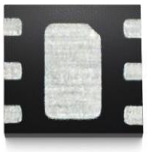
DATA SHEET

RELEASE A DATA SHEET



GRF2373

LOW-CURRENT LNA / DRIVER 0.09 to 4 GHz

FEATURES

- Flexible Bias Voltage and Current
- Process: InGaP HBT
- Compact 1.5 x 1.5 mm DFN-6 Package

Reference: 3.3 V / 15 mA / 1.95 GHz

- Gain: 18 dB
- OIP3: 25 dBm
- OP1dB: 13 dBm
- Evaluation Board Noise Figure: 1.3 dB

APPLICATIONS

- Drones
- Small Cells and Cellular Repeaters
- Distributed Antenna Systems
- Set Top Boxes
- General Purpose Amplification
- VHF/UHF/900/2400 ISM

DESCRIPTION

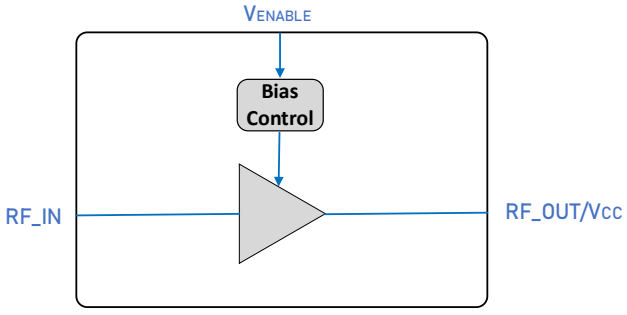
The GRF2373 can serve as a low current, high gain LNA or linear driver tunable from 0.09 to 4 GHz. It exhibits outstanding gain and noise figure (NF) with a typical bias condition of 3.3 volts and 15 mA.

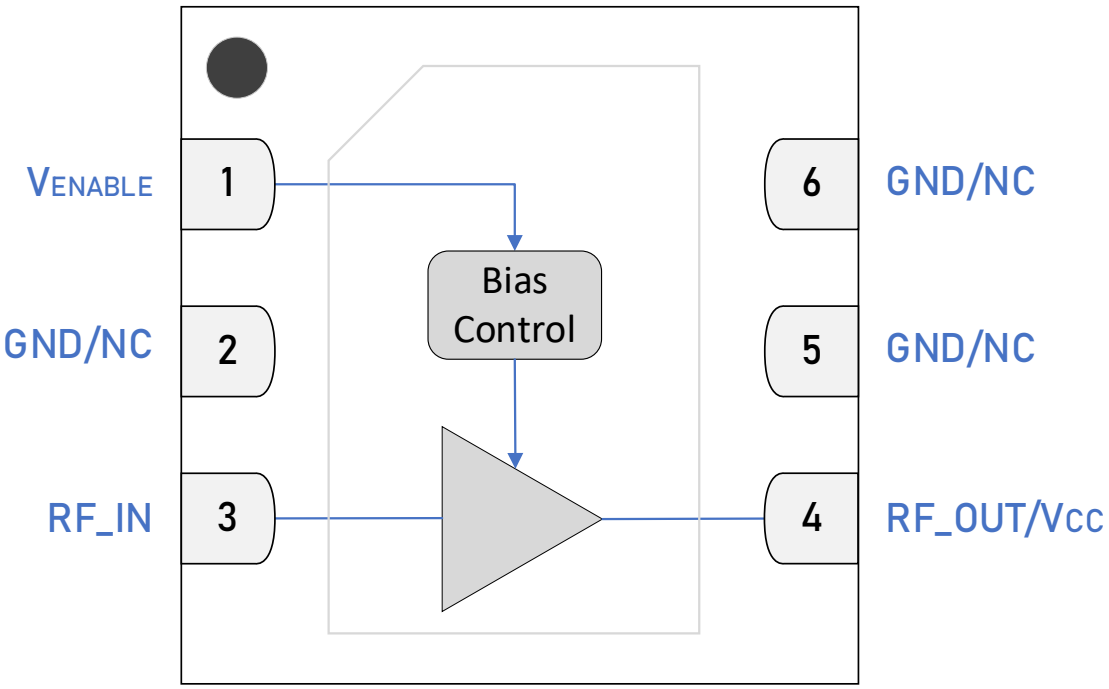
The device is operated from a single supply voltage (V_{CC}) of 1.8 to 5.0 volts with a selectable I_{CCQ} range of 10 to 25 mA for optimal efficiency and linearity.

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

Additional tunes can be found on the GRF2373 "Custom Tunes" product page: GRF2373 Custom Tunes

BLOCK DIAGRAM





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

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Pin Assignments

Pin	Name	Description	Note
1	V_{ENABLE}	Enable Voltage Input	V_{ENABLE} and series resistor set I_{CCQ}. $V_{ENABLE} \leq 0.2$ volts disables device. On die pull-down resistor will turn the device off if this node is allowed to float.
2, 5, 6	GND/NC	Ground or No Connect	No internal connection to die. We recommend connecting these pins to ground.
3	RF_IN	RF Input	An external DC blocking capacitor must be used.
4	RF_OUT/V_{CC}	RF Output	V_{CC} must be applied through a choke to this pin.
PKG BASE	GND	Ground	Provides DC and RF ground 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	5.5	V
RF Input Power: Load VSWR < 2:1, V_{CC} = 5 V	$P_{IN\ MAX}$		22	dBm
Operating Temperature (package base)	$T_{PKG\ BASE}$	-40	85	°C
Maximum Channel Temperature (MTTF > 10^6 hours)	T_{MAX}		150	°C
Maximum Dissipated Power	$P_{DISS\ MAX}$		100	mW

Electrostatic Discharge

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.

