RFRX5932A

10 GHz TO 16 GHz DOWNCONVERTER

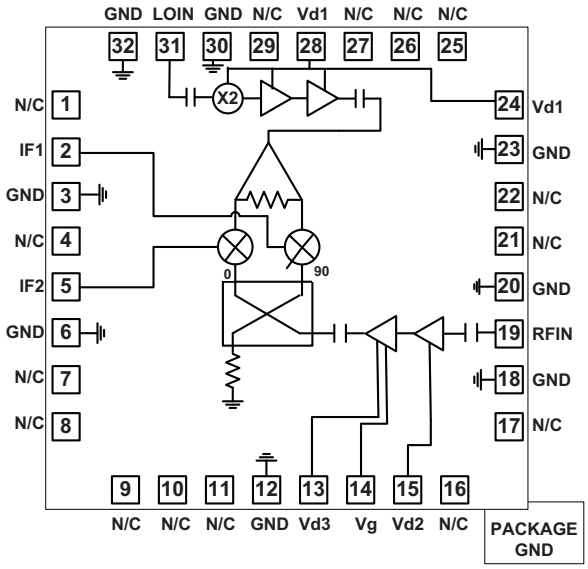
Package: QFN, 32-Pin, 5mm x 5mm

Features

- Integrated Variable Gain LNA, Image Rejection Mixer, LO Buffer Amplifier, and x2 LO Multiplier
- 2.0dB NF
- 15dB Conversion Gain
- 25dBc Image Frequency Rejection
- -45dBc Third Order Intermodulation (IMD3)
- 0dBm Third Order Intercept (IIP3)
- DC to 4GHz IF Frequency
- No Mixer Bias Required
- Low Cost 5mmx5mm QFN Package
- 100% RF and DC Tested

Applications

- Point-to-Point
- VSAT



Functional Block Diagram

Product Description

The RFRX5932A is a 10 GHz to 16 GHz GaAs pHEMT downconverter, incorporating an integrated variable gain LNA, image rejection mixer, LO buffer amplifier, x2 LO multiplier, and DC decoupling capacitors. The device is packaged in a 5mm x 5mm QFN to simplify both system-level board design and volume assembly. The combination of high performance and low cost packaging makes the RFRX5932A a cost effective solution, ideally suited to both current and next generation Point-to-Point and VSAT applications.

Optimum Technology Matching® Applied

☐ GaAs HBT	☐ SiGe BiCMOS	☑ GaAs pHEMT	☐ GaN HEMT
☐ GaAs MESFET	☐ Si BiCMOS	☐ Si CMOS	☐ BiFET HBT
☐ InGaP HBT	☐ SiGe HBT	☐ Si BJT	☐ LDMOS

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Absolute Maximum Ratings

Parameter	Rating	Unit
LNA Drain Voltage (V_D)	5	V
LOA Drain Voltage (V_D)	5	V
RF Input Power	+10	dBm
LO Input Power	+15	dBm
ESD Human Body Model	250	V
ESD Machine Model	50	V
MSL	2	

Caution! ESD sensitive device.

Exceeding any one or a combination of the Absolute Maximum Rating conditions may cause permanent damage to the device. Extended application of Absolute Maximum Rating conditions to the device may reduce device reliability. Specified typical performance or functional operation of the device under Absolute Maximum Rating conditions is not implied.

RoHS status based on EU Directive 2002/95/EC (at time of this document revision).

