RFMD2014

DIRECT QUADRATURE MODULATOR 1450MHz TO 2700MHz

Package: QFN, 24-Pin, 4mm x 4mm

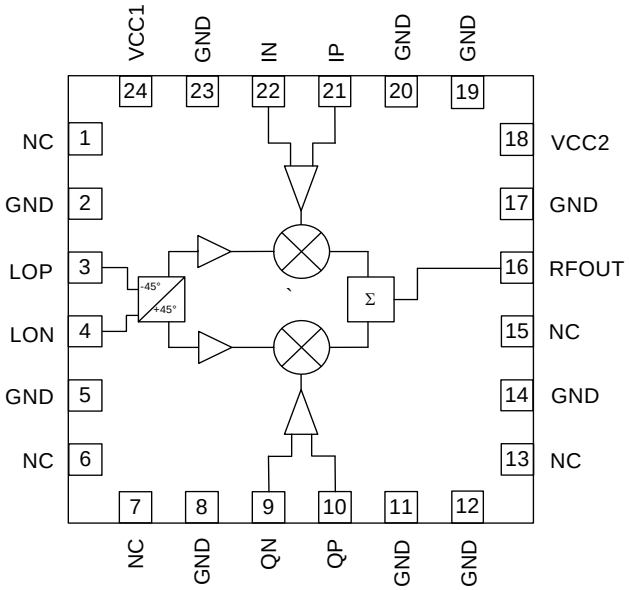


Features

- ACPR Performance: -70dBc Typ. for 1-Carrier WCDMA
- Very High Linearity: +26dBm OIP3
- Very Low Noise Floor: -160dBm/Hz
- High Output Power: +11dBm P1dB
- Typical Carrier Feed-Through: <-40dBm
- Single-Ended or Differential LO Drive
- Typical Sideband Suppression: <-40dBc
- Single +5V Supply
- Small 24-Pin, 4mmx4mm, QFN

Applications

- Cellular, 3G Infrastructure
- WiBro, WiMax, LTE
- WiFI or WLL Systems
- GMSK, QPSK, DQPSK, QAM Modulation



Functional Block Diagram

Product Description

The RFMD2014 is direct quadrature modulator for use in cellular base stations and other communications systems. RFMD2014 supports cellular, 3G, WiMax, and LTE air interface standards. This device features operation from 1450MHz to 2700MHz with excellent carrier and sideband suppression and ultra low noise floor. The device is manufactured in an advanced GaAs HBT process. The RFMD2014 operates from a single 5V supply and is packaged in a low cost, 4mm x 4mm, 24-pin leadless package.

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
Supply Voltage	5.5	V
LO Input	+10	dBm
Operating Temperature	-40 to +85	°C
Storage Temperature	-65 to +150	°C
Maximum Junction Temperature	+150	°C
Power Dissipation	1200	mW
BB CM Voltage	1.8	V
Thermal Resistance	28	°C/W
ESD	Class 1 C (1000V)	

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.

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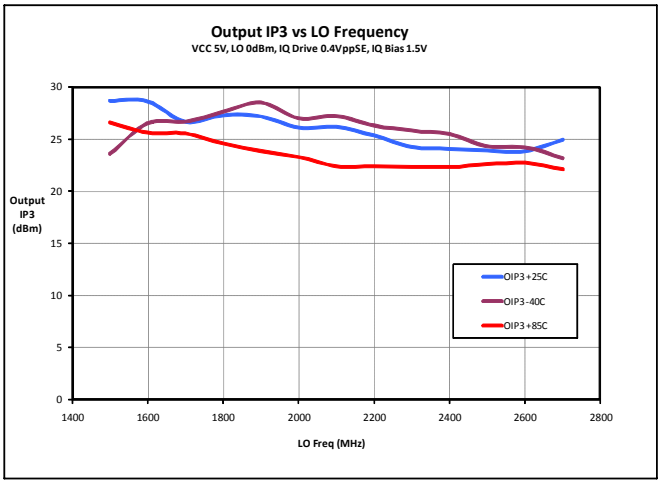
RFMD Green: RoHS compliant per EU Directive 2002/95/EC, halogen free per IEC 61249-2-21, < 1000ppm each of antimony trioxide in polymeric materials and red phosphorus as a flame retardant, and <2% antimony in solder.