Note: For additional information, please refer to *Package Manufacturing Information | Guerrilla RF (guerrilla-rf.com)*

RoHS compliant

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*

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Recommended Operating Conditions

Parameter	Symbol	Specification			Unit	Condition
		Min.	Typ.	Max.		
Supply Voltage	V_{CC}	1.8	3.3	5.5	V	
Operating Temperature (package base)	$T_{PKG\ BASE}$	-40		85	°C	
RF Frequency Range	F_{RF}	0.09	1.95	4	GHz	Typical application schematic with external matching components **(notes 1 & 2)**.
RF_IN Port Impedance	Z_{RFIN}		50		Ω	
RF_OUT Port Impedance	Z_{RFOUT}		50		Ω	

Note 1: Operation outside of this range is supported by using different custom tunes. Examples of other optimized tunes can be found here: GRF2373 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 1.7 to 2.2 GHz tuning set. V_{CC} = 3.3 V, V_{ENABLE} = 3.3 V, F_{TEST} = 1.95 GHz, 50 Ω system impedance, $T_{PKG\ BASE}$ = 25 °C. Evaluation board losses are included within the specifications.

Parameter	Symbol	Specification			Unit	Condition
		Min.	Typ.	Max.		
Supply Current	I_{CC}		15		mA	V_{CC} = 3.3 V, V_{ENABLE} = 3.3 V.
Switching Rise Time	T_{RISE}		200		ns	Gain mode to Disabled mode **(note 3)**.
Switching Fall Time	T_{FALL}		100		ns	Disabled mode to Gain mode **(note 4)**.
Disabled Mode						
Leakage Current	$I_{LEAKAGE}$		< 1.0		µA	V_{CC} = 3.3 V, V_{ENABLE} = 0 V.
Thermal Data						
Thermal Resistance: (Infrared Scan)	Θ_{JC}		700		°C/W	On standard evaluation board **(note 5)**.

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}.

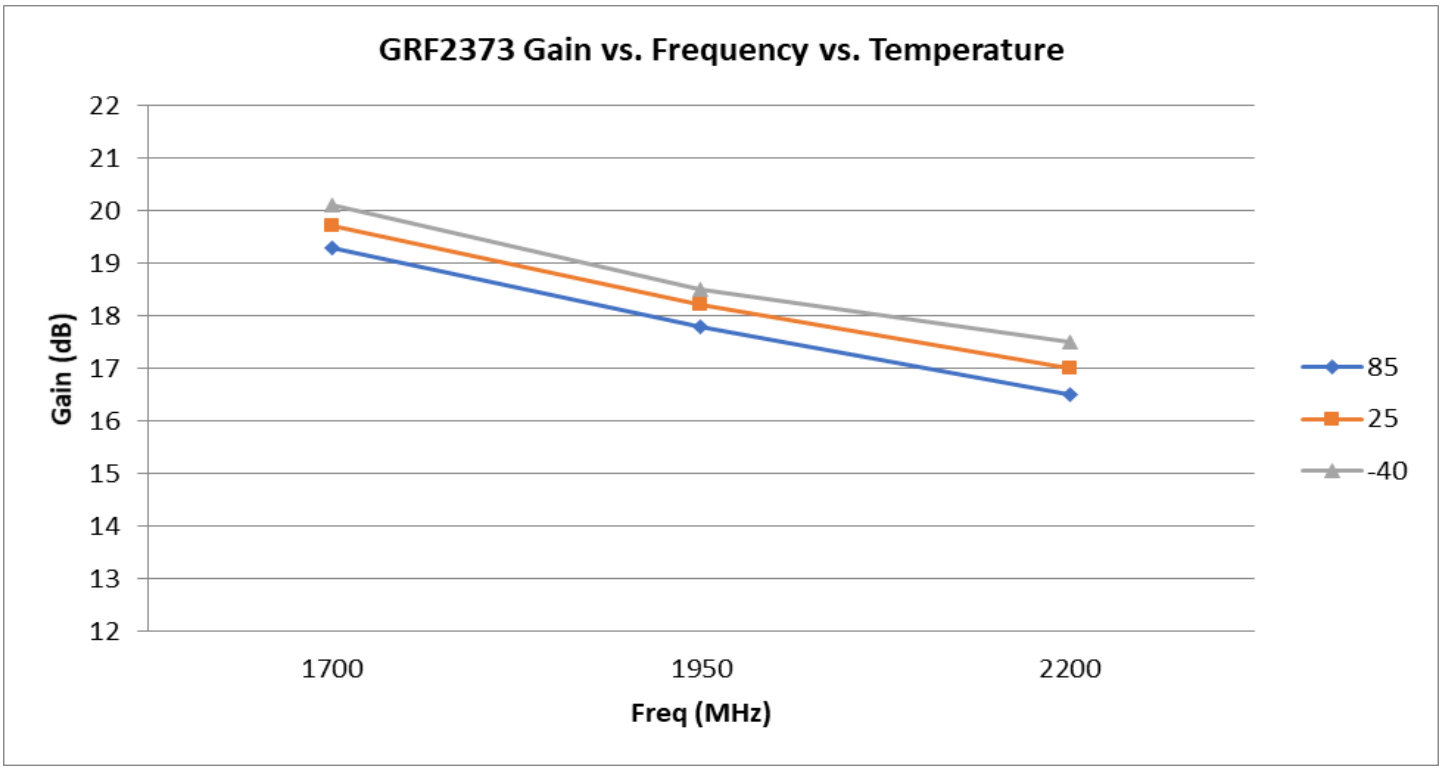
Note 5: MTTF > 10^6 hours for $T_{CHANNEL}$ ≤ 150 °C.

