RF to IF Dual Downconverting Mixer

2300 - 2700 MHz F1162NBGI

General Description

This document describes the specifications for the IDTF1162 Zero-Distortion™ RF to IF Downconverting Mixer. This device is part of a series of mixers offered with high side or low side injection options for all UTRA bands. See the Part# Matrix for the details of all devices in this series.

The F1162 dual channel device is designed to operate with a single 5V supply. It is optimized for operation in a Multi-mode, Multi-carrier BaseStation Receiver for RF bands from 2300 - 2700 MHz with Low Side or High Side Injection. IF frequencies from 50 to 500 MHz are supported. Nominally, the device offers +43 dBm Output IP3 with 330 mA of I_{CC}. Alternately one can adjust 4 resistor values and a toggle pin to run the device in low current mode with +38 dBm Output IP3 and 230 mA of I_{CC}.

Competitive Advantage

In typical basestation receivers the RF to IF mixer dominates the linearity performance for the entire receive system. The Zero-Distortion™ family of mixers dramatically improve the maximum signal levels (IM_3 tones) that the BTS can withstand at a desired Signal to Noise Ratio (SNR.) Alternately, one can run the device in Low Current Mode to reduce Power consumption significantly. Zero-Distortion™ technology allows realization of either benefit.

- ✓ $IP3_O$: ⇑ **11 dB** STD Mode, ⇑ **5 dB** LC Mode
- ✓ Dissipation: ⇓ **40%** LC, ⇓ **15%** STD Mode
- ✓ Allows for higher RF gain improving **Sensitivity**

Zero-Distortion™

Part# Matrix

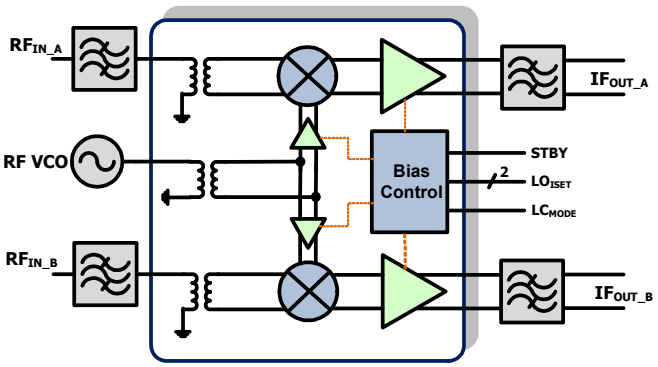
Part#	RF freq range	UTRA bands	IF freq range	Typ. Gain	Injection
F1100	698 - 915	5,6,8,12,13,14,17 ,19,20	50 - 450	8.5	High Side
F1102	698 - 915	5,6,8,12,13,14,17 ,19,20	50 - 250	8.5	Both
F1150	1700 - 2200	1,2,3,4,9,10, 33, 34,35, 36, 37,39	50 - 450	8.5	High Side
F1152	1400 - 2200	1,2,3,4,9,10,11[1], 21[1], 24[1], 33, 34,35, 36, 37,39	50 - 350	8.5	Low Side
F1162	**2300 – 2700**	**7,38,40,41**	**50 – 500**	**8.9**	**Both**

1 – with High side injection

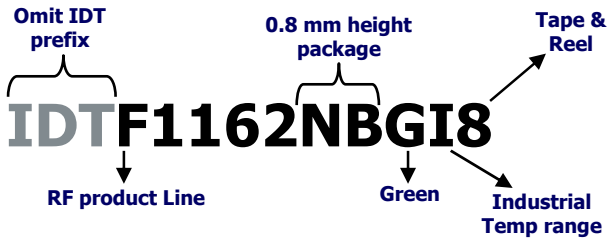
Features

- Dual Path for Diversity Systems
- Ideal for Multi-Carrier Systems
- 8.9 dB Gain
- Ultra linear **+43 dBm $IP3_O$**
- Low NF < 10 dB
- 200 Ω output impedance
- Ultra high +13 dBm $P1dB_I$
- **Pin Compatible** w/existing solutions
- 6x6 36 pin package
- **Constant LO Port Z in STBY mode**
- < 200 nsec settling from Power Down
- Low Current Mode : **I_{CC} = 230 mA**
- Standard Mode: I_{CC} = 330 mA
- NOTE production BOM on p. 25

Device Block Diagram



Ordering Information



ABSOLUTE MAXIMUM RATINGS

VCC to GND	-0.3V to +5.5V
STBY, LC_{MODE}	-0.3V to (VCC_ + 0.3V)
IF_A+, IF_B+, IF_A-, IF_B-, LO1_ADJ, LO2_ADJ	-0.3V to (VCC_ + 0.3V)
LO_IN, LO_IN_ALT, RF_A, RF_B	-0.3V to +0.3V
IF_BiasA, IF_BiasB to GND	-0.3V to +0.3V
RF Input Power (RF_IN[A+, A-, B+, B-])	+20dBm
Continuous Power Dissipation	2.2W
θ_{JA} (Junction – Ambient)	+35°C/W
θ_{JC} (Junction – Case) The Case is defined as the exposed paddle	+2.5°C/W
Operating Temperature Range (Case Temperature)	T_C = -40°C to +100°C
Maximum Junction Temperature	150°C
Storage Temperature Range	-65°C to +150°C
Lead Temperature (soldering, 10s) .	+260°C

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.

IDTF1162 SPECIFICATION

Specifications apply at V_{CC} = +5.00V, T_C = +25°C F_{RF} = **2600 MHz**, F_{IF} = **400MHz**, Low Side Injection, P_{LO} = 0 dBm, STBY = GND, LC_{MODE} = V_{IH} (STD Mode), EVKit BOM = Standard Mode, Transformer Loss included (not de-embedded) unless otherwise noted.

Parameter	Comment	Symbol	min	typ	max	units
Logic Input High	For Standby, LC_{MODE} Pins	V_{IH}	***2***			V
Logic Input Low	For Standby, LC_{MODE} Pins	V_{IL}			***0.8***	V
Logic Current	For Standby Pin	I_{IH}, I_{IL}	***-30***		***+30***	µA
Logic Current	For LC_{MODE} Pin	I_{IH}, I_{IL}	***-100***		***-20***	µA
Supply Voltage(s)	All V_{CC} pins	V_{CC}		4.75 to 5.25		V
Operating Temperature Range	Case Temperature	T_{CASE}		-40 to +100		degC
Supply Current	Total V_{CC} , STD Mode ▪ Total Both Channels	I_{STD}		***330***	***375***[1]	mA
Supply Current	Total V_{CC} , LC Mode ▪ LC_{MODE} = GND ▪ EVkit BOM = LC Mode ▪ Total Both Channels	I_{LC}		***230***	***260***	mA
Supply Current	Standby Mode ▪ STBY = V_{IH} ▪ LC_{MODE} > V_{IH} (STD Mode) ▪ Total Both Channels	I_{STBY}		***23***	***30***	mA
RF Freq Range	Operating Range	F_{RF}		2300 to 2700		MHz
IF Freq Range	Operating Range	F_{IF}		50 to 500		MHz
LO Freq Range	Operating Range	F_{LO}		1800 to 2900		MHz
LO Power	Operating Range	P_{LO}		-6 to +6		dBm
RF Input Impedance	Single Ended *Return Loss ~20 dB*	Z_{RF}		50		Ω
IF Output Impedance	Differential *Return Loss ~ 15 dB*	Z_{IF}		200		Ω
LO port Impedance	Single Ended *Return Loss ~15 dB*	Z_{LO}		50		Ω
Settling Time	• Pin = -13 dBm • Gate STBY from V_{IH} to V_{IL} • Time for IF Signal to settle to within 0.1 dB of final value	T_{SETT}		0.150		µsec
Gain STD Mode	Conversion Gain • F_{RF} = 2300 MHz • LC_{MODE} = V_{IH} • EVkit BOM = STD Mode • F_{IF} = 400 MHz (Low Side Inj.)	G_{STD}	***7.2***	***8.4***	***9.6***	dB

IDTF1162 SPECIFICATION (CONTINUED)

Parameter	Comment	Symbol	min	typ	max	units
Gain LC Mode	Conversion Gain • F_{RF} = 2700 MHz • LC_{MODE} = GND • EVkit BOM = LC Mode • F_{IF} = 200 MHz (High Side Inj.)	G_{LC}	***6.8***	***7.9***	***9.0***	dB
NF STD Mode	Noise Figure • RF trace de-embedded • F_{IF} = 200 MHz	NF_{STD}		9.9		dB
NF LC Mode	Noise Figure • RF trace de-embedded • LC_{MODE} = GND, EVKit BOM = LC • F_{IF} = 200 MHz	NF_{LC}		9.7		dB
NF w/Blocker	▪ +100 MHz offset blocker ▪ $P_{BLOCKER}$ = +10 dBm ▪ F_{IF} = 250 MHz	NF_{BLK}		23.5		dB
Output IP3 – STD mode	▪ P_{IN} = -10 dBm per tone ▪ 800 KHz Tone Separation	$IP3_{O1}$	38[2]	43		dBm
Output IP3 – LC mode	▪ P_{IN} = -10 dBm per tone ▪ F_{IF} = 200 MHz (Low Side Inj.) ▪ F_{RF} = 2600 MHz ▪ 800 KHz Tone Separation ▪ LC_{MODE} = GND ▪ EVKit BOM = LC Mode	$IP3_{O3}$	***33.5***	***37.7***		dBm
Output IP3 – High Side Injection	▪ P_{IN} = -10 dBm per tone ▪ 800 KHz Tone Separation ▪ F_{IF} = 154 MHz (High Side Inj.) ▪ F_{RF} = 2600 MHz ▪ Modified LC mode BOM (p. 26)	$IP3_{O2}$		43		dBm
2RF – 2LO rejection	▪ P_{IN} = -10 dBm ▪ Frequency = F_{RF} - ½ F_{IF}	2x2		-68		dBc
1 dB Compression – STD Mode	▪ Input referred ▪ 400 MHz IF	$P1dB_{I1}$	11	11.9		dBm
1 dB Compression – LC Mode	▪ LC_{MODE} = GND ▪ EVKit BOM = LC Mode ▪ F_{IF} = 200 MHz (Low Side Inj.)	$P1dB_{I2}$	***8***	***10.2***		dBm
Gain Comp. w/blocker	▪ Blocker → unmodulated tone ▪ P_{IN} = +8 dBm, +100 MHz offset ▪ Signal Pin Tone = -20 dBm ▪ Measure ΔG of signal ▪ F_{IF} = 250 MHz	ΔG_{AC}		0.15		dB
Channel Isolation	IF_B Pout vs. IF_A w/ RF_A input	ISO_C		63		dB
LO to IF leakage	LO Frequency = 2200 MHz	ISO_{LI}		-32	-23	dBm
RF to IF leakage	Pin = -10 dBm	ISO_{RI}		-57	-43	dBm
LO to RF leakage	• LO Frequency = 2345 MHz • Low Current Mode	ISO_{LR}		-41		dBm

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

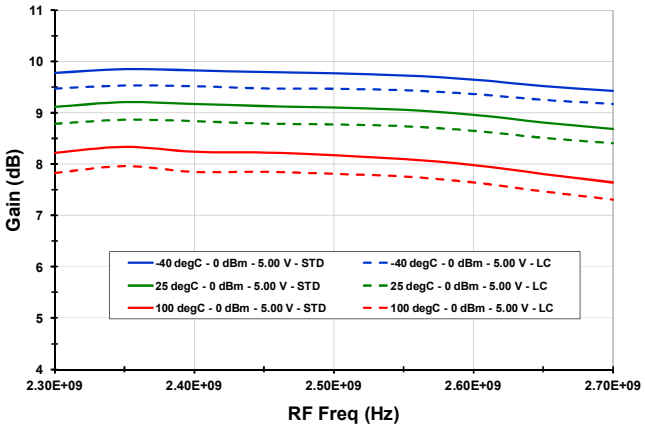
TYPICAL OPERATING CONDTIONS

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

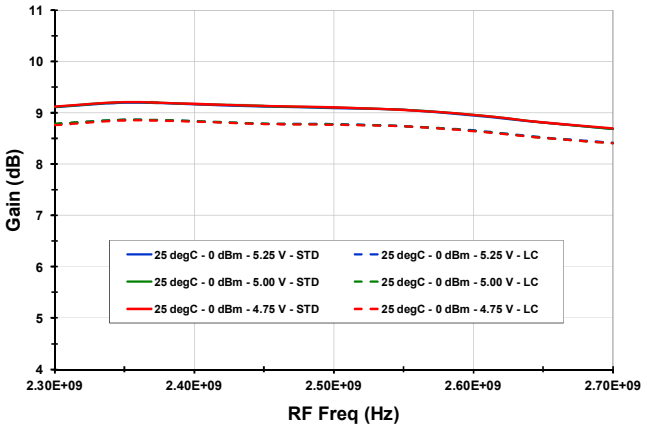
- 800 KHz Tone Spacing
- Low Side injection graphs with 200MHz & 400MHz IF (pages 6 – 14)
- High Side injection graphs with 200MHz & 154MHz IF (pages 15 – 17)
- Average of Channel A & Channel B
- Pin = – 10 dBm per Tone
- LO port = Pin 19 (Main Port)
- Listed Temperatures are Case Temperature (T_C = Case Temperature)
- Where noted, T_A or T_{AMB} = Ambient Temperature

TYPICAL OPERATING CONDITIONS [IF = 200 MHz, Low Side Injection] (-1-)

