Preliminary

GRF6011

SPDT Failsafe Switch
0.1 – 3.8 GHz

Features

Path: RFC to RF1: (1.9 GHz); Vdd: 3.3V

- Insertion Loss: 0.43 dB
- IP1dB: 32.0 dBm
- IIP3: 49.5 dBm
- Failsafe Mode: High loss

Path: RFC to RF2: (1.9 GHz); Vdd: 3.3V

- Insertion Loss: 0.33 dB
- IP1dB: 30.5 dBm
- IIP3: 51.0 dBm
- Failsafe Mode: 0.4 dB loss

Applications

- Signal Boosters/Repeaters
- Tower Mounted Amplifiers
- ISM Radios
- Automotive Telematics
- RFID

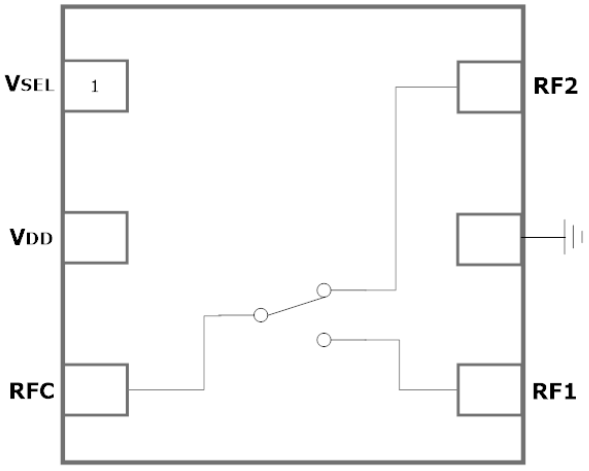
Product Description

GRF6011 is linear, ultra-low loss SPDT switch that has been designed with failsafe characteristics when all voltage inputs are removed. In switching mode, the device delivers IP1dB levels greater than 1 Watt along with >49 dBm IIP3 levels for both RF paths.

When powered down (Failsafe Mode), RFC to RF1 defaults to a high insertion loss while RFC to RF2 defaults to a low insertion loss state that retains high linearity.

The device is operated from a supply voltage of 3.0 volts to 5.0 volts with the single control input (V_{SEL}) from 3.0 volts up to V_{DD}.

Consult with the GRF applications engineering team for technical support and device s-parameters.



1.5 x 1.5 mm DFN-6

Absolute Ratings:

Parameter	Symbol	Min.	Max.	Unit
Drain Voltage	V_D	0	6.0	V
RF Input Power (average)	$P_{IN\ MAX}$		36	dBm
Operating Temperature	T_{AMB}	-40	105	°C
Maximum Channel Temperature	T_{MAX}		170	°C
Electrostatic Discharge:				
Charged Device Model: (TBD)	CDM	1500		V
Human Body Model: (TBD)	HBM	250		V
Storage:				
Storage Temperature	T_{STG}	-40	150	°C
Moisture Sensitivity Level	MSL		1	--

RoHS Compliant

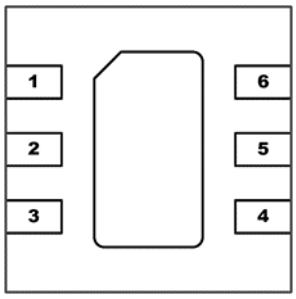
Caution! ESD Sensitive Device

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 GRF6011 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_{SEL}	Switching control Input	Selects RF path
2	V_{DD}	Supply voltage input	
3	RFC	Common RF Path	DC blocking cap must be used
4	RF1	RFC to RF1	This path defaults to high insertion loss when all power is removed. DC blocking cap must be used
5	GND	Ground	
6	RF2	RFC to RF2	This path defaults to low insertion loss when all power is removed. DC blocking cap must be used
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.

