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# RF2373

## 3.3V LOW NOISE AMPLIFIER/ 3V DRIVER AMPLIFIER

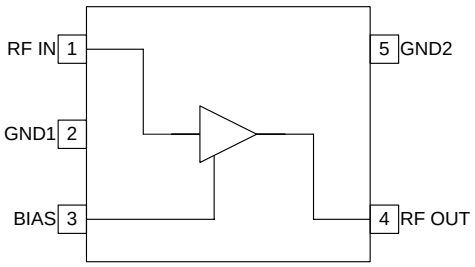
**RoHS Compliant & Pb-Free Product**
**Package Style: SOT 5-Lead**

## Features

- Low Noise and High Intercept Point
- Adjustable Bias Current
- Power Down Control
- Single 2.7V to 5.0V Power Supply
- 0.4GHz to 4GHz Operation
- SOT 5-Lead Package

## Applications

- WLAN LNA/Driver
- GPS LNA
- CDMA PCS LNA
- Low Noise Transmit Power Amplifier
- General Purpose Amplification
- Driver Amplifier for TX Power Amplifier




Functional Block Diagram

## Product Description

The RF2373 is a low noise amplifier with a high dynamic range designed for WLAN, WiMAX, and digital cellular applications. The device functions as an outstanding front end low noise amplifier or driver amplifier in the transmit chain of digital subscriber units where low transmit noise power is a concern. When used as an LNA, the bias current can be set externally. When used as a PA driver, the IC can operate directly from a single cell Li-ion battery and includes a power down feature that can be used to completely turn off the device. The IC is featured in a standard SOT 5-lead plastic package.

### Ordering Information

| | |
|---|---|
| RF2373PCK-414 | Fully Assembled Evaluation Board with 5 Sample Parts |

### Optimum Technology Matching® Applied

| | | | |
|---|---|---|---|
| ☑ GaAs HBT | ☐ SiGe BiCMOS | ☐ GaAs pHEMT | ☐ GaN HEMT |
| ☐ GaAs MESFET | ☐ Si BiCMOS | ☐ Si CMOS | |
| ☐ InGaP HBT | ☐ SiGe HBT | ☐ Si BJT | |





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## Absolute Maximum Ratings

| Parameter | Rating | Unit |
|---|---|---|
| Supply Voltage | -0.5 to +6.0 | $V_{DC}$ |
| Bias Voltage, $V_{BIAS}$ | $\leq V_{CC}$ | $V_{DC}$ |
| Input RF Level | +15 (see note) | dBm |
| Current Drain, $I_{CC}$ | 32 | mA |
| Operating Ambient Temperature | -40 to +85 | °C |
| Storage Temperature | -40 to +150 | °C |

NOTE: Exceeding any one or a combination of the above maximum rating limits may cause permanent damage. Input RF transients to +15dBm will not harm the device. For sustained operation at inputs ≥+10dBm, a small dropping resistor of 10Ω is recommended in series with the $V_{CC}$.

**Caution!** ESD sensitive device.

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

RoHS status based on EUDirective2002/95/EC (at time of this document revision).



| Parameter | Specification | | | Unit | Condition |
|---|---|---|---|---|---|
| | Min. | Typ. | Max. | | |
| **Overall** | | | | | 25°C, $V_{CC}$=3.3V, at typical frequencies unless otherwise specified |
| Supply Voltage ($V_{CC}$) | 2.7 | 3.3 | 5.0 | V | |
| Bias Voltage ($V_{BIAS}$) | 2.7 | 3.3 | 5.0 | V | |
| RF Frequency Range | 400 | | 3800 | MHz | |
| Power Down Current | | | 10 | μA | $V_{BIAS}$=0V |
| Isolation | | 23 | | dB | |
| Current Drain (LNA) | 8 | 14 | 19 | mA | Bias Resistor (R1)=560Ω |
| IP2 | | 55 | | dBm | |
| **Cellular Low Noise Amplifier** | | | | | |
| Frequency | 820 | 880 | 960 | MHz | |
| Gain | | 21.5 | | dB | |
| Noise Figure | | 1.1 | | dB | |
| IIP3 | | -1 | | dBm | |
| IP1dB | | -11 | | dBm | |
| **GPS Low Noise Amplifier** | | | | | |
| Frequency | | 1575 | | MHz | |
| Gain | | 19.0 | | dB | |
| Noise Figure | | 1.1 | | dB | |
| IIP3 | | 5 | | dBm | |
| IP1dB | | -6 | | dBm | |
| **W-CDMA Low Noise Amplifier** | | | | | |
| Frequency Range | 1920 | 2045 | 2170 | MHz | |
| Gain | | 17.5 | | dB | |
| Noise Figure | | 1.2 | | dB | |
| IIP3 | | 8 | | dBm | |
| IP1dB | | -6 | | dBm | |


