



GRF2074

Ultra-Low Noise Amplifier 1 to 6 GHz

FEATURES

- Flexible Bias Voltage and Current
- Compact 2.0 x 2.0 mm DFN-8 Package
- Process: GaAs pHEMT

Reference: 5 V / 60 mA / 2332.5 MHz

- Gain: 20.5 dB
- OIP3: 35.5 dBm
- OP1dB: 17.5 dBm
- Evaluation Board Noise Figure: 0.35 dB

APPLICATIONS

- SDARS
- Small Cells and Cellular Repeaters
- Distributed Antenna Systems
- C-Band LNA to 6 GHz
- 3.5 GHz CBRS
- TDD-LTE

DESCRIPTION

The GRF2074 is a broadband, linear, ultra-low noise amplifier designed for small cell, wireless infrastructure, and other high performance RF applications requiring ultra-low noise figure (NF), high gain, and linearity.

The standard tune covers the SDARS band and is matched for optimal NF and simplicity.

This device is a member of a family of pin-compatible, ultra-low noise devices which cover a wide range of frequency bands with industry leading NF and gain:

[GRF2070](#): 0.01 to 1.7 GHz [GRF2071](#): 0.7 to 2.7 GHz

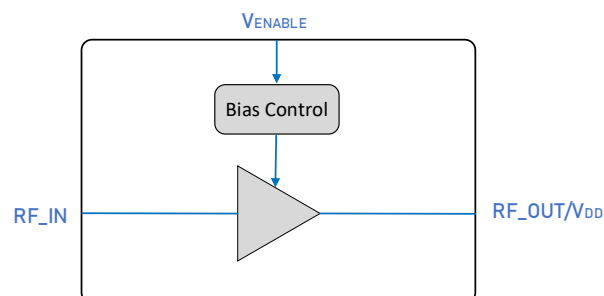
[GRF2072](#): 1.17 to 3.8 GHz [GRF2073](#): 1.0 to 6.8 GHz

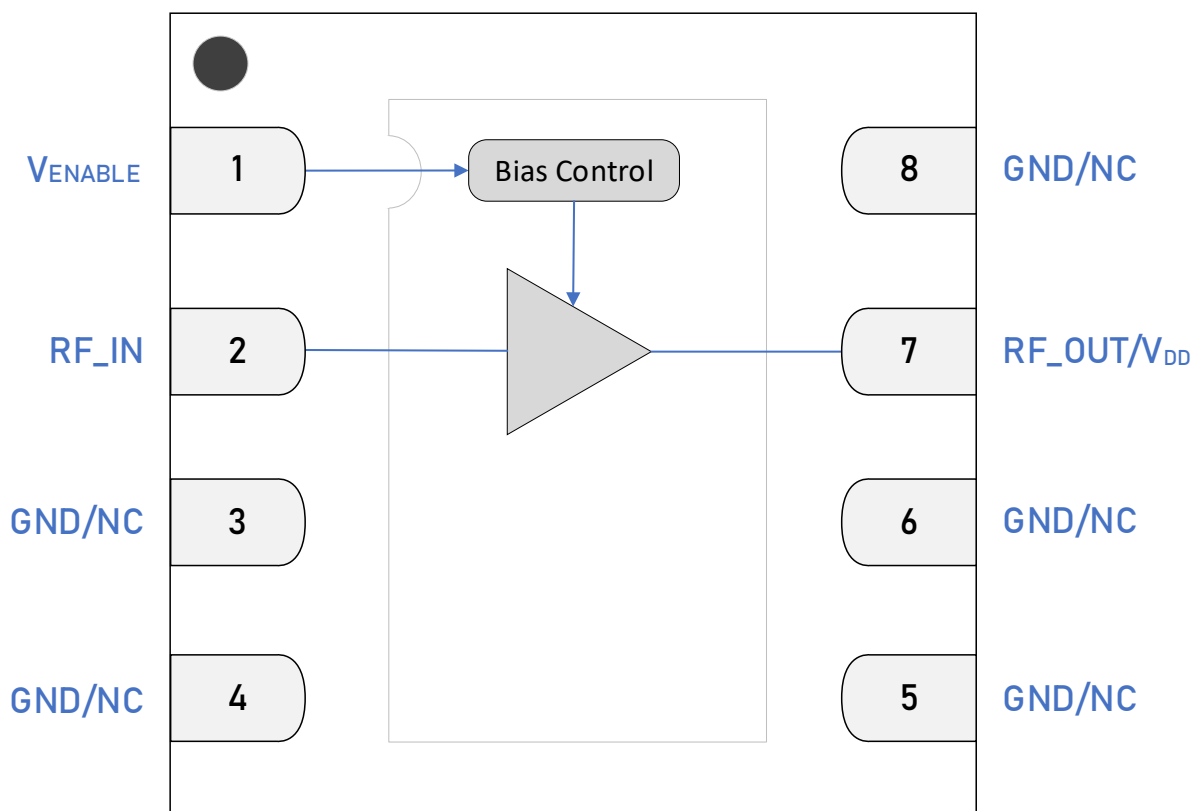
[GRF2074](#): 1.0 to 6.0 GHz

Please consult with the GRF applications engineering team for application notes and custom tuning/evaluation board data. De-embedded S-parameters with noise parameters are available on the website.

Additional tunes can be found on the GRF2074 "Custom Tunes" product page: [GRF2074 Custom Tunes](#)

BLOCK DIAGRAM





2.0 x 2.0 mm DFN-8 Pin Out (Top View)

Pin Assignments

Pin	Name	Description	Note
1	V _{ENABLE}	Enable Voltage Input	V _{ENABLE} and series resistor sets I _{DDQ} . V _{ENABLE} ≤ 0.2 volts disables device.
2	RF_IN	RF Input	External match must provide DC block.
3, 4, 5, 6, 8	GND/NC	Ground or No Connect	No internal connection to die. We recommend connecting these pins to ground.
7	RF_OUT/V _{DD}	RF Output	Provides device V _{DD} via external bias inductor.
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.

