GRF1201

Released

Log Average Power Detector 0.1 to 6.0 GHz

Features

Reference: 5.0V/7mA/2.0 GHz

- Detector Slope: 0.08 volts per dB (–20 to +20 dBm)
- Linear Logarithmic Power Detector
- Flexible bias voltage
- Minimal External Components
- Process: InGaP HBT

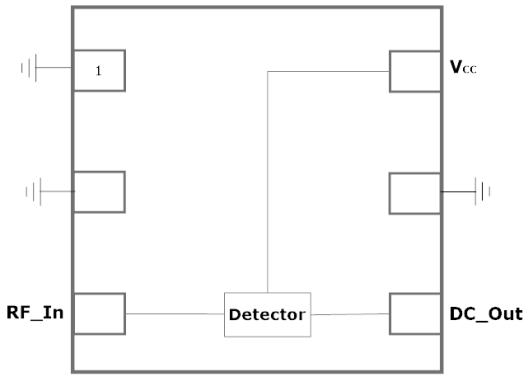
Applications

- High-volume, cost-sensitive logarithmic power detector applications

Product Description

GRF1201 is a low-cost, logarithmic, average power detector IC LNA designed for cost-sensitive applications in the 100 to 6000 MHz frequency range.

It is operated from a supply voltage (Vcc) range of 2.7 to 5.0 volts and housed in a 1.5 x 1.5 x 0.5 mm 6-pin plastic DFN package. Consult with the GRF applications engineering team for additional performance data.



1.5 x 1.5 mm DFN-6

Absolute Ratings:

Parameter	Symbol	Min.	Max.	Unit
Supply Voltage	V_{CC}	0	6.0	V
RF Input Power CW: (Load VSWR < 2:1; V_C: 5.0 volts)	$P_{IN\ MAX}$		TBD	dBm
Operating Temperature (Package Heat Sink)	T_{AMB}	-40	105	°C
Maximum Channel Temperature (MTTF > 10^6 Hours)	T_{MAX}		170	°C
Electrostatic Discharge:				
Charged Device Model:	CDM	1000		V
Human Body Model:	HBM	500		V
Storage:				
Storage Temperature	T_{STG}	-65	150	°C
Moisture Sensitivity Level	MSL		1	--

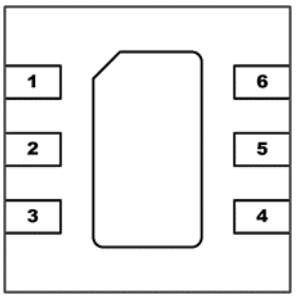
Caution! ESD Sensitive Device

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

Note: For manufacturing information, see the Guerrilla-RF.com website for the following document located on the GRF1201 landing page: Manufacturing Note—MN-001 Product Tape and Reel, Solderability and Package Outline Specification.

Link to manufacturing note

Pin Out (Top View)