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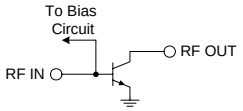
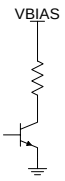
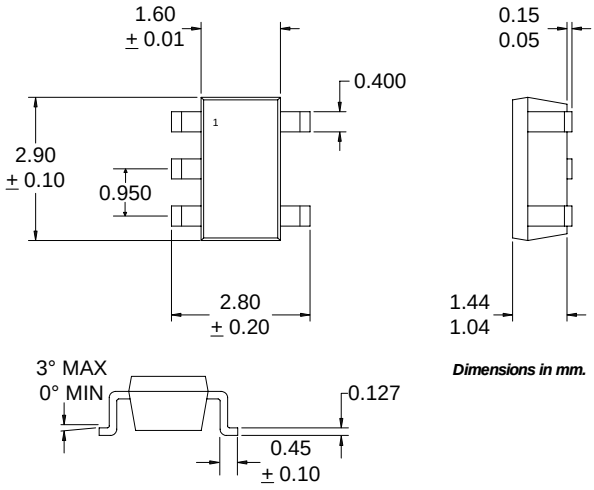
| Parameter | Specification | | | Unit | Condition |
|---|---|---|---|---|---|
| | Min. | Typ. | Max. | | |
| **WLAN Low Noise Amplifier** | | | | | |
| Frequency | 2400 | 2450 | 2500 | MHz | |
| Gain | 13.0 | 15.0 | 17.0 | dB | |
| Noise Figure | | 1.3 | 1.5 | dB | |
| IIP3 | 7.5 | 9.5 | | dBm | |
| Input P1dB | | -3.5 | | dBm | |
| **WiMAX Low Noise Amplifier** | | | | | |
| Frequency | 3100 | 3500 | 3800 | MHz | |
| Gain | | 12.5 | | dB | |
| Noise Figure | | 1.5 | | dB | |
| IIP3 | | 10 | | dBm | |
| Input P1dB | | 3 | | dBm | |
| **W-CDMA Driver** | | | | | |
| Frequency Range | 1920 | 2045 | 2170 | MHz | $V_{CC}$=5.0V |
| Gain | | 17.5 | | dB | |
| Noise Figure | | 1.3 | | dB | |
| OIP3 | | 25 | | dBm | |
| OP1dB | | 14 | | dBm | |
| **WLAN Driver** | | | | | |
| Frequency | 2400 | 2450 | 2500 | MHz | $V_{CC}$=5.0V |
| Gain | | 15.5 | | dB | |
| Noise Figure | | 1.4 | 1.6 | dB | |
| OIP3 | | 25 | | dBm | |
| OP1dB | | 14 | | dBm | |

| Pin | Function | Description | Interface Schematic |
|---|---|---|---|
| 1 | RF IN | RF input pin. This pin is DC coupled. |   |
| 2 | GND1 | Ground connection. For best performance, keep traces physically short and connect immediately to ground plane. | |
| 3 | BIAS | This pin is used to control the bias current. An external resistor can be used to set the bias current for any $V_{BIAS}$ voltage. See table with evaluation board schematic. |   |
| 4 | RF OUT | Amplifier output pin. This pin is an open-collector output. It must be biased to $V_{CC}$ through a choke or matching inductor. This pin is typically matched to 50Ω with a shunt bias/matching inductor and series blocking/matching capacitor. Refer to application schematics. | |
| 5 | GND2 | Ground connection. For best performance, keep traces physically short and connect immediately to ground plane. | |

