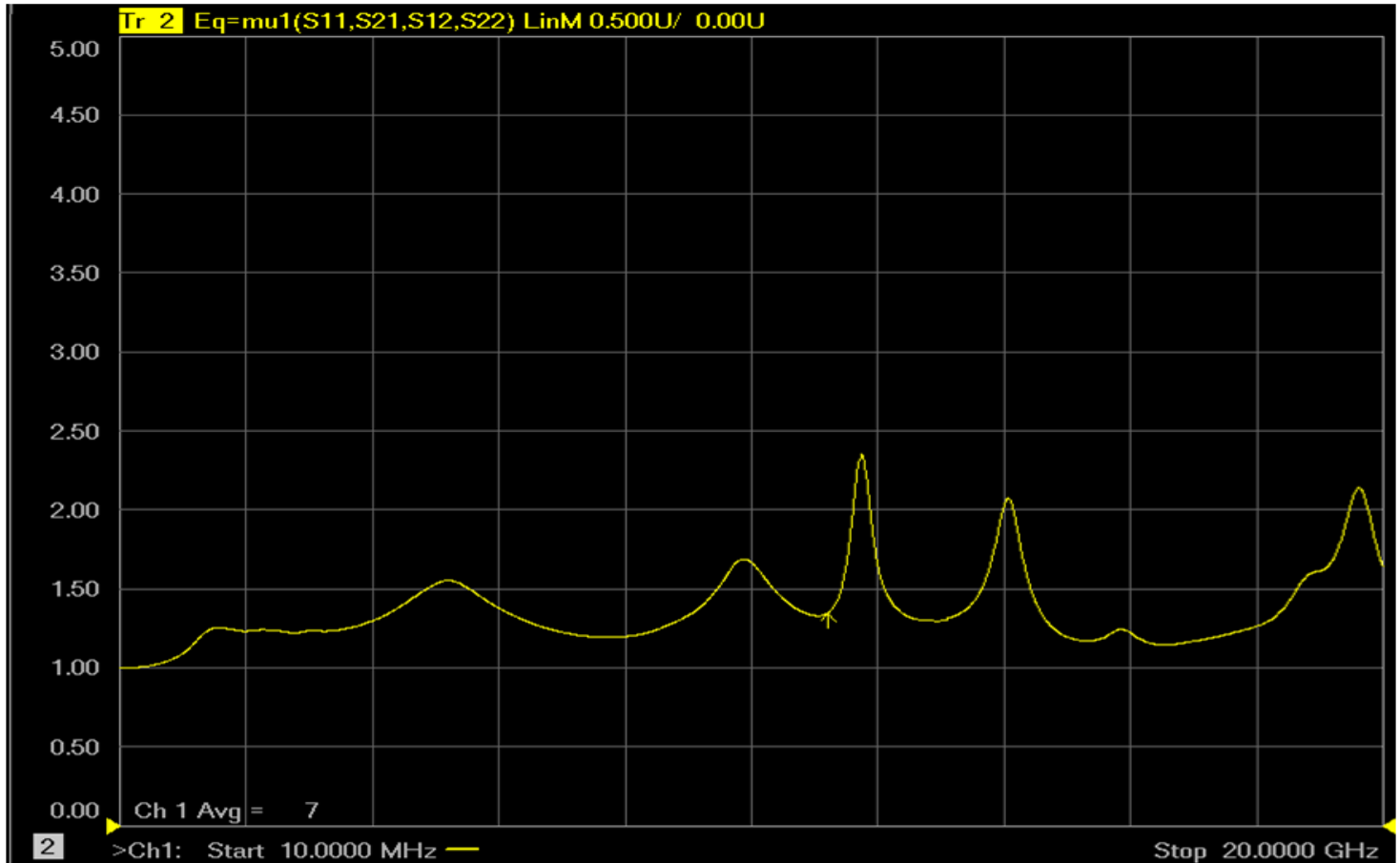


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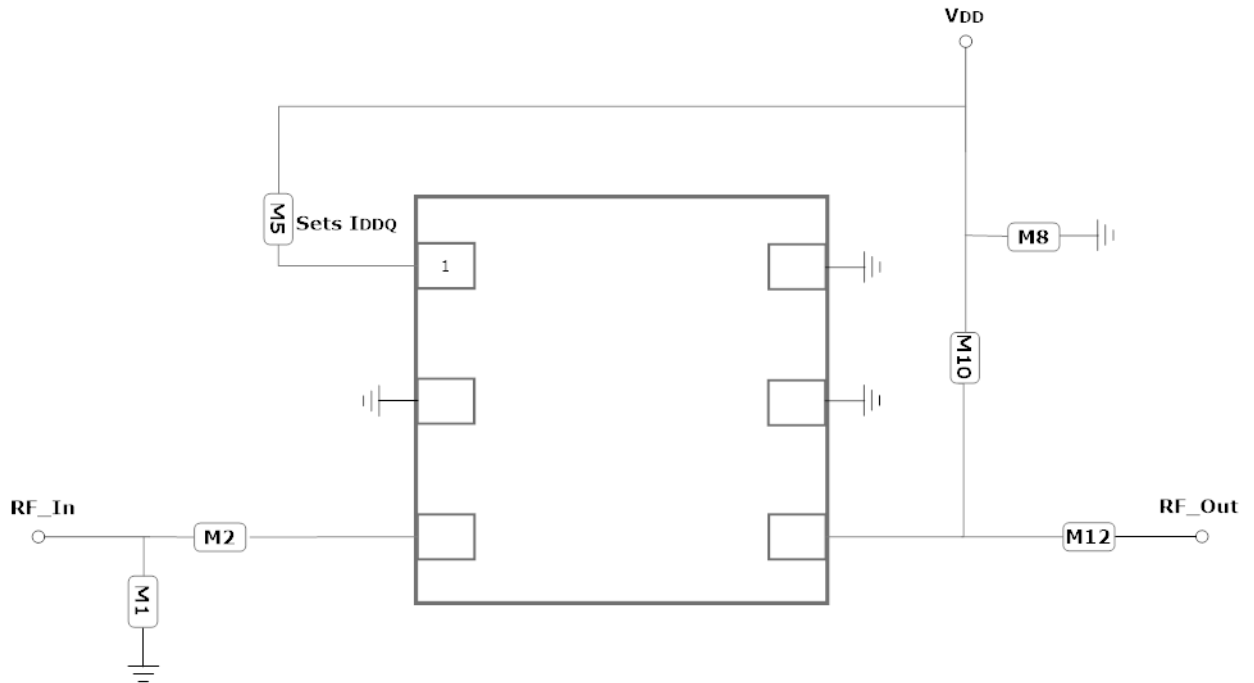
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Low Current LNA w/Bypass
Tuning Range: 0.1 to 3.8 GHz

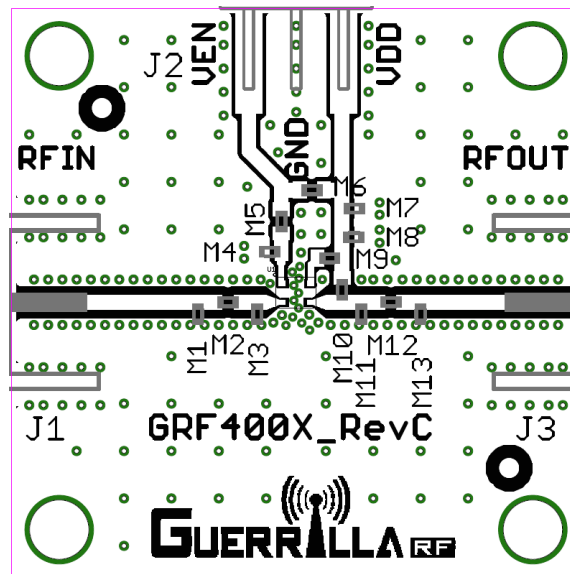
GRF2374 Evaluation Board Stability Mu Factor; (3.3V/15mA)



