# High-Gain Broadband RF Amplifier 600MHz to 5000MHz

## Description

The F0424 is a 600MHz to 5000MHz SiGe High-Gain Broadband RF Amplifier. The combination of low noise figure (NF) and high linearity performance allows the device to be used in both receiver and transmitter applications.

The F0424 is designed to operate with a single 5V or 3.3V power supply using a nominal 70mA of $I_{CC}$. With a supply voltage of 5V, the F0424 provides 17.3dB gain with +40dBm OIP3 and 2.3dB noise figure at 2600MHz.

The device is packaged in a 2 × 2 mm, 8-pin Thin DFN with 50Ω single-ended RF input and output impedances for ease of integration into the signal path.

## Competitive Advantage

- High gain
- Broadband
- STBY feature
- Superior reliability versus GaAs

## Typical Applications

- 4G TDD and FDD Base Stations
- 2G/3G Base Stations
- Repeaters and DAS
- Point-to-Point Infrastructure
- Public Safety Infrastructure
- Military Handhelds

Table 1. Typical Values

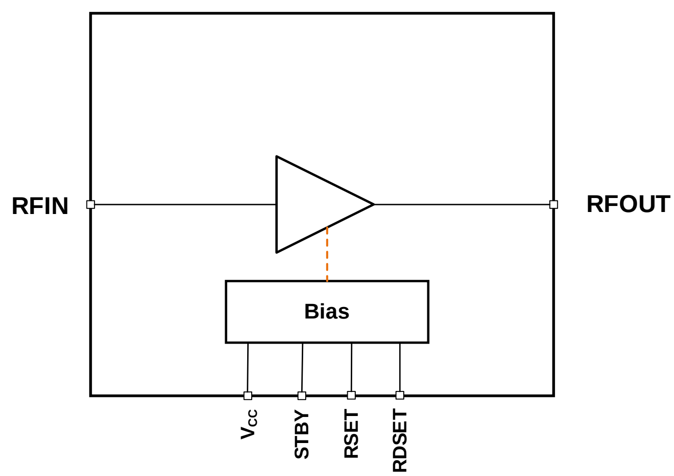
| Part Number | Frequency (MHz) | Gain (dB) | NF (dB) | OIP3 (dBm) |
|---|---|---|---|---|
| F0424 | 600 to 5000 | 17.3 | 2.3 | +40 |

## Features

- RF Range: 600MHz to 5000MHz
- Noise Figure = 2.3dB at 2600MHz
- Gain = 17.3dB at 2600MHz
- OIP3 = +40dBm at 2600MHz
- Output P1dB = +21dBm at 2600MHz
- Near-Constant Gain versus Temperature
- 3.3V or 5V Power Supply
- $I_{CC}$ = 70mA
- 2mA Standby Current
- 350mW Typical DC Power at 5V Supply
- 50Ω Input and Output Impedances
- Operating temperature ($T_{EPAD}$) range: -40°C to +105°C
- 2 × 2 mm, 8-DFN package

## Block Diagram

Figure 1. Block Diagram



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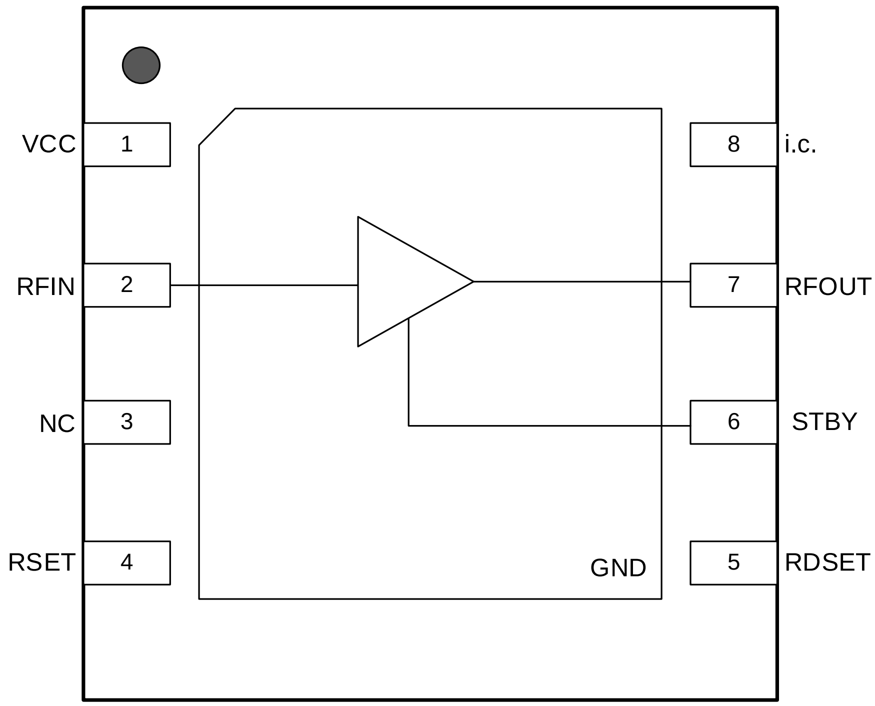
# Pin Assignments

Figure 2. Pin Assignments for 2 × 2 × 0.75 mm 8-DFN Package – Top View




# Pin Descriptions

Table 2. Pin Descriptions

| Number | Name | Description |
|---|---|---|
| 1 | VCC | Power supply. The bypass capacitor must be as close to the pin as possible. |
| 2 | RFIN | RF input internally matched to 50Ω. An external DC block is required. |
| 3 | NC | No connection. This pin can be left unconnected, connected to VCC, or connected to GND. IDT recommends connecting it to GND. |
| 4 | RSET | Main amplifier current bias setting resistor. Connect to GND. |
| 5 | RDSET | Distortion amplifier current bias setting resistor. Connect to GND. |
| 6 | STBY | Standby. If this pin is not connected or is logic LOW, the device will operate under its normal operating condition. If this pin is logic HIGH, the F0424 will be in STBY Mode. |
| 7 | RFOUT | RF output internally matched to 50Ω. An external DC block is required. |
| 8 | i.c. | Connect this pin directly to ground. |
| | EPAD | Exposed pad. This pad is internally connected to GND. Solder this exposed pad to a printed circuit board (PCB) pad that uses multiple ground vias to provide heat transfer out of the device into the PCB ground planes. These multiple ground vias are also required to achieve the specified RF performance. |

# Absolute Maximum Ratings

The absolute maximum ratings are stress ratings only. Stresses greater than those listed below can cause permanent damage to the device. Functional operation of the F0424 at absolute maximum ratings is not implied. Exposure to absolute maximum rating conditions may affect device reliability.

Table 3. Absolute Maximum Ratings

| Parameter | Symbol | Minimum | Maximum | Units |
|---|---|---|---|---|
| $V_{CC}$ to GND | $V_{CC}$ | -0.3 | +5.5 | V |
| STBY | $V_{STBY}$ | -0.3 | +3.6 | V |
| STBY Minus VCC Voltage (voltage difference) | $V_{STBY\text{-}VCC}$ | | 0.3 | V |
| RFIN Externally Applied DC Current | $I_{RFIN}$ | -1 | +1 | mA |
| RFOUT Externally Applied DC Voltage | $V_{RFOUT}$ | $V_{CC}$ – 0.15 | $V_{CC}$ + 0.15 | V |
| RSET Pin Maximum DC Current | $I_{PIN4}$ | -1 | +1 | mA |
| RDSET Pin Maximum DC Current | $I_{PIN5}$ | -1 | +1 | mA |
| RF Input Power (RFOUT) Present for 24 Hours Maximum [a] | $P_{MAX\_IN}$ | | +20 | dBm |
| Continuous Power Dissipation | $P_{DISS}$ | | 0.6 | W |
| Junction Temperature | $T_{JMAX}$ | | 140 | °C |
| Storage Temperature Range | $T_{STOR}$ | -65 | 150 | °C |
| Lead Temperature (soldering, 10s) | | | 260 | °C |
| Electrostatic Discharge – HBM (JEDEC/ESDA JS-001-2012) | | | 2000 (Class 2) | V |
| Electrostatic Discharge – CDM (JEDEC 22-C101F) | | | 1000 (Class C3) | V |

[a] Exposure to these maximum RF levels can result in significant Vcc current draw due to overdriving the amplifier stages.

# Recommended Operating Conditions

Table 4. Recommended Operating Conditions

| Parameter | Symbol | Conditions | Minimum | Typical | Maximum | Units |
|---|---|---|---|---|---|---|
| Power Supply Voltage | $V_{CC}$ | $V_{CC}$ pins | 3.15 | | 5.25 | V |
| Operating Temperature Range | $T_{EPAD}$ | Exposed paddle temperature | -40 | | +105 | °C |
| RF Frequency Range | $f_{RF}$ | Operating range | 600 | | 5000 | MHz |
| RFIN Source Impedance | $Z_{RFIN}$ | Single-ended | | 50 | | Ω |
| RFOUT Load Impedance | $Z_{RFOUT}$ | Single-ended | | 50 | | Ω |

# Electrical Characteristics – 5V Supply Voltage

See the F0424 Typical Application Circuit in Figure 42. Specifications apply when operated with VCC = +5.0V, R5 = 2.49kΩ, R6 = 160Ω, $T_{EPAD}$ = +25°C, fRF = 2.6GHz, STBY = LOW, ZS = ZL = 50Ω single-ended, and output power = 0dBm/tone, unless stated otherwise. EVKit trace and connector losses are de-embedded (see the F0424EVBK Evaluation Kit in Figure 40).