## Package Drawing

SOT 5-Lead




*Dimensions in mm.*



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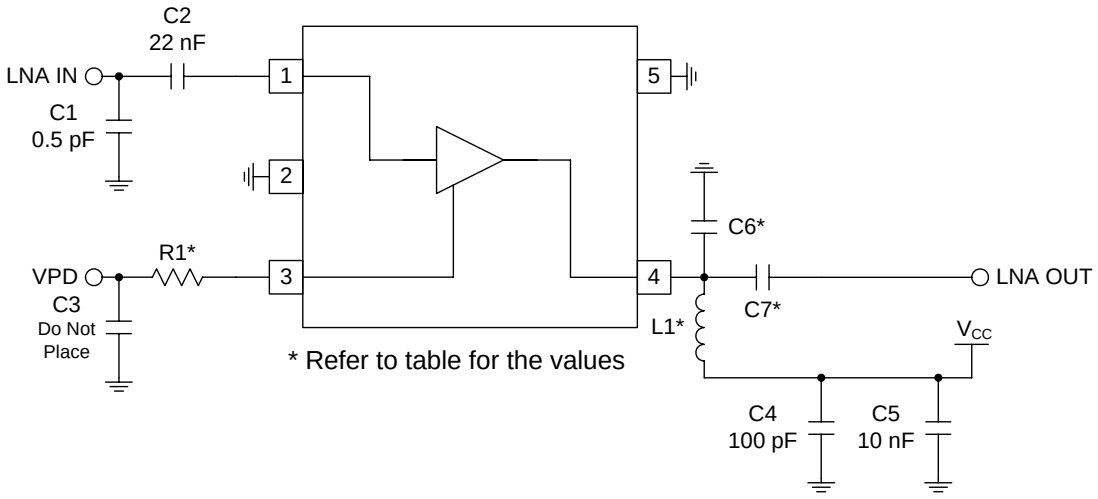
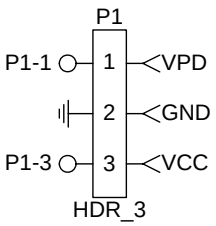
## Evaluation Board Schematic




| Component | Cellular 900 MHz | GPS 1575 MHz | PCS 1950 MHz | W-CDMA 2140 MHz | WLAN 2450 MHz |
|---|---|---|---|---|---|
| L1 (nH) | 3.9 | 2.7 | 2.7 | 2.7 | 2.2 |
| C6 (pF) | 4.3 | 1.5 | 0.5 | DNP | DNP |
| C7 (pF) | 2.0 | 1.2 | 1.0 | 1.0 | 1.0 |




| $V_{PD}$ | $I_{CC}$ R1 = 300 Ω | $I_{CC}$ R1 = 430 Ω | $I_{CC}$ R1 = 560 Ω | $I_{CC}$ R1 = 1 kΩ | $I_{CC}$ R1 = 1.5 kΩ |
|---|---|---|---|---|---|
| 2.7 | 12 | 9 | 7 | 5 | 4 |
| 3.0 | 16 | 12 | 9 | 6 | 5 |
| 3.3 | 20 | 15 | 11 | 7 | 5 |
| 3.6 | 25 | 19 | 14 | 8 | 6 |
| 4.0 | 31 | 24 | 18 | 10 | 7 |
| 4.5 | Over Limit | 31 | 23 | 13 | 8 |
| 5.0 | Over Limit | Over Limit | 29 | 16 | 10 |

Note: $V_{CC}$ set to 3.3 V. $I_{CC}$ only slightly dependent on $V_{CC}$.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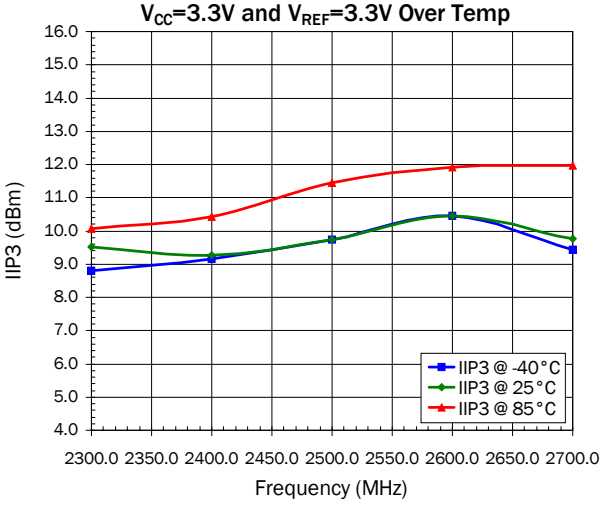
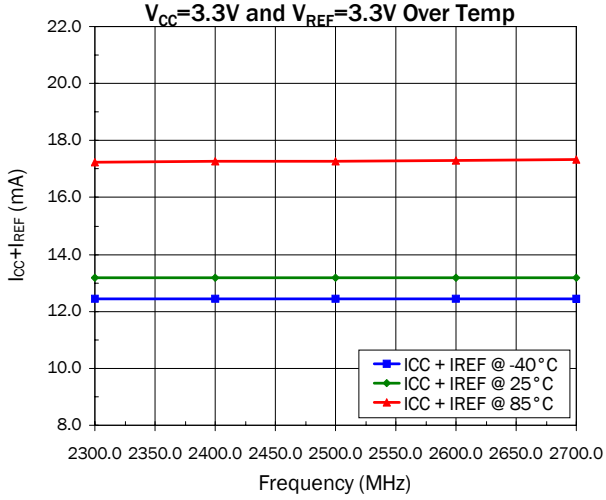
## WiBRO/WLAN DATA