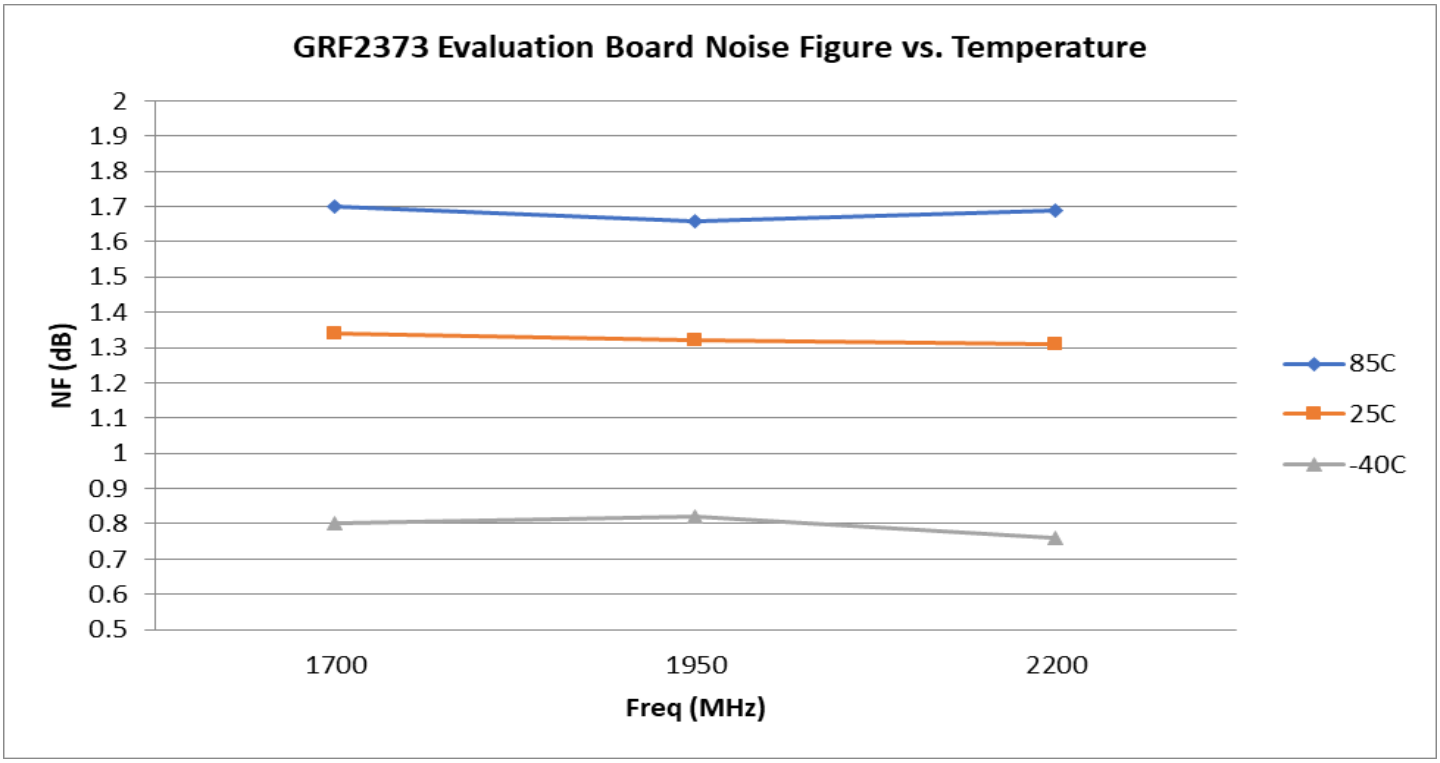
Nominal Operating Parameters – RF

The following conditions apply unless noted otherwise: typical application schematic using the 1.7 to 2.2 GHz tuning set. V_{CC} = 3.3 V, V_{ENABLE} = 3.3 V, F_{TEST} = 1.95 GHz, 50 Ω system impedance, $T_{PKG\ BASE}$ = 25 °C. Evaluation board losses are included within the specifications.

Parameter	Symbol	Specification			Unit	Condition
		Min.	Typ.	Max.		
Gain	S21	16.5	18		dB	
Noise Figure	NF		1.3	1.6	dB	On standard evaluation board.
Output 3rd Order Intercept Point	OIP3		25		dBm	-5 dBm P_{OUT} per tone at 2 MHz spacing (1949 and 1951 MHz).
Output 1 dB Compression Power	OP1dB	11.5	13		dBm	

