



GRF6004

SPDT Switch 0.1 to 4 GHz

FEATURES

Path: RFC to RF1: 2 GHz, $V_{EN1} = 5V$

- Insertion Loss: -0.48 dB
- IP0.1dB: 37.1 dBm

Path: RFC to RF2: 2 GHz, $V_{EN2} = 5V$

- Insertion Loss: -0.54 dB
- IP0.1dB: 37.1 dBm

APPLICATIONS

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

DESCRIPTION

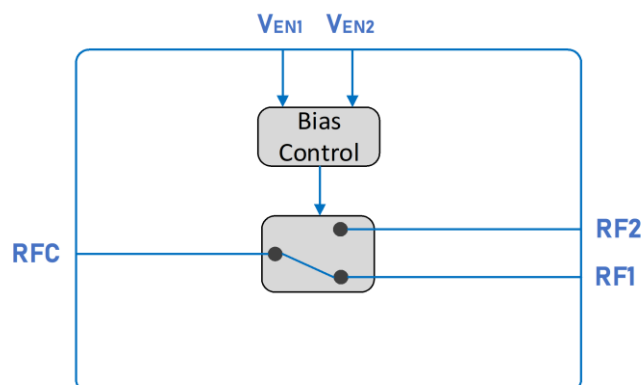
The GRF6004 is a linear, ultra-low loss SPDT Switch. The device delivers IP0.1dB levels of 5 Watts along with high IIP3 levels for both RF paths.

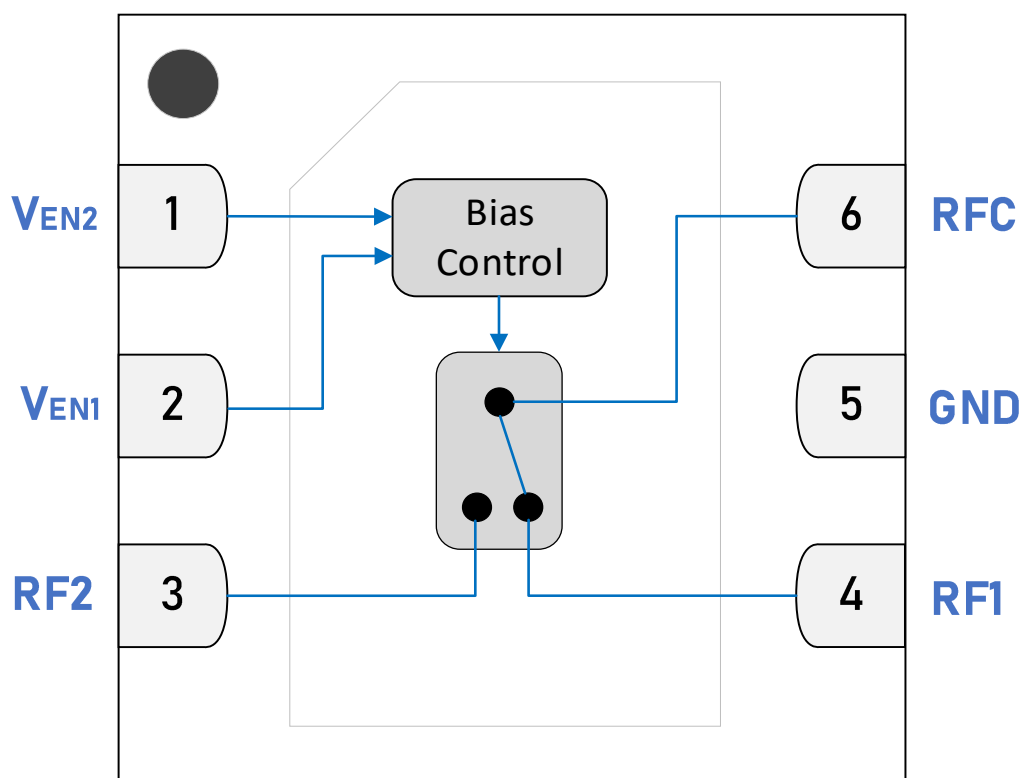
With optimization of external components, the upper frequency range of the device can be extended to 4 GHz and lowered down to 100 MHz. Optimization for a particular band essentially involves selecting the optimal series capacitor values (M1, M6, M7) for the three RF Ports.

The device is operated from a supply voltage of 3.3 volts to 5 volts.

