Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of “Quality Parts,Customers Priority,Honest Operation,and Considerate Service”,our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!

Contact us

Tel: +86-755-8981 8866 Fax: +86-755-8427 6832
Email & Skype: info@chipsmall.com Web: www.chipsmall.com
Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China

IDTF1192NLGI Datasheet

RF Dual Wideband Gain-Settable Downconverting Mixer *400MHz to 3800MHz*

General Description

This document describes the specifications for the IDTF1192 Dual Wideband, Gain-Settable, Zero-Distortion™ Flat-Noise™, RF to IF Downconverting Mixer.

The F1192 offers very low power consumption with excellent linearity. In addition to this and the four dynamically adjustable gain settings, the F1192 performance is exceptional across an extremely broad range of RF and IF frequencies. All of this makes it ideal for myriad applications including:

- 2G/3G/4G/5G/Multimode Remote Radio Units
- High order MIMO systems, µcells, picocells, DAS
- Point to Point µWave Backhaul systems
- Broadband Repeaters
- Public Safety Infrastructure
- Any radio system operating between 400 MHz and 4000 MHz

Competitive Advantage

F1192 offers maximum performance and flexibility at minimum power consumption. The unique and patented settable-gain feature allows it to be used in a very wide variety of radiocard applications, even allowing for dynamic adjustment of gain to maximize performance on the fly. The extremely wide RF and IF bandwidths are achieved with a fixed BOM with all internal matching. The device can function with as little as -6 dBm LO power and with independent channel shutdown modes for ease of integration into high order TDD MIMO systems.

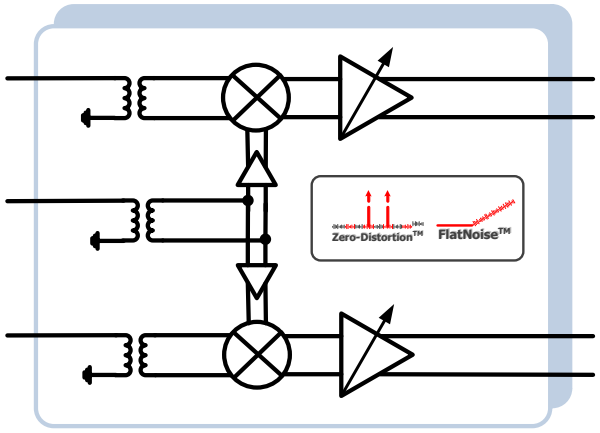
Band Performance Summary

RF Frequency (MHz)	900	1900	2600	3500
Gain (max G_{11} setting)	11.0	10.8	10.3	9.0
Gain (min G_2 setting)	2.5	2.3	1.8	0.5
NF @ max gain (dB)	8.9	8.7	10.0	10.9
IIP3 @ min gain (dBm)	28	27	29	30
OIP3 @ G_8 (dBm)	37	34	35	35
IP1dB @ min gain (dBm)	13.6	14.7	14.6	15.8
2x2 @ min gain (dBc)	-75	-82	-73	-68
Channel Isolation (dB)	48	47	48	45
Pdiss (mW)	792	835	875	935

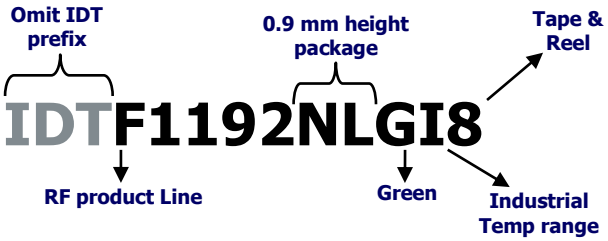
Features

- RF range: 400MHz to 3800MHz
- LO range: 400MHz to 3600MHz
- IF Range: 50MHz to 600MHz
- Dual Path for MIMO
- 4 Gain Settings; 11dB, 8dB, 5dB, 2dB
- 2 bit gain step control
- Ideal for Multi-Carrier Systems
- +35dBm OIP3
- Low Noise Figure at any gain setting via IDT's FlatNoise™ technology
- Z = 200 Ω IF balanced, 50 Ω RF, 50 Ω LO single ended
- All internally matched. Single BOM for all RF, LO and IF frequencies
- 4 mm x 4 mm, 24-pin TQFN package
- Independent Path Standby mode
- 75 nsec settling for gain adjustment
- VCC = 3.3V, 835 mW, 620 mW (low power mode)

Functional Block Diagram



Ordering Information



ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Min	Max	Units
VCC to GND	V_{CC}	-0.5	+3.6	V
STBY_A, STBY_B, Gain_Select1, Gain_Select2, RF_A, RF_B, LO1_ADJ, LO2_ADJ	V_{CTRL}	-0.5	Vcc + 0.5	V
IF_A+, IF_A-, IF_B+, IF_B-	IF_{OUT}	2.4	Vcc + 0.5	V
LO_IN	LO_{IN}	-0.5	+0.5	V
IF_BiasA, IF_BiasB	IF_{BIAS}		50	ohms
IF_Ref_Bias	IF_{REF}		500	ohms
RF Input Power (RF_A, RF_B) continuous	RF_{MAX}		+20	dBm
LO Input Power (LO_IN) continuous	LO_{MAX}		+20	dBm
Continuous Power Dissipation	P_{DISS}		1.5	W
Junction Temperature	T_j		150	°C
Storage Temperature Range	T_{ST}	-65	150	°C
Lead Temperature (soldering, 10s)	T_{LEAD}		260	°C
ElectroStatic Discharge – HBM (JEDEC/ESDA JS-001-2012)			Class 2 (2500 V)	
ElectroStatic Discharge – CDM (JEDEC 22-C101F)			Class C3 (1000 V)	

Stresses above those listed above may cause permanent damage to the device. Functional operation of the device at these or any other conditions above those indicated in the operational section of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

PACKAGE THERMAL AND MOISTURE CHARACTERISTICS

θ_{JA} (Junction – Ambient)	45 °C/W
θ_{JC} (Junction – Case) [The Case is defined as the exposed paddle]	2.1 °C/W
Moisture Sensitivity Rating (Per J-STD-020)	MSL1

F1192 RECOMMENDED OPERATING CONDITIONS

Parameter	Symbol	Comment	min	typ	max	Units
Supply Voltage(s)	V_{CC}	All V_{CC} pins	3.15		3.45	V
Operating Temperature Range	T_{CASE}	Case Temperature	-40		+105	deg C
RF Freq Range	F_{RF}		400		3800	MHz
LO Freq Range	F_{LO}		400		3600	
IF Range	F_{IF}		50		600	
LO Power	P_{LO}	Operating Range	-6		+6	dBm

IDTF1192 SPECIFICATION (GENERAL)

Typical Application Circuit, V_{CC} = +3.3V, T_C = +25°C, F_{RF} = 900MHz, F_{IF} = 199MHz, F_{LO} = 1100MHz, P_{LO} = 0 dBm, P_{IN} = -10dBm per tone for all gain settings unless otherwise stated, STBY_A = STBY_B = LOW. EVkit IF transformer losses are de-embedded unless otherwise noted.

Parameter	Symbol	Comment	min	typ	max	units
Logic Input High[3]	V_{IH}	For all control pins	***1.1***[1]			V
Logic Input Low[3]	V_{IL}	For all control pins			***0.65***	V
Logic Current	I_{IH}, I_{IL}	For all control pins	***-5***		***+100***	µA
Supply Current	I_{1CHA_LB}	Single channel - low band LO		134	***154***	mA
	I_{1CHA_MB}	Single channel - mid band LO		140	***160***	
	I_{1CHA_HB}	Single channel - high band LO		147	***166***	
	I_{2CHA_LB}	Dual channel - low band LO		240	***275***	
	I_{2CHA_MB}	Dual channel - mid band LO		253	***287***	
	I_{2CHA_HB}	Dual channel - high band LO		265	***299***	
Supply Current – reduced linearity		• Dual channel • F_{RF} = 2.2GHz, F_{LO} = 2GHz • OIP3 = +20dBm max gain • IFRef_Bias resistor = 3.9Kohm		194	***220***	
Shutdown current	I_{SD_2CHA}	Both Channels		3	***6***	
Settling Time	T_{SETT}	• Pin = -13 dBm • Gate STBY pins per Independent Channel Standby table • Time for IF Signal to settle from 50% CTRL to within 90% of final value		340		nsec
		• Pin = -13 dBm • Gate STBY pins per Independent Channel Standby table • Time for IF Signal to settle from 50% CTRL to within 0.1 dB of final value		920		
		• Pin = -13 dBm • Gate Gain Select pins per Gain Control table • Time for IF Signal to settle from 50% Gain Select to within 90% of final value		75		
RFIN Impedance	Z_{RFIN}	Single Ended		50		Ω
LO Port Impedance	Z_{LO}	Single Ended		50		
IF Output Impedance	Z_{IF}	Differential		200		
IF Return Loss	RL_{IF}	Differential 200 ohm with 4:1 Balun		-15		dB
LO Return Loss	RL_{LO}	Single Ended 50 ohm		-15		dB

Note 1: Items in min/max columns in ***bold italics*** are Guaranteed by Test.
Note 2: Items in min/max columns that are not bold/italics are Guaranteed by Design Characterization.
Note 3: JEDEC 3.3V and JEDEC 1.8V logic

IDTF1192 SPECIFICATION (LOW BAND)

Typical Application Circuit, V_{CC} = +3.3V, T_C = +25°C, F_{RF} = 900MHz, F_{IF} = 199MHz, F_{LO} = 1100MHz, P_{LO} = 0 dBm, P_{IN} = -10dBm per tone for all gain settings unless otherwise stated, STBY_A = STBY_B = LOW. EVkit IF transformer losses are de-embedded unless otherwise noted. Gain Setting = G_5 (~ 5 dB gain).

Parameter	Symbol	Comment	min	typ	max	units
Power Gain	G_{11}	Gain setting = G_{11}		11.1		dB
	G_8	Gain setting = G_8		8.3		
	G_5	Gain setting = G_5	***4.05***	5.4	***6.75***	
	G_2	Gain setting = G_2		2.5		
G5 Gain Change over temp	$G5_{TempDrift}$	Tcase -40C to +105C referenced to +25C		+0.7 -0.7		dB
Gain Slope	$Gain_{SLOPE}$	• IF center 200MHz • 100MHz BW		+ 0.006		dB/MHz
Noise Figure	NF_{G11}	Gain setting = G_{11}		8.9		dB
	NF_{G8}	Gain setting = G_8		9.4		
	NF_{G5} [4, 5]	Gain setting = G_5		10.1	11.7	
	NF_{G2}	Gain setting = G_2		10.7		
Input IP3	$IIP3_{G11}$	Gain setting = G_{11} 800 kHz tone separation		24		dBm
	$IIP3_{G8}$	Gain setting = G_8 800 kHz tone separation		29		
	$IIP3_{G5}$ [4]	Gain setting = G_5 800 kHz tone separation	26	28		
	$IIP3_{G2}$	Gain setting = G_2 800 kHz tone separation		28		
G3 IIP3 change over temp	$IIP3_{G3TempDrift}$	Tcase -40C / +105C referenced to +25C		-2.6/ +0.6		dB
Output IP3	$OIP3_{G11}$	Gain setting = G_{11} 800 kHz tone separation		35		dBm
	$OIP3_{G8}$	Gain setting = G_8 800 kHz tone separation		37		
	$OIP3_{G5}$	Gain setting = G_5 800 kHz tone separation		32		
		• Gain setting = G_5 • Tc = +105°C • LO power = -3dBm • Vcc = 3.15V	33	34		
	$OIP3_{G2}$	Gain setting = G_2 800 kHz tone separation		30		

IDTF1192 SPECIFICATION (LOW BAND) CONTINUED

Typical Application Circuit, V_{CC} = +3.3V, T_C = +25°C, F_{RF} = 900MHz, F_{IF} = 199MHz, F_{LO} = 1100MHz, P_{LO} = 0 dBm, P_{IN} = -10dBm per tone for all gain settings unless otherwise stated, STBY_A = STBY_B = LOW. EVkit IF transformer losses are de-embedded unless otherwise noted. Gain Setting = G_5 (~ 5 dB gain).