GRF2373 Typical Operating Curves: 1.7 to 2.2 GHz Tune





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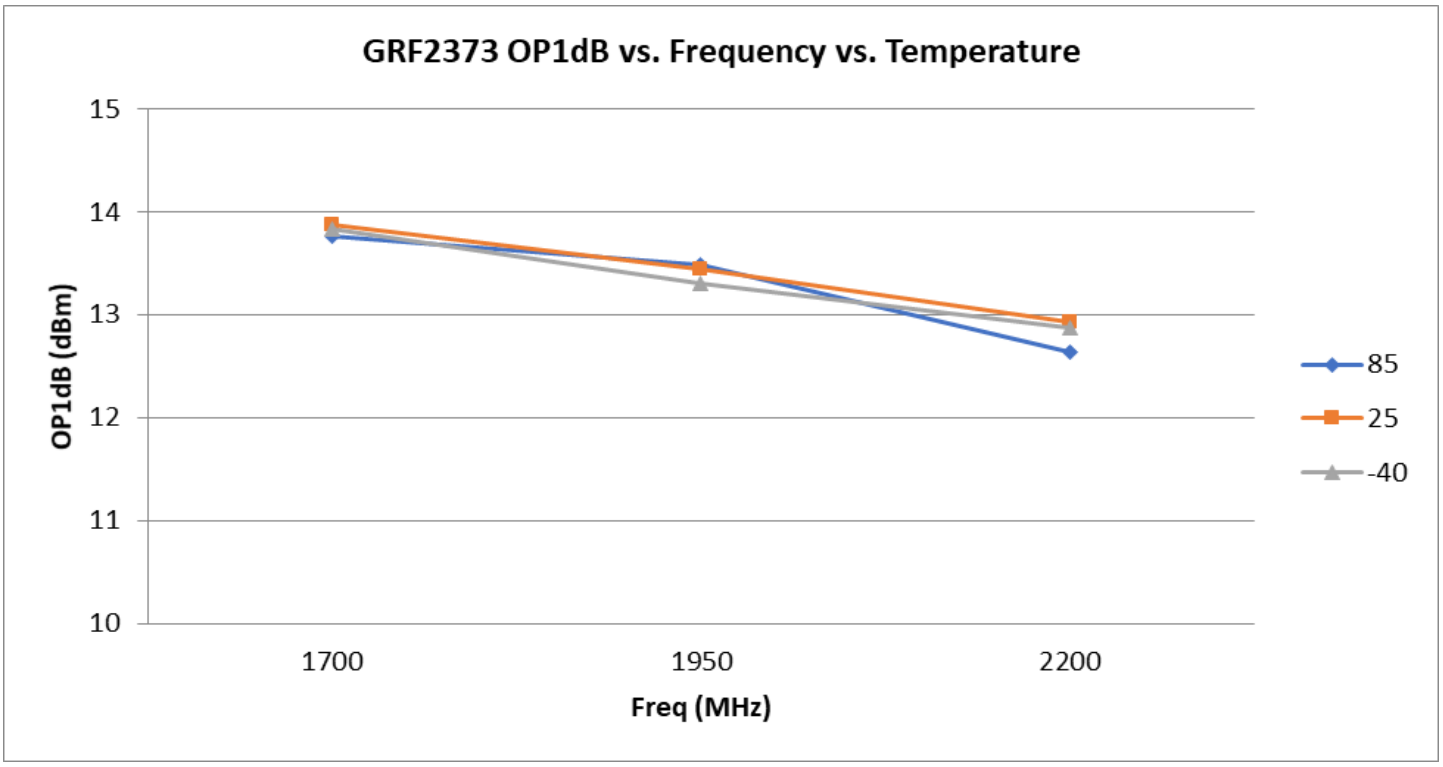