Please consult with the GRF applications engineering team for technical support.

BLOCK DIAGRAM





DFN-6 1.5 x 1.5 mm Pin Out (Top View)

Pin Assignments

Pin	Name	Description	Note
1	V _{EN2}	Switching Control Input	
2	V _{EN1}	Switching Control Input	
3	RF2	RFC to RF2	An external DC blocking capacitor must be used.
4	RF1	RFC to RF1	An external DC blocking capacitor must be used.
5	GND	Ground	Connect this pin to ground metal.
6	RFC	Common RF Path	An external DC blocking capacitor must be used.
PKG BASE	GND	Ground	Provides DC and RF ground 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.

Power On/Off Sequence (V_{EN1}/V_{EN2}/RF):

	V _{EN1}	V _{EN2}	RF		RF	V _{EN2}	V _{EN1}
POWER ON →	On →	On →	On	POWER OFF →	Off →	Off →	Off

Note: Voltage can be applied to and removed from V_{EN1} and V_{EN2} simultaneously.

Control Logic Truth Table

Mode	Description	V _{EN1}	V _{EN2}
RFC to RF1	Selects RF1	≥ 3.3 V	0 V
RFC to RF2	Selects RF2	0 V	≥ 3.3 V

Absolute Ratings

Parameter	Symbol	Min.	Max.	Unit
Supply Voltage	V_{EN1} / V_{EN2}	0	6	V
RF Input Power (average) VSWR: 1:1	$P_{IN\ MAX}$		37	dBm
Operating Temperature (package base)	$T_{PKG\ BASE}$	-40	105	°C
Maximum Channel Temperature	T_{MAX}		170	°C

Electrostatic Discharge

Human Body Model	HBM	TBD		V
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Storage

Storage Temperature	T_{STG}	TBD	TBD	°C
Moisture Sensitivity Level	MSL	1		--



Caution! ESD Sensitive Device.

Exceeding Absolute Maximum Rating conditions may cause permanent damage.

Note: For additional information, please refer to [Manufacturing Note MN-001 — Package and Manufacturing Information](#).



All Guerrilla RF products are provided in RoHS compliant lead (Pb)-free packaging requiring no exemptions. Additional information for this topic can be found at this link - [Environmental and Restricted Substance Statement Library](#)

Recommended Operating Conditions

Parameter	Symbol	Specification			Unit	Condition
		Min.	Typ.	Max.		
Supply Voltage	V_{EN1} / V_{EN2}	0	5	5	V	
RF Frequency Range	F_{TEST}	0.1	2	4	GHz	Typical application schematic with external matching components (notes 1 & 2).
Operating Temperature (package base)	$T_{PKG\ BASE}$	-40		105	°C	
RF_IN Port Impedance	Z_{RF_IN}		50		Ω	Single-ended.
RF_OUT Port Impedance	Z_{RF_OUT}		50		Ω	Single-ended.

Note 1: Operation outside this range is possible, but with degraded performance of some parameters.

Note 2: Contact the Guerrilla RF Applications team for guidance on optimizing the tuning of the device for alternative bands.

Nominal Operating Parameters

The following conditions apply unless noted otherwise: typical application schematic using the 0.1 to 4 GHz tuning set. $V_{EN1} = 5\text{ V}$, $V_{EN2} = 5\text{ V}$, $F_{TEST} = 2\text{ GHz}$, $50\ \Omega$ system impedance, $T_{PKG\ BASE} = 25\text{ }^{\circ}\text{C}$. Evaluation board losses are included within the specifications.

Parameter	Symbol	Specification			Unit	Condition
		Min.	Typ.	Max.		
Switch Mode: RFC to RF1 Selected						
Loss (De-Embedded)	Loss_1		0.48		dB	V _{EN1} = 5 V, V _{EN2} = 0 V.
Loss (Including EVB)	Loss		0.53		dB	
Isolation: RF1 to RF2 (note 1)	Isol_1_2		28.2		dB	
Input Power for P0.1 dB Compression Power	IP0.1dB_1		37.1		dBm	
Input 3 rd Order Intercept Point (P _{OUT} = 12 dBm)	IIP3_1		TBD		dBm	
Supply Current	I _{EN1}		0.1		μA	
Select Current	I _{EN2}		0.2		μA	
Switch Mode: RFC to RF2 Selected						
Loss (De-Embedded)	Loss_2		0.54		dB	V _{EN1} = 0 V, V _{EN2} = 5 V.
Loss (Including EVB)	Loss		0.59		dB	
Isolation: RF1 to RF2 (note 2)	Isol_1_2		27.3		dB	
Input Power for P0.1 dB Compression Power	IP0.1dB_2		37.1		dBm	
Input 3 rd Order Intercept Point (P _{OUT} = 12 dBm)	IIP3_2		TBD		dBm	
Supply Current	I _{EN1}		0.2		μA	
Select Current	I _{EN2}		0.1		μA	
Thermal Data						
Thermal Resistance (Infrared Scan)	θ _{JC}		TBD		°C/W	On standard evaluation board.