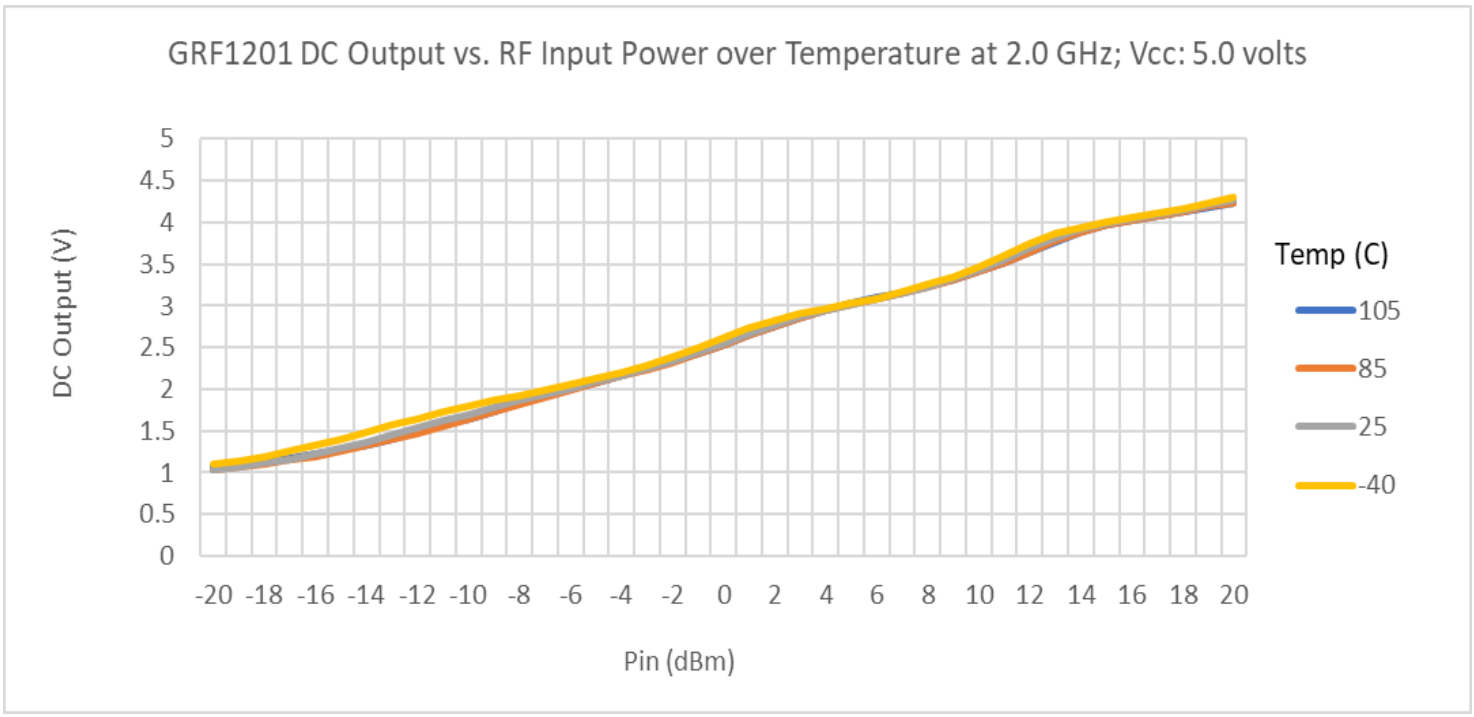
Pin Assignments:

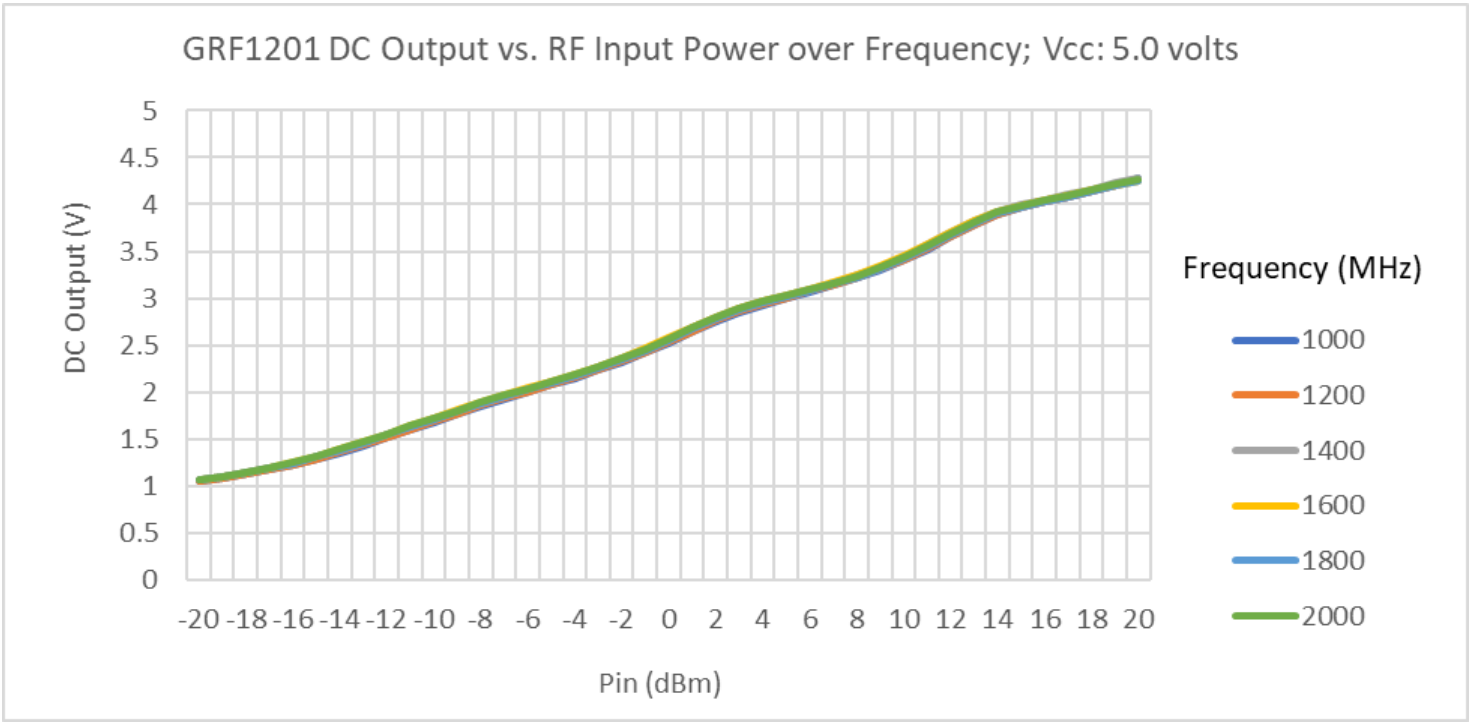
Pin	Name	Description	Note
1	NC/GND	Enable Voltage Input	No internal connection to die
2	NC/GND	No Connect or Ground	No internal connection to die
3	RF_In	Detector RF Input	An external DC blocking cap must be used.
4	DC_Out	Detector DC Output	DC couple to measure detected output power
5	NC/GND	No Connect or Ground	No internal connection to die
6	Vcc	Supply Voltage Input	V_{CC} must be applied through a choke to this pin
PKG BASE	GND	Ground	Provides DC and RF ground for detector, as well as thermal heat sink. Recommend multiple 8 mil vias beneath the package for optimal RF and thermal performance.

Nominal Operating Parameters:

Parameter	Symbol	Specification			Unit	Condition
		Min.	Typ.	Max.		
Test Frequency (50 Ohm Source)	F_{TEST}		2.0		GHz	V_{CC}= 5.0V, T_A = 25°C
DC Out (No RF Applied)	DC_Out		0.8		volts	
DC Out (-20 dBm RF Input Power)	DC_Out		1.0		volts	
DC Out (0 dBm RF Input Power)	DC_Out		2.6		volts	
DC Out (10 dBm RF Input Power)	DC_Out		3.5		volts	
DC Out (+20 dBm RF Input Power)	DC_Out		4.3		volts	
Detector Output Rise Time	T_Rise		200		ns	
Detector Output Fall Time	T_Fall		650		ns	
Supply Current	I_{CC}		7.0	9.0	mA	
Thermal Data						
Thermal Resistance: (Infra-Red Scan)	Qjc		TBD		°C/W	On standard Evaluation Board
Channel Temperature @ +85 C Reference (Package heat sink)	$T_{CHANNEL}$		TBD		°C	V_{CC}: 5.0 V; I_{CCQ}: 7 mA; No RF; P_{DISS}: 35 mW

GRF1201 Evaluation Board Data:





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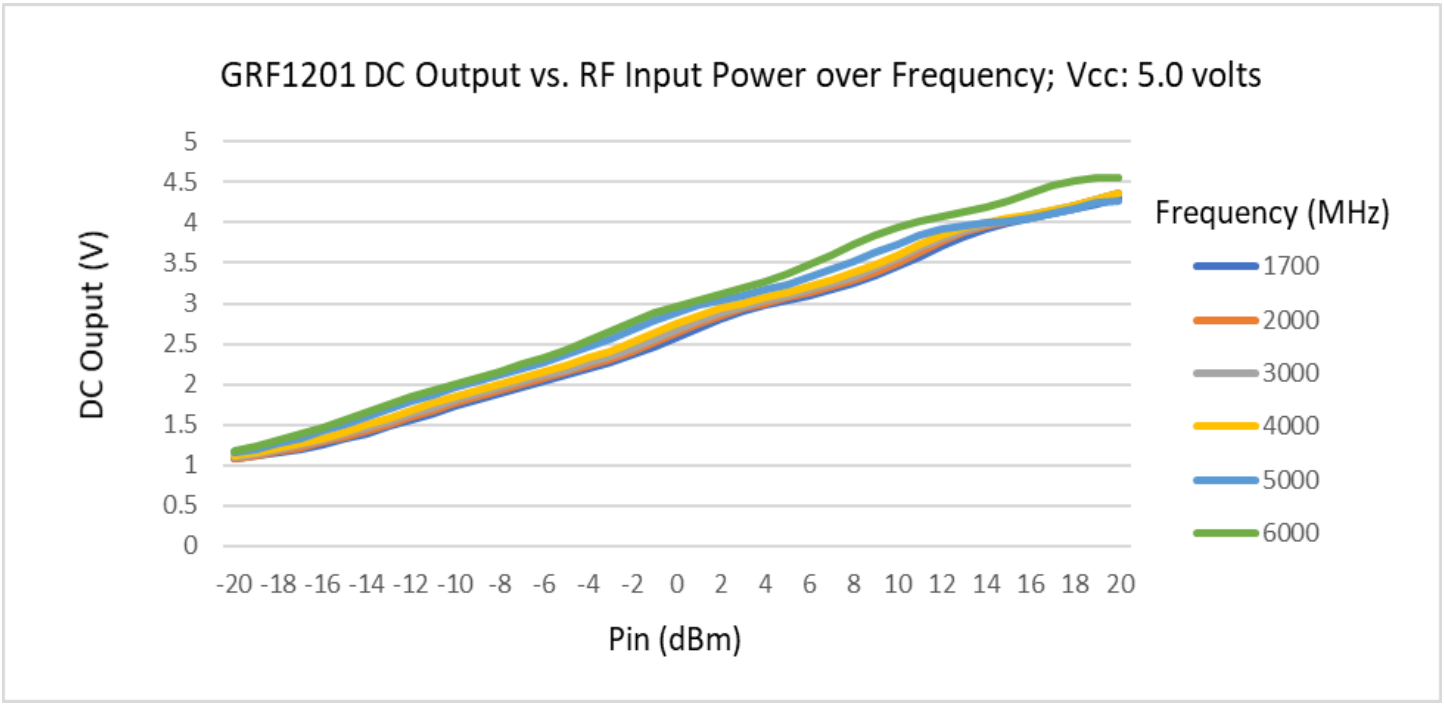