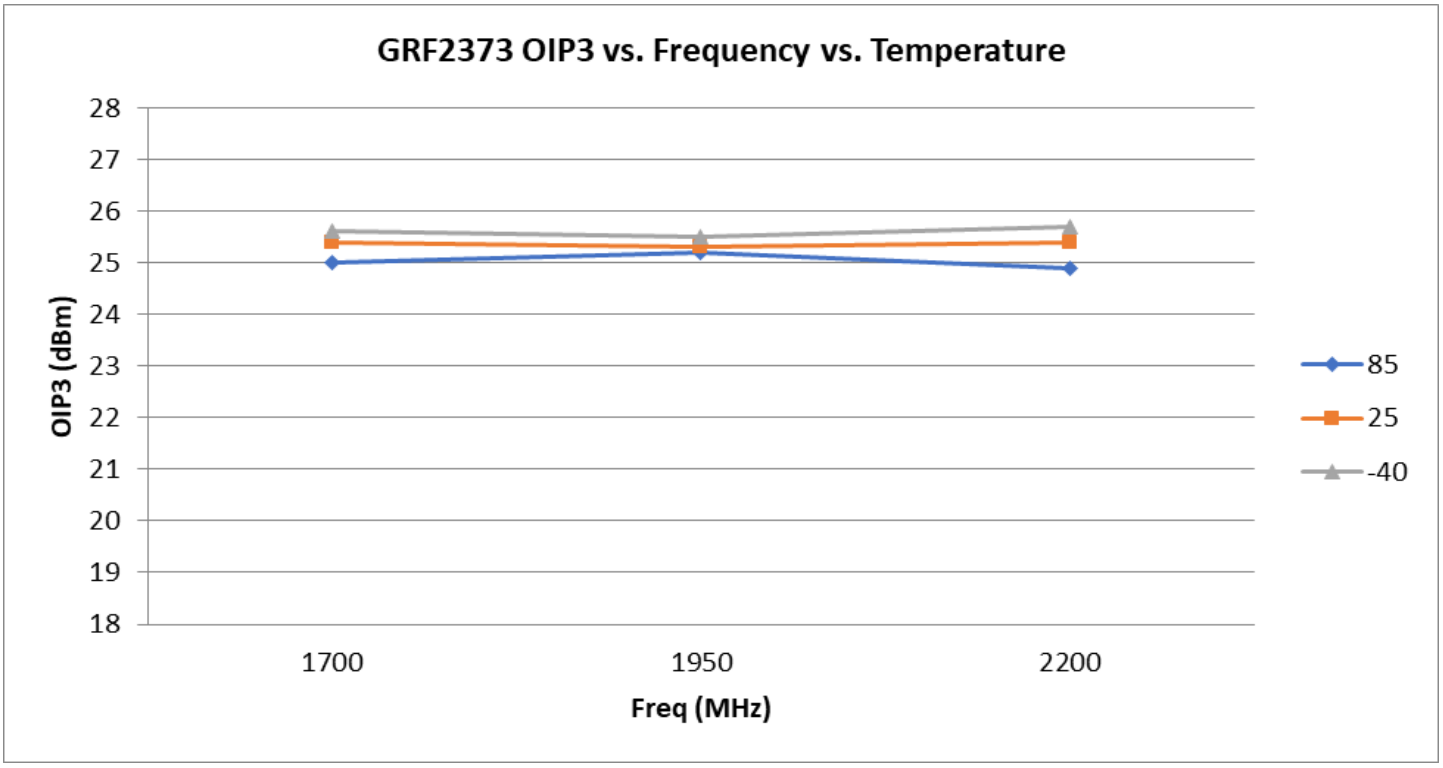
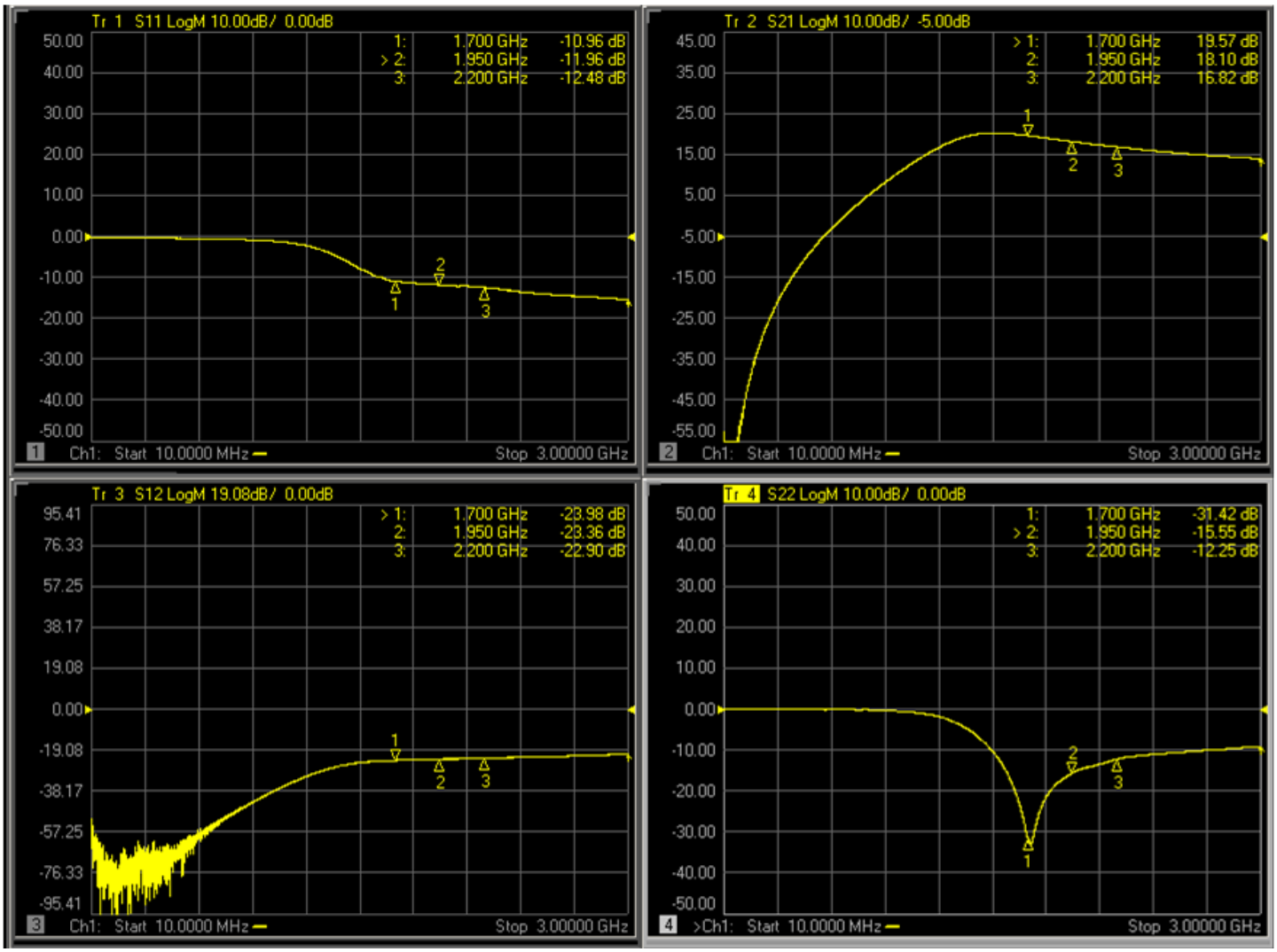
GRF2373 Typical Operating Curves: 1.7 to 2.2 GHz Tune





