



Preliminary

GRF2130

Ultra-High Gain LNA
Tuning Range: 0.7 to 3.8 GHz



Product Description

GRF2130 is an ultra-high gain LNA featuring 1.2 dB noise figure for small cell, cellular booster, wireless infrastructure and other high performance applications.

The device is operated from a supply voltage of 1.8 to 5.0 V with a selectable Iddq range of 15 to 50 mA for optimal efficiency and linearity.

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

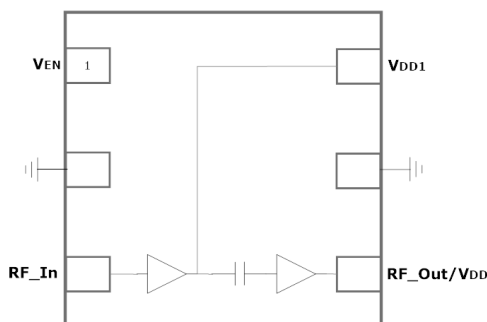
Features

Reference: 3.3V/25mA/1900 MHz

- Gain: 32.0 dB
- OP1dB: 14.0 dBm
- OIP3: 17.0 dBm
- NF: 1.2 dB
- Unconditionally Stable
- Flexible Biasing
- Process: GaAs pHEMT

Applications

- High Gain LNA
- Cellular Boosters / Repeaters



1.5 x 1.5 mm DFN-6



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Absolute Ratings:

Parameter	Symbol	Min.	Max.	Unit
Supply Voltage	V _{DD}	0	6.0	V
RF Input Power: (Load VSWR < 2:1; V _D : 5.0 volts)	P _{IN MAX}		17	dBm
Operating Temperature (Package Heat Sink)	T _{AMB}	-40	105	°C
Maximum Channel Temperature (MTTF > 10 ⁶ Hours)	T _{MAX}		170	°C
Maximum Dissipated Power	P _{DISS MAX}		150	mW
Electrostatic Discharge:				
Charged Device Model:	CDM	1500		V
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 to the device.

Note: For manufacturing information, see the Guerrilla-RF.com website for the following document located on the GRF2130 landing page (Coming soon): Manufacturing Note—MN-001 Product Tape and Reel, Solderability and Package Outline Specification.

[Link to manufacturing note](#)

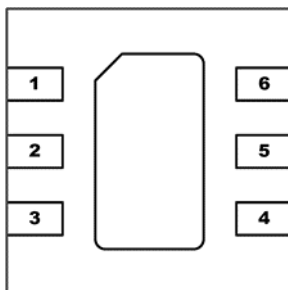


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Pin Out (Top View)



Pin Assignments:

Pin	Name	Description	Note
1	V _{ENABLE}	Enable Voltage Input	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 connection to die
3	RF_In	LNA RF input	External DC block required.
4	RF_Out/V _{DD}	LNA RF output	V _{DD} applied to this pin. External DC block required.
5	NC	No Connect or Ground	No internal connection to die
6	V _{DD1}	Bias Supply	Typically tied to V _{DD} via an external resistor or an inductor (for V _{DD} < 4.0 volts). Tying to V _{DD} allows for the re-use of M8 for the required de-coupling
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.



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Nominal Operating Parameters:

Parameter	Symbol	Specification			Unit	Condition
		Min.	Typ.	Max.		
Test Frequency	F_{TEST}		1900		MHz	$V_{DD} = 3.3\text{ V}$, $T_A = 25^\circ\text{C}$
Gain	S21		32.0		dB	
Output 3rd Order Intercept	OIP3		17.0		dBm	-4.0 dBm P_{OUT} per tone at 2 MHz Spacing (1899 and 1901 MHz)
Output 1dB Compression Power	OP1dB		14.0		dBm	
Evaluation Board Noise Figure	NF		1.2		dB	
Switching Rise Time	T_{RISE}		TBD		us	
Switching Fall Time	T_{FALL}		TBD		ns	
Supply Current	I_{DD}		25		mA	
Enable Current	I_{ENABLE}		0.2		mA	
Disabled Mode						
Leakage Current	$I_{LEAKAGE}$		1		uA	$V_{DD}: 3.3\text{V}$; $V_{ENABLE}: 0.0\text{V}$
Thermal Data						
Thermal Resistance: (Infra-Red Scan)	Θ_{jc}		TBD		$^\circ\text{C}/\text{W}$	On standard Evaluation Board
Channel Temperature @ +85 C Reference (Package heat sink)	$T_{CHANNEL}$		TBD		$^\circ\text{C}$	$V_{DD}: 3.3\text{ V}$; $I_{DDQ}: 25\text{ mA}$; No RF; $P_{DISS}: 83\text{ mW}$

Note: MTTF >10⁶ hours for $T_{CHANNEL} \leq 170$ degrees C.