Absolute Ratings

Parameter	Symbol	Min.	Max.	Unit
Supply Voltage	V_{DD}	0	6	V
RF Input Power: Load VSWR < 2:1, $V_{DD} = 5$ V	$P_{IN\ MAX}$		23	dBm
Operating Temperature (package base)	$T_{PKG\ BASE}$	-40	115	°C
Maximum Channel Temperature (MTTF > 10 ⁶ hours)	T_{MAX}		170	°C
Maximum Dissipated Power	$P_{DISS\ MAX}$		800	mW

Electrostatic Discharge

Charged Device Model	CDM	1500		V
Human Body Model	HBM	500		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.

Note: For additional information, please refer to [Manufacturing Note MN-001 — Package and Manufacturing Information](#).



All Guerrilla RF products are provided in RoHS compliant lead (Pb)-free packaging requiring no exemptions. Additional information for this topic can be found at this link - [Environmental and Restricted Substance Statement Library](#)

Recommended Operating Conditions

Parameter	Symbol	Specification			Unit	Condition
		Min.	Typ.	Max.		
Supply Voltage	V_{DD}	0	5	6	V	
RF Frequency Range	F_{RF}	1	2.332	6	GHz	Typical application schematic with external matching components (notes 1 & 2).
Operating Temperature (package base)	$T_{PKG\ BASE}$	-40		115	°C	

Note 1: Operation outside of this range is supported by using different custom tunes. Examples of other optimized tunes can be found here: [GRF2074 Custom Tunes](#)

Note 2: Contact the Guerrilla RF Applications team for guidance on optimizing the tuning of the device for alternative bands.

Nominal Operating Parameters – General

The following conditions apply unless noted otherwise: typical application schematic using the 1 to 6 GHz tuning set. $V_{DD} = 5\text{ V}$, $V_{ENABLE} = 5\text{ V}$, $I_{DD} = 60\text{ mA}$, $F_{TEST} = 2.332\text{ GHz}$, $M3 = 2.74\text{ k}\Omega$, $T_{PKG\text{ BASE}} = 25\text{ }^{\circ}\text{C}$. Evaluation board losses are included within the specifications.

Parameter	Symbol	Specification			Unit	Condition
		Min.	Typ.	Max.		
Supply Current	I_{DD}	45	60	80	mA	$V_{DD} = 5\text{ V}$, $V_{ENABLE} = 5\text{ V}$.
Enable Current	I_{ENABLE}		2		mA	
Switching Rise Time	T_{RISE}		400		ns	Disabled mode to Gain mode (note 3).
Switching Fall Time	T_{FALL}		100		ns	Gain mode to Disabled mode (note 4).
Leakage Current	$I_{LEAKAGE}$		180		μA	$V_{DD} = 5\text{ V}$, $V_{ENABLE} = 0\text{ V}$.

Thermal Data

Thermal Resistance: (Infrared Scan)	Θ_{JC}		60		$^{\circ}\text{C/W}$	On standard evaluation board (note 5).
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Note 3: Switching Time: 50% of V_{ENABLE} to 90% of P_{OUT} .

Note 4: Switching Time: 50% of V_{ENABLE} to 10% of P_{OUT} .