Table 5. Electrical Characteristics – 5V Supply Voltage

| Parameter | Symbol | Condition | Minimum | Typical | Maximum | Units |
|---|---|---|---|---|---|---|
| Logic Input High Threshold | $V_{IH}$ | | *1.07* [a] | | | V |
| Logic Input Low Threshold | $V_{IL}$ | | | | *0.8* | V |
| Logic Current | $I_{IH}$, $I_{IL}$ | Applied STBY voltage = 3.6V | *-10* | | *+100* | µA |
| Supply Current | $I_{CC}$ | | | 70 | *80* | mA |
| Pull-down Resistor on STBY pin | $R_{STBY}$ | | | 50 | | kΩ |
| Standby Current | $I_{CC\_STBY}$ | | | 2 | *3* | mA |
| Settling Time | $t_{SETTLE}$ | 50% STBY control to within ±0.5dB of final power level | | 0.25 | | µs |
| RF Input Return Loss | $RL_{IN}$ | | | 13 | | dB |
| RF Output Return Loss | $RL_{OUT}$ | | | 12 | | dB |
| Gain | G | $f_{RF}$ = 600MHz | | 17.2 | | dB |
| | | $f_{RF}$ = 1900MHz | | 17.6 | | |
| | | $f_{RF}$ = 2600MHz | *16* | 17.3 | | |
| | | $f_{RF}$ = 3500MHz | | 16.7 | | |
| | | $f_{RF}$ = 4200MHz | | 16.1 | | |
| | | $f_{RF}$ = 4900MHz | | 15.2 | | |
| Gain Flatness (amplitude) | $G_{VAR}$ | $f_{RF}$ = 700MHz, ±100MHz | | ±0.15 | | dB |
| | | $f_{RF}$ = 1900MHz, ±100MHz | | ±0.1 | | |
| | | $f_{RF}$ = 2600MHz, ±100MHz | | ±0.1 | | |
| | | $f_{RF}$ = 3500MHz, ±100MHz | | ±0.1 | | |
| | | $f_{RF}$ = 4100MHz, ±100MHz | | ±0.15 | | |
| | | $f_{RF}$ = 4900MHz, ±100MHz | | ±0.19 | | |
| Gain Variation over Temperature | $G_{TEMP}$ | $T_{EPAD}$ = -40°C to +105°C | | ±0.2 | | dB |
| Noise Figure | NF | $f_{RF}$ = 2600MHz | | 2.3 | 2.7 | dB |
| | | $f_{RF}$ = 3500MHz | | 2.7 | | |
| | | $f_{RF}$ = 4900MHz | | 3.9 | | |
| Noise Figure Variation over Temperature | $NF_{TEMP}$ | $T_{EPAD}$ = -40°C to +105°C | | ± 0.4 | | dB |
| Output Third-Order Intercept Point | OIP3 | $f_{RF}$ = 2600MHz 5MHz tone separation | *35* | 40 | | dBm |
| | | $f_{RF}$ = 3500MHz 5MHz tone separation | | 40 | | |
| | | $f_{RF}$ = 4900MHz 5MHz tone separation | | 39 | | |
| Output Third-Order Intercept Point Variation over Temperature | $OIP3_{VAR}$ | $f_{RF}$ = 2600MHz 5MHz tone separation $T_{EPAD}$ = -40°C to +105°C | | -1.2/+0.26 | | dB |

| Parameter | Symbol | Condition | Minimum | Typical | Maximum | Units |
|---|---|---|---|---|---|---|
| Output P1dB compression | $OP_{1dB}$ | $f_{RF}$ = 2600MHz | ***20*** | 21 | | dBm |
| | | $f_{RF}$ = 3500MHz | | 20 | | |
| | | $f_{RF}$ = 4900MHz | | 18 | | |
| Reverse Isolation | $REV_{ISO}$ | | | 24 | | dB |

[a] Specifications in the minimum/maximum columns that are shown in ***bold italics*** are guaranteed by test. Specifications in these columns that are not shown in bold italics are guaranteed by design characterization.

## Electrical Characteristics – 3.3V Supply Voltage

See the F0424 Typical Application Circuit. Specifications apply when operated with $V_{CC}$ = +3.3V, R5 = 2.49kΩ, R6 = 160Ω, $T_{EPAD}$ = +25°C, $f_{RF}$ = 2.6GHz, STBY = LOW, $Z_S$ = $Z_L$ = 50Ω single-ended, and output power = 0dBm/tone, unless stated otherwise. EVKit trace and connector losses are de-embedded.

Table 6. Electrical Characteristics – 3.3V Supply Voltage

| Parameter | Symbol | Condition | Minimum | Typical | Maximum | Units |
|---|---|---|---|---|---|---|
| Logic Input High Threshold | $V_{IH}$ | | ***1.07*** [a] | | | V |
| Logic Input Low Threshold | $V_{IL}$ | | | | ***0.8*** | V |
| Logic Current | $I_{IH}$, $I_{IL}$ | Applied STBY voltage = 3.6V | ***-10*** | | ***+100*** | µA |
| Supply Current | $I_{CC}$ | | | 70 | | mA |
| Pull-Down Resistor on STBY Pin | $R_{STBY}$ | | | 50 | | kΩ |
| Standby Current | $I_{CC\_STBY}$ | | | 2 | | mA |
| Settling Time | $t_{SETTLE}$ | 50% STBY control to within ±0.5dB of final power level | | 0.25 | | µs |
| RF Input Return Loss | $RL_{IN}$ | | | 13 | | dB |
| RF Output Return Loss | $RL_{OUT}$ | | | 12 | | dB |
| Gain | G | $f_{RF}$ = 600MHz | | 17.2 | | dB |
| | | $f_{RF}$ = 1900MHz | | 17.6 | | |
| | | $f_{RF}$ = 2600MHz | | 17.3 | | |
| | | $f_{RF}$ = 3500MHz | | 16.7 | | |
| | | $f_{RF}$ = 4200MHz | | 16.1 | | |
| | | $f_{RF}$ = 4900MHz | | 15.0 | | |
| Gain Flatness (amplitude) | $G_{VAR}$ | $f_{RF}$ = 700MHz, ±100MHz | | ±0.15 | | dB |
| | | $f_{RF}$ = 1900MHz, ±100MHz | | ±0.1 | | |
| | | $f_{RF}$ = 2600MHz, ± 100MHz | | ±0.1 | | |
| | | $f_{RF}$ = 3500MHz, ± 100MHz | | ±0.2 | | |
| | | $f_{RF}$ = 4100MHz, ± 100MHz | | ±0.15 | | |
| | | $f_{RF}$ = 4900MHz, ± 100MHz | | ±0.17 | | |
| Gain Variation over Temperature | $G_{TEMP}$ | $T_{EPAD}$ = -40°C to +105°C | | ±0.2 | | dB |
| Noise Figure | NF | $f_{RF}$ = 2600MHz | | 2.3 | | dB |
| | | $f_{RF}$ = 3500MHz | | 2.7 | | |
| | | $f_{RF}$ = 4900MHz | | 3.9 | | |

| Parameter | Symbol | Condition | Minimum | Typical | Maximum | Units |
|---|---|---|---|---|---|---|
| Noise Figure Variation over Temperature | $NF_{TEMP}$ | $T_{EPAD}$ = -40°C to +105°C | | +0.5/-0.4 | | dB |
| Output Third Order Intercept Point | OIP3 | $f_{RF}$ = 2600MHz<br>5MHz tone separation | | 33 | | dBm |
| | | $f_{RF}$ = 3500MHz<br>5MHz tone separation | | 31 | | |
| | | $f_{RF}$ = 4900MHz<br>5MHz tone separation | | 27 | | |
| Output P1dB compression | $OP_{1dB}$ | $f_{RF}$ = 2600MHz | | 16.4 | | dBm |
| | | $f_{RF}$ = 3500MHz | | 15.5 | | |
| | | $f_{RF}$ = 4900MHz | | 13.3 | | |
| Reverse Isolation | $REV_{ISO}$ | | | 24 | | dB |

[a] Specifications in the minimum/maximum columns that are shown in bold italics are guaranteed by test. Specifications in these columns that are not shown in bold italics are guaranteed by design characterization.

## Thermal Characteristics

Table 7. Package Thermal Characteristics

| Parameter | Symbol | Value | Units |
|---|---|---|---|
| Junction-to-Ambient Thermal Resistance. | $\theta_{JA}$ | 93 | °C/W |
| Junction-to-Case Thermal Resistance.<br>(Case is defined as the exposed paddle) | $\theta_{JC-BOT}$ | 27 | °C/W |
| Moisture Sensitivity Rating (Per J-STD-020) | | MSL-1 | |

## Typical Operating Conditions (TOC)

- Evaluation kit connector and trace losses de-embedded
- $V_{CC}$ = 5.0V (plots also taken with $V_{CC}$ = 3.3V)
- $T_{EPAD}$ = +25°C
- STBY = not connected (internally pulled logic low)
- RSET (R5) = 2.49K unless otherwise noted
- Small signal parameters measured with $P_{OUT}$ = 0dBm
- Two tone tests $P_{OUT}$ = 0dBm/tone with 5MHz tone spacing
- $Z_L = Z_S = 50\Omega$, single-ended

# Typical Performance Characteristics

Figure 3. Gain versus Temperature (5V Variation)

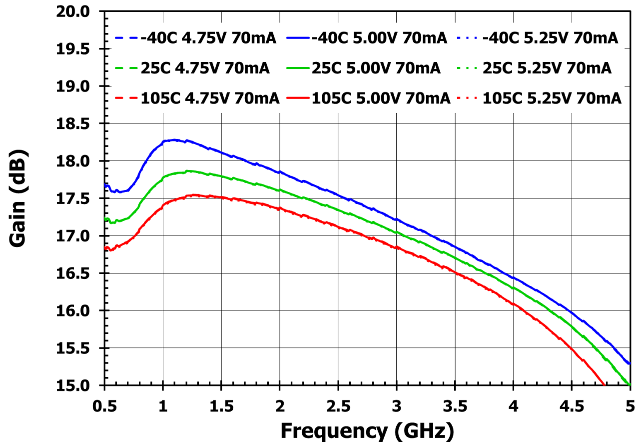



Figure 4. Gain versus Temperature (3.3V Variation)