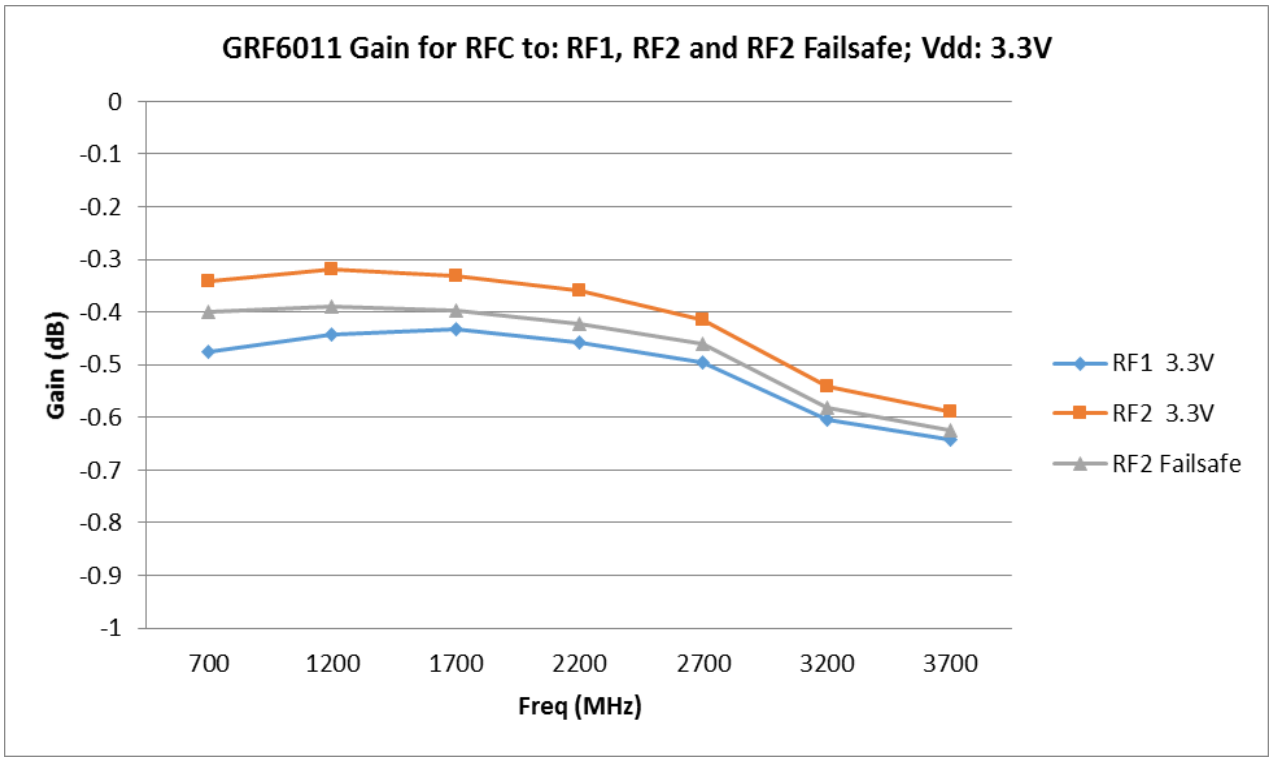
Control Logic Truth Table:

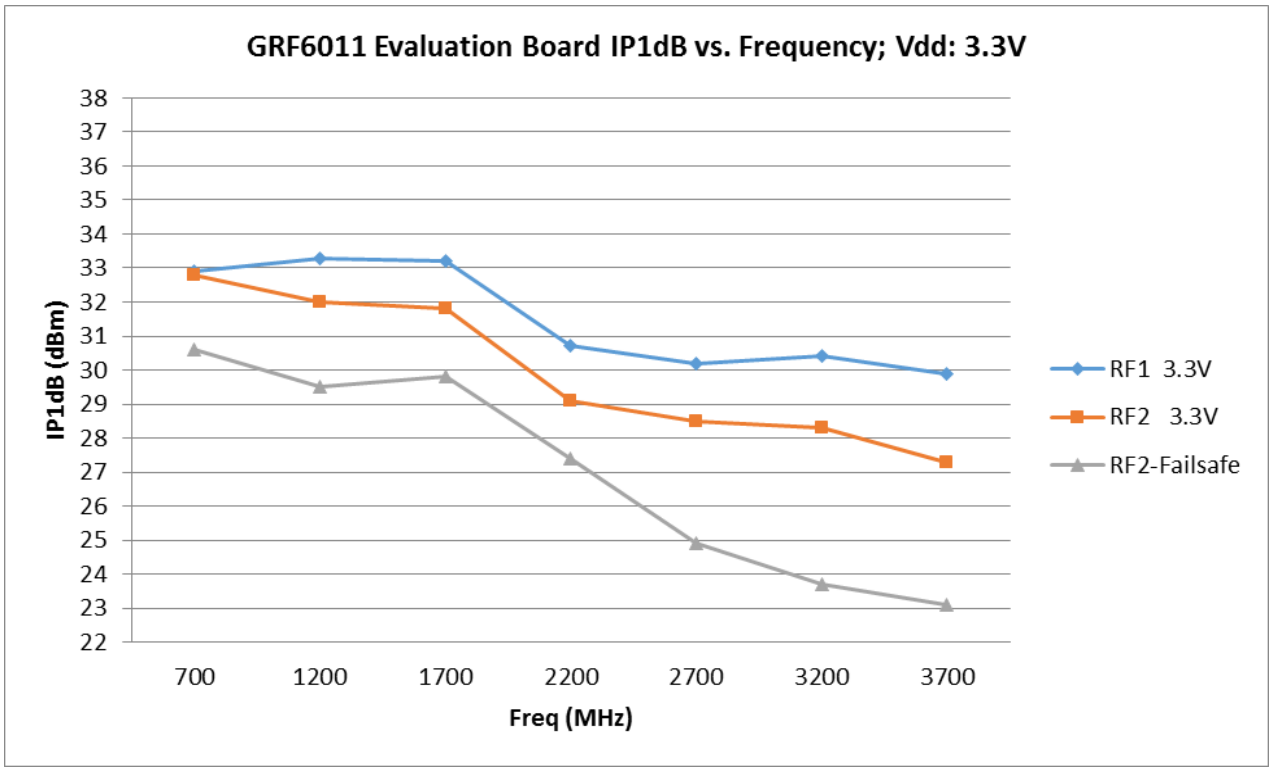
Mode	Description	Vdd	V_{SELECT}
RFC to RF1	Select RF1	>= 3.0	1
RFC to RF2	Select RF2	>= 3.0	0
Failsafe	No voltage input	0.0 or float	0.0 or float
V_{SELECT} Logic Level "0"	Logic Low	>= 3.0	< 0.1V
V_{SELECT} Logic Level "1"	Logic High	>= 3.0	3.0 <= V_{SELECT} <= V_{DD}