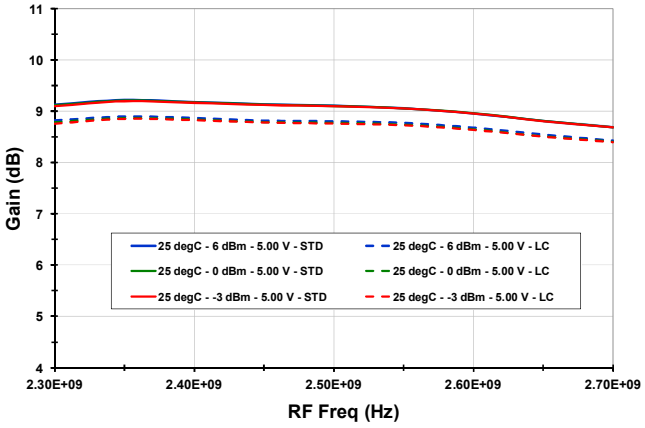
Gain vs. T_{CASE}



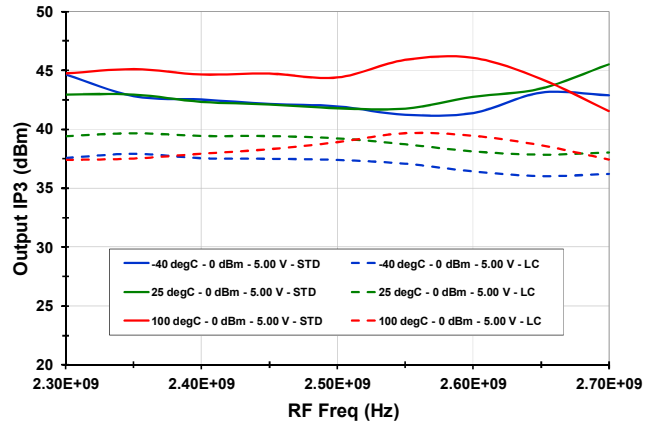
Gain vs. V_{CC}



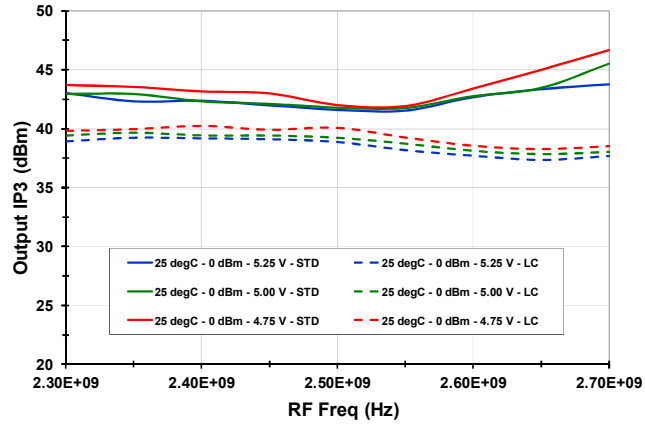
Gain vs. LO Level



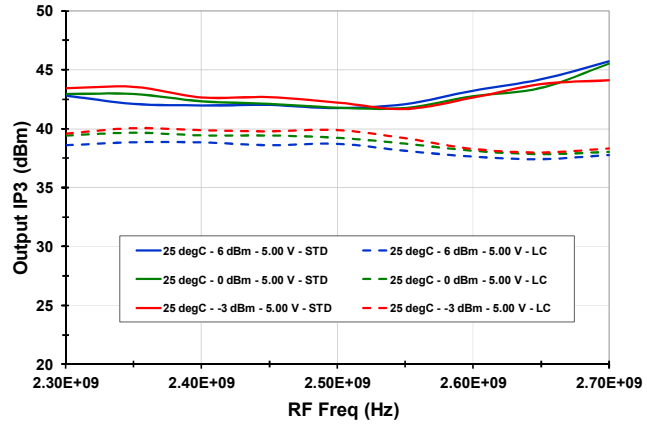
Output IP3 vs. T_{CASE}



Output IP3 vs. V_{CC}

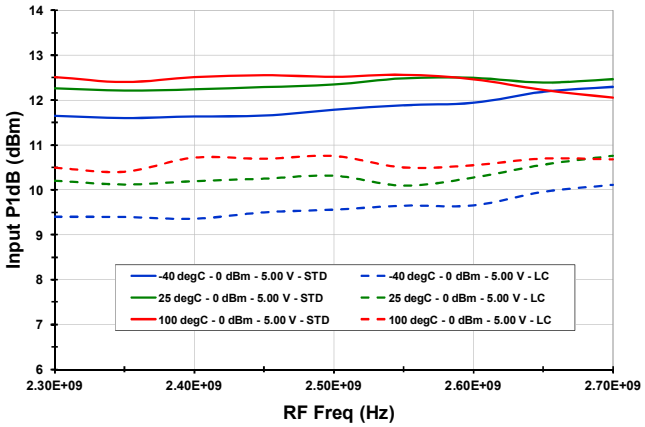


Output IP3 vs. LO Level

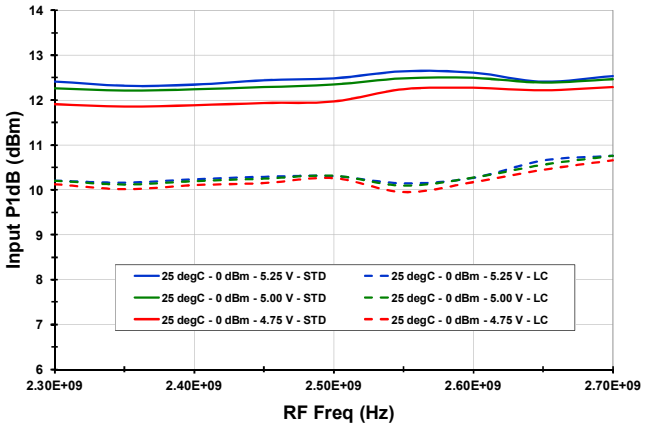


TYPICAL OPERATING CONDITIONS [IF = 200 MHz, Low Side Injection] (-2-)

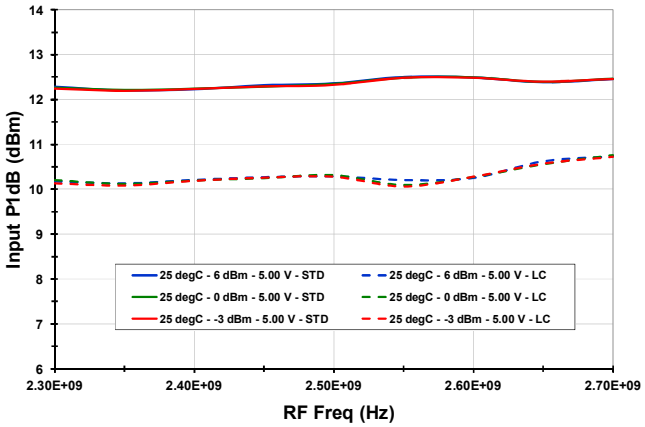
P1dB vs. T_{CASE}



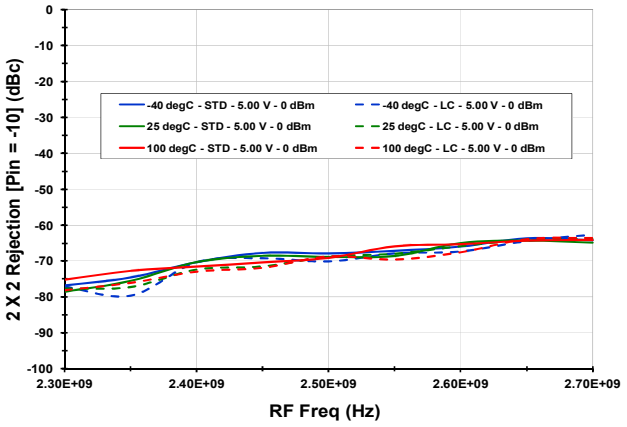
P1dB vs. V_{CC}



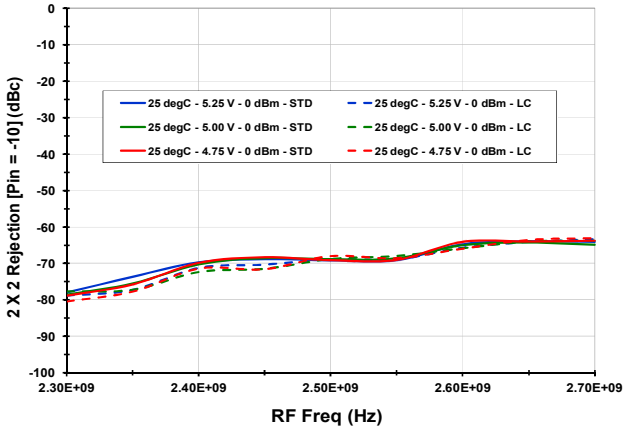
P1dB vs. LO Level



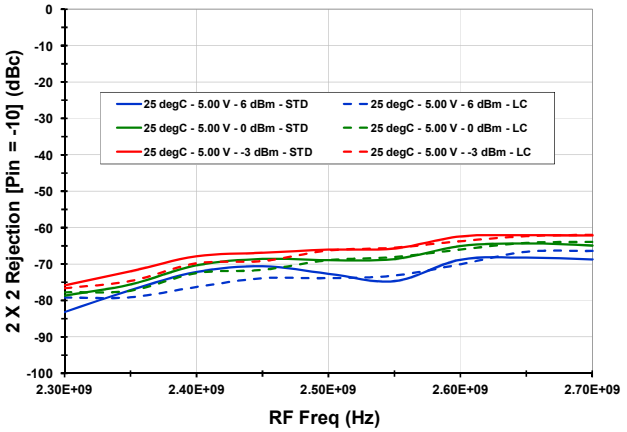
2RF x 2LO rejection vs. T_{CASE}



2RF x 2LO Rejection vs. V_{CC}

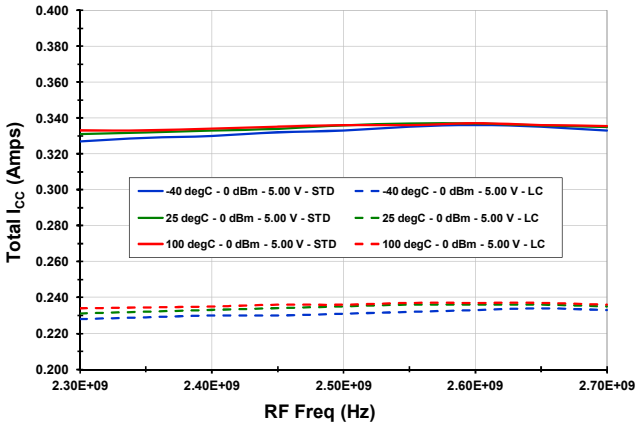


2RF x 2LO Rejection vs. LO Level

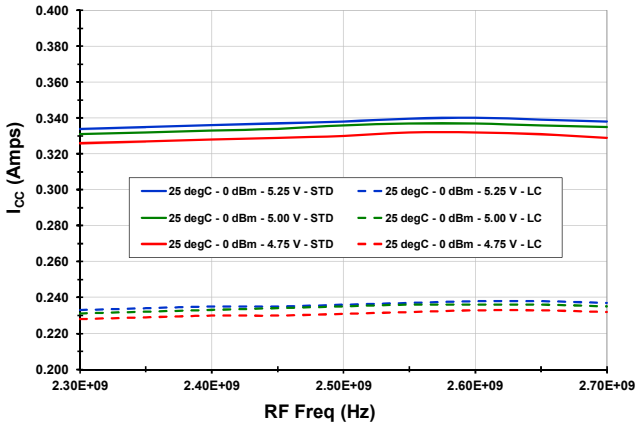


TYPICAL OPERATING CONDITIONS [IF = 200 MHz, Low Side Injection] (-3-)

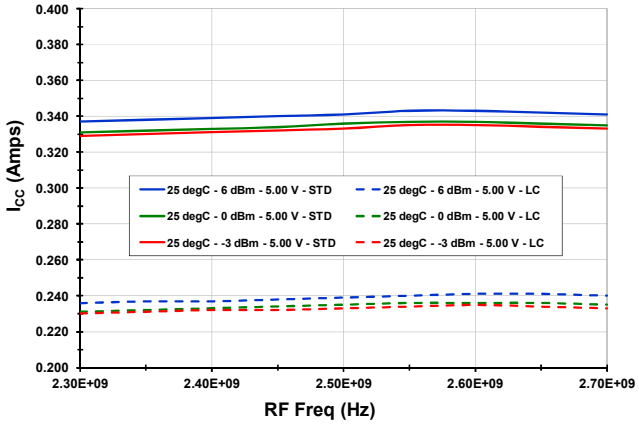
I_{CC} vs. T_{CASE}



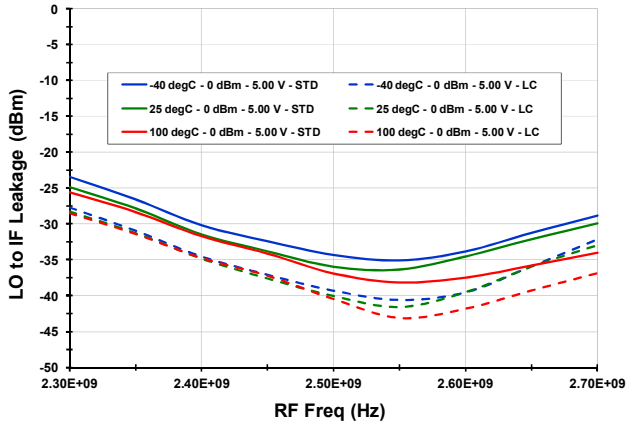
I_{CC} vs. V_{CC}



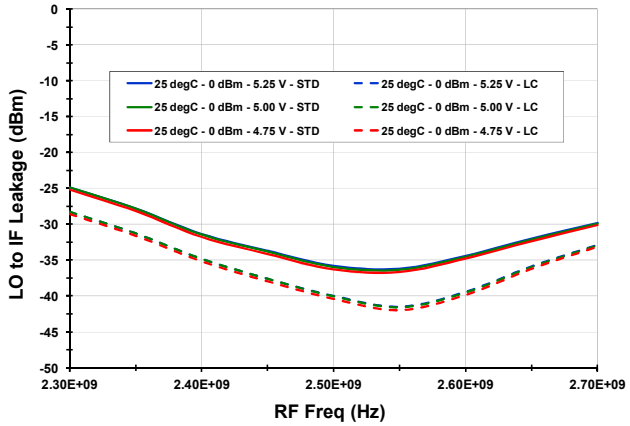
I_{CC} vs. LO Level



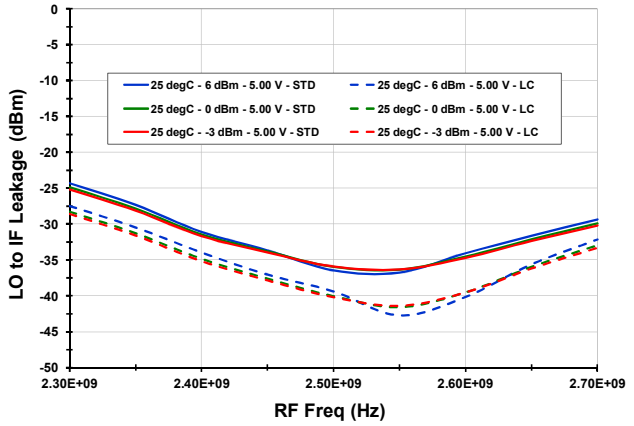
LO-IF Leakage vs. T_{CASE}



LO-IF Leakage vs. V_{CC}

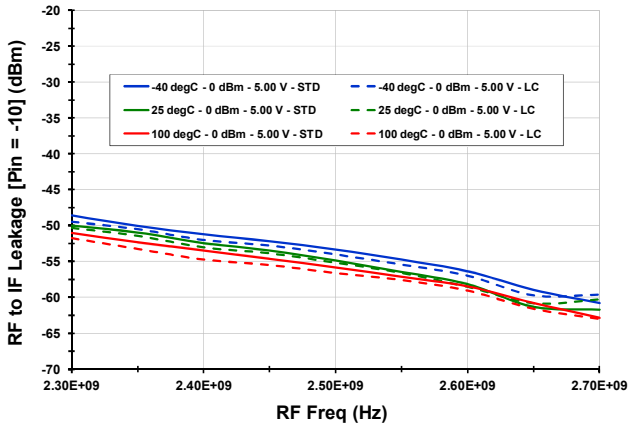


LO-IF Leakage vs. LO Level

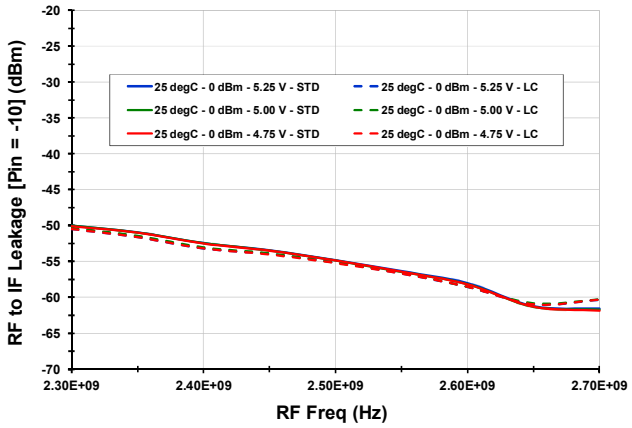


TYPICAL OPERATING CONDITIONS [IF = 200 MHz, Low Side Injection] (-4-)