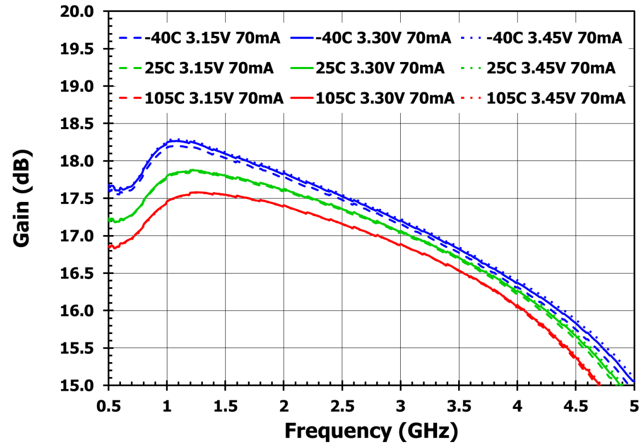



Figure 5. Gain versus Bias Current (5V)

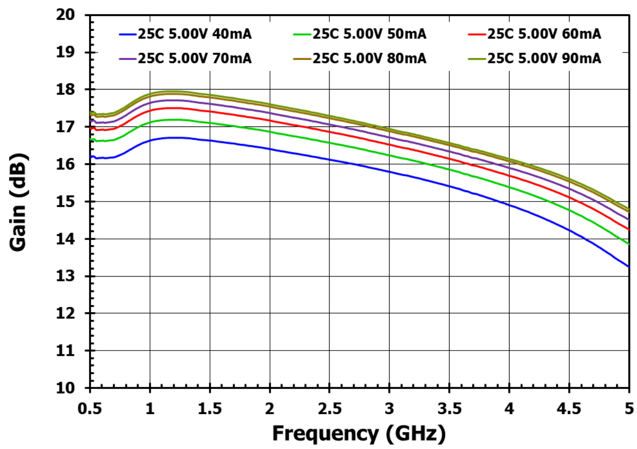



Figure 6. Gain versus Bias Current (3.3V)

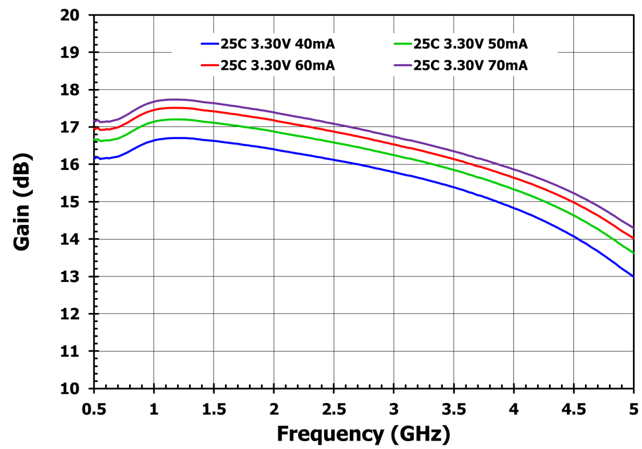



Figure 7. Output IP3 versus Temperature (5V Variation, 70mA)

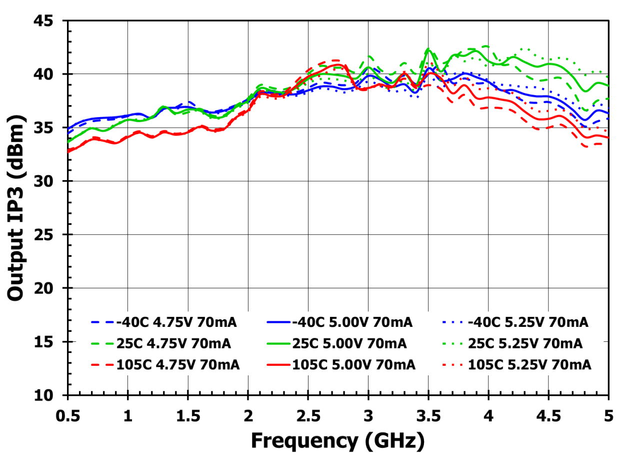



Figure 8. Output IP3 versus Temperature (5V Variation, 80mA)

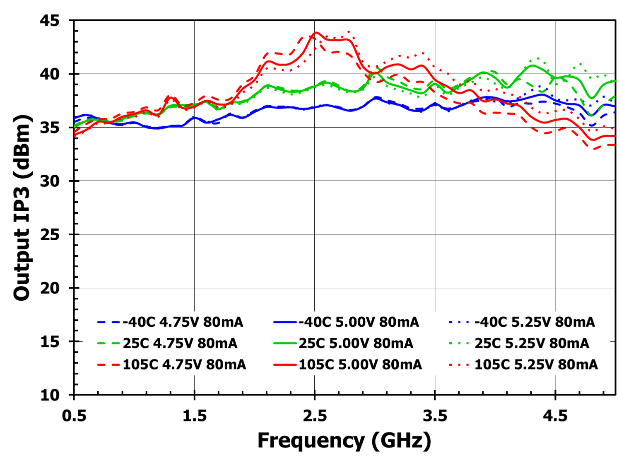


Figure 9. Output IP3 versus Temperature (3.3V Variation, 70mA)

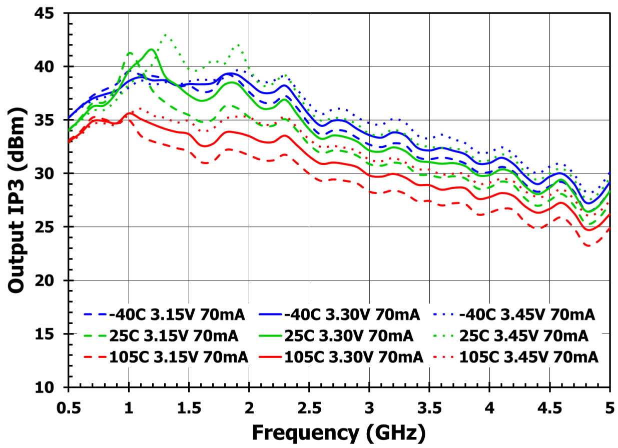



Figure 10. Output IP3 versus Temperature (3.3V Variation, 40mA)

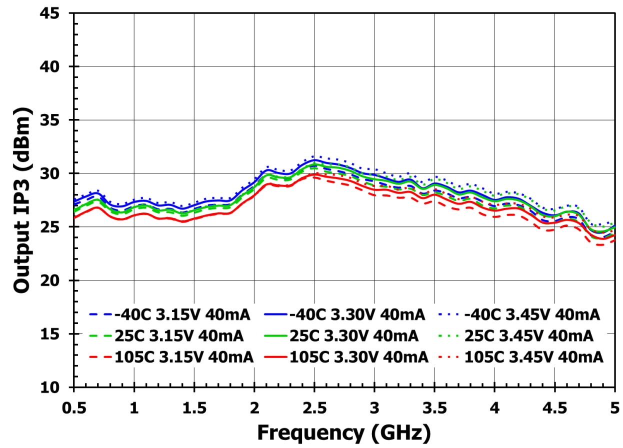



Figure 11. Output IP3 versus Bias Current (5V)

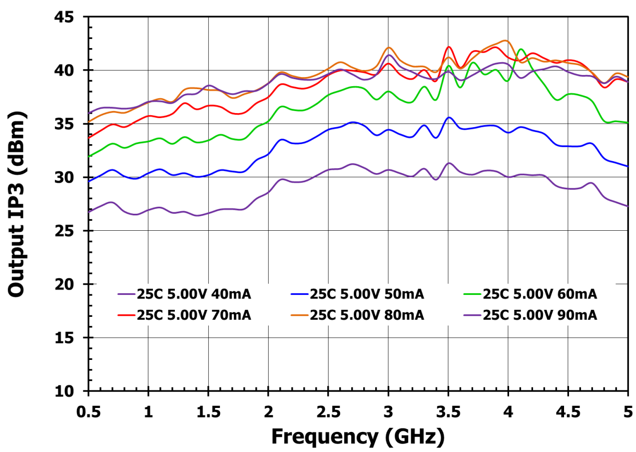



Figure 12. Output IP3 versus Bias Current (3.3V)

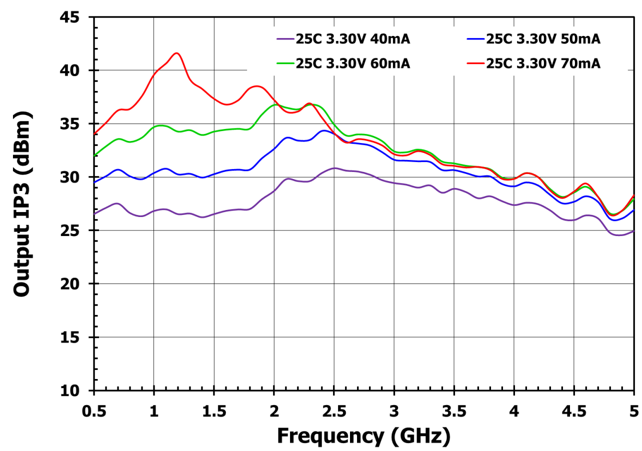



Figure 13. Output 1dB Compression versus Temperature (5V Variation, 70mA)

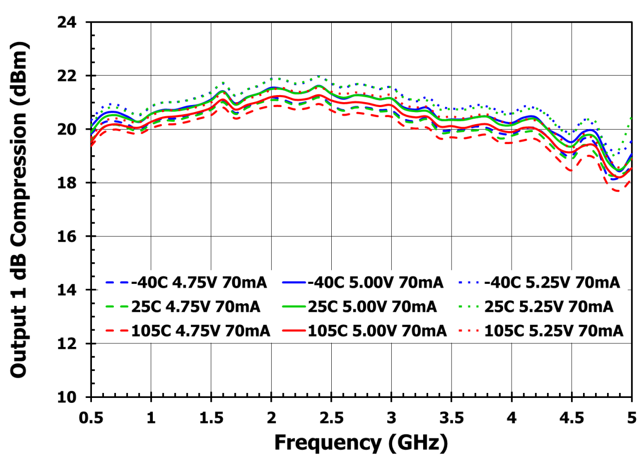



Figure 14. Output 1dB Compression versus Temperature (3.3V Variation, 70mA)

