



**THE DATASHEET OF
F1150NBGI**



GENERAL DESCRIPTION

This document describes the specifications for the IDTF1150 Zero-Distortion™ RF to IF Downconverting Mixer. This device is part of a series of downconverting 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 F1150 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 1700 - 2200 MHz with High Side Injection. IF frequencies from 50 to 450 MHz are supported. Nominally, the device offers +40 dBm Output IP3 with 335 mA of I_{CC}. Alternately one can adjust 4 resistor values and a toggle pin to run the device in low current mode with +36 dBm Output IP3 and 235 mA of I_{CC}.

COMPETITIVE ADVANTAGE

In typical basestation receivers the RF to IF mixer dominates the linearity performance for the entire receive system. Zero-Distortion mixers dramatically improve the maximum signal levels (IM₃ 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. IDT's innovative design allows realization of either benefit.

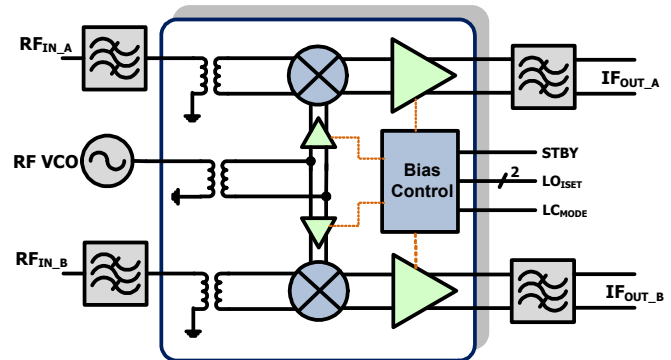
- ✓ IP_{3o}: ↑ **5 dB** STD Mode, ↑ **2 dB** LC Mode
- ✓ Dissipation: ↓ **40%** LC Mode, ↓ **12%** STD Mode
- ✓ Allows for higher RF gain improving **Sensitivity**



FEATURES

- Dual Path for Diversity Systems
- Ideal for Multi-Carrier Systems
- 8.5 dB Gain (200 MHz IF)
- Ultra linear +38 dBm IP_{3o} (350 MHz IF)
- Ultra linear **+40 dBm IP_{3o} (200 MHz IF)**
- Low NF < 10 dB
- 200 Ω output impedance
- Ultra high +13 dBm P_{1dB_I}
- **Pin Compatible** with existing solutions
- 6x6 36 pin package
- **Power Down mode**
- < 200 nsec settling from Power Down
- Minimizes Synth pulling in Standby Mode
- Low Current Mode : **I_{CC} = 235 mA**
- Standard Mode: I_{CC} = 335 mA

DEVICE BLOCK DIAGRAM

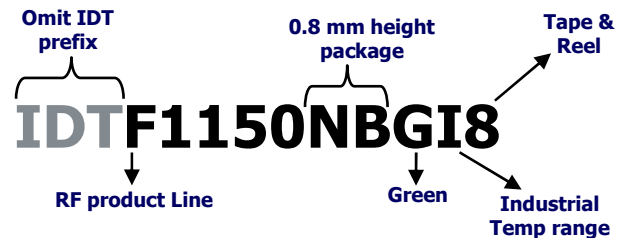


PART# MATRIX

| 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 | 1,2,3,4,9,10,11,21 ¹ ,24 ¹ ,33,34,35,36,37,39 | 50 - 350 | 8.4 | Low Side |
| F1162 | 2200 - 2700 | 7,38,40,41 ² | 50 - 500 | 8.9 | Both |

1 - with High side injection
2 - With High side or Low side injection

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-, LO_IN | -0.3V to (VCC ₋ + 0.3V) |
| LO1_ADJ, LO2_ADJ, IF_BiasA, IF_BiasB to GND | -0.3V to +1.2V |
| 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 | +2.1°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.

RF to IF Dual Downconverting Mixer
1700 - 2200 MHz F1150NBGI
IDTF1150 SPECIFICATION (1700 – 2200 MHz MIXER w/HIGH SIDE INJECTION)

Specifications apply at $V_{CC} = +5.0V$, $F_{RF} = 1850 \text{ MHz}$, $F_{IF} = 350\text{MHz}$, $P_{LO} = 0 \text{ dBm}$, $T_C = +25^\circ\text{C}$, $STBY = GND$, $LC_{MODE} = V_{IH}$ (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, LC_{MODE} Pins | I_{IH}, I_{IL} | -30 | | +30 | 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} | | 334 | 375 | mA |
| Supply Current | Total V_{CC} , LC Mode ▪ $LC_{MODE} = GND$ ▪ EVkit BOM = LC Mode ▪ Total Both Channels | I_{LC} | | 235 | 260 | mA |
| Supply Current | Standby Mode ▪ $STBY = V_{IH}$ ▪ Total Both Channels | I_{STBY} | | 23 | 30 | mA |
| RF Freq Range | Operating Range | F_{RF} | | 1700 to 2200 | | MHz |
| IF Freq Range | Operating Range | F_{IF} | | 50 to 450 | | MHz |
| LO Freq Range | High Side Injection | F_{LO} | | 1750 to 2650 | | MHz |
| LO Power | | P_{LO} | | -3 to +6 | | dBm |
| RF Input Impedance | Single Ended Return Loss ~17 dB | Z_{RF} | | 50 | | Ω |
| IF Output Impedance | Differential Return Loss ~ 13 dB | Z_{IF} | | 200 | | Ω |
| LO port Impedance | Single Ended Return Loss ~15 dB | Z_{LO} | | 50 | | Ω |
| Settling Time | <ul style="list-style-type: none"> 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} | | 0.155 | | μsec |
| Gain STD Mode | Conversion Gain <ul style="list-style-type: none"> $F_{RF} = 1710 \text{ MHz}$ $LC_{MODE} = V_{IH}$ EVkit BOM = STD Mode $F_{IF} = 350 \text{ MHz}$ | G_{STD} | 7.0 | 8.1 | 8.6 | dB |
| Gain LC Mode | Conversion Gain <ul style="list-style-type: none"> $F_{RF} = 2050 \text{ MHz}$ $LC_{MODE} = GND$ EVkit BOM = LC Mode $F_{IF} = 200 \text{ MHz}$ | G_{LC} | 7.2 | 8.2 | 8.8 | dB |
| NF STD Mode | Noise Figure | NF_{STD} | | 10 | | dB |

IDTF1150 SPECIFICATION (CONTINUED)

| Parameter | Comment | Symbol | min | typ | max | units |
|---------------------------------------|--|--------------------|-----------|-------------|-------|-------|
| NF LC Mode | Noise Figure <ul style="list-style-type: none"> LC_{MODE} = GND EVKit BOM = LC Mode F_{IF} = 200 MHz | NF _{LC} | | 9.6 | | dB |
| NF w/Blocker | <ul style="list-style-type: none"> -100 MHz offset blocker P_{IN} = +4 dBm F_{IF} = 250 MHz | NF _{BLK} | | 17.5 | | dB |
| Output IP3 – Narrowband | <ul style="list-style-type: none"> P_{IN} = -10 dBm per tone 800 KHz Tone Separation | IP3 _{O1} | 36 | 38 | | dBm |
| Output IP3 – Wideband | <ul style="list-style-type: none"> P_{IN} = -10 dBm per tone 30 MHz Tone Separation | IP3 _{O2} | | 37 | | dBm |
| Output IP3 – LC _{MODE} | <ul style="list-style-type: none"> P_{IN} = -5 dBm per tone F_{RF} = 1850 MHz F_{IF} = 200 MHz 800 KHz Tone Separation LC_{MODE} = GND EVKit BOM = LC Mode | IP3 _{O3} | 33 | 36 | | dBm |
| 2RF – 2LO rejection | <ul style="list-style-type: none"> P_{RF} = -10 dBm Frequency = F_{RF} + ½ F_{IF} | 2x2 | | -74 | -64 | dBc |
| 1 dB Compression | <ul style="list-style-type: none"> Input referred | P1dB _{I1} | 12 | 12.8 | | dBm |
| 1 dB Compression - LC _{MODE} | <ul style="list-style-type: none"> Input referred LC_{MODE} = GND EVKit BOM = LC Mode F_{IF} = 200 MHz | P1dB _{I2} | 8 | 10.6 | | dBm |
| Gain Comp. w/blocker | <ul style="list-style-type: none"> 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 | | 52 | | dB |
| LO to IF leakage | | ISO _{LI} | | -39 | -35 | dBm |
| RF to IF leakage | P _{in} = -10 dBm | ISO _{RI} | | -30 | -22.5 | dBm |
| LO to RF leakage | | ISO _{LR} | | -40 | | dBm |

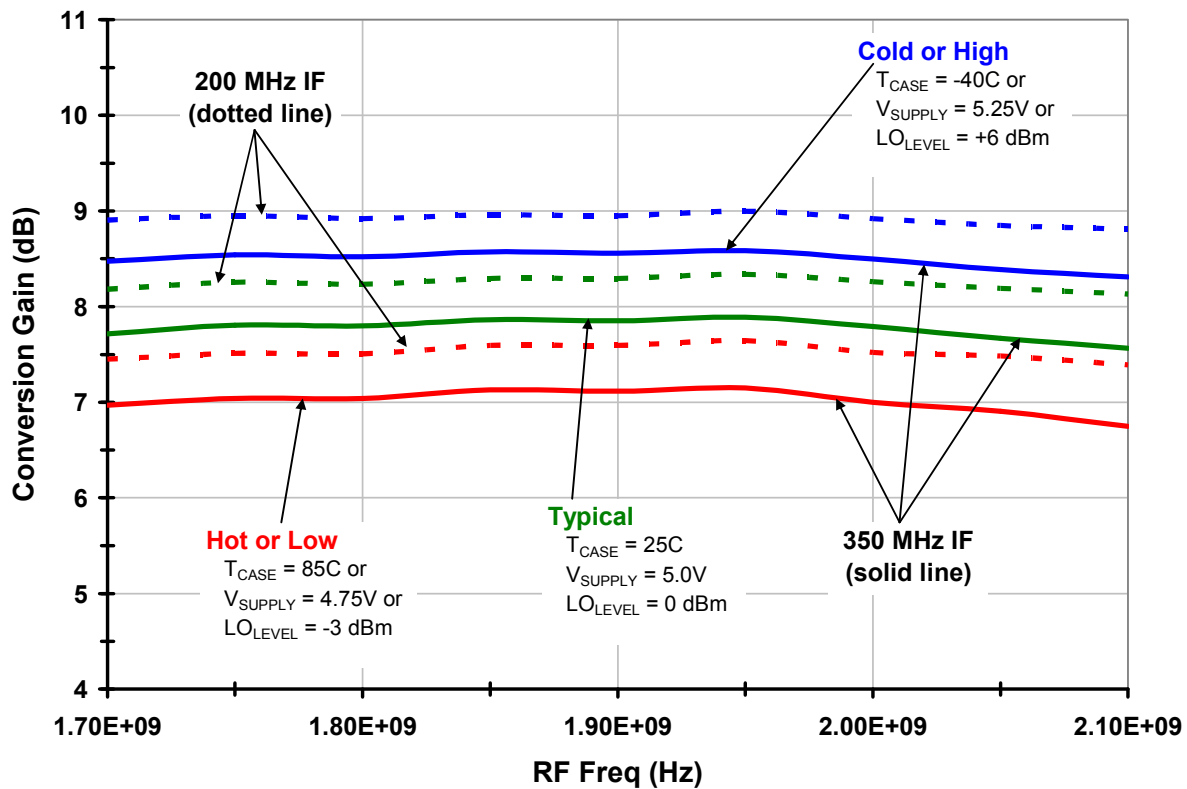
1 – Items in min/max columns in ***bold italics*** are Guaranteed by Test

2 – All other Items in min/max columns are Guaranteed by Design Characterization

TYPICAL OPERATING CONDITIONS

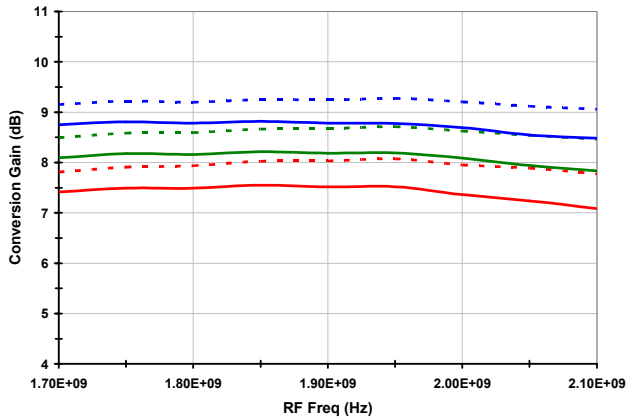
Unless otherwise Noted, the following Apply

- High Side Injection, 350 MHz IF & 200 MHz IF
- RF frequency = 1850 MHz for single point measurements
- Average of Channel A & Channel B
- Pin = -10 dBm, 800KHz Tone Spacing
- Use the Decoder example below for the Typ Op graphs on pages 6 – 10 & 13 - 17

