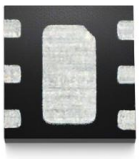
DATA SHEET

PRELIMINARY DATA SHEET



GRF3020

ULTRA-BROADBAND GAIN BLOCK
Near DC to 18 GHz

FEATURES

- Internally Matched to 50 Ω
- Compact 1.5 x 1.5 mm DFN-6 Package
- Process: InGaP / GaAs HBT

Reference: 5 V / 75 mA / 5 GHz

- Gain: 13.2 dB
- OP1dB: 16.1 dBm
- OIP3: 27.1 dBm

APPLICATIONS

- Instrumentation
- Broadband LO driver
- General Purpose Amplifier
- C-Band Amplifier
- X-Band Amplifier
- Low SWaP Applications

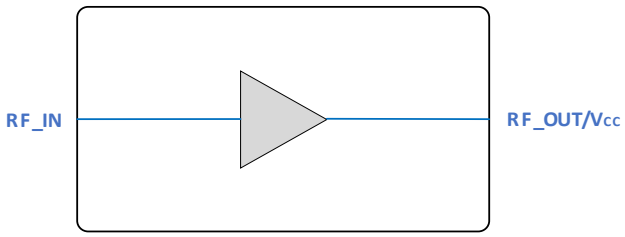
DESCRIPTION

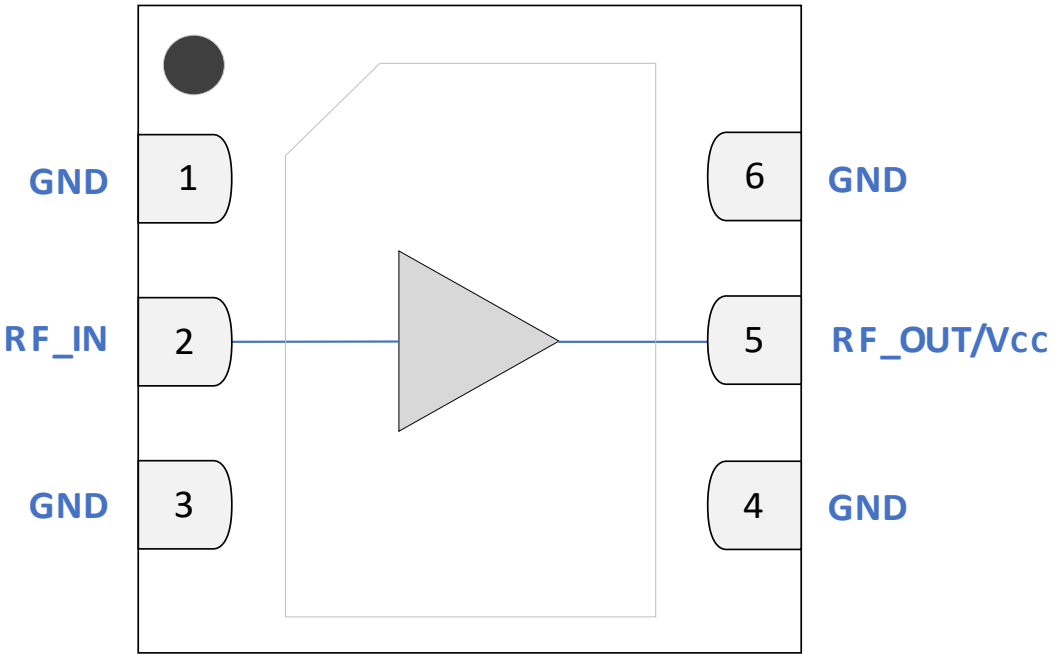
The GRF3020 is a broadband gain block designed for RF applications from near DC through KU-Band. The use of HBT technology results in low phase noise for LO driver applications.

The device is internally biased. The only external components required are an input DC block and an output Bias-T.

Please consult with the GRF applications engineering team for custom tuning/evaluation board data.