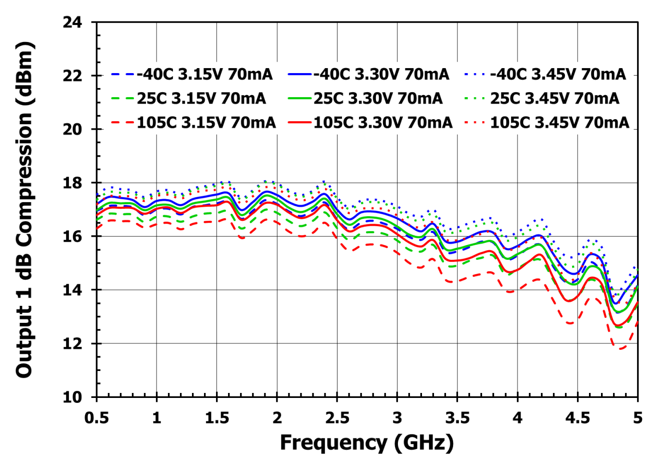


Figure 15. Gain Compression versus Temperature (5V, 0.7GHz, 70mA)

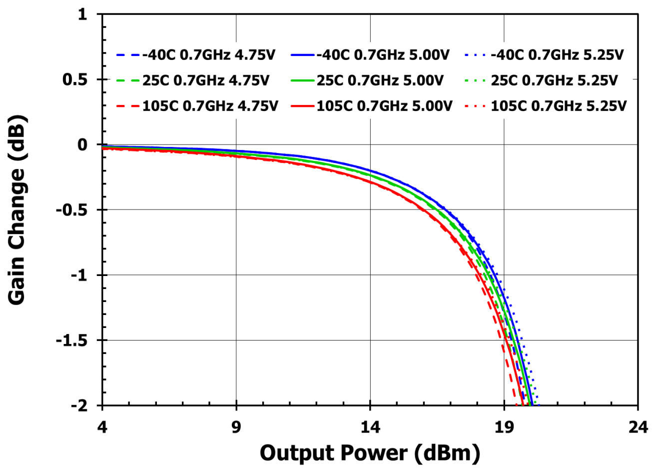



Figure 16. Phase Compression versus Temperature (5V, 0.7GHz, 70mA)

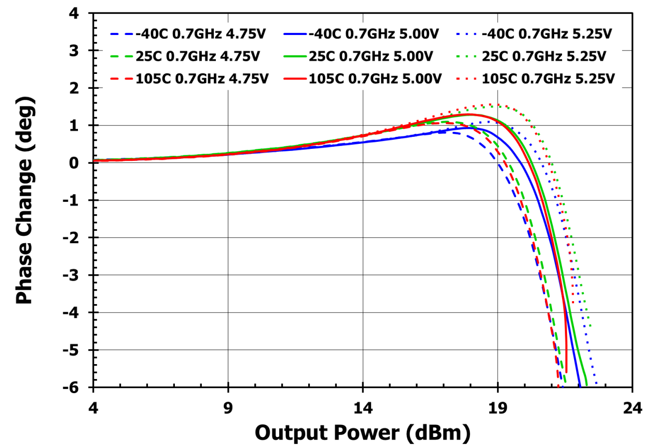



Figure 17. Gain Compression versus Temperature (5V, 1.9GHz, 70mA)

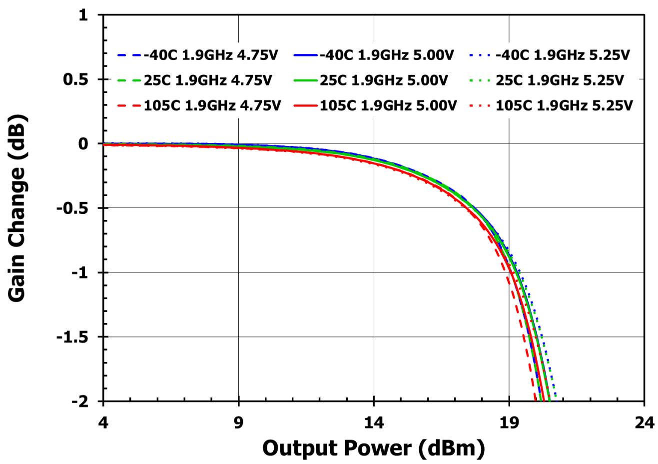



Figure 18. Phase Compression versus Temperature (5V, 1.9GHz, 70mA)

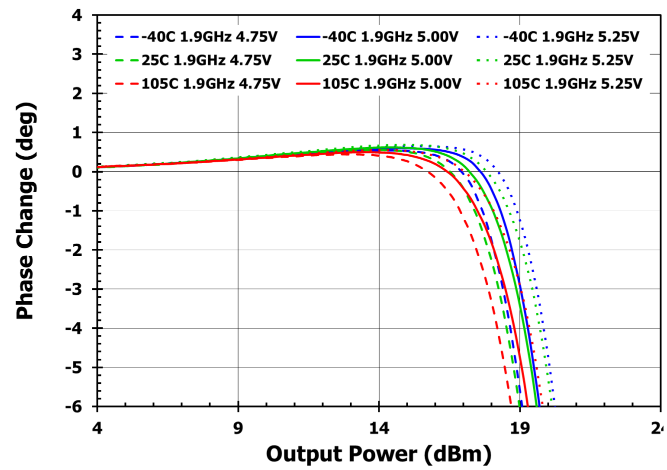



Figure 19. Gain Compression versus Temperature (5V, 2.6GHz, 70mA)

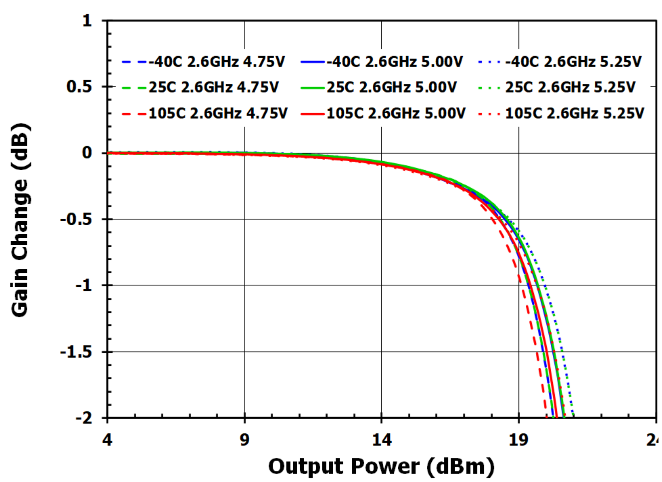



Figure 20. Phase Compression versus Temperature (5V, 2.6GHz, 70mA)

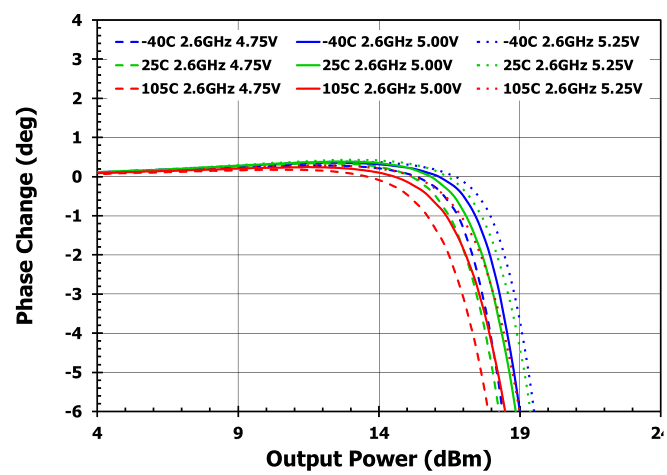


Figure 21. Gain Compression versus Temperature (5V, 3.5GHz, 70mA)

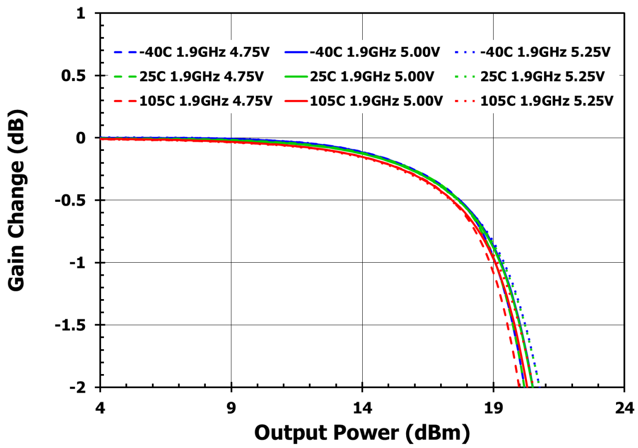



Figure 22. Phase Compression versus Temperature (5V, 3.5GHz, 70mA)

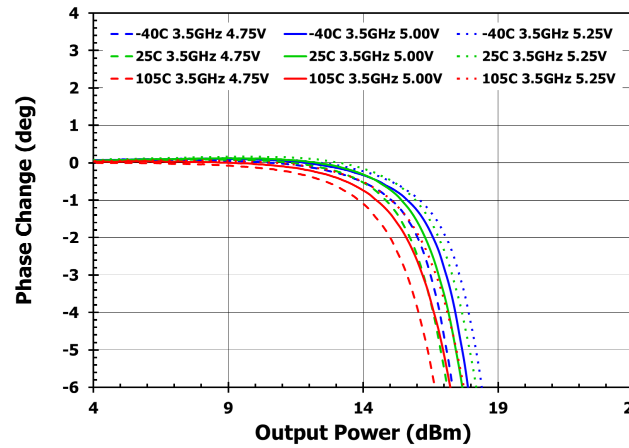



Figure 23. Gain Compression versus Temperature (5V, 4.1GHz, 70mA)