Parameter	Specification			Unit	Condition
	Min.	Typ.	Max.		
10.7GHz to 11.7GHz Output RF Frequency					
RF Electrical Characteristics					T=22°C
RF Frequency	10.7		11.7	GHz	
LO Frequency	3.35		7.85	GHz	
IF Frequency	DC		4	GHz	
Conversion Gain	10	16		dB	
Noise Figure		2.5	3	dB	
Third Order Intermodulation		-35	-30	dBc	
Input Third Order Intercept		-5		dBm	
Image Rejection	20	40		dBc	
RF Input Return Loss		12		dB	
LO Input Return Loss		15		dB	
IF Input Return Loss		17		dB	
DC Electrical Characteristics					
LNA Bias Voltage		4		V	
LOA Bias Voltage		3.5		V	
Supply Current		110	230	mA	
Variable Gain Voltage		-2.3		V	
12.7GHz to 13.2GHz Output RF Frequency					
RF Electrical Characteristics					T=22°C
RF Frequency	12.75		13.25	GHz	
LO Frequency	4.375		8.625	GHz	
IF Frequency	DC		4	GHz	
Conversion Gain	12	15		dB	
Noise Figure		2.0	3	dB	
Third Order Intermodulation		-45	-35	dBc	
Input Third Order Intercept		-1		dBm	
Image Rejection	10	25		dBc	
RF Input Return Loss		12		dB	
LO Input Return Loss		12		dB	
IF Input Return Loss		17		dB	

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Parameter	Specification			Unit	Condition
	Min.	Typ.	Max.		
12.7GHz to 13.2GHz Output RF Frequency (continued)					
DC Electrical Characteristics					
LNA Bias Voltage		4		V	
LOA Bias Voltage		3.5		V	
Supply Current		110	230	mA	
Variable Gain Voltage		-2.3		V	
14.4GHz to 15.3GHz Output RF Frequency					
RF Electrical Characteristics					T=22°C
RF Frequency	14.4		15.3		
LO Frequency	5.2		9.675	GHz	
IF Frequency	DC		4	GHz	
Conversion Gain	9	12		dB	
Noise Figure		2.5	3	dB	
Third Order Intermodulation		-50	-45	dBc	
Input Third Order Intercept		+2		dBm	
Image Rejection	10	15		dBc	
RF Input Return Loss		12		dB	
LO Input Return Loss		12		dB	
IF Input Return Loss		17		dB	
DC Electrical Characteristics					
LNA Bias Voltage		4		V	
LOA Bias Voltage		3.5		V	
Supply Current		110	230	mA	
Variable Gain Voltage		-2.3		V	

Measurements

(IF1/IF2 ports connected to external 90° Hybrid Combiner)

Conversion Gain (dB) vs. RF Freq
Prf=-20dBm, Plo=+10dBm, Vd_LNA=4V, Vd_LOA=3.5V
LO<RF, IF=1.35GHz

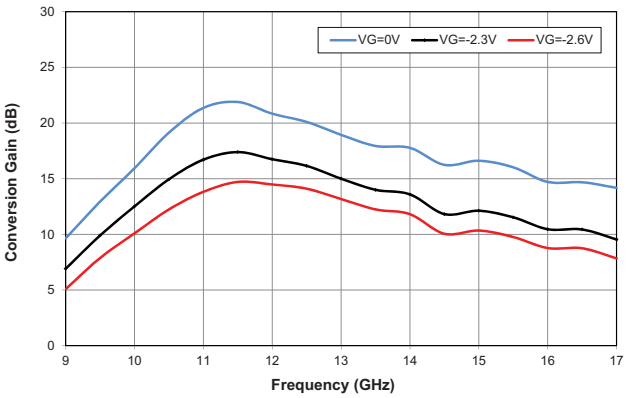
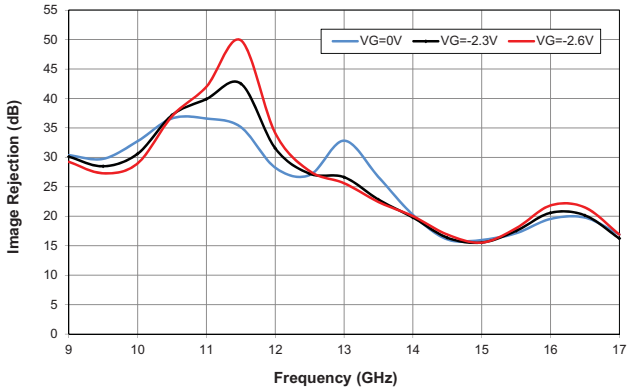
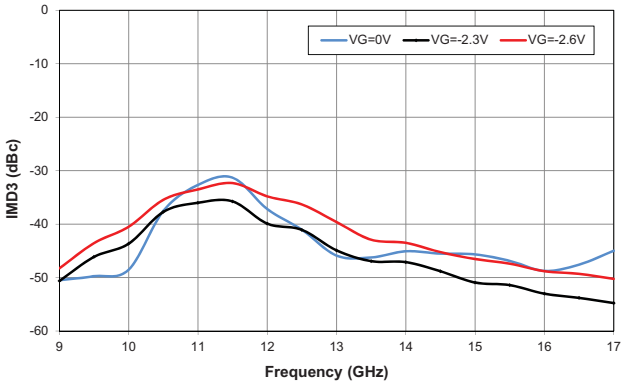