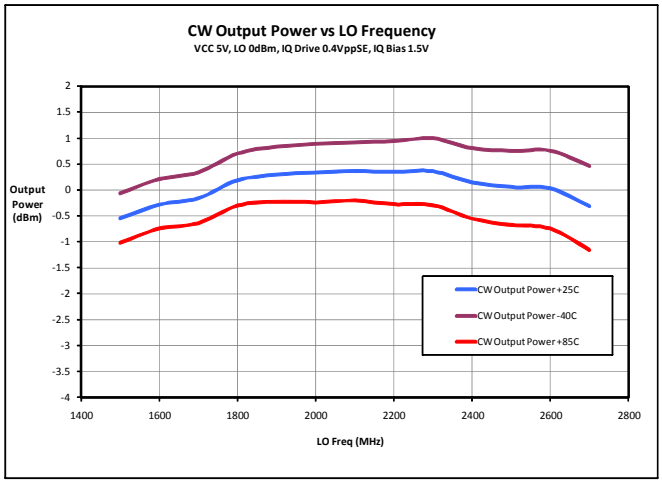
Parameter	Specification			Unit	Condition
	Min.	Typ.	Max.		
General					
Supply Voltage	4.75	5	5.25	V	
Supply Current	189	210	231	mA	
RF Output					
RF Frequency Range	1450		2700	MHz	
Carrier Feed through		-40		dBm	Uncalibrated
Sideband Suppression		-40		dB	Uncalibrated
OIP3	23	26		dBm	Baseband input 800mV$_{PP}$, 20kHz Δ
RF Port Return Loss		15		dB	
P_{OUT}	-3	0	3	dBm	Baseband input 800mV$_{PP}$, CW quadrature
ACP		-70		dBc	RF output -10dBm, 1 carrier WCDMA
Broadband Noise Floor		-160		dBm/Hz	20MHz offset, BB 0V$_{PP}$
Output Power Flatness		0.25		dB	Over 60MHz BW
P1dB	9	11		dBm	
LO Input					
LO Frequency Range	1450		2700	MHz	
LO Input Power	-3	0	3	dBm	
Return Loss		15		dB	
BB Input					
I/Q Input Frequency Range	DC		300	MHz	
BB Input Impedance		600		Ω	Differential impedance
Common Mode Voltage		1.5		V	

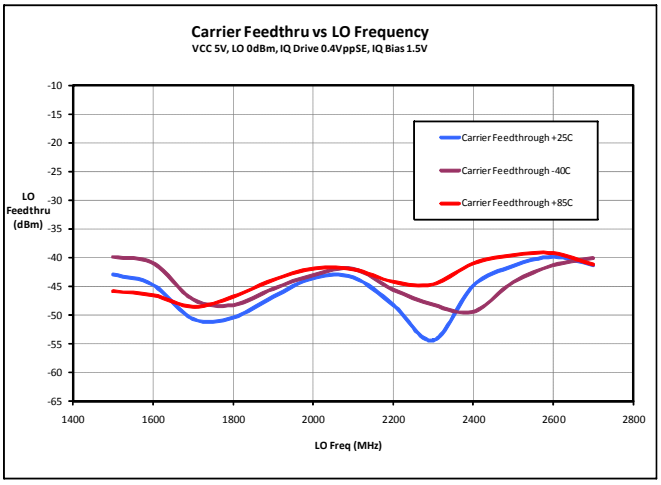
Note: Typical performance at nominal conditions unless otherwise noted: VCC=+5V, Temperature=+25°C, Baseband CM Voltage=+1.5V, LO Frequency=2100MHz, LO Power=0dBm, Single-Ended

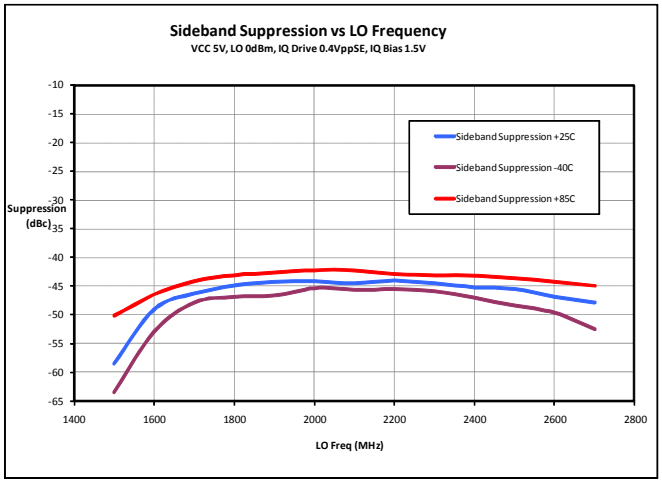
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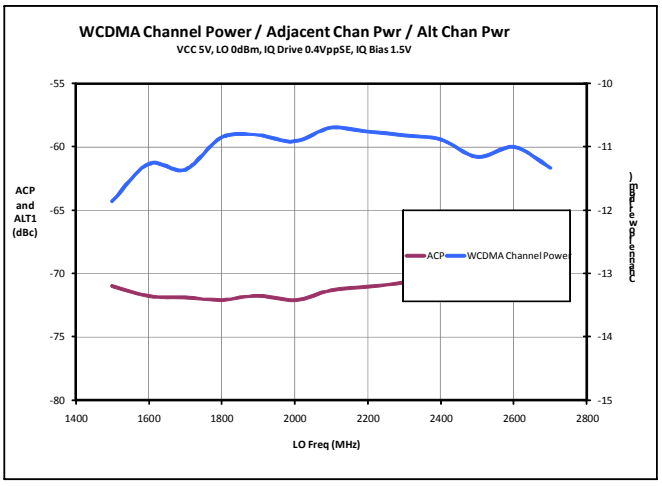
Pin	Function	Description
1	NC	No connection.
2	GND	RF/DC Ground connection.
3	LOP	Local oscillator differential input.
4	LON	Local oscillator differential input. Connect to ground when using LOP input in single ended mode.
5	GND	RF/DC Ground connection.
6	NC	No connection.
7	NC	No connection.
8	GND	RF/DC Ground connection.
9	QN	Q channel differential baseband input.
10	QP	Q channel differential baseband input.
11	GND	RF/DC Ground connection.
12	GND	RF/DC Ground connection.
13	NC	No connection.
14	GND	RF/DC Ground connection.
15	NC	No connection.
16	RFOUT	RF single-ended output.
17	GND	RF/DC Ground connection.
18	VCC2	5V supply.
19	GND	RF/DC Ground connection.
20	GND	RF/DC Ground connection.
21	IP	I channel differential baseband input.
22	IN	I channel differential baseband input.
23	GND	RF/DC Ground connection.
24	VCC1	5V supply.