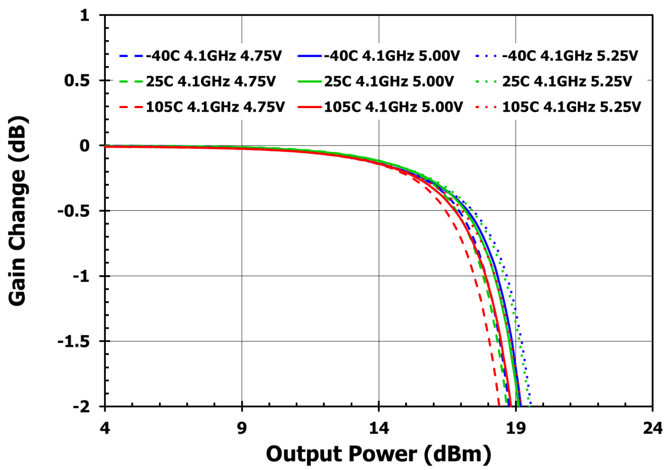



Figure 24. Phase Compression versus Temperature (5V, 4.1GHz, 70mA)

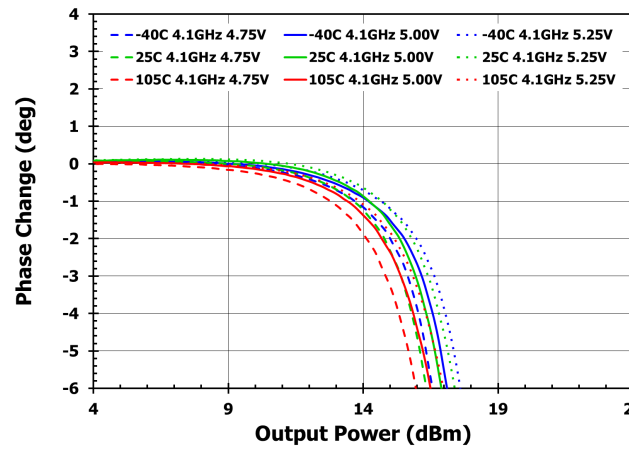



Figure 25. Gain Compression versus Temperature (3.3V, 2.6GHz, 70mA)

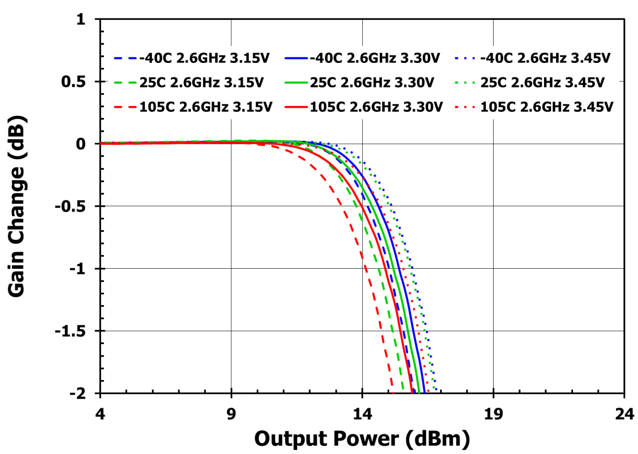



Figure 26. Phase Compression versus Temperature (3.3V, 2.6GHz, 70mA)

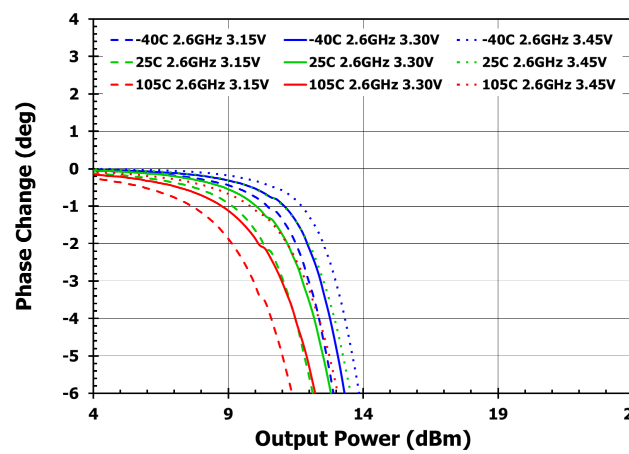


Figure 27. RFIN Return Loss versus Temperature (5V Variation)

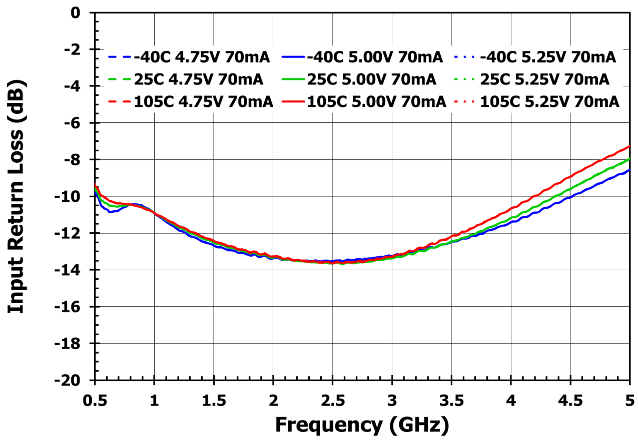



Figure 28. RFIN Return Loss versus Temperature (3.3V Variation)

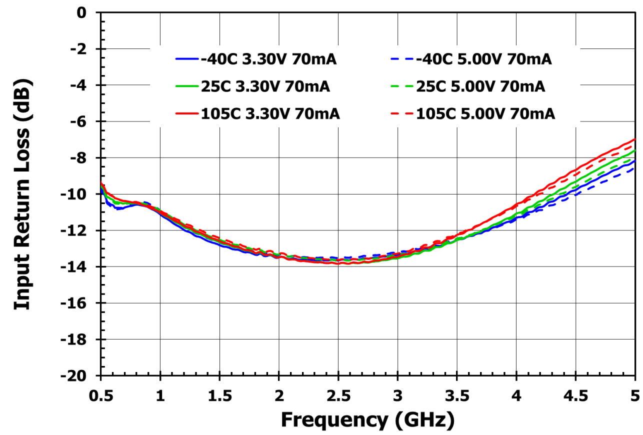



Figure 29. RFOUT Return Loss versus Temperature (5V Variation)

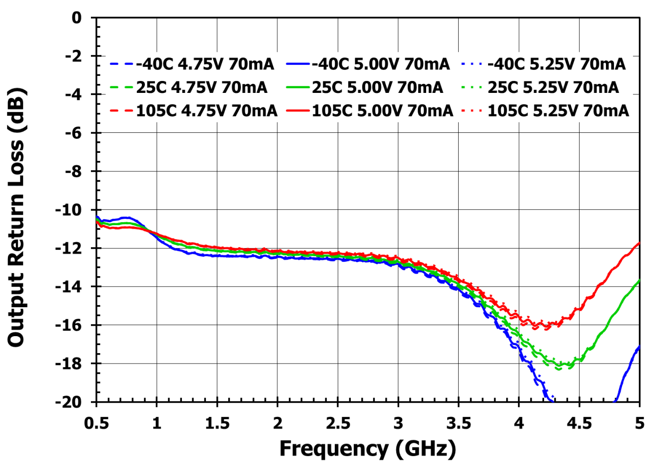



Figure 30. RFOUT Return Loss versus Temperature (3.3V Variation)

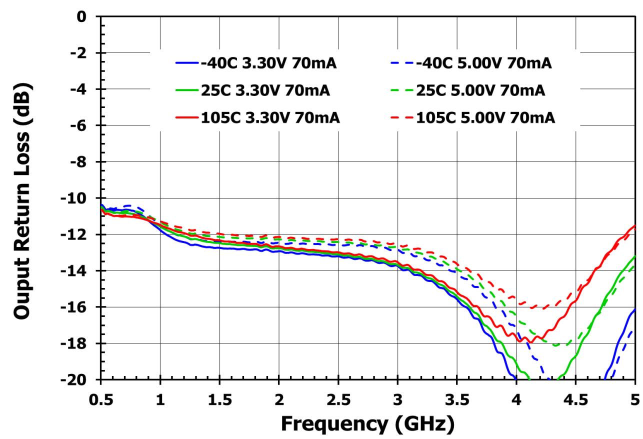



Figure 31. Reverse Gain versus Temperature (5V Variation)

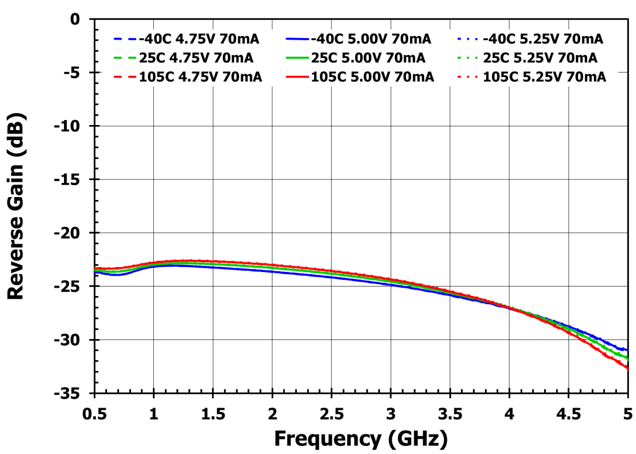



Figure 32. Stability Factor for Various Currents (3.3V, 5V, -40°C, R8=1K)

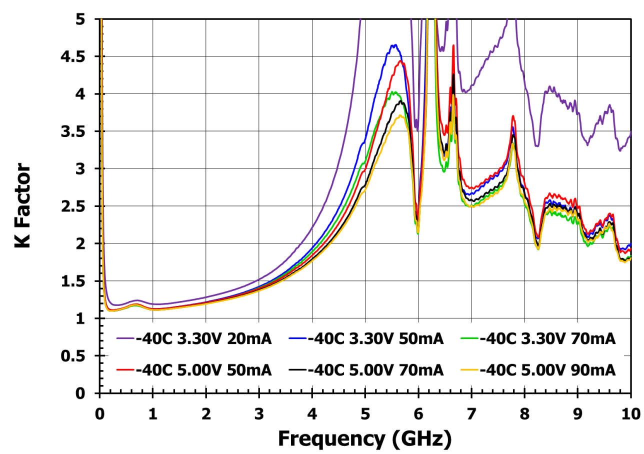


Figure 33. Turn-on Time (3.3V)