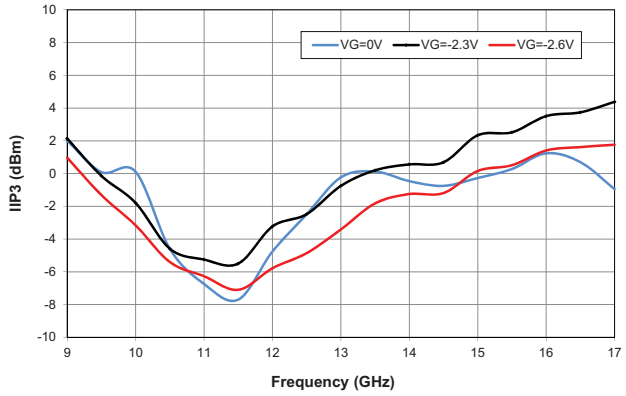
Image Rejection (dB) vs. RF Freq
Prf=-20dBm, Plo=+10dBm, Vd_LNA=4V, Vd_LOA=3.5V
LO<RF, IF=1.35GHz



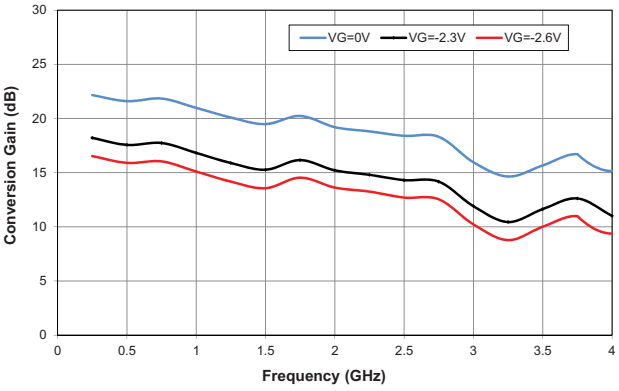
IMD3 (dBc) vs. RF Freq
Prf=-20dBm, Plo=+10dBm, Vd_LNA=4V, Vd_LOA=3.5V
LO<RF, IF=1.35GHz



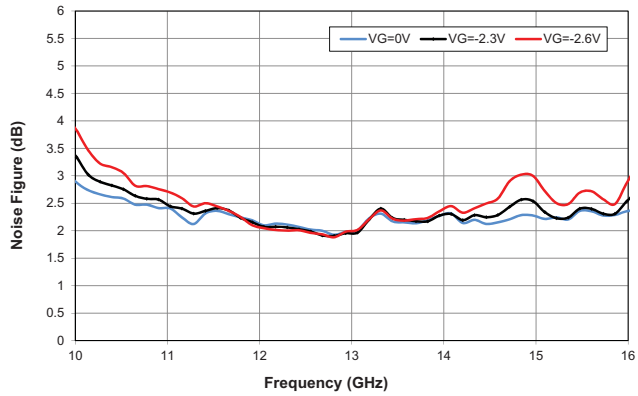
IIP3 (dBm) vs. RF Freq
Prf=-20dBm, Plo=+10dBm, Vd_LNA=4V, Vd_LOA=3.5V
LO<RF, IF=1.35GHz



Conversion Gain (dB) vs. IF Freq
Prf=-20dBm, Plo=+10dBm, Vd_LNA=4V, Vd_LOA=3.5V
LO Freq = 6.5GHz



Noise Figure (dB) vs. RF Freq
Plo=+10dBm, Vd_LNA=4V, Vd_LOA=3.5V
LO<RF, IF=1.35GHz