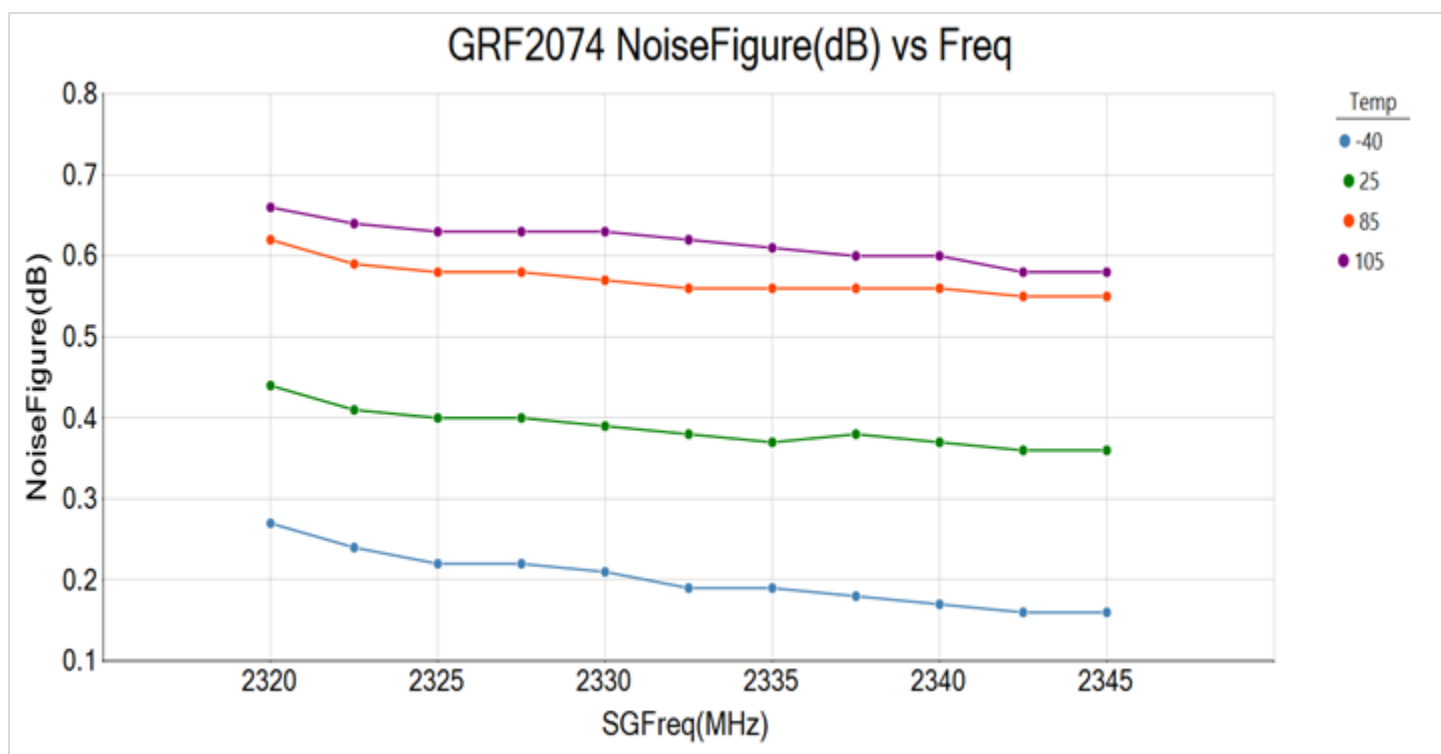
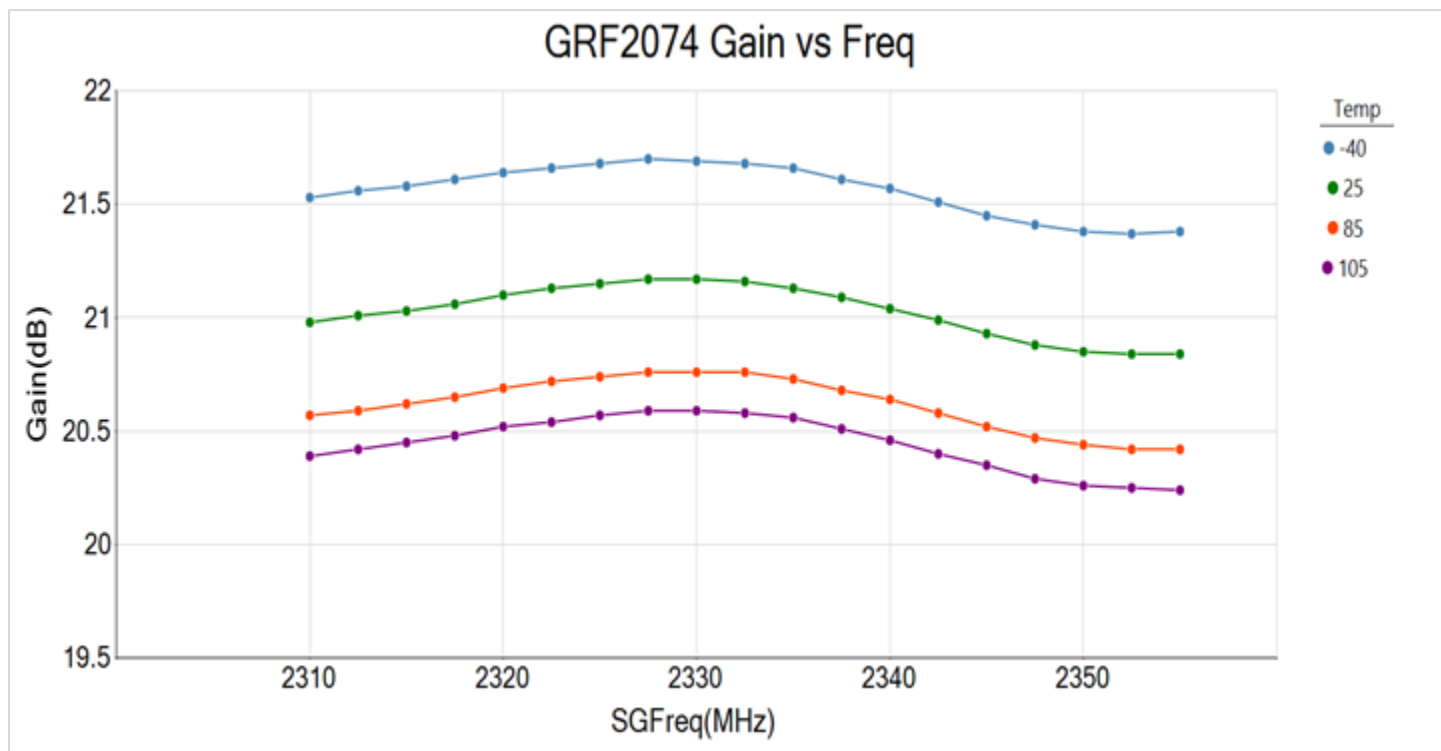
Note 5: MTTF > 10^6 hours for $T_{MAX} \leq 170\text{ }^{\circ}\text{C}$.

