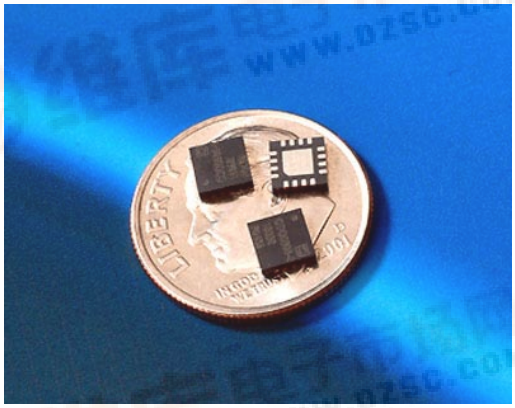
1.5-6.0 GHz GaAs MMIC Packaged Driver Amplifier

February 2008 - Rev 03-Feb-08

CMM9000-QT
RoHS

Features

- 15 dB Gain
- 15 dBm P1dB
- 3x3 QFN Package
- Single Positive Supply
- 4-8 V, 70 mA Self Bias
- DC Blocking Capacitors and RF Choke Inductors Integrated On-Chip
- RoHS Compliant



Circuit Description

Mimix Broadband's 2 stage feedback 1.5 to 6.0 GHz driver amplifier is packaged in an RoHS compliant surface mount 3x3 QFN package. The device is a self-biased, single supply design with 15 dB gain and 15 dBm P1dB between 1 and 6 GHz. This MMIC uses Mimix Broadband's 0.5um MESFET process. The device is fully matched, so there is no need for external matching components. Output DC blocking capacitor and RF choke inductors are integrated on-chip. Care must be taken to isolate the input from external DC voltages.

Absolute Maximum Ratings

Supply Voltage	+8 V
RF Input Power	+15 dBm
Storage Temperature (Tstg)	-55 °C to +125 °C
Junction Temperature	175 °C
Operating Temperature	-40 °C to +85°C
ΘJc	85 °C/W

Operating this device beyond any of these parameters may cause permanent damage.

Electrical Characteristics (T=25°C, Vdd=6V)

Parameter	Units	Min.	Typ.	Max.	Min.	Typ.	Max.
Frequency Range (f)	GHz	1.5	-	6	6.1	-	10
Gain (S21)	dB	9.5	15	-	-	9	-
Input Return Loss (S11)	dB	-	-10	-	-	-6	-
Output Return Loss (S22)	dB	-	-10	-	-	-6	-
Output P1dB	dBm	11	15	-	-	14	-
Output IP3	dBm	20	25	-	-	25	-
Current	mA	-	90	120	-	90	120

Typical Parameters (6V, 90 mA)

Parameter (Unit)	Typical					
Frequency (GHz)	1	2	4	6	8	10
Gain (dB)	13	15	15	11	9	9
IP Return Loss (dB)	-10	-18	-18	-12	-6	-8
Op Return Loss (dB)	-10	-20	-15	-12	-9	-20
P1dB (dBm)	17	16	15	16	15	15
OIP3 (dBm)	26	25	25	25	25	26
Noise Figure (dB)	5.5	5.5	5.5	5.5	5.5	6

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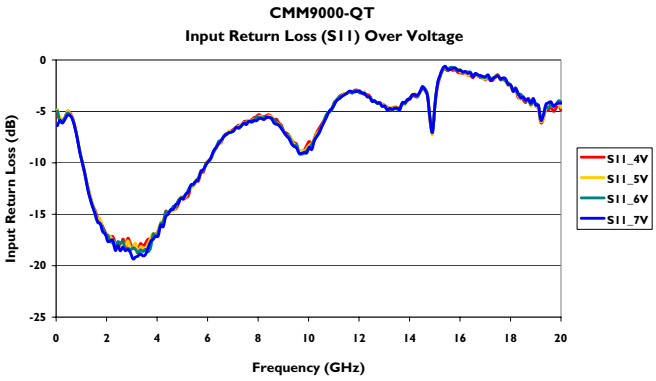
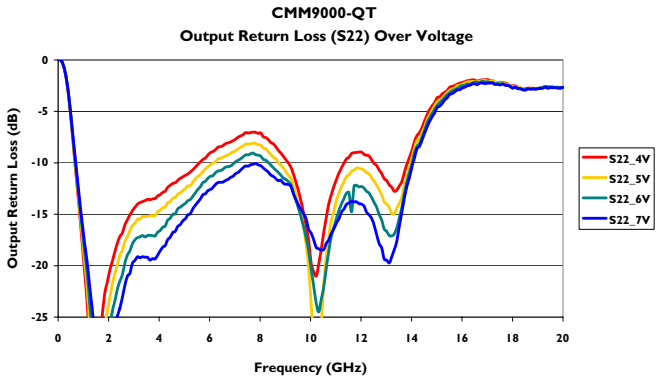
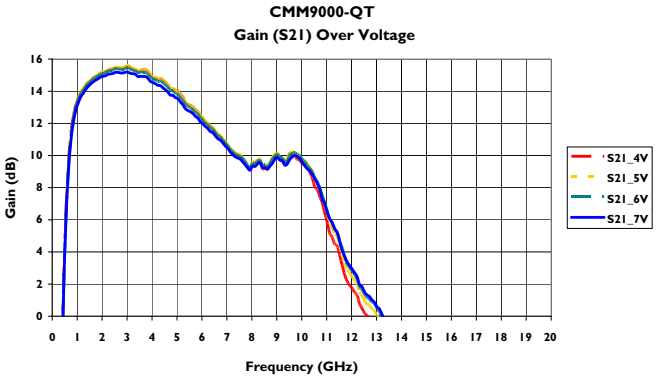
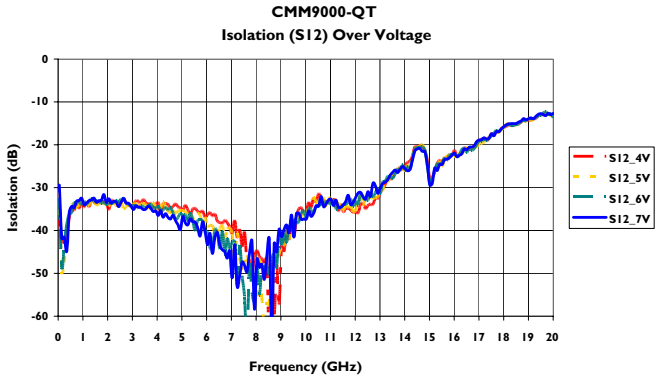
Driver Amplifier Measurements

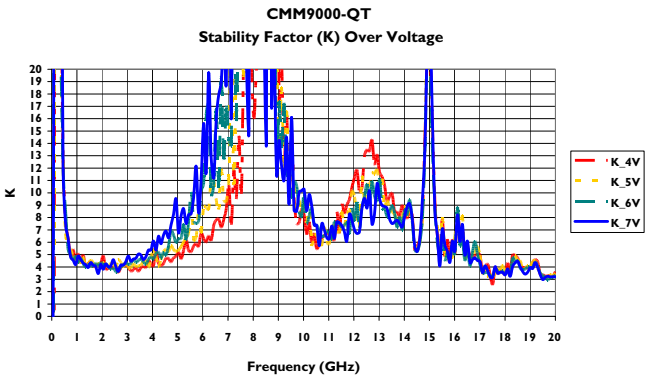