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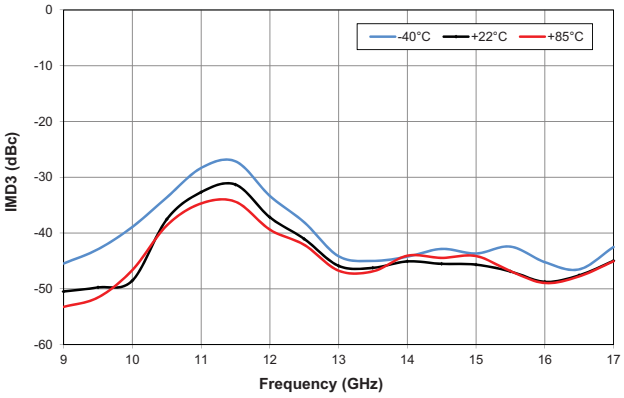
IMD3 (dBc) vs. RF Freq, Over Temperature
Prf=-20dBm, Plo=+10dBm, Vd_LNA=4V, Vd_LOA=3.5V, Vg=0V
LO<RF, IF=1.35GHz



IIP3 (dBm) vs. RF Freq, Over Temperature
Prf=-20dBm, Plo=+10dBm, Vd_LNA=4V, Vd_LOA=3.5V, Vg=0V
LO<RF, IF=1.35GHz

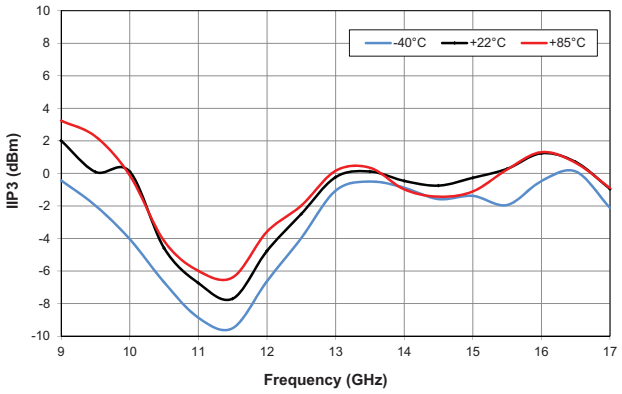
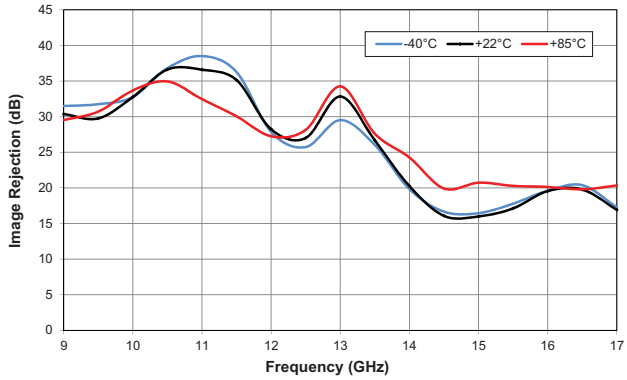
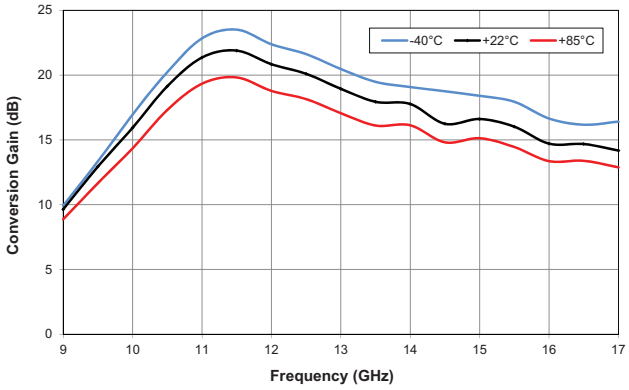