Nominal Operating Parameters:

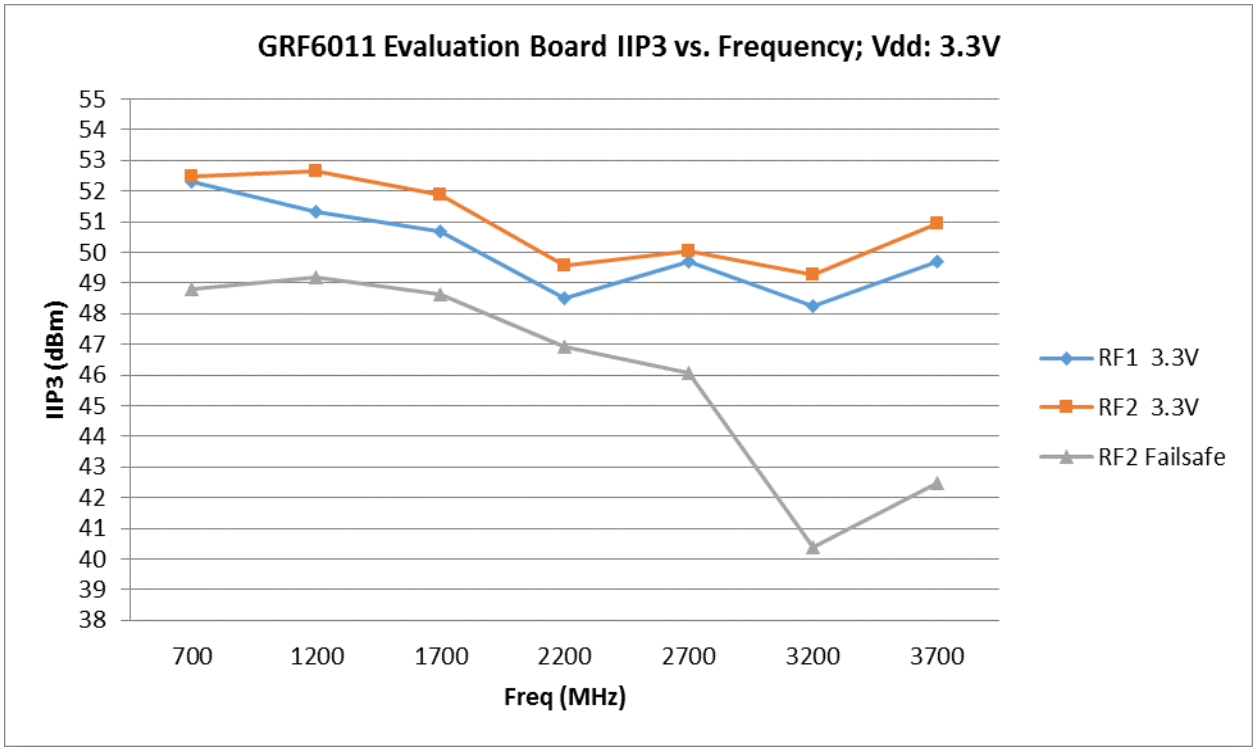
Parameter	Symbol	Specification			Unit	Condition
		Min.	Typ.	Max.		
Test Frequency	F_{TEST}		1.9		GHz	
Switch Mode: RFC to RF1 Selected						V_{DD}: 3.3V; V_{SEL}: 3.3V; T_A = 25°C
Loss (Packaged Device)	Loss_1		0.43		dB	
Isolation: RF1 to RF2	Isol_1_2		22.0		dB	
Input Power for 1 dB Compression	IP1dB_1		32.0		dBm	
Input 3rd Order Intercept	IIP3_1		49.5		dBm	
Supply Current	I_{DD}		1000		uA	
Select Current	I_{SELECT}		800		uA	
Switch Mode: RFC to RF2 Selected						V_{DD}: 3.3V; V_{SEL}: 0.0V , T_A = 25°C
Loss (Packaged Device)	Loss_2		0.33		dB	
Isolation: RF1 to RF2	Isol_1_2		25.0		dB	
Input Power for 1 dB Compression	IP1dB_2		30.5		dBm	
Input 3rd Order Intercept	IIP3_2		51.0		dBm	
Supply Current	I_{DD}		300		uA	
Select Current	I_{SELECT}		0		uA	
Failsafe Mode: RFC to RF2 (Default Short)						V_{DD}: 0.0V; V_{SEL}: 0.0 V , T_A = 25°C
Loss	Loss_2		0.40		dB	
Isolation: RF1 to RF2	Isol_1_2		22.0		dB	
Input Power for 1 dB Compression	IP1dB_2		29.0		dBm	
Input 3rd Order Intercept	IIP3_2		48.0		dBm	
Failsafe Mode: RFC to RF1 (Default Open)						V_{DD}: 0.0V; V_{SEL}: 0.0 V , T_A = 25°C
Loss	Loss_1		23.0		dB	
Thermal Data						
Thermal Resistance: (Infra-Red Scan)	Θjc		TBD		°C/W	On standard Evaluation Board
Channel Temperature @ +85 C Reference (Package heat sink)	$T_{CHANNEL}$				°C	