Parameter	Symbol	Comment	min	typ	max	units
Input P1dB	$IP1dB_{G11}$	Gain setting = G_{11}		7.0		dBm
	$IP1dB_{G8}$	Gain setting = G_8		9.2		
	$IP1dB_{G5}$ [4]	Gain setting = G_5	10.4	11.8		
	$IP1dB_{G2}$	Gain setting = G_2		13.6		
Maximum saturated output power	Psat	Pin up to +20dBm		17		dBm
2RF – 2LO rejection	2x2 [6]	▪ P_{RF} = -10 dBm ▪ $F_{RFspur} = F_{LO} - F_{IF}/2$		-75	-73	dBc
3RF – 3LO rejection	3x3	▪ P_{RF} = -10 dBm ▪ $F_{RFspur} = F_{LO} - F_{IF}/3$		-75		dBc
Channel Isolation	ISO_C	IF_B Pout versus IF_A w/ RF_A input	47	48		dB
LO to IF leakage	ISO_{LI}			-38	-35	dBm
2LO to IF leakage	ISO_{LI2}			-25		dBm
3LO to IF leakage	ISO_{LI3}			-49		dBm
4LO to IF leakage	ISO_{LI4}			-45		dBm
RF to IF leakage	ISO_{RI}	RF output power compared to measured IF output power		-25	-23	dBc
LO to RF leakage	ISO_{LR}			-52		dBm
RF Return Loss	RL_{RF}	Single Ended 50 ohm		-12		dB

1 – Items in min/max columns in ***bold italics*** are Guaranteed by Test
2 – All other Items in min/max columns are Guaranteed by Design Characterization
3 – JEDEC 3.3V and JEDEC 1.8V logic
4 – Specification limits over voltage and temperature
5 – Max limit at Tcase = +105C
6 – Max limit over temperature extremes

IDTF1192 SPECIFICATION (MID BAND)

Typical Application Circuit, V_{CC} = +3.3V, T_C = +25°C, F_{RF} = 1900 MHz, F_{IF} = 199MHz, F_{LO} = 1700MHz, P_{LO} = 0 dBm, P_{IN} = -10dBm per tone for all gain settings unless otherwise stated, STBY_A = STBY_B = LOW. EVkit IF transformer losses are de-embedded unless otherwise noted. Gain Setting = G_5 (~ 5 dB gain)

Parameter	Symbol	Comment	min	typ	max	units
Power Gain	G_{11}	Gain setting = G_{11}		10.8		dB
	G_8	Gain setting = G_8		8.1		
	G_5	Gain setting = G_5	***3.75***	5.1	***6.45***	
	G_2	Gain setting = G_2		2.3		
G5 Gain Change over temp	$G5_{TempDrift}$	Tcase -40C to +105C referenced to +25C		+0.7 -0.6		dB
Gain Slope	$Gain_{SLOPE}$	• IF center 200MHz • 100MHz BW		+0.006		dB/MHz
Noise Figure	NF_{G11}	Gain setting = G_{11}		8.7		dB
	NF_{G8}	Gain setting = G_8		9.1		
	NF_{G5} [4, 5]	Gain setting = G_5		9.8	11.4	
	NF_{G2}	Gain setting = G_2		10.7		
Blocking NF	NF_{BLK}	• Gain Setting = G_{11} • +100MHz offset blocker • Pin = +4dBm		17		dB
Input IP3	$IIP3_{G11}$	Gain setting = G_{11} 800 kHz tone separation		23		dBm
	$IIP3_{G8}$	Gain setting = G_8 800 kHz tone separation		25		
	$IIP3_{G5}$ [4]	Gain setting = G_5 800 kHz tone separation	25	26		
	$IIP3_{G2}$	Gain setting = G_2 800 kHz tone separation		27		
G3 IIP3 change over temp	$IIP3_{G3TempDrift}$	Tcase -40C / +105C referenced to +25C		-0.2/ +5		dB
Output IP3	$OIP3_{G11}$	Gain setting = G_{11} 800 kHz tone separation		33.6		dBm
	$OIP3_{G8}$	Gain setting = G_8 800 kHz tone separation		33.6		
	$OIP3_{G5}$	Gain setting = G_5 800 kHz tone separation	***29***	31.0		
		• Gain setting = G_5 • Tc = +105°C • LO power = -3dBm • Vcc = 3.15V	28.8	29.5		
	$OIP3_{G2}$	Gain setting = G_2 800 kHz tone separation		29.0		

IDTF1192 SPECIFICATION (MID BAND) CONTINUED

Typical Application Circuit, V_{CC} = +3.3V, T_C = +25°C, F_{RF} = 1900 MHz, F_{IF} = 199MHz, F_{LO} = 1700MHz, P_{LO} = 0 dBm, P_{IN} = -10dBm per tone for all gain settings unless otherwise stated, STBY_A = STBY_B = LOW. EVkit IF transformer losses are de-embedded unless otherwise noted. Gain Setting = G_5 (~ 5 dB gain)

Parameter	Symbol	Comment	min	typ	max	units
Input P1dB	$IP1dB_{G11}$	Gain setting = G_{11}	***6.0***	7.7		dBm
	$IP1dB_{G8}$	Gain setting = G_8		10.1		
	$IP1dB_{G5}$ [4]	Gain setting = G_5	11.3	12.7		
	$IP1dB_{G2}$	Gain setting = G_2		14.7		
Maximum saturated output power	Psat	Pin up to +20dBm		17		dBm
2RF – 2LO rejection	2x2 [6]	▪ P_{RF} = -10 dBm ▪ $F_{RFspur} = F_{LO} + F_{IF}/2$		-82	-71	dBc
3RF – 3LO rejection	3x3	▪ P_{RF} = -10 dBm ▪ $F_{RFspur} = F_{LO} + F_{IF}/3$		-76		dBc
Channel Isolation	ISO_C	IF_B Pout versus IF_A w/ RF_A input	***40***	47		dB
LO to IF leakage	ISO_{LI}			-31	***-22***	dBm
2LO to IF leakage	ISO_{LI2}			-20		dBm
3LO to IF leakage	ISO_{LI3}			-59		dBm
4LO to IF leakage	ISO_{LI4}			-44		dBm
RF to IF leakage	ISO_{RI}	RF output power compared to measured IF output power		-25	***-20***	dBc
LO to RF leakage	ISO_{LR}			-46		dBm
RF Return Loss	RL_{RF}	Single Ended 50 ohm		-13		dB

1 – Items in min/max columns in ***bold italics*** are Guaranteed by Test
2 – All other Items in min/max columns are Guaranteed by Design Characterization
3 – JEDEC 3.3V and JEDEC 1.8V logic
4 – Specification limits over voltage and temperature
5 – Max limit at Tcase = +105C
6 – Max limit over temperature extremes

IDTF1192 SPECIFICATION (HIGH BAND)

Typical Application Circuit, V_{CC} = +3.3V, T_C = +25°C, F_{RF} = 2600MHz, F_{IF} = 199MHz, F_{LO} = 2400MHz, P_{LO} = 0 dBm, P_{IN} = -10dBm per tone for all gain settings unless otherwise stated, STBY_A = STBY_B = LOW. EVkit IF transformer losses are de-embedded unless otherwise noted. Gain Setting = G_5 (~ 5 dB gain)

Parameter	Symbol	Comment	min	typ	max	units
Power Gain	G_{11}	Gain setting = G_{11}		10.3		dB
	G_8	Gain setting = G_8		7.5		
	G_5	Gain setting = G_5	***3.25***	4.6	***5.95***	
		• Gain setting = G_5 • F_{IF} = 469MHz • F_{LO} = 2130MHz	***2.4***	4.0	***5.6***	
	G_2	Gain setting = G_2		1.8		
G5 Gain Change over temp	$G5_{TempDrift}$	Tcase -40C to +105C referenced to +25C		+0.7 -0.7		dB
Gain Slope	$Gain_{SLOPE1}$	• IF center 200MHz • 100MHz BW		+0.006		dB/MHz
	$Gain_{SLOPE2}$	• IF center 370MHz • 200MHz BW		+0.008		dB/MHz
Noise Figure	NF_{G11}	Gain setting = G_{11}		10.0		dB
	NF_{G8}	Gain setting = G_8		10.4		
	NF_{G5} [4, 5]	Gain setting = G_5		11.1	13	
		• Gain setting = G_5 • F_{IF} = 469MHz • F_{LO} = 2130MHz		11.8		
	NF_{G2}	Gain setting = G_2		11.9		
Input IP3	$IIP3_{G11}$	Gain setting = G_{11} 800 kHz tone separation		24		dBm
	$IIP3_{G8}$	Gain setting = G_8 800 kHz tone separation		28		
	$IIP3_{G5}$ [4]	Gain setting = G_5 800 kHz tone separation	25	28		
	$IIP3_{G2}$	Gain setting = G_2 800 kHz tone separation		29		
G3 IIP3 change over temp	$IIP3_{G3TempDrift}$	Tcase -40C / +105C referenced to +25C		-0.8/ +1.8		dB

IDTF1192 SPECIFICATION (HIGH BAND) CONTINUED

Typical Application Circuit, V_{CC} = +3.3V, T_C = +25°C, F_{RF} = 2600MHz, F_{IF} = 199MHz, F_{LO} = 2400MHz, P_{LO} = 0 dBm, P_{IN} = -10dBm per tone for all gain settings unless otherwise stated, STBY_A = STBY_B = LOW. EVkit IF transformer losses are de-embedded unless otherwise noted. Gain Setting = G_5 (~ 5 dB gain)

Parameter	Symbol	Comment	min	typ	max	units
Output IP3	$OIP3_{G11}$	Gain setting = G_{11} 800 kHz tone separation		34.7		dBm
	$OIP3_{G8}$	Gain setting = G_8 800 kHz tone separation		35.4		
	$OIP3_{G5}$	Gain setting = G_5 800 kHz tone separation		32.5		
		• Gain setting = G_5 • Tc = +105°C • LO power = -3dBm • Vcc = 3.15V	28.4	29.3		
		• Gain setting = G_5 • F_{IF} = 469MHz • F_{LO} = 2130MHz		31.0		
	$OIP3_{G2}$	Gain setting = G_2 800 kHz tone separation		30.5		
Input P1dB	$IP1dB_{G11}$	Gain setting = G_{11}		8.3		dBm
	$IP1dB_{G8}$	Gain setting = G_8		10.8		
	$IP1dB_{G5}$ [4]	Gain setting = G_5	11.8	13.2		
		• Gain setting = G_5 • F_{IF} = 469MHz • F_{LO} = 2130MHz		13.1		
	$IP1dB_{G2}$	Gain setting = G_2		14.6		
Maximum saturated output power	Psat	Pin up to +20dBm		17		dBm
2RF – 2LO rejection	2x2 [6]	▪ P_{RF} = -10 dBm ▪ $F_{RFspur} = F_{LO} + F_{IF}/2$		-73	-69	dBc
3RF – 3LO rejection	3x3	▪ P_{RF} = -10 dBm ▪ $F_{RFspur} = F_{LO} + F_{IF}/2$		-76		dBc
Channel Isolation	ISO_C	IF_B Pout versus IF_A w/ RF_A input	46	48		dB
LO to IF leakage	ISO_{LI}			-40	-38	dBm
2LO to IF leakage	ISO_{LI2}			-44		dBm
3LO to IF leakage	ISO_{LI3}			-68		dBm
4LO to IF leakage	ISO_{LI4}			-71		dBm
RF to IF leakage	ISO_{RI}	RF output power compared to measured IF output power		-32	-30	dBc
LO to RF leakage	ISO_{LR}			-51		dBm
RF Return Loss	RL_{RF}	Single Ended 50 ohm		-17		dB

1 – Items in min/max columns in ***bold italics*** are Guaranteed by Test
2 – All other Items in min/max columns are Guaranteed by Design Characterization
3 – JEDEC 3.3V and JEDEC 1.8V logic
4 – Specification limits over voltage and temperature
5 – Max limit at Tcase = +105C
6 – Max limit over temperature extremes

SPUR MEASUREMENTS

NxM (dBc, Gset=5 dB, LO=1700 MHz, IF=200 MHz, RFfund=0 dBm at 1900 MHz, RFspur(MHz)=(N*LO(MHz)+IF(MHz))/M)											
		N (LO)									
		1	2	3	4	5	6	7	8	9	10
M (RF)	1	0.0	37.7	22.0	64.3	39.4	73.3	52.4			
	2	54.3	69.5	53.7	64.2	50.4	57.0	61.3	71.8	62.1	88.7
	3	61.8	73.1	56.0	78.6	60.0	79.1	69.2	83.8	82.2	96.4
	4	68.0	88.8	94.4	91.5	97.2	96.7	87.7	94.1	87.1	98.7
	5	>99	>99	81.1	95.7	94.9	97.8	94.9	>99	86.6	97.3
	6	>99	>99	>99	>99	>99	>99	>99	>99	>99	>99
	7	>99	>99	>99	>99	>99	>99	93.3	>99	>99	>99
	8	>99	>99	>99	>99	>99	>99	>99	>99	>99	>99
	9	>99	>99	>99	>99	>99	>99	>99	>99	>99	>99
	10	>99	>99	>99	>99	>99	>99	>99	>99	>99	>99