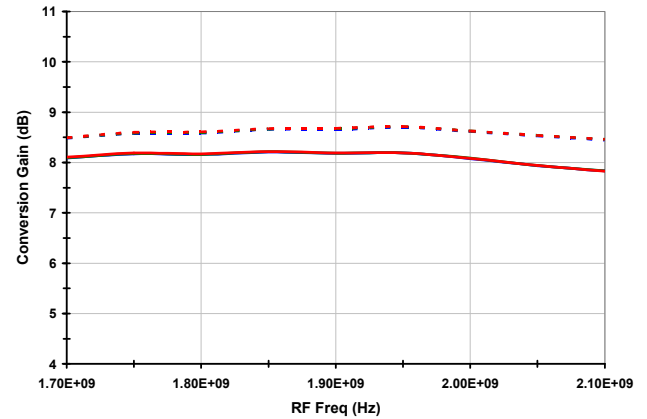


TYPICAL OPERATING CONDITIONS STD MODE (1) — SEE TRACE DECODER ON PAGE 5

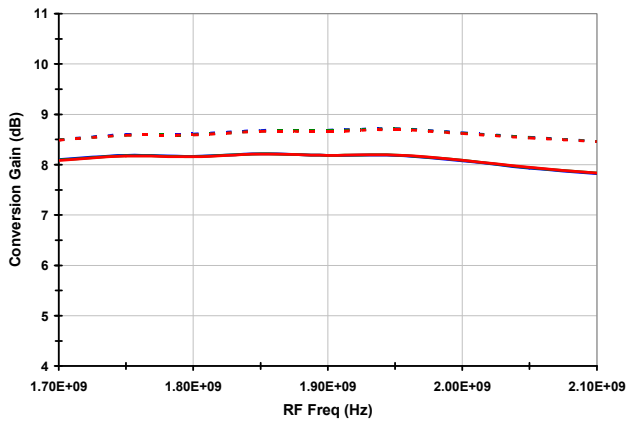
Gain vs. Temperature



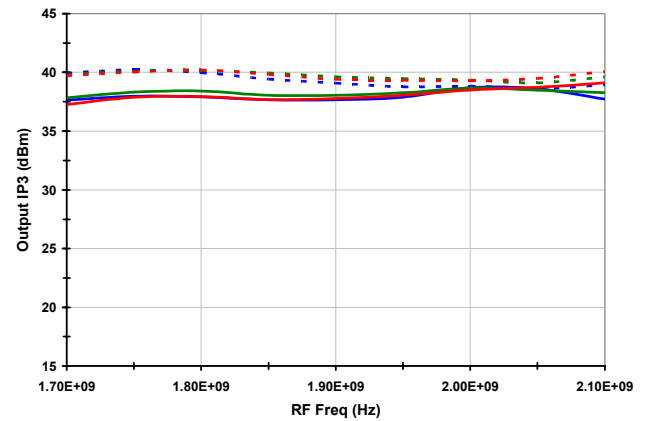
Gain vs. V_{CC}



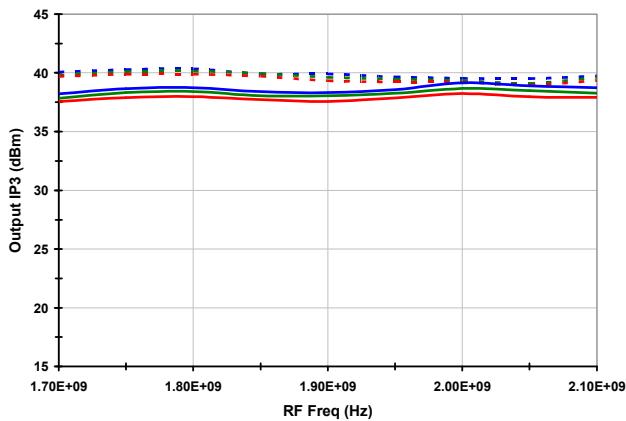
Gain vs. LO Level



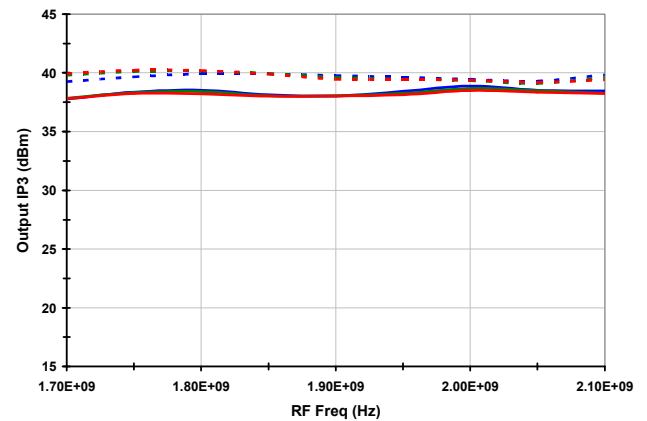
Output IP3 vs. Temperature



Output IP3 vs. V_{CC}

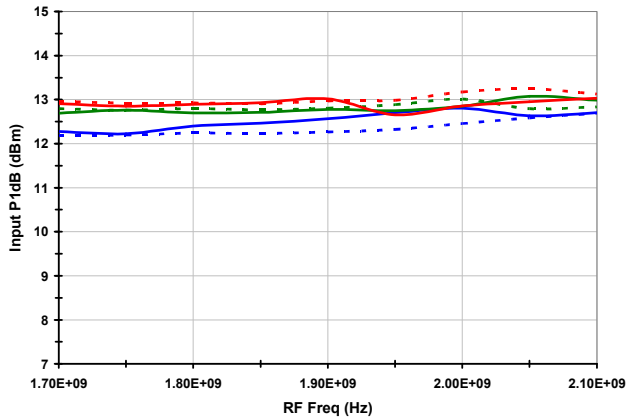


Output IP3 vs. LO Level

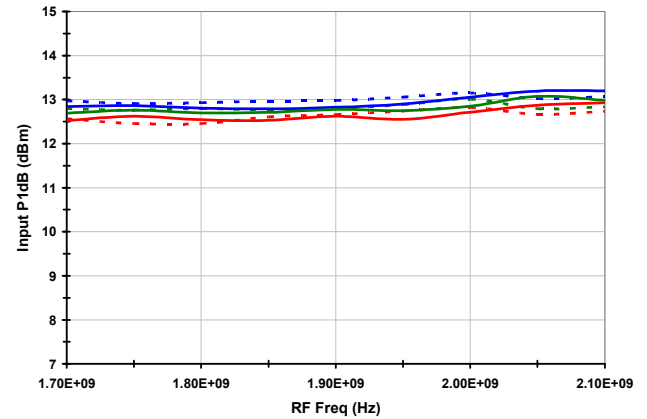


TYPICAL OPERATING CONDITIONS STD MODE (2) - SEE TRACE DECODER ON PAGE 5

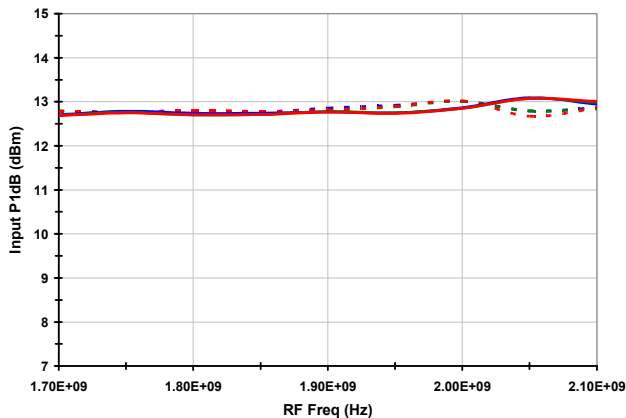
P1dB vs. Temperature



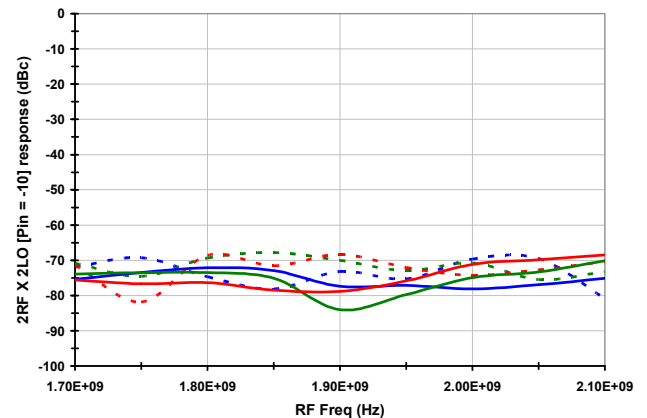
P1dB vs. V_{CC}



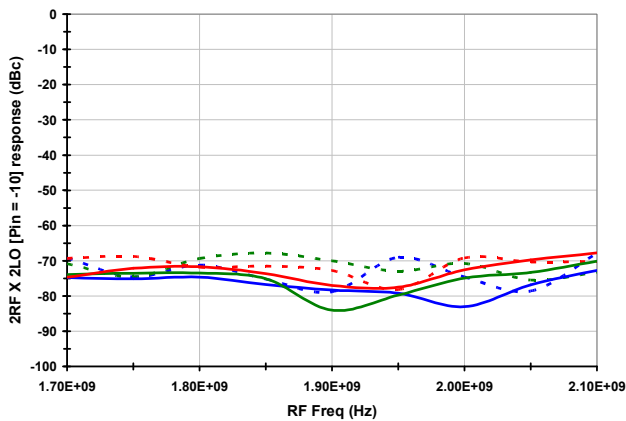
P1dB vs. LO Level



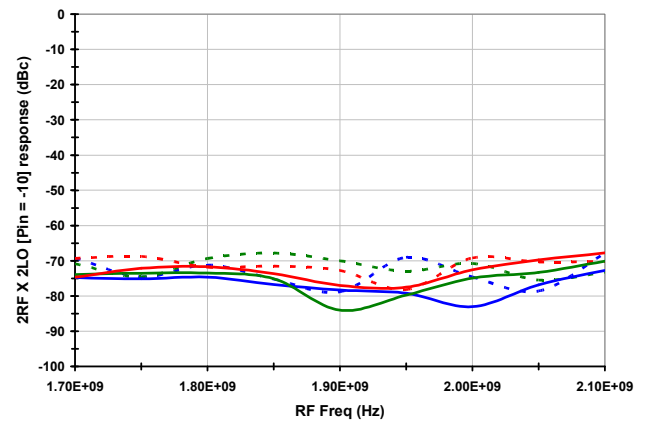
2RF x 2LO rejection vs. Temperature



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

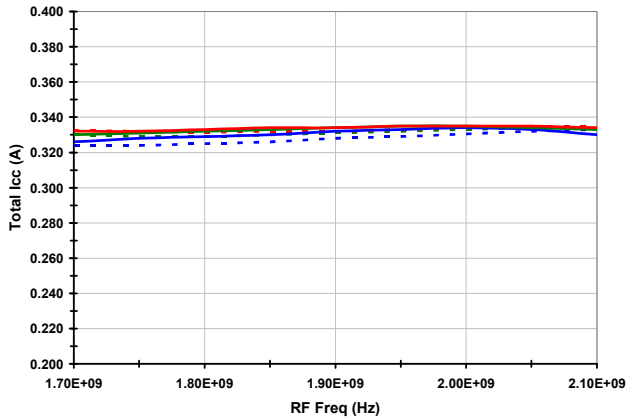


2RF x 2LO rejection vs. LO Level

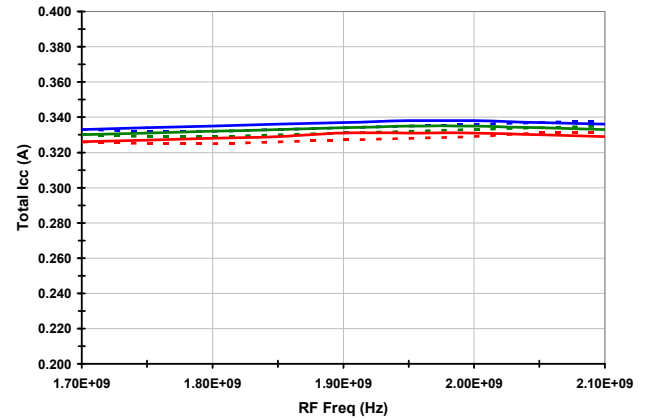


TYPICAL OPERATING CONDITIONS STD MODE (3) – SEE TRACE DECODER ON PAGE 5

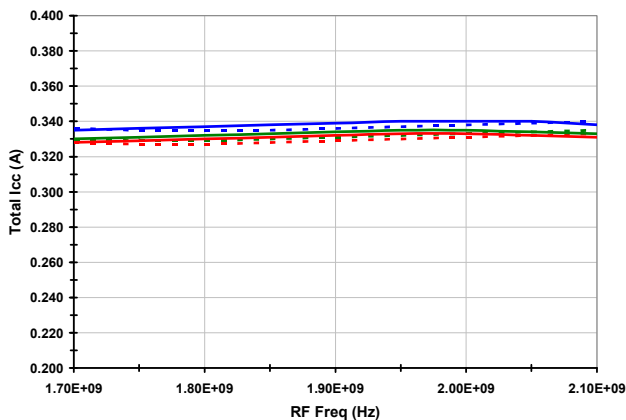
I_{CC} vs. Temperature



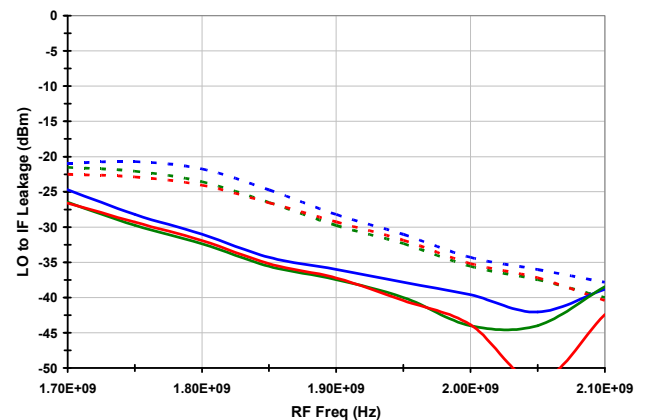
I_{CC} vs. V_{CC}



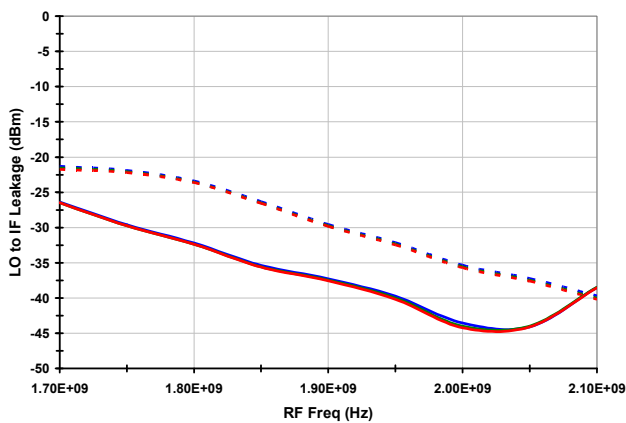
I_{CC} vs. LO Level



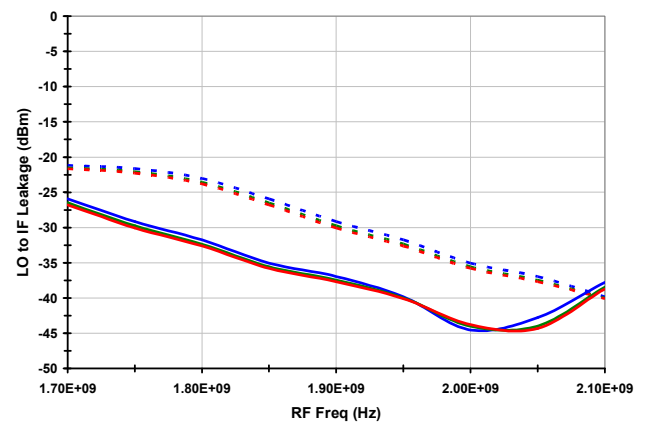
LO-IF Leakage vs. Temperature