Nominal Operating Parameters – RF

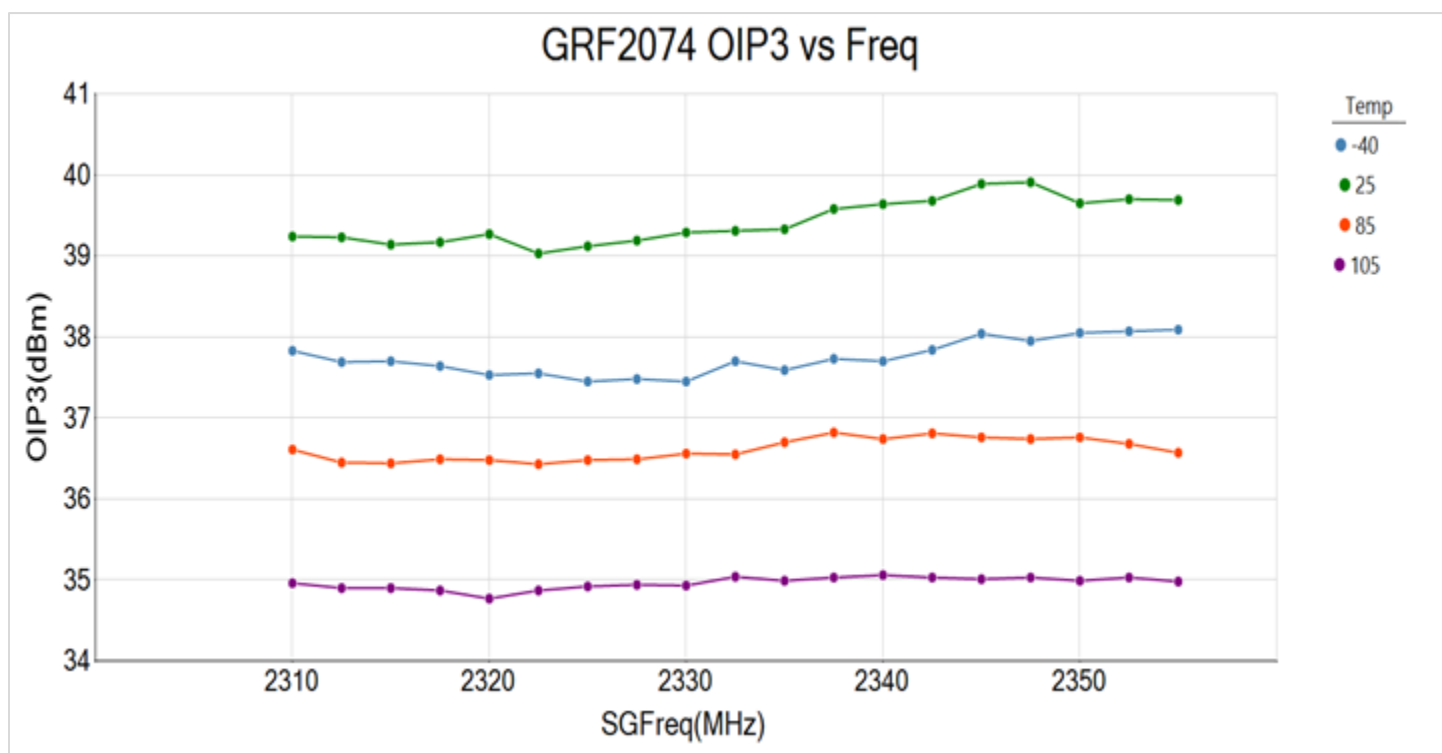
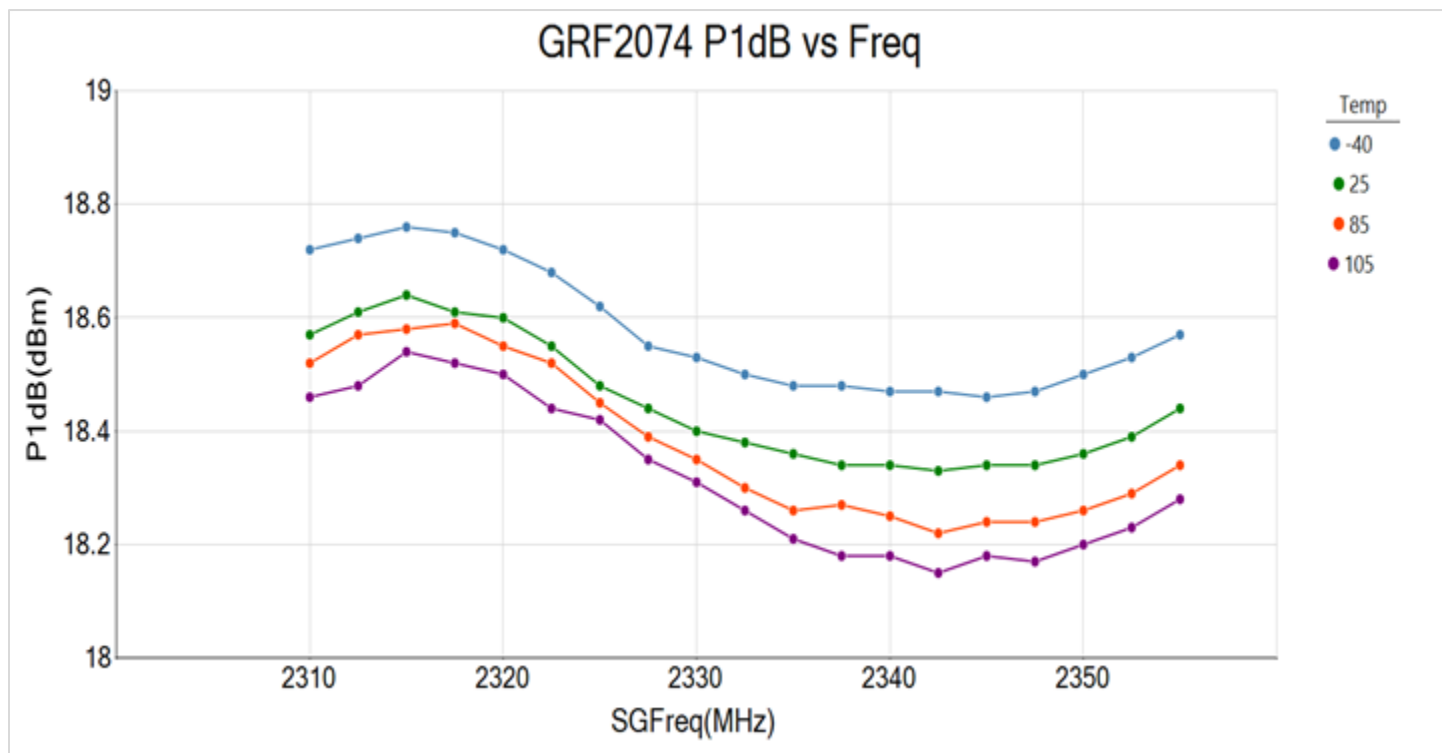
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Parameter	Symbol	Specification			Unit	Condition
		Min.	Typ.	Max.		
Gain	S21	19.5	20.5	22.4	dB	
Reverse Isolation	S12		-28		dB	
Noise Figure	NF		0.37	0.57	dB	On standard evaluation board.
Output 3 rd Order Intercept Point	OIP3		35.5		dBm	+3 dBm P_{OUT} per tone at 2 MHz spacing (2331.5 and 2333.5 MHz).
Output 1 dB Compression Power	OP1dB	16	17.5		dBm	