NxM (dBc, Gset=5 dB, LO=1700 MHz, IF=200 MHz, RFfund=0 dBm at 1500MHz, RFspur(MHz)=(N*LO(MHz)-IF(MHz))/M)											
		N (LO)									
		1	2	3	4	5	6	7	8	9	10
M (RF)	1	0.0	42.1	19.0	61.0	36.5	77.2	50.1			
	2	49.0	72.4	57.0	60.0	53.9	57.1	63.1	68.0	62.5	85.7
	3	69.8	78.6	51.5	75.9	62.1	75.3	66.0	84.5	76.2	91.4
	4	72.9	86.3	98.3	91.1	97.5	>99	88.2	95.8	93.2	>99
	5	>99	>99	85.2	96.9	86.7	>99	93.2	98.2	88.6	98.3
	6	>99	>99	>99	>99	>99	>99	>99	>99	>99	>99
	7	>99	>99	>99	>99	>99	>99	89.5	>99	>99	>99
	8	>99	>99	>99	>99	>99	>99	>99	>99	>99	>99
	9	>99	>99	>99	>99	>99	>99	>99	>99	>99	>99
	10	>99	>99	>99	>99	>99	>99	>99	>99	98.2	>99

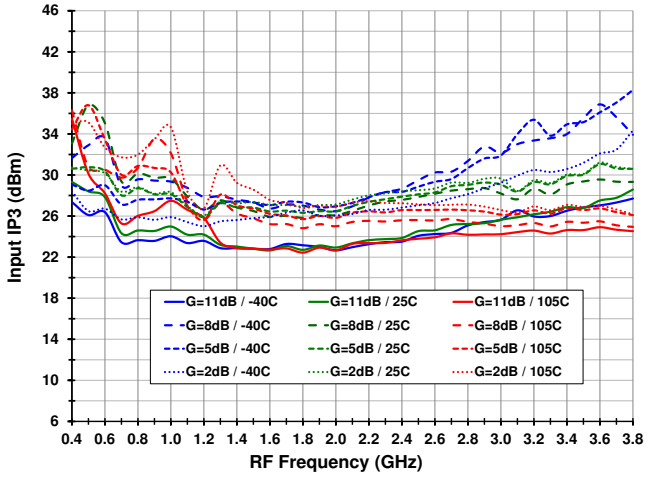
TYPICAL OPERATING CONDITIONS (TOC)

Unless otherwise Noted, the following Apply to the Typ Ops Graphs

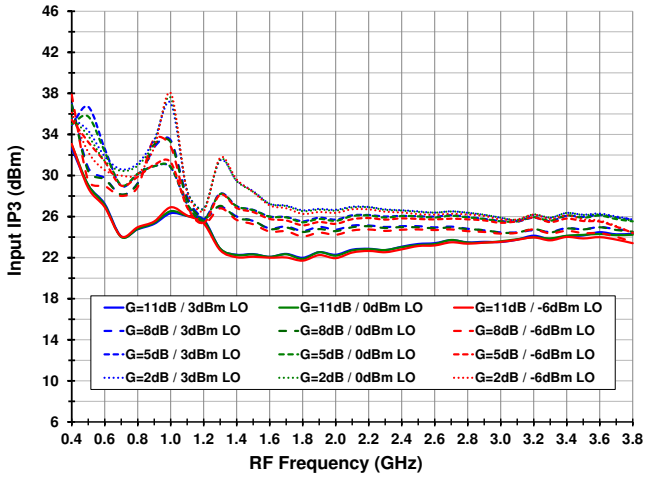
- High Side Injection for RF frequencies below 1.2 GHz
- Low Side Injection for RF frequencies from 1.3 to 2.7 GHz
- 199MHz IF
- 800KHz Tone Spacing
- All measurements fully de-embedded for trace, connector, transformer losses
- Pin = -10dBm for 2x2, 3x3, Gain
- Pout = 0 dBm/Tone for IP3
- LO level = 0 dBm, V_{CC} = 3.30 V
- Listed Temperatures are Case Temperature (TC = Case Temperature)
- Where noted, TA or TAMB = Ambient Temperature

TOCs (-1-) Fixed IF = 199 MHz - IIP3, OIP3, and Gain

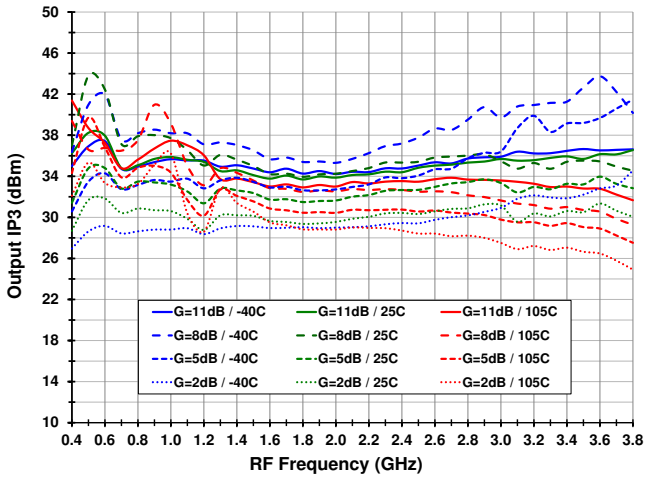
IIP3 vs. Temperature and Gain Setting



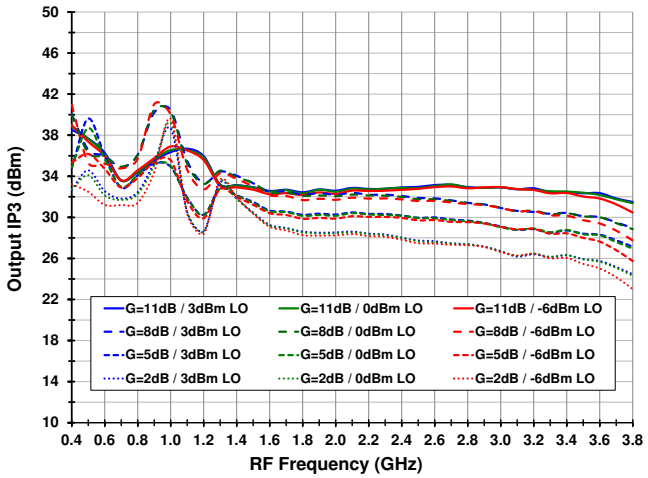
IIP3 vs. LO Power and Gain Setting
(Vcc = 3.15, Tcase = 105C)



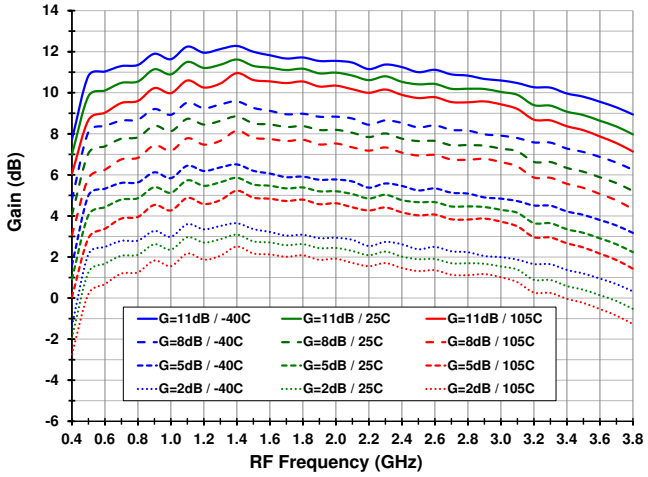
OIP3 vs. Temperature and Gain Setting



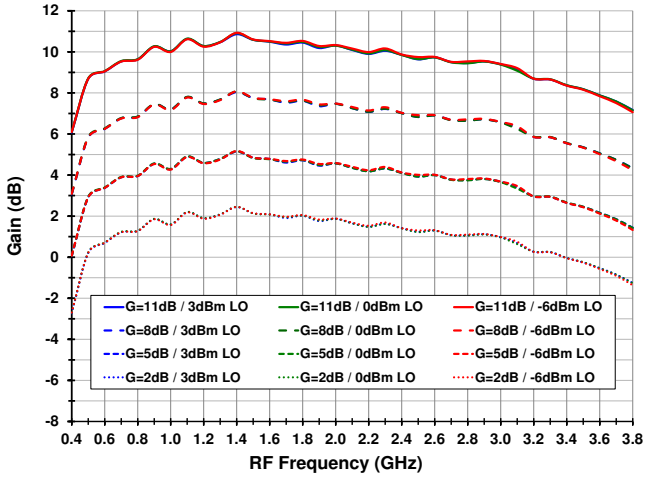
OIP3 vs. LO Power and Gain Setting
(Vcc = 3.15, Tcase = 105C)



Gain vs. Temperature and Gain Setting

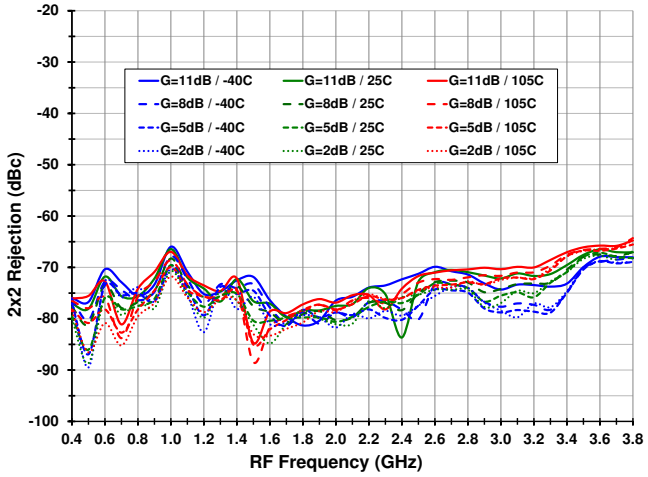


Gain vs. LO Power and Gain Setting
(Vcc = 3.15, Tcase = 105C)

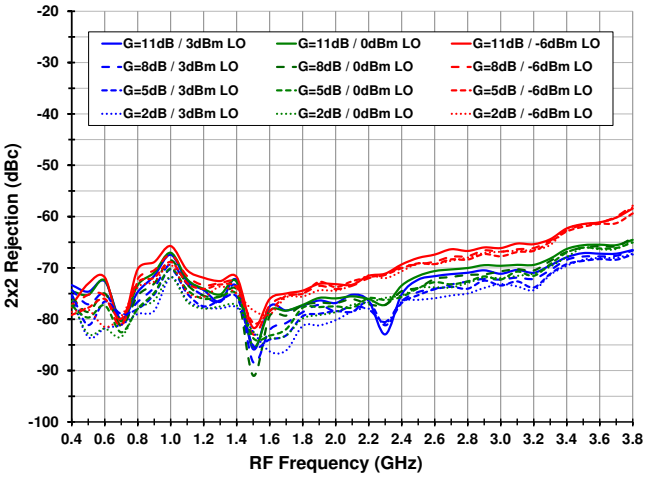


TOCs (-2-) Fixed IF = 199 MHz - 2x2 Rejection, 3x3 Rejection, and P1dB

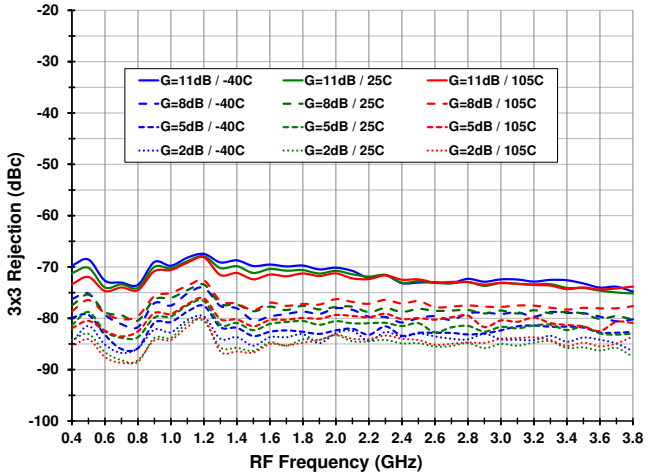
2x2 Rejection vs. Temperature and Gain Setting