LO-IF Leakage vs. V_{CC}

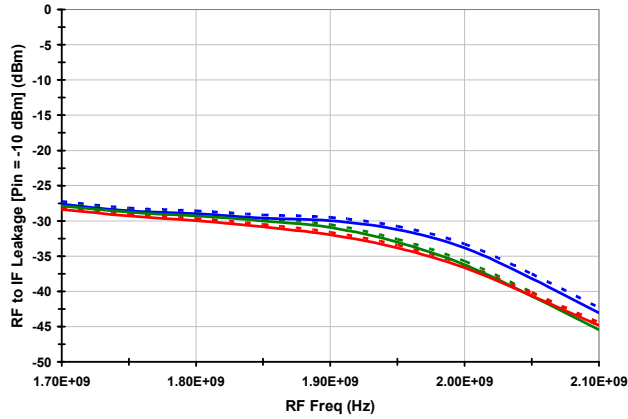


LO-IF Leakage vs. LO Level

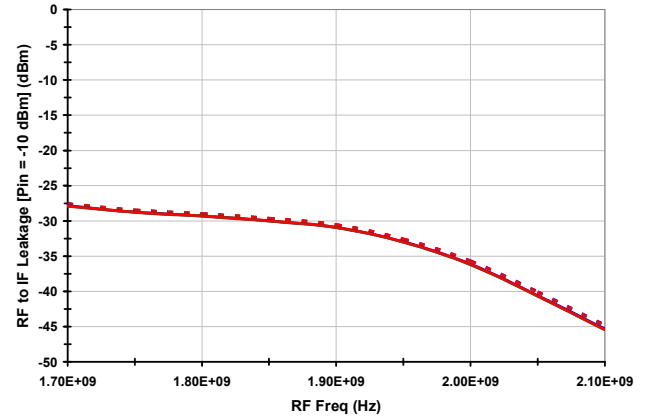


TYPICAL OPERATING CONDITIONS STD MODE (4) – SEE TRACE DECODER ON PAGE 5

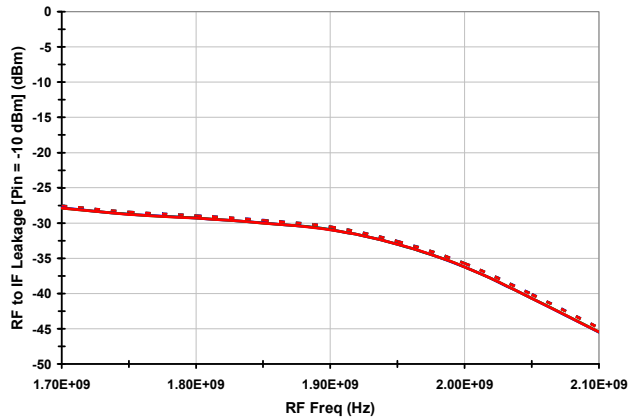
RF-IF Leakage vs. Temperature



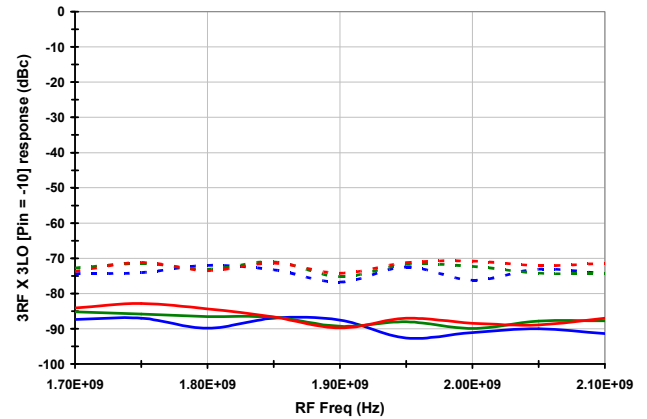
RF-IF Leakage vs. V_{CC}



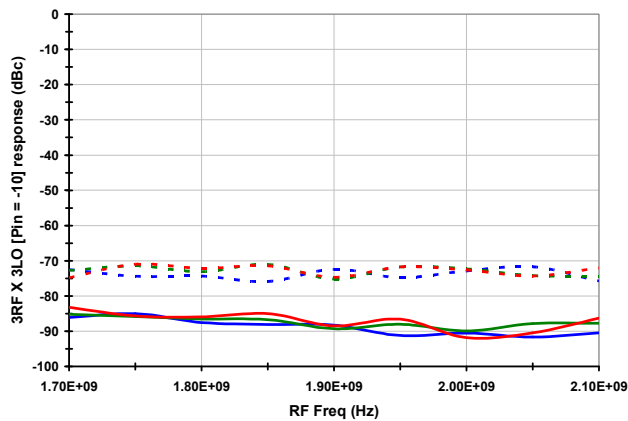
RF-IF Leakage vs. LO Level



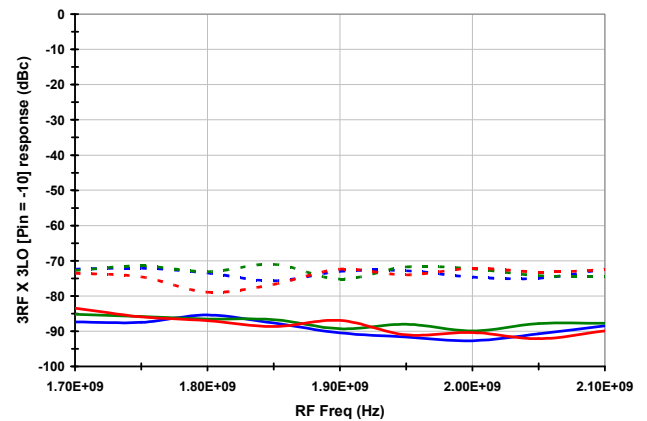
3RF X 3LO Rejection vs. Temperature



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

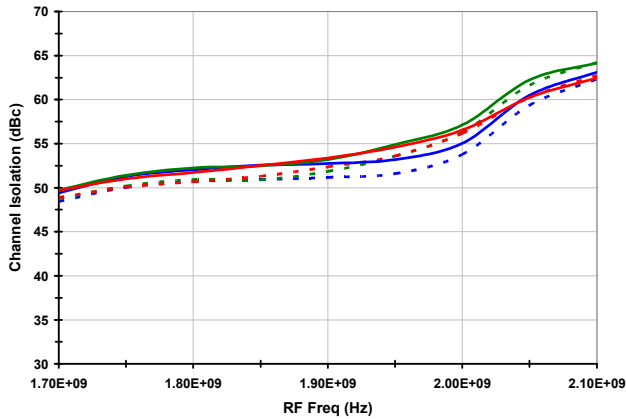


3RF X 3LO Rejection vs. LO Level

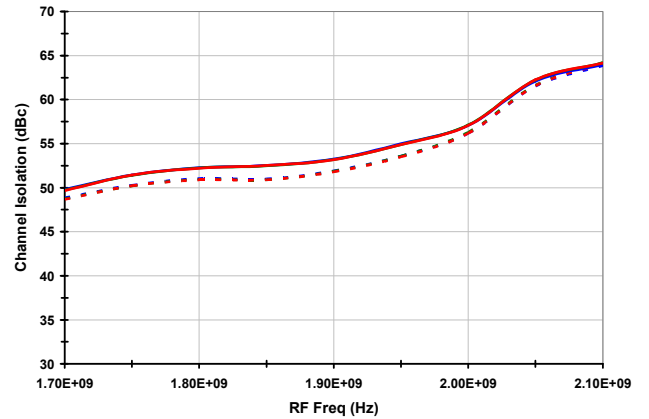


TYPICAL OPERATING CONDITIONS STD MODE (5) – SEE TRACE DECODER ON PAGE 5

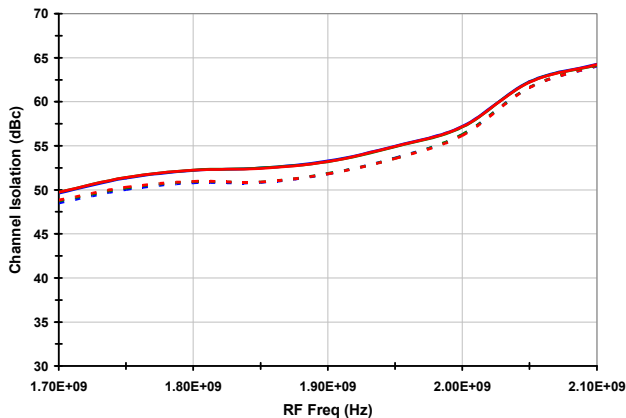
Channel Isolation vs. Temperature



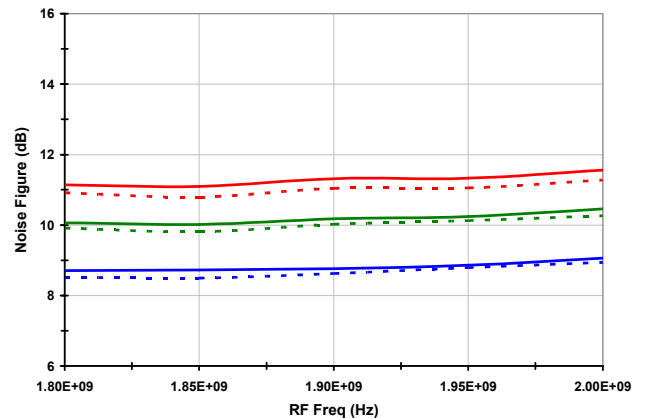
Channel Isolation vs. V_{CC}



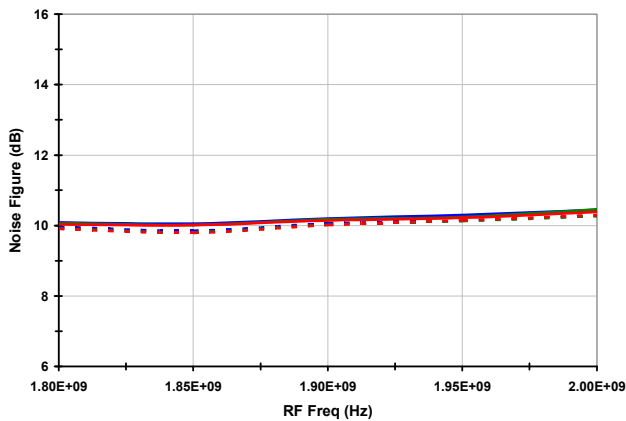
Channel Isolation vs. LO Level



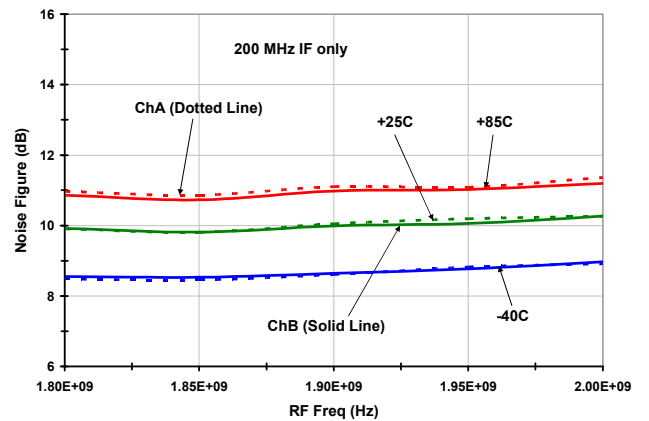
Noise Figure vs. Temperature



Noise Figure vs. V_{CC}

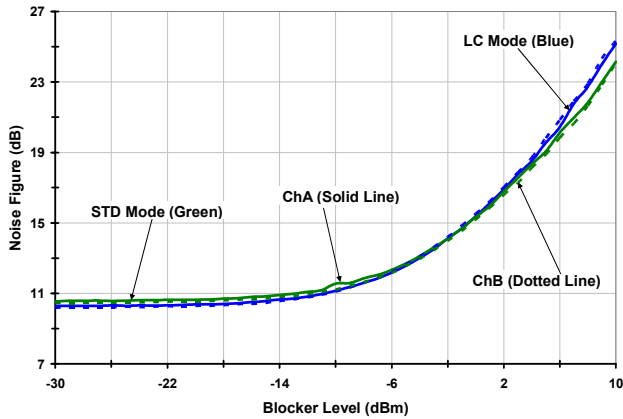


Noise Figure ChA vs. ChB

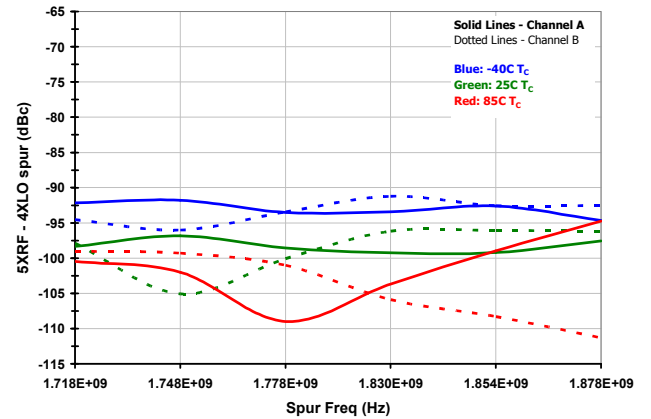


TYPICAL OPERATING CONDITIONS – GENERAL (-1-)

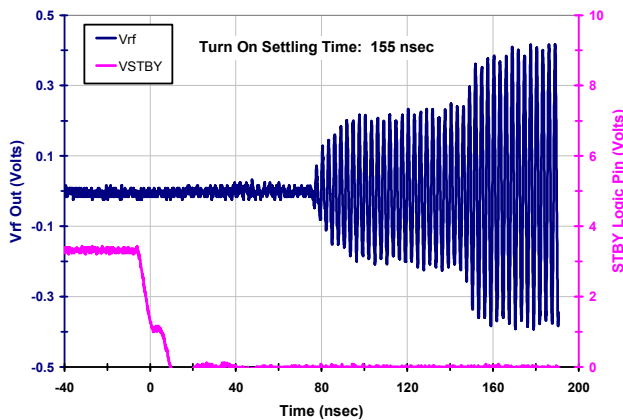
NF v. Blocker (RF = 1850 MHz, IF = 250 MHz, T_A = 25C)