GRF2373 Typical Operating Curves: S-Parameters (1.7 to 2.2 GHz Tune)



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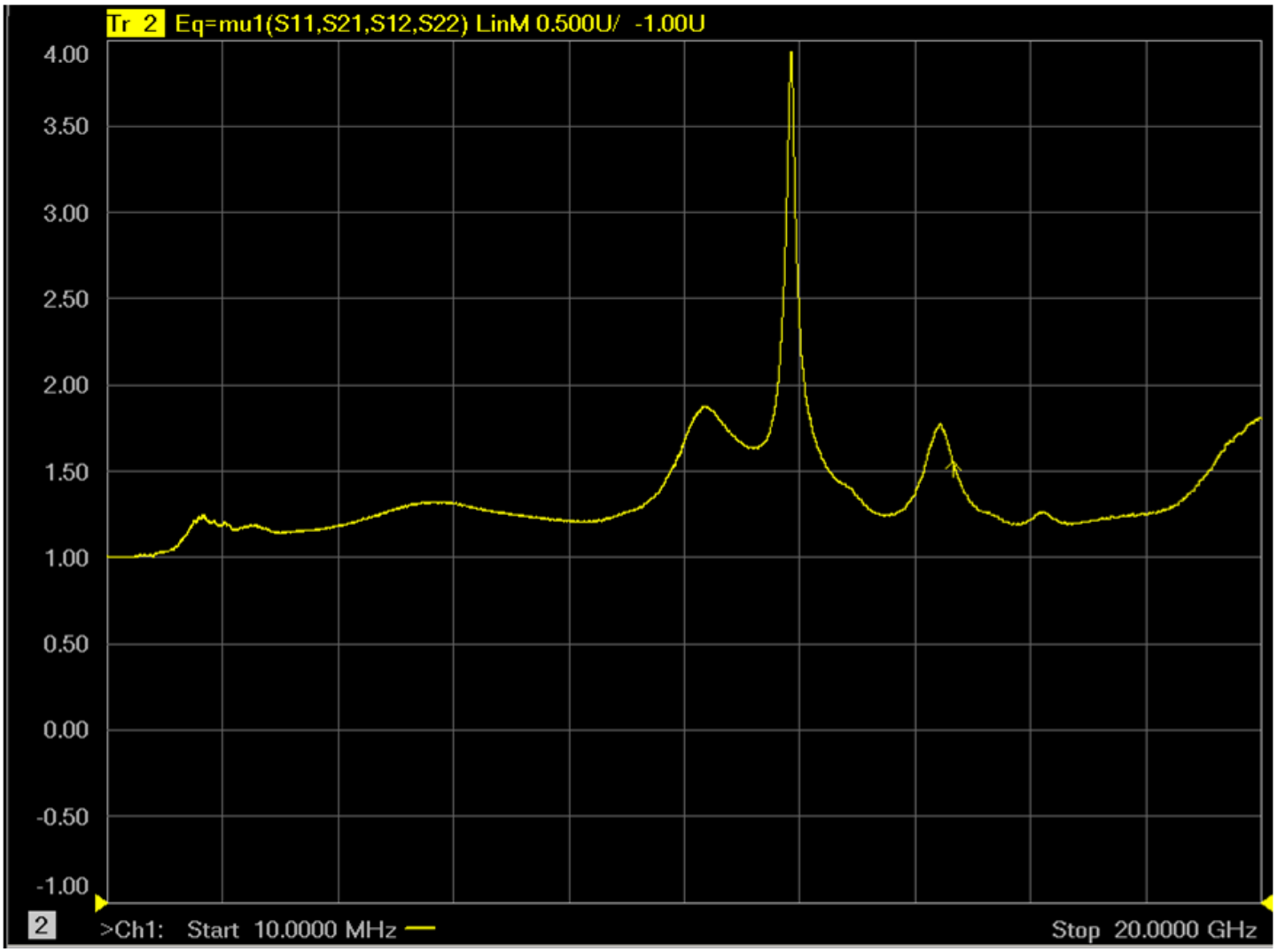
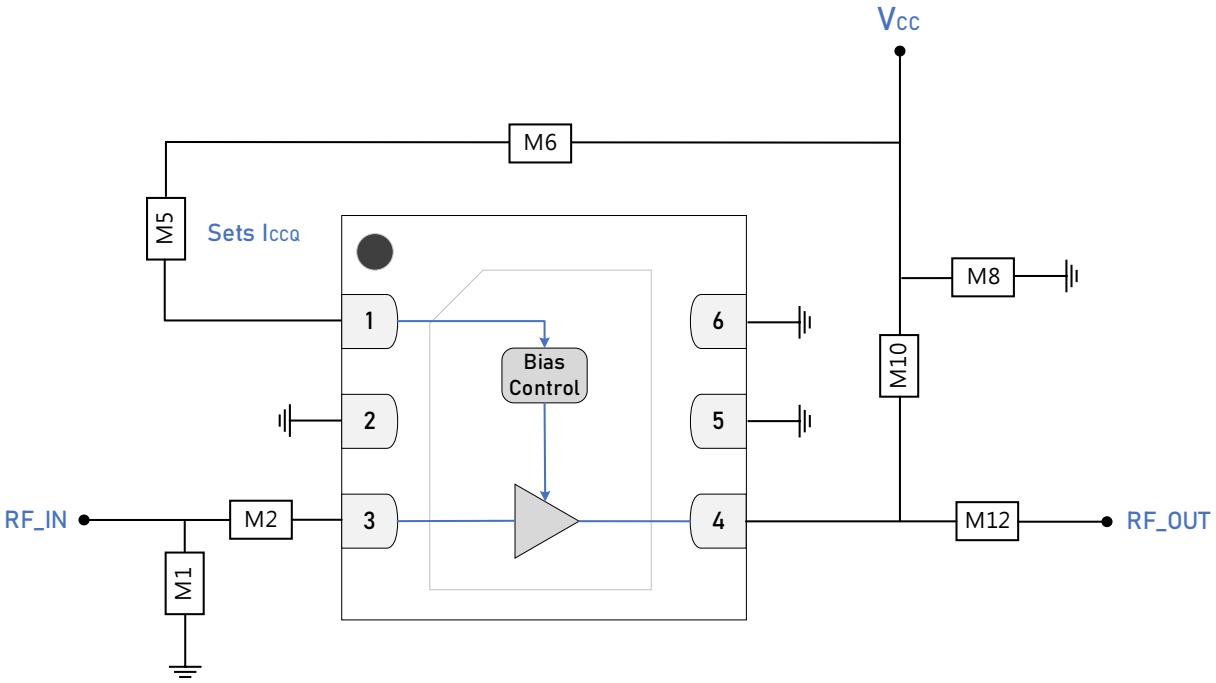
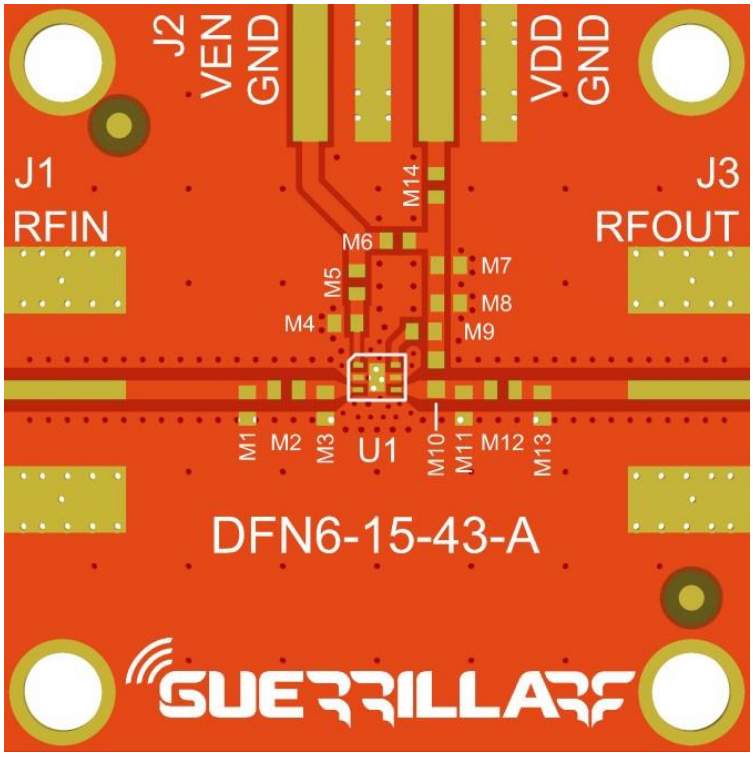
GRF2373 Typical Operating Curves: Stability Mu Factor (10 MHz to 20 GHz)



Note: Mu ≥ 1.0 implies unconditional stability.