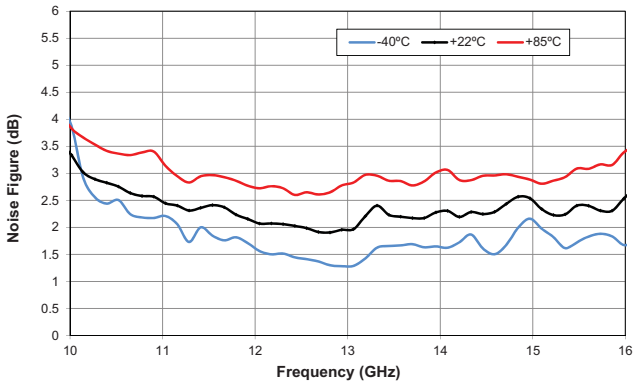
Image Rejection (dB) vs. RF Freq, Over Temperature
Prf=-20dBm, Plo=+10dBm, Vd_LNA=4V, Vd_LOA=3.5V, Vg=0V
LO<RF, IF=1.35GHz



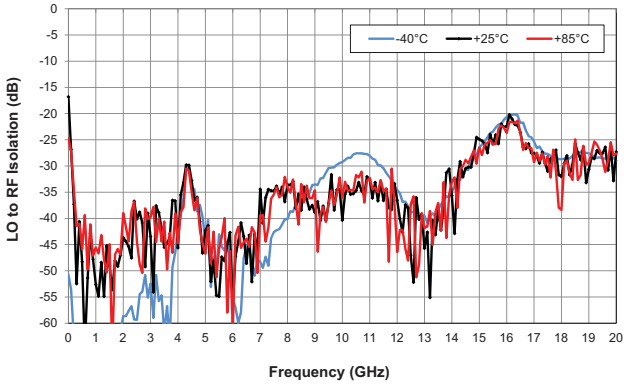
Conversion Gain (dB) vs. RF Freq, Over Temperature
Prf=-20dBm, Plo=+10dBm, Vd_LNA=4V, Vd_LOA=3.5V, Vmix=-0.8V
LO<RF, IF=1.35GHz



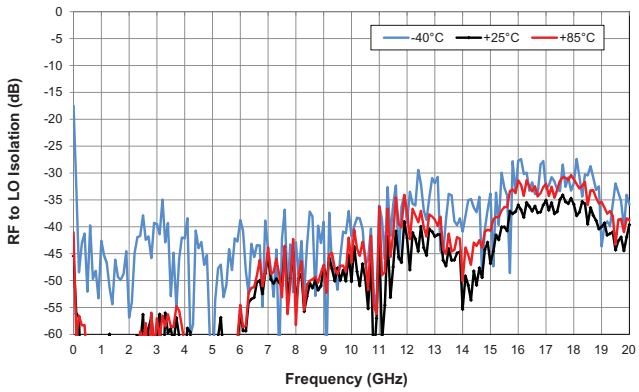
Noise Figure (dB) vs. RF Freq, Over Temperature
Plo=+10dBm, Vd_LNA=4V, Vd_LOA=3.5V, Vg=-2.3V
LO<RF, IF=1.35GHz