Note 1: Isolation from RF1 to RF2 with RFC to RF1 path active.

Note 2: Isolation from RF1 to RF2 with RFC to RF2 path active.

GRF6004 Switching Times

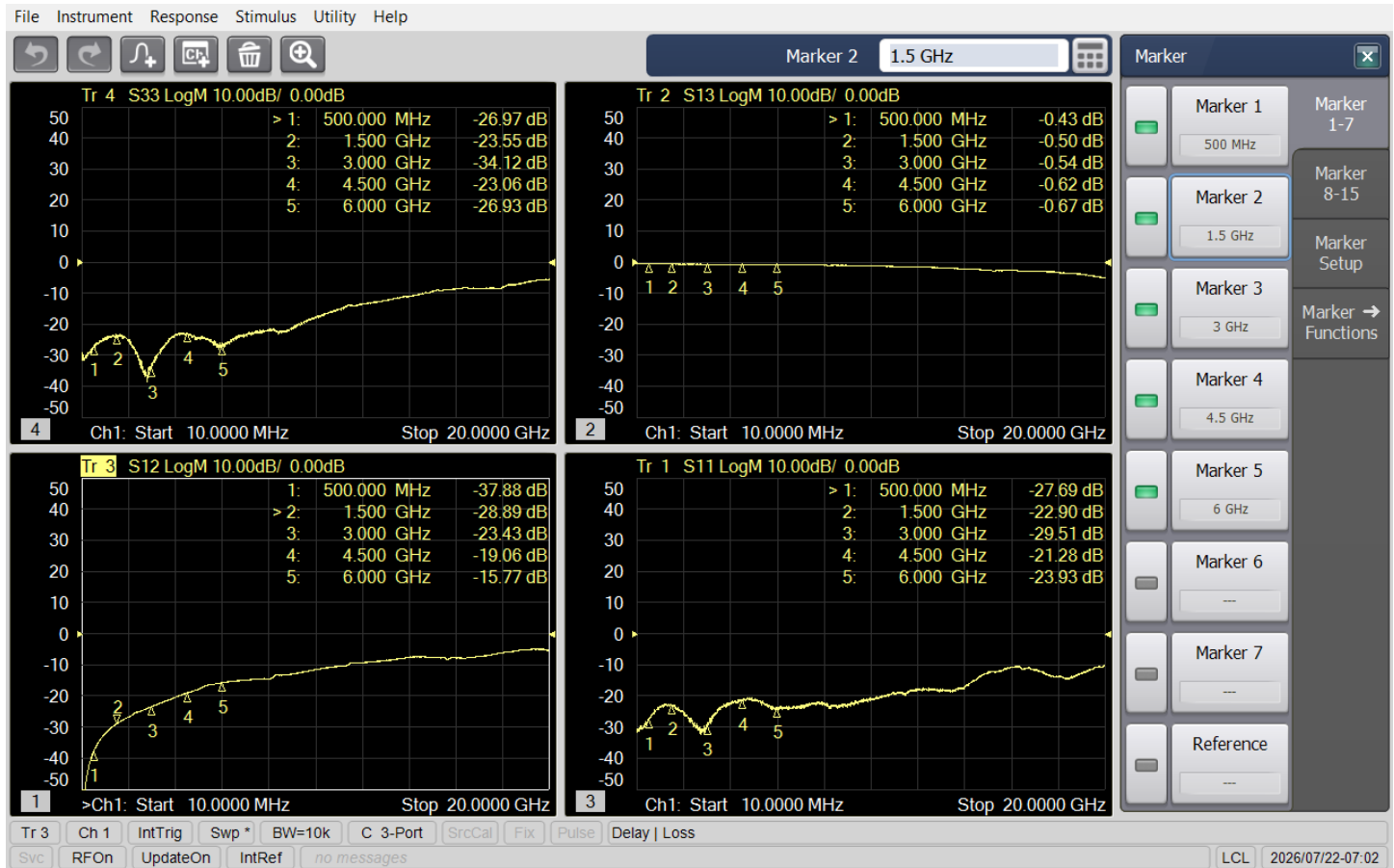
The following conditions apply unless noted otherwise: typical application schematic using the 0.1 to 4 GHz tuning set. $V_{EN1} = 5\text{ V}$, $V_{EN2} = 5\text{ V}$, $F_{TEST} = 2\text{ GHz}$, $50\ \Omega$ system impedance, $T_{PKG\ BASE} = 25\text{ }^{\circ}\text{C}$. Evaluation board losses are included within the specifications.