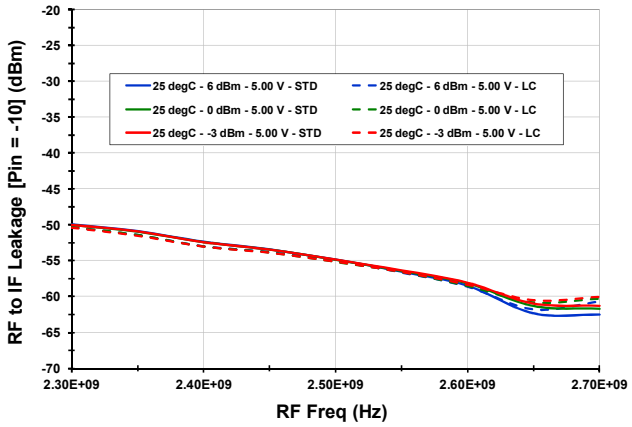
RF-IF Leakage vs. T_{CASE}



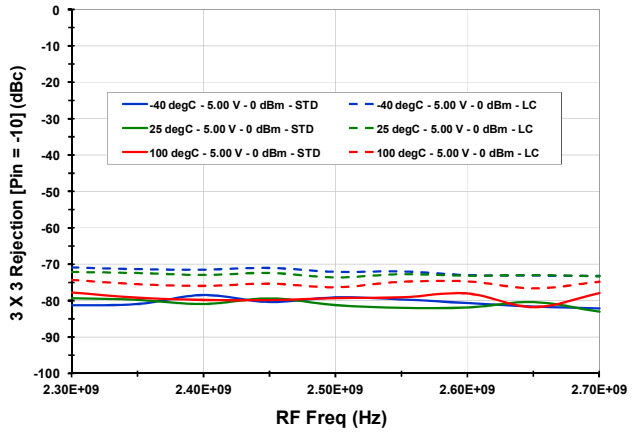
RF-IF Leakage vs. V_{CC}



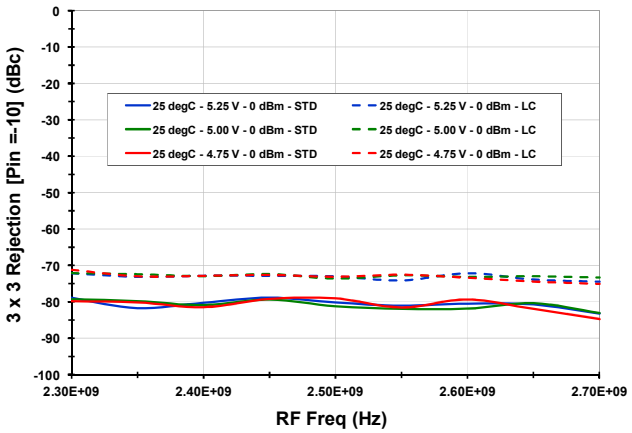
RF-IF Leakage vs. LO Level



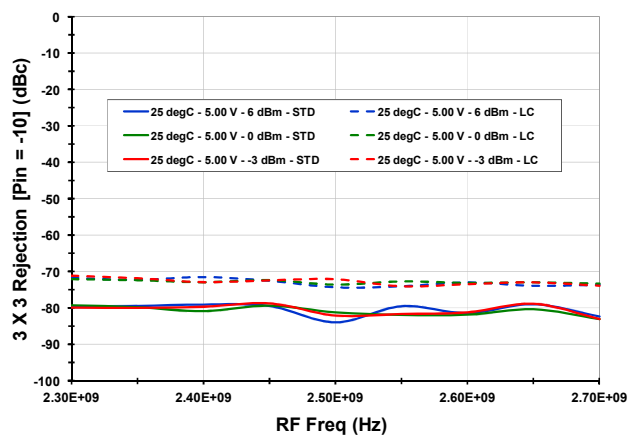
3RF X 3LO Rejection vs. T_{CASE}



3RF X 3LO Rejection vs. V_{CC}

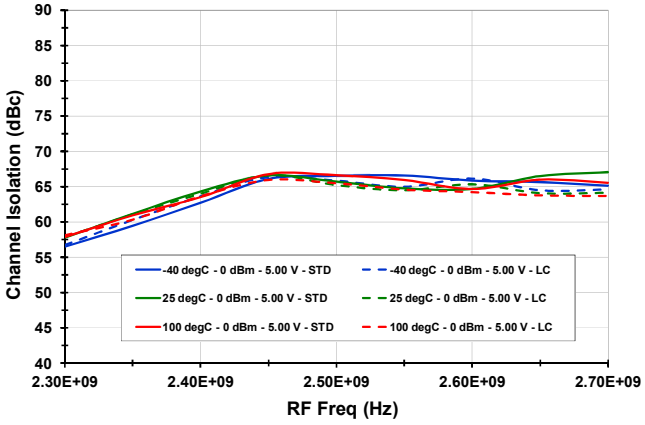


3RF X 3LO Rejection vs. LO Level

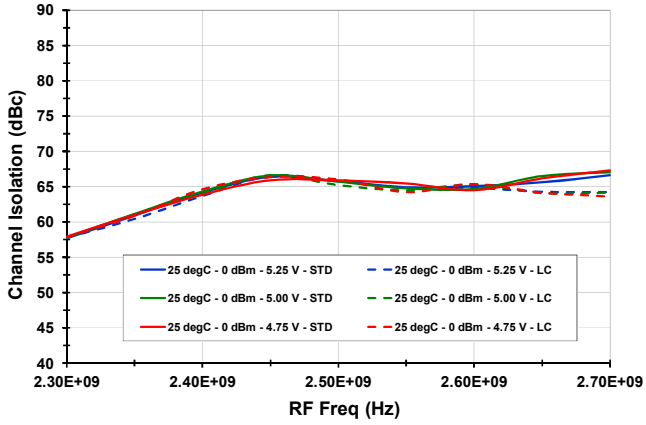


TYPICAL OPERATING CONDITIONS [IF = 200 MHz, Low Side Injection] (-5-)

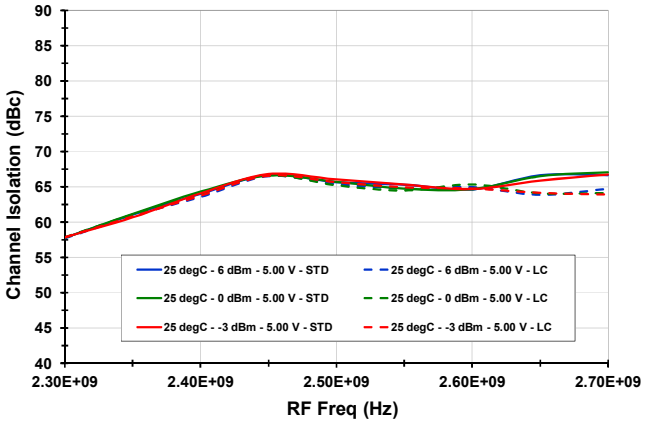
Channel Isolation vs. T_{CASE}



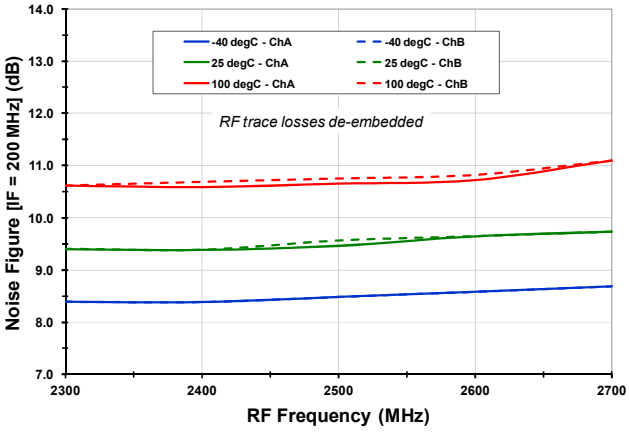
Channel Isolation vs. V_{CC}



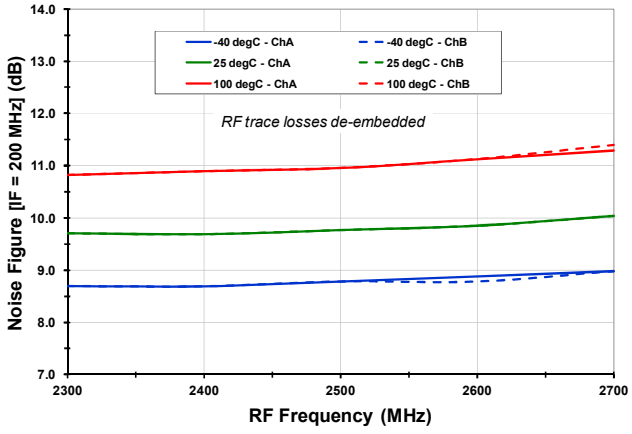
Channel Isolation vs. LO Level



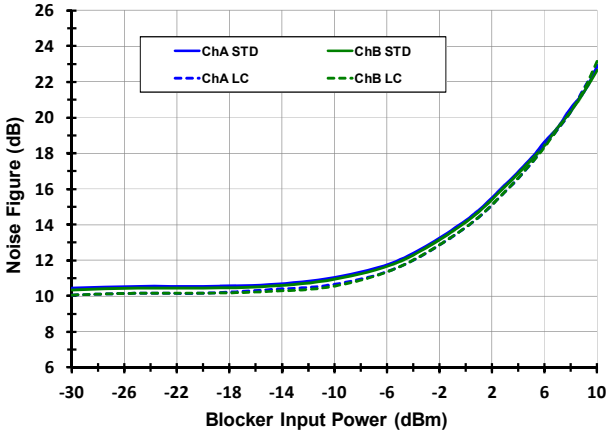
Noise Figure vs. T_{CASE} (LC Mode)



Noise Figure vs. T_{CASE} (STD Mode)

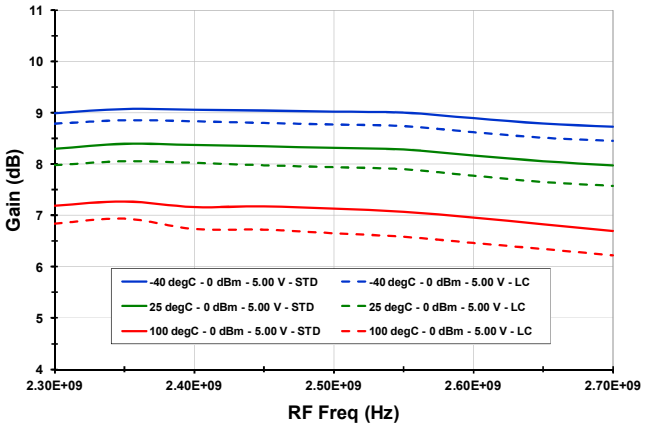


NF vs. Blocker (RF =2600 MHz, IF = 250 MHz, T_A = 25C)

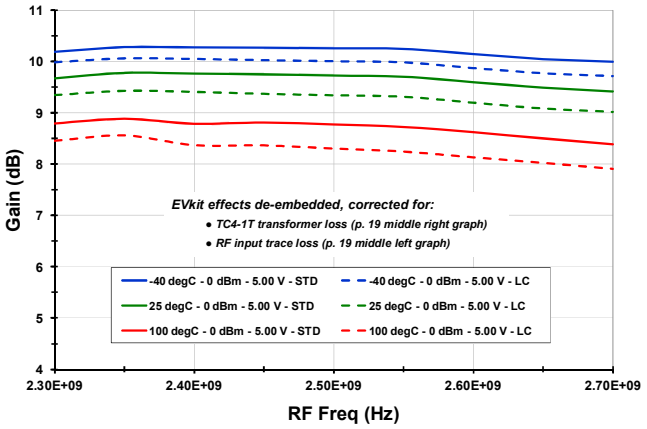


TYPICAL OPERATING CONDITIONS [IF = 400 MHz, Low Side Injection] (-6-)