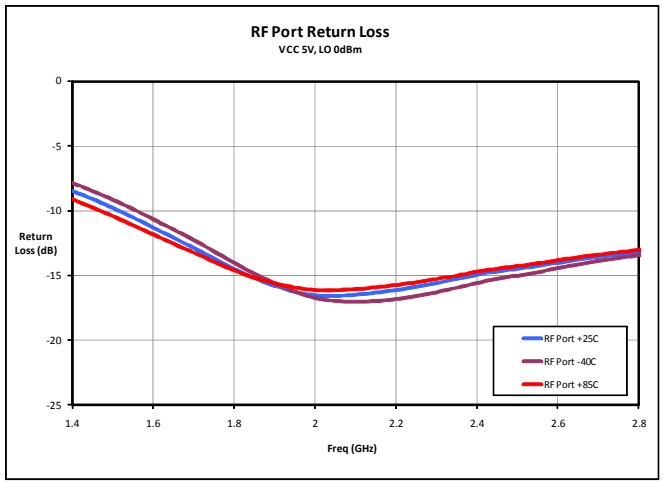




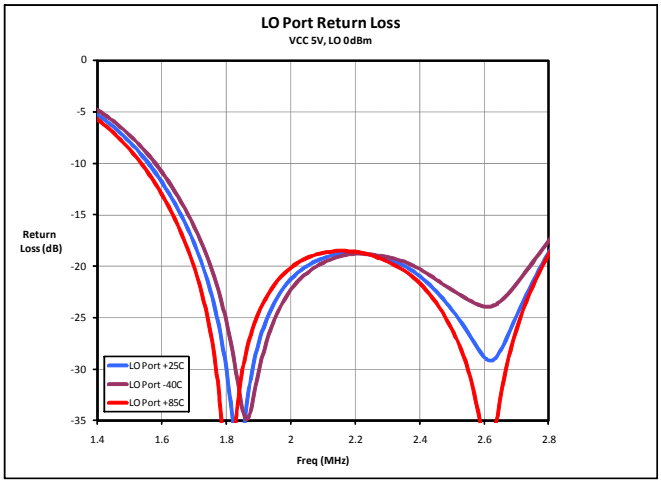


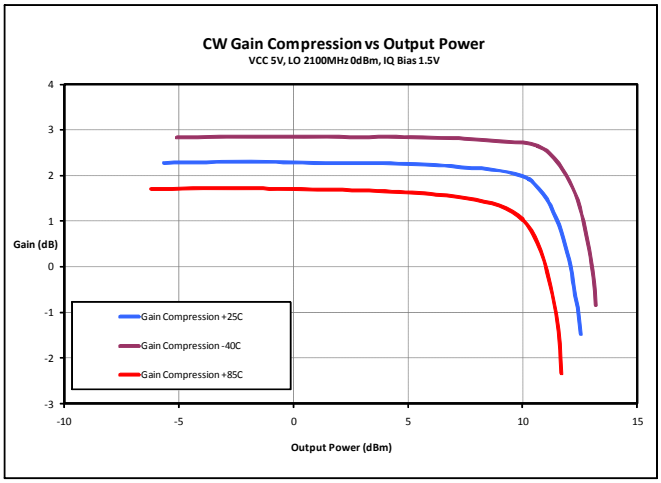


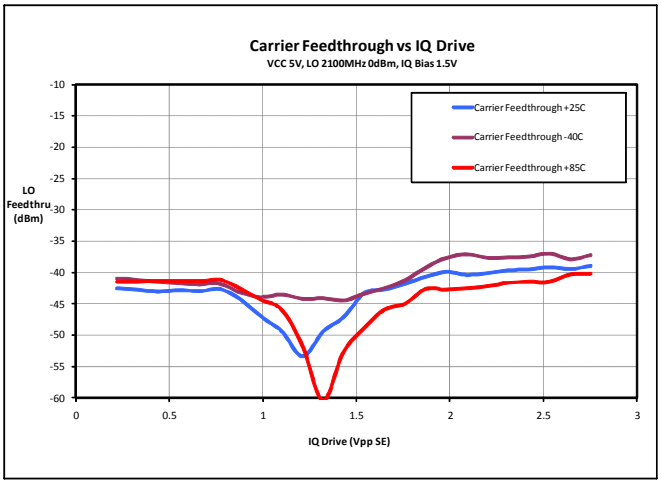


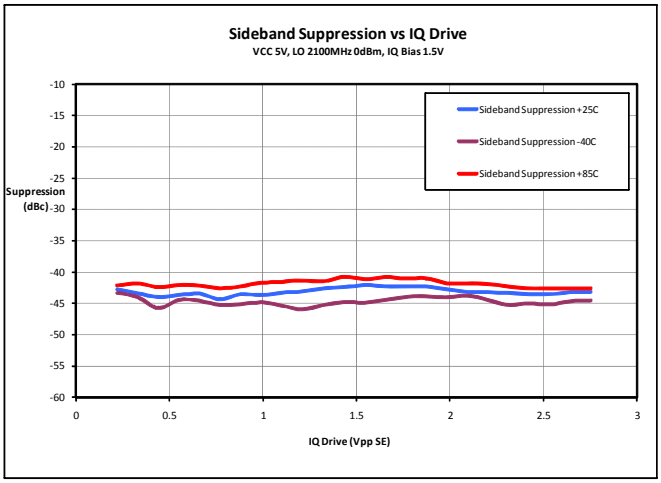


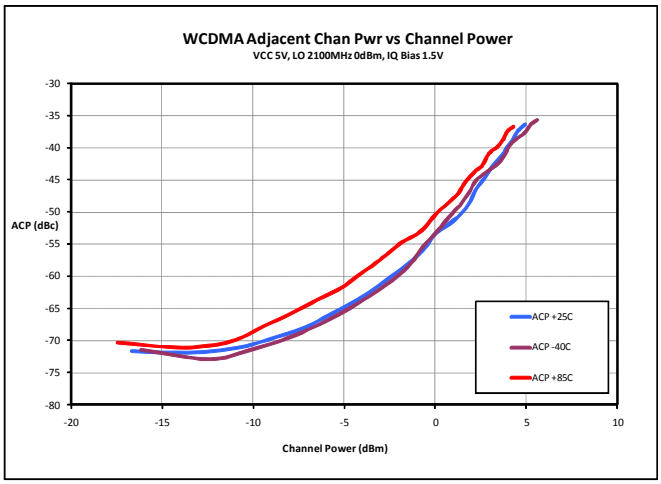
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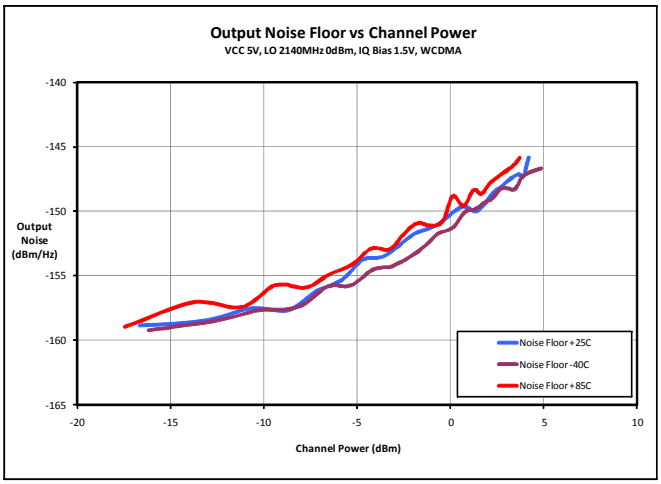