Path	State	Freq (GHz)	V_{EN1} (V)	V_{EN2} (V)	P_{IN} (dBm)	Time (ns)
Normal Mode						
RFC to RF1 (50% V_{EN1} to 90% RF1_Out)	On	2	$0 \rightarrow 5$	$5 \rightarrow 0$	15	160
RFC to RF1 (50% V_{EN1} to 10% RF1_Out)	Off	2	$5 \rightarrow 0$	$0 \rightarrow 5$	15	60
RFC to RF2 (50% V_{EN2} to 90% RF2_Out)	On	2	$5 \rightarrow 0$	$0 \rightarrow 5$	15	100
RFC to RF2 (50% V_{EN2} to 10% RF2_Out)	Off	2	$0 \rightarrow 5$	$5 \rightarrow 0$	15	60

GRF6004 Typical Operating Curves: S-Parameters

$V_{EN1} = 5\text{ V}$, $V_{EN2} = 0\text{ V}$, Jumpers used instead of series capacitor values (M1, M6, M7) for the three RF Ports.

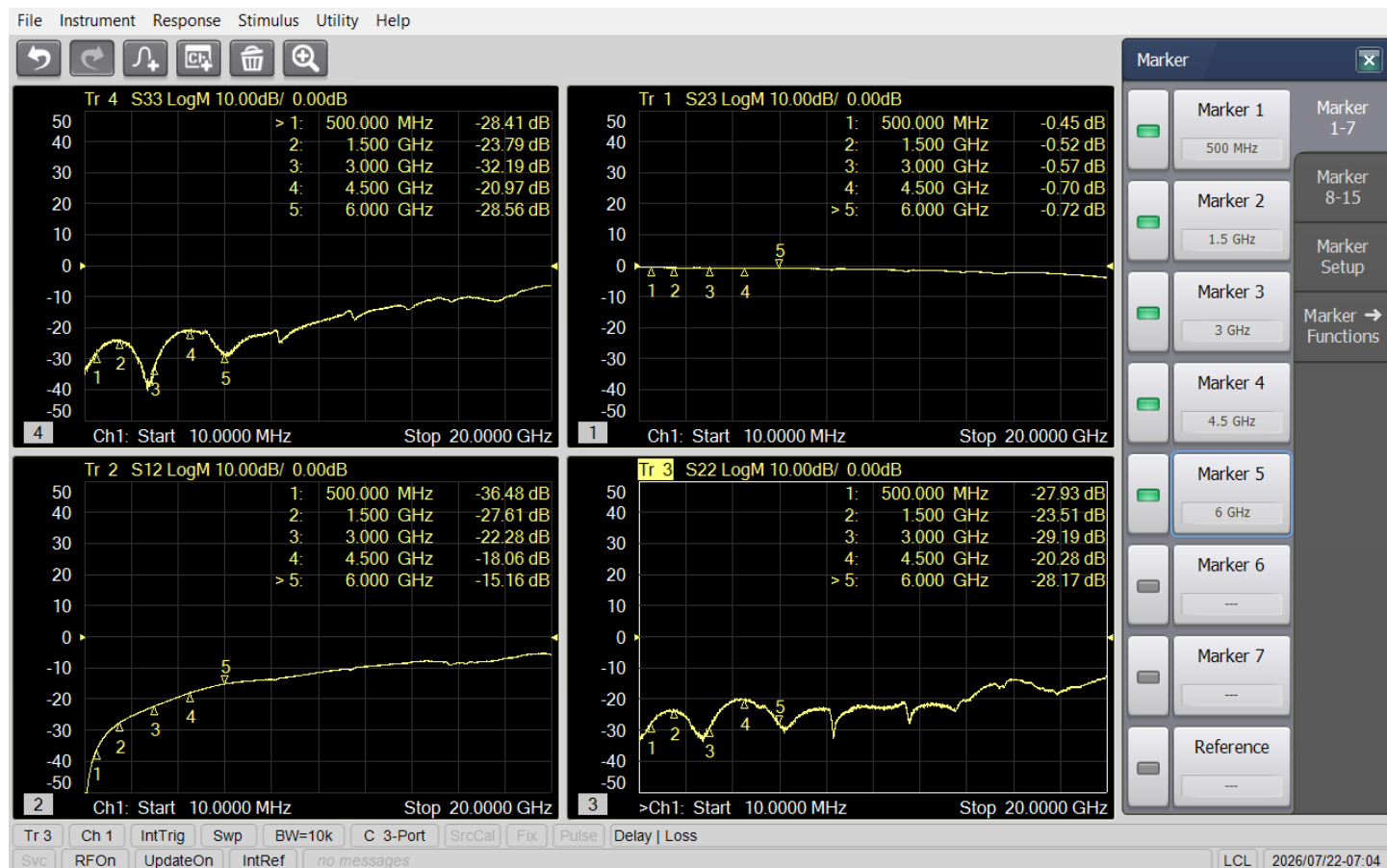
RFC to RF1 Enabled:

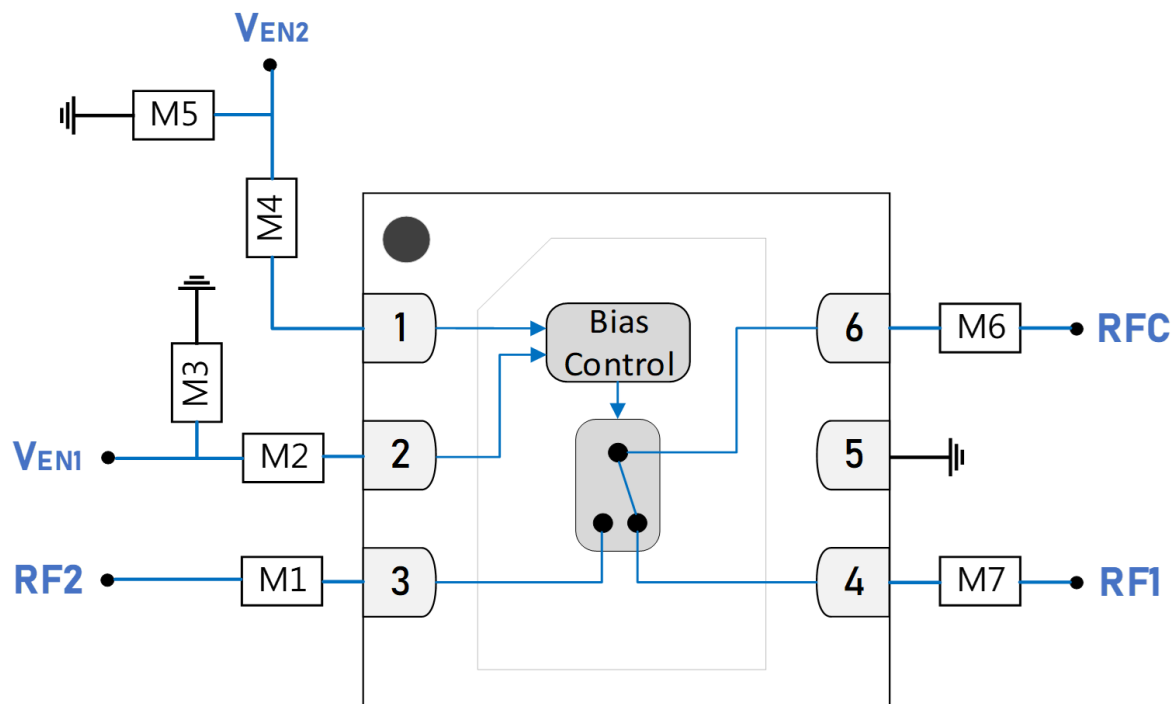


GRF6004 Typical Operating Curves: S-Parameters

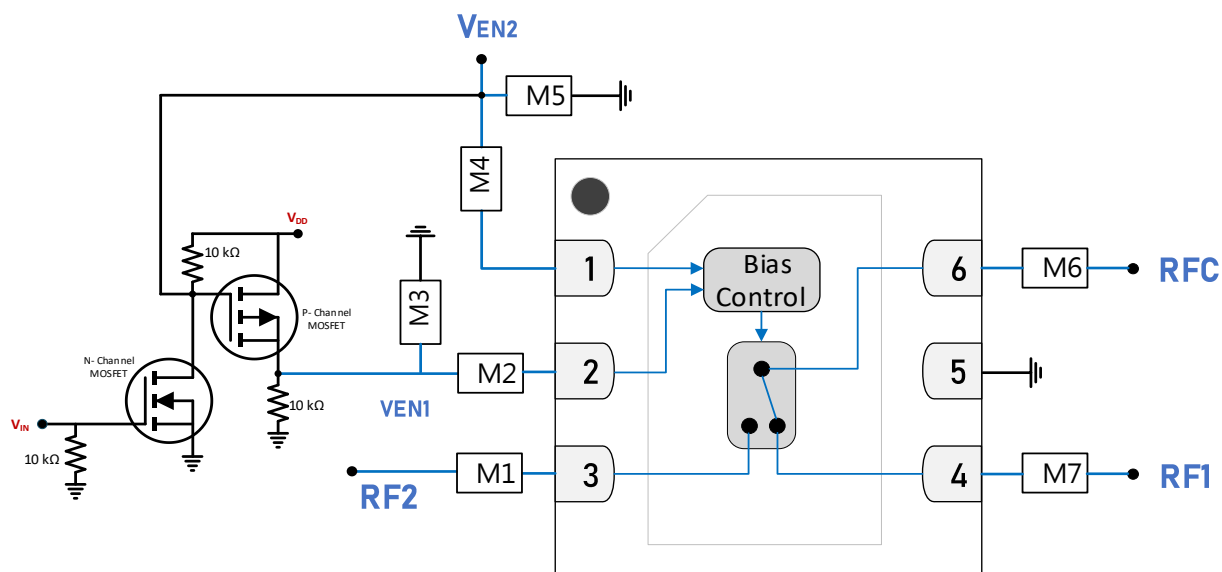
$V_{EN1} = 0\text{ V}$, $V_{EN2} = 5\text{ V}$, Jumpers used instead of series capacitor values (M1, M6, M7) for the three RF Ports.

RFC to RF2 Enabled:

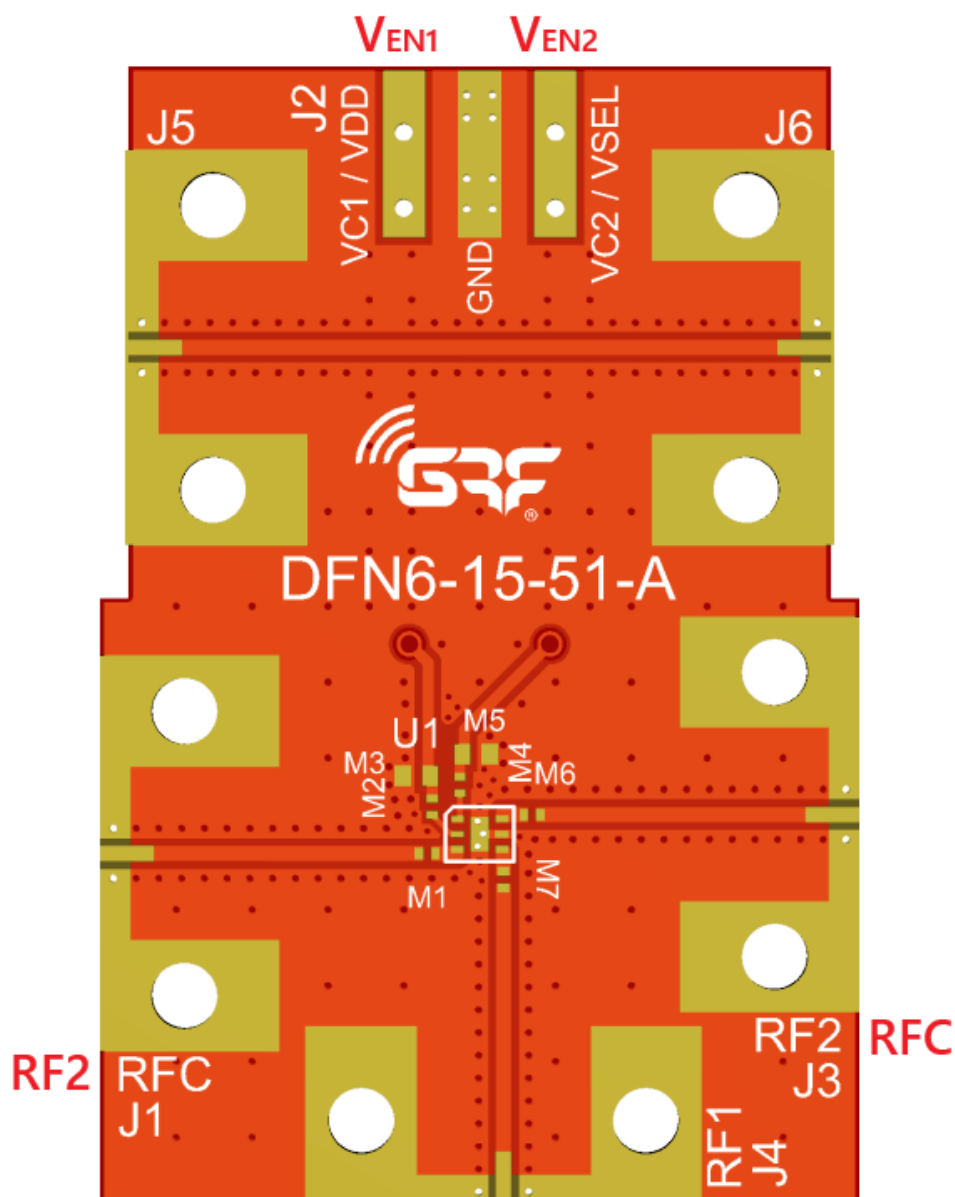




GRF6004 Standard Evaluation Board Schematic



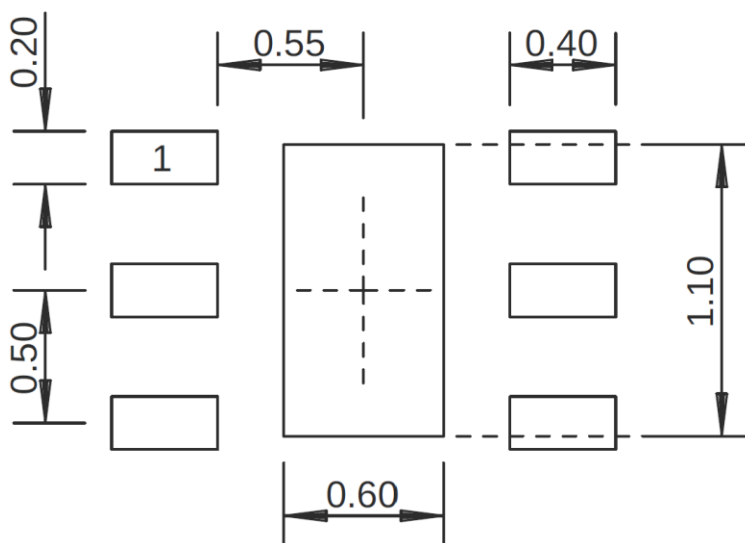
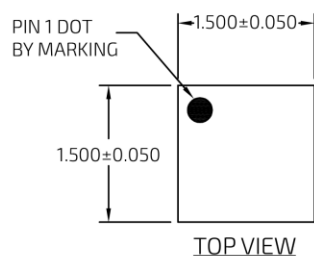
GRF6004 Optional Controller Evaluation Board Schematic



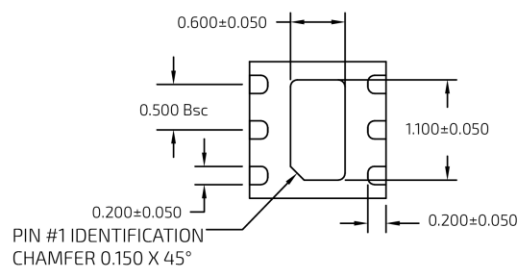
GRF6004 Evaluation Board Assembly Diagram

