



### Product Description

GRF7001 is a broadband, high-linearity mixer with integrated LO buffer that can be used as either an up or down converter.

The device inputs and outputs are single-ended and internally matched to 50 ohms. The device implementation requires an external image-reject filter on the RF port and an IF bandpass filter on the IF port. Pins 4 and 6 can be used for either RF or IF with appropriate filtering in place.

The integrated LO buffer is operated from a single positive supply of 3.0 to 5.0 V with a selectable  $I_{DDQ}$  range of 10 to 30 mA.

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

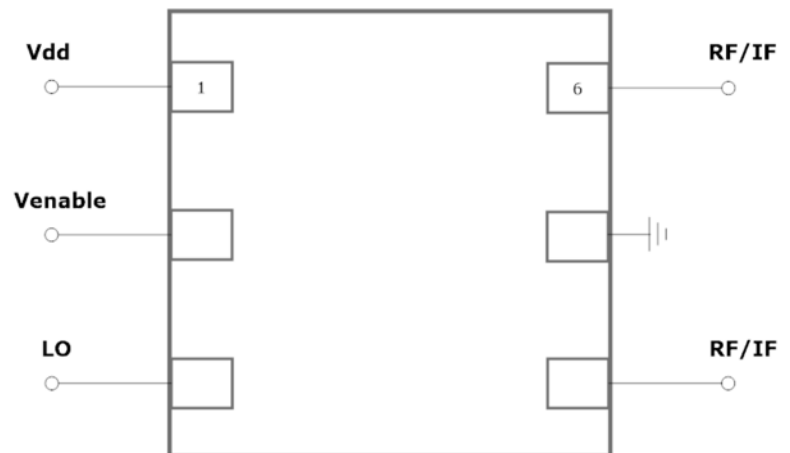
### Features

Reference: RF: 808 MHz; LO: 965 MHz;  
IF: 157 MHz

- Conversion Loss: 6.0 dB
- SSB NF: 7.1 dB
- IIP3: 25.4 dBm
- IP1dB: >17.0 dBm
- RF/IF Range: 0.1 to 5.0 GHz
- LO Range: 0.1 to 4.0 GHz
- Flexible Bias Voltage and Current
- Internally Matched to 50  $\Omega$
- Process: GaAs pHEMT

### Applications

- Bi-directional Mixer for High-linearity Transmit/Receive Chains





Preliminary

# GRF7001

## High Linearity Mixer with Integrated LO Buffer

### Absolute Ratings:

Parameter	Symbol	Min.	Max.	Unit
Supply Voltage	V <sub>DD</sub>	0	6.0	V
RF/IF/LO Input Power: (Load VSWR < 2:1; V <sub>D</sub> : 5.0	P <sub>IN MAX</sub>		15	dBm
Operating Temperature (Package Heat Sink)	T <sub>AMB</sub>	-40	105	°C
Maximum Channel Temperature (MTTF > 10 <sup>6</sup> Hours)	T <sub>MAX</sub>		170	°C
Maximum Dissipated Power	P <sub>DISS MAX</sub>		100	mW
<b>Electrostatic Discharge:</b>				
Charged Device Model:	CDM	1500		V
Human Body Model:	HBM	250		V
<b>Storage:</b>				
Storage Temperature	T <sub>STG</sub>	-65	150	°C
Moisture Sensitivity Level	MSL		1	--



**Caution!** ESD Sensitive Device



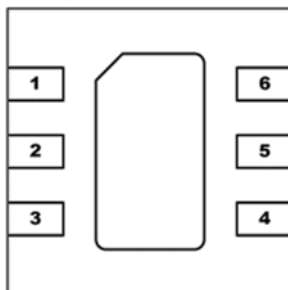
Exceeding Absolute Maximum Rating conditions may cause permanent damage to the device.

**Note:** For package dimensions and manufacturing information, see the [Guerrilla-RF.com](http://Guerrilla-RF.com) website for the following document located on the GRF7001 landing page (pending): 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	V <sub>DD</sub>	LO buffer voltage input	Vdd: 3.0 to 5.0 volts
2	V <sub>ENABLE</sub>	I <sub>ddq</sub> control input	Venable and external resistor set I <sub>ddq</sub> for LO buffer. Venable < =0.2 volts disables the device
3	LO	Input to LO buffer	Target LO input power: 0 dBm
4	RF/IF	RF/IF input or output	External filtering required
5	NC/GND	No Connect or Ground	No internal connection to die
6	RF/IF	RF/IF input or output	External filtering required
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.