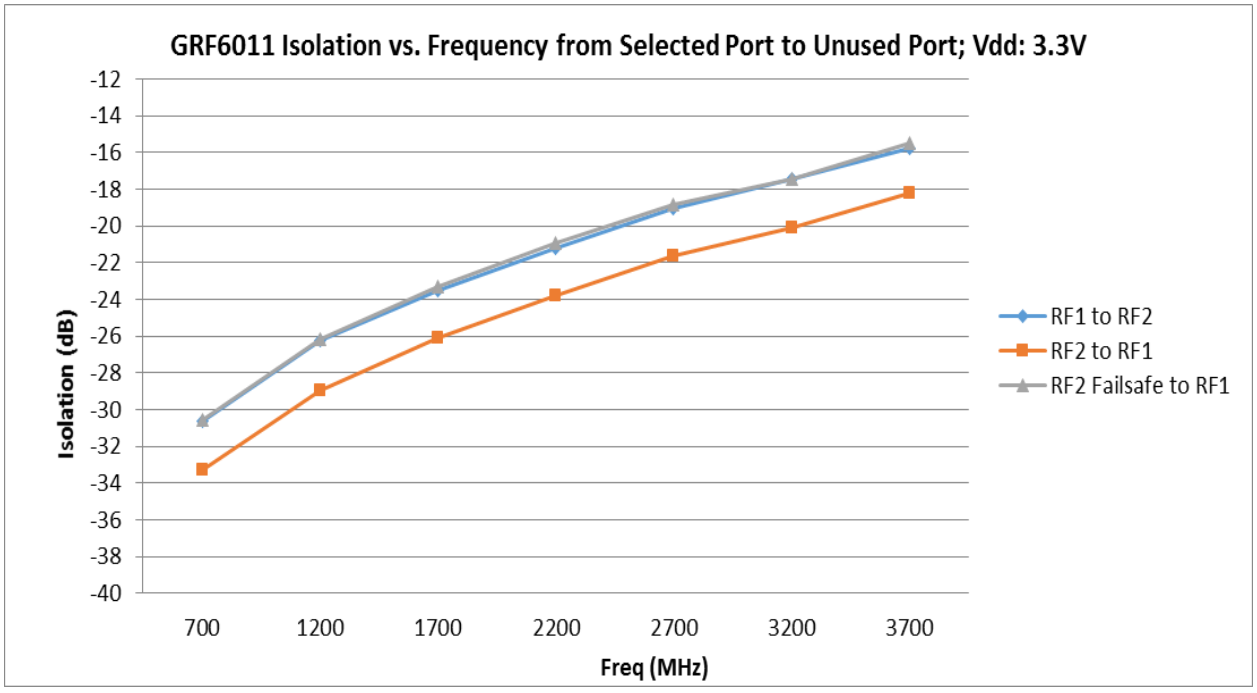
GRF6011 Evaluation Board Data

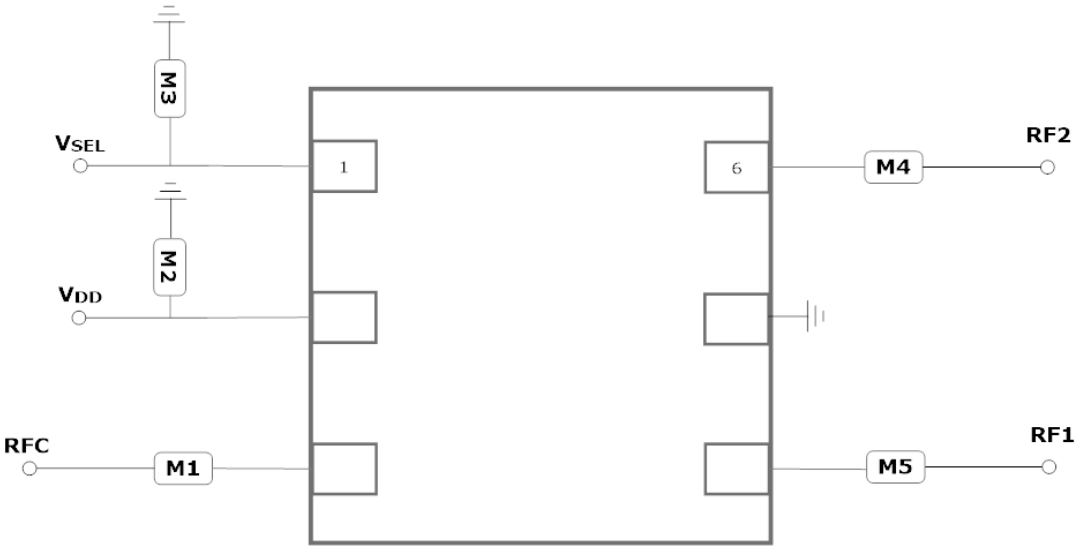




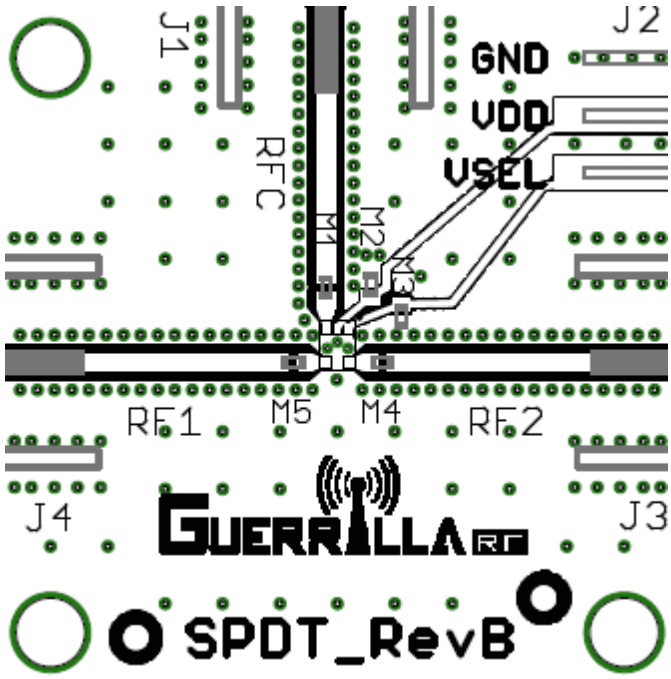
GRF6011 Measured Data







GRF6011 Application Schematic



GRF6011 Evaluation Board Assembly Drawing

GRF6011 Standard Evaluation Board BOM: (0.4 to 2.7 GHz)

Component	Type	Manufacturer	Family	Value	Package Size	Substitution
M1	Capacitor	Murata	GJM	47 pF	0402	ok
M2	Capacitor	Murata	GRM	100 pF	0402	ok
M3	Capacitor	Murata	GRM	100 pF	0402	ok
M4	Capacitor	Murata	GJM	47 pF	0402	ok
M5	Capacitor	Murata	GJM	47 pF	0402	ok

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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