



Product Description

GRF2501 is an ultra-low noise amplifier (LNA) designed for IEEE 802.11a/n/ac/p applications (5.1 GHz to 5.925 GHz). Over this band, the device exhibits outstanding de-embedded noise figure (NF) of 0.80 dB along with excellent gain flatness. The high gain, superior NF and directivity of its design allows designers to create receiver architectures with outstanding cascaded NF and unconditional stability.

The LNA is operated from a single positive supply of 2.7 to 5.0 V with a typical bias condition of 3.3 V and 15 mA. GRF2501 is internally matched to 50 Ω at the input and output ports.

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

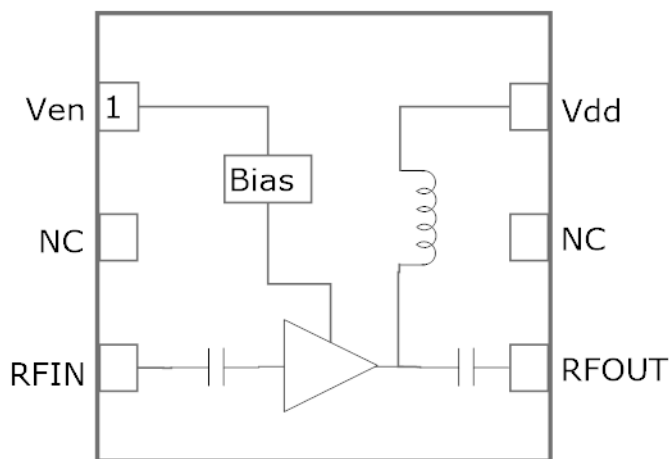
Features

Reference: 3.3V/15mA/5.5 GHz

- De-embedded NF: 0.8 dB
- Gain: 16.0 dB
- IP1dB: -8.0 dBm
- Flexible Bias Voltage and Current
- Internally Matched to 50 Ω
- Process: GaAs pHEMT

Applications

- WiFi Access Points
- Mobile WiFi Devices
- 802.11p Vehicle Communications
- Microwave Backhaul



1.5 x 1.5 mm DFN-6



Released

GRF2501

High Gain, Ultra-LNA
802.11ac: 4.9–6.0 GHz

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}		15	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}		200	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

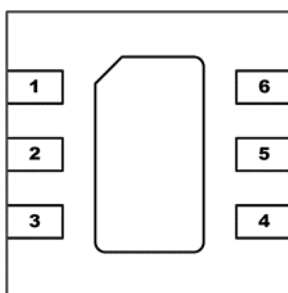


Exceeding Absolute Maximum Rating conditions may cause permanent damage to the device.

Note: For package dimensions and manufacturing information, see the Guerrilla-RF.com website for the following document located on the GRF2501 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	V _{ENABLE}	LNA Enable 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	Internally matched to 50 Ω. These ports may be DC connected to ground externally but no DC > 0.2 volts should be applied to these ports.
4	RF_Out	LNA RF output	
5	NC	No Connect or Ground	No internal connection to die
6	V _{DD}	Supply Voltage for the LNA	Requires bypass capacitance as close as possible to pin on PCB
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.

V_{ENABLE} Truth Table:

V _{DD}	V _{ENABLE}	Mode
High	>=1.8 V	LNA On
High	<0.1 V	LNA Off



Released

GRF2501

High Gain, Ultra-LNA
802.11ac: 4.9–6.0 GHz

Nominal Operating Parameters:

Parameter	Symbol	Specification			Unit	Condition
		Min.	Typ.	Max.		
High Gain Mode						V _{DD} = 3.3 V, V _{ENABLE} = 3.3 V, T _A = 25 °C
Test Frequency	F _{TEST}		5500		MHz	
Gain	S ₂₁	15.0	16.0		dB	
Gain Flatness	ΔS ₂₁		+/- 0.5		dB	Across 5.1 to 5.825 GHz
Evaluation Board Noise Figure	NF		1.1	1.3	dB	
Input Power at 1% EVM	EVM		-19.0		dBm	802.11a modulation
Input 1dB Compression	IP1dB	-10.0	-8.0		dBm	
Supply Current (Quiescent)	I _{DD}	12.0	15.0	28.0	mA	
Enable Current	I _{ENABLE}		1.5	3.0	mA	
Disabled Mode						V _{DD} = 3.3 V, V _{ENABLE} = 0.0V
Supply Current (Leakage)	I _{DD}		200	500	μA	
Thermal Data						
Thermal Resistance (Infra-Red Scan)	Θ _{jc}		150		°C/W	
Channel Temperature @ +85 C reference (Package heat sink)	T _{CHANNEL}		99		°C	V _{DD} : 3.3V; I _{DDQ} : 28 mA; No RF P _{DISS} : 92 mW

GRF2501 Evaluation Board Performance Summary Table:

Tune (GHz)	Reference Freq. (GHz)	Gain (dB)	NF (dB) (de-embedded)	IP1dB (dBm)	Input Power for 1% EVM (dBm)	Bias Condition (V/mA)
4.9 to 6.0	5.1	16.2	0.75	-8.7	-20.0	3.3/15
4.9 to 6.0	5.5	16.0	0.80	-8.0	-19.0	3.3/15
4.9 to 6.0	5.9	15.8	0.80	-7.7	-19.0	3.3/15

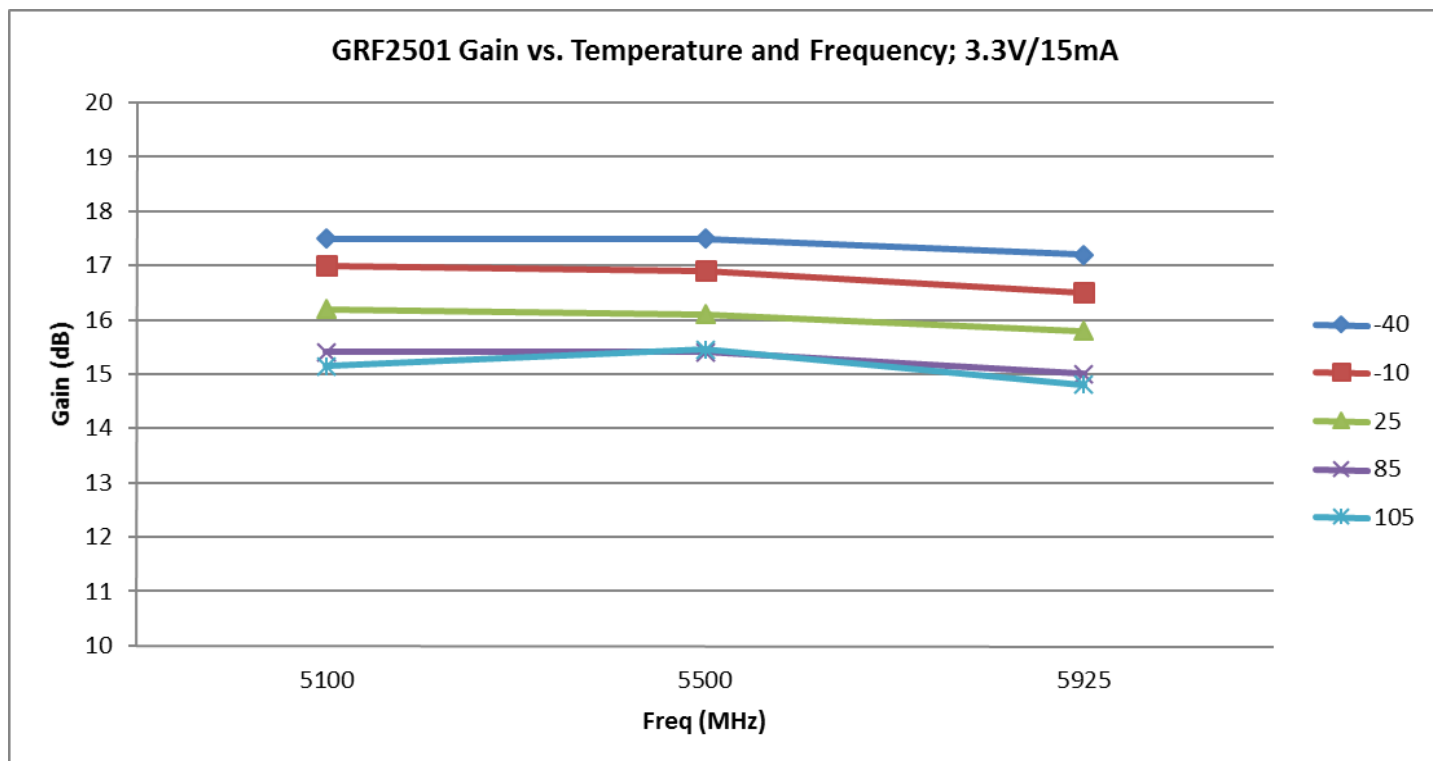
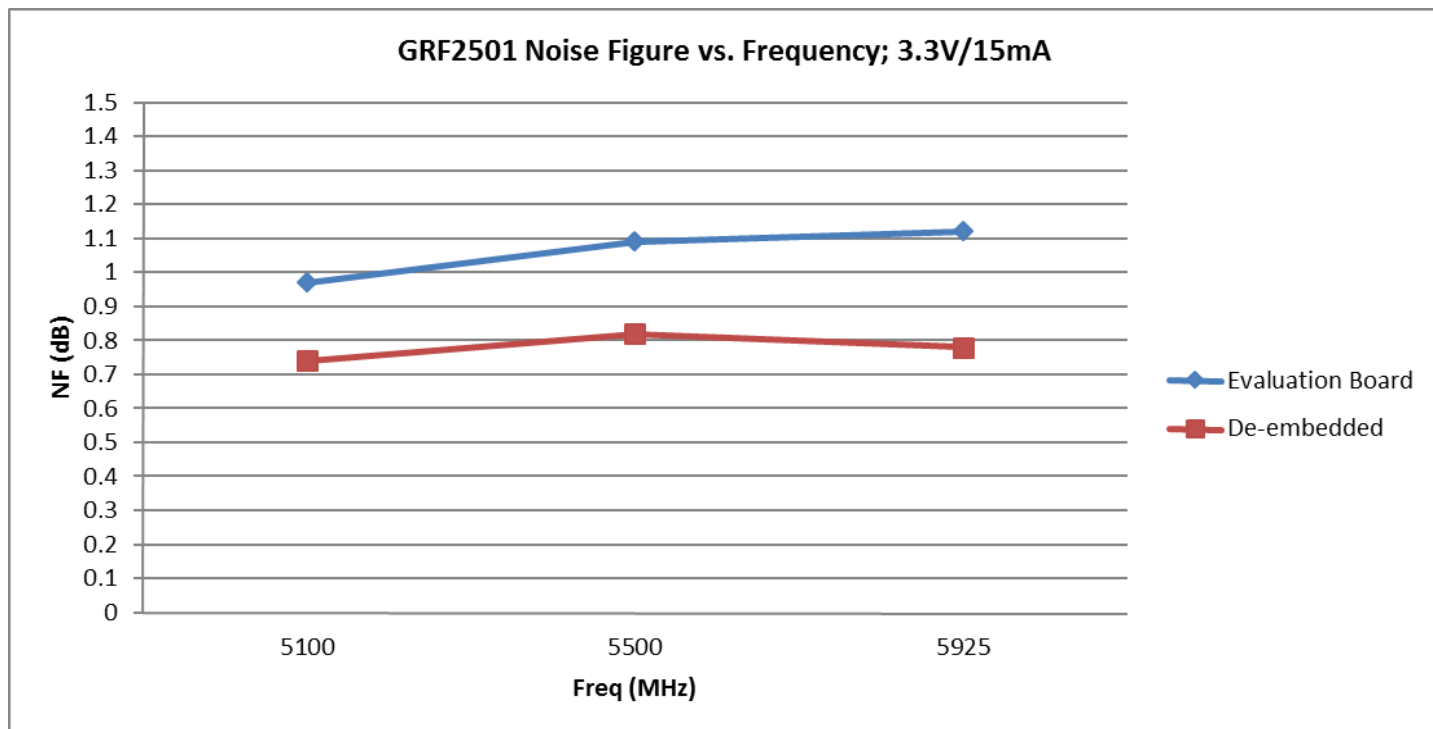