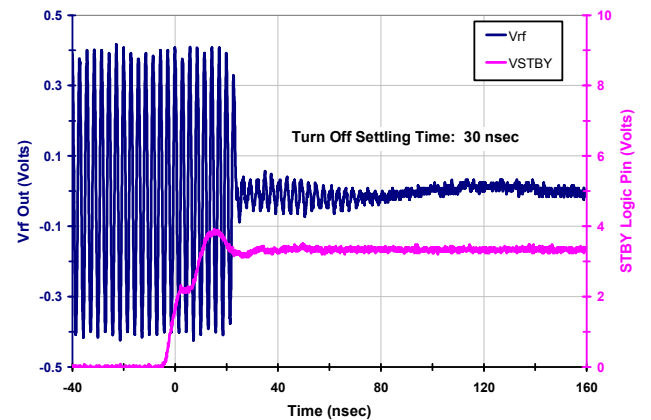
5x-4 Spur (+5 dBm Pin, IF = 350 MHz, STD Mode)



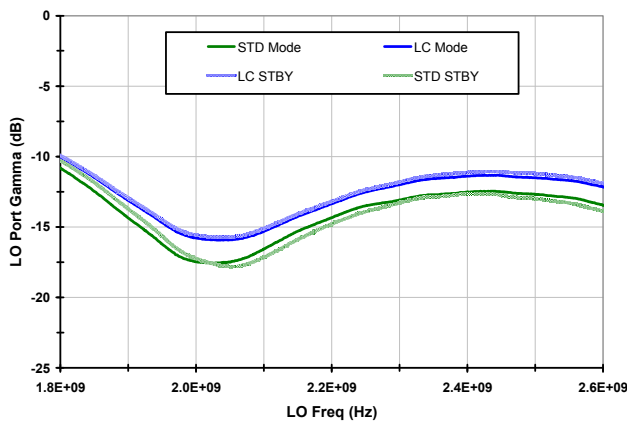
Settling Time (STBY -> V_{IL})



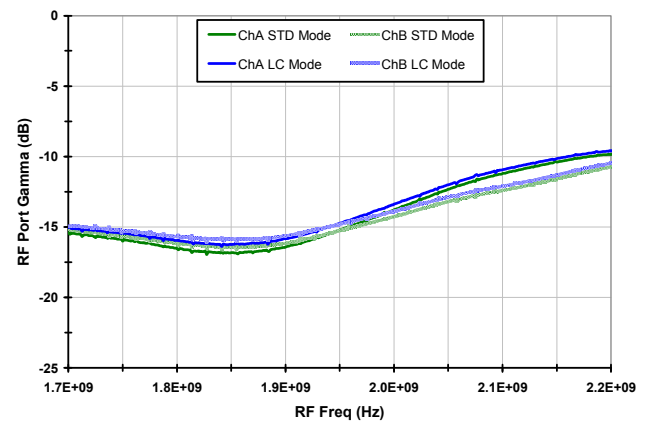
Settling Time (STBY -> V_{IH})



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

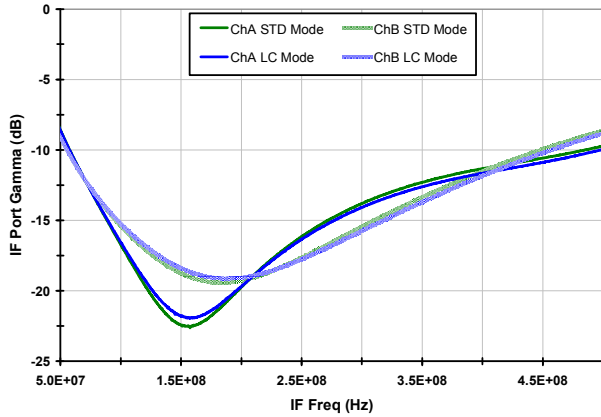


EVkit RF Port Match (T_A = 25C)

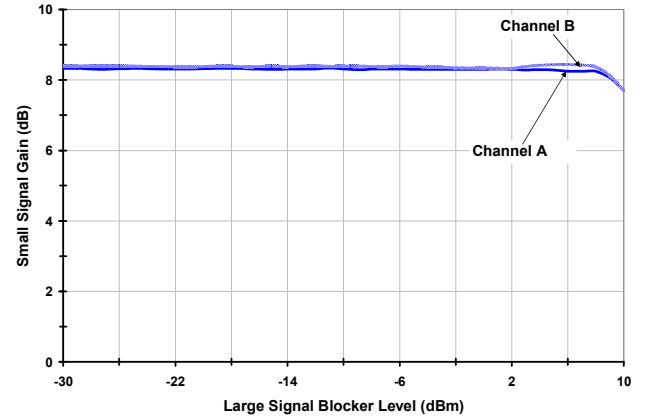


TYPICAL OPERATING CONDITIONS – GENERAL (-2-)

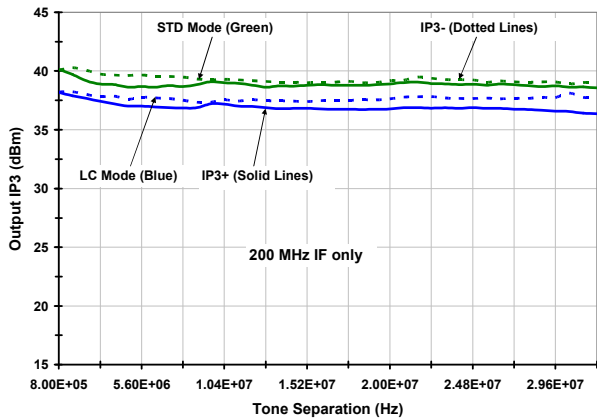
EVkit IF Port Match ($T_A = 25C$)



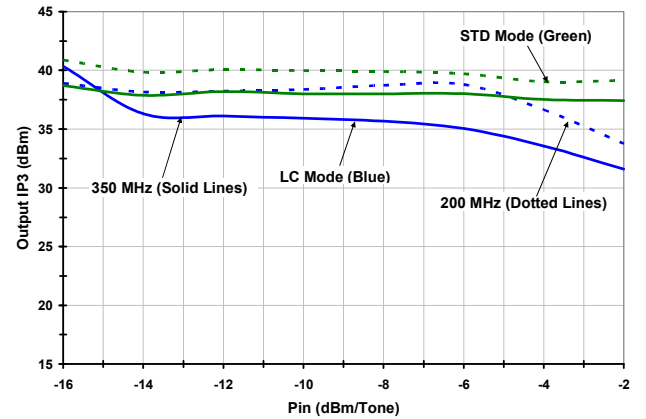
Small Signal Compression (IF = 250 MHz, STD Mode)



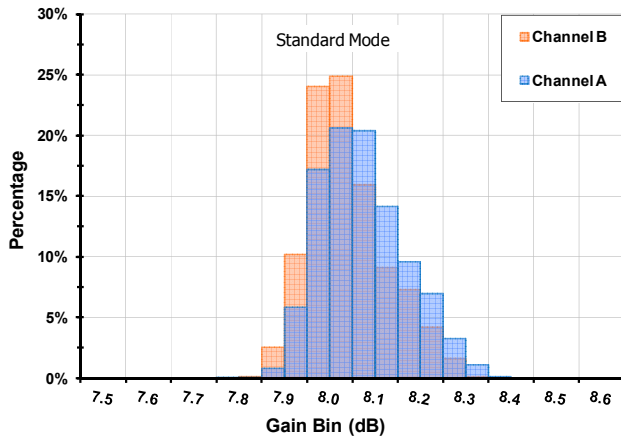
IP_{3O} vs. Tone Δf ($T_A = 25C$, Freq = 1850 MHz)



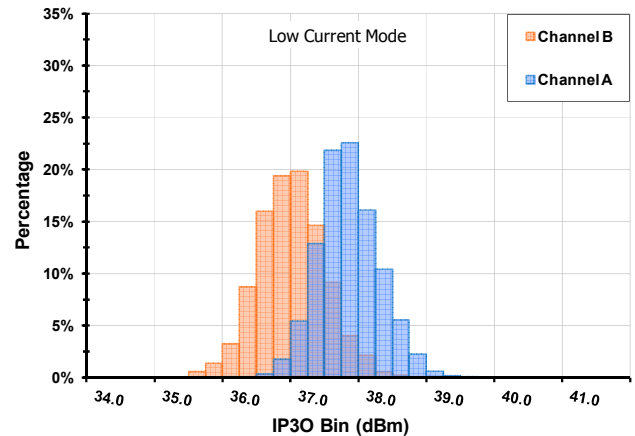
IP_{3O} vs. RF Power ($T_A = 25C$, Freq = 1850 MHz)



Gain Distribution (N = 2348, F_{RF} = 1710M, F_{IF} = 350M)

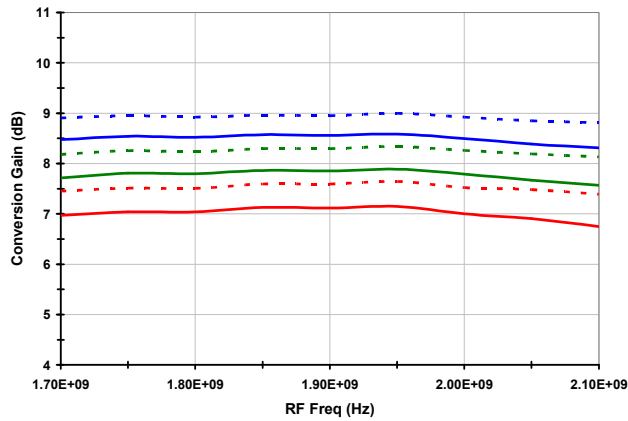


IP_{3O} Distribution (N = 2348, F_{RF} = 1850M, F_{IF} = 200M)