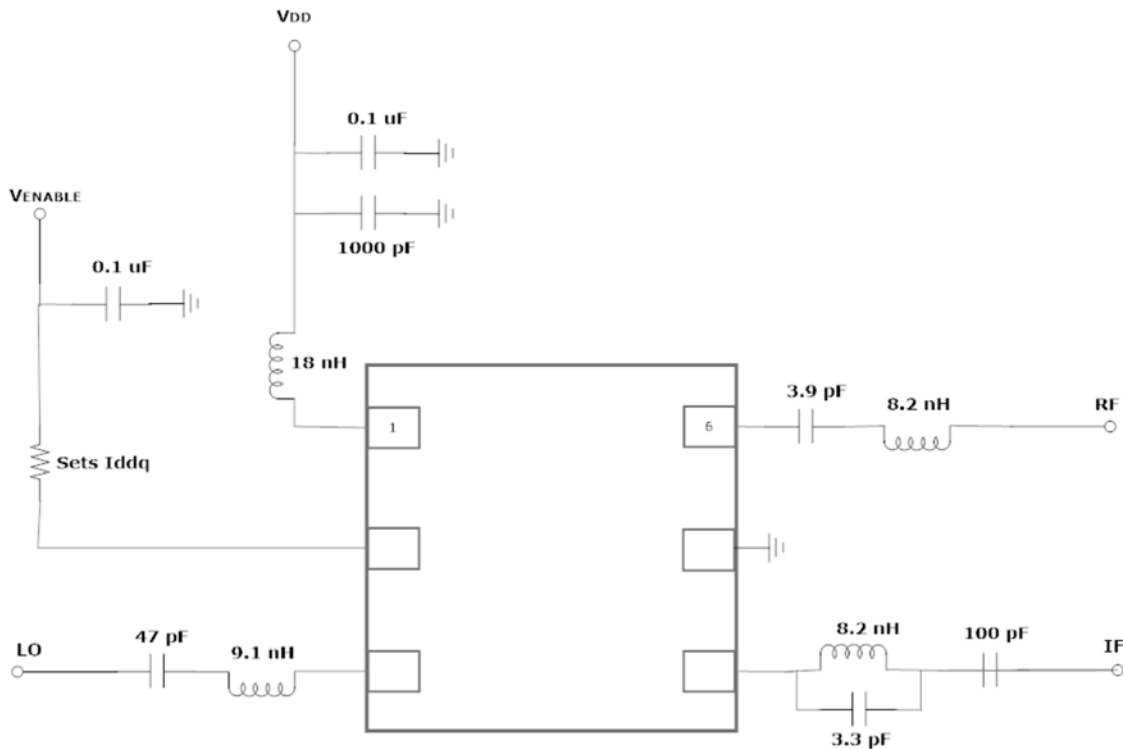
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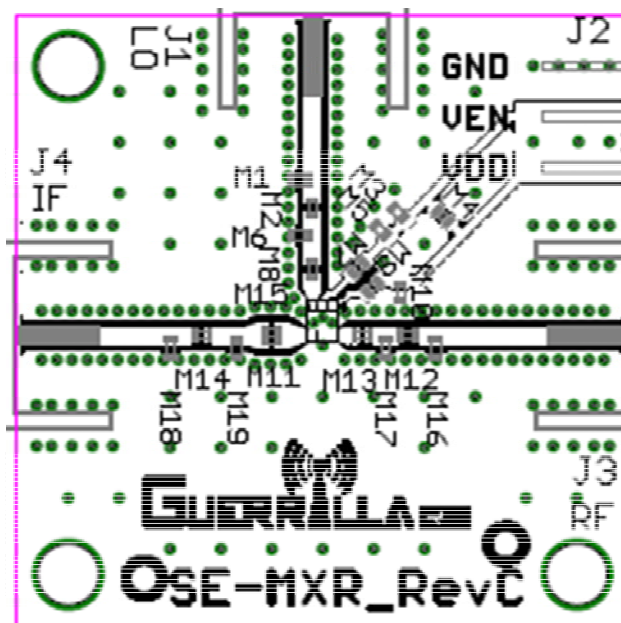
High Linearity Mixer with  
Integrated LO Buffer

## Nominal Operating Parameters:

Parameter	Symbol	Specification			Unit	Condition
		Min.	Typ.	Max.		
						Vdd = 3.0 V, T <sub>A</sub> = 25 °C
RF Frequency (Down conversion)	F <sub>RF</sub>		808		MHz	
LO Frequency:	F <sub>LO</sub>		965		MHz	
IF Frequency:	F <sub>IF</sub>		157		MHz	
Evaluation Board Conversion Gain	S <sub>21</sub>		-6.0		dB	
Evaluation Board SSB Noise Figure	NF		7.1		dB	
Input 3rd Order Intercept Point	IIP3		25.4		dBm	
Input 1dB Compression Point	IP1dB		>17.0		dBm	
LO Drive Level	LO_IN		0		dBm	
Buffer Supply Current	I <sub>DD</sub>		10		mA	Adjustable for optimal mixer performance and efficiency
Enable Current	I <sub>ENABLE</sub>		1.0		mA	
<b>Thermal Data</b>						
Thermal Resistance (measured via IR scan)	Θ <sub>JC</sub>		TBD		°C/W	On standard evaluation board
Channel Temperature @ +85 C Reference (Package Heat Sink)	T <sub>CHANNEL</sub>		TBD		°C	Vdd: 3.0 V; Iddq:10 mA; No RF; P <sub>diss</sub> :30 mW



GRF7001 Standard Application Schematic



GRF7001 Evaluation Board Assembly Drawing



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High Linearity Mixer with  
Integrated LO Buffer

## GRF7001 Standard Evaluation Board BOM:

Component	Type	Manufacturer	Family	Value	Package Size	Substitution
M2	Capacitor	Murata	GJM	47 pF	0402	Ok
M5	Capacitor	Murata	GRM	0.1 uF	0402	Ok
M7	Resistor	Various	—	0 Ohm	0402	ok
M8	Inductor	Murata	LQP	9.1 nH	0402	ok
M9	Inductor	Murata	LQG	18 nH	0402	ok
M10	Capacitor	Murata	GRF	1000 pF//0.1 uF	0402	Ok
M11	Inductor/Capacitor	Murata	LQG//GJM	8.2 nH//3.3 pF	0402	ok
M12	Inductor	Murata	LQG	8.2 nH	0402	ok
M13	Capacitor	Murata	GRM	3.9 pF	0402	Ok
M14	Capacitor	Murata	GRM	100 pF	0402	Ok
Evaluation Board:	SE-MXR_RevC					



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## High Linearity Mixer with Integrated LO Buffer

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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