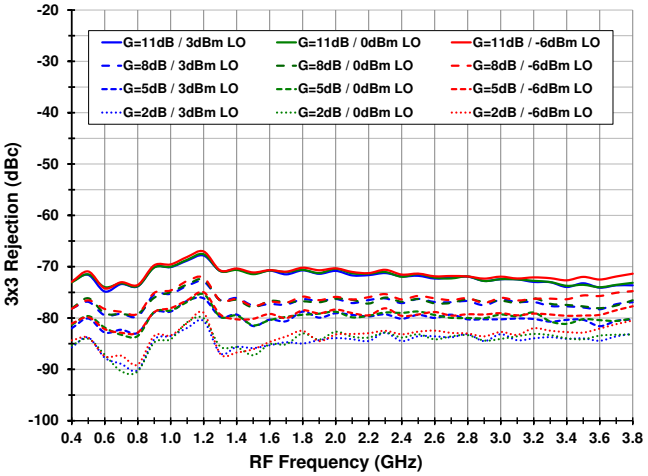
2x2 Rejection vs. LO Power and Gain Setting (Vcc = 3.15, Tcase = 105C)



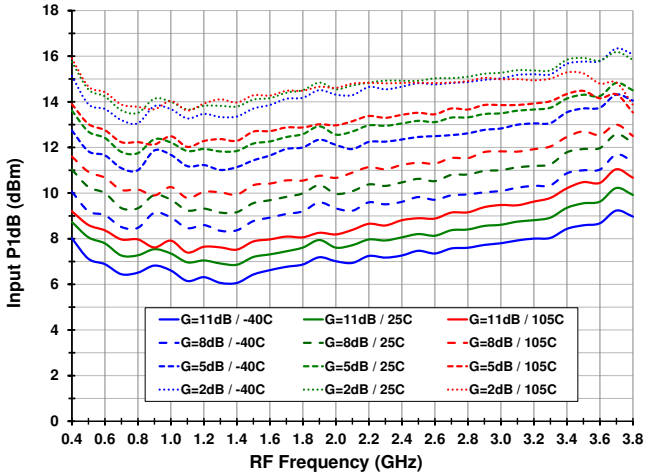
3x3 Rejection vs. Temperature and Gain Setting



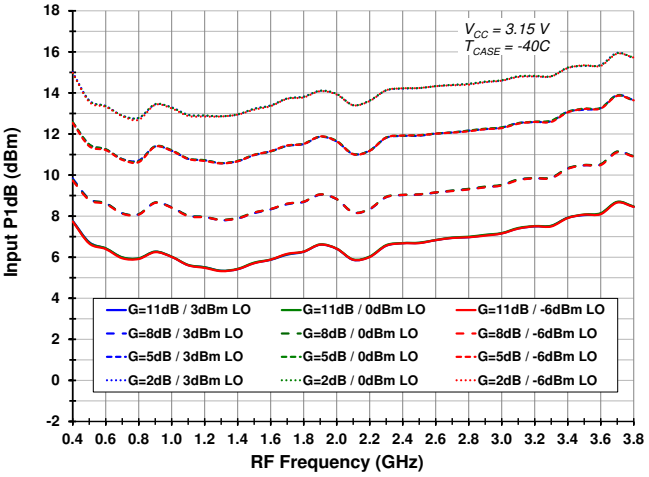
3x3 Rejection vs. LO Power and Gain Setting (Vcc = 3.15, Tcase = 105C)



Input P1dB vs. Temperature and Gain Setting

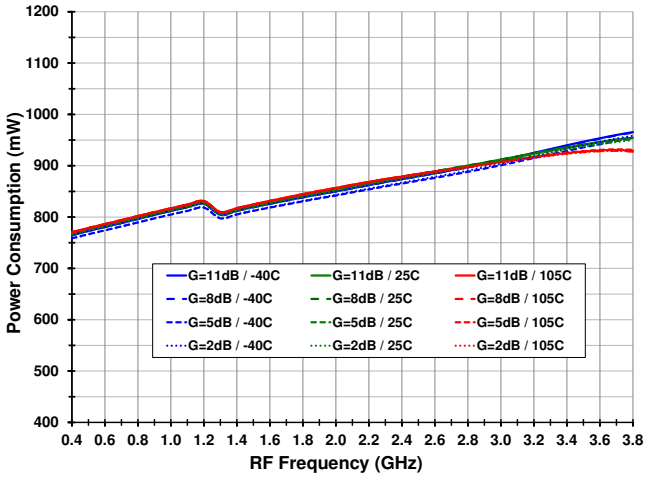


Input P1dB vs. LO Level and Gain Setting (Vcc = 3.15, Tcase = -40C)

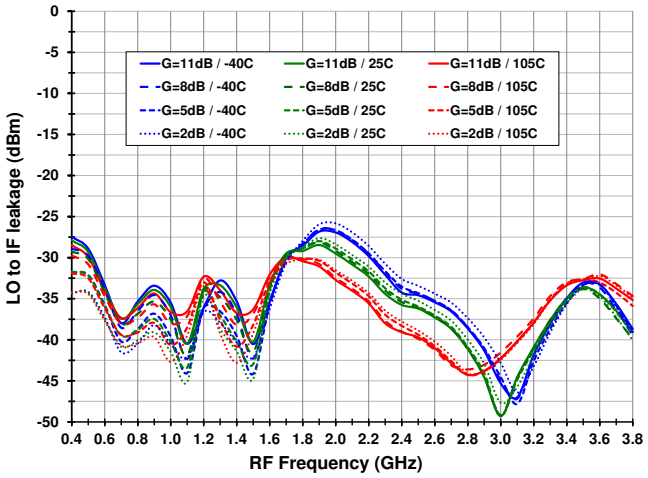


TOCs (-3-) Fixed IF = 199 MHz – Power Consumption, LO to IF Leakage, and RF to IF

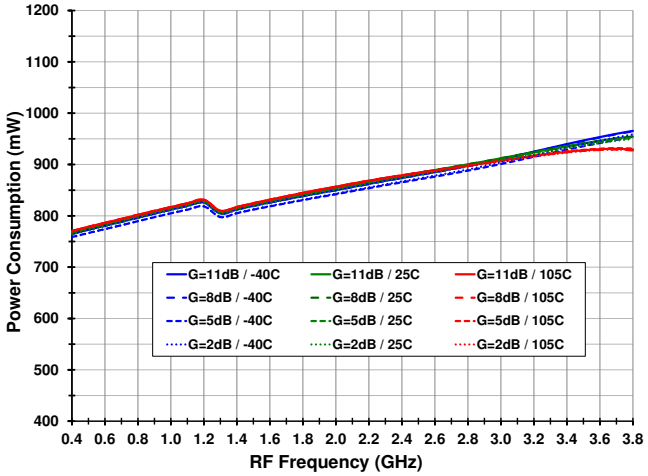
Power Consumption vs. Temperature and Gain Setting



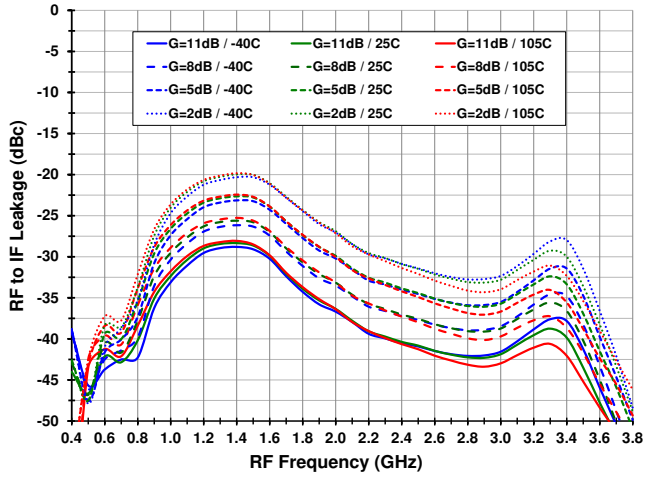
LO to IF Leakage vs. Temperature and Gain Setting



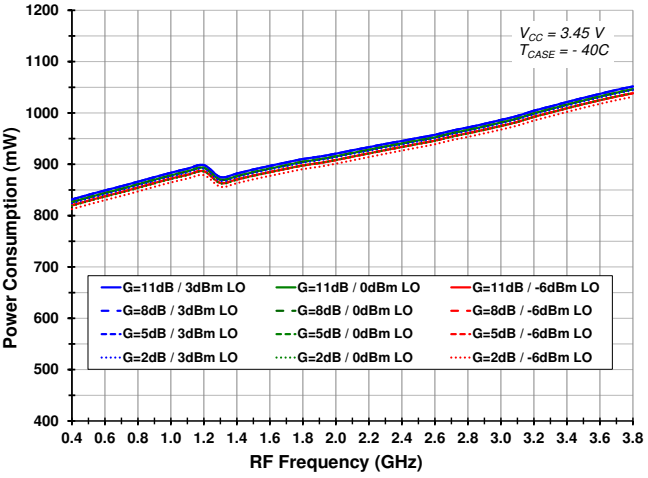
Power Consumption vs. Temperature and Gain Setting (Vcc = 3.15, Tcase = 105C)



RF to IF Leakage vs. Temperature and Gain Setting

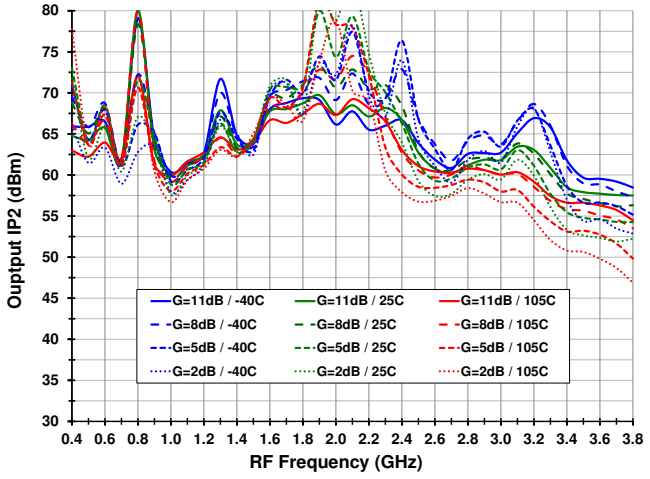


Power Consumption vs. Temperature and Gain Setting (Vcc = 3.45, Tcase = -45C)

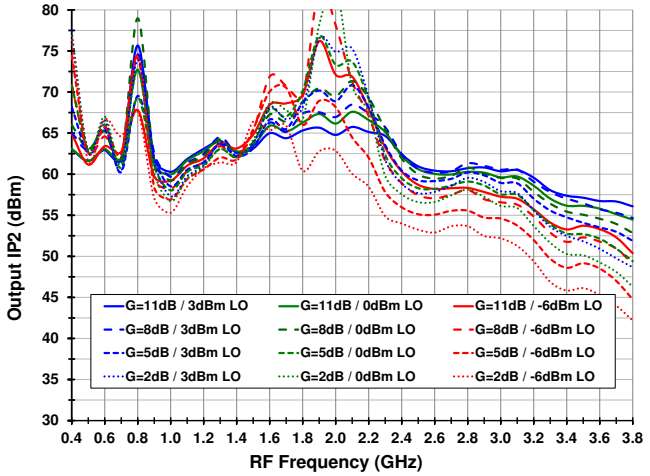


TOCs (-4-) Fixed IF = 199 MHz – Output IP2, Channel Isolation, Noise Figure

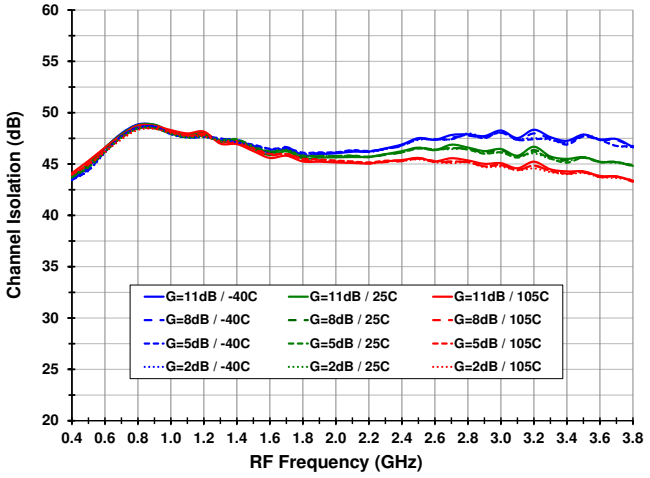
Output IP2 vs. Temperature and Gain Setting