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GRF2130 Evaluation Board Performance; (3.3V/25 mA)

Descriptor	Freq MHz	Vdd	Iddq mA	Gain dB	OIP3 dBm	OP1dB dBm	EVB NF dB
GRF2130	1700	3.3	26.6	32.3	17.9	15.1	1.2
GRF2130	1900	3.3	26.1	32.0	17.0	14.0	1.2
GRF2130	2200	3.3	26.2	30.1	16.9	10.1	1.2

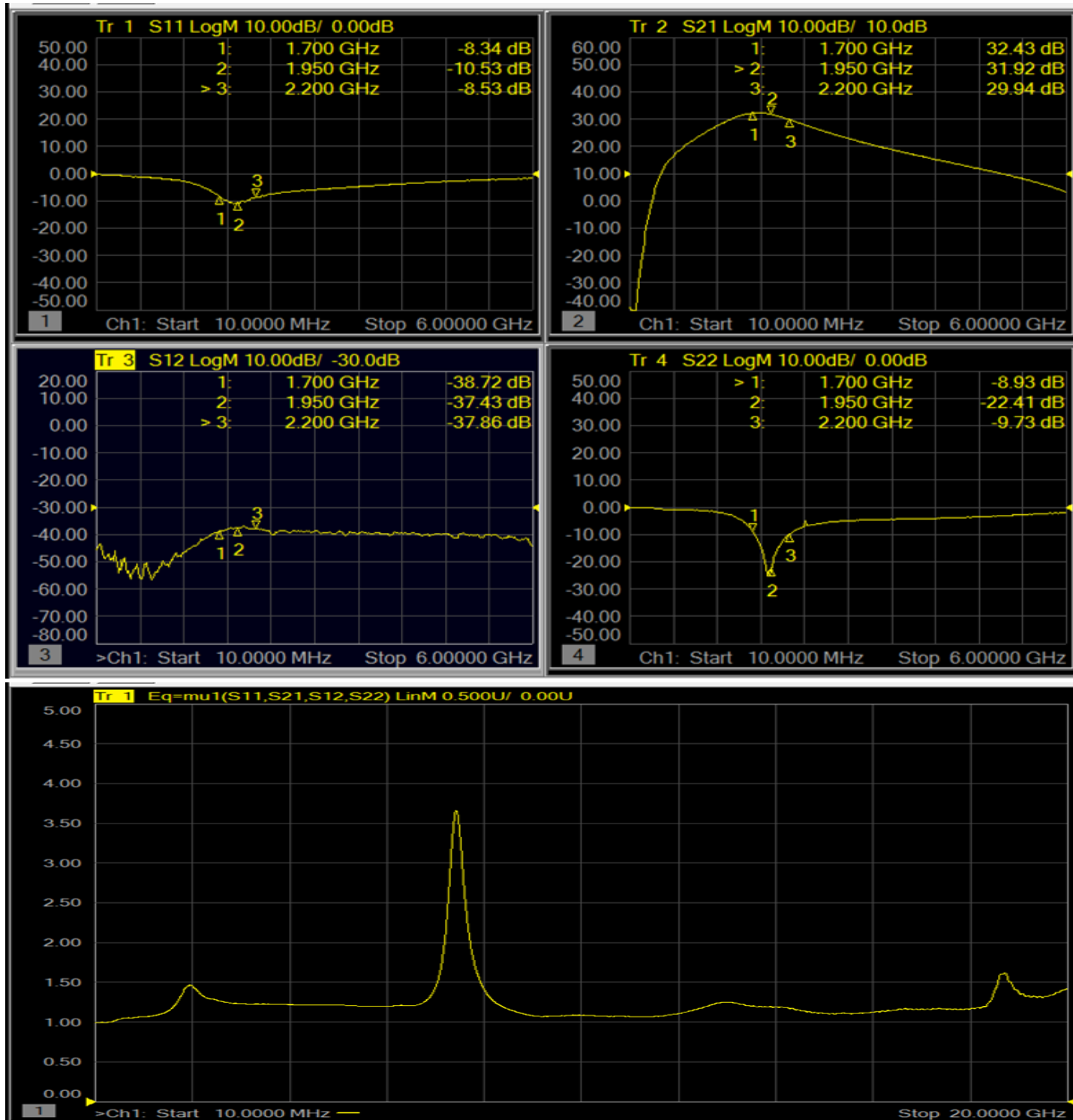


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GRF2130 Evaluation Board S-Params and Stability Mu Factor: (3.3V/25 mA)



Note: Mu factor ≥ 1.0 implies unconditional stability.