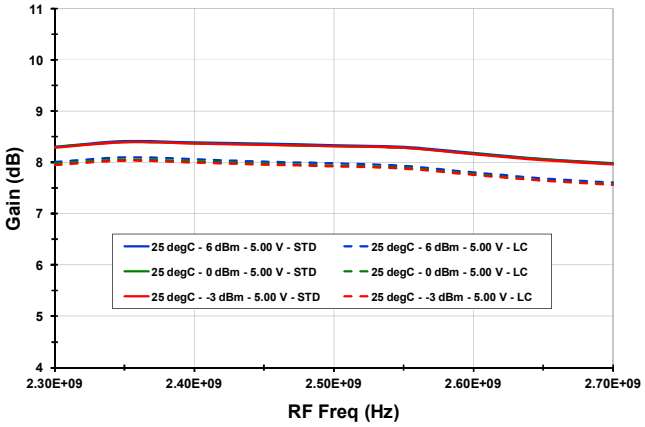
Gain vs. T_{CASE}



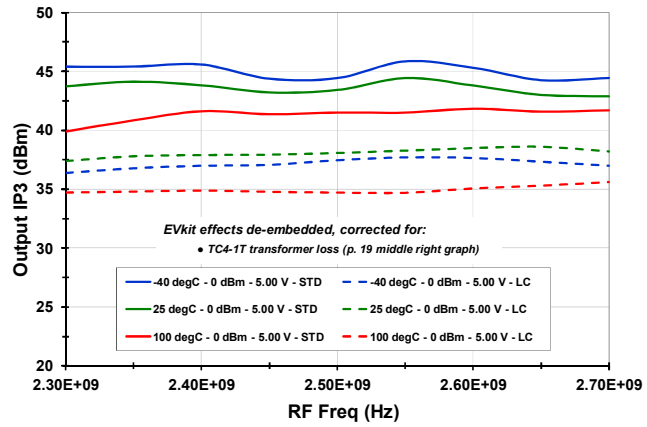
Gain vs. T_{CASE} (EVKIT DE-EMBEDDED)



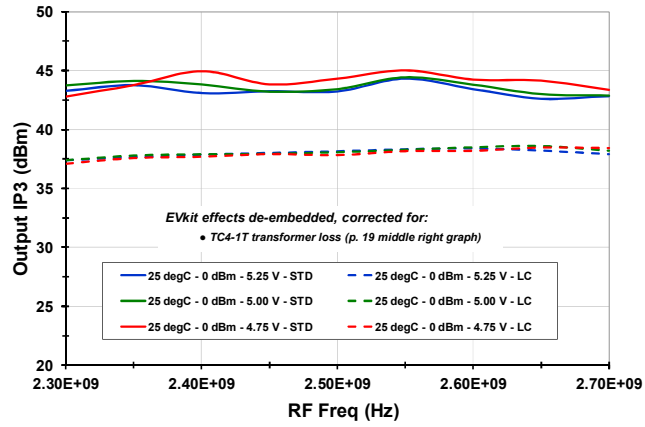
Gain vs. LO Level



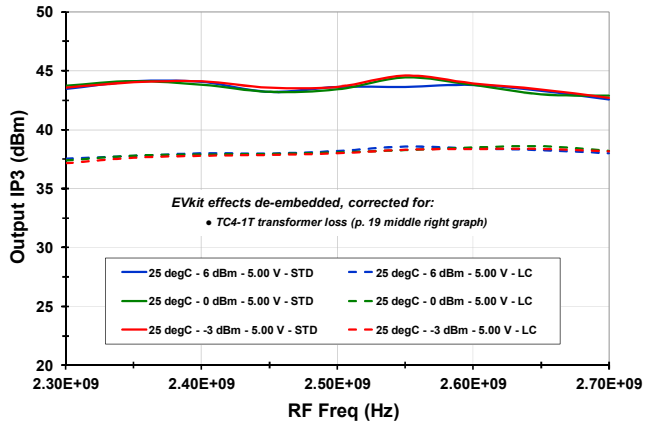
Output IP3 vs. T_{CASE} (EVKIT DE-EMBEDDED)



Output IP3 vs. V_{CC} (EVKIT DE-EMBEDDED)

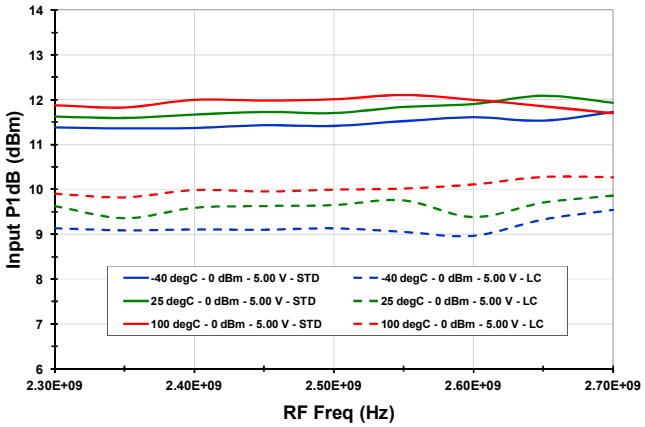


Output IP3 vs. LO Level (EVKIT DE-EMBEDDED)

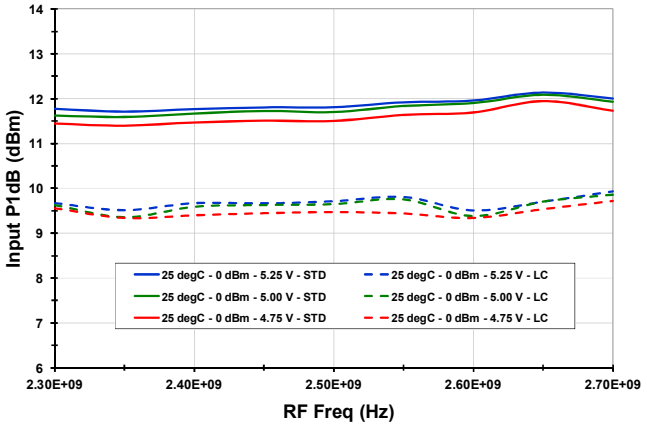


TYPICAL OPERATING CONDITIONS [IF = 400 MHz, Low Side Injection] (-7-)

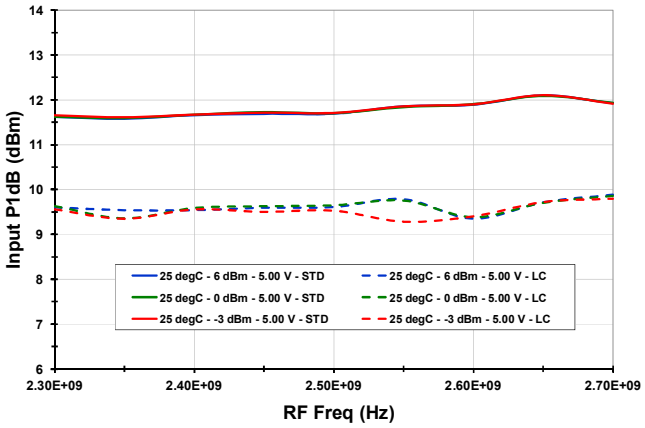
P1dB vs. T_{CASE}



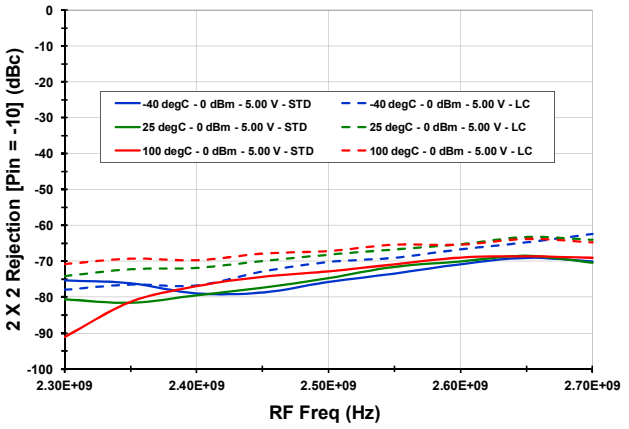
P1dB vs. V_{CC}



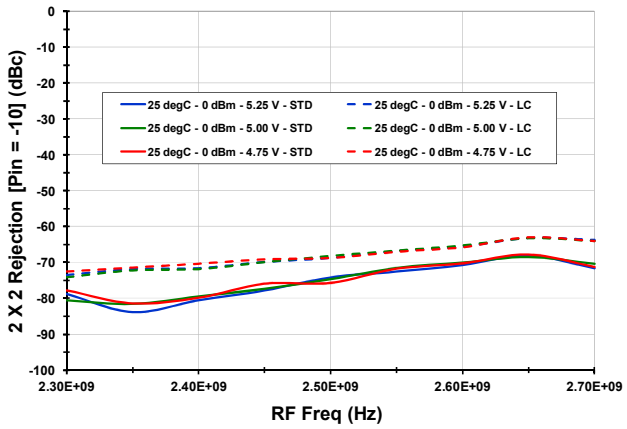
P1dB vs. LO Level



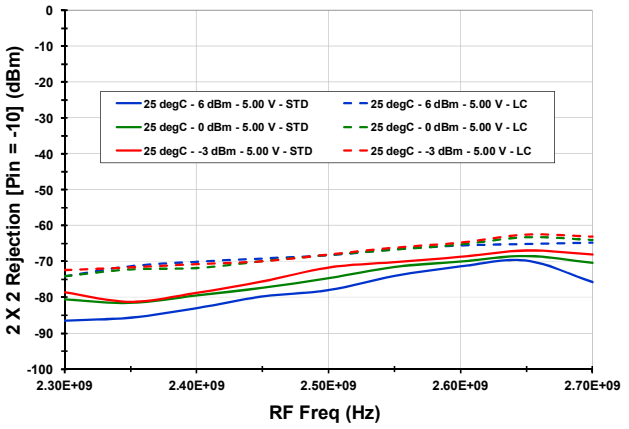
2RF x 2LO rejection vs. T_{CASE}



2RF x 2LO Rejection vs. V_{CC}

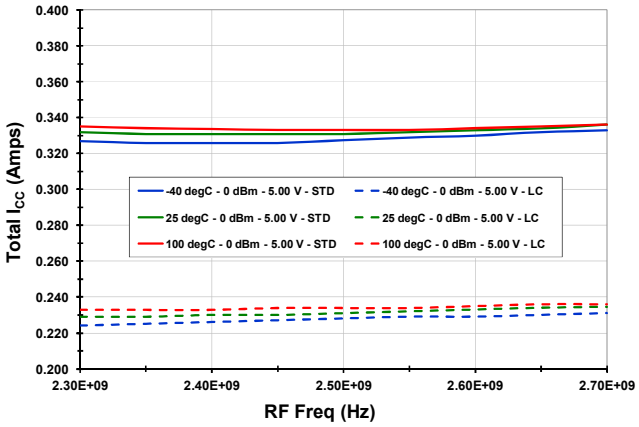


2RF x 2LO rejection vs. LO Level

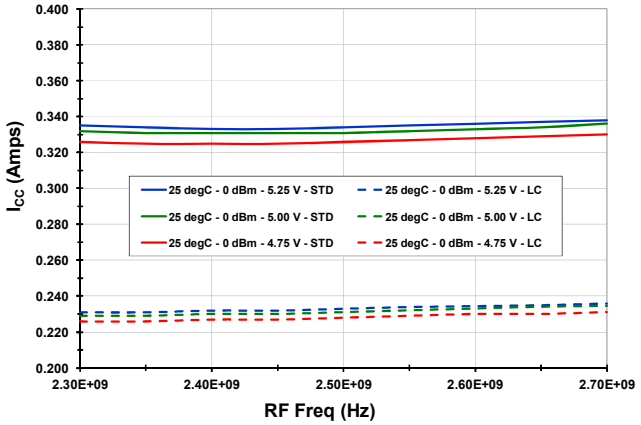


TYPICAL OPERATING CONDITIONS [IF = 400 MHz, Low Side Injection] (-8-)