LO Port Return Loss
VCC 5V, LO 0dBm
Return Loss (dB)
Freq (MHz)
LO Port +25C
LO Port -40C
LO Port +85C

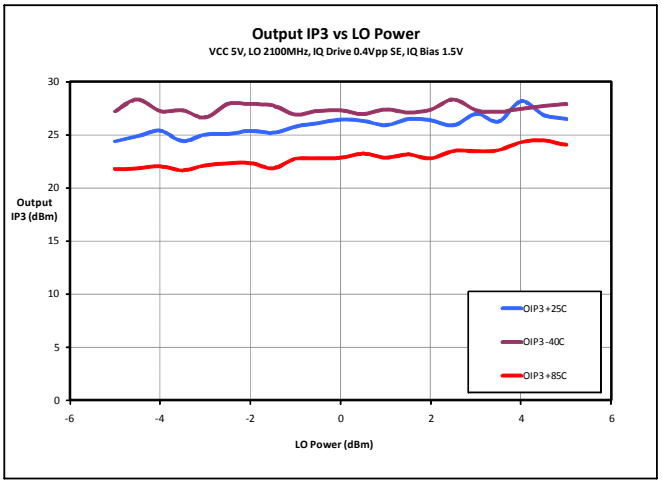

CW Gain Compression vs Output Power
VCC 5V, LO 2100MHz 0dBm, IQ Bias 1.5V
Gain (dB)
Output Power (dBm)
Gain Compression +25C
Gain Compression -40C
Gain Compression +85C

