

10.0-40.0 GHz GaAs MMIC Distributed Amplifier, QFN

Mimix
BROADBAND™

February 2007 - Rev 08-Feb-07

X DI005-QT
X RoHS

Features

- X Ultra Wide Band Driver Amplifier
- X Self Biased Architecture
- X 18.0 dB Small Signal Gain
- X 6.0 dB Noise Figure
- X RoHS Compliant SMD, 3x3 mm QFN Package
- X 100% RF, DC, and Output Power Testing



General Description

Mimix Broadband's three stage 10.0-40.0 GHz GaAs MMIC distributed amplifier has a small signal gain of 18.0 dB with a 6.0 dB noise figure across much of the band. This MMIC uses Mimix Broadband's 0.15 μm GaAs PHEMT device model technology, and is based upon electron beam lithography to ensure high repeatability and uniformity. The device comes in a RoHS compliant 3x3mm QFN Surface Mount Package offering excellent RF and thermal properties. This device is well suited for Millimeter-wave Point-to-Point Radio, LMDS, SATCOM and VSAT applications.

Absolute Maximum Ratings

| | |
|----------------------------|--------------------------------|
| Supply Voltage (Vd) | +6.0 VDC |
| Supply Current (Id) | 240 mA |
| Input Power (Pin) | +17.0 dBm |
| Storage Temperature (Tstg) | -65 to +165 °C |
| Operating Temperature (Ta) | -55 to MTTF Graph ¹ |
| Channel Temperature (Tch) | MTTF Graph ¹ |

(1) Channel temperature affects a device's MTTF. It is recommended to keep channel temperature as low as possible for maximum life.

Electrical Characteristics (Ambient Temperature T = 25 °C)

| Parameter | Units | Min. | Typ. | Max. |
|--|-------|------|--------|------|
| Frequency Range (f) | GHz | 10.0 | - | 40.0 |
| Input Return Loss (S11) | dB | - | 7.0 | - |
| Output Return Loss (S22) | dB | - | 20.0 | - |
| Small Signal Gain (S21) | dB | - | 18.0 | - |
| Gain Flatness (ΔS_{21}) | dB | - | +/-5.0 | - |
| Reverse Isolation (S12) | dB | - | 40.0 | - |
| Noise Figure (NF) | dB | - | 6.0 | - |
| Output Power for 1dB Compression (P1dB) ² | dBm | - | TBD | - |
| Drain Bias Voltage (Vd) | VDC | - | +5.0 | +5.5 |
| Supply Current (Id) (Vd=5.0V) | mA | - | 170 | 205 |

(2) Measured using constant current.