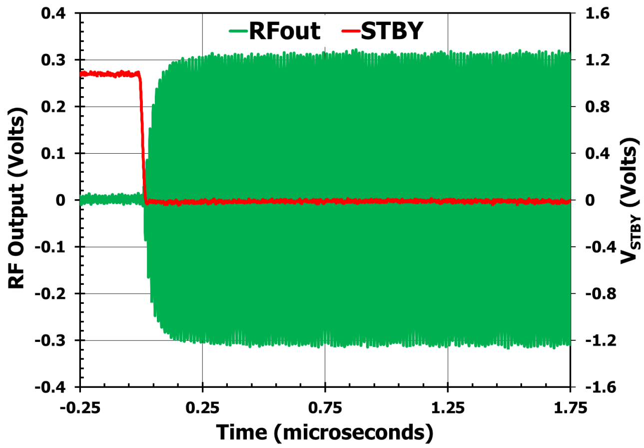



Figure 34. Turn-on Time (5V)

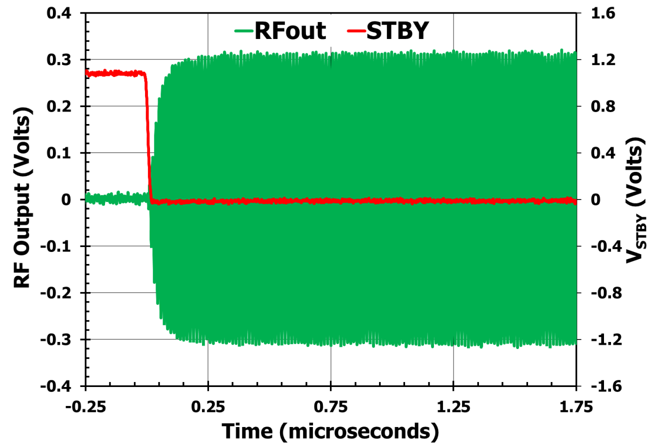



Figure 35. Noise Figure versus Temperature (5V Variation)

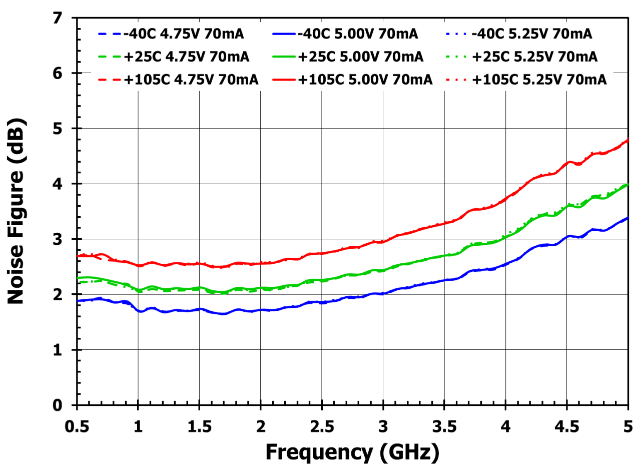



Figure 36. Noise Figure versus Temperature (3.3V Variation)

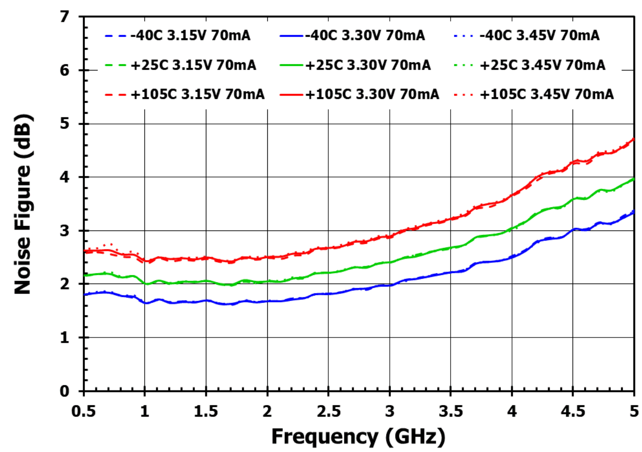



Figure 37. Noise Figure versus Current (5V Variation)

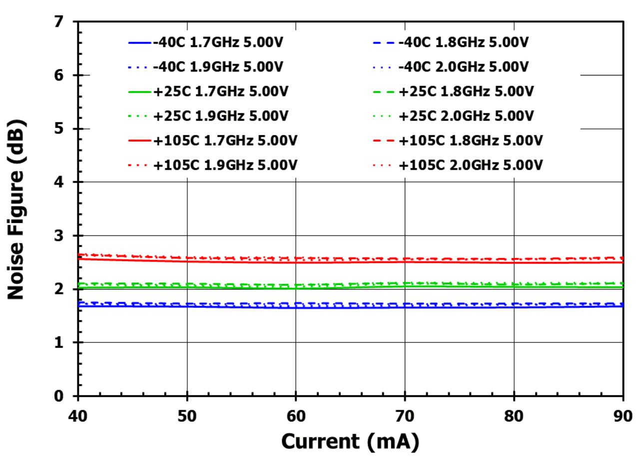
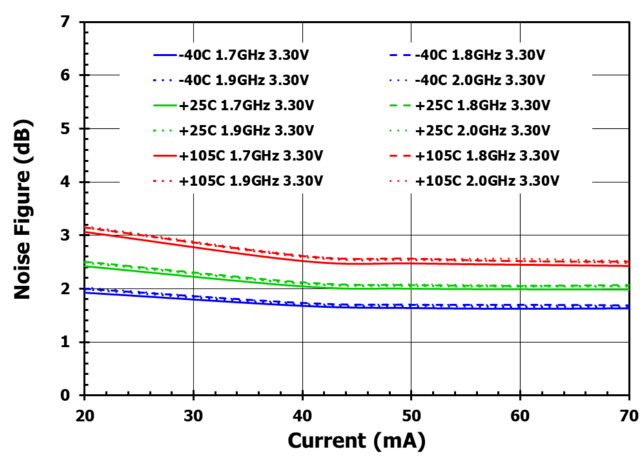


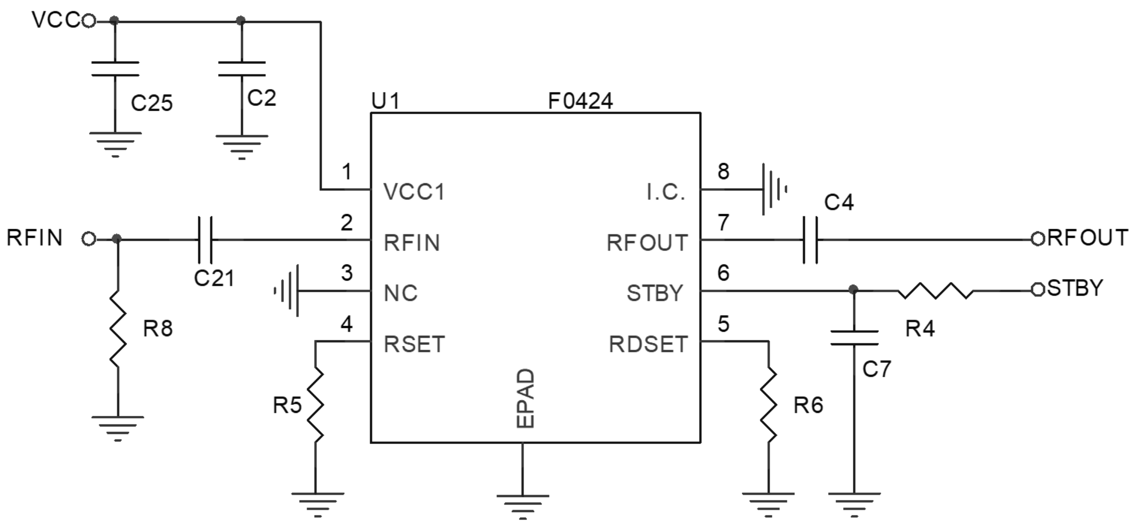

Figure 38. Noise Figure versus Current (3.3V Variation)



## Typical Application Circuit

Figure 39 is a typical circuit (minimum components) that can be use in a design for the F0424 by the customer.