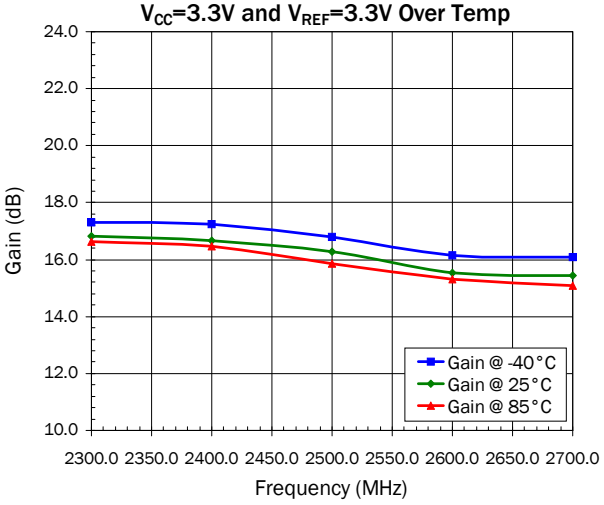
IIP3 @ WLAN Band in High Gain Mode
$V_{CC}$=3.3V and $V_{REF}$=3.3V Over Temp



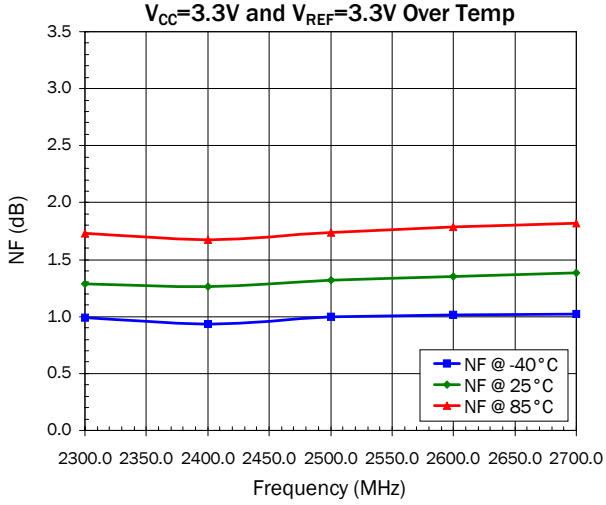

$I_{CC}$+$I_{REF}$ @ WLAN Band in High Gain Mode
$V_{CC}$=3.3V and $V_{REF}$=3.3V Over Temp




Gain @ WLAN Band in High Gain Mode
$V_{CC}$=3.3V and $V_{REF}$=3.3V Over Temp




Noise Figure @ WLAN Band in High Gain Mode
$V_{CC}$=3.3V and $V_{REF}$=3.3V Over Temp