Note: $\mu \geq 1.0$ implies unconditional stability



GRF2374 Application Schematic



GRF2374 Evaluation Board Assembly Diagram



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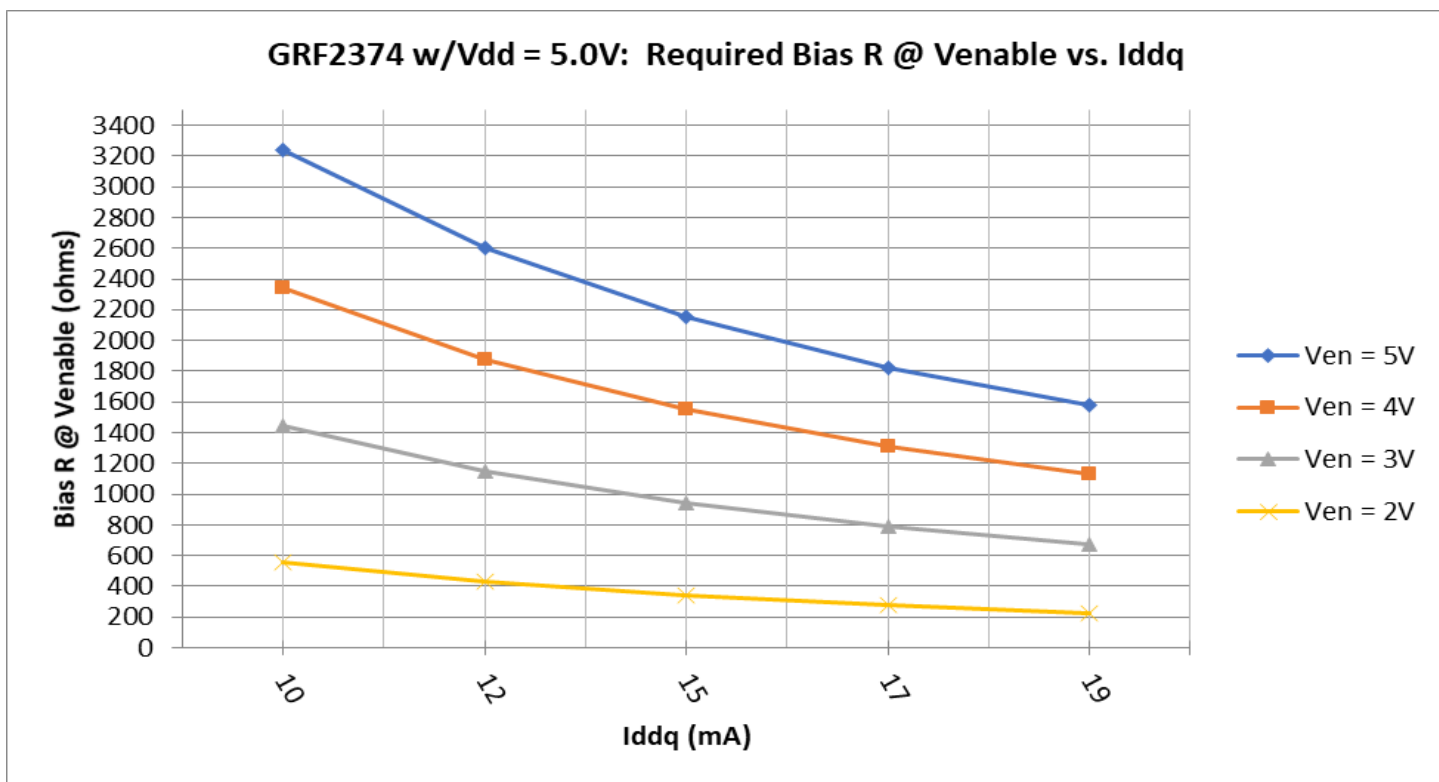