BLOCK DIAGRAM





DFN-6 1.5 x 1.5 mm Pin Out (Top View)

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Pin Assignments

Pin	Name	Description	Note
1, 3, 4, 6	GND	Ground	RF coplanar ground. Low inductance connection to RF ground is required to maintain good return loss and isolation.
2	RF_IN	RF Input	Internally matched to 50 Ω. An external DC blocking capacitor must be used.
5	RF_OUT/V_{CC}	RF Output	Internally matched to 50 Ω. V_{CC} must be applied through a choke to this pin.
PKG BASE	GND	Ground	Provides DC and RF ground for gain block 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_{CC}	0	5.1	V
RF Input Power: 50 Ω Load	$P_{IN\ MAX}$		TBD	dBm
Operating Temperature (package base)	$T_{PKG\ BASE}$	-40	85	°C
Maximum Channel Temperature (MTTF >10^6 hours)	T_{MAX}		170	°C
Maximum Dissipated Power	$P_{DISS\ MAX}$		500	mW

Electrostatic Discharge

Human Body Model	HBM	TBD		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_{CC}	4.5	5	5.1	V	
RF Frequency Range	F_{TEST}	Near DC	5	18	GHz	Typical application schematic using broadband Bias T.
Operating Temperature (package base)	$T_{PKG\ BASE}$	-40		85	°C	
RF_IN Port Impedance	Z_{RF_IN}		50		Ω	Single-ended.
RF_OUT Port Impedance	Z_{RF_OUT}		50		Ω	Single-ended.

Nominal Operating Parameters – General

The following conditions apply unless noted otherwise: typical measurement schematic using broadband Bias T. VCC = 5 V, ICC = 75 mA, F_{TEST} = 5 GHz, 50 Ω system impedance, $T_{PKG\ BASE}$ = 25 °C. Data measured directly at input and output of device exclusive of external bias-tee loss.

Parameter	Symbol	Specification			Unit	Condition
		Min.	Typ.	Max.		
Supply Current	I_{CC}		75		mA	

Thermal Data

Thermal Resistance (Infrared Scan)	θ_{JC}		165.2		°C/W	On standard evaluation board **(note 3)**.

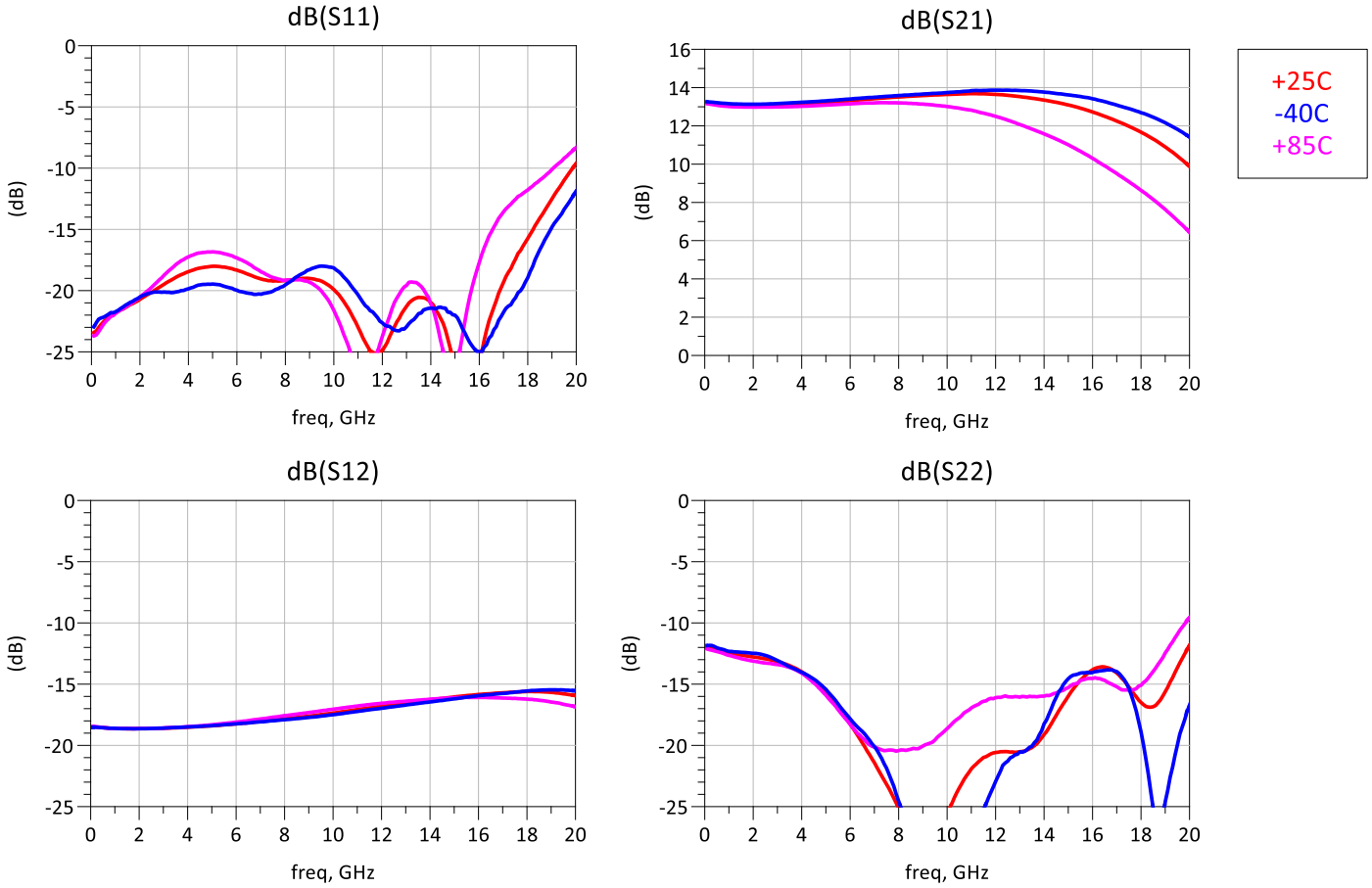
Note 3: MTTF > 10^6 hours for $T_{CHANNEL}$ ≤ 170 °C.