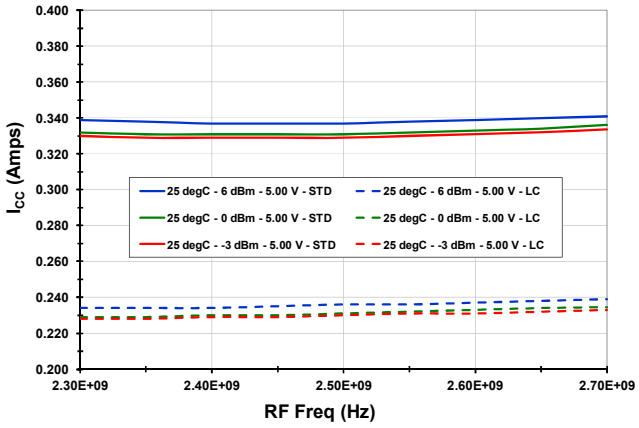
I_{CC} vs. T_{CASE}



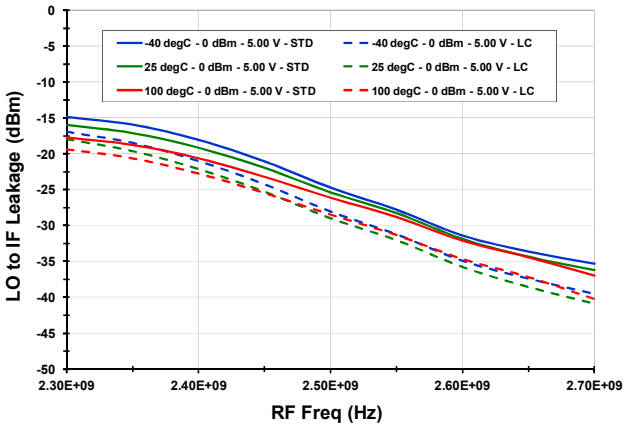
I_{CC} vs. V_{CC}



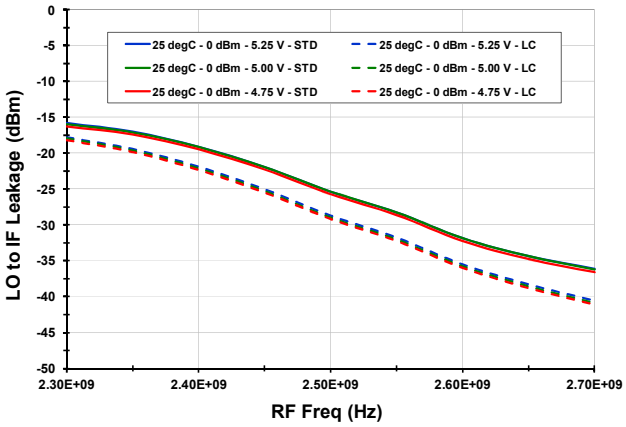
I_{CC} vs. LO Level



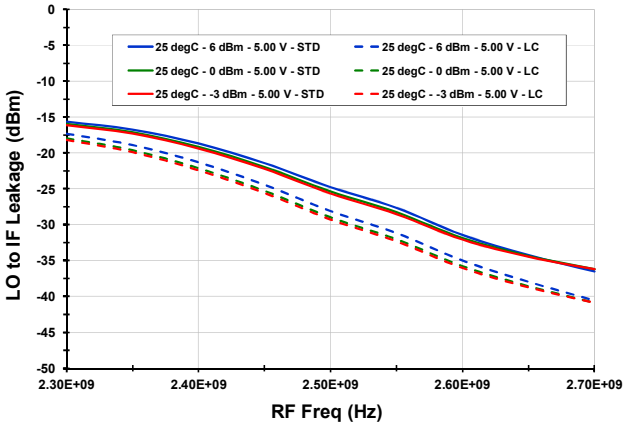
LO-IF Leakage vs. T_{CASE}



LO-IF Leakage vs. V_{CC}

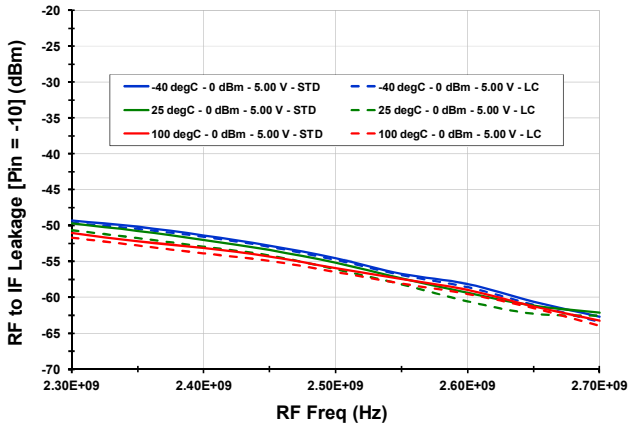


LO-IF Leakage vs. LO Level

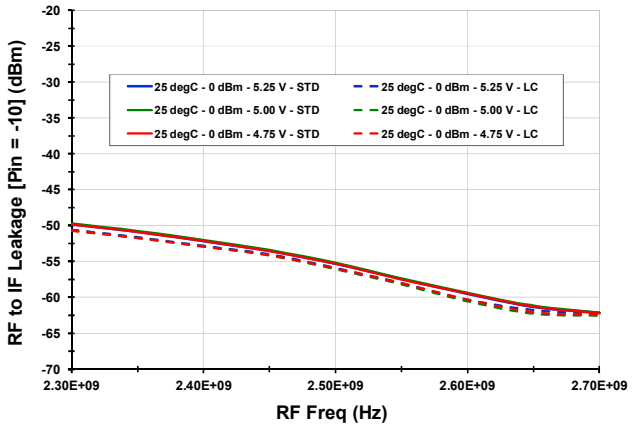


TYPICAL OPERATING CONDITIONS [IF = 400 MHz, Low Side Injection] (-9-)

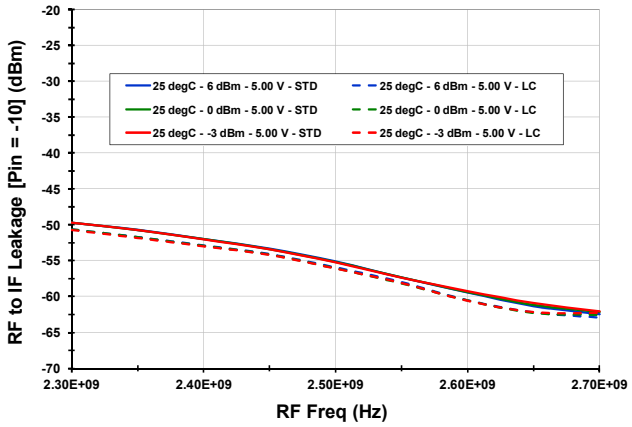
RF-IF Leakage vs. T_{CASE}



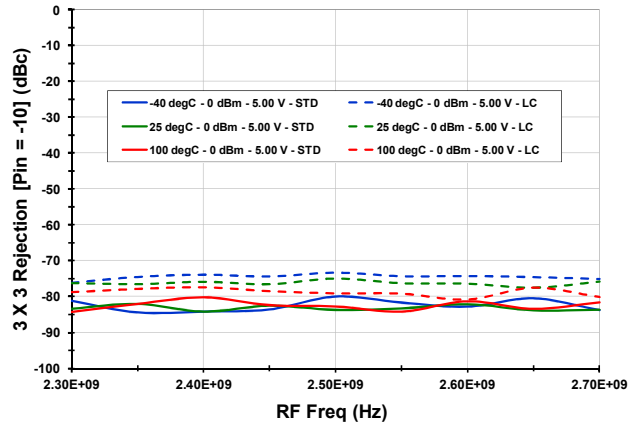
RF-IF Leakage vs. V_{CC}



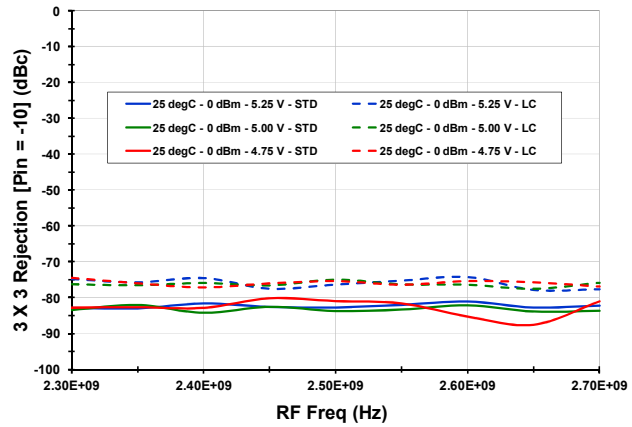
RF-IF Leakage vs. LO Level



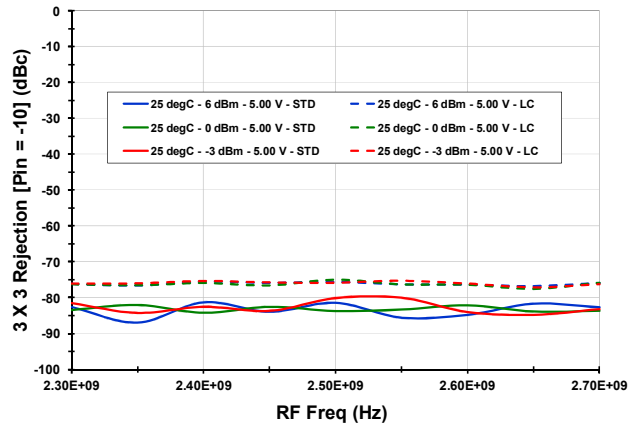
3RF X 3LO Rejection vs. T_{CASE}



3RF X 3LO Rejection vs. V_{CC}

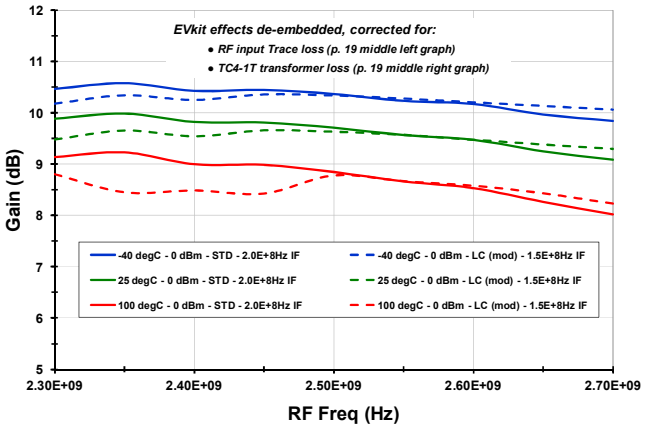


3RF X 3LO Rejection vs. LO Level

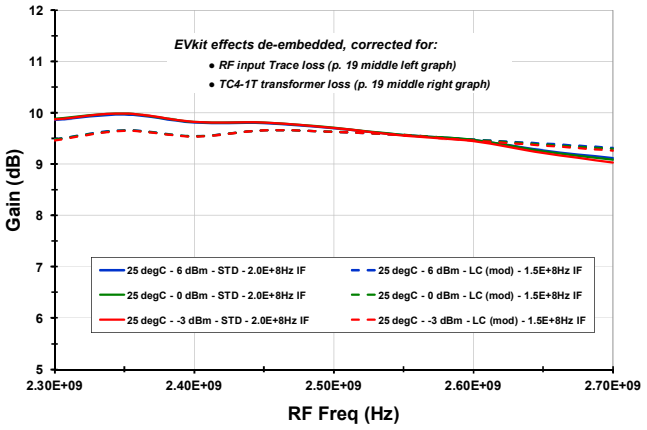


TYPICAL OPERATING CONDITIONS [High Side Injection *see LC mode modifications on p. 25*] (-10-)

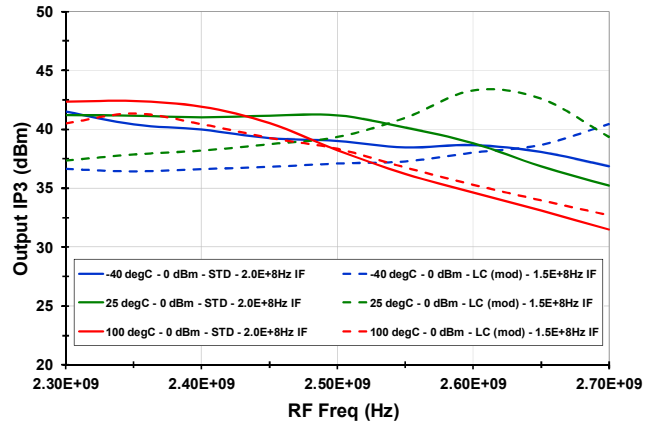
Gain vs. T_{CASE} (EVKIT DE-EMBEDDED)



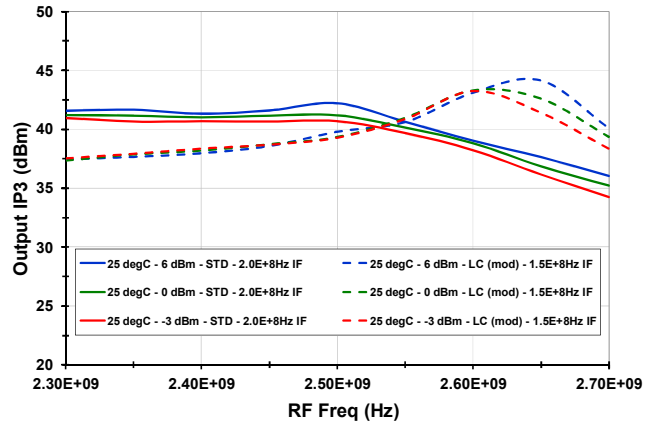
Gain vs. LO Level (EVKit de-embedded)



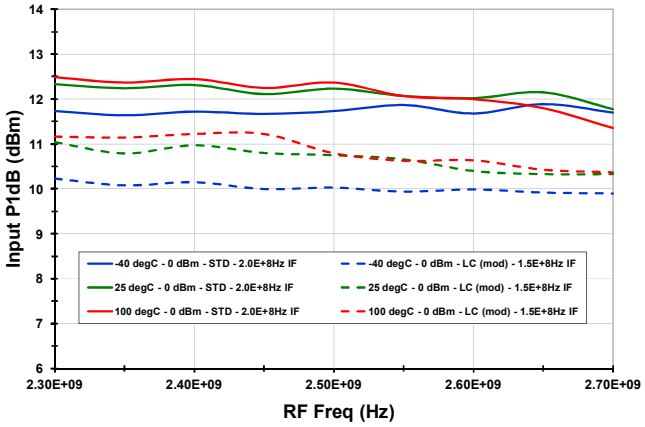
Output IP3 vs. T_{CASE}



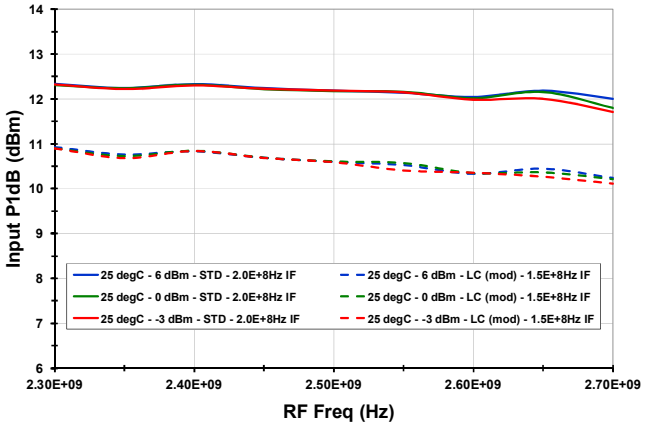
Output IP3 vs. LO Level



P1dB vs. T_{CASE}

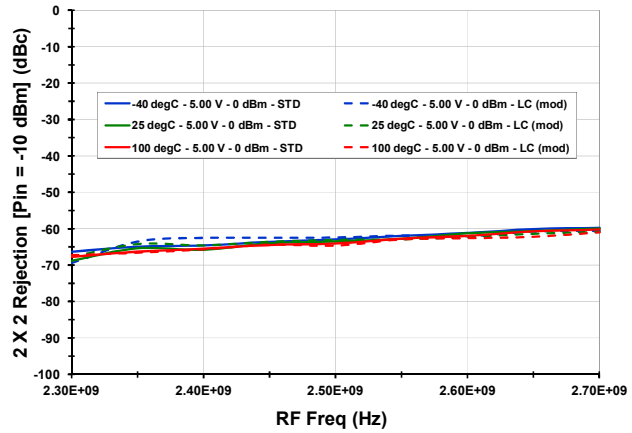


P1dB vs. LO Level

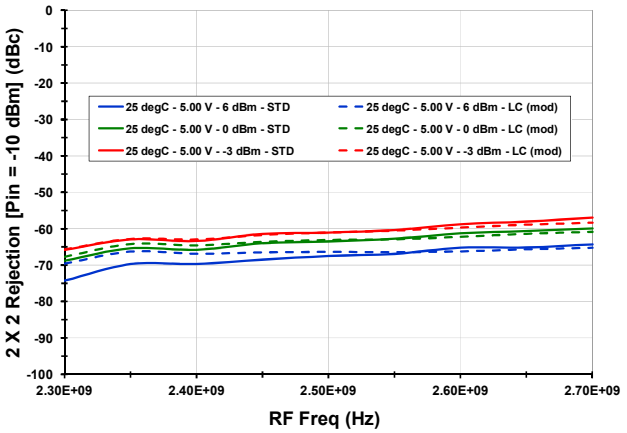


TYPICAL OPERATING CONDITIONS [High Side Injection *see LC mode modifications on p. 25*] (-11-)