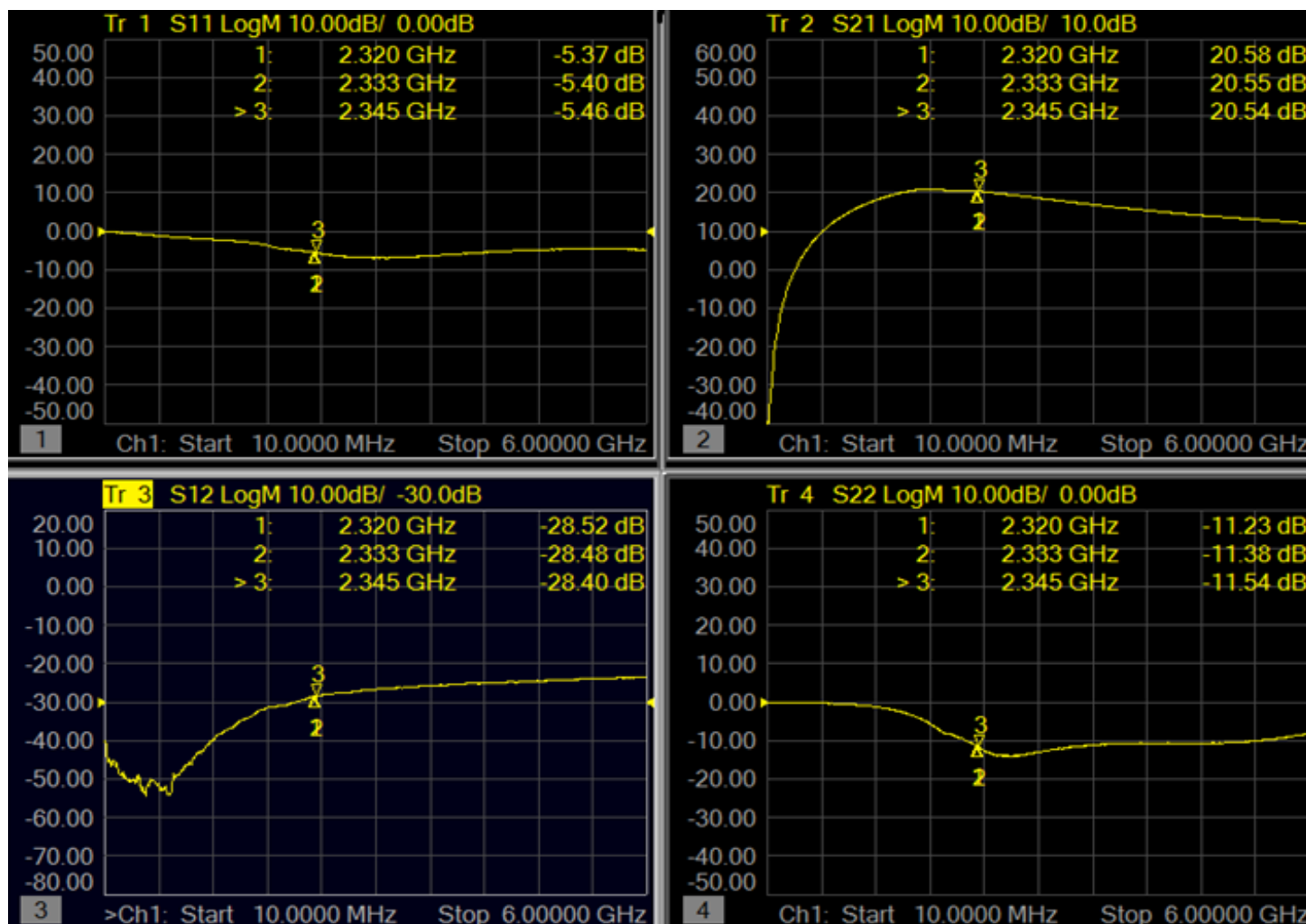
GRF2074 Typical Operating Curves: SDARS Tune



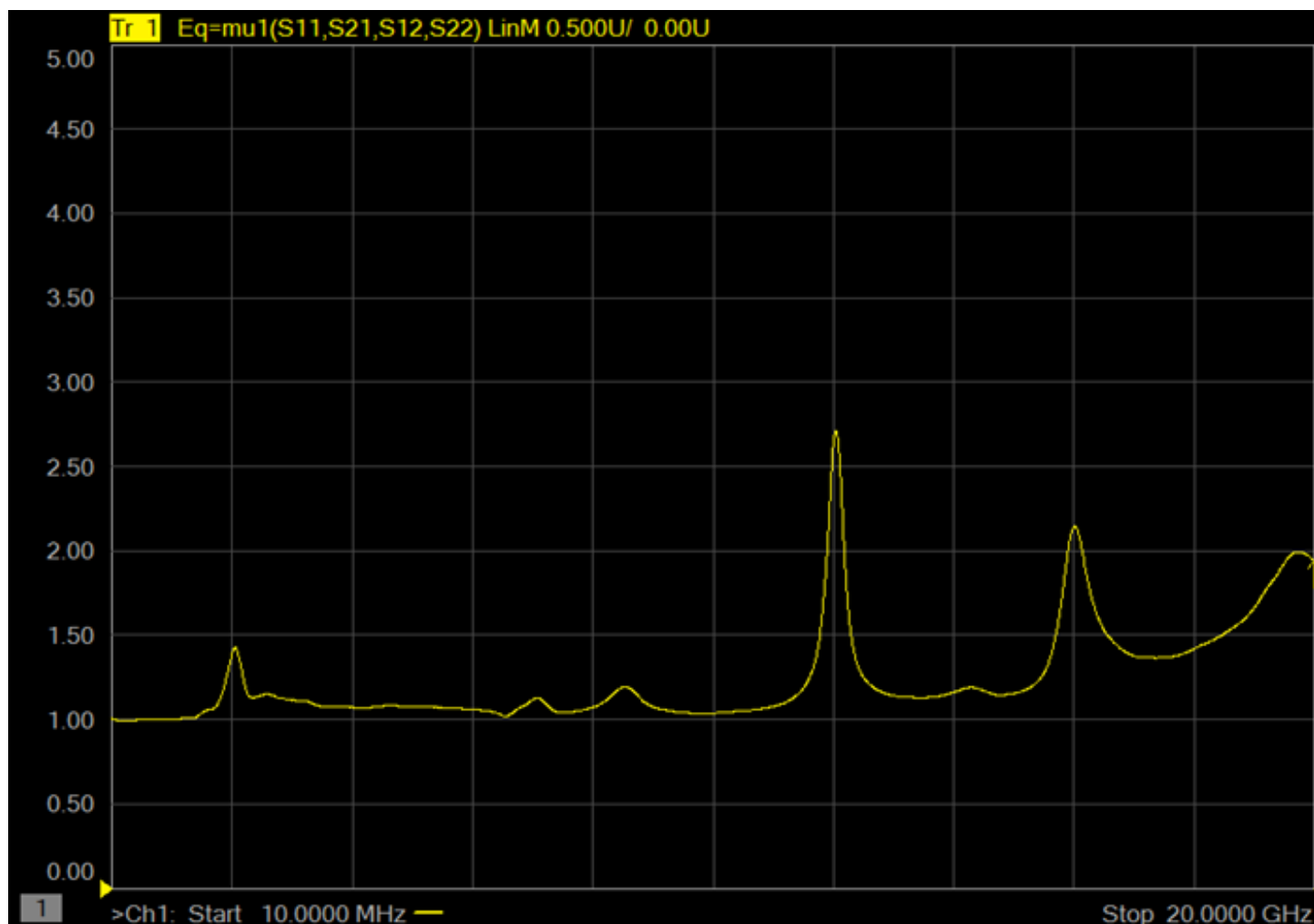
GRF2074 Typical Operating Curves: SDARS Tune