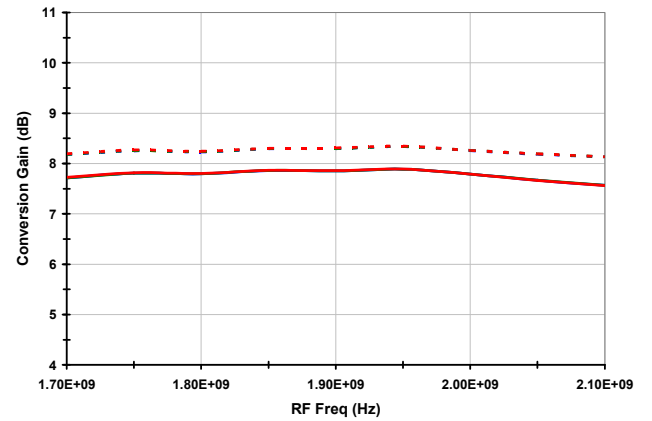


TYPICAL OPERATING CONDITIONS LC MODE (1) — SEE TRACE DECODER ON PAGE 5

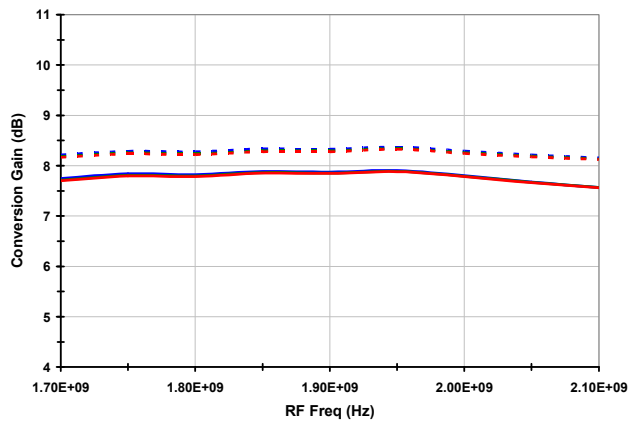
Gain vs. Temperature



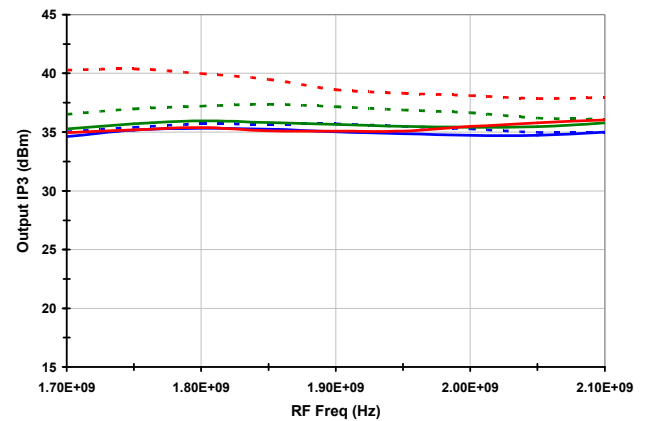
Gain vs. V_{CC}



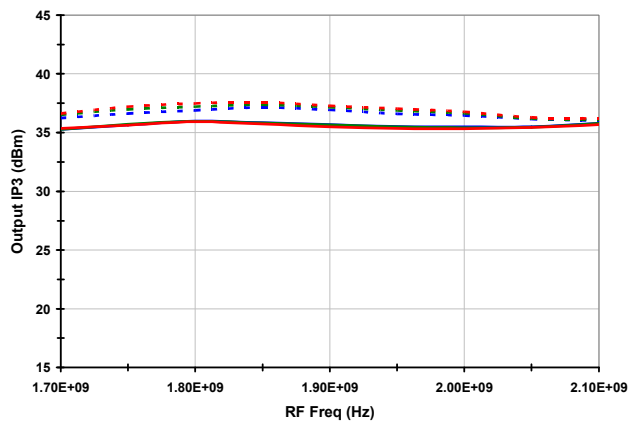
Gain vs. LO Level



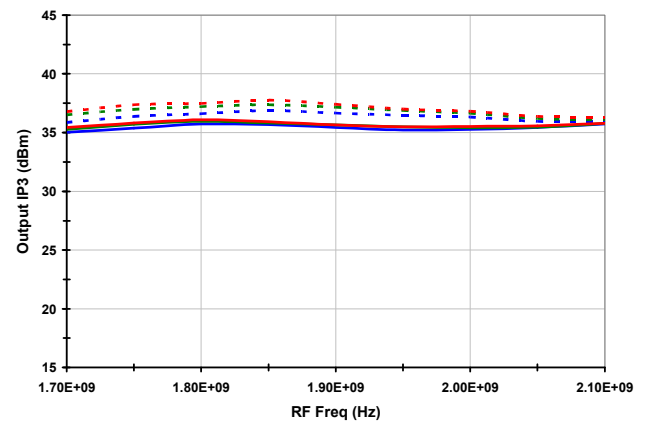
Output IP3 vs. Temperature



Output IP3 vs. V_{CC}

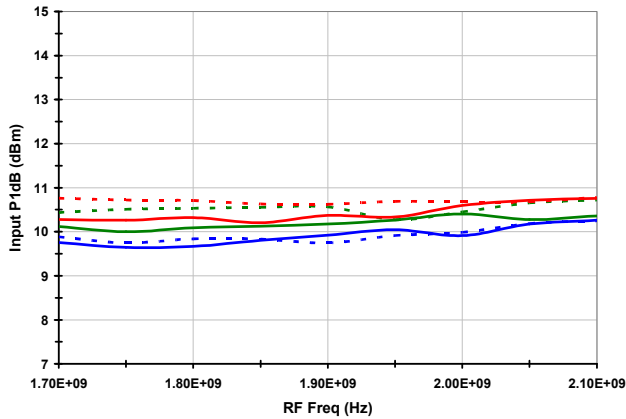


Output IP3 vs. LO Level

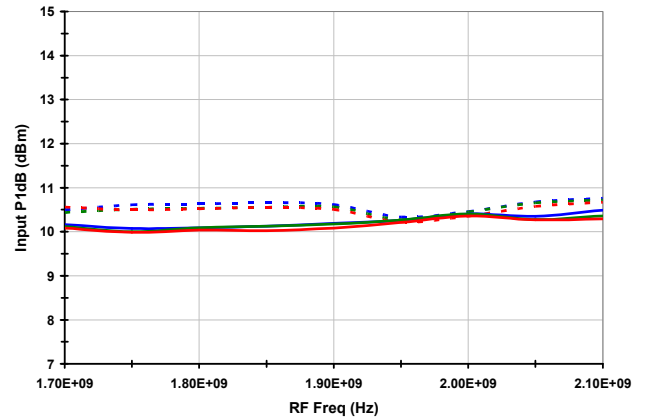


TYPICAL OPERATING CONDITIONS LC MODE (2) - SEE TRACE DECODER ON PAGE 5

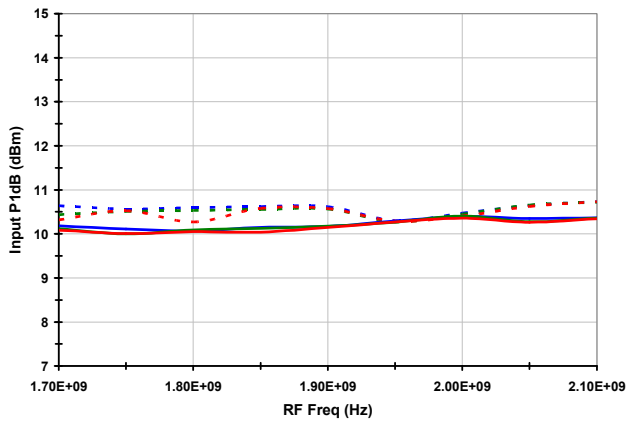
P1dB vs. Temperature



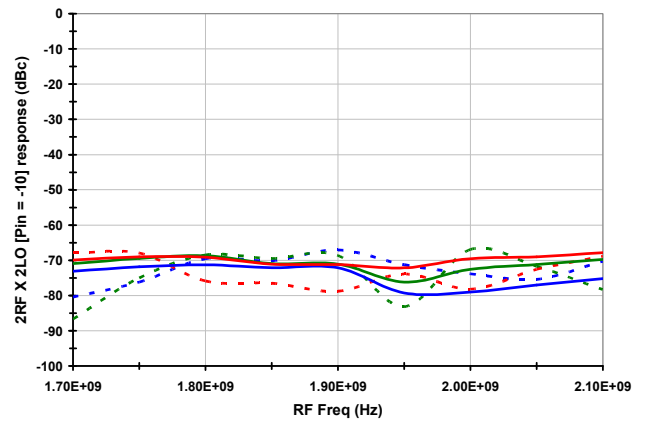
P1dB vs. V_{CC}



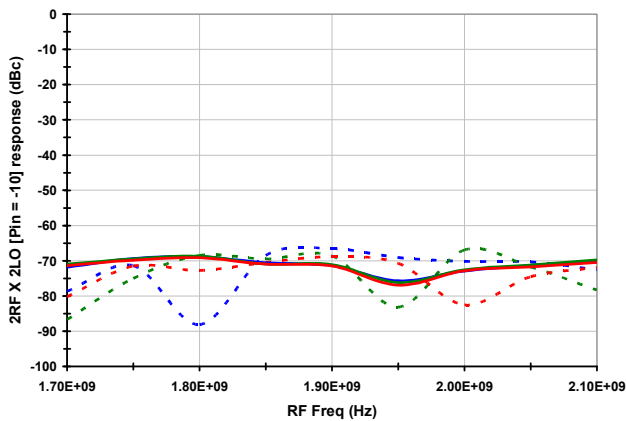
P1dB vs. LO Level



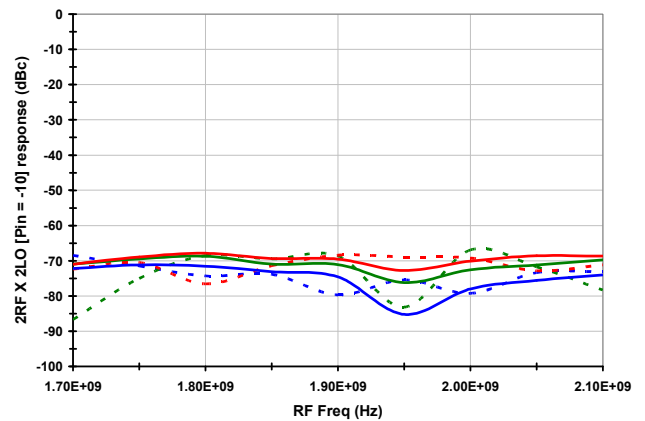
2RF x 2LO rejection vs. Temperature



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

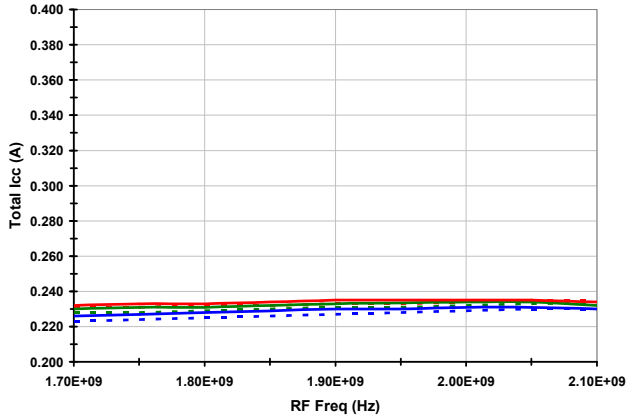


2RF x 2LO rejection vs. LO Level

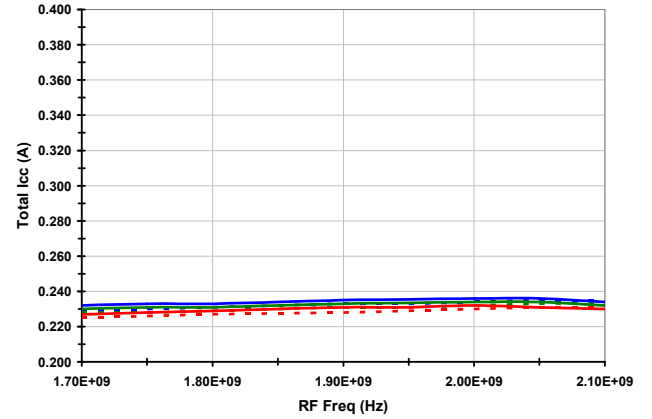


TYPICAL OPERATING CONDITIONS LC MODE (3) – SEE TRACE DECODER ON PAGE 5

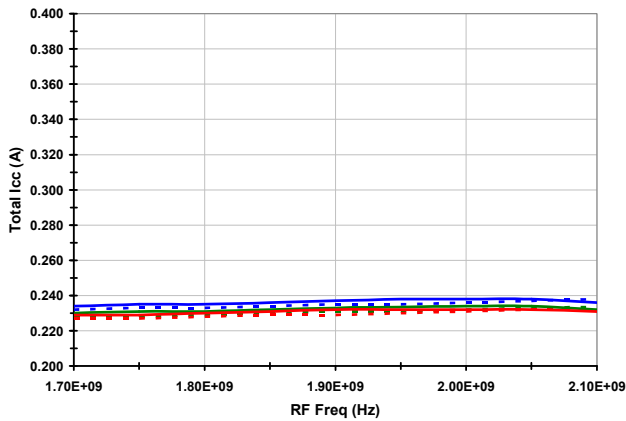
I_{CC} vs. Temperature



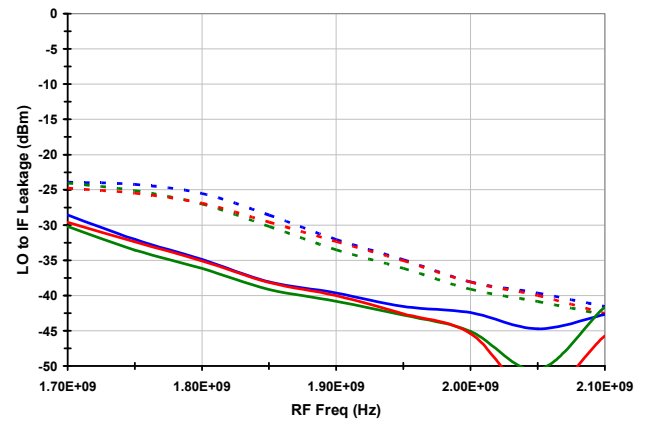
I_{CC} vs. V_{CC}



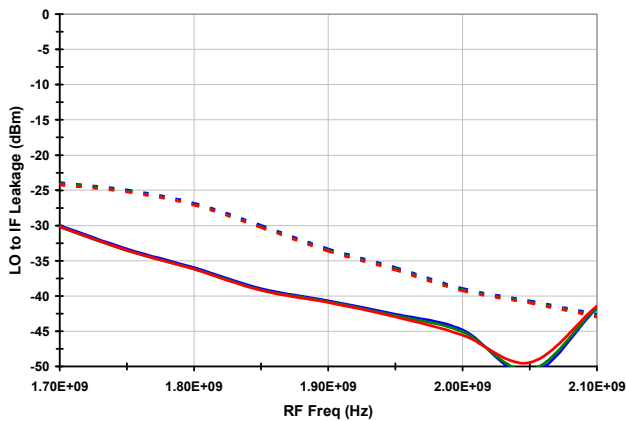
I_{CC} vs. LO Level



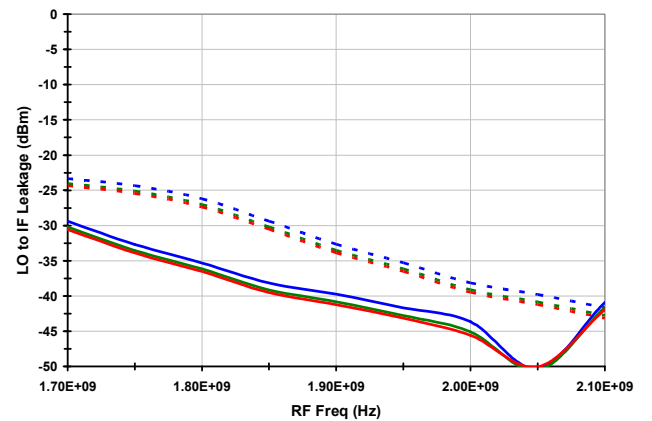
LO-IF Leakage vs. Temperature



LO-IF Leakage vs. V_{CC}

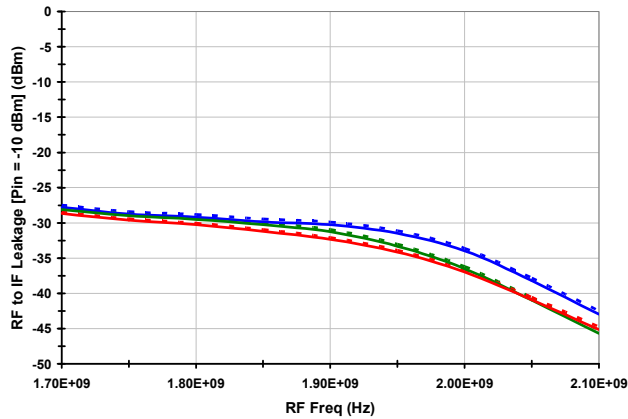


LO-IF Leakage vs. LO Level

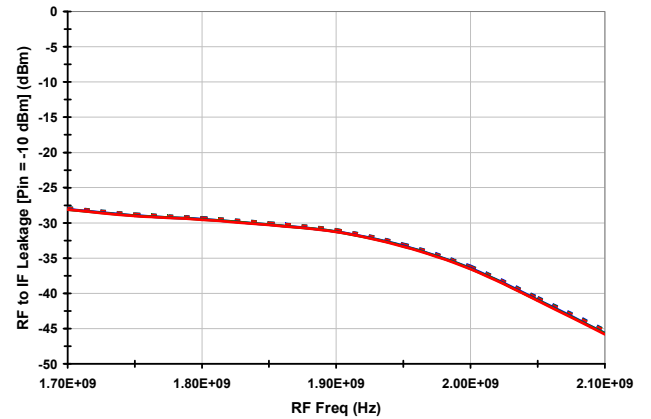