Released

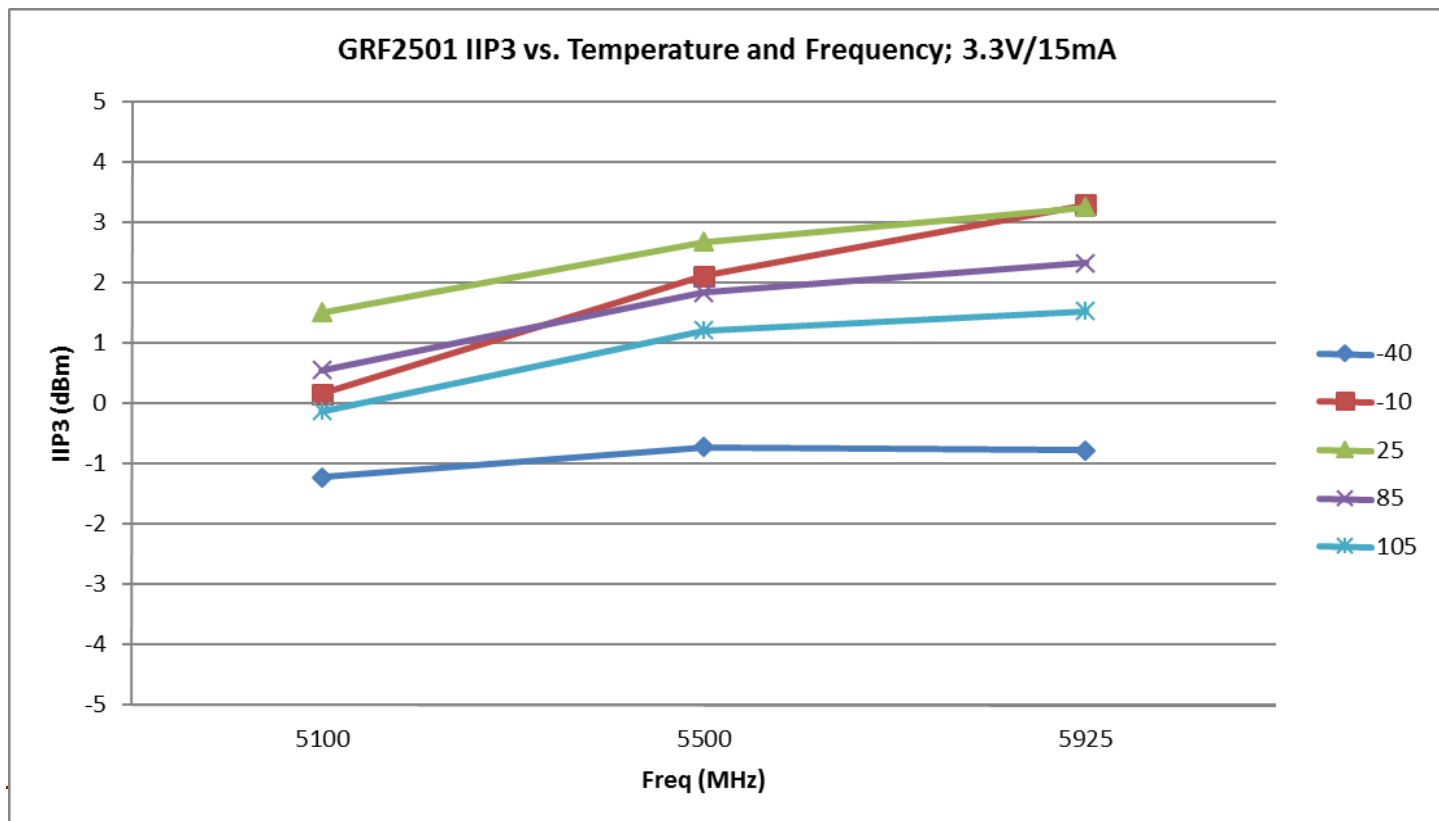
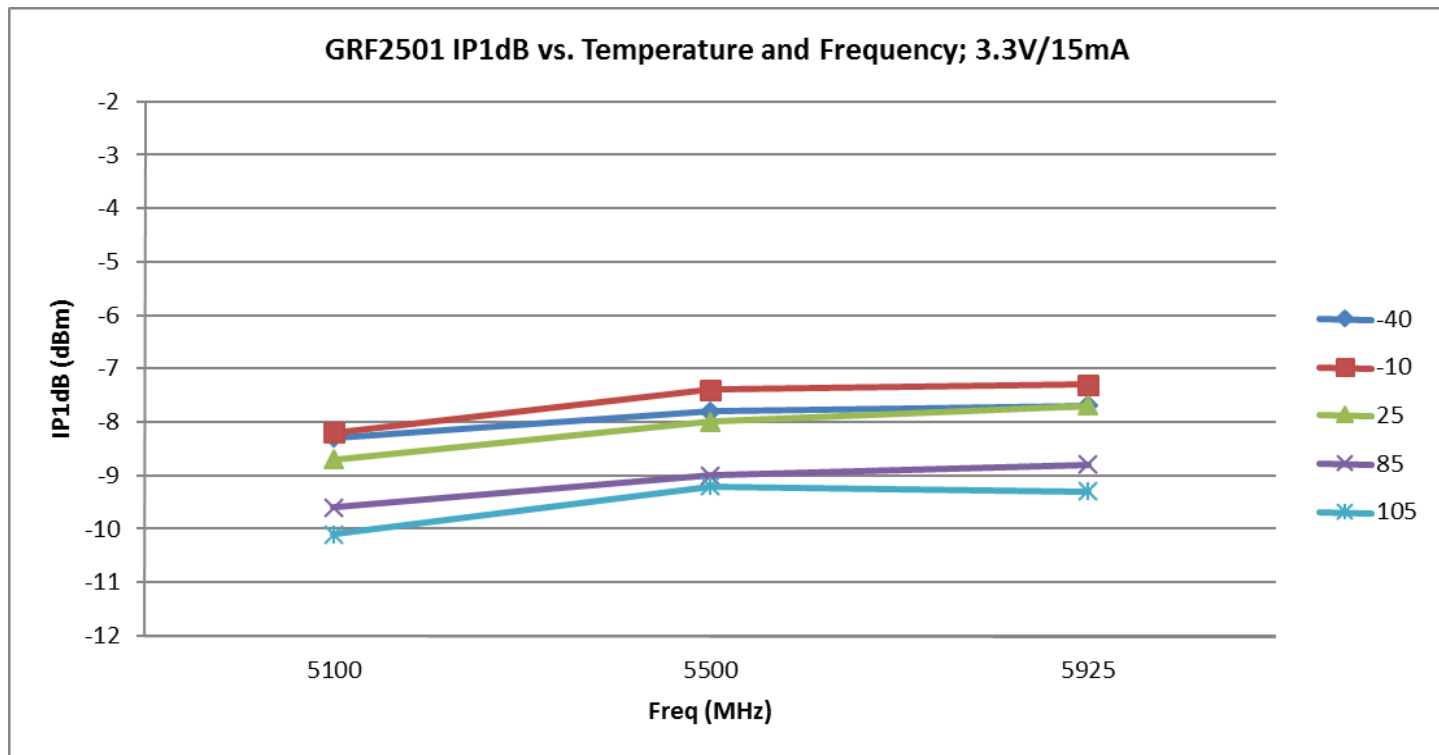
GRF2501