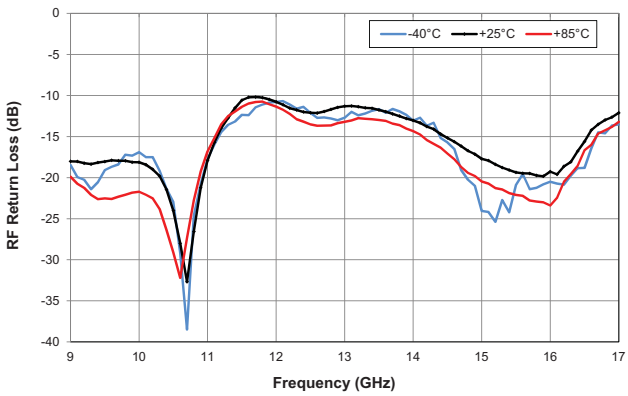
LO to RF Isolation Over Temperature



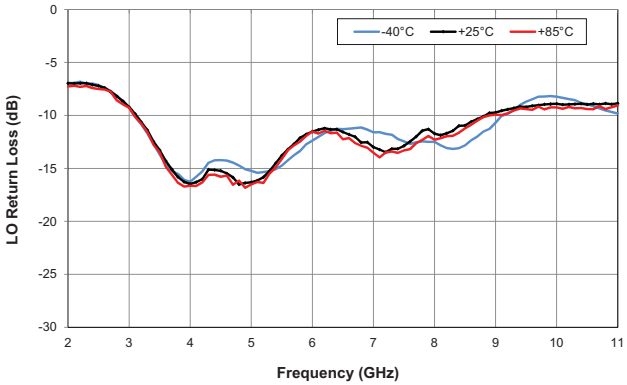
RF to LO Isolation Over Temperature



RF Return Loss Over Temperature



LO Return Loss Over Temperature



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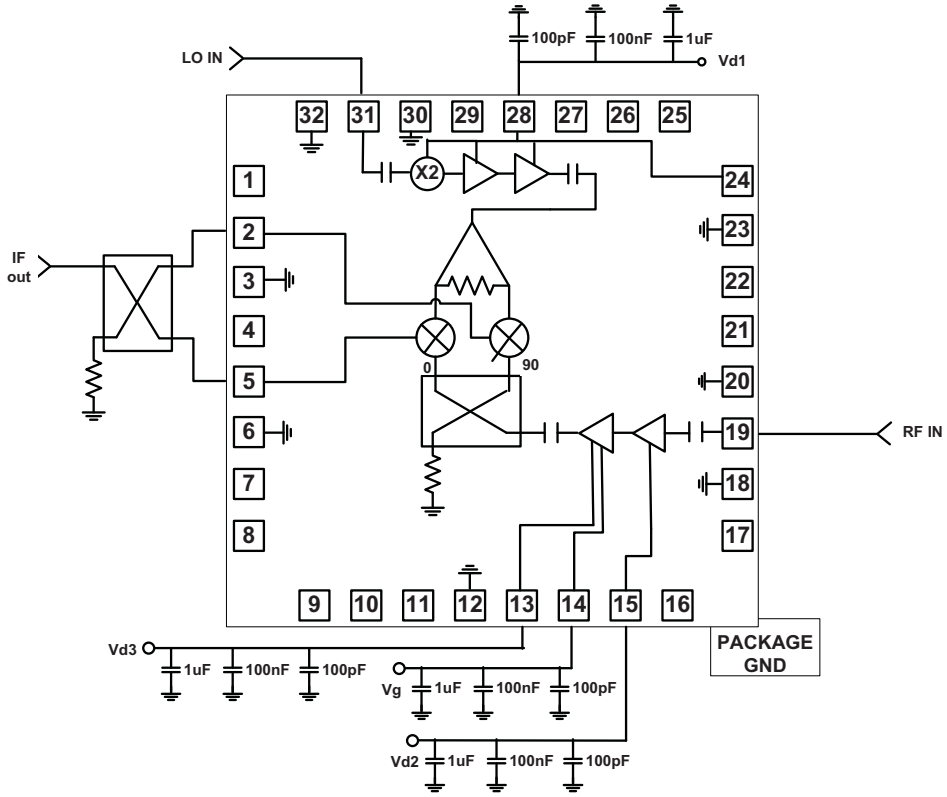
Functional Schematic



Pin Out

Pin	Function	Description
1	N/C	
2	IF1	
3	IF1 GND	
4	N/C	
5	IF2	
6	IF2 GND	
7	N/C	
8	N/C	
9	N/C	
10	N/C	
11	N/C	
12	GND	
13	VD2	LNA 2nd stage drain bias 4V
14	VG	Gain control -3V to 0V
15	VD1	LNA 1st stage drain bias 4V
16	N/C	
17	N/C	
18	RF GND	RF ground
19	RF IN	RF input
20	RF GND	RF ground
21	N/C	
22	GND	
23	GND	
24	VD3	LO amplifier drain bias (also connected to pin 28) 3.5V
25	N/C	
26	N/C	
27	N/C	
28	OPTIONAL	Connected to Pin 24 (LO amplifier drain bias) 3.5V
29	N/C	
30	LO GND	LO ground
31	LO IN	LO input
32	LO GND	LO ground