Nominal Operating Parameters – RF

The following conditions apply unless noted otherwise: typical measurement schematic using broadband Bias T. VCC = 5 V, ICC = 75 mA, F_{TEST} = 5 GHz, 50 Ω system impedance, $T_{PKG\ BASE}$ = 25 °C. Data measured directly at input and output of device exclusive of external bias-tee loss.

Parameter	Symbol	Specification			Unit	Condition
		Min.	Typ.	Max.		
Gain	S21		13.2		dB	
Noise Figure	NF		5.5		dB	On standard evaluation board.
Output 3rd Order Intercept Point	OIP3		27.1		dBm	-10 dBm P_{OUT} per tone at 2 MHz spacing (9,999 and 10,001 MHz)
Output 1 dB Compression Power	OP1dB		16.1		dBm	

GRF3020 Typical Operating Curves: S-Parameters



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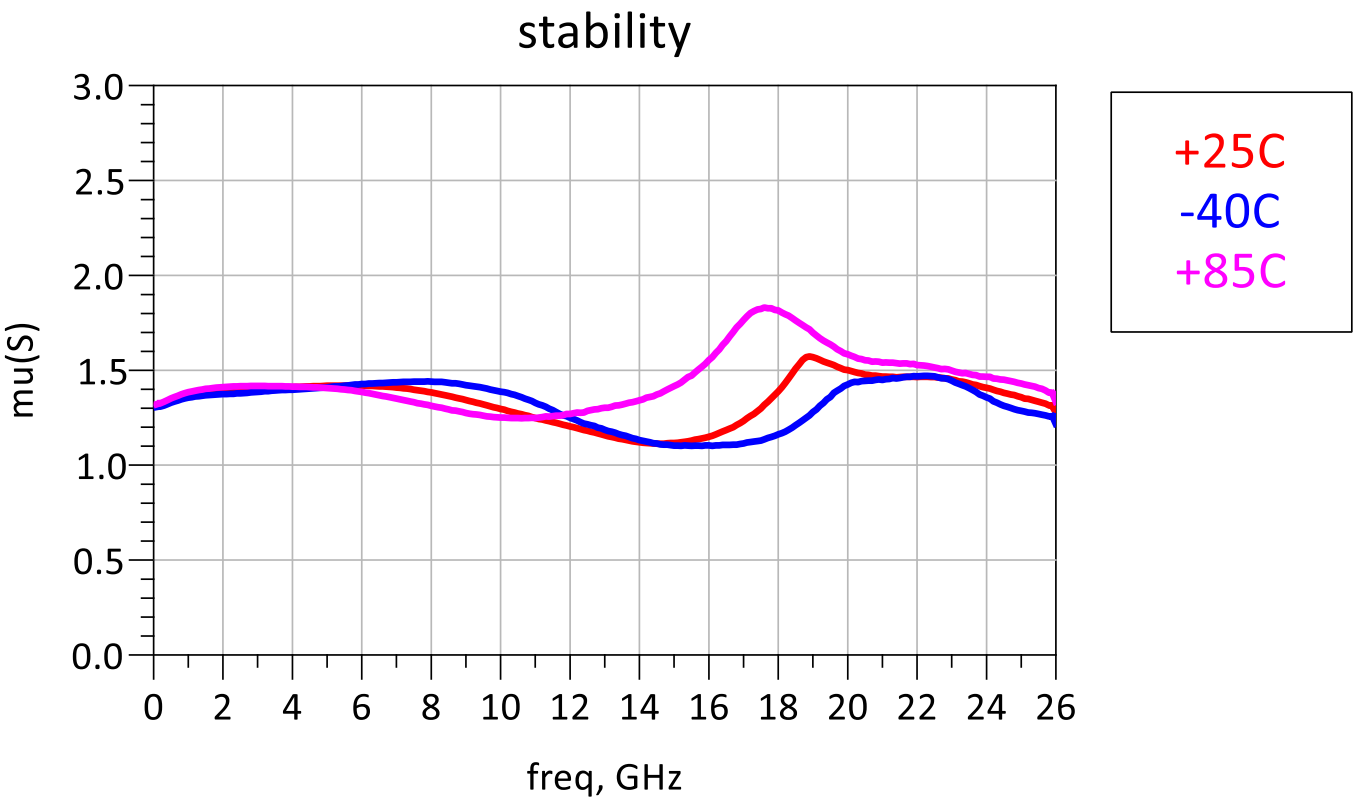
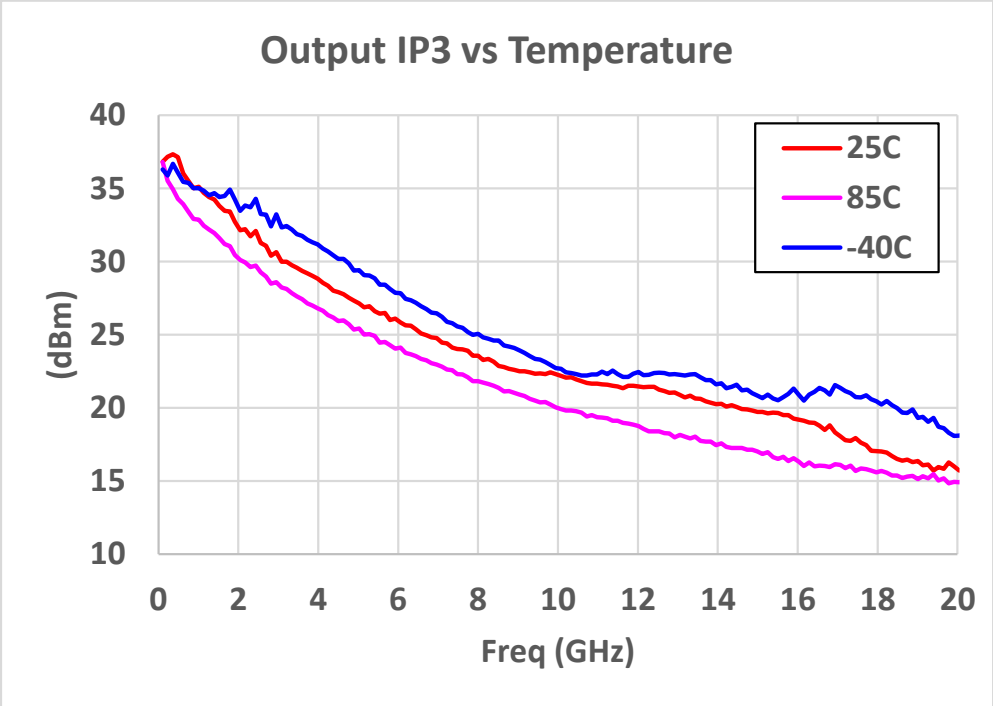
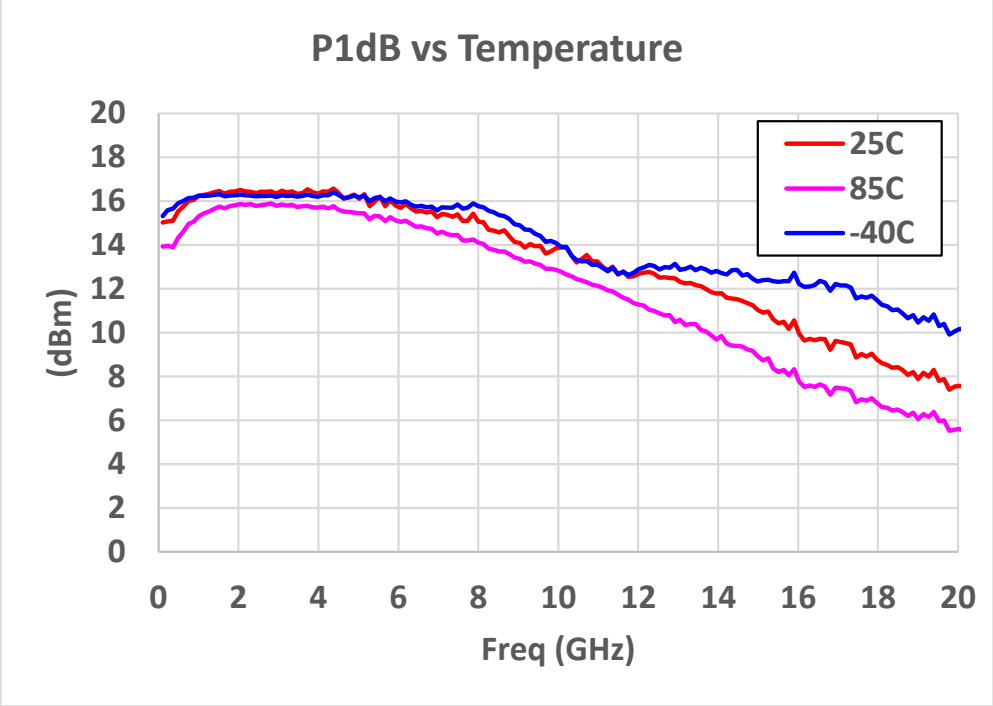
GRF3020 Typical Operating Curves: Stability Mu Factor