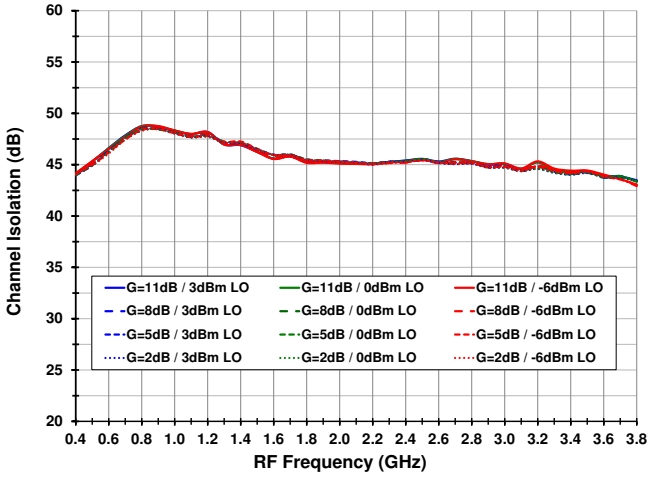
Output IP2 vs. Temperature and Gain Setting (Vcc = 3.15, Tcase = 105C)



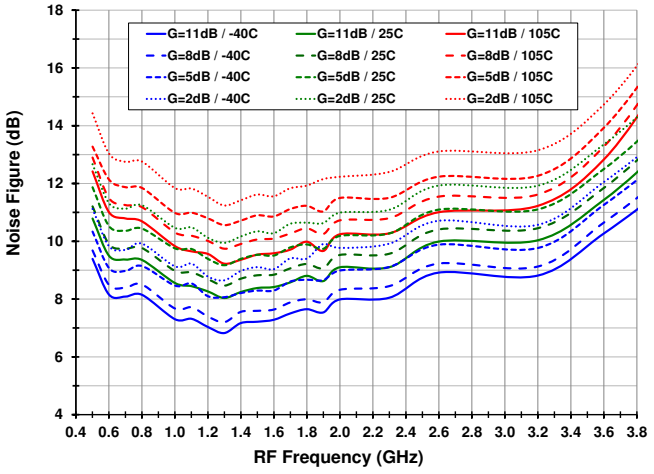
Channel Isolation vs. Temperature and Gain Setting



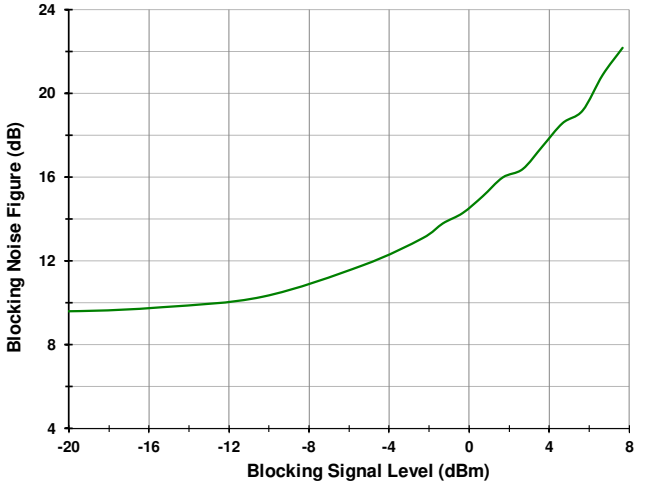
Channel Isolation vs. LO Power and Gain Setting (Vcc = 3.15, Tcase = 105C)



Noise Figure vs. Temperature and Gain Setting

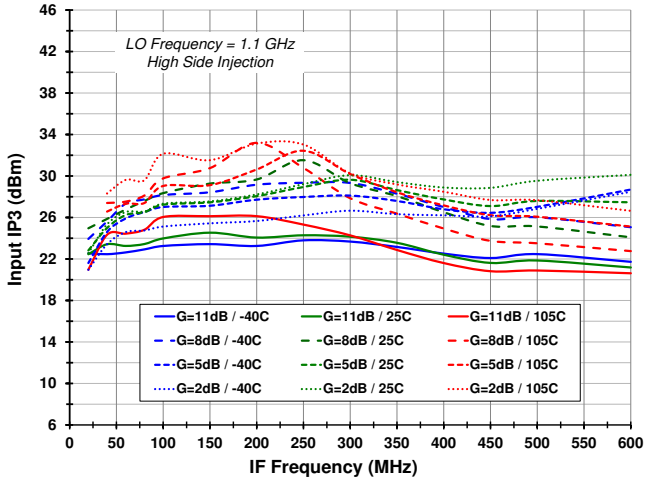


Blocking Noise Figure (Max Gain, LO=1700MHz, RF=1899MHz, Blocker=1999MHz, 25C ambient)

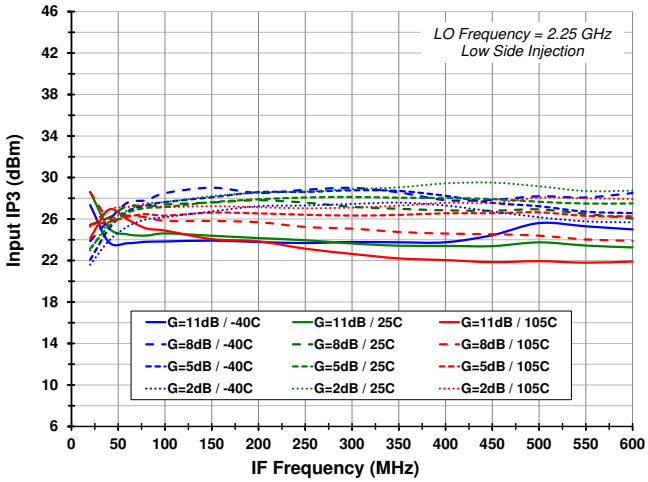


TOCs (-5-) Fixed LO = 1.1 GHz, 1.7 GHz, 2.25 GHz, 3.13 GHz – Input IP3

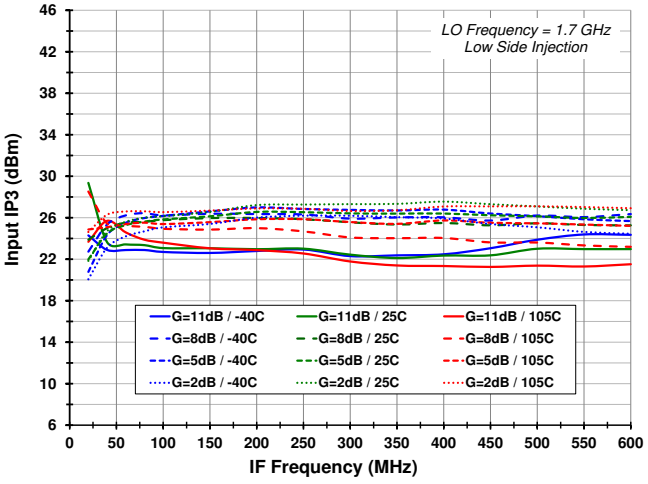
Input IP3 vs. Temperature and Gain Setting (LO=1.1 Ghz)



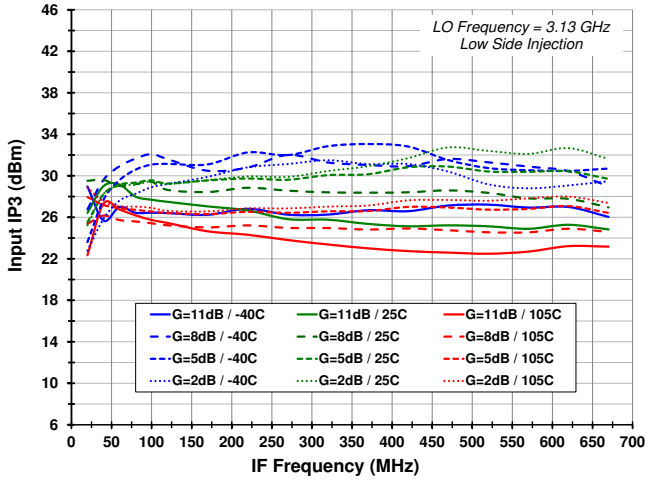
Input IP3 vs. Temperature and Gain Setting (LO=2.25 Ghz)



Input IP3 vs. Temperature and Gain Setting (LO=1.7 Ghz)

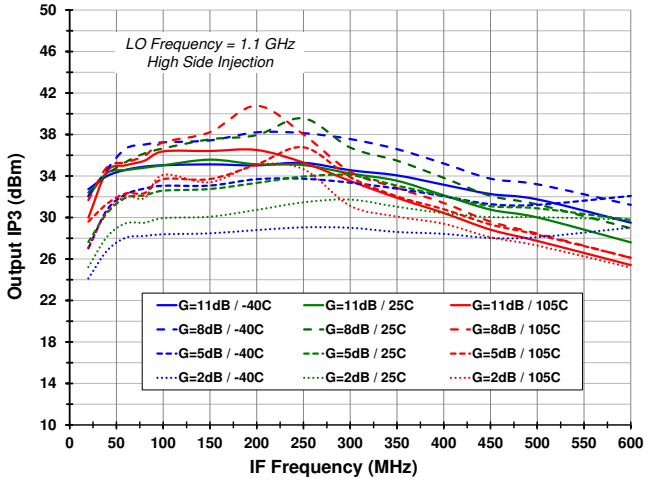


Input IP3 vs. Temperature and Gain Setting (LO=3.13 Ghz)

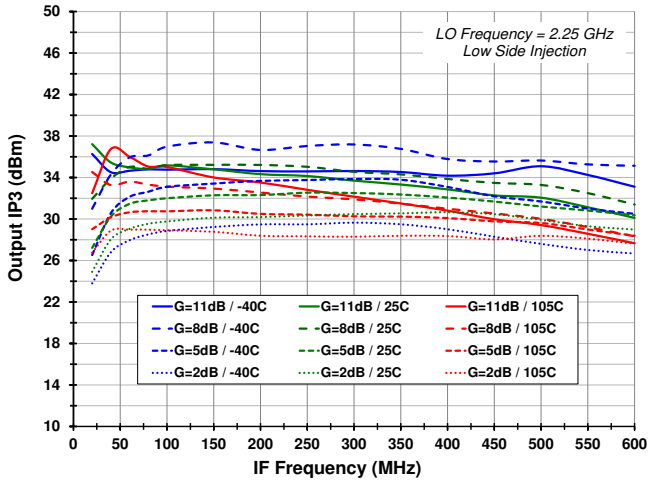


TOCs (-6-) Fixed LO = 1.1 GHz, 1.7 GHz, 2.25 GHz, 3.13 GHz – Output IP3

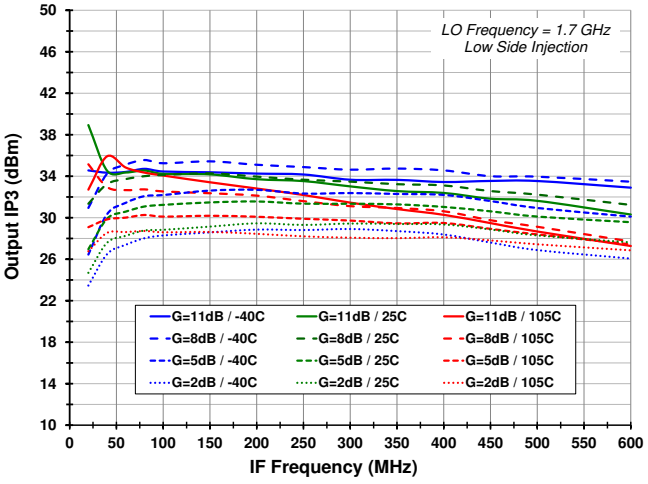
Output IP3 vs. Temperature and Gain Setting (LO=1.1 Ghz)