TYPICAL OPERATING CONDITIONS LC MODE (4) — SEE TRACE DECODER ON PAGE 5

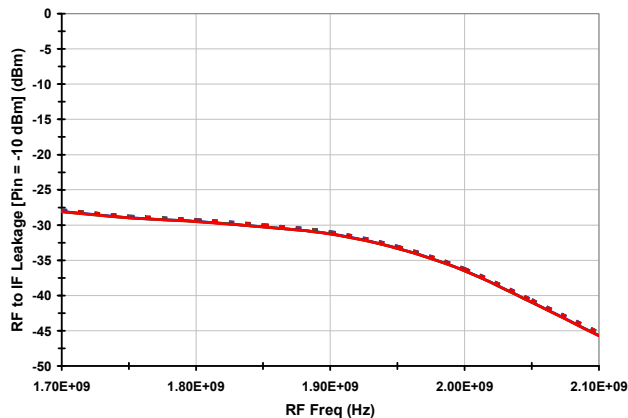
RF-IF Leakage vs. Temperature



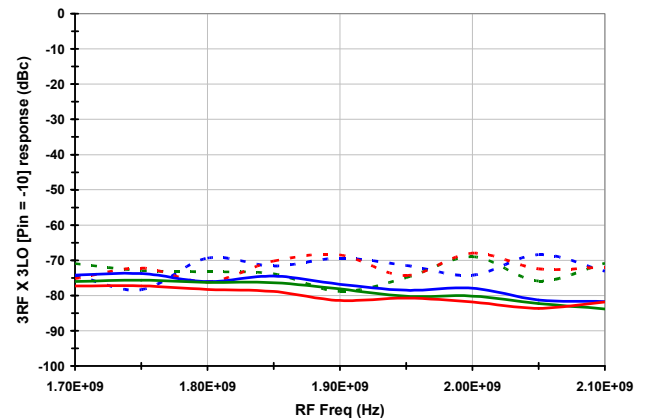
RF-IF Leakage vs. V_{CC}



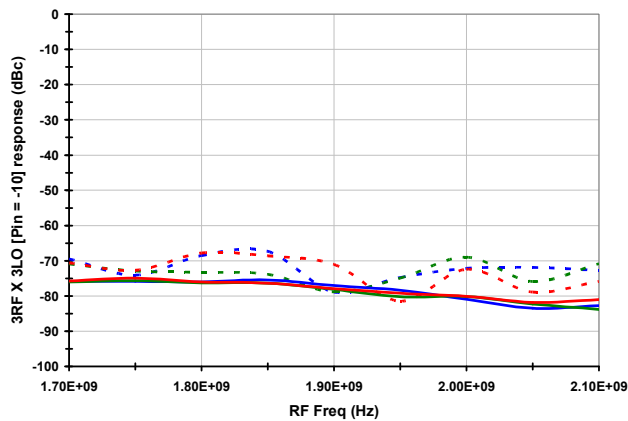
RF-IF Leakage vs. LO Level



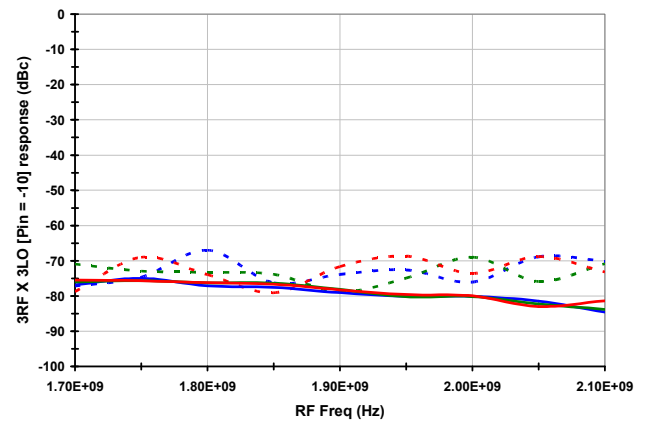
3RF X 3LO Rejection vs. Temperature



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

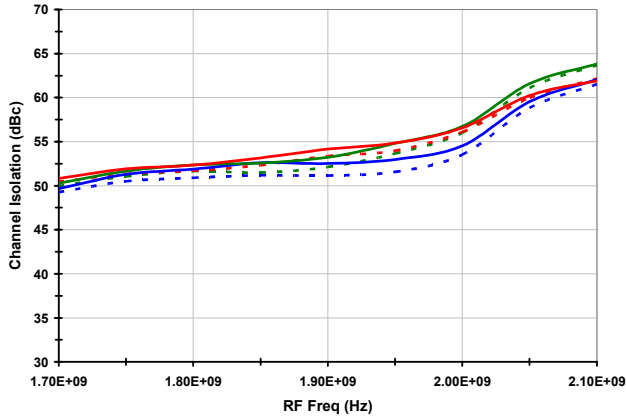


3RF X 3LO Rejection vs. LO Level

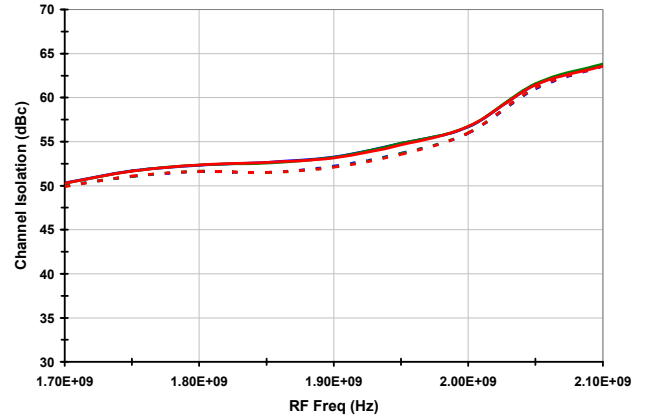


TYPICAL OPERATING CONDITIONS LC MODE (5) — SEE TRACE DECODER ON PAGE 5

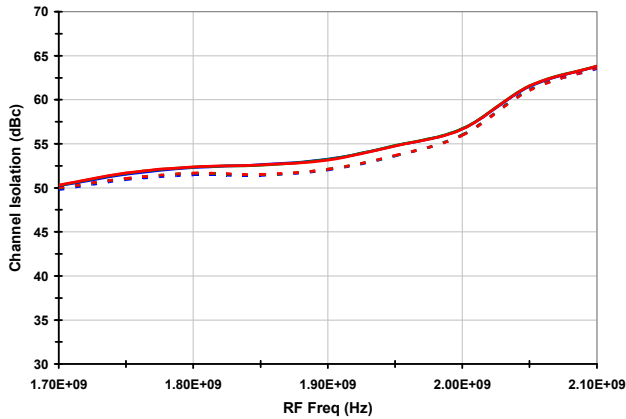
Channel Isolation vs. Temperature



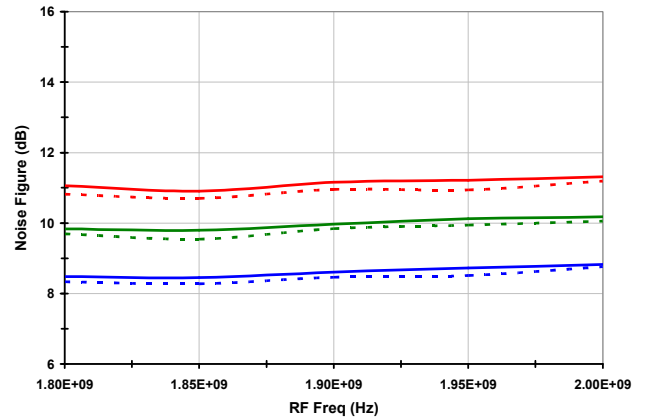
Channel Isolation vs. V_{CC}



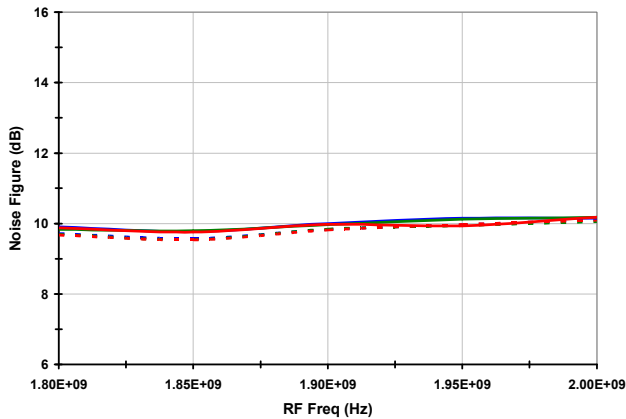
Channel Isolation vs. LO Level



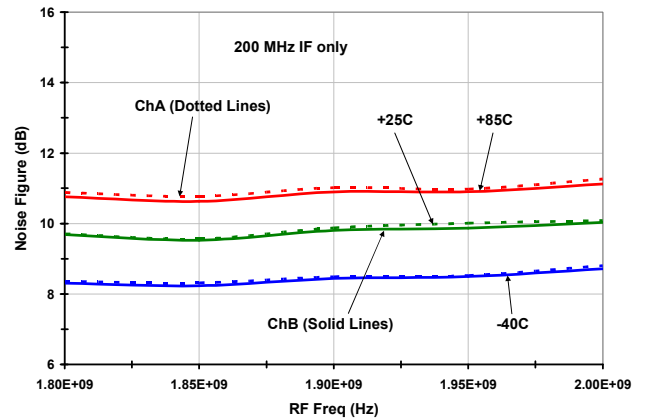
Noise Figure vs. Temperature



Noise Figure vs. V_{CC}

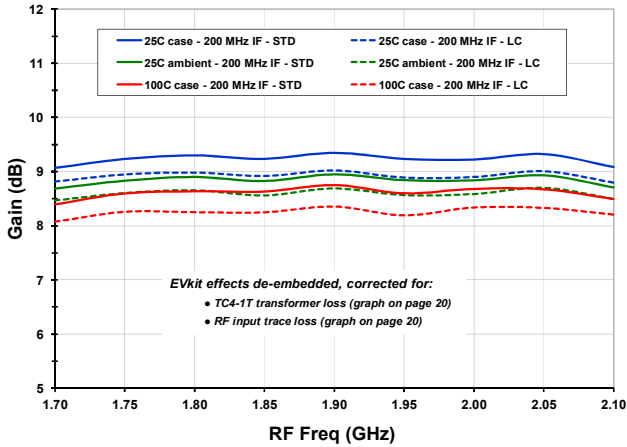


Noise Figure ChA vs. ChB

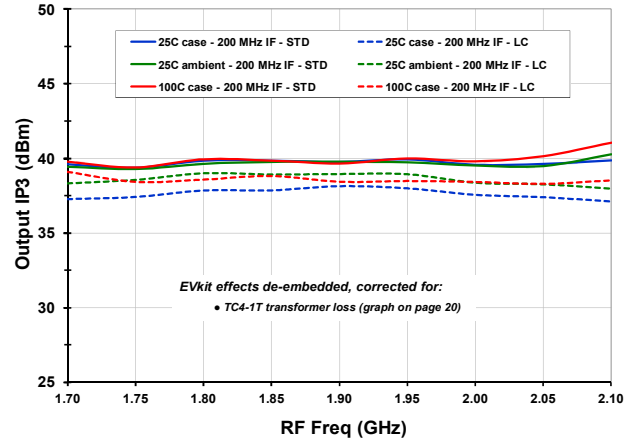


HIGH TEMP OPERATING CONDITIONS [200 MHz IF] (1)

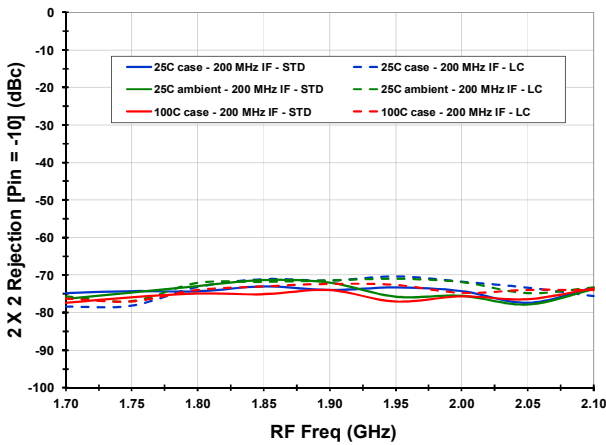
Gain [EVKit de-embedded]



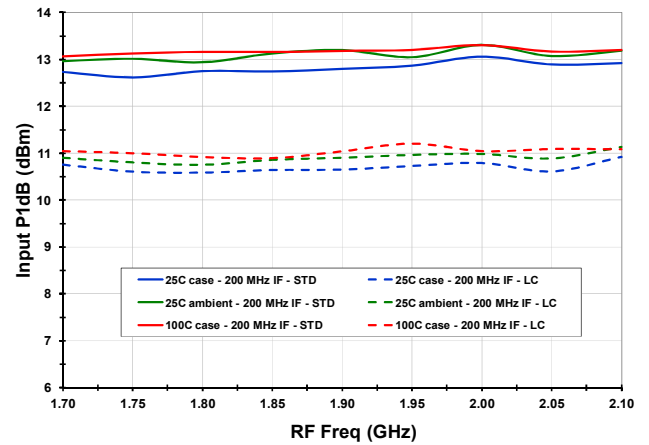
Output IP3 [EVkit de-embedded]



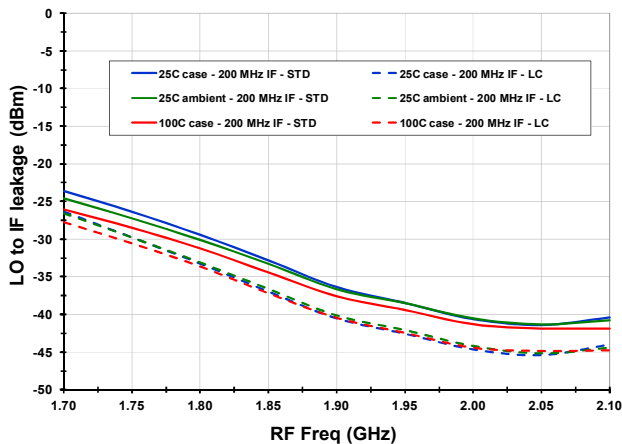
2RF x 2LO rejection



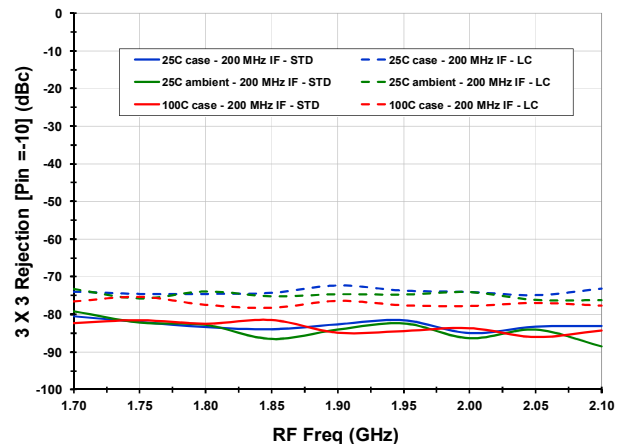
Input 1dB Compression



LO - IF leakage

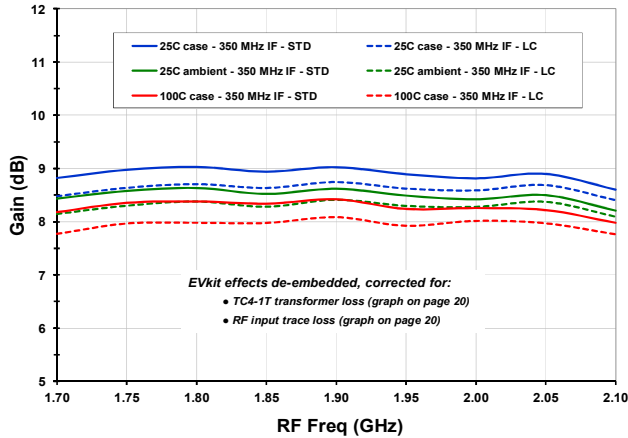


3RF x 3LO rejection

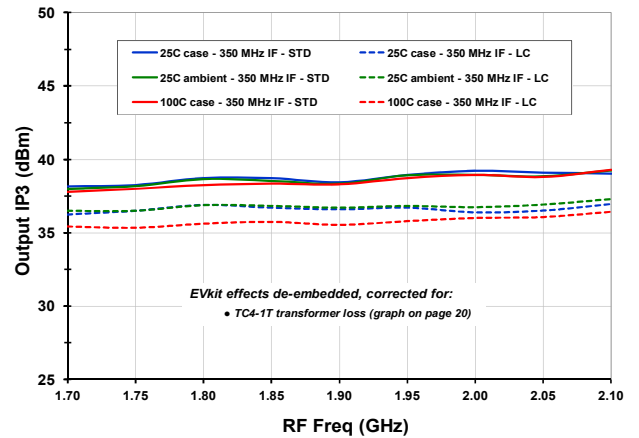


HIGH TEMP OPERATING CONDITIONS [350 MHz IF] (2)