Note: Mu factor ≥ 1.0 implies unconditional stability

GRF3020 Typical Operating Curves:





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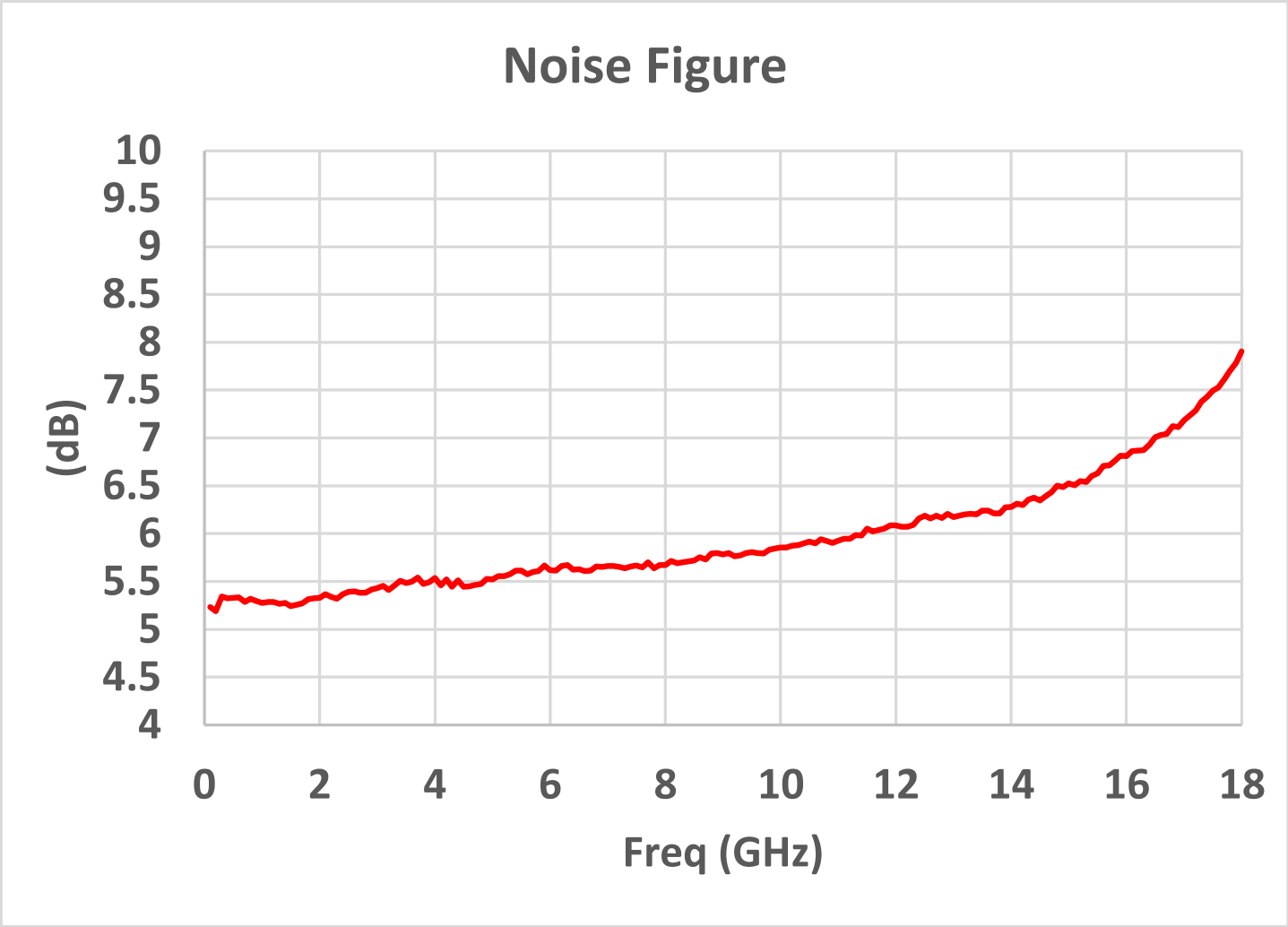
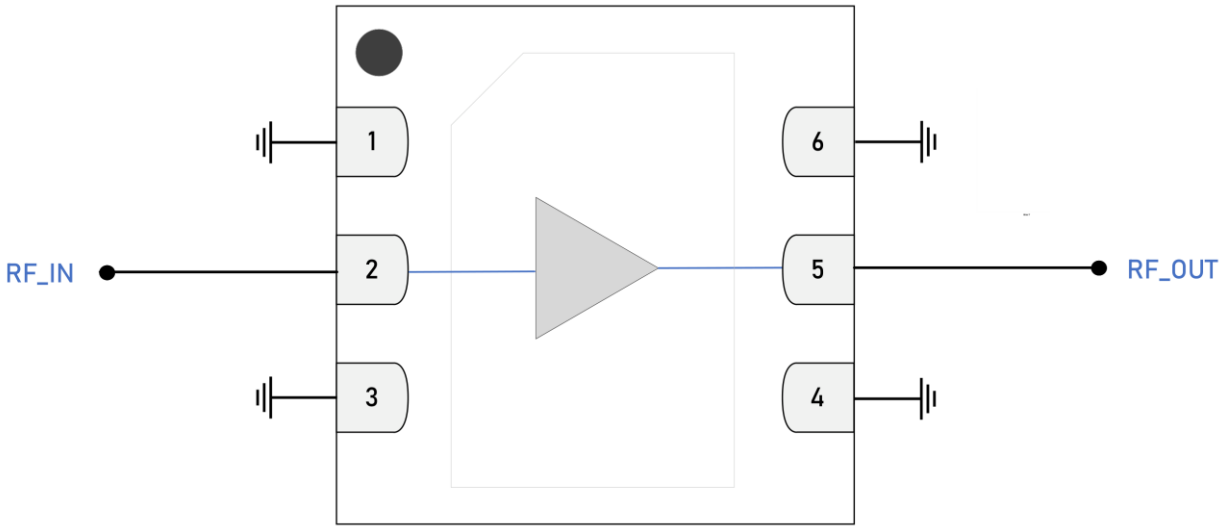
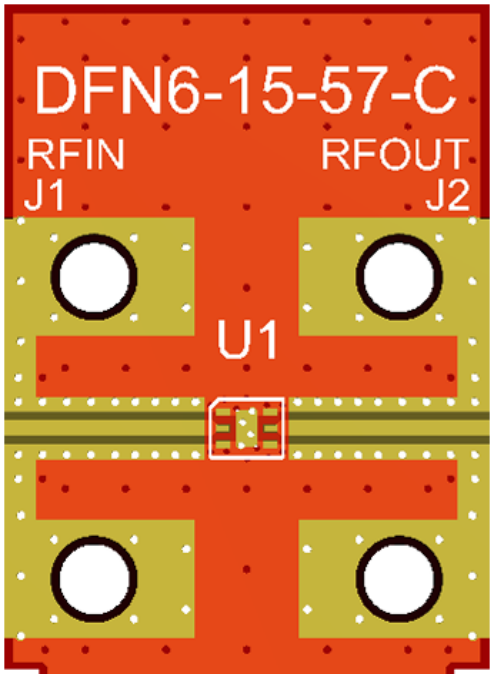
GRF3020 Typical Operating Curves: Noise Figure