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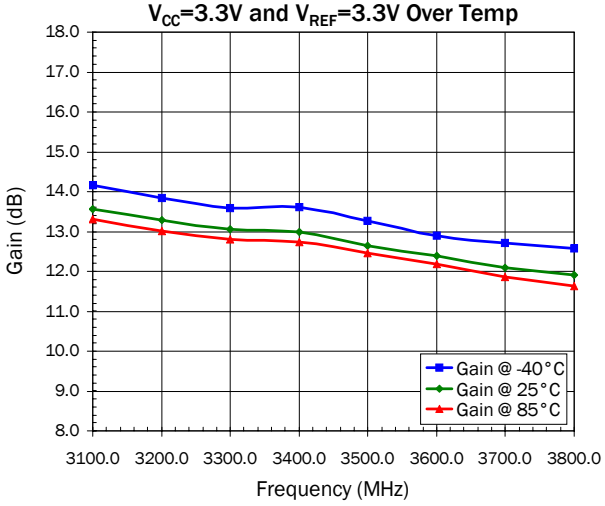
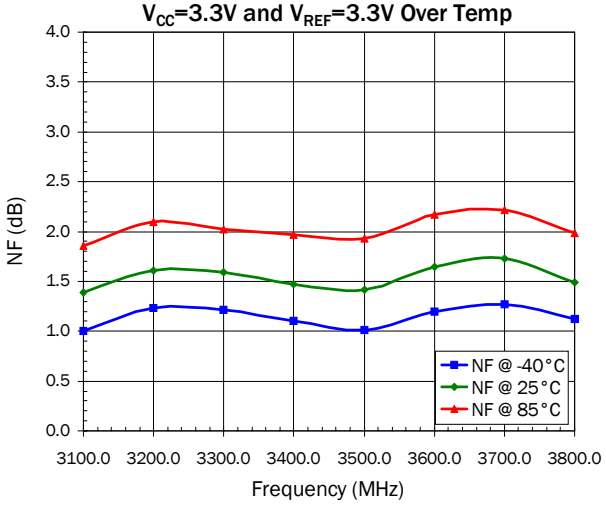
## WiMAX DATA

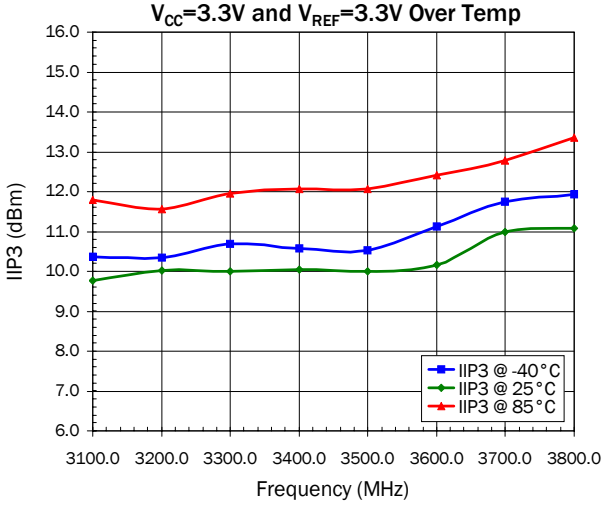
Gain @ WiMAX Band in High Gain Mode
$V_{CC}$=3.3V and $V_{REF}$=3.3V Over Temp



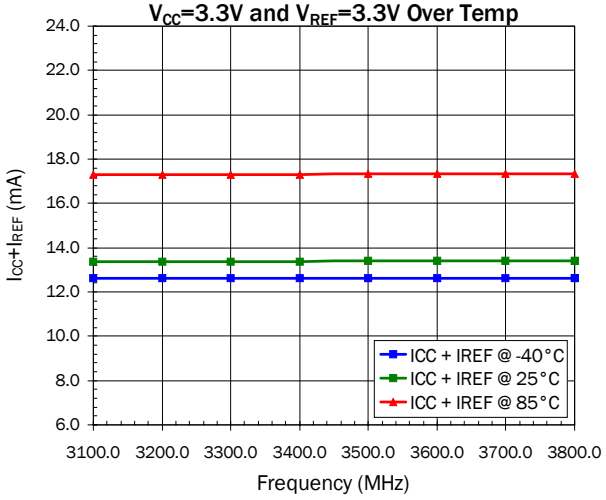

Noise Figure @ WiMAX Band in High Gain Mode
$V_{CC}$=3.3V and $V_{REF}$=3.3V Over Temp