GRF2373 Standard Evaluation Board Schematic



GRF2373 Evaluation Board Assembly Diagram

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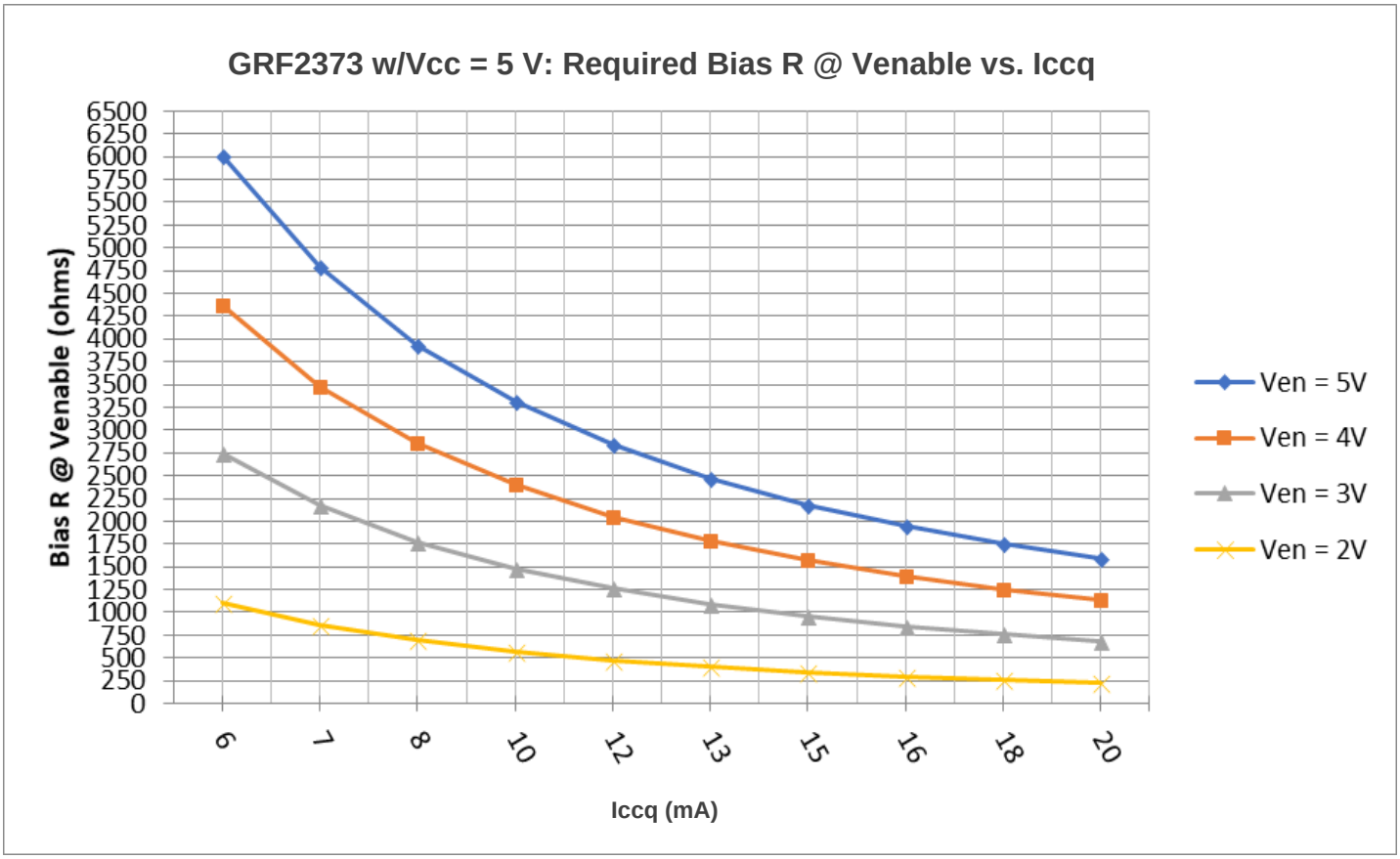
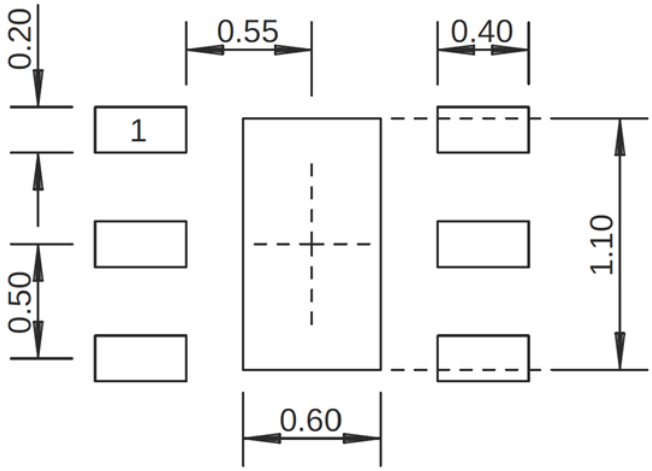
GRF2373 Evaluation Board Assembly Diagram Reference: 1.7 to 2.2 GHz Tune