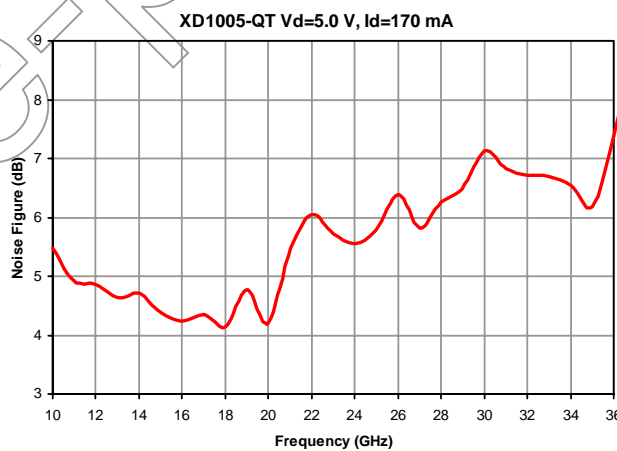
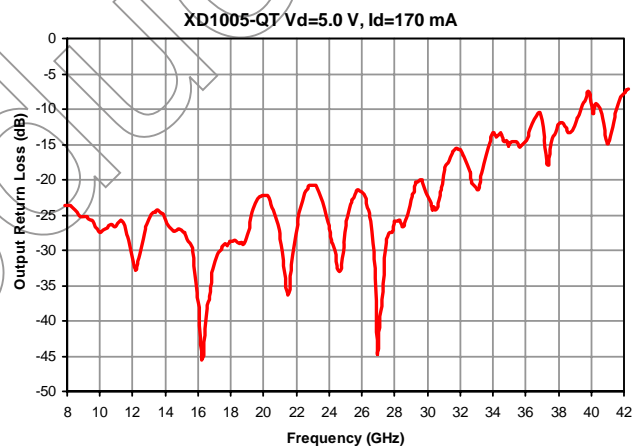
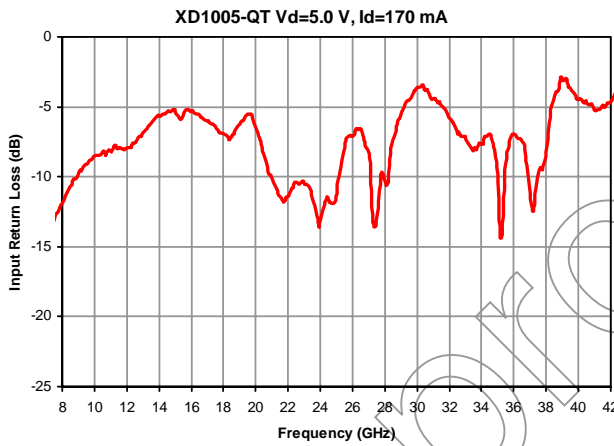
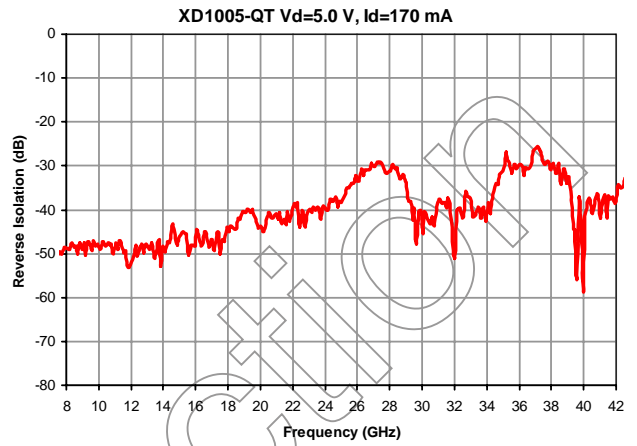
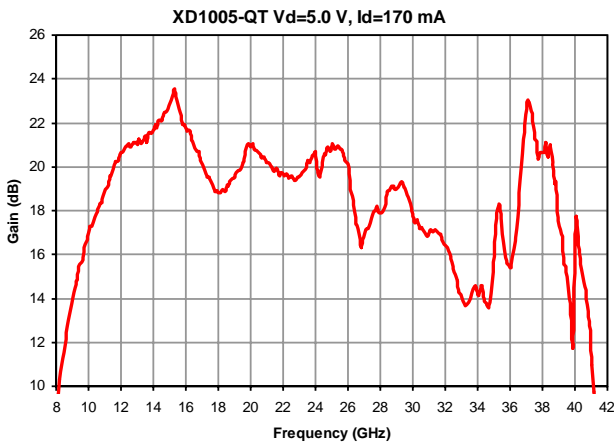
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Distributed Amplifier Measurements