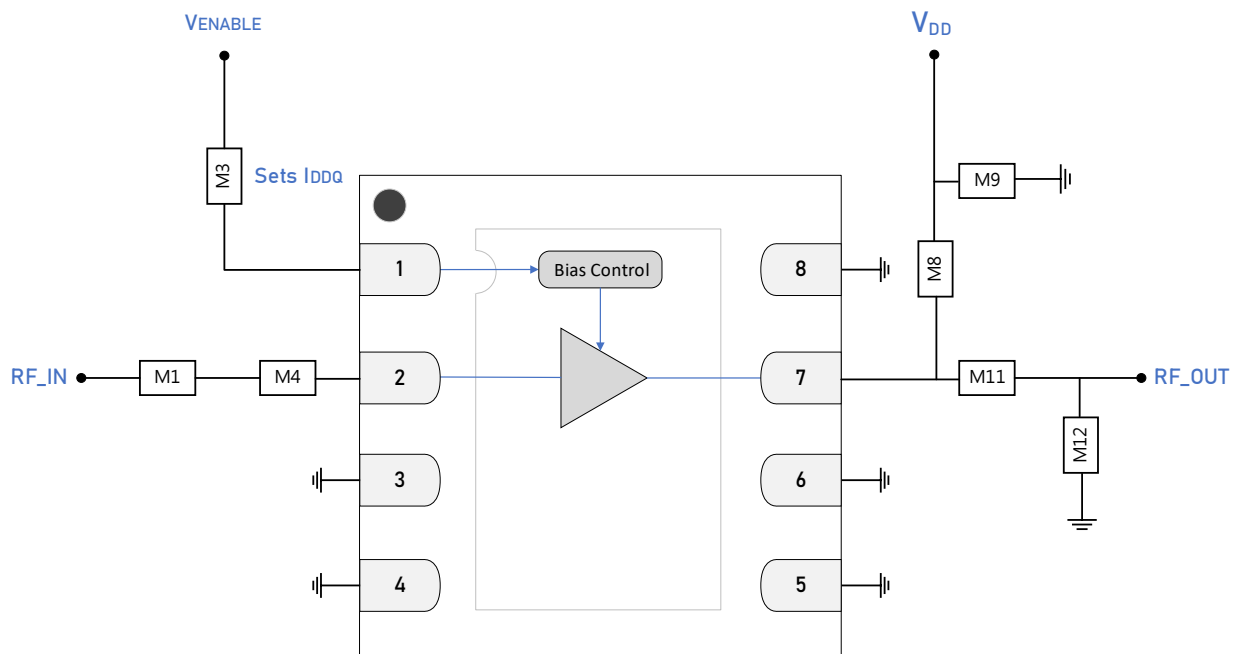
GRF2074 Typical Operating Curves: S-Parameters (SDARS Tune)



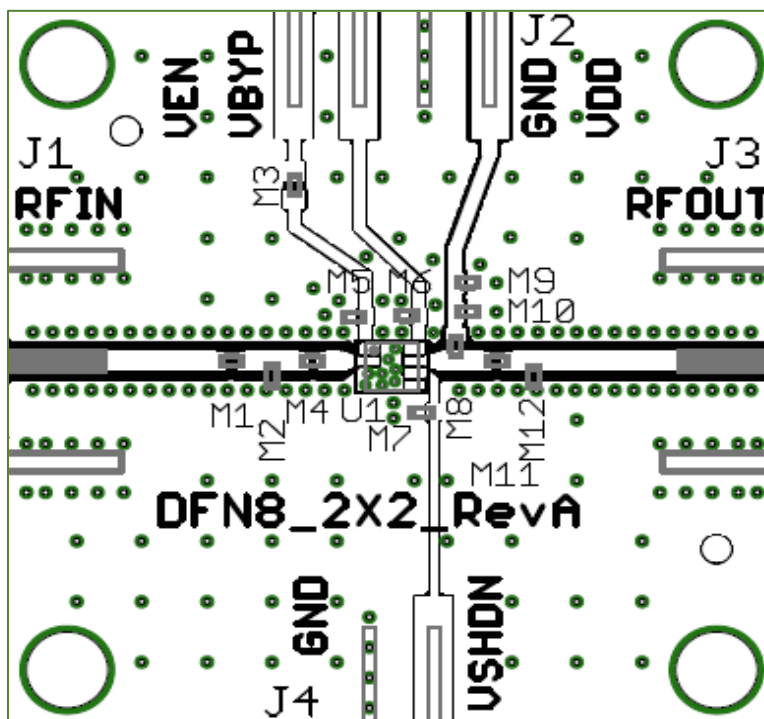
GRF2074 Typical Operating Curves: Stability Mu, SDARS Tune (10 MHz to 20 GHz)



Note: Mu Factor ≥ 1.0 implies unconditional stability.