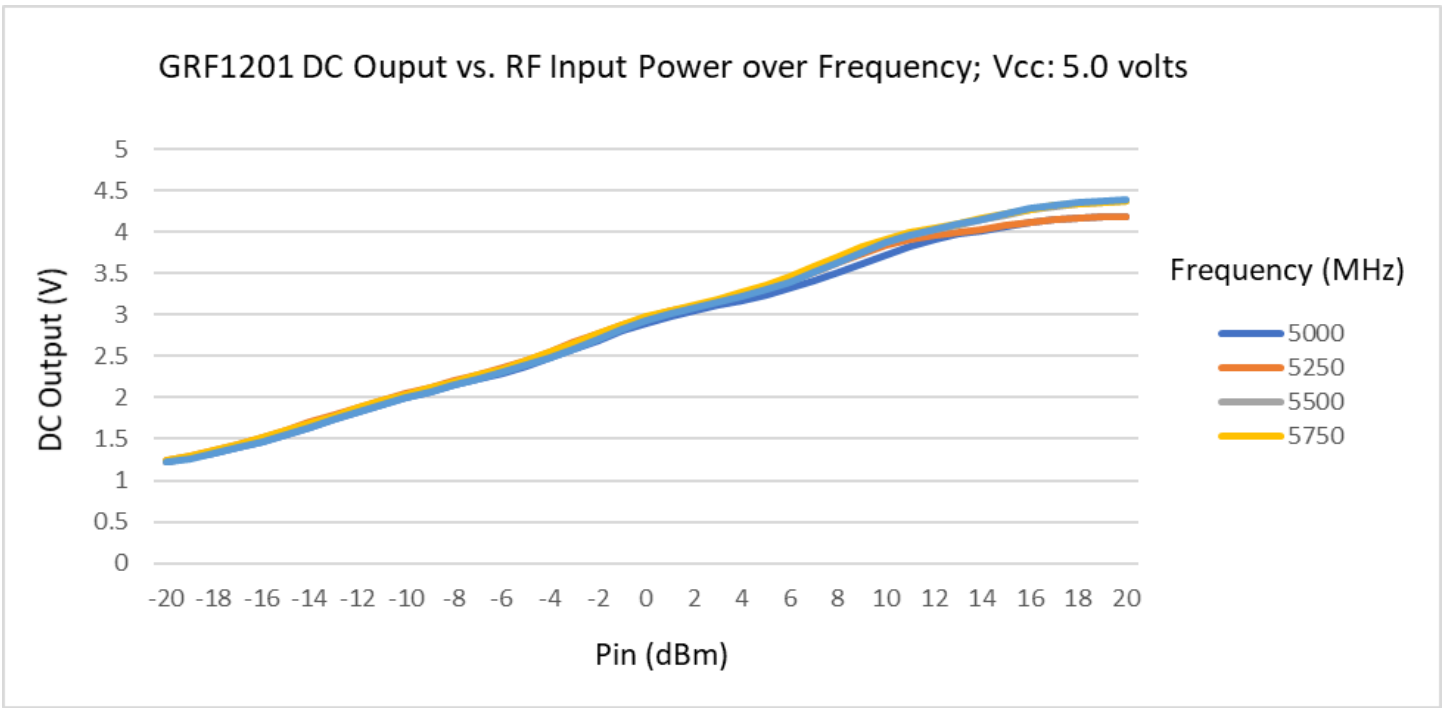

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