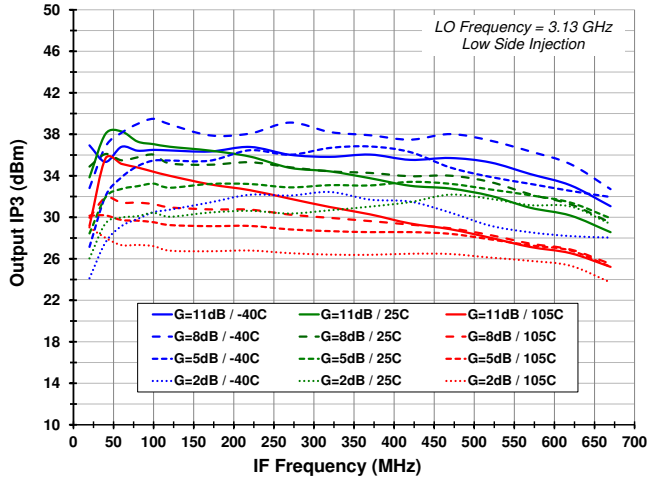
Output IP3 vs. Temperature and Gain Setting (LO=2.25 Ghz)



Output IP3 vs. Temperature and Gain Setting (LO=1.7 Ghz)

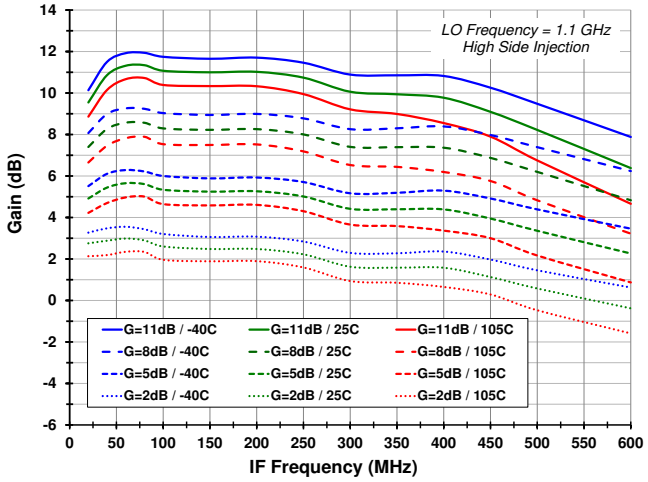


Output IP3 vs. Temperature and Gain Setting (LO=3.13 Ghz)

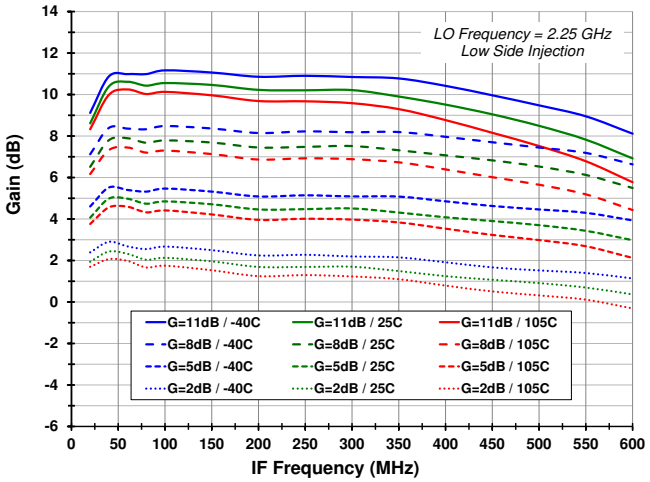


TOCs (-7-) Fixed LO = 1.1 GHz, 1.7 GHz, 2.25 GHz, 3.13 GHz – Gain

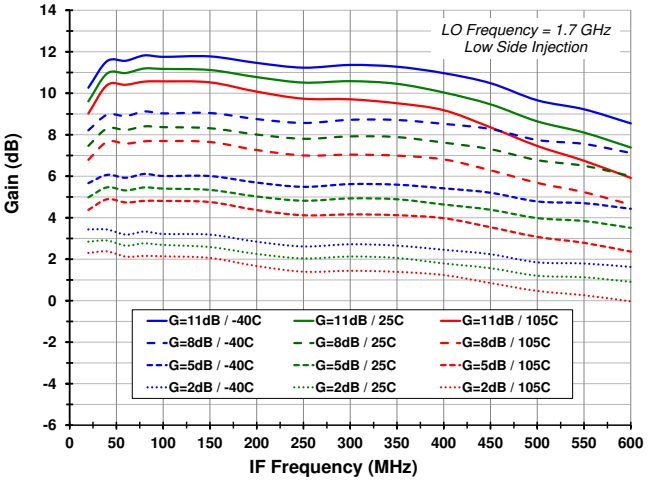
Gain vs. Temperature and Gain Setting
(LO=1.1 Ghz)



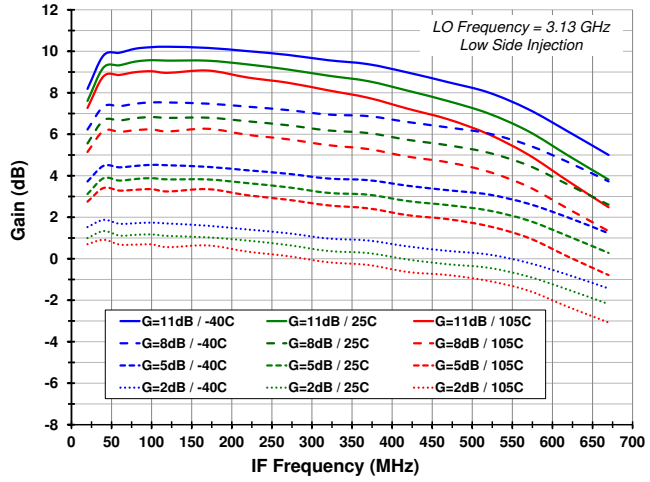
Gain vs. Temperature and Gain Setting
(LO=2.25 Ghz)



Gain vs. Temperature and Gain Setting
(LO=1.7 Ghz)

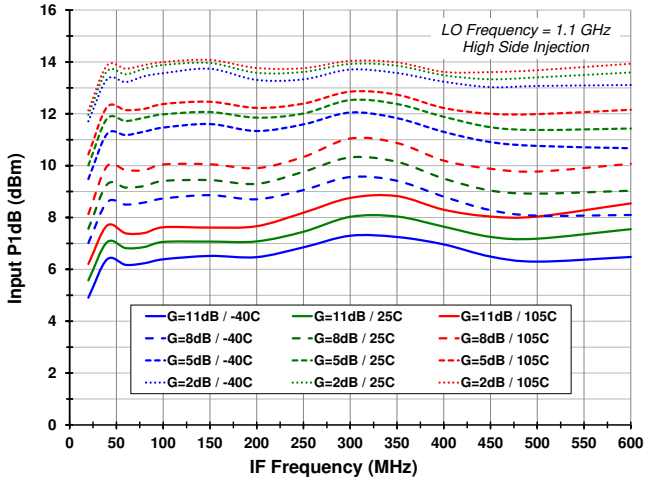


Gain vs. Temperature and Gain Setting
(LO=3.13 Ghz)

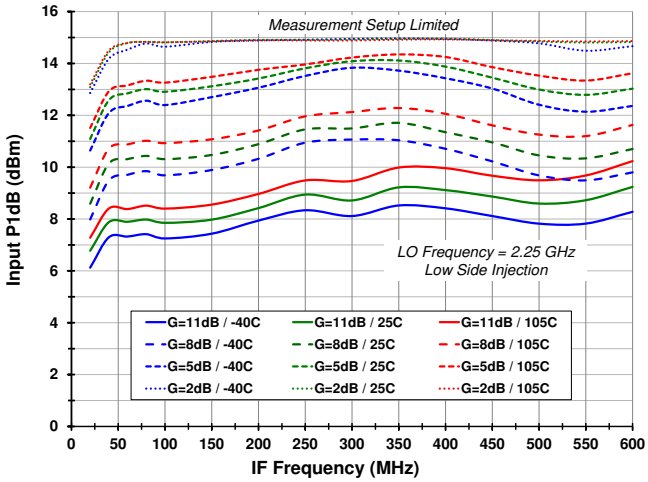


TOCs (-8-) Fixed LO = 1.1 GHz, 1.7 GHz, 2.25 GHz, 3.13 GHz – Input P1dB

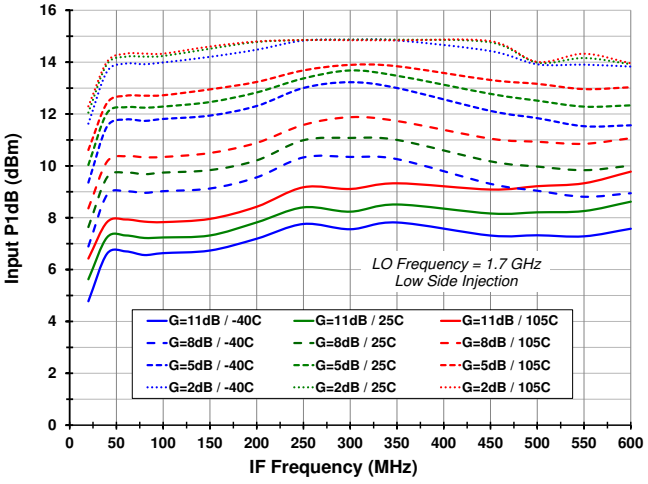
Input P1dB vs. Temperature and Gain Setting (LO=1.1 Ghz)



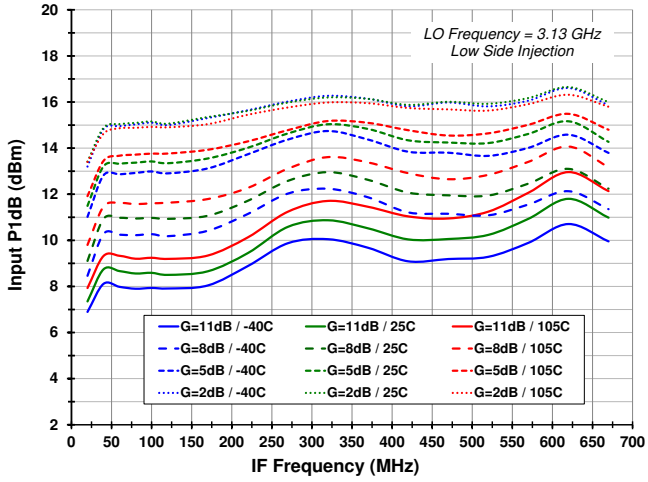
Input P1dB vs. Temperature and Gain Setting (LO=2.25 Ghz)



Input P1dB vs. Temperature and Gain Setting (LO=1.7 Ghz)

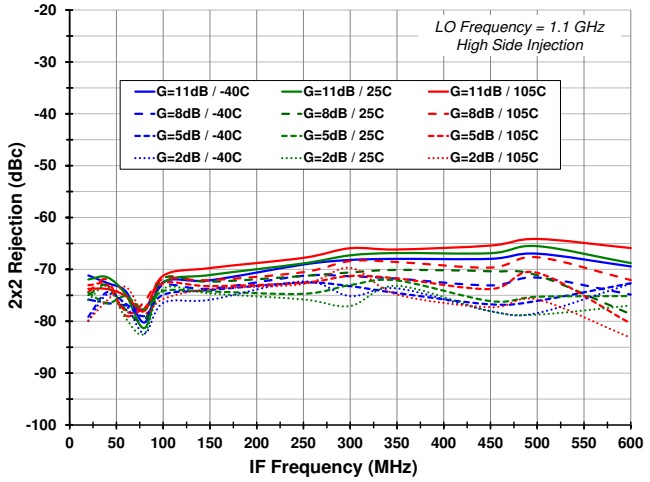


Input P1dB vs. Temperature and Gain Setting (LO=3.13 Ghz)