GRF3020 Standard Evaluation Board Schematic



GRF3020 Evaluation Board Assembly Diagram

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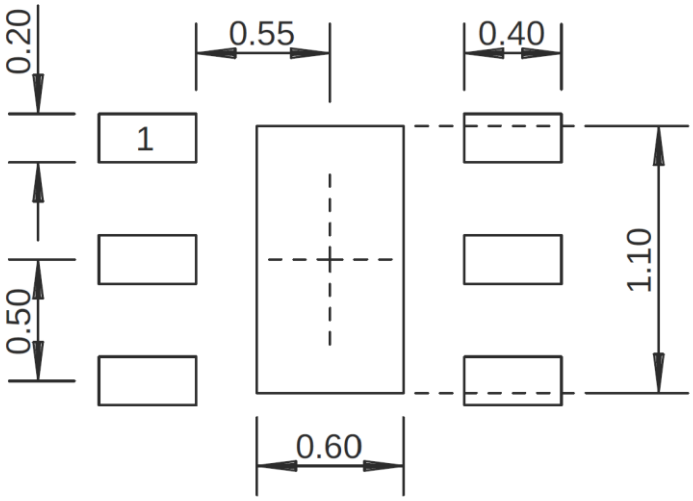
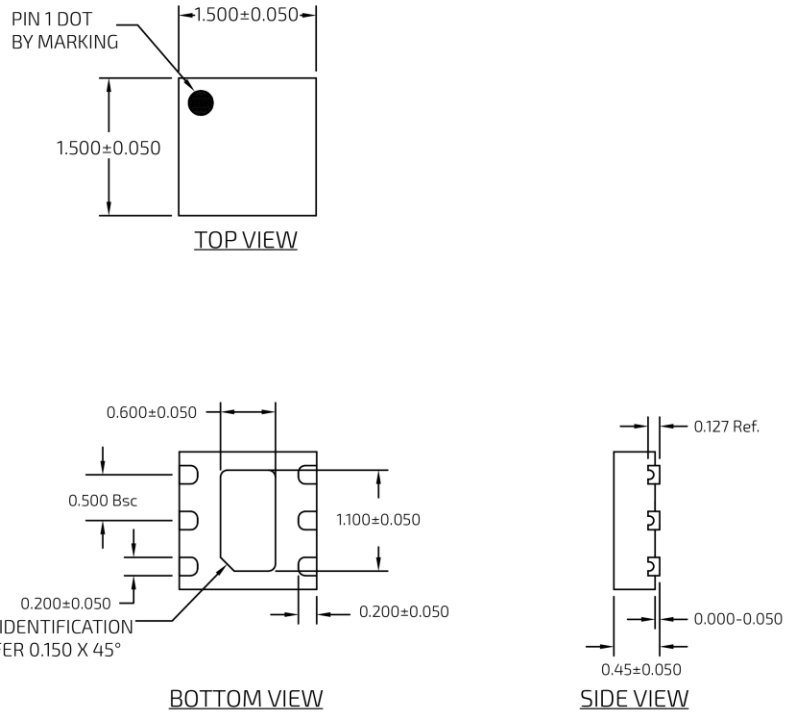