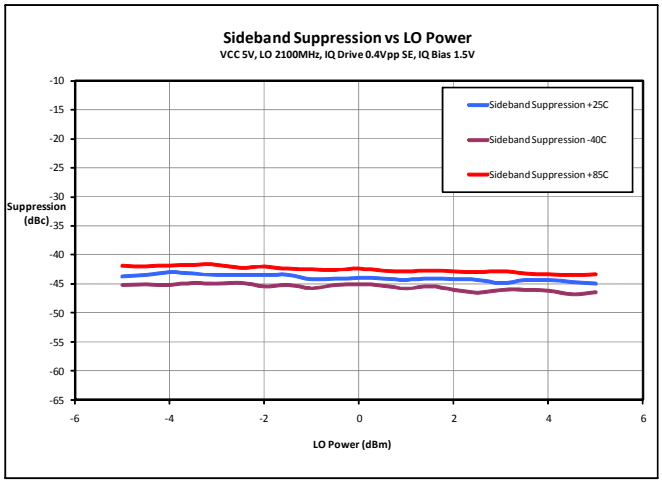

Carrier Feedthrough vs IQ Drive
VCC 5V, LO 2100MHz 0dBm, IQ Bias 1.5V
LO Feedthru (dBm)
IQ Drive (Vpp SE)
Carrier Feedthrough +25C
Carrier Feedthrough -40C
Carrier Feedthrough +85C

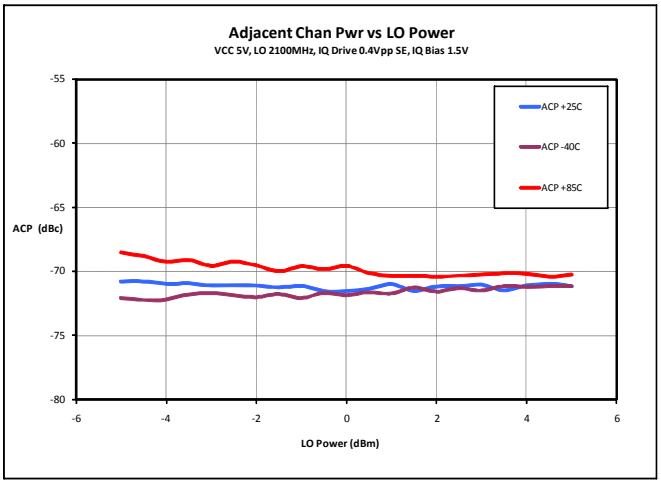

Sideband Suppression vs IQ Drive
VCC 5V, LO 2100MHz 0dBm, IQ Bias 1.5V
Suppression (dBc)
IQ Drive (Vpp SE)
Sideband Suppression +25C
Sideband Suppression -40C
Sideband Suppression +85C

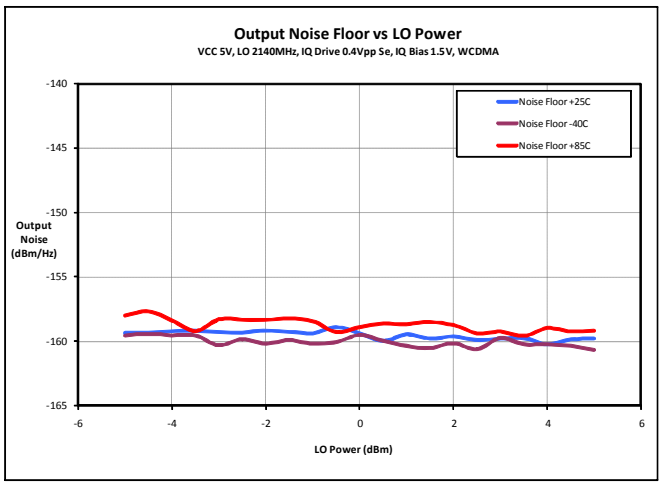

WCDMA Adjacent Chan Pwr vs Channel Power
VCC 5V, LO 2100MHz 0dBm, IQ Bias 1.5V
ACP (dBc)
Channel Power (dBm)
ACP +25C
ACP -40C
ACP +85C

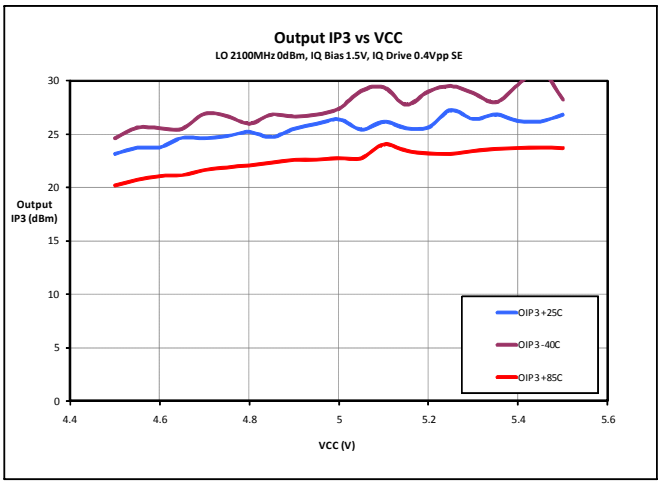

Output Noise Floor vs Channel Power
VCC 5V, LO 2140MHz 0dBm, IQ Bias 1.5V, WCDMA
Output Noise (dBm/Hz)
Channel Power (dBm)
Noise Floor +25C
Noise Floor -40C
Noise Floor +85C