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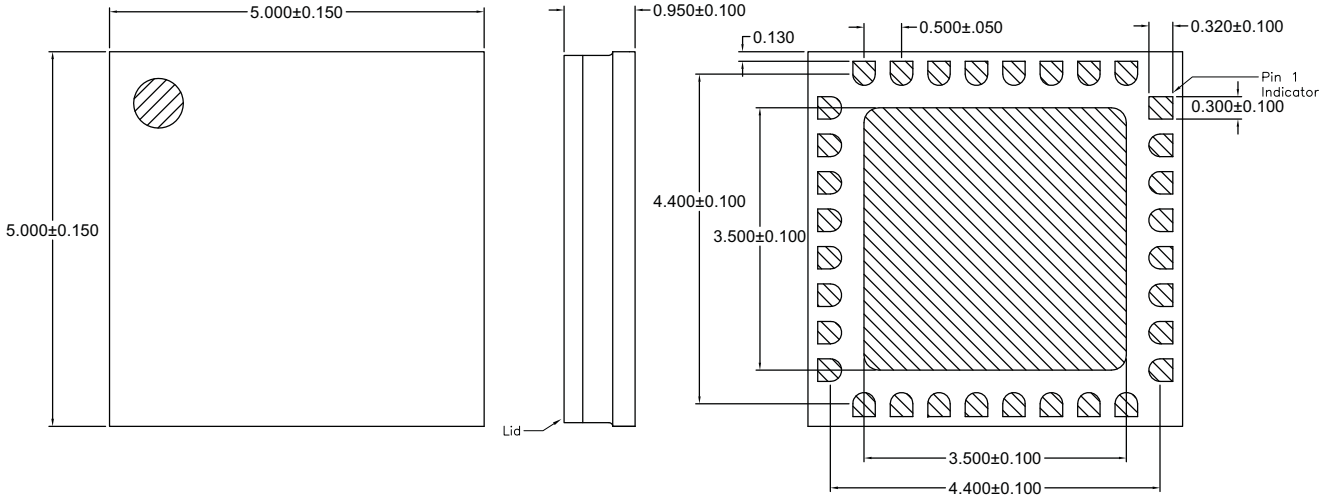
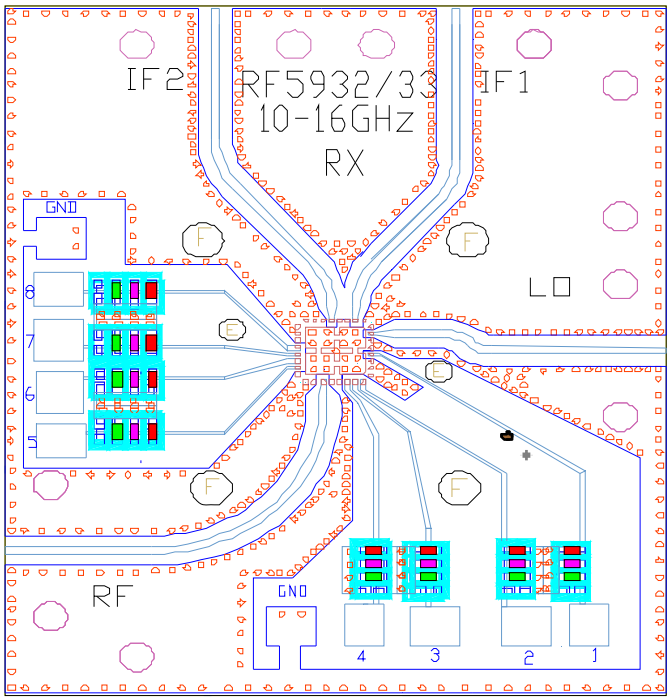
Package Drawing

(All dimension in mm)



Evaluation Board Layout



Color	0402 Capacitors
	1µF Capacitor
	100nF Capacitor
	10000pF Capacitor

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Ordering Information

Ordering Code	Description
RFRX5932AS2	2 piece sample bag
RFRX5932ASB	5 piece bag
RFRX5932ASQ	25 piece bag
RFRX5932ASR	100 pieces on a 7” reel
RFRX5932ATR7	750 pieces on a 7” reel
RFRX5932ATR13	2500 pieces on a 13” reel
RFRX5932APCK410	Evaluation board with 2 piece sample bag