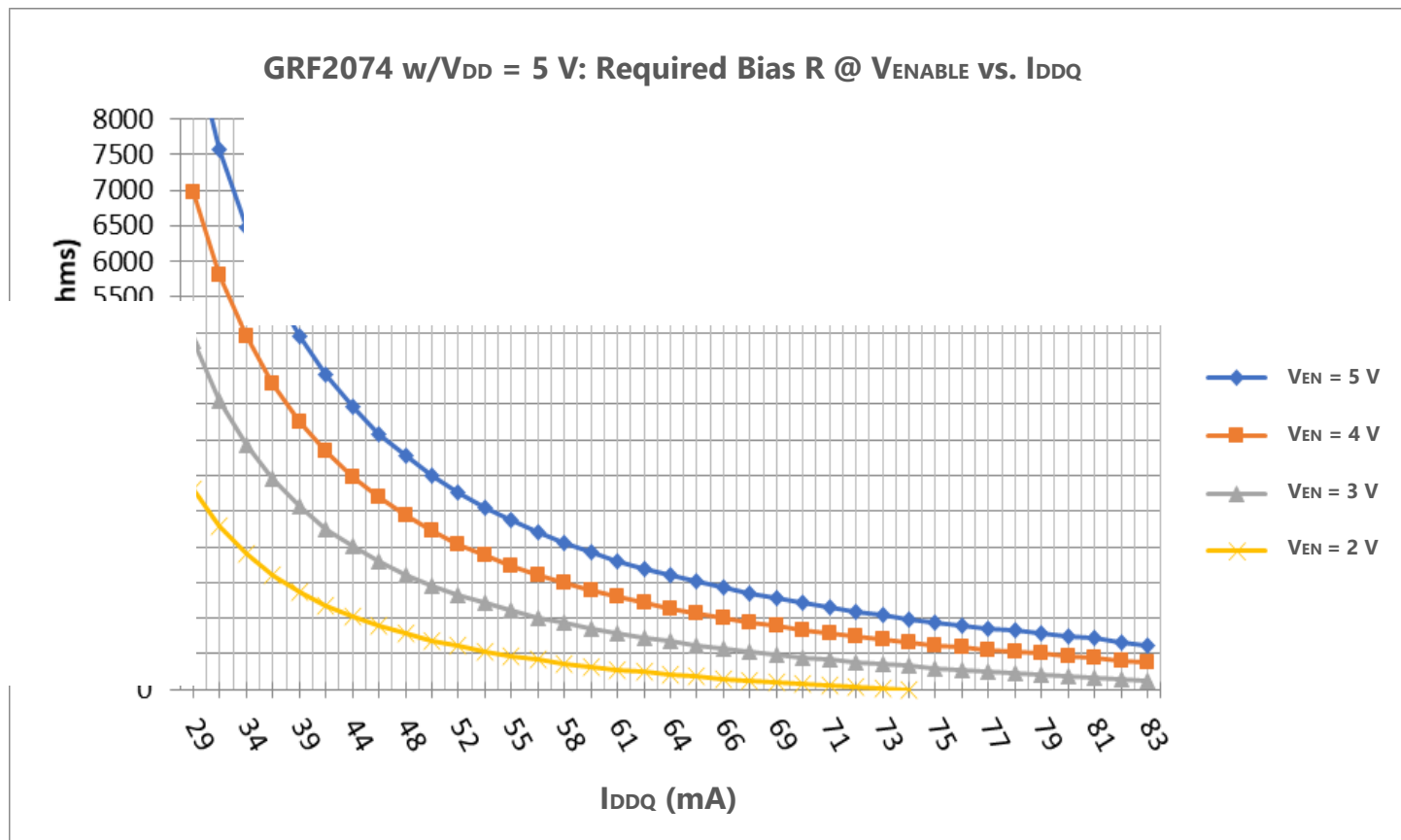
GRF2074 Standard Evaluation Board Schematic (SDARS Tune)

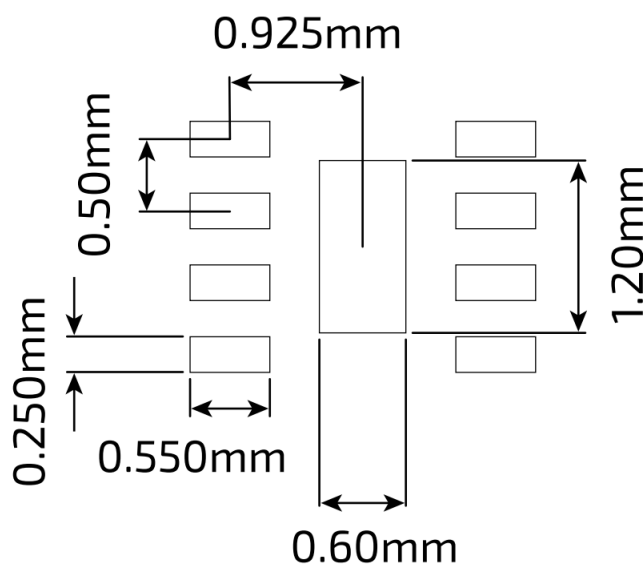
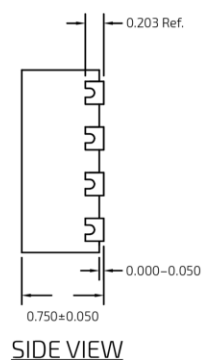
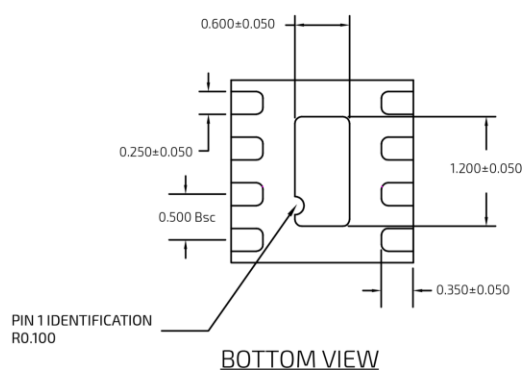
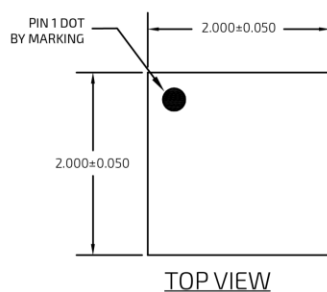