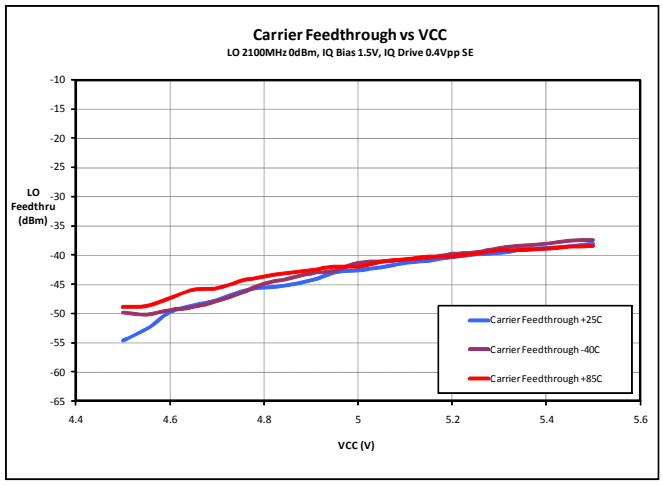




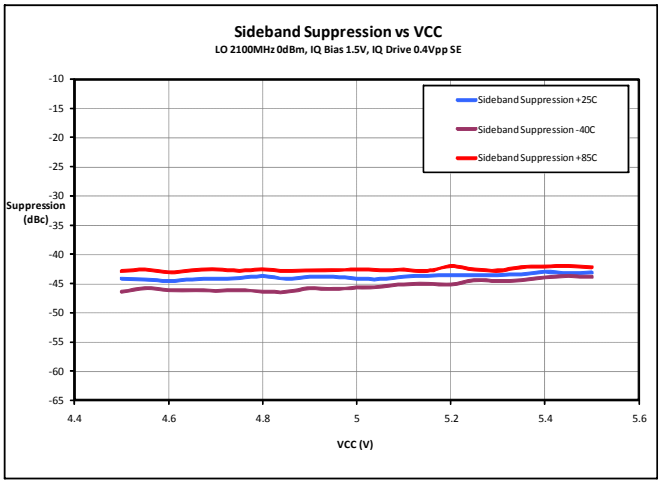


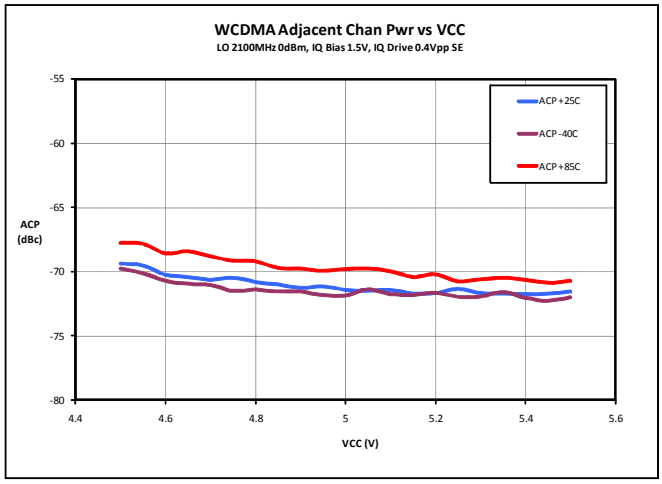


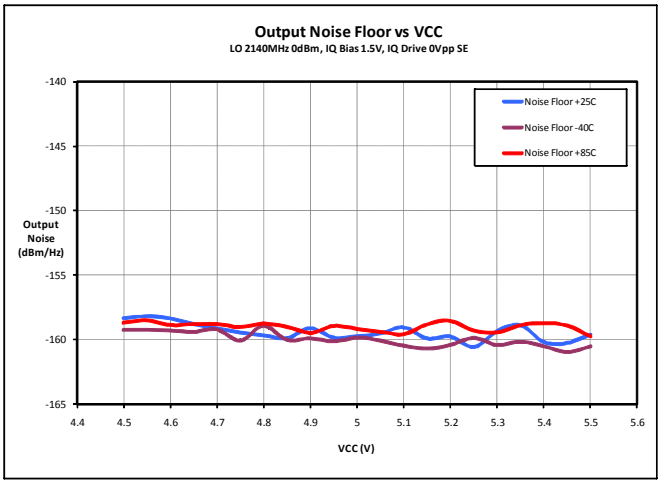




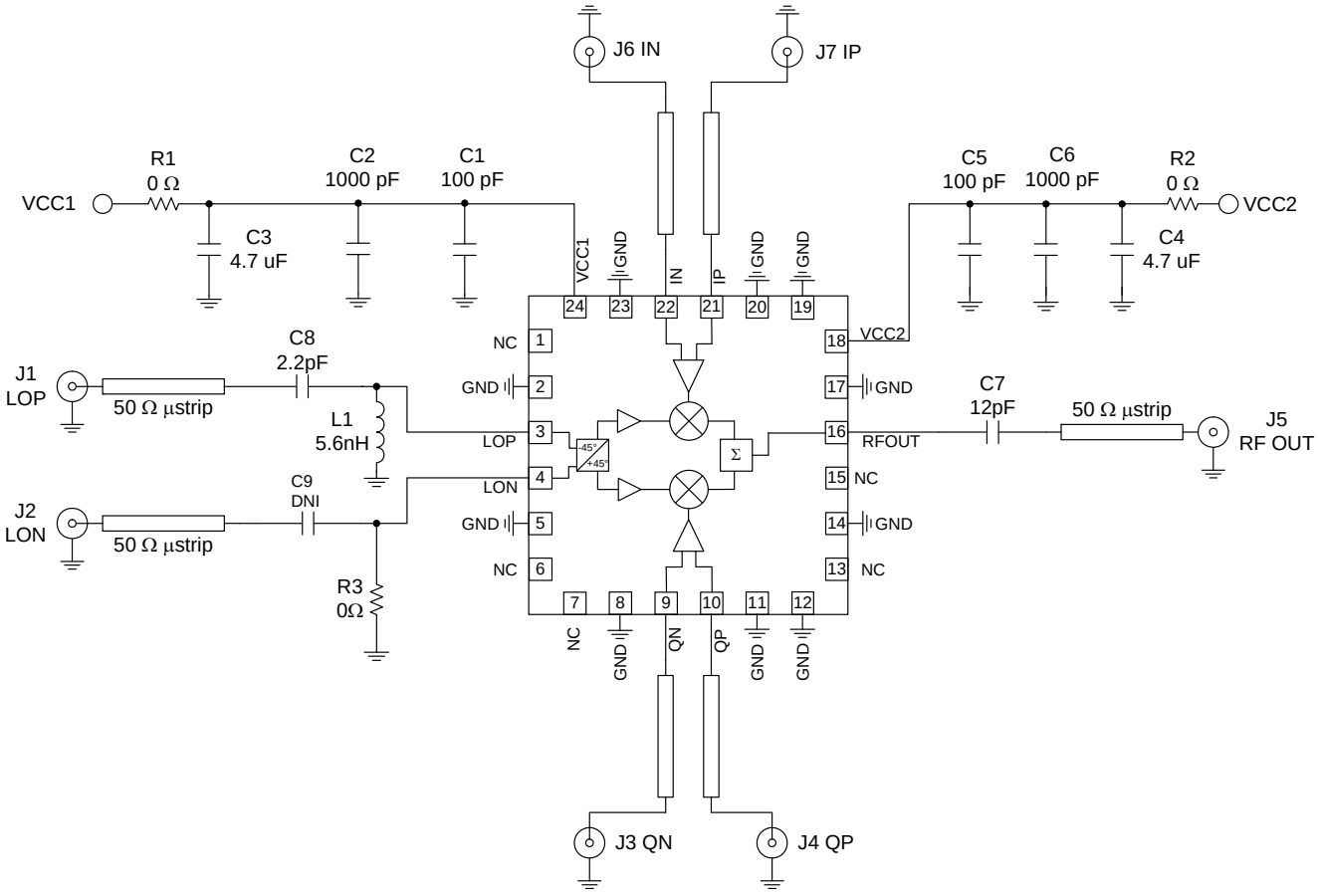
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Sideband Suppression vs VCC
LO 2100MHz 0dBm, IQ Bias 1.5V, IQ Drive 0.4Vpp SE
Sideband Suppression +25C
Sideband Suppression -40C
Sideband Suppression +85C
Suppression (dBc)
VCC (V)


WCDMA Adjacent Chan Pwr vs VCC
LO 2100MHz 0dBm, IQ Bias 1.5V, IQ Drive 0.4Vpp SE
ACP +25C
ACP -40C
ACP +85C
ACP (dBc)
VCC (V)


Output Noise Floor vs VCC
LO 2140MHz 0dBm, IQ Bias 1.5V, IQ Drive 0Vpp SE
Noise Floor +25C
Noise Floor -40C
Noise Floor +85C
Output Noise (dBm/Hz)
VCC (V)