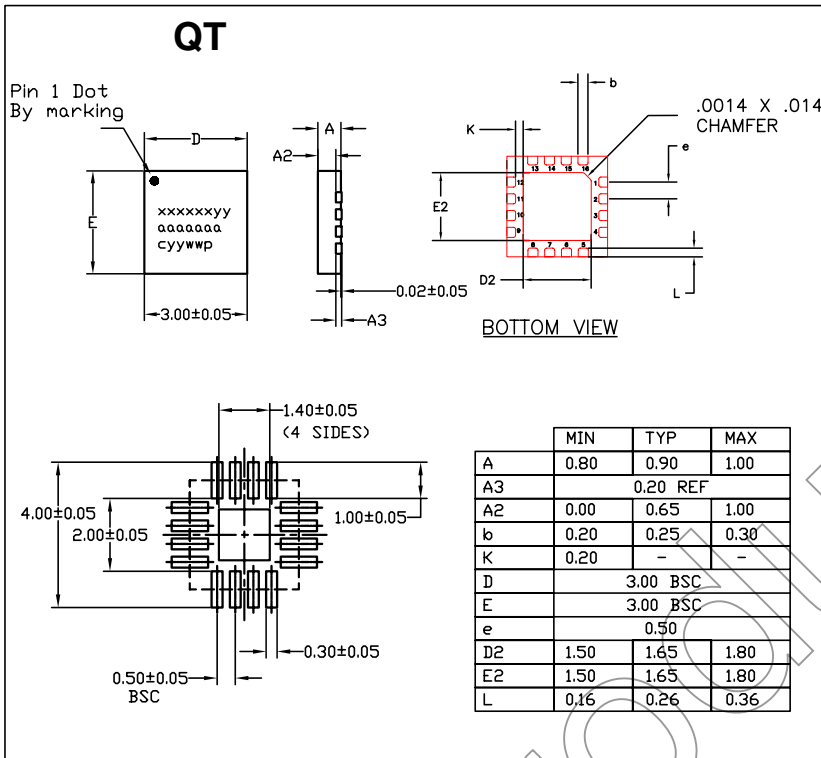


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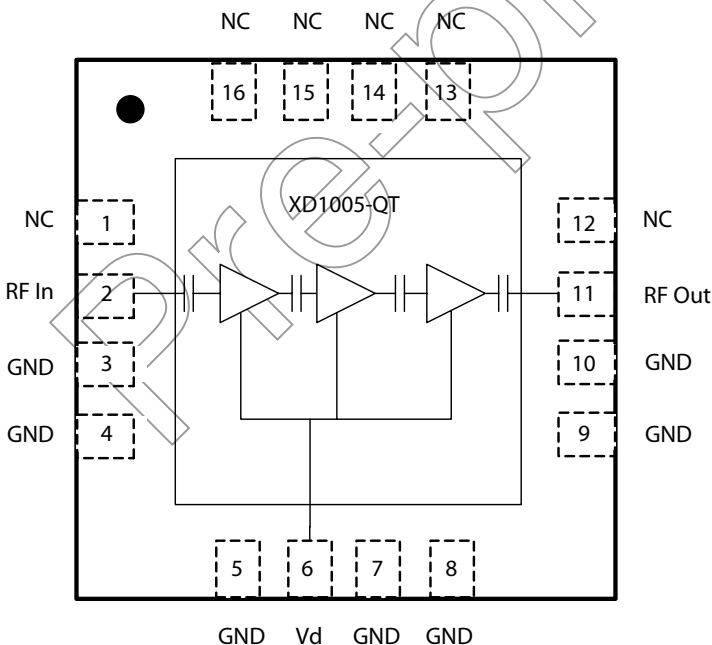
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Package Dimensions/Layout

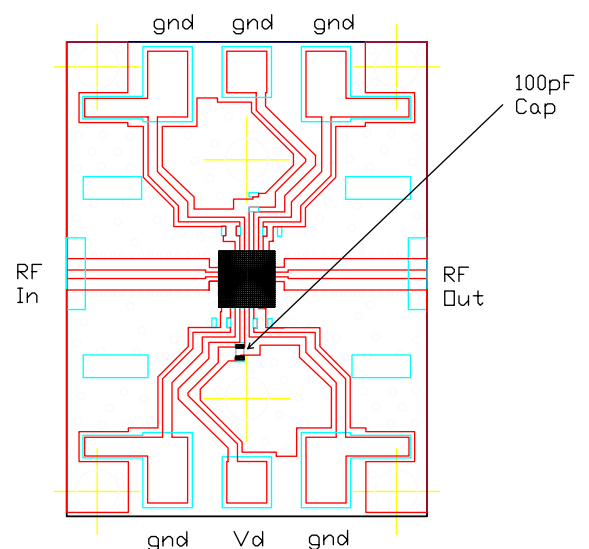


| Pin | Description |
|-------|-------------|
| 1 | N/C |
| 2 | RF Input |
| 3,4 | Ground |
| 5 | Ground |
| 6 | Vd |
| 7,8 | Ground |
| 9,10 | Ground |
| 11 | RF Output |
| 12 | N/C |
| 13,14 | N/C |
| 15,16 | N/C |

Functional Block Diagram/Board Layout



Bypass Capacitors - See App Note [2]



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App Note [1] Biasing – As shown in the bonding diagram, this device operates using a self-biased architecture and only requires one drain bias. Bias is nominally $V_d=5V, I_d=170\text{ mA}$.