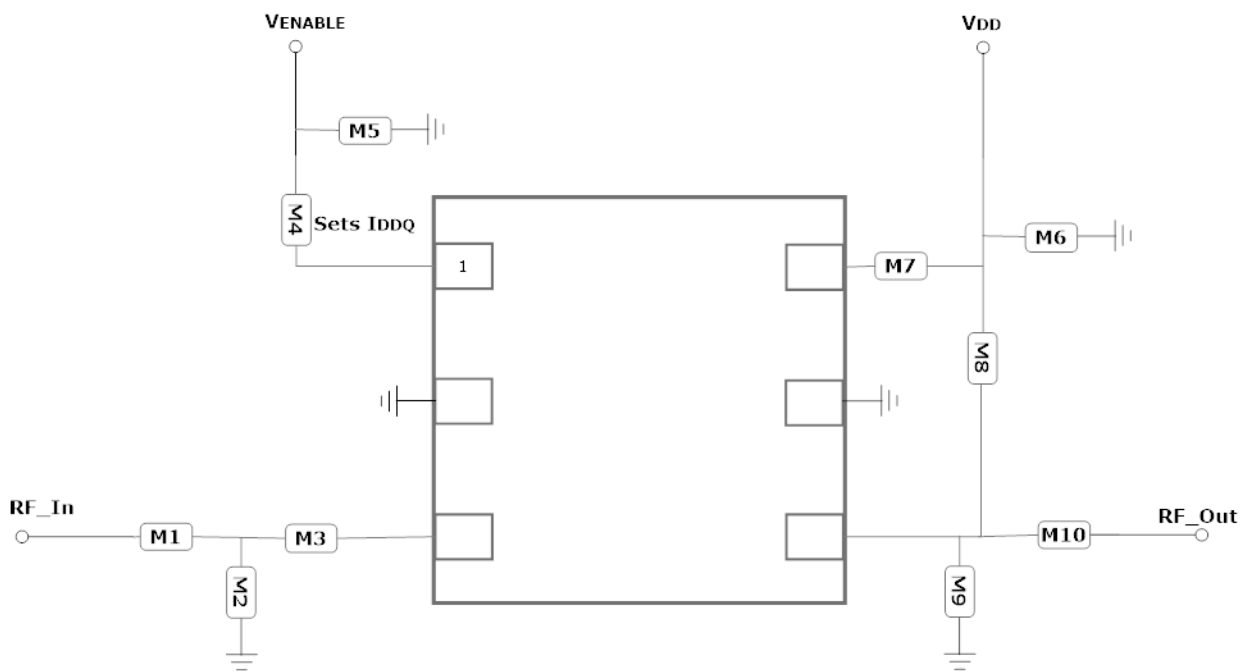
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GRF2130 Application Schematic (1700–2200 MHz)

(TBD)

GRF2130 Evaluation Board Assembly Drawing



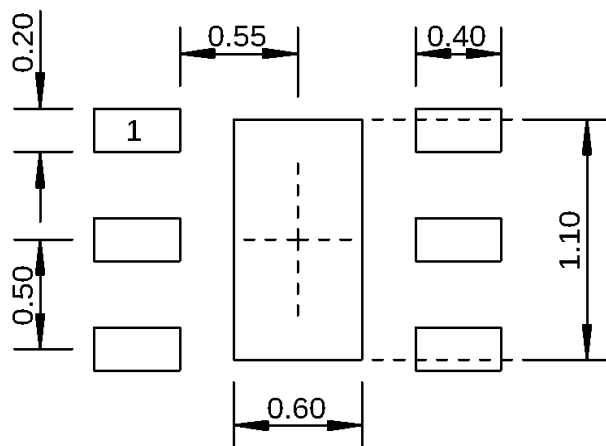
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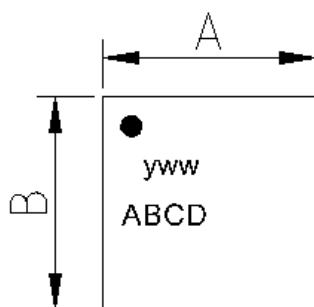
GRF2130 Evaluation Board BOM; (1.7 to 2.2 GHz)

Component	Type	Manufacturer	Family	Value	Package Size	Substitution
M1	Inductor	Murata	LQG	1.8 nH	0402	ok
M2	Inductor	Murata	LQG	6.2 nH	0402	ok
M3	Capacitor	Murata	GJM	15 pF	0402	ok
M4 (Sets Iddq)	Resistor: 5%	Various	—	—	0402	ok
M6	Capacitor	Murata	GRM	0.1 uF	0402	ok
M7	Inductor	Murata	LQG	7.5 nH	0402	ok
M8	Inductor	Murata	LQG	15 nH	0402	ok
M9	Capacitor	Murata	GJM	0.5 pF	0402	ok
M10	Capacitor	Murata	GJM	1.5 pF	0402	ok
Evaluation Board	TBD					

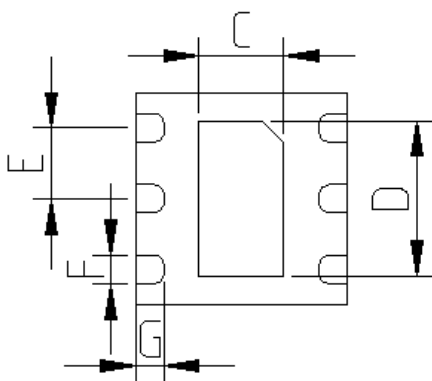


Dimensions in millimeters

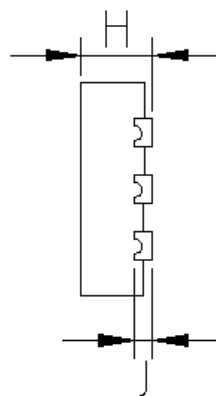
1.5 mm DFN-6 Suggested PCB Footprint (Top View)



Top View



Bottom View



Side 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



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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.

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