GRF6004 Standard Evaluation Board Assembly Diagram Reference: 0.1 to 8 GHz

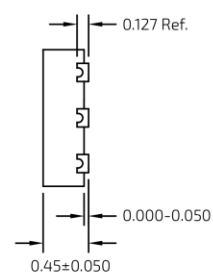
Component	Type	Manufacturer	Family	Value	Package Size	Substitution
M1	Capacitor	Murata	GJM	27 pF	0402	ok
M2	Resistor	Various	5%	0 Ω	0402	ok
M3	Capacitor	Murata	GRM	100 pF	0402	ok
M4	Resistor	Various	5%	0 Ω	0402	ok
M5	Capacitor	Murata	GJM	100 pF	0402	ok
M6	Capacitor	Murata	GJM	27 pF	0402	ok
M7	Capacitor	Murata	GJM	27 pF	0402	ok


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


TOP VIEW



BOTTOM VIEW



SIDE VIEW

1.5 x 1.5 mm DFN-6 Package Dimensions

Package Marking Diagram



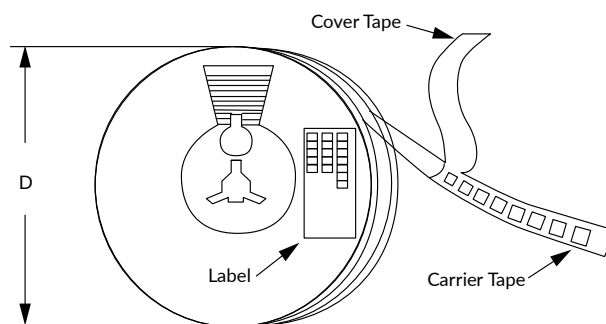
- Line 1: "Y" = YEAR (single digit). "WW" = WEEK the device was assembled.
- Line 2: "XXXX" = Device Part Number.

Tape and Reel Information

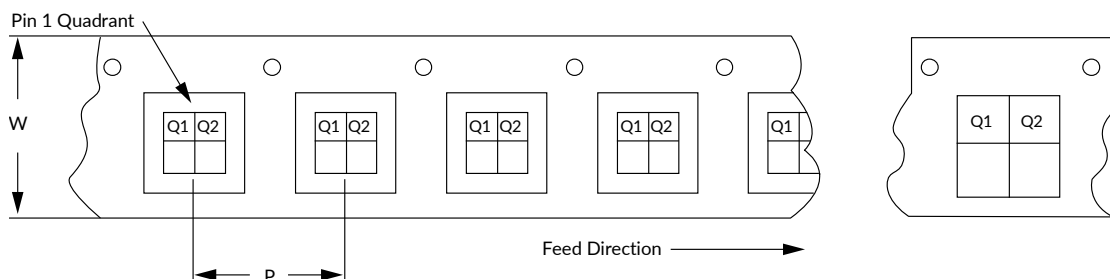
Guerrilla RF's tape and reel specification complies with Electronic Industries Alliance (EIA) standards for "Embossed Carrier Tape of Surface Mount Components for Automatic Handling" (reference EIA-481). See the following page for the Tape and Reel Specification and Device Package Information table, which includes units per reel.

Devices are loaded with pins down into the carrier pocket with protective cover tape and reeled onto a plastic reel. Each reel is packaged in a cardboard box. There are product labels on the reel, the protective ESD bag and the outside surface of the box.

For the Tape and Reel Reference Table, please refer to: [Package Manufacturing Information | Guerrilla RF \(guerrilla-rf.com\)](#)



Tape and Reel Packaging with Reel Diameter Noted (D)



Carrier Tape Width (W), Pitch (P), Feed Direction and Pin 1 Quadrant Information



Revision History

Revision Date	Description of Change
March 6, 2026	Advance Data Sheet
July 8, 2026	Preliminary Data Sheet



Datasheet Classifications

Data Sheet 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 limited evaluation board measurements taken within the Guerrilla RF Applications Lab. All parametric values are subject to change pending the collection of additional data.
Release Ø	All data based on measurements taken with <i>production-released</i> material. TYP values are based on a combination of ATE and bench-level measurements, with MIN/MAX limits defined using <i>modelled estimates</i> that account for part-to-part variations and expected process spreads. Although unlikely, future refinements to the TYP/MIN/MAX values may be in order as multiple lots are processed through the factory.
Release A-Z	All data based on measurements taken with production-released material <i>derived from multiple lots which have been fabricated over an extended period of time</i> . MIN/MAX limits may be refined over previous releases as more statistically significant data is collected to account for process spreads.

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

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