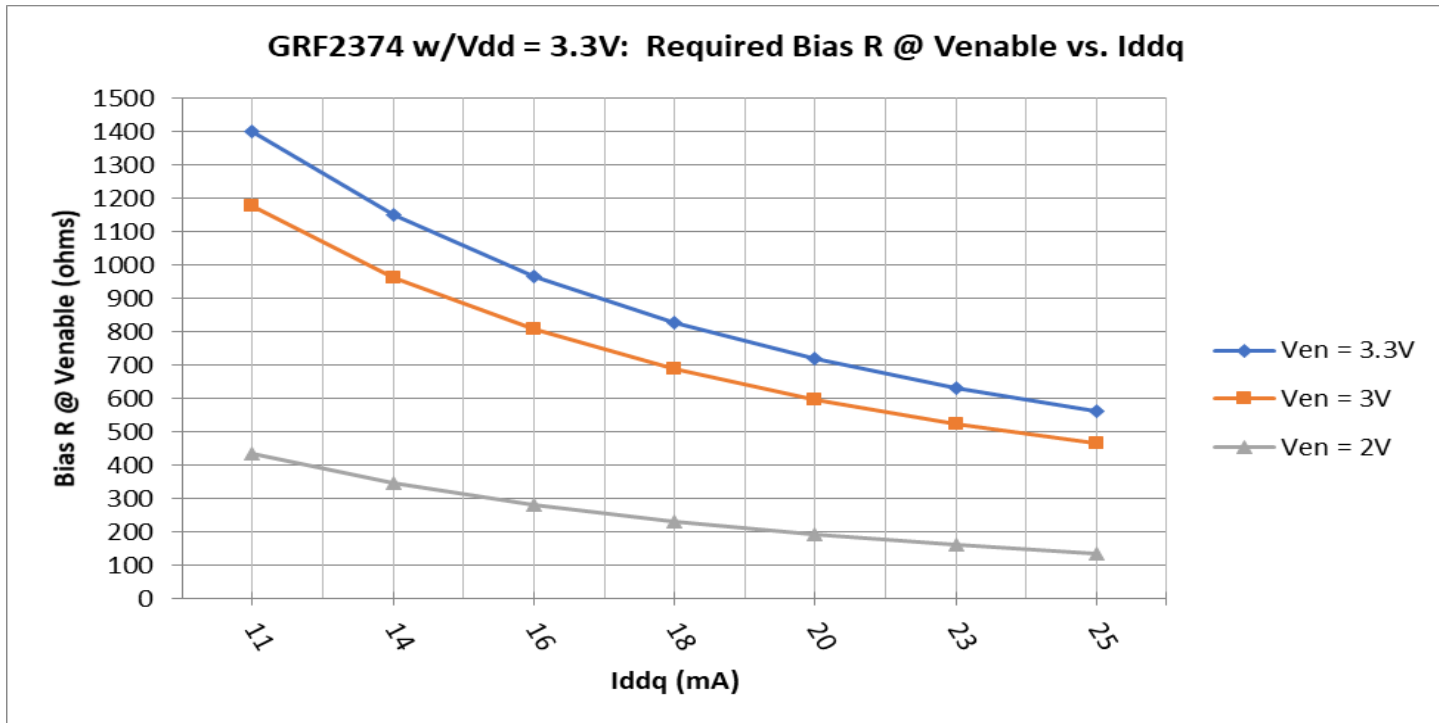
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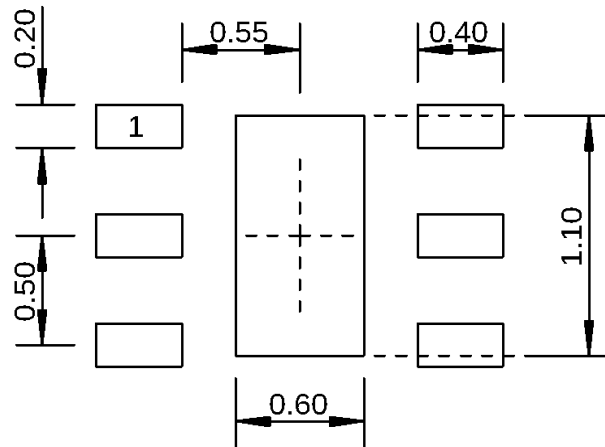
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GRF2374 Standard Evaluation Board BOM: (1.7 to 2.7 GHz Tune)