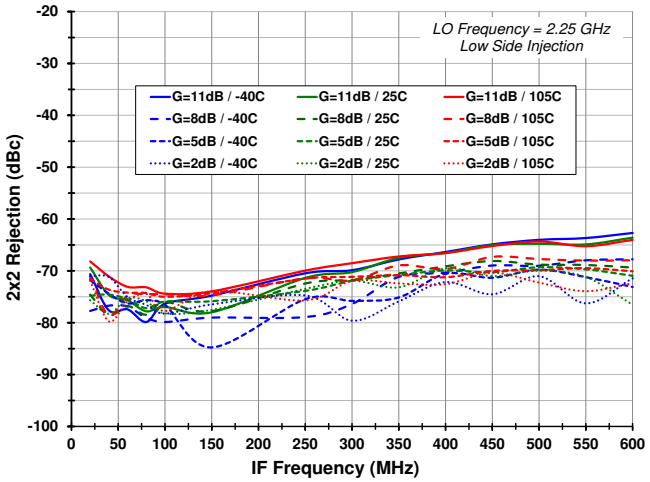


TOCs (-9-) Fixed LO = 1.1 GHz, 1.7 GHz, 2.25 GHz, 3.13 GHz – 2x2 Rejection

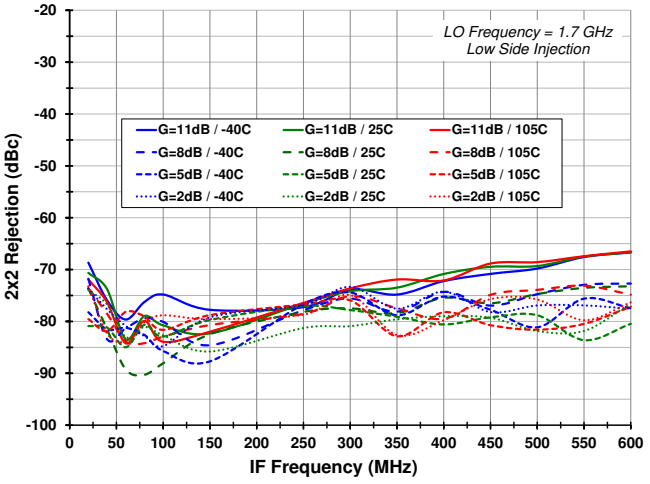
2x2 Rejection vs. Temperature and Gain Setting (LO=1.1 Ghz)



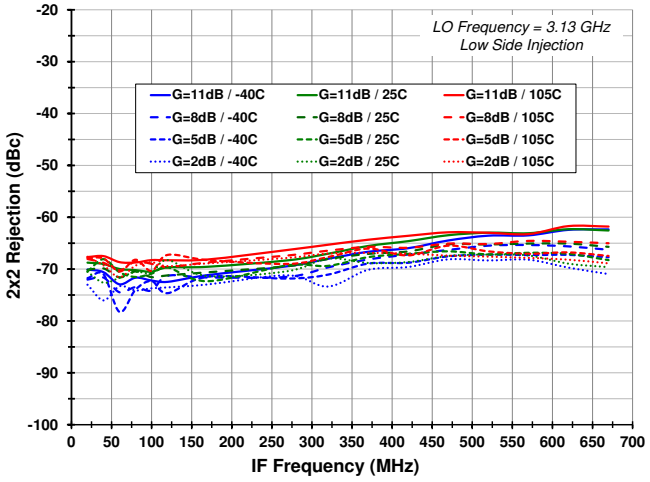
2x2 Rejection vs. Temperature and Gain Setting (LO=2.25 Ghz)



2x2 Rejection vs. Temperature and Gain Setting (LO=1.7 Ghz)

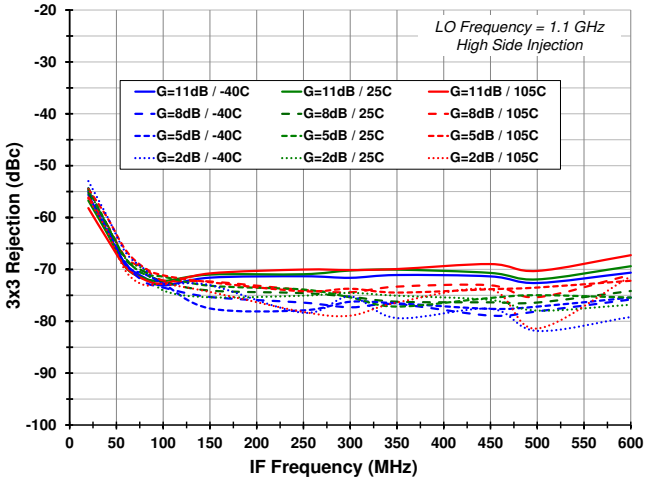


2x2 Rejection vs. Temperature and Gain Setting (LO=3.13 Ghz)

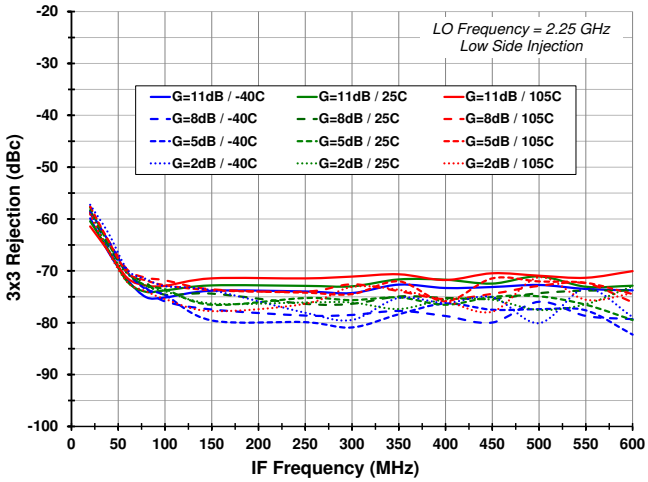


TOCs (-10-) Fixed LO = 1.1 GHz, 1.7 GHz, 2.25 GHz, 3.13 GHz – 3x3 Rejection

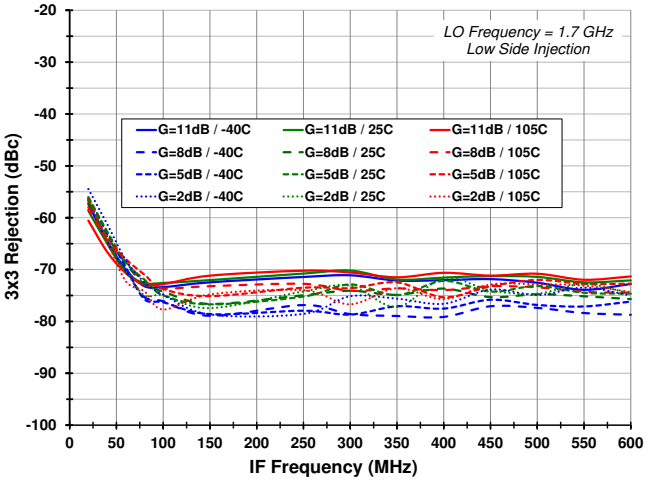
3x3 Rejection vs. Temperature and Gain Setting (LO=1.1 Ghz)



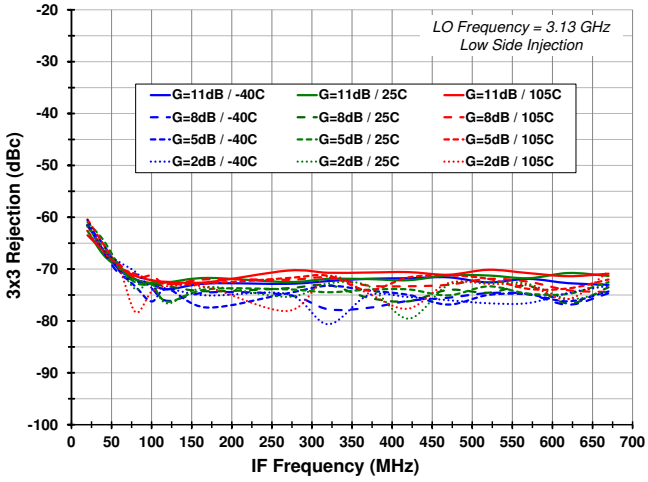
3x3 Rejection vs. Temperature and Gain Setting (LO=2.25 Ghz)



3x3 Rejection vs. Temperature and Gain Setting (LO=1.7 Ghz)

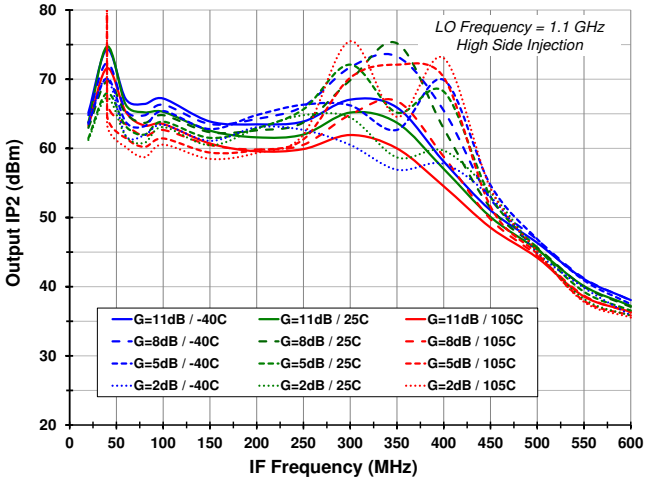


3x3 Rejection vs. Temperature and Gain Setting (LO=3.13 Ghz)

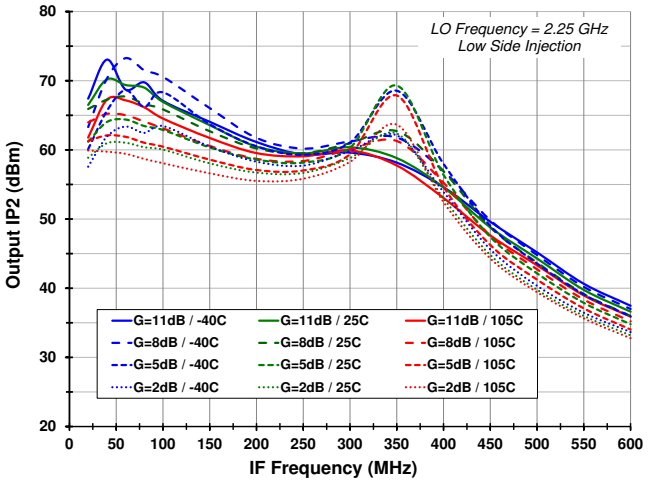


TOCs (-11-) Fixed LO = 1.1 GHz, 1.7 GHz, 2.25 GHz, 3.13 GHz – Output IP2

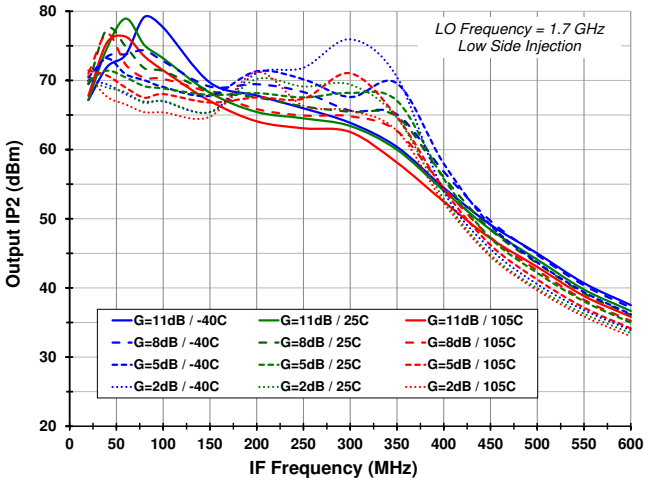
Output IP2 vs. Temperature and Gain Setting (LO=1.1 Ghz)



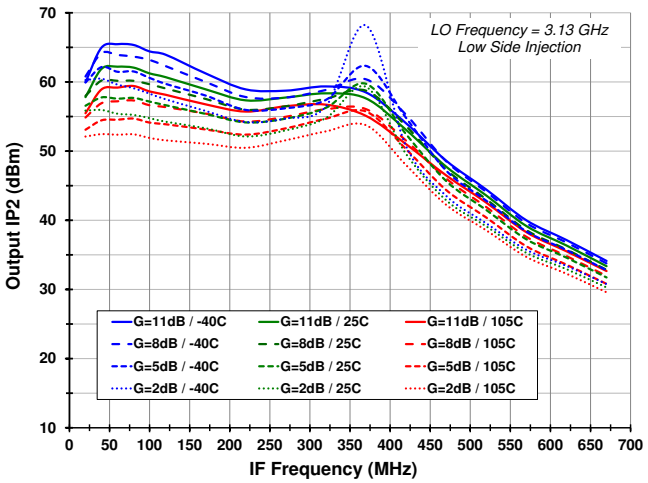
Output IP2 vs. Temperature and Gain Setting (LO=2.25 Ghz)



Output IP2 vs. Temperature and Gain Setting (LO=1.7 Ghz)