Component	Type	Manufacturer	Family	Value	Package Size	Substitution
M1	Inductor	Murata	LQG	5.1 nH	0402	ok
M2	Capacitor	Murata	GJM	3.0 pF	0402	ok
M5 (sets I_{CCQ})	Resistor	Various	5%	see curves	0402	ok
M6	Resistor (jumper)	Various	5%	0 Ω	0402	ok
M8	Capacitor	Murata	GRM	0.1 µF	0402	ok
M10	Inductor	Murata	LQG	3.0 nH	0402	ok
M12	Capacitor	Murata	GJM/GRM	1.5 pF	0402	ok
Evaluation Board	DFN6-15-43-A					

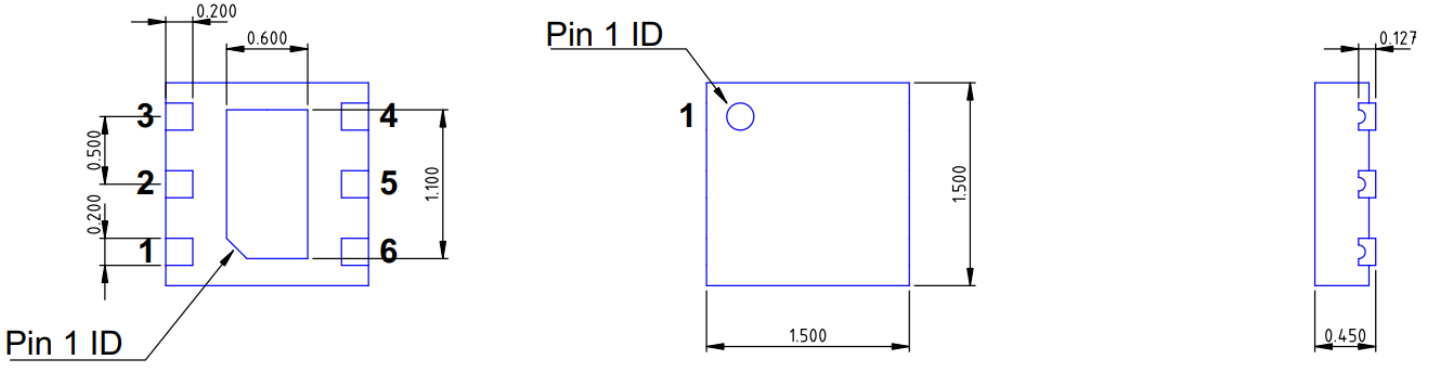
Note: V_{CC} = 3.3 V, V_{ENABLE} = 3.3 V, I_{CCQ} = 15 mA.

GRF2373 Bias Resistor Selection Curves





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

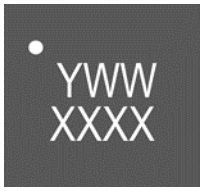


Bottom View **Top View** **Side View**

DFN6 1.5x1.5mm
Dimensions in millimeters
Dimensional Tolerance: ±0.05

1.5 x 1.5 mm DFN-6 Package Dimensions

Package Marking Diagram



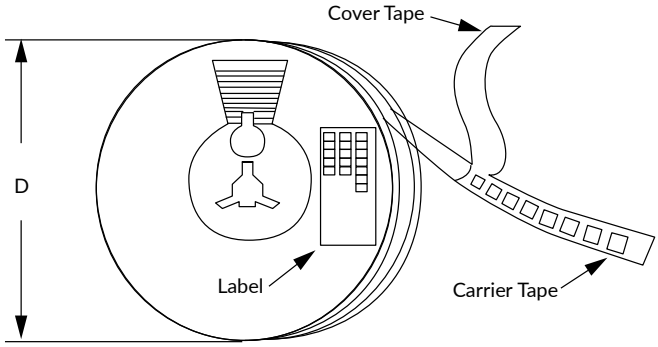
- Line 1: "Y" = YEAR (single digit). "WW" = WORK WEEK the device was assembled.
- Line 2: "XXXX" = Device PART NUMBER.

Tape and Reel Information

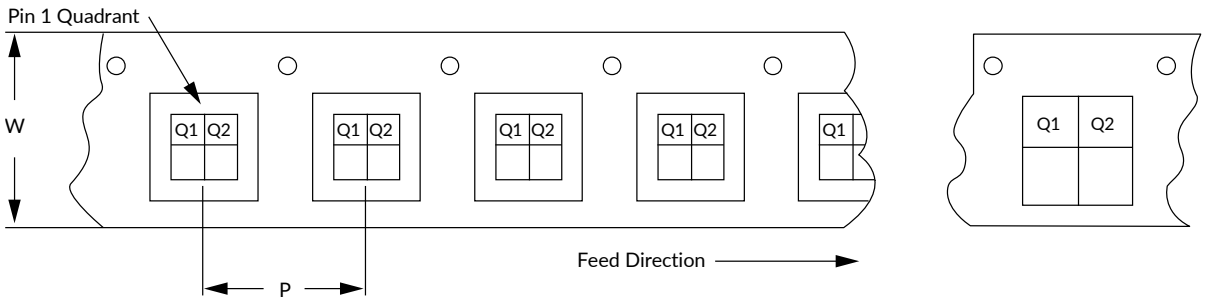
Guerrilla RF's tape and reel specification complies with Electronic Industries Alliance (EIA) standards for "Embossed Carrier Tape of Surface Mount Components for Automatic Handling" (reference EIA-481). See the following page for the Tape and Reel Specification and Device Package Information table,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

Revision History

Revision Date	Description of Change
May 30, 2019	Preliminary Data Sheet.
January 14, 2020	Release A Data Sheet.
February 27, 2025	Upgraded Data Sheet to new format only. No change to device or device specifications.
June 2, 2025	Extended frequency range from 100 - 3800 MHz to 90 - 4000 MHz.

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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.