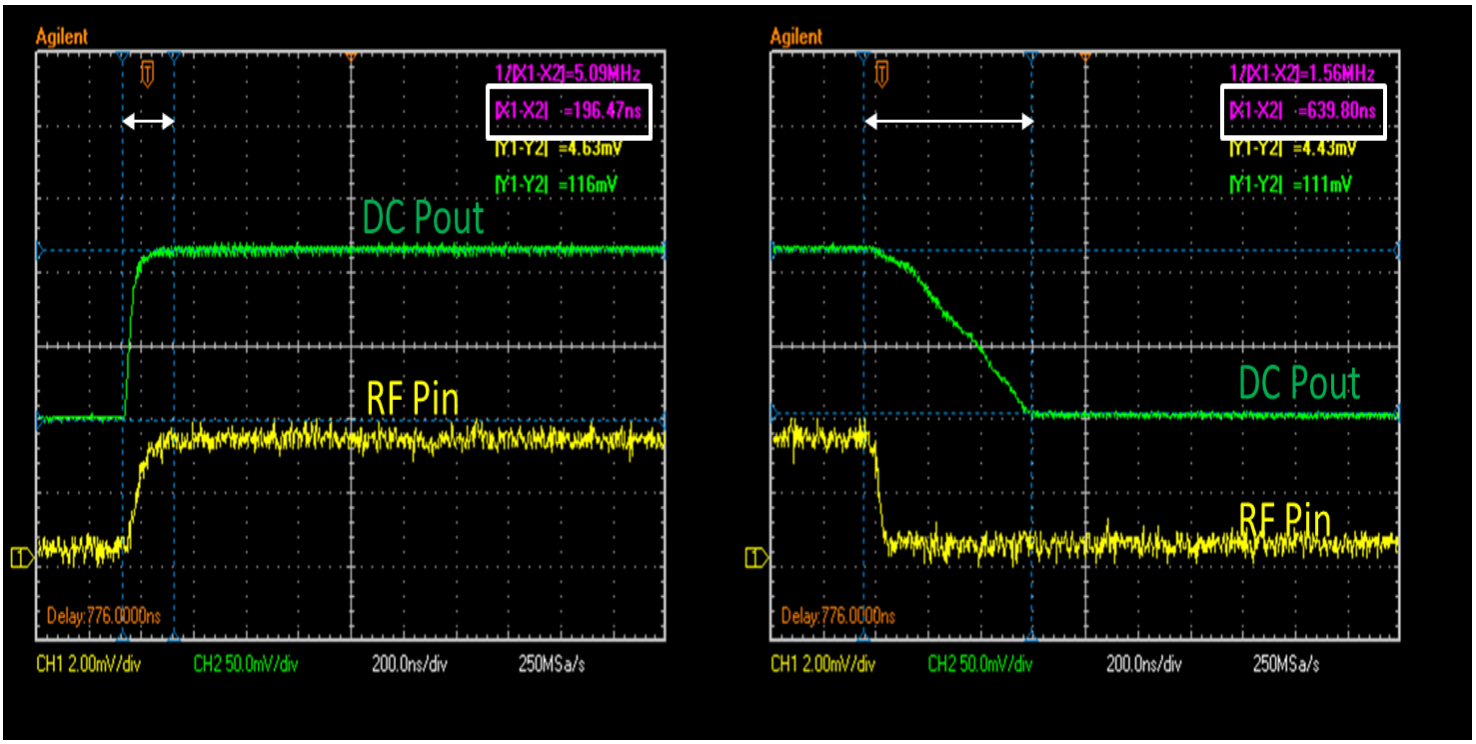
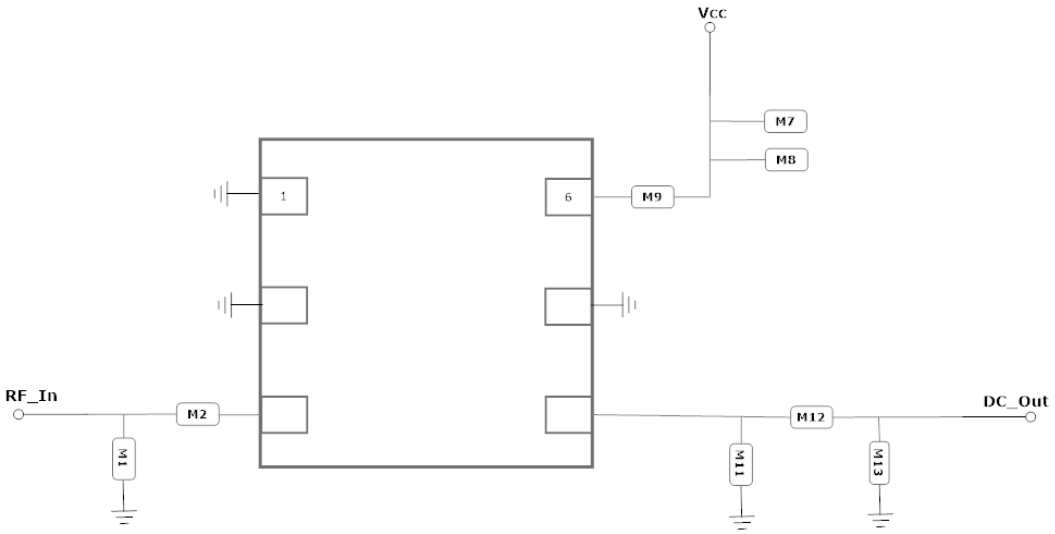
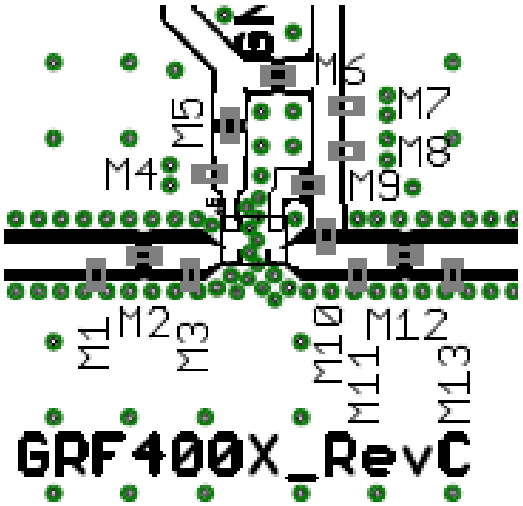