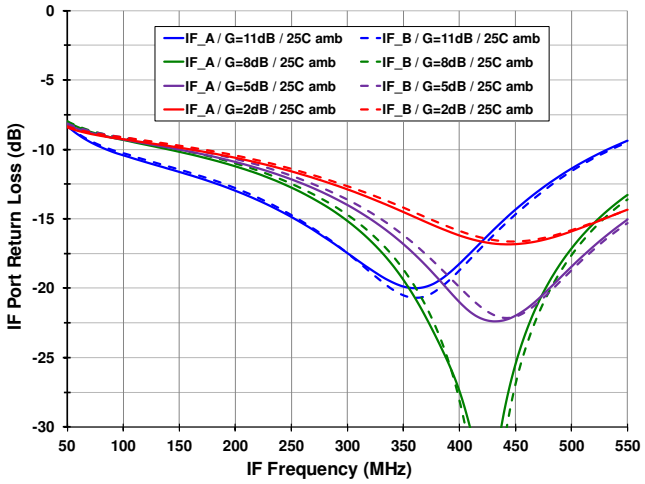


Output IP2 vs. Temperature and Gain Setting (LO=3.13 Ghz)

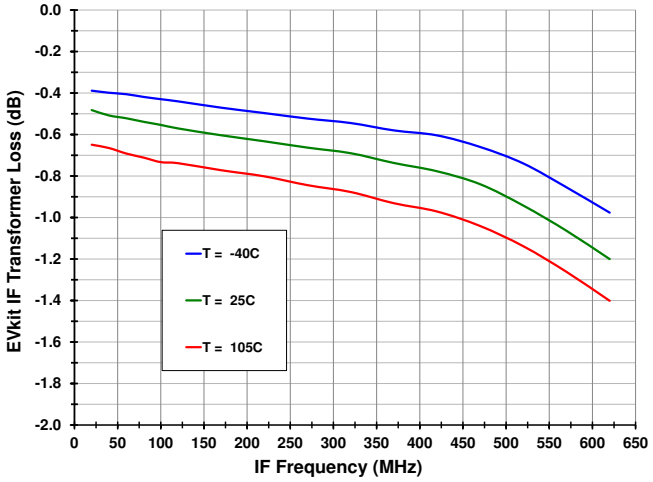


TOCs (-12-) Return Losses, Evaluation Kit Losses, STBY Settling Time

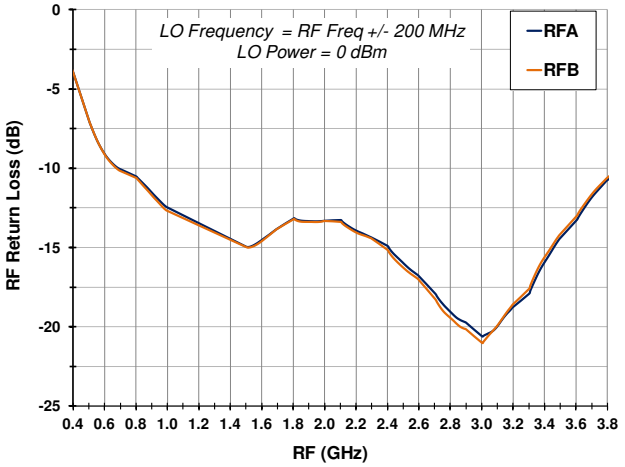
IF Port Return Loss vs. Gain Setting



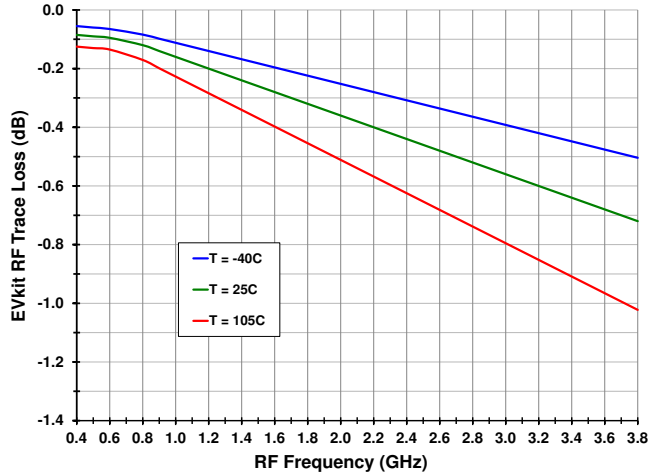
Evaluation Kit IF Transformer Loss vs. Temperature



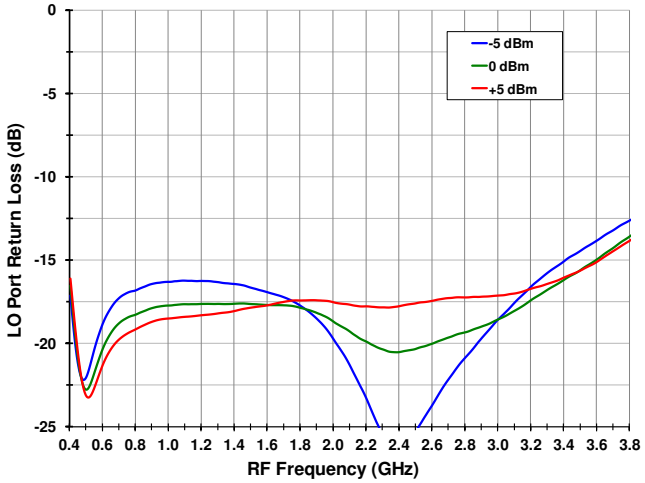
RF Port Return Loss vs. LO Frequency



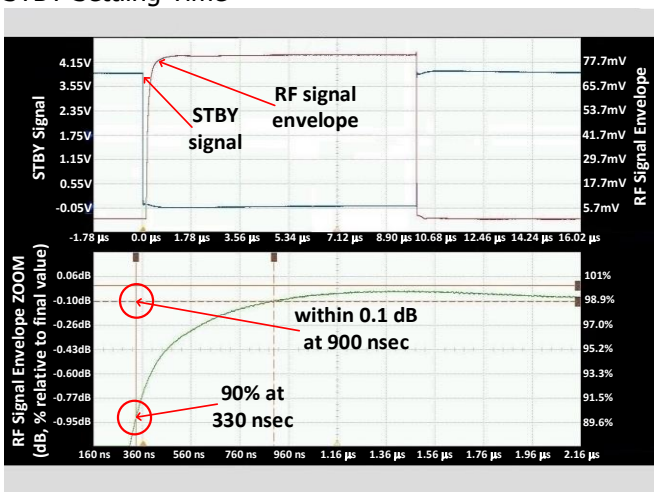
Evaluation Kit RF Trace Loss vs. Temperature



LO Port Return Loss vs. LO Power Level

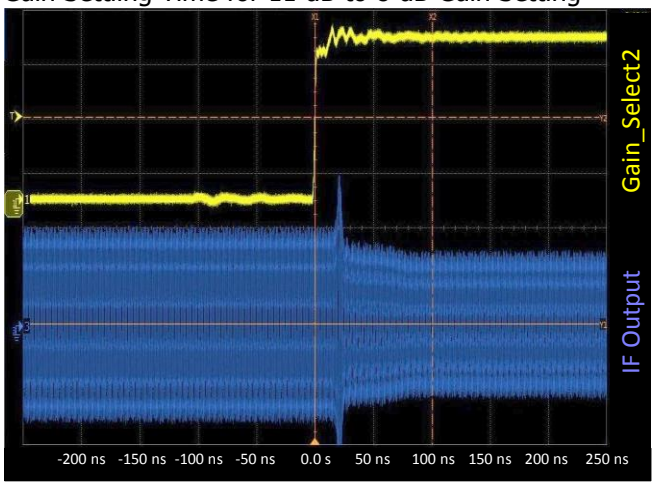


STBY Settling Time

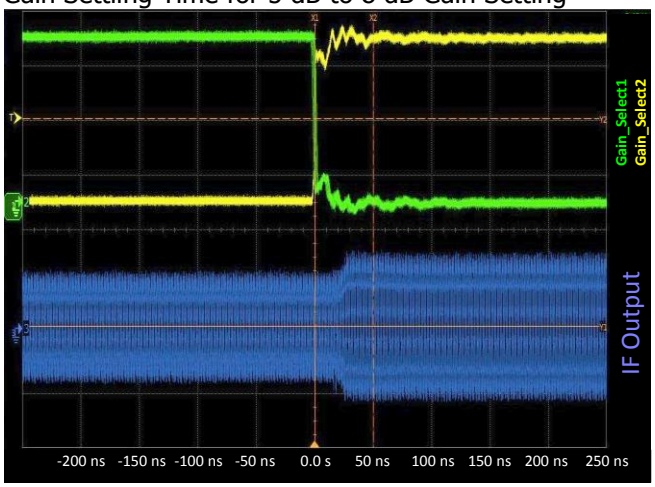


TOCs (-13-) Gain Settling Time

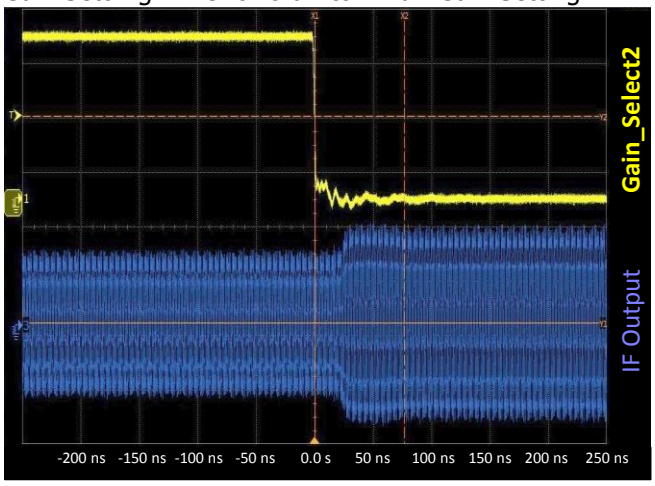
Gain Settling Time for 11 dB to 8 dB Gain Setting



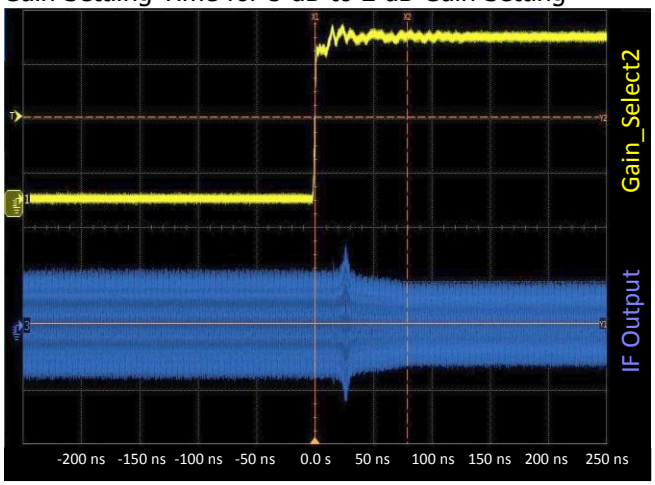
Gain Settling Time for 5 dB to 8 dB Gain Setting



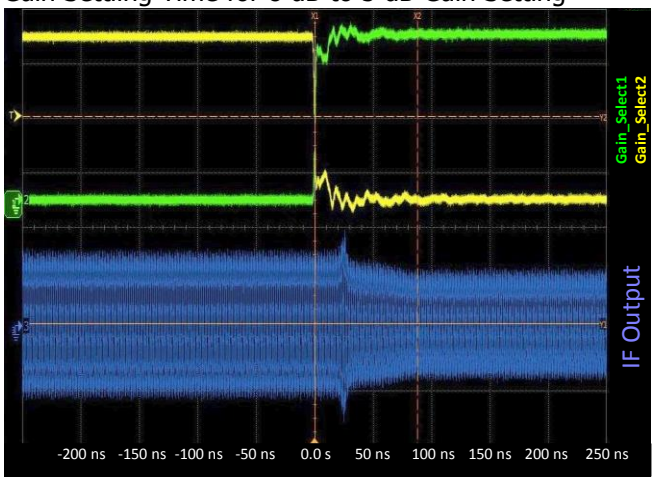
Gain Settling Time for 8 dB to 11 dB Gain Setting



Gain Settling Time for 5 dB to 2 dB Gain Setting



Gain Settling Time for 8 dB to 5 dB Gain Setting



Gain Settling Time for 2 dB to 5 dB Gain Setting