App Note [2] Bias Arrangement - Each DC pad (V_d) needs to have DC bypass capacitance ($\sim 100\text{-}200\text{ pF}$) as close to the device as possible. Additional DC bypass capacitance ($\sim 0.01\text{ }\mu\text{F}$) is also recommended.

MTTF Tables (TBD)

These numbers were calculated based on accelerated life test information and thermal model analysis received from the fabricating foundry.

| Backplate Temperature | Channel Temperature | Rth | MTTF Hours | FITs |
|-----------------------|---------------------|-----|------------|------|
| 55 deg Celsius | Deg Celsius | C/W | E+ | E+ |
| 75 deg Celsius | Deg Celsius | C/W | E+ | E+ |
| 95 deg Celsius | Deg Celsius | C/W | E+ | E+ |

Bias Conditions: $V_d=5.0V, I_d=170\text{ mA}$

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Handling and Assembly Information

CAUTION! - Mimix Broadband MMIC Products contain gallium arsenide (GaAs) which can be hazardous to the human body and the environment. For safety, observe the following procedures:

- Do not ingest.
- Do not alter the form of this product into a gas, powder, or liquid through burning, crushing, or chemical processing as these by-products are dangerous to the human body if inhaled, ingested, or swallowed.
- Observe government laws and company regulations when discarding this product. This product must be discarded in accordance with methods specified by applicable hazardous waste procedures.

Life Support Policy - Mimix Broadband's products are not authorized for use as critical components in life support devices or systems without the express written approval of the President and General Counsel of Mimix Broadband. As used herein: (1) Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, and whose failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury to the user. (2) A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

Package Attachment - This packaged product from Mimix Broadband is provided as a rugged surface mount package compatible with high volume solder installation. Vacuum tools or other suitable pick and place equipment may be used to pick and place this part. Care should be taken to ensure that there are no voids or gaps in the solder connection so that good RF, DC and ground connections are maintained. Voids or gaps can eventually lead not only to RF performance degradation, but reduced reliability and life of the product due to thermal stress.

Typical Reflow Profiles

| Reflow Profile | SnPb | Pb Free |
|---------------------------------|-------------------------|-------------------------|
| Ramp Up Rate | 3-4 °C/sec | 3-4 °C/sec |
| Activation Time and Temperature | 60-120 sec @ 140-160 °C | 60-180 sec @ 170-200 °C |
| Time Above Melting Point | 60-150 sec | 60-150 sec |
| Max Peak Temperature | 240 °C | 265 °C |
| Time Within 5 °C of Peak | 10-20 sec | 10-20 sec |
| Ramp Down Rate | 4-6 °C/sec | 4-6 °C/sec |

Factory Automation and Identification

| Mimix Designator | Package Type | Number of leads offered | W Tape Width | P ₁ Component Pitch | P ₀ Hole Pitch | Reel Diameter | Units per Reel |
|------------------|--------------|-------------------------|--------------|--------------------------------|---------------------------|---------------|----------------|
| -QT | QFN (3x3mm) | 16 | 12mm | 8mm | 4mm | 329mm (13in) | 2000 |

Component Orientation: Parts are to be oriented with the PIN 1 closest to the tape's round sprocket holes on the tape's trailing edge.

Note: Tape and Reel packaging is ordered with a -000T suffix. Package is available in 500 unit reels through designated sales channels. Minimum order quantities should be discussed with your local sales representative.

Mimix Lead-Free RoHS Compliant Program - Mimix has an active program in place to meet customer and governmental requirements for eliminating lead (Pb) and other environmentally hazardous materials from our products. All Mimix RoHS compliant components are form, fit and functional replacements for their non-RoHS equivalents. Lead plating of our RoHS compliant parts is 100% matt tin (Sn) over copper alloy and is backwards compatible with current standard SnPb low-temperature reflow processes as well as higher temperature (260°C reflow) "Pb Free" processes.

Part Number for Ordering

XD1005-QT-0G00
XD1005-QT-EV1

Description

Matte Tin plated RoHS compliant 3x3 16L QFN surface mount package in bulk quantity
XD1005-QT evaluation board

We also offer this part with SnPb (Tin-Lead) or NiPdAu plating. Please contact your regional sales manager for more information regarding different plating types.

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