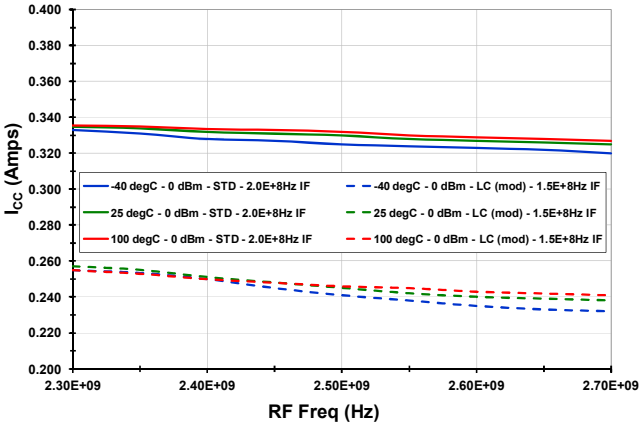
2RF x 2LO vs. T_{CASE} [IF = 154 MHz]



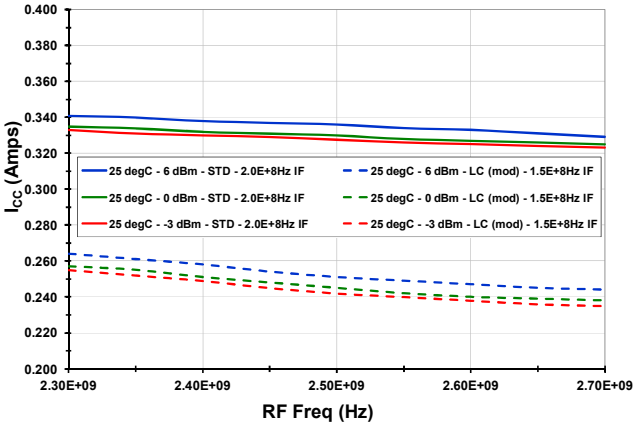
2RF x 2LO vs. LO Level [IF = 154 MHz]



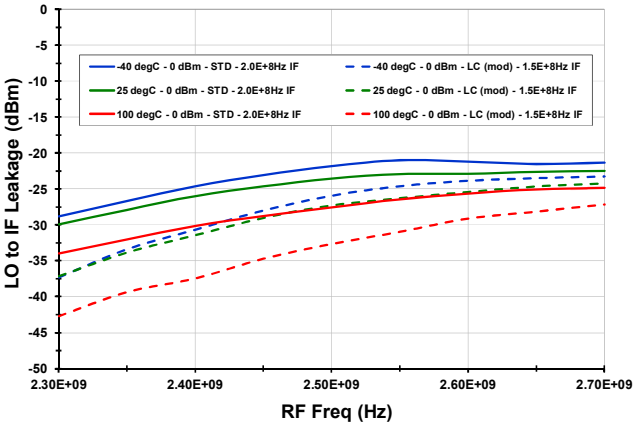
I_{CC} vs. T_{CASE}



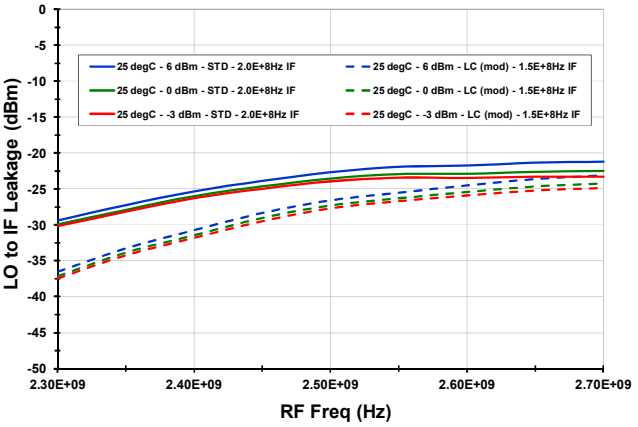
I_{CC} vs. LO Level



LO to IF Leakage vs. T_{CASE}

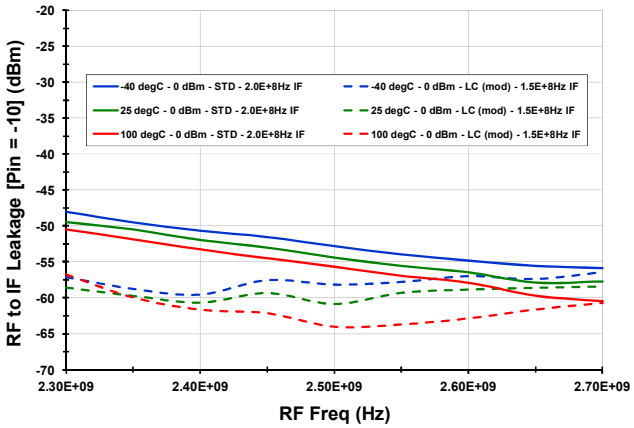


LO to IF Leakage vs. LO Level

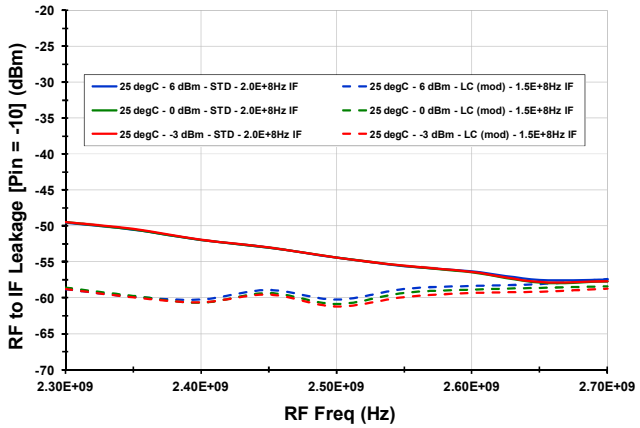


TYPICAL OPERATING CONDITIONS [High Side Injection *see LC mode modifications on p. 25*] (-12-)

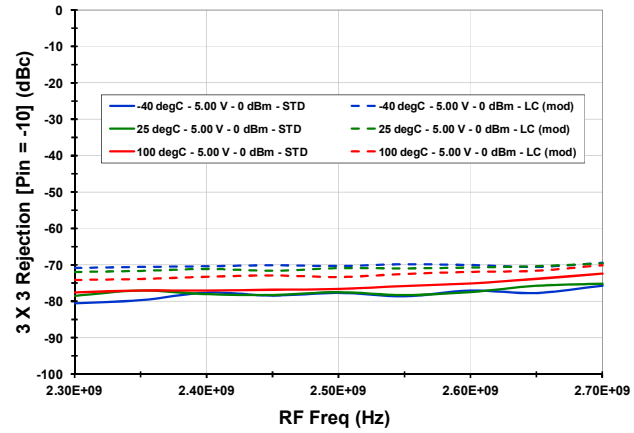
RF to IF Leakage vs. T_{CASE}



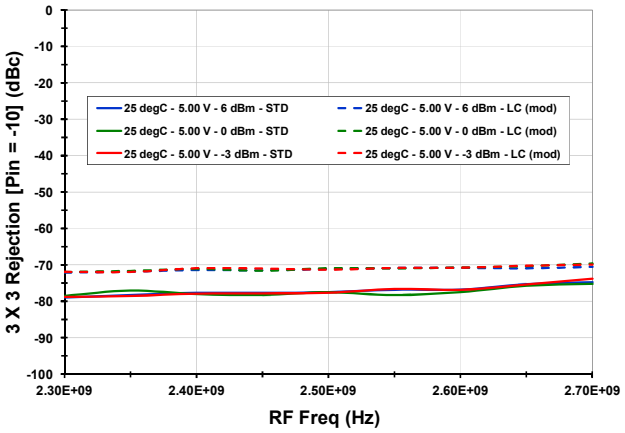
RF to IF Leakage vs. LO Level



3RF x 3LO rejection vs. T_{CASE} [IF = 154 MHz]

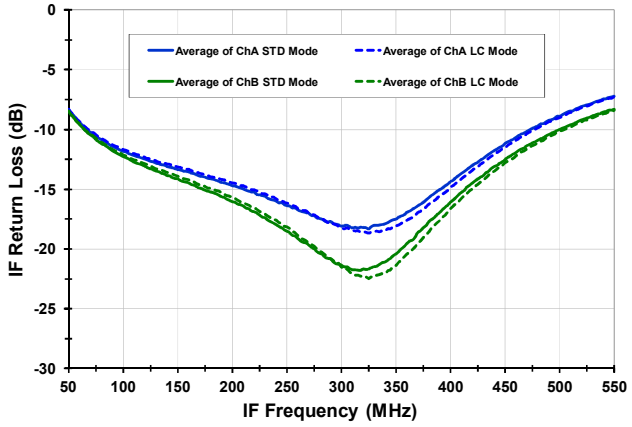


3RF x 3LO rejection vs. LO Level [IF = 154 MHz]

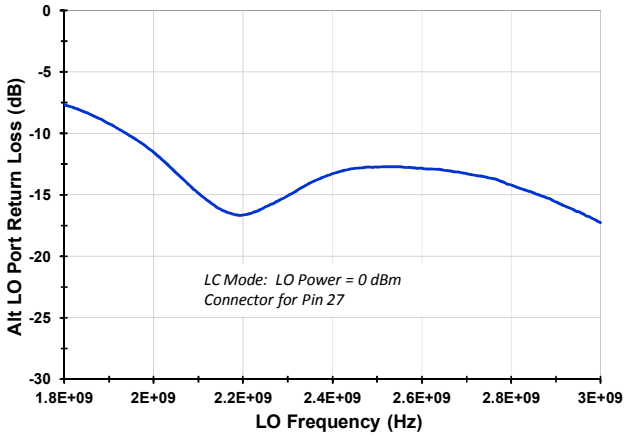


TYPICAL OPERATING CONDITIONS [General] (-13-)

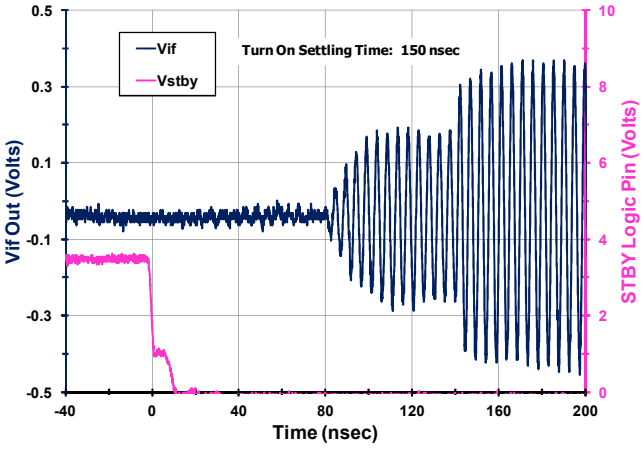
EVkit IF Port Match (T_A = 25C)



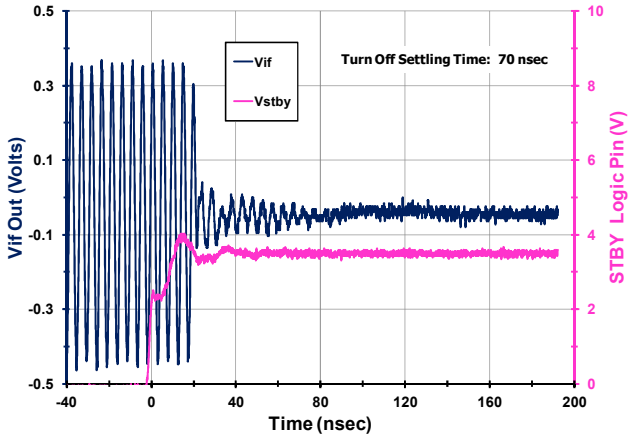
Alt. LO port Match (T_A = 25C, P_{MEAS} = 0 dBm)



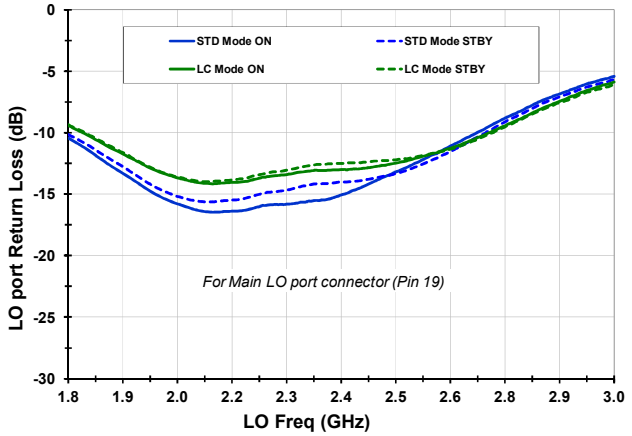
Settling Time (STBY -> V_{IL})



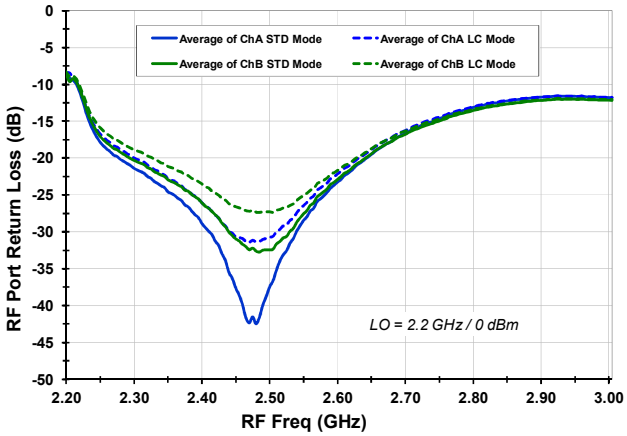
Settling Time (STBY -> V_{IH})



Main LO Port Match (T_A = 25C, P_{MEAS} = 0 dBm)

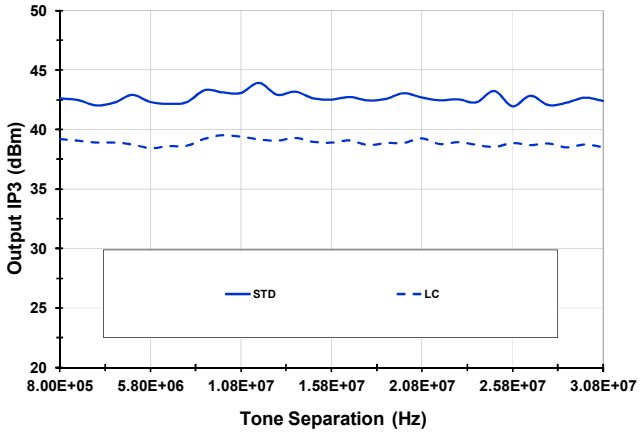


EVkit RF Port Match (T_A = 25C)