High Gain, Ultra-LNA
802.11ac: 4.9–6.0 GHz

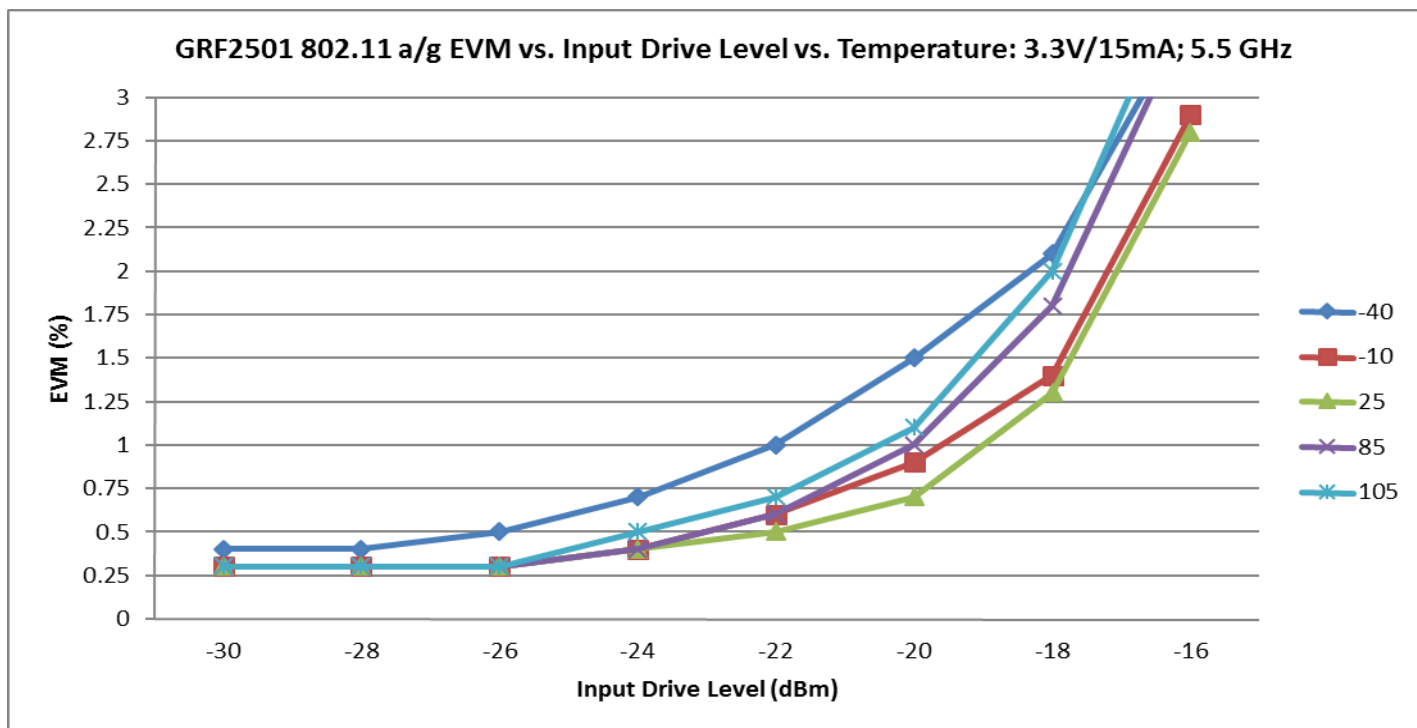
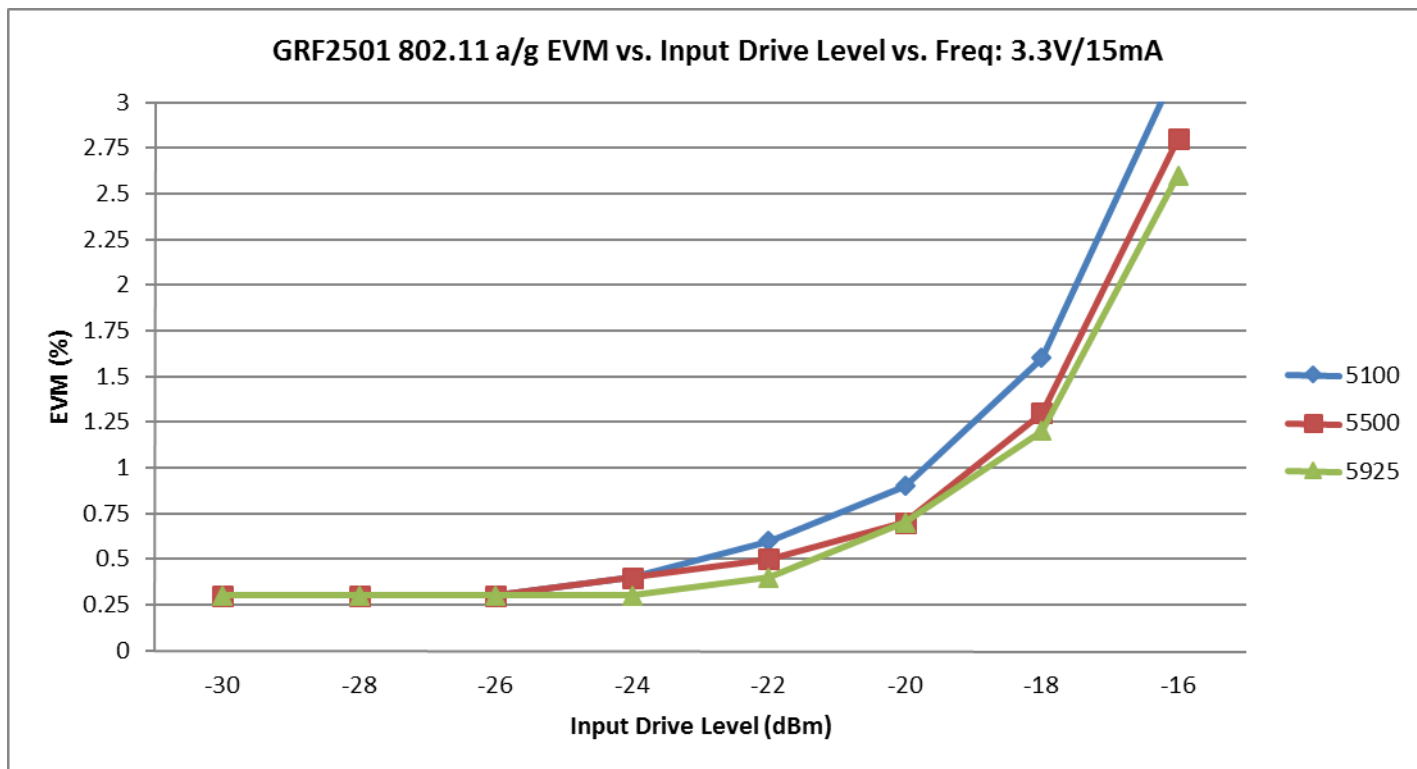
GRF2501 Evaluation Board Measured Data:



GRF2501 Evaluation Board Measured Data:



GRF2501 Evaluation Board Measured Data:



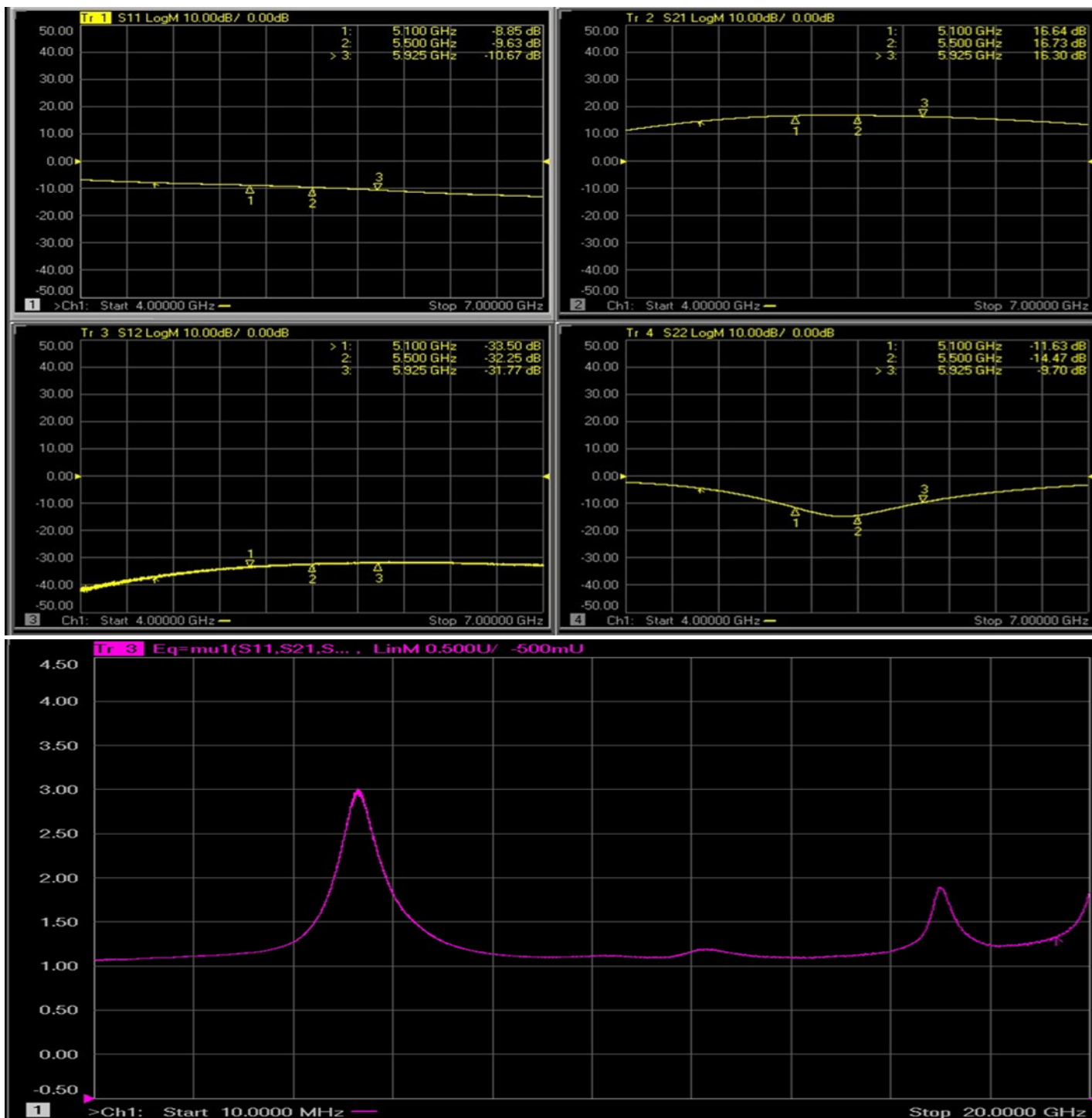


Released

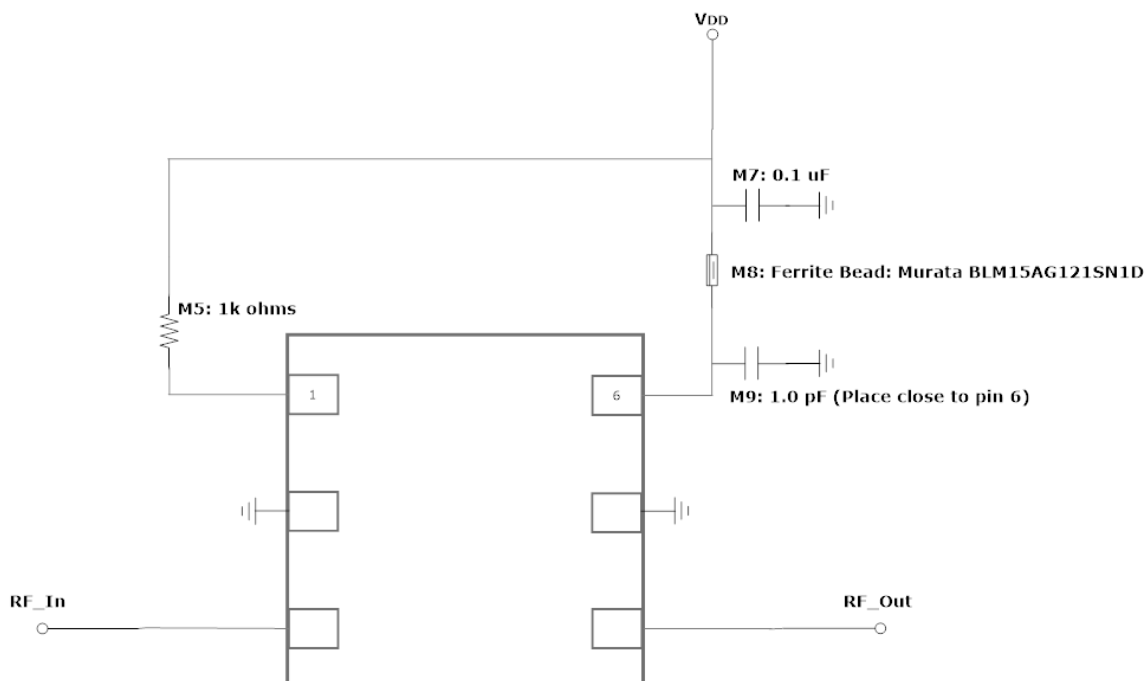
GRF2501

High Gain, Ultra-LNA
802.11ac: 4.9–6.0 GHz

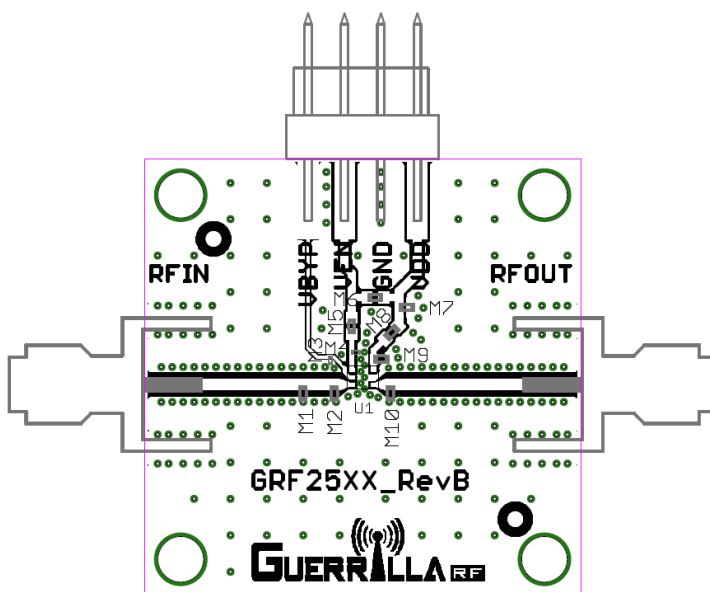
GRF2501 Evaluation Board S-Pars:



Note: $\mu_1 \geq 1.0$ implies unconditional stability



GRF2501 Application Schematic



GRF2501 Evaluation Board Assembly Diagram



Released

GRF2501

High Gain, Ultra-LNA
802.11ac: 4.9–6.0 GHz

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.