GRF1201 Detector Rise and Fall Times:



GRF1201 Application Schematic

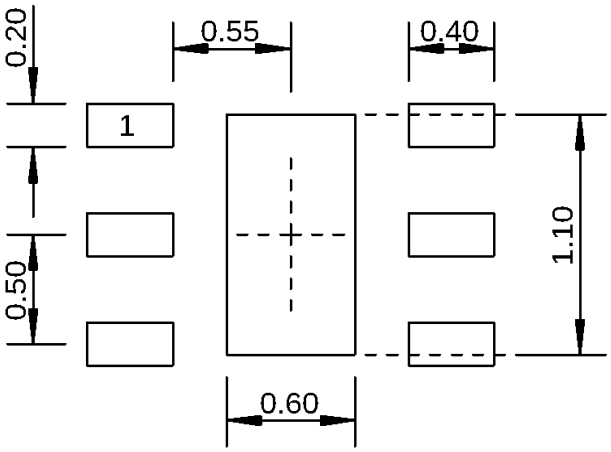


GRF1201 Evaluation Board Assembly Drawing

GRF1201 Evaluation Board BOM: All Bands

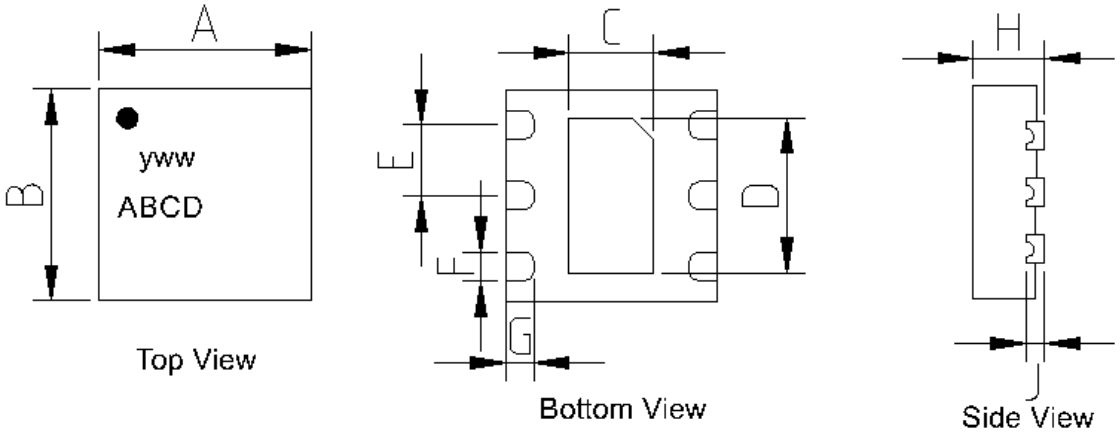
Component	Type	Manufacturer	Family	Value	Package Size	Substitution
M1	Resistor	Various	5%	68 ohms	0402	ok
M2 (0.4 to 2.0 GHz)*	Capacitor	Murata	GRM	100 pF	0402	ok
M2 (2.0 to 5.0 GHz)*	Capacitor	Murata	GRM	10 pF	0402	ok
M2 (5.0 to 6.0 GHz)*	Capacitor	Murata	GRM	2.0 pF	0402	ok
M7	Capacitor	Murata	GRM	0.1 uF	0402	ok
M8	Capacitor	Murata	GRM	100 pF	0402	ok
M9	Resistor (Jumper)	Various	—	0 Ohm	0402	ok
M11	Capacitor	Murata	GRM/GJM	100 pF	0402	ok
M12	Resistor (Jumper)	Various	—	0 Ohm	0402	ok
M13	Resistor	Various	—	10k ohms	0402	ok