GRF2074 Evaluation Board Assembly Diagram

GRF2074 Evaluation Board Assembly Diagram Reference: SDARS Tune

Component	Type	Manufacturer	Family	Value	Package Size	Substitution
M1	Resistor (jumper)	Various	--	0 Ω	0402	ok
M3	Resistor	Various	5%	2.74 k Ω	0402	ok
M4	Capacitor	Murata	GJM	20.0 pF	0402	ok (High Q)
M8	Inductor	Murata	LQG	1.8 nH	0402	ok
M9	Capacitor	Murata	GRM	0.1 μ F	0402	ok
M11	Capacitor	Murata	GJM	2.7 pF	0402	ok
M12	Capacitor	Murata	GJM	0.2 pF	0402	ok
Evaluation Board	DFN8_2x2_RevA					

GRF2074 Bias Resistor Selection Curves:



2.0 x 2.0 mm DFN-8 Suggested PCB Footprint (Top View)

2.0 x 2.0 mm DFN-8 Package Dimensions

Package Marking Diagram



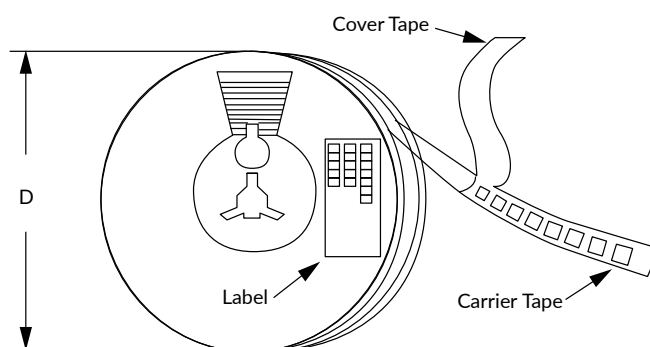
- Line 1: "Y" = YEAR (single digit). "WW" = WORK WEEK the device was assembled.
- Line 2: "XXXX" = Device PART NUMBER.

Tape and Reel Information

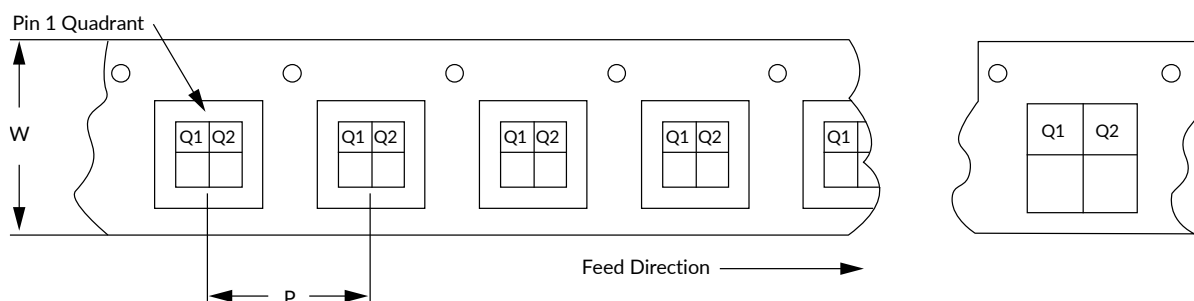
Guerrilla RF's tape and reel specification complies with Electronic Industries Alliance (EIA) standards for "Embossed Carrier Tape of Surface Mount Components for Automatic Handling" (reference EIA-481). See the following page for the Tape and Reel Specification and Device Package Information table, which includes units per reel.

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

For the Tape and Reel Reference Table, please refer to: [Package Manufacturing Information | Guerrilla RF \(guerrilla-rf.com\)](https://www.guerrilla-rf.com/package-manufacturing-information)



Tape and Reel Packaging with Reel Diameter Noted (D)



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

Revision History

Revision Date	Description of Change
July 29, 2021	Release Ø Data Sheet. Upgraded Data Sheet to new format only.
June 23, 2022	Changed M3 resistor value to 2.74 kΩ to match Production Test Plan. Changed thermal resistance typical value from 50 to 60 °C/W.
February 20, 2023	Release A Data Sheet. Raised Supply Current Max from 75 to 80 mA. Raised Gain Max from 21.5 to 22.4 dB. Added characterization plots (over temperature).
April 4, 2024	Upgraded Data Sheet to new format only. No change to device or device specifications.
November 22, 2024	Release B Data Sheet. Changed $P_{DISS\ MAX}$ from 500 to 800 mW.
February 12, 2025	Raised Max operating temperature from 105 to 110 °C.
April 29, 2025	Raised Max operating temperature from 110 to 115 °C.
May 22, 2025	Updated frequency range of family of part numbers listed on page 1.
September 15, 2025	Converted Data Sheet to new format. No change to device or device specifications.



Data Sheet Classifications

Data Sheet 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 limited evaluation board measurements taken within the Guerrilla RF Applications Lab. All parametric values are subject to change pending the collection of additional data.
Release Ø	All data based on measurements taken with <i>production-released</i> material. TYP values are based on a combination of ATE and bench-level measurements, with MIN/MAX limits defined using <i>modelled estimates</i> that account for part-to-part variations and expected process spreads. Although unlikely, future refinements to the TYP/MIN/MAX values may be in order as multiple lots are processed through the factory.
Release A-Z	All data based on measurements taken with production-released material <i>derived from multiple lots which have been fabricated over an extended period of time</i> . MIN/MAX limits may be refined over previous releases as more statistically significant data is collected to account for process spreads.

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

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