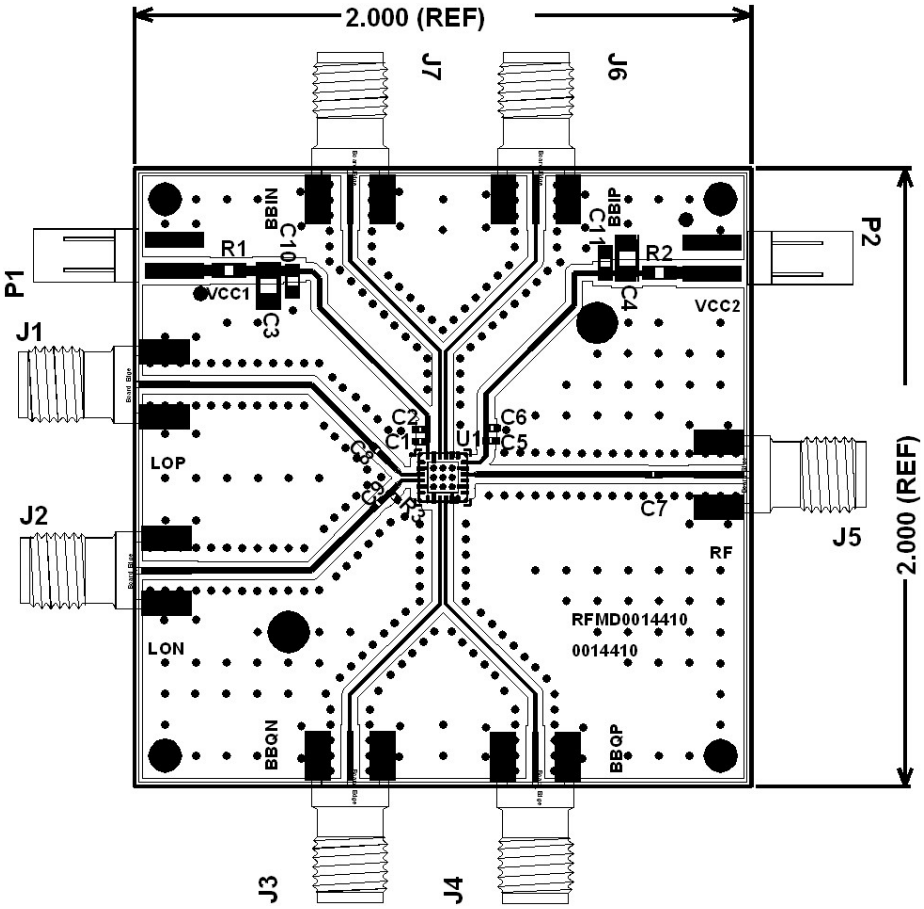
Evaluation Board Schematic



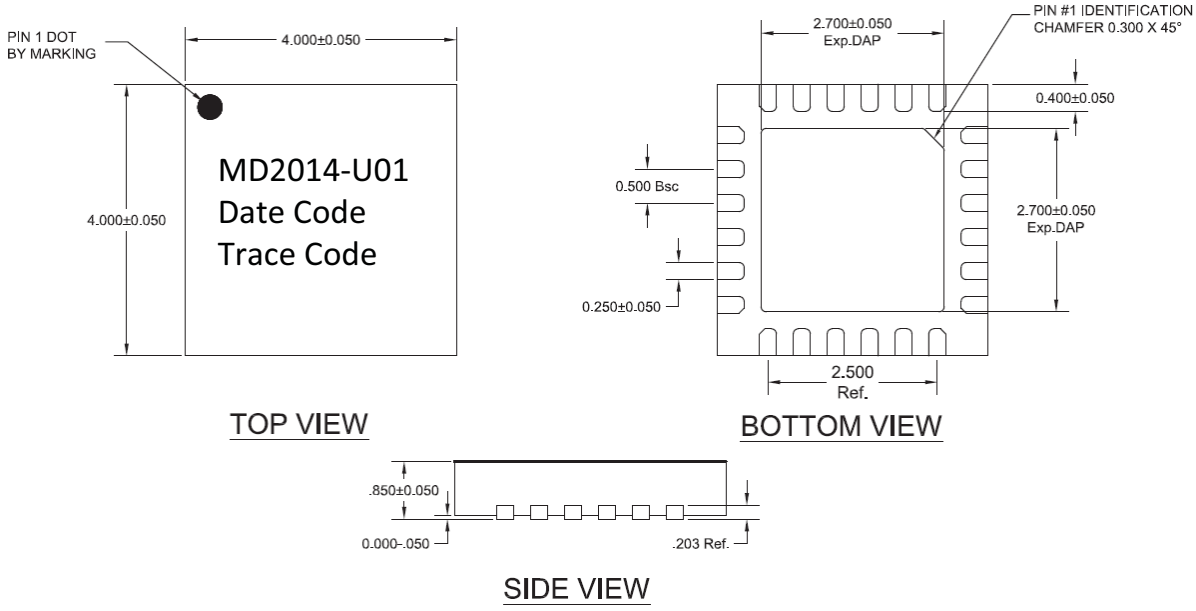
Note: Evaluation board configured for single-ended LO drive using LOP connector. Terminate the LON pin to ground near the package.

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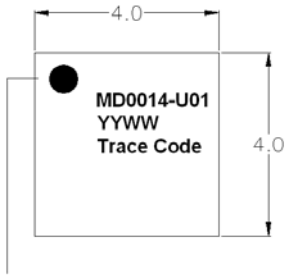
Evaluation Board Layout



Package Drawing
QFN, 24-pin, 4mm x 4mm



Branding Diagram



Pin 1 Indicator

YYWW Date Code Notation
YY = Year
WW = Week

Trace Code for tracking

Ordering Information

Ordering Code	Description
RFMD2014SQ	Sample bag with 25 pieces
RFMD2014SR	7" Reel with 100 pieces
RFMD2014TR7	7" Reel with 750 pieces
RFMD2014TR13	13" Reel with 2500 pieces
RFMD2014PCK-410	1450MHz to 2700MHz PCBA with 5-piece sample bag

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