*** Note: M2 value is flexible and only needs to be a good RF short at the frequencies of interest. All other BOM components are not frequency dependent.**



Dimensions in millimeters

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



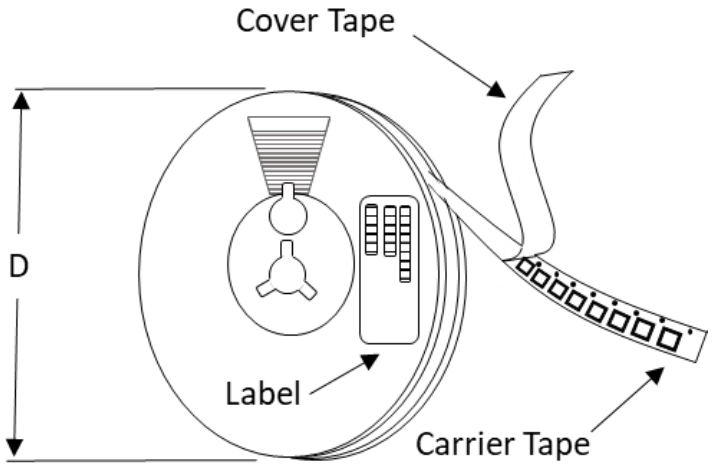
Dimensions (MM)	
A	1.5 +/- 0.050
B	1.5 +/- 0.050
C	.6 +/- 0.050
D	1.1 +/- 0.050
E	.5 Bsc
F	.2 +/- 0.050
G	.2 +/- 0.050
H	.45 +/- 0.050
J	.12 Ref.

1.5 mm DFN-6 Package Dimensions

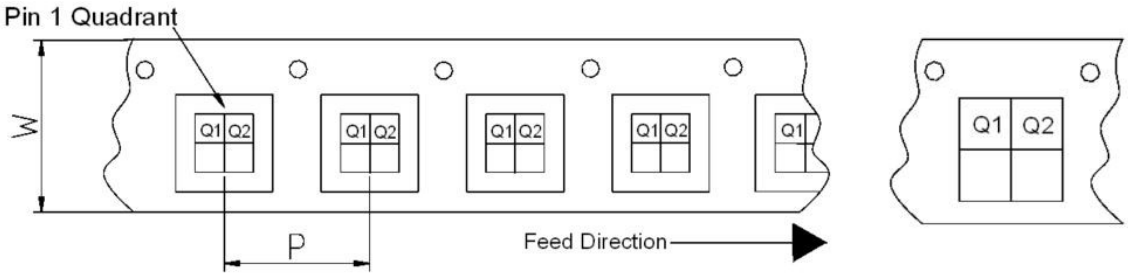
Tape and Reel Information:

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

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 Quad-rant	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

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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