Information in this datasheet is specific to the Guerrilla RF, Inc. ("Guerrilla RF") product identified.

This datasheet, including the information contained in it, is provided by Guerrilla RF as a service to its customers and may be used for informational purposes only by the customer. Guerrilla RF assumes no responsibility for errors or omissions on this datasheet or the information contained herein. Information provided is believed to be accurate and reliable, however, no responsibility is assumed by Guerrilla RF for its use, nor for any infringement of patents, or other rights of third parties, resulting from its use. Guerrilla RF assumes no liability for any datasheet, datasheet information, materials, products, product information, or other information provided hereunder, including the sale, distribution, reproduction or use of Guerrilla RF products, information or materials.

No license, whether express, implied, by estoppel, by implication or otherwise is granted by this datasheet for any intellectual property of Guerrilla RF, or any third party, including without limitation, patents, patent rights, copyrights, trademarks and trade secrets. All rights are reserved by Guerrilla RF.

All information herein, products, product information, datasheets, and datasheet information are subject to change and availability without notice. Guerrilla RF reserves the right to change component circuitry, recommended application circuitry and specifications at any time without prior notice. Guerrilla RF may further change its datasheet, product information, documentation, products, services, specifications or product descriptions at any time, without notice. Guerrilla RF makes no commitment to update any materials or information and shall have no responsibility whatsoever for conflicts, incompatibilities, or other difficulties arising from any future changes.

GUERRILLA RF INFORMATION, PRODUCTS, PRODUCT INFORMATION, DATASHEETS AND DATASHEET INFORMATION ARE PROVIDED "AS IS" AND WITHOUT WARRANTY OF ANY KIND, WHETHER EXPRESS, IMPLIED, STATUTORY, OR OTHERWISE, INCLUDING FITNESS FOR A PARTICULAR PURPOSE OR USE, MERCHANTABILITY, PERFORMANCE, QUALITY OR NON-INFRINGEMENT OF ANY INTELLECTUAL PROPERTY RIGHT; ALL SUCH WARRANTIES ARE HEREBY EXPRESSLY DISCLAIMED. GUERRILLA RF DOES NOT WARRANT THE ACCURACY OR COMPLETENESS OF THE INFORMATION, TEXT, GRAPHICS OR OTHER ITEMS CONTAINED WITHIN THESE MATERIALS. GUERRILLA RF SHALL NOT BE LIABLE FOR ANY DAMAGES, INCLUDING BUT NOT LIMITED TO ANY SPECIAL, INDIRECT, INCIDENTAL, STATUTORY, OR CONSEQUENTIAL DAMAGES, INCLUDING WITHOUT LIMITATION, LOST REVENUES OR LOST PROFITS THAT MAY RESULT FROM THE USE OF THE MATERIALS OR INFORMATION, WHETHER OR NOT THE RECIPIENT OF MATERIALS HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.

Customers are solely responsible for their use of Guerrilla RF products in the Customer's products and applications or in ways which deviate from Guerrilla RF's published specifications, either intentionally or as a result of design defects, errors, or operation of products outside of published parameters or design specifications. Customers should include design and operating safeguards to minimize these and other risks. Guerrilla RF assumes no liability or responsibility for applications assistance, customer product design, or damage to any equipment resulting from the use of Guerrilla RF products outside of stated published specifications or parameters.

Guerrilla RF Proprietary Information. Guerrilla RF™ and the composite logo of Guerrilla RF™ are trademarks of Guerrilla RF, Inc. ©2014 Guerrilla RF, Inc. All rights reserved.

Данный компонент на территории Российской Федерации

Вы можете приобрести в компании MosChip.

Для оперативного оформления запроса Вам необходимо перейти по данной ссылке:

<http://moschip.ru/get-element>

Вы можете разместить у нас заказ для любого Вашего проекта, будь то серийное производство или разработка единичного прибора.

В нашем ассортименте представлены ведущие мировые производители активных и пассивных электронных компонентов.

Нашей специализацией является поставка электронной компонентной базы двойного назначения, продукции таких производителей как XILINX, Intel (ex.ALTERA), Vicor, Microchip, Texas Instruments, Analog Devices, Mini-Circuits, Amphenol, Glenair.

Сотрудничество с глобальными дистрибьюторами электронных компонентов, предоставляет возможность заказывать и получать с международных складов практически любой перечень компонентов в оптимальные для Вас сроки.

На всех этапах разработки и производства наши партнеры могут получить квалифицированную поддержку опытных инженеров.

Система менеджмента качества компании отвечает требованиям в соответствии с ГОСТ Р ИСО 9001, ГОСТ РВ 0015-002 и ЭС РД 009

Офис по работе с юридическими лицами:

105318, г.Москва, ул.Щербаковская д.3, офис 1107, 1118, ДЦ «Щербаковский»

Телефон: +7 495 668-12-70 (многоканальный)

Факс: +7 495 668-12-70 (доб.304)

E-mail: info@moschip.ru

Skype отдела продаж:

moschip.ru

moschip.ru_4

moschip.ru_6

moschip.ru_9