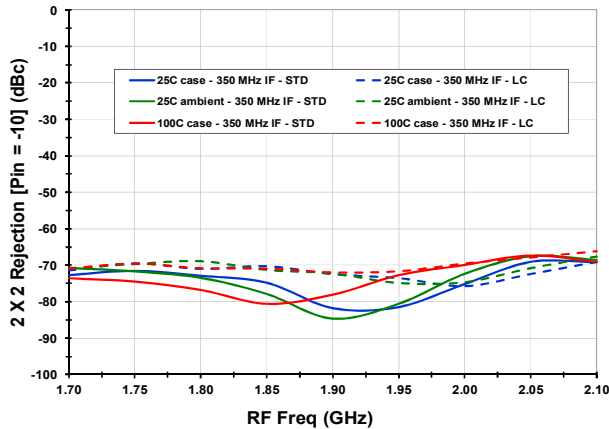
Gain [EVKit de-embedded]



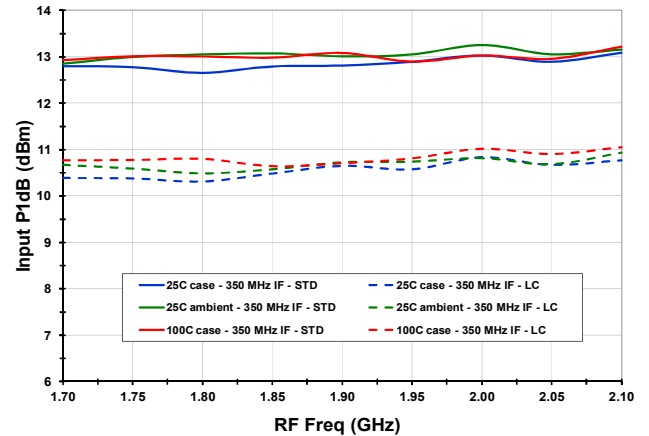
Output IP3 [EVKit de-embedded]



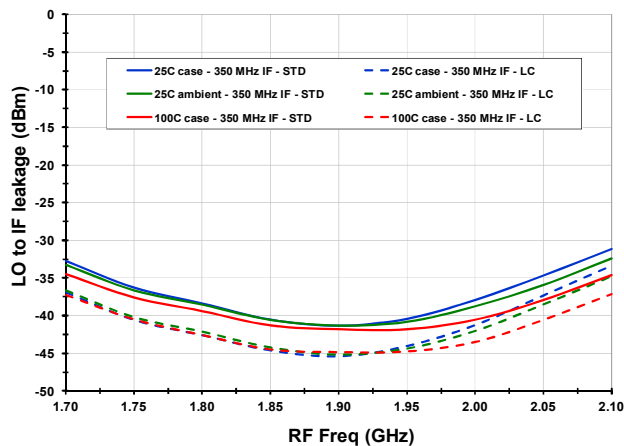
2RF x 2LO rejection



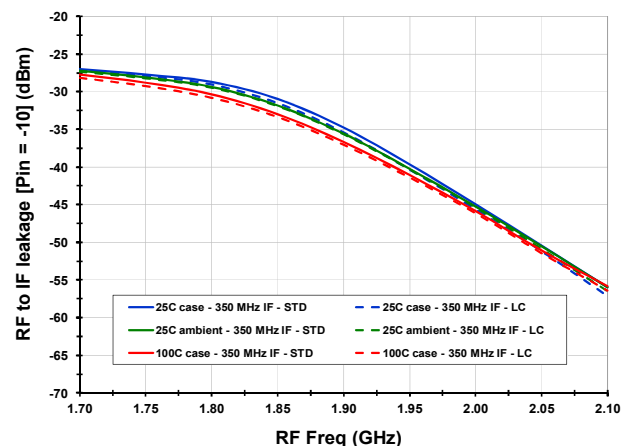
Input 1dB Compression



LO - IF leakage

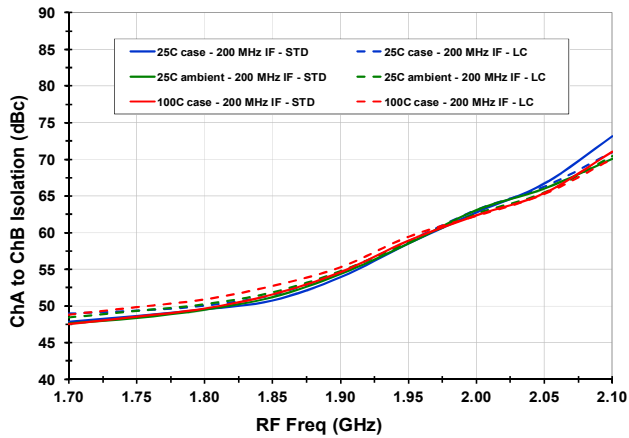


RF - IF leakage

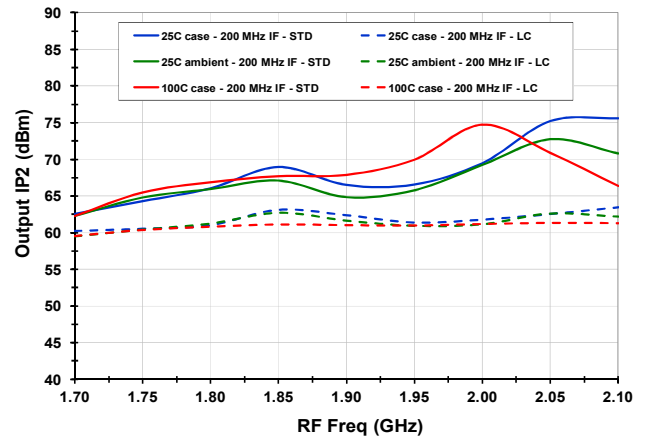


HIGH TEMP OPERATING CONDITIONS [GENERAL] (3)

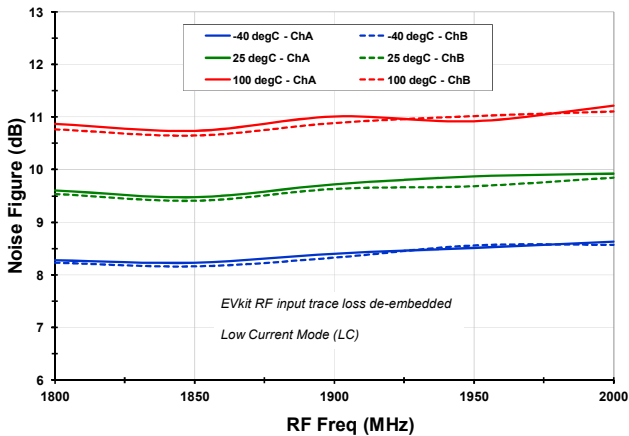
Channel Isolation



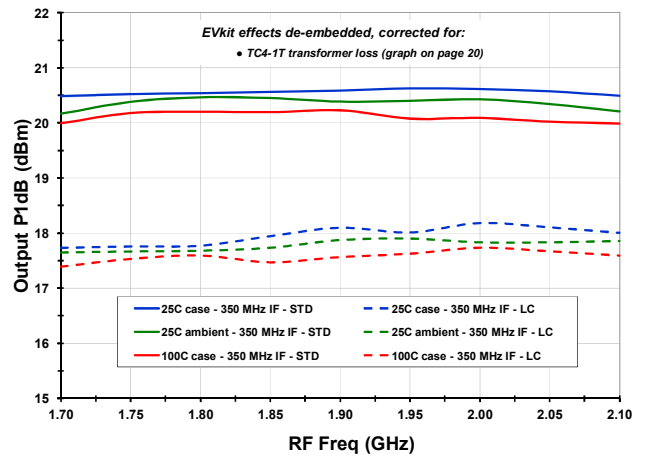
Output IP2



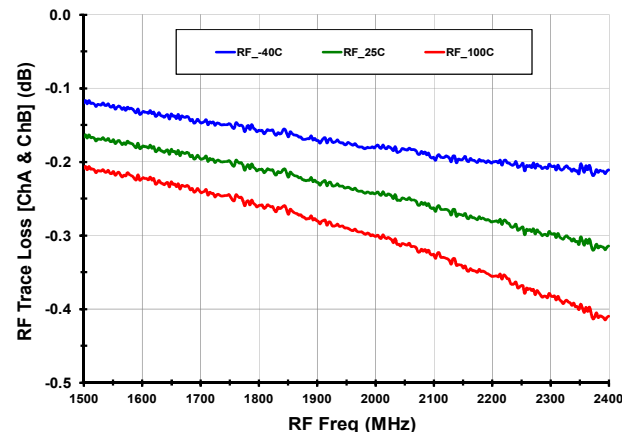
Noise Figure [EVkit de-embedded]



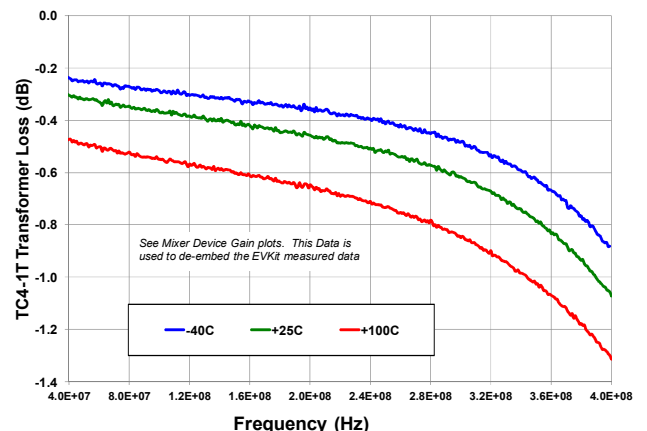
Output 1dB Compression [EVkit de-embedded]