DFN-6 1.5 x 1.5 mm Suggested PCB Footprint (Top View)



DFN-6 1.5 x 1.5 mm Package Dimensions

Package Marking Diagram

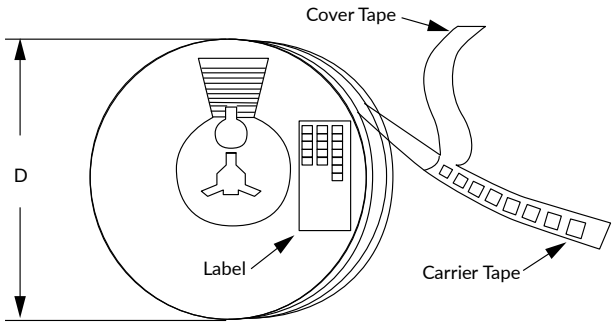
- Line 1: "Y" = YEAR (single digit). "WW" = WORK WEEK the device was assembled.
- Line 2: "XXXX" = Device Part Number.

Tape and Reel Information

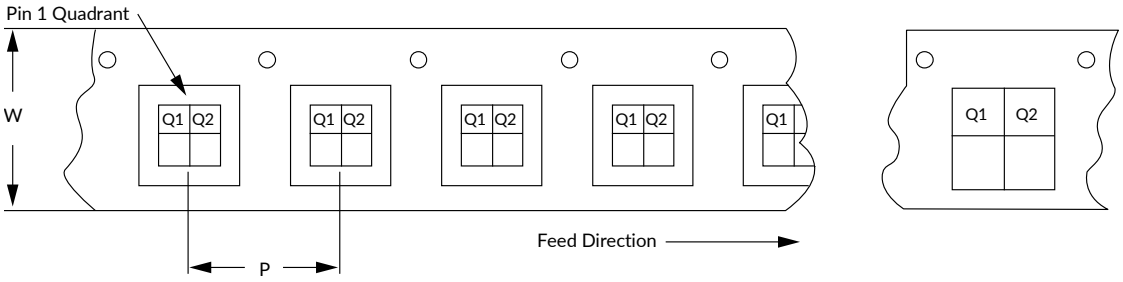
Guerrilla RF's tape and reel specification complies with Electronic Industries Alliance (EIA) standards for "Embossed Carrier Tape of Surface Mount Components for Automatic Handling" (reference EIA-481). See the following page for the Tape and Reel Specification and Device Package Information table,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



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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Revision History

Revision Date	Description of Change
February 2, 2026	Advance Data Sheet.
September 16, 2026	Preliminary Data Sheet.

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 *production-released* material. TYP values are based on a combination of ATE and bench-level measurements, with MIN/MAX limits defined using *modelled estimates* 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 *derived from multiple lots which have been fabricated over an extended period of time.* MIN/MAX limits may be refined over previous releases as more statistically significant data is collected to account for process spreads.