IIP3 @ WiMAX Band in High Gain Mode
$V_{CC}$=3.3V and $V_{REF}$=3.3V Over Temp

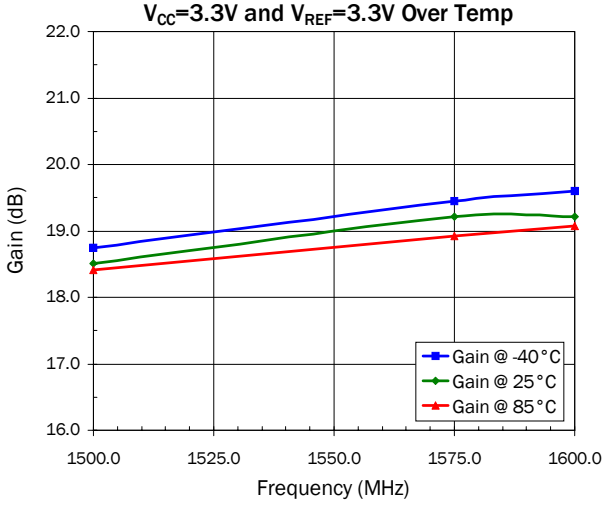



$I_{CC}$+$I_{REF}$ @ WiMAX Band in High Gain Mode
$V_{CC}$=3.3V and $V_{REF}$=3.3V Over Temp

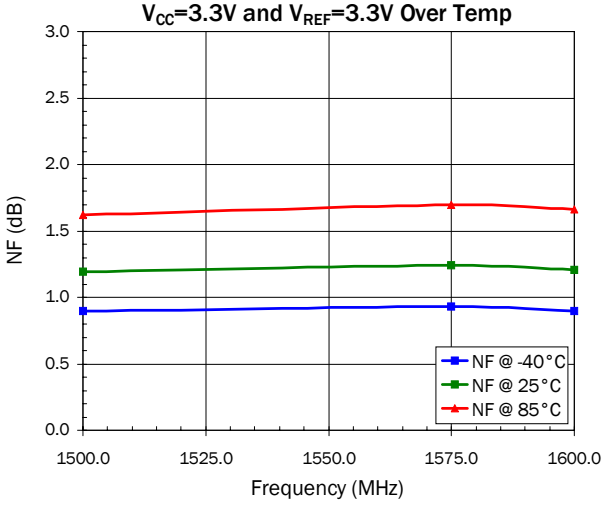


## GPS DATA

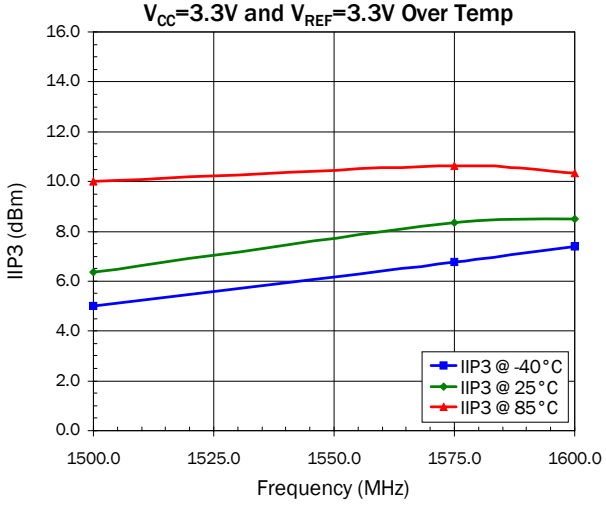
Gain @ GPS Band in High Gain Mode
$V_{CC}$=3.3V and $V_{REF}$=3.3V Over Temp



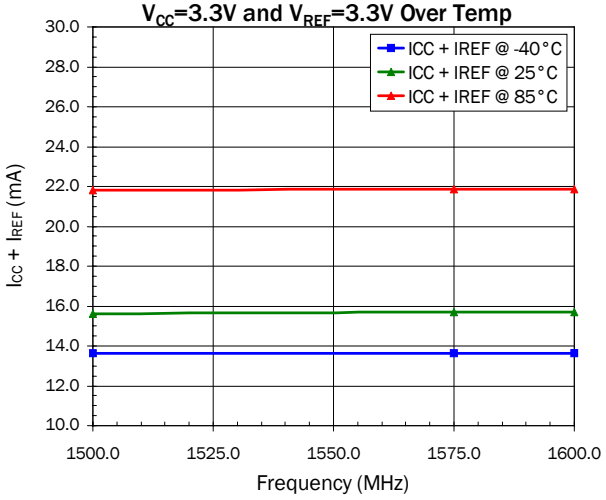

Noise Figure @ GPS Band in High Gain Mode
$V_{CC}$=3.3V and $V_{REF}$=3.3V Over Temp




IIP3 @ GPS Band in High Gain Mode
$V_{CC}$=3.3V and $V_{REF}$=3.3V Over Temp




$I_{CC}$+$I_{REF}$ @ GPS Band in High Gain Mode
$V_{CC}$=3.3V and $V_{REF}$=3.3V Over Temp



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