Figure 39. Electrical Schematic



# Evaluation Kit Picture

Figure 40. Evaluation Kit – Top View

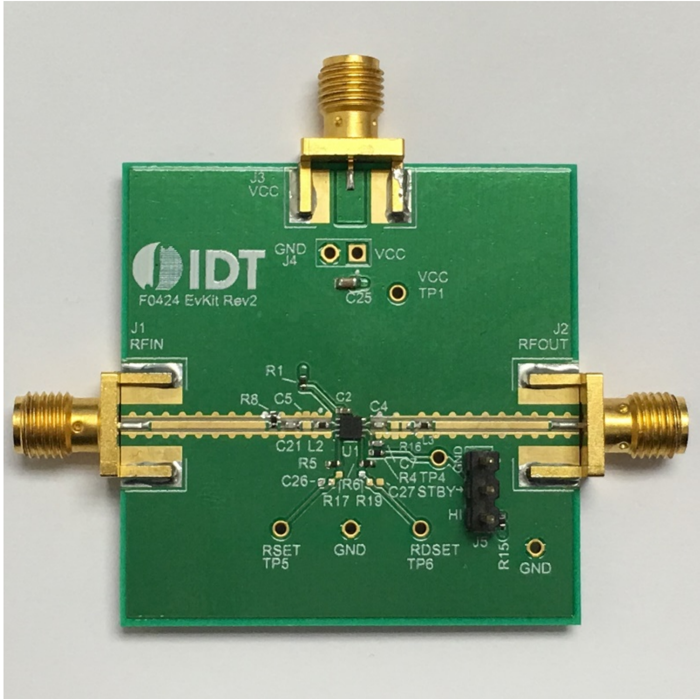
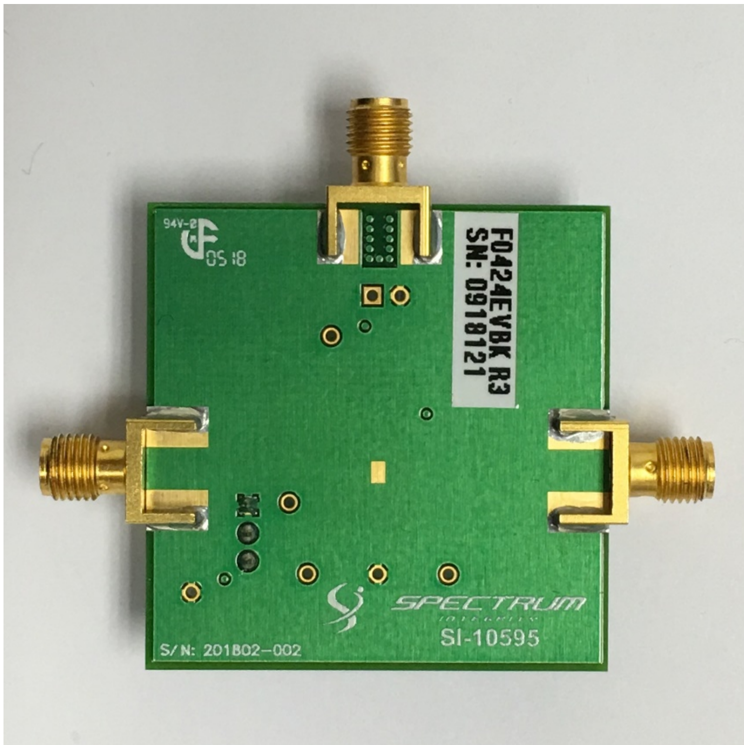



Figure 41. Evaluation Kit – Bottom View



# Evaluation Kit / Applications Circuit

Figure 42. Electrical Schematic for Evaluation Board

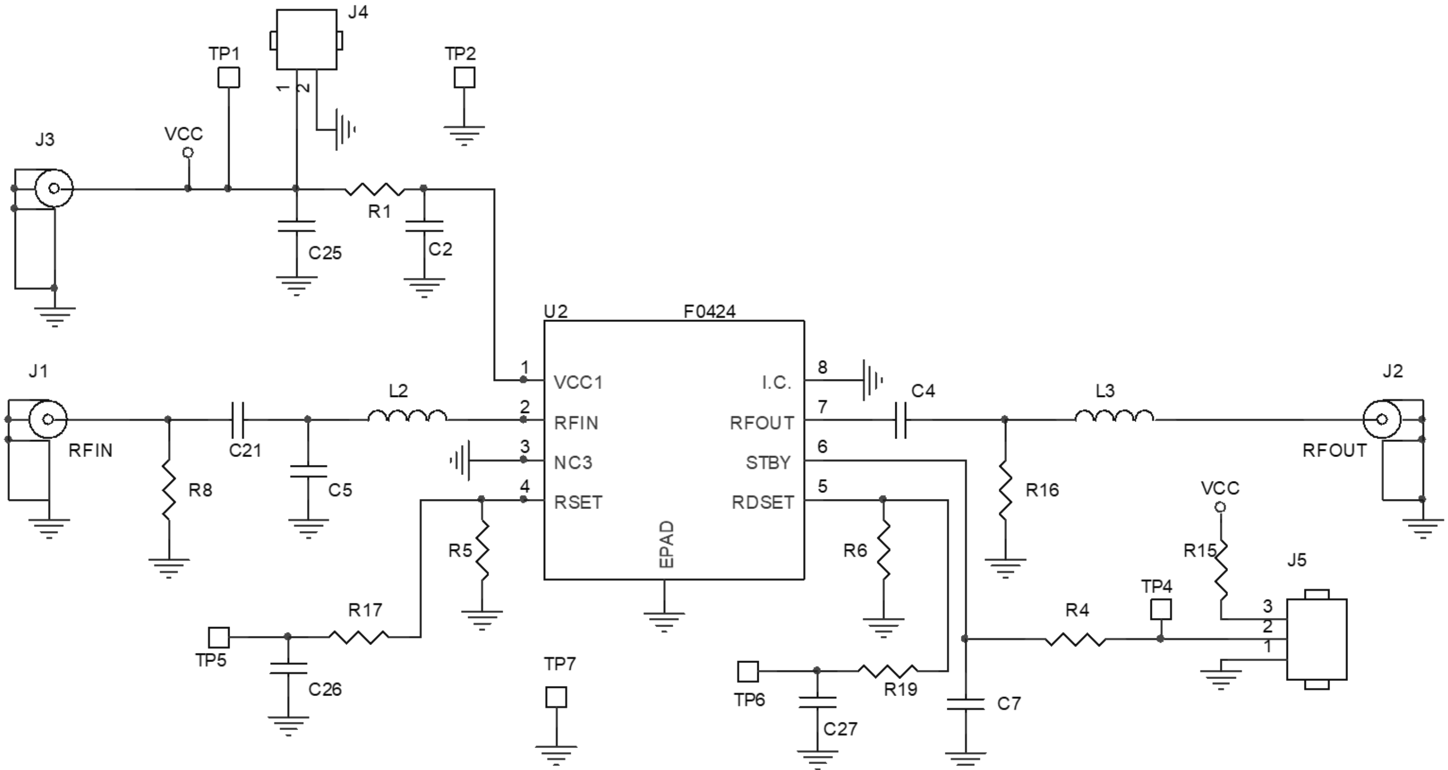


Table 8. Bill of Material (BOM)

| Part Reference | QTY | Description | Manufacturer Part # | Manufacturer |
|---|---|---|---|---|
| C2 | 1 | 10nF ±5% 50V X7R Ceramic Capacitor (0402) | GRM155R71H103J | Murata |
| C4, C21 | 2 | 22pF ±5%, 50V, C0G Ceramic Capacitor (0402) | GRM1555C1H220J | Murata |
| C7 | 1 | 2pF ±0.1pF 100V C0G, Ceramic Capacitor (0402) | GRM1555C1H2R0B | Murata |
| C25 | 1 | 1µF ±10% 16V X7R Ceramic Capacitor (0603) | GRM188R71C105K | Murata |
| L2, L3, R1, R15 | 4 | 0Ω 1/10W Resistors (0402) | ERJ-2GE0R00X | Panasonic |
| R4, R8 | 1 | 1kΩ ±1% 1/10W Resistor (0402) | ERJ-3EKF1001X | Panasonic |
| R5 | 1 | 2.49kΩ ±1% 1/10W Resistor (0402)<br>see Table 9 for resistor value versus operating current | ERJ-2RKF2491X | Panasonic |
| R6 | 1 | 160Ω ±1% 1/10W Resistor (0402) | ERJ-2RKF1600X | Panasonic |
| J1, J2, J3 | 3 | Edge Launch SMA (0.375 inch pitch ground tab) | 142-0701-851 | Emerson Johnson |
| J4 | 0 | CONN HEADER VERT SGL 2 X 1 POS GOLD | 961102-6404-AR | 3M |
| J5 | 1 | CONN HEADER VERT SGL 3 X 1 POS GOLD | 961103-6404-AR | 3M |
| TP1 | 1 | TEST POINT PC MINI .040"D RED | Keystone5000 | Keystone |
| TP2 | 1 | TEST POINT PC MINI .040"D BLACK | Keystone5001 | Keystone |
| TP4, TP5, TP6, TP7 | 0 | DNP | | |
| U1 | 1 | High Gain Broadband RF Amplifier | F0424 | IDT |
| C5, C26, C27, R16, R17, R19 | NA | These components are not populated | | |

Table 9. RSET Biasing Resistor for Various Bias Currents (5V, 3.3V Supply)

| Operating $I_{CC}$ | RSET Resistor (R5) |
|---|---|
| 40mA | 6.19kΩ |
| 50mA | 4.22kΩ |
| 60mA | 3.16kΩ |
| 70mA | 2.49kΩ |
| 80mA | 2.00kΩ |
| 90mA | 1.74kΩ |

Note: 1% resistors can be substituted with 5% equivalents.

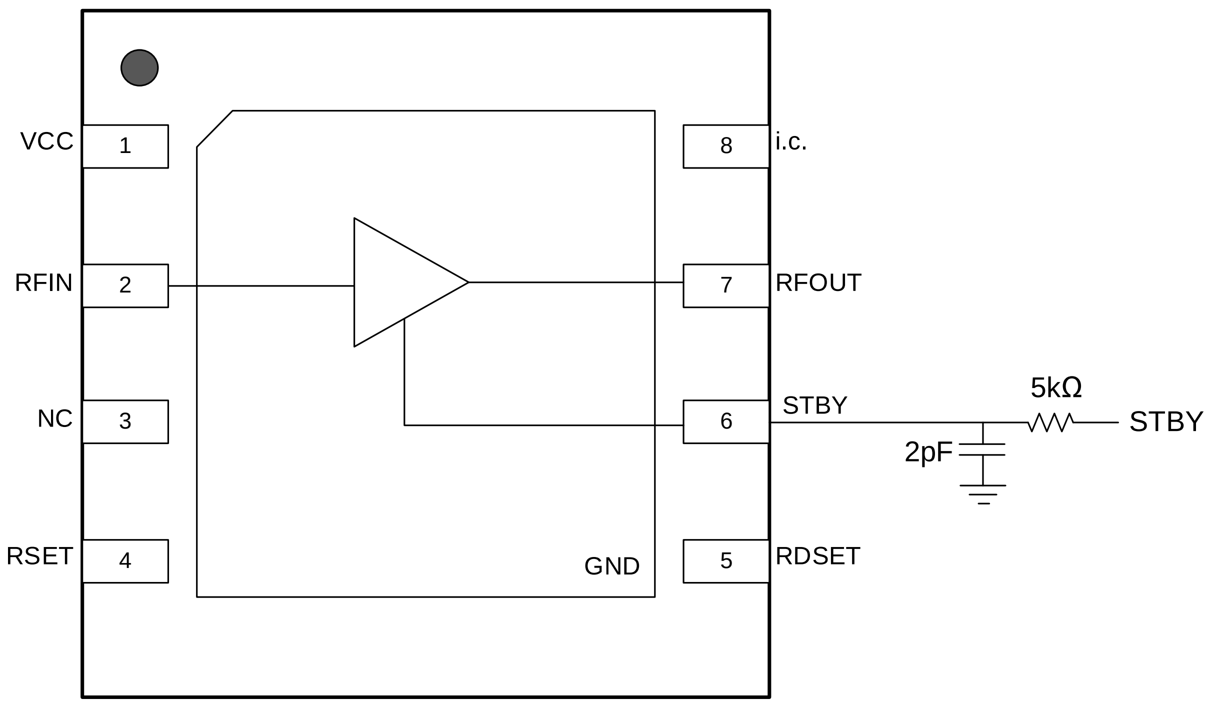
# Applications Information

## Power Supplies

A common $V_{CC}$ power supply should be used for all pins requiring DC power. All supply pins should be bypassed with external capacitors to minimize noise and fast transients. Supply noise can degrade the noise figure, and fast transients can trigger ESD clamps and cause them to fail. Supply voltage change or transients should have a slew rate smaller than 1V/20µS. In addition, all control pins should remain at 0V (±0.3V) while the supply voltage ramps or while it returns to zero.