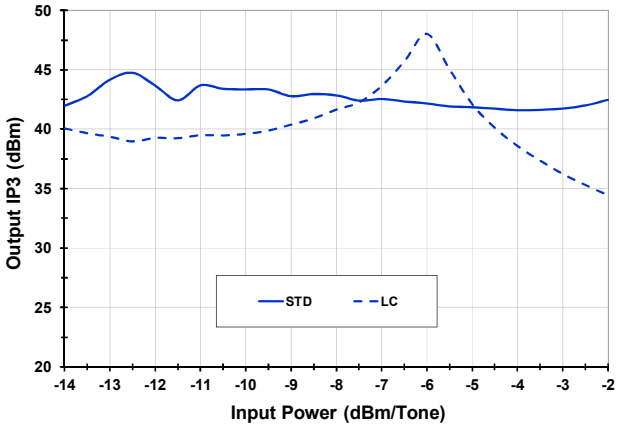


TYPICAL OPERATING CONDITIONS [General] (-14-)

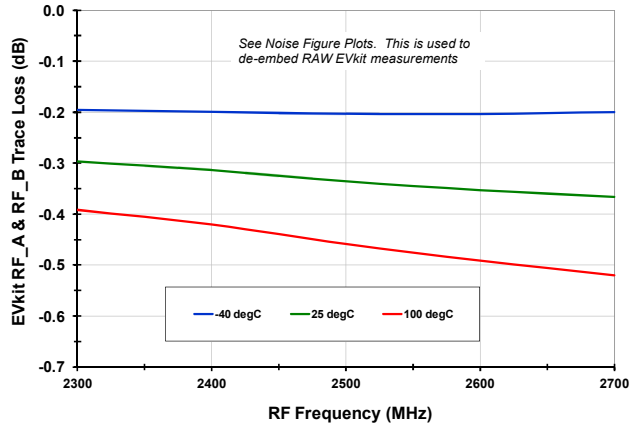
$IP3_O$ vs. Δf (T_A = 25C, Freq = 2.6 GHz, IF = 200 MHz)



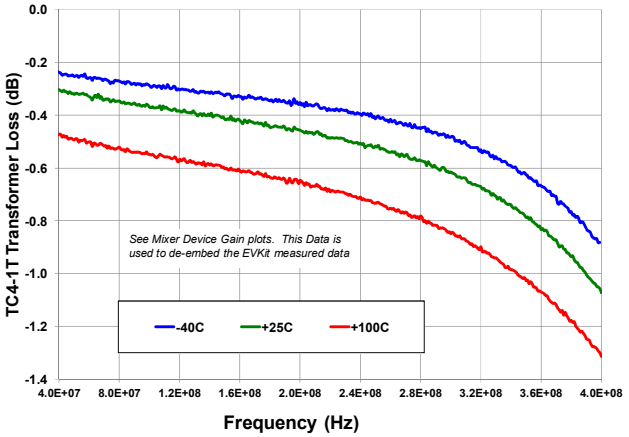
$IP3_O$ vs. P_{IN} (T_A = 25C, Freq = 2.6 GHz, IF = 200 MHz)



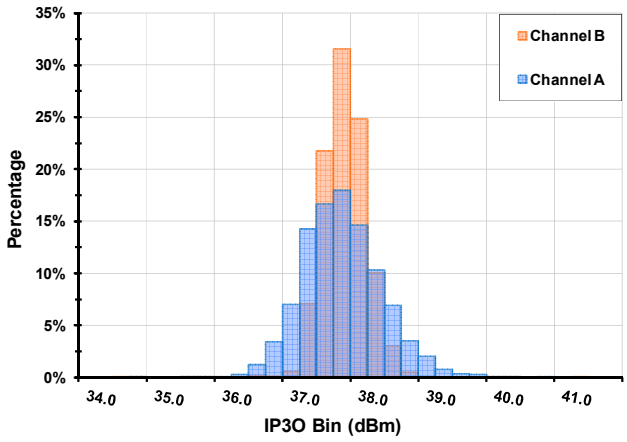
EVkit Input RF Trace Loss (T_A = 25C)



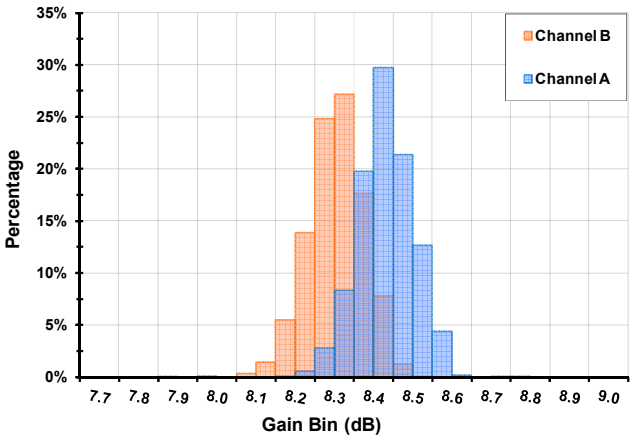
TC4-1T Transformer Loss



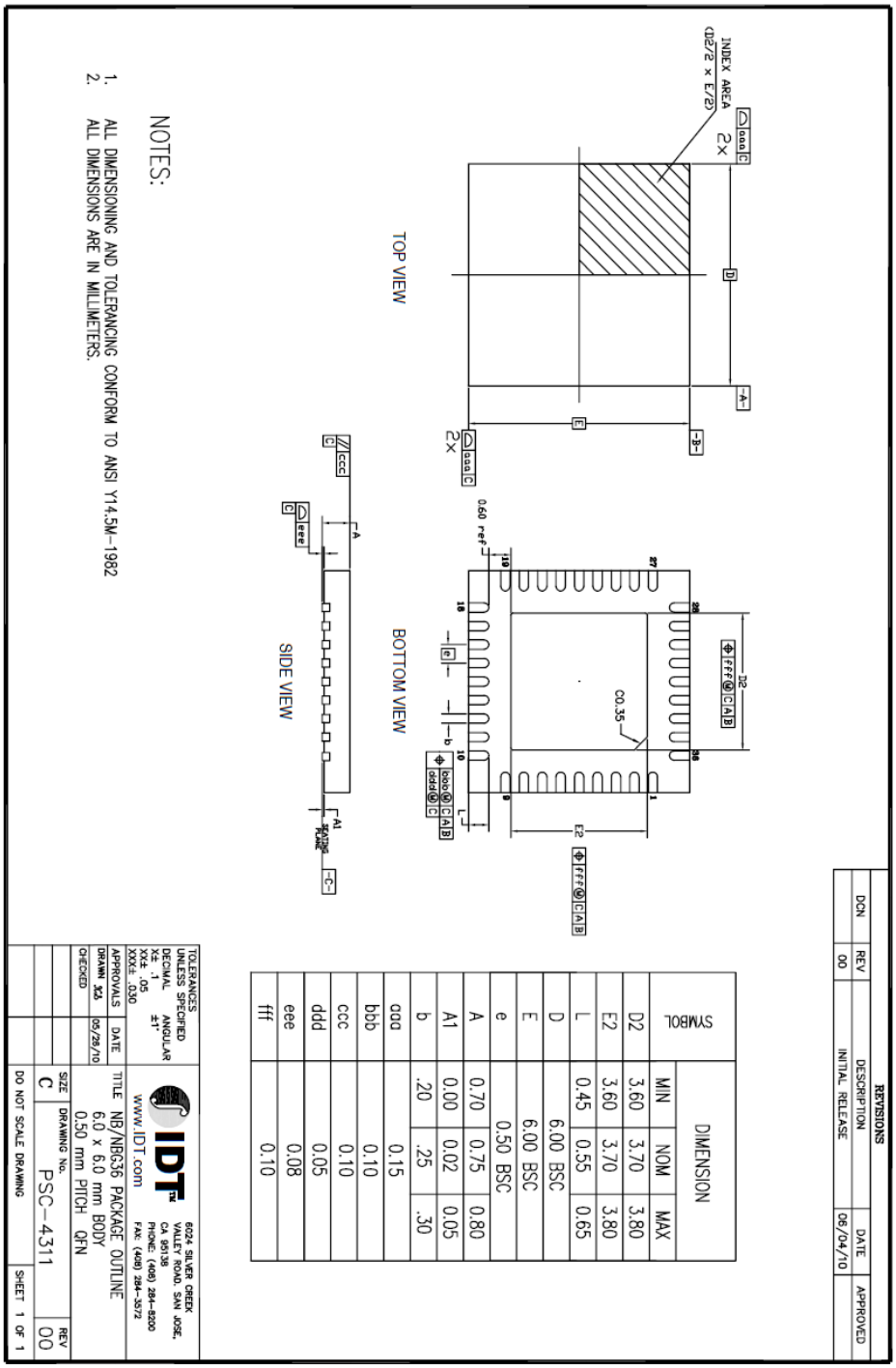
$IP3_O$ Distribution (F_{IF} = 200MHz, LC mode, N = 3340)



Gain Distribution (F_{IF} = 400MHz, STD mode, N = 3340)



PACKAGE DRAWING (6x6 QFN)



SYMBOL	DIMENSION		
	MIN	NOM	MAX
D2	3.60	3.70	3.80
E2	3.60	3.70	3.80
L	0.45	0.55	0.65
D		6.00 BSC	
E		6.00 BSC	
e		0.50 BSC	
A	0.70	0.75	0.80
A1	0.00	0.02	0.05
b	.20	.25	.30
aaa		0.15	
bbb		0.10	
ccc		0.10	
ddd		0.05	
eee		0.08	
fff		0.10	

REVISIONS

DCN	REV	DESCRIPTION	DATE	APPROVED
	00	INITIAL RELEASE	06/04/10	

TOLERANCES UNLESS SPECIFIED
DECIMAL ANGULAR
XX ± .1 ±1°
XXX ± .05
XXX ± .030

APPROVALS DATE
DRAWN XJL 05/28/10
CHECKED

IDT™ 6024 SILVER CREEK VALLEY ROAD, SAN JOSE, CA 95138
PHONE: (408) 284-8200 FAX: (408) 284-3572
www.IDT.com

TITLE NB/NBG36 PACKAGE OUTLINE
6.0 x 6.0 mm BODY
0.50 mm PITCH QFN

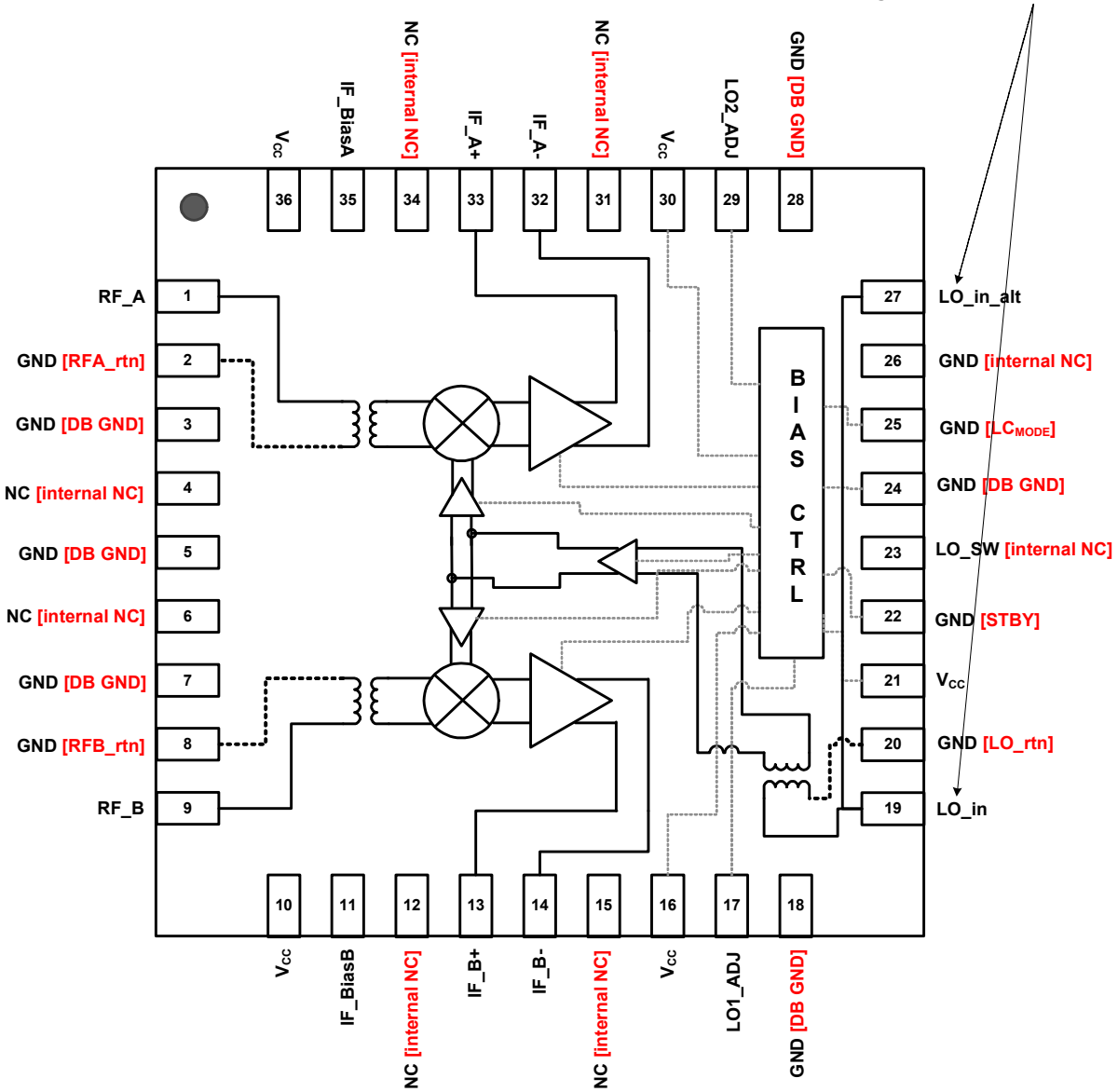
SIZE C DRAWING No. PSC-4311 REV 00

DO NOT SCALE DRAWING SHEET 1 OF 1

PINOUTS

Black Text denotes recommended external connection
Red Text denotes internal Function or Connection
- DB GND = Downbonded to Paddle
- Internal NC = Pin not connected