Component	Type	Manufacturer	Family	Value	Package Size	Substitution
M1	Inductor	Murata	LQG	5.1 nH	0402	Yes
M2	Capacitor	Murata	GJM	3.0 pF	0402	Yes
M5 (Sets Iddq)	Resistor	Various	—	TBD	0402	Yes
M8	Capacitor	Murata	GRM	0.1 uF	0402	Yes
M10	Inductor	Murata	LQG	3.0 nH	0402	Yes
M12	Capacitor	Murata	GJM	2.7 pF	0402	Yes
Evaluation Board:	GRF400X_Rev C					

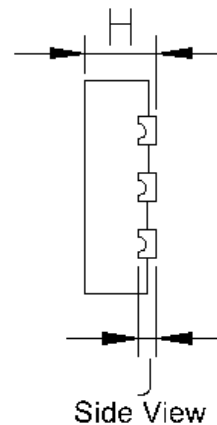
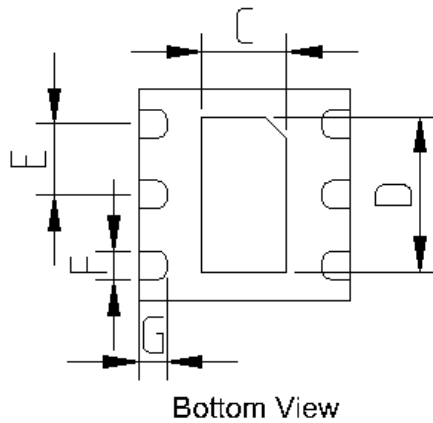
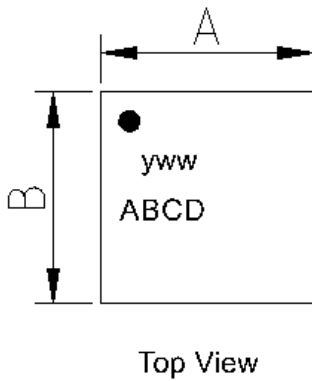
Bias R (M5) Selection Curves





Dimensions in millimeters

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



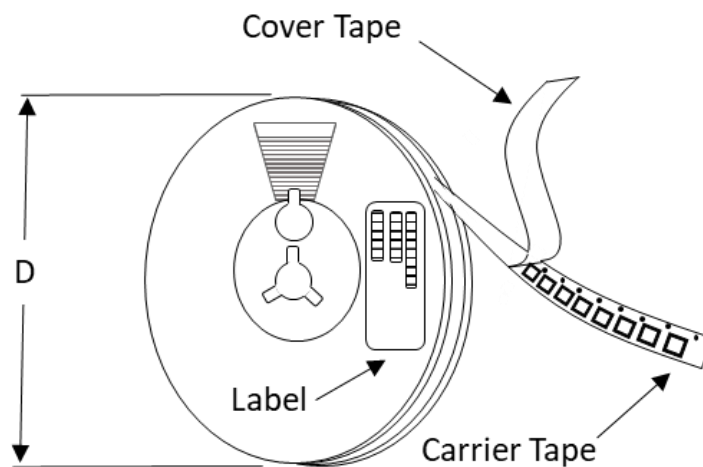
Dimensions (MM)	
A	1.5 +/- 0.050
B	1.5 +/- 0.050
C	.6 +/- 0.050
D	1.1 +/- 0.050
E	.5 Bsc
F	.2 +/- 0.050
G	.2 +/- 0.050
H	.45 +/- 0.050
J	.12 Ref.

1.5 mm DFN-6 Package Dimensions

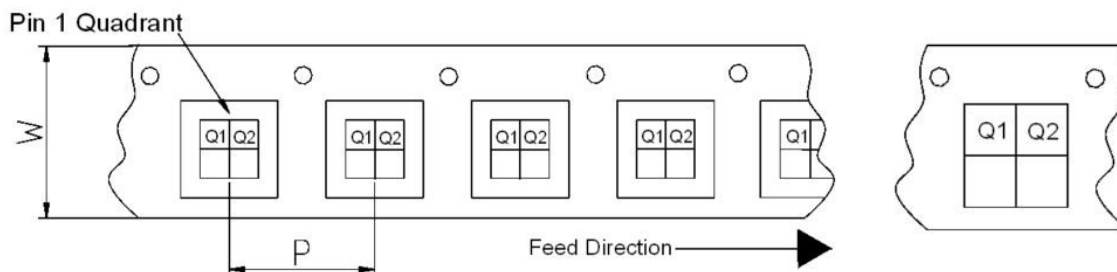
Tape and Reel Information:

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



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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 Quadrant	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 note	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



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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.

Information in this datasheet is specific to the Guerrilla RF, Inc. ("Guerrilla RF") product identified.

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