EVkit RF trace loss



EVkit Transformer Loss



RF to IF Dual Downconverting Mixer

1700 - 2200 MHz F1150NBGI

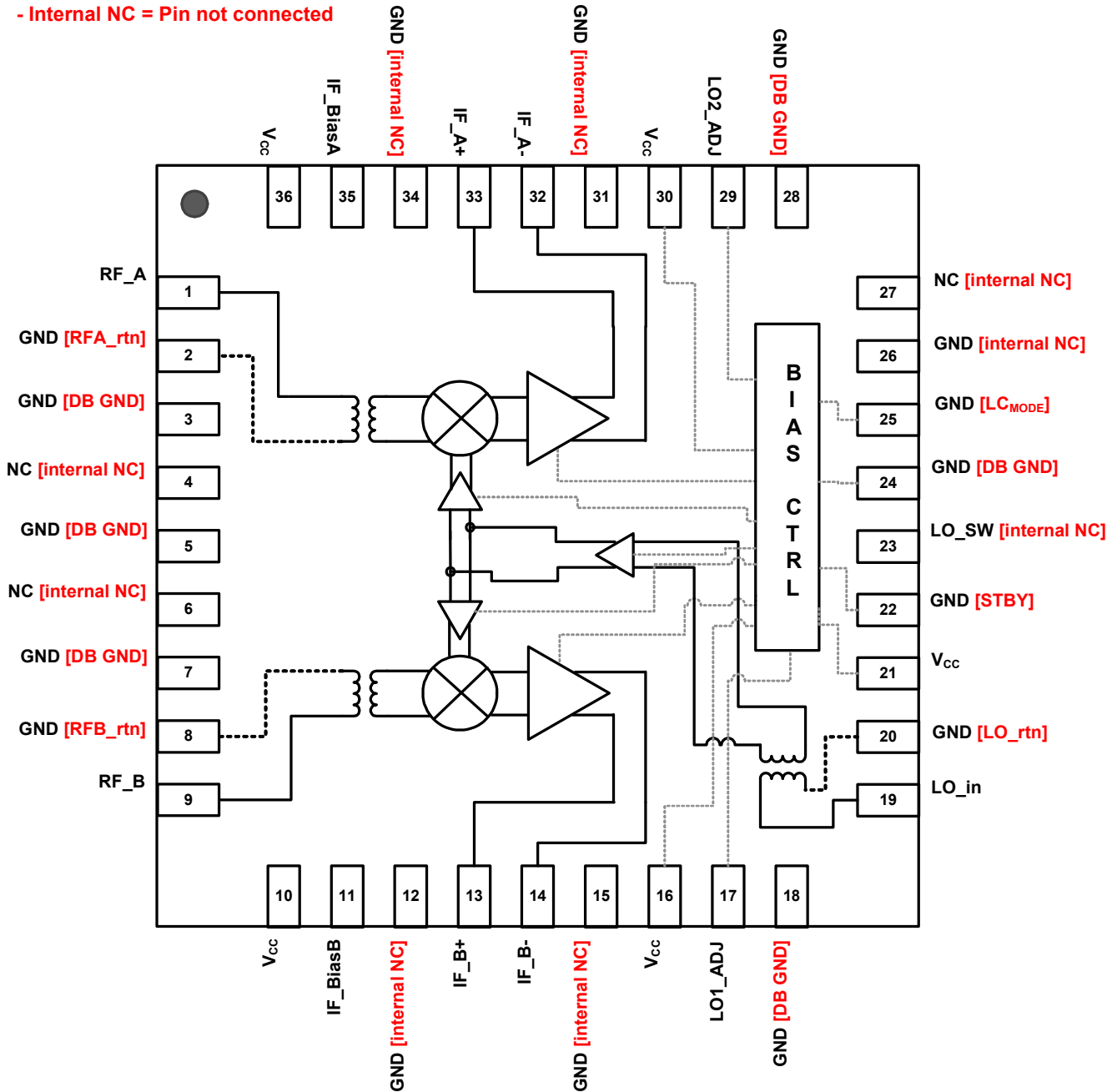
PINOUTS

Black Text denotes recommended external connection

Red Text denotes internal Function or Connection

- DB GND = Downbonded to Paddle

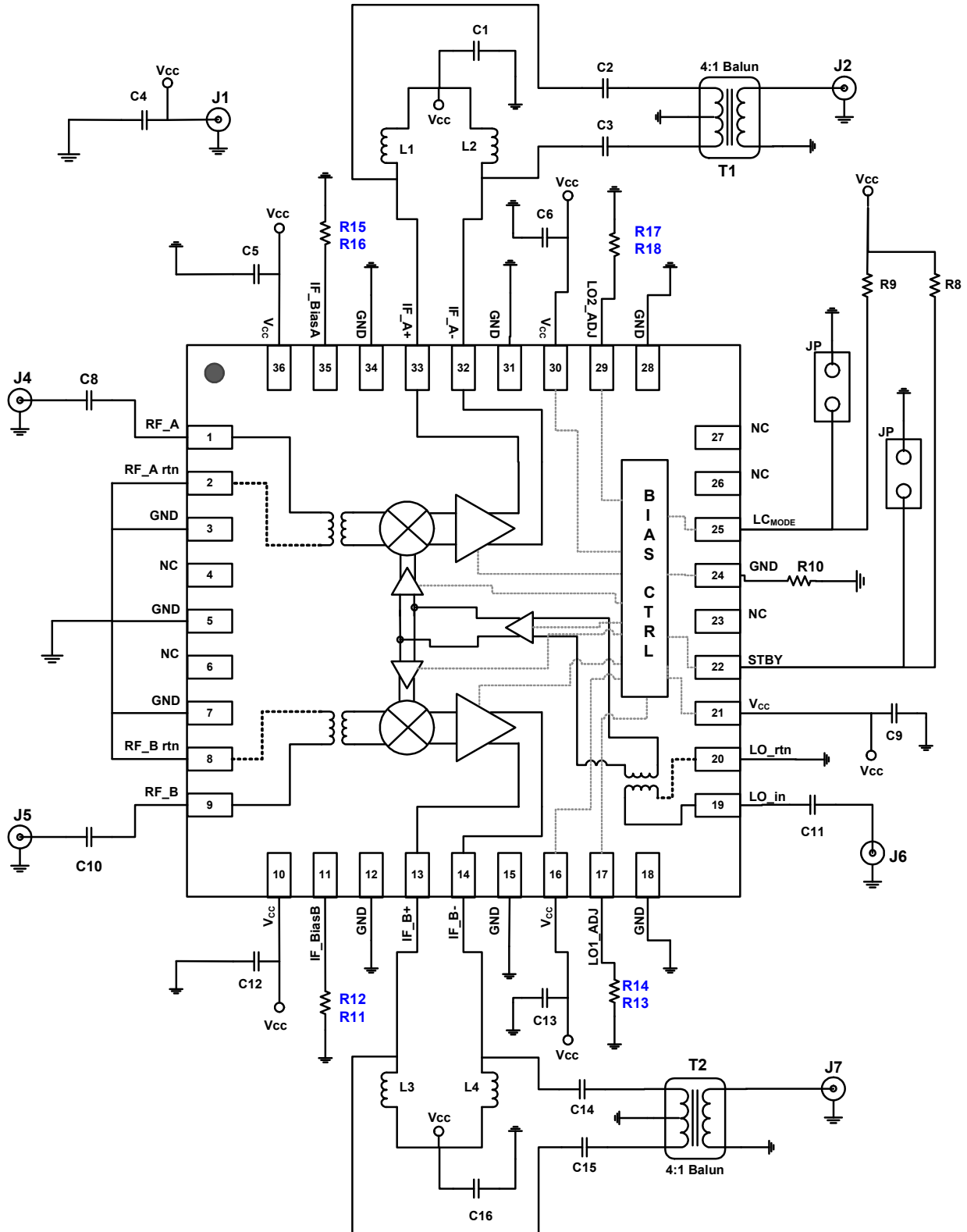
- Internal NC = Pin not connected



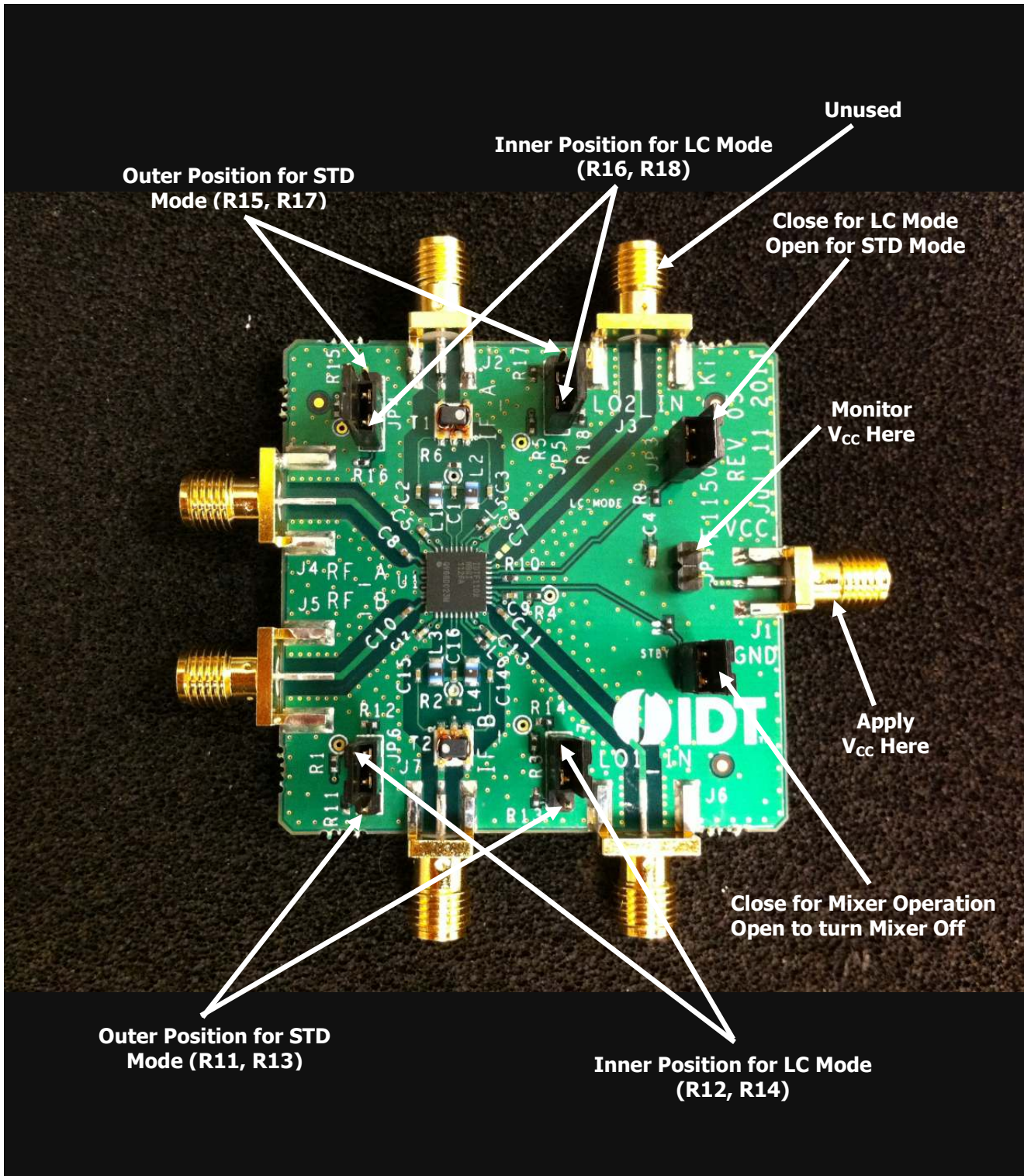
PIN DESCRIPTIONS

| Pin(s) | 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, 22, 24, 28 | GND | Ground these pins. |
| 4, 6, 12, 15, 31, 23, 26, 27, 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 Supplies. 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 | LO_in | Local Oscillator Input. Connect the LO to this port through a series 3 pF capacitor |
| 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



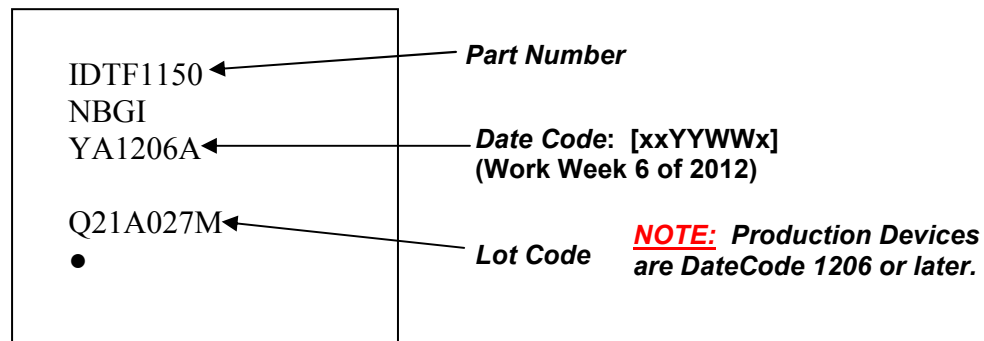
RF to IF Dual Downconverting Mixer
1700 - 2200 MHz F1150NBGI
EVKIT BOM

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**.

F1150 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 | 1.2nH | 0402 | 0402CS-1N2XJLU Ceramic Chip Inductor | 0402CS-1N2XJLU | COILCRAFT | C8,10 | 2 |
| 4 | 3pF | 0402 | CAP CER 3PF 0402 | GRM1555C1H3R0CZ01D | MURATA | C11 | 1 |
| 5 | 10uF | 0603 | CAP CER 10UF 6.3V X5R 0603 | GRM188R60J106ME47D | MURATA | C4 | 1 |
| 6 | Header 2 Pin | TH 2 | CONN HEADER VERT SGL 2POS GOLD | 961102-6404-AR | 3M | JP1,2,3 | 3 |
| 7 | Header 3 Pin | TH 3 | CONN HEADER VERT SGL 3POS GOLD | 961103-6404-AR | 3M | JP4,5,6,7 | 4 |
| 8 | SMA_END_LAUNCH | .062 | SMA_END_LAUNCH | 142-0711-821 | Emerson Johnson | J1,2,3,4,5,6,7 | 7 |
| 9 | 270nH | 0805 | 0805CS (2012) Ceramic Chip Inductor | 0805CS-271XJLB | COILCRAFT | L1,2,3,4 | 4 |
| 10 | 27 | 0402 | RES 27 OHM 1/10W 1% 0402 SMD | ERJ-2RKF27R0X | Panasonic | R11,15 | 2 |
| 11 | 63 | 0402 | RES 63 OHM 1/10W 1% 0402 SMD | ERJ-2RKF63R0X | Panasonic | R12,16 | 2 |
| 12 | 91 | 0402 | RES 91.0 OHM 1/10W 1% 0402 SMD | ERJ-2RKF91R0X | Panasonic | R13 | 1 |
| 13 | 180 | 0402 | RES 180 OHM 1/10W 1% 0402 SMD | ERJ-2RKF1800X | Panasonic | R14 | 1 |
| 14 | 1.91K | 0402 | RES 1.91K OHM 1/10W 1% 0402 SMD | ERJ-2RKF1911X | Panasonic | R18 | 1 |
| 15 | 1.21K | 0402 | RES 1.21K OHM 1/10W 1% 0402 SMD | ERJ-2RKF1211X | Panasonic | R17 | 1 |
| 16 | 47K | 0402 | RES 47.0K OHM 1/16W 1% 0402 SMD | RC0402FR-0747KL | Yageo | R8,9 | 2 |
| 17 | 0 | 0402 | RES 0.0 OHM 1/10W 0402 SMD | ERJ-2GE0R00X | Panasonic | R1,2,3,4,5,6,7,10 | 10 |
| 18 | 4:1 Balun | SM-22 | 4:1 Center Tap Balun | TC4-1TG2+ | Mini Circuits | T1,2 | 2 |
| 19 | F1150ZM (021) | QFN-36 | Diversity Downconverter | | IDT | U1 | 1 |
| 20 | PCB | | | F1150 EVKit Rev5 | | | 1 |

TOPMARKINGS


IMPORTANT NOTICE AND DISCLAIMER

RENESAS ELECTRONICS CORPORATION AND ITS SUBSIDIARIES (“RENESAS”) PROVIDES TECHNICAL SPECIFICATIONS AND RELIABILITY DATA (INCLUDING DATASHEETS), DESIGN RESOURCES (INCLUDING REFERENCE DESIGNS), APPLICATION OR OTHER DESIGN ADVICE, WEB TOOLS, SAFETY INFORMATION, AND OTHER RESOURCES “AS IS” AND WITH ALL FAULTS, AND DISCLAIMS ALL WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, WITHOUT LIMITATION, ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, OR NON-INFRINGEMENT OF THIRD-PARTY INTELLECTUAL PROPERTY RIGHTS.

These resources are intended for developers who are designing with Renesas products. You are solely responsible for (1) selecting the appropriate products for your application, (2) designing, validating, and testing your application, and (3) ensuring your application meets applicable standards, and any other safety, security, or other requirements. These resources are subject to change without notice. Renesas grants you permission to use these resources only to develop an application that uses Renesas products. Other reproduction or use of these resources is strictly prohibited. No license is granted to any other Renesas intellectual property or to any third-party intellectual property. Renesas disclaims responsibility for, and you will fully indemnify Renesas and its representatives against, any claims, damages, costs, losses, or liabilities arising from your use of these resources. Renesas' products are provided only subject to Renesas' Terms and Conditions of Sale or other applicable terms agreed to in writing. No use of any Renesas resources expands or otherwise alters any applicable warranties or warranty disclaimers for these products.

(Disclaimer Rev.1.01 Jan 2024)

Corporate Headquarters

TOYOSU FORESIA, 3-2-24 Toyosu,
Koto-ku, Tokyo 135-0061, Japan
www.renesas.com

Trademarks

Renesas and the Renesas logo are trademarks of Renesas Electronics Corporation. All trademarks and registered trademarks are the property of their respective owners.

Contact Information

For further information on a product, technology, the most up-to-date version of a document, or your nearest sales office, please visit www.renesas.com/contact-us/.

Looking for pricing, stock, or lifecycle information?

Click below to explore more details on WIN SOURCE:

-  [View F1150NBGI on WIN SOURCE](#)
-  [Renesas Electronics America](#) Information

Optimize Your Supply Chain with WIN SOURCE Solutions

-  Global Sourcing Solution
-  Obsolete Management
-  Cost Control Management
-  Shortage Management
-  Alternative Solution
-  Excess Inventory Management