If control signal integrity is a concern and clean signals cannot be guaranteed due to overshoot, undershoot, ringing, etc., the following circuit at the input of the STBY control pin is recommended. This applies to the STBY pin as shown below. Note the recommended resistor and capacitor values do not necessarily match the EVKit BOM for the case of poor control signal integrity. For multiple devices driven by a single control line, the component values will need to be adjusted accordingly so as not to load down the control line.

Figure 43. Control Pin Interface for Signal Integrity

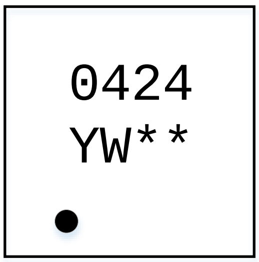


## Package Outline Drawings

The package outline drawings are appended at the end of this document and are accessible from the link below. The package information is the most current data available.

https://www.idt.com/document/psc/8-dfn-package-outline-drawing-20-x-20-x-075-mm-body-05mm-pitch-epad-08-x-160-mm-ntg8p2

## Marking Diagram




Line 1 – 0424 = abbreviated the part number.
Line 2 – Y = Year code, last digit of production year (“8” would correspond to 2018).
Line 2 – W = Work week code (“W” corresponds to week 30).
Line 2 - ** = Sequential alphanumeric for lot traceability.

## Ordering Information

| Orderable Part Number | Description and Package | MSL Rating | Carrier Type | Temperature |
|---|---|---|---|---|
| F0424NTGK | F0424 High-Gain Broadband RF Amplifier, 2.0 × 2.0 × 0.75 mm 8-DFN (NTG8P2) | 1 | Tray | -40°C to +105°C |
| F0424NTGK8 | F0424 High-Gain Broadband RF Amplifier, 2.0 × 2.0 × 0.75 mm 8-DFN (NTG8P2) | 1 | Reel | -40°C to +105°C |
| F0424EVBK | Evaluation Board | | | |

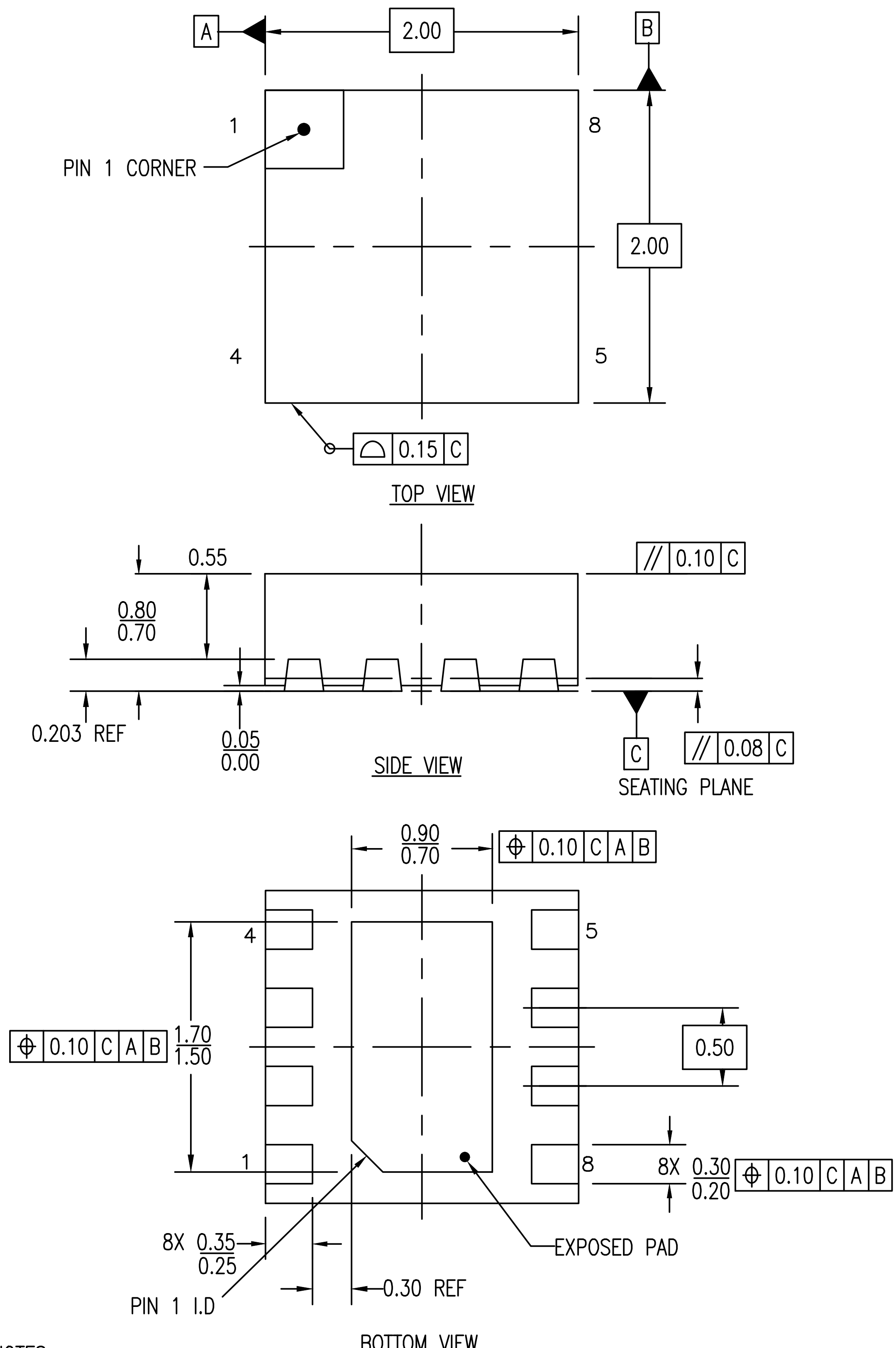
## Revision History

| Revision Date | Description of Change |
|---|---|
| December 16, 2022 | ▪ Updated Figure 19 |
| February 13, 2020 | ▪ Completed stylistic changes; no technical updates |
| February 7, 2020 | ▪ Frequency expansion up to 5000MHz and specifications added to spec table at 4.9GHz |
| March 7, 2019 | ▪ Added simplified application circuit.<br>▪ Updated datasheet format |
| May 5, 2018 | Initial release. |

# 8-DFN, Package Outline Drawing

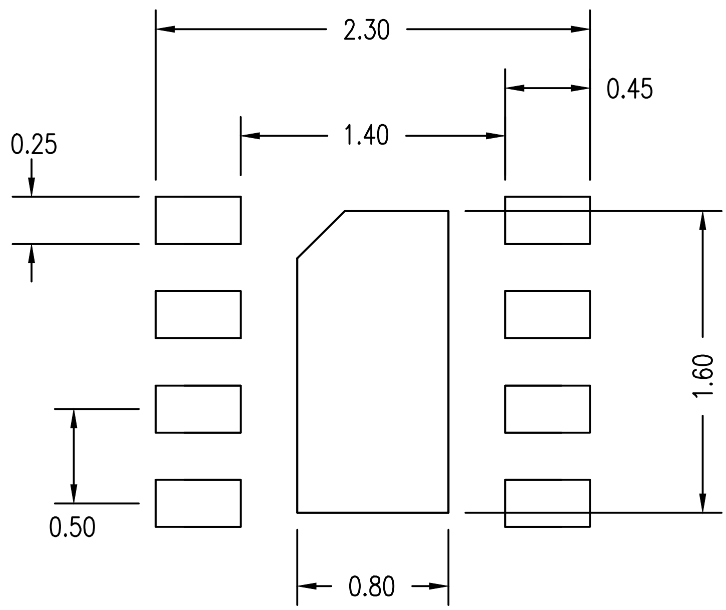
2.0 x 2.0 x 0.75 mm Body, 0.5mm Pitch, Epad 0.8 x 1.60 mm

NTG8P2, PSC-4604-02, Rev 02, Page 1




NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS.
2. ALL DIMENSIONING AND TOLERANCING CONFORM TO ASME Y14.5M−1994




RECOMMENDED LAND PATTERN DIMENSION

NOTES:

1. ALL DIMENSIONS ARE IN MM. ANGLES IN DEGREES.
2. TOP DOWN VIEW, AS VIEWED ON PCB.
3. LAND PATTERN RECOMMENDATION PER IPC-7351B GENERIC REQUIREMENT FOR SURFACE MOUNT DESIGN AND LAND PATTERN.

| Package Revision History | | |
|---|---|---|
| Date Created | Rev No. | Description |
| Feb 12, 2018 | Rev 01. | New Format, Change QFN to VFQFPN |
| April 12, 2018 | Rev 02 | Change "VFQFPN" to "DFN" |

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