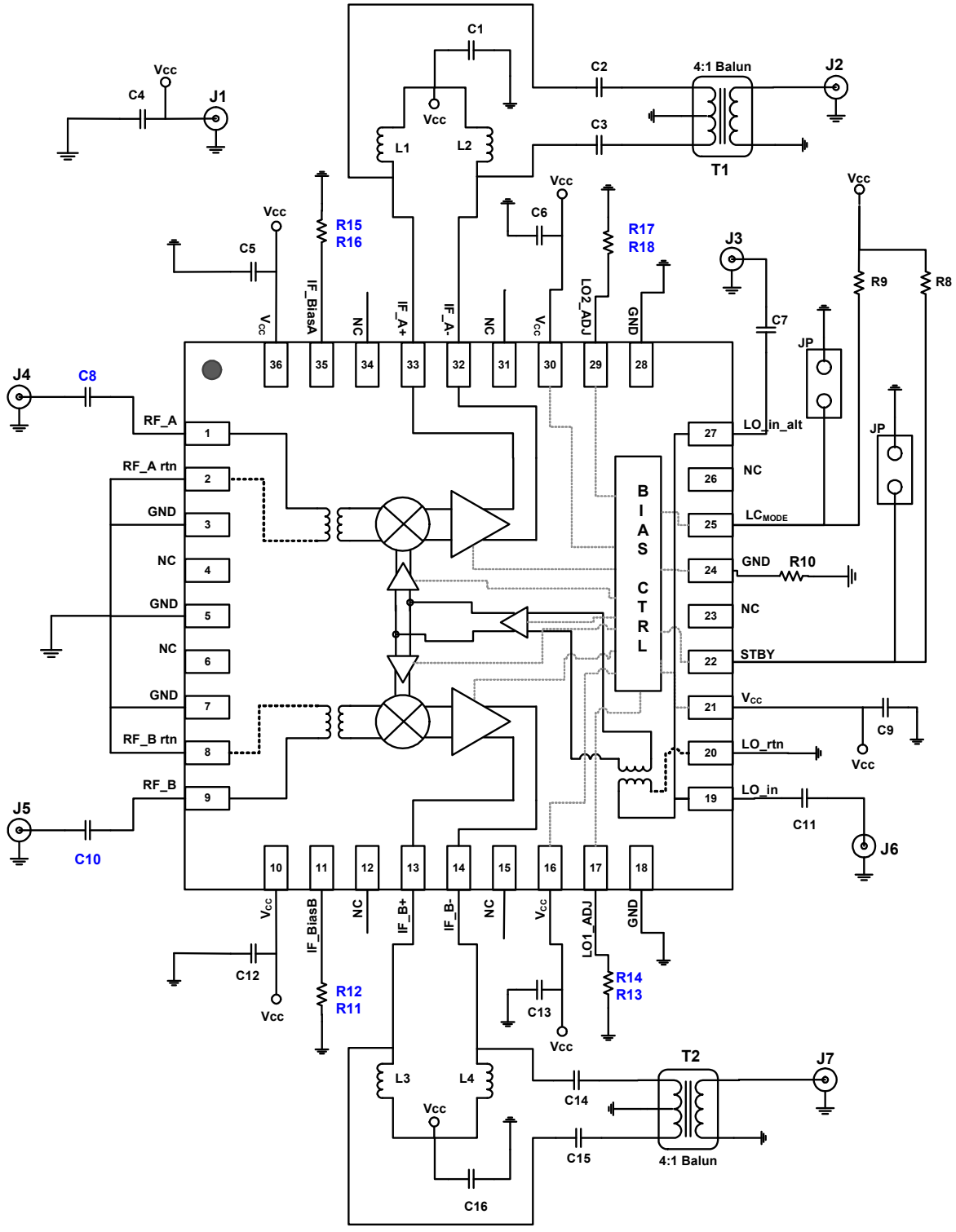
Please Note!
- Only connect to one LO feed
- Choose Either Pin 19 or Pin 27
- Do not connect the unused LO pin to ensure good LO return loss



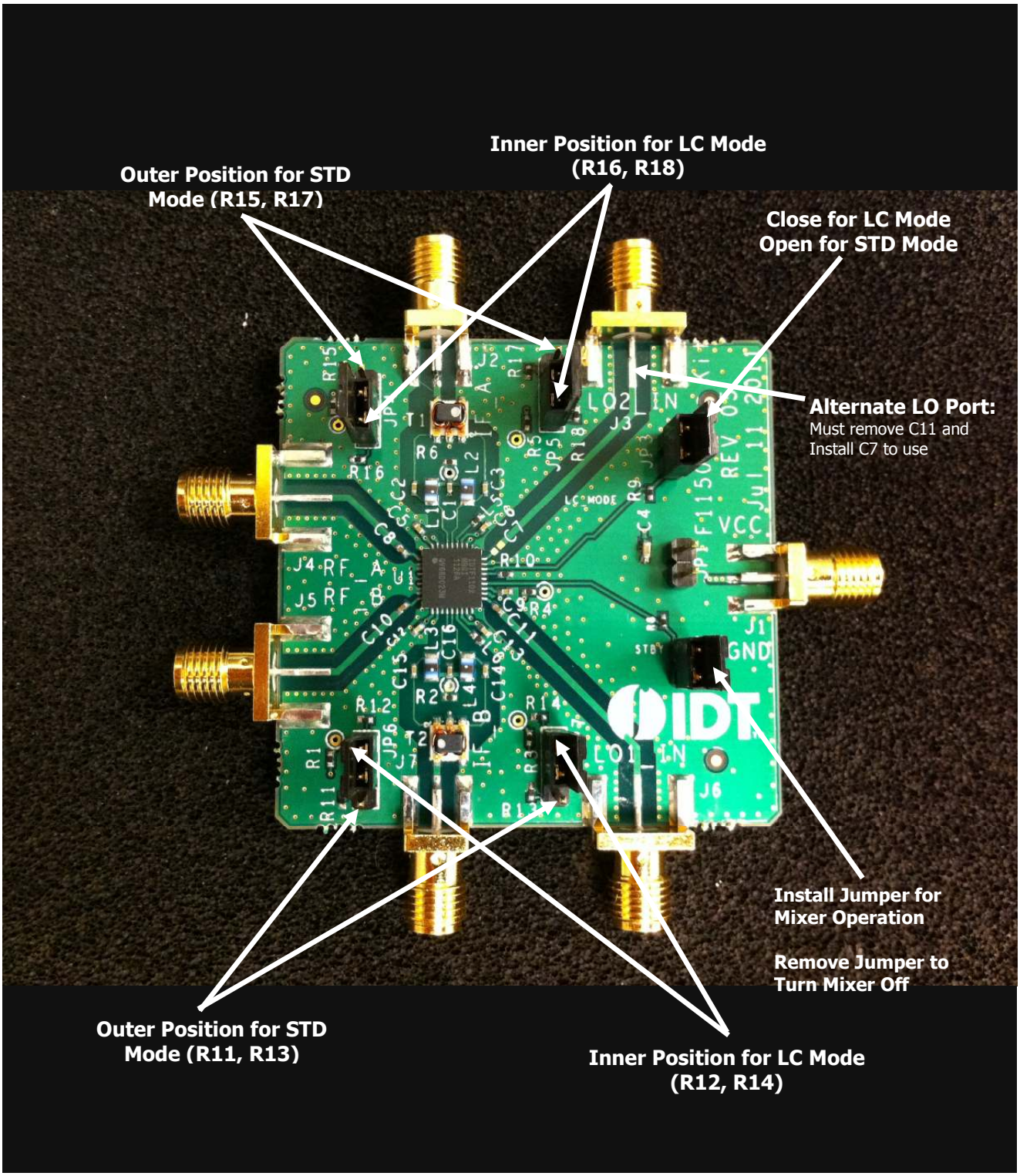
PIN DESCRIPTIONS

Pin	Name	Function
1	RF_A	Main Channel RF Input. Internally matched to 50Ω. DO NOT apply DC to these pins
2, 8, 20	RF_Artn, RF_Brtn, LO_rtn	Transformer Ground Returns. Ground these pins.
3, 5, 7, 18, 24, 28	GND	Ground these pins.
4, 6, 12, 15, 31, 23, 26, 34	N.C.	No Connection. Not internally connected. OK to connect to Vcc. OK to connect to GND
10, 16, 21, 30, 36	VCC	Power Supply. Bypass to GND with capacitors shown in the Typical Application Circuit as close as possible to pin.
9	RF_B	Diversity Channel RF Input. Internally matched to 50Ω
11	IF_BiasB	Connect the specified resistor from this pin to ground to set the bias for the Diversity IF amplifier. This is NOT a current set resistor
13, 14	IFB+, IFB-	Diversity Mixer Differential IF Output. Connect pullup inductors from each of these pins to VCC (see the Typical Application Circuit).
17	LO1_ADJ	Connect the specified resistor for either Standard or LC mode from this pin to ground to set the LO common buffer Icc
19, 27	LO_in LO_in_alt	Local Oscillator Input. Connect the LO to this port through the recommended coupling capacitor. **Note that you can only drive one LO port at a time. Remove the series capacitor from the unused port.**
25	LC_MODE	Low_Current Mode. Set this pin to low or ground for LC mode. Set to high or No-Connect for Standard mode. There is an internal pull-up resistor.
22	STBY	STBY Mode. Pull this pin high for Standby mode (~20 mA). Pull low or Ground for normal Operation
29	LO2_ADJ	Connect the specified resistor for either Standard or LC mode from this pin to ground to set the LO drive buffers Icc
32, 33	IFA-, IFA+	Main Mixer Differential IF Output. Connect pullup inductors from each of these pins to VCC (see the Typical Application Circuit).
35	IF_BiasA	Connect the specified resistor from this pin to ground to set the bias for the Main IF amplifier. This is NOT a current set resistor
	— EP	Exposed Pad. Internally connected to GND. Solder this exposed pad to a PCB pad that uses multiple ground vias to provide heat transfer out of the device into the PCB ground planes. These multiple via grounds are also required to achieve the noted RF performance.

EVKIT SCHEMATIC



EVKIT PICTURE/LAYOUT/OPERATION



EVKIT BOM

Default BOM:

For Standard Mode, Open the LC_{MODE} jumper in conjunction with positioning the 4 dual jumpers to select the resistors in **red.**

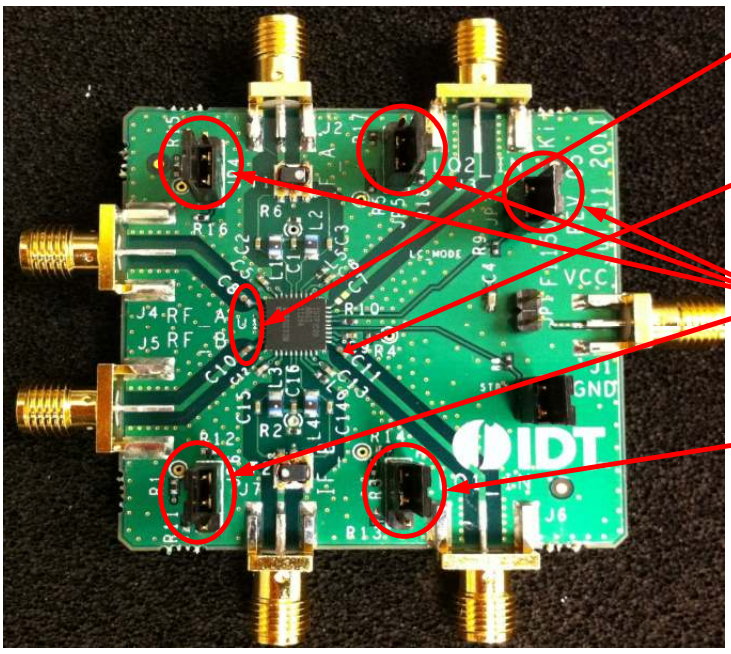
For Low Current Mode close the LC_{MODE} jumper in conjunction with positioning the 4 dual jumpers to select the resistors in **blue.**

F1162 BOM

Item #	Value	Size	Desc	Mfr. Part #	Mfr.	Part Reference	Qty
1	10nF	0402	CAP CER 10000PF 16V 10% X7R 0402	GRM155R71C103KA01D	MURATA	C1,5,6,9,12,13,16	7
2	1000pF	0402	CAP CER 1000PF 50V C0G 0402	GRM1555C1H102JA01D	MURATA	C2,3,14,15	4
3	39pF	0402	CAP CER 39PF 50V 5% C0G 0402	GRM1555C1H390JZ010	MURATA	C8,10	2
4	4.7pF	0402	CAP CER 4.7PF 50V 5% C0G 0402	GRM1555C1H4R7CZ01D	MURATA	C11	1
5	1pF	0402	Note: C7 and C11 cannot be installed together. C7 for Pin27 LO feed. C11 for Pin19 LO feed			C7	1
6	10uF	0603	CAP CER 10UF 6.3V X5R 0603	GRM188R60J106ME47D	MURATA	C4	1
7	Header 2 Pin	TH 2	CONN HEADER VERT SGL 2POS GOLD	961102-6404-AR	3M	JP1,2,3	3
8	Header 3 Pin	TH 3	CONN HEADER VERT SGL 3POS GOLD	961103-6404-AR	3M	JP4,5,6,7	4
9	SMA_END_LAUNCH	.062	SMA_END_LAUNCH	142-0711-821	Emerson Johnson	J1,2,3,4,5,6,7	7
10	270nH	0805	0805CS (2012) Ceramic Chip Inductor	0805CS-271XJLB	COILCRAFT	L1,2,3,4	4
11	40	0402	RES 40 OHM 1/10W 1% 0402 SMD	ERJ-2RKF40R2X	Panasonic	**R11,15**	2
12	63	0402	RES 63 OHM 1/10W 1% 0402 SMD	ERJ-2RKF62R0X	Panasonic	**R12,16**	2
13	91	0402	RES 91.0 OHM 1/10W 1% 0402 SMD	ERJ-2RKF91R0X	Panasonic	**R13**	1
14	180	0402	RES 180 OHM 1/10W 1% 0402 SMD	ERJ-2RKF1800X	Panasonic	**R14**	1
15	1.91k	0402	RES 1.91K OHM 1/10W 1% 0402 SMD	ERJ-2RKF1911X	Panasonic	**R18**	1
16	1.21K	0402	RES 1.21K OHM 1/10W 1% 0402 SMD	ERJ-2RKF1211X	Panasonic	**R17**	1
17	47K	0402	RES 47.0K OHM 1/16W 1% 0402 SMD	RC0402FR-0747KL	Yageo	R8,9	2
18	0	0402	RES 0.0 OHM 1/10W 0402 SMD	ERJ-2GE0R00X	Panasonic	R1,2,3,4,5,6,7,10	8
19	4:1 Balun	SM-22	4:1 Center Tap Balun	TC4-1TG2+	Mini Circuits	T1,2	2
20	F1162	QFN-36	Diversity Downconverter	F1162NBGI	IDT	U1	1
21	PCB			F1162 EVKit Rev5			1

Modified BOM (for High Side Injection LC Mode):

EVkit Modifications for High Side Injection Low Current Mode (see TOCs on pages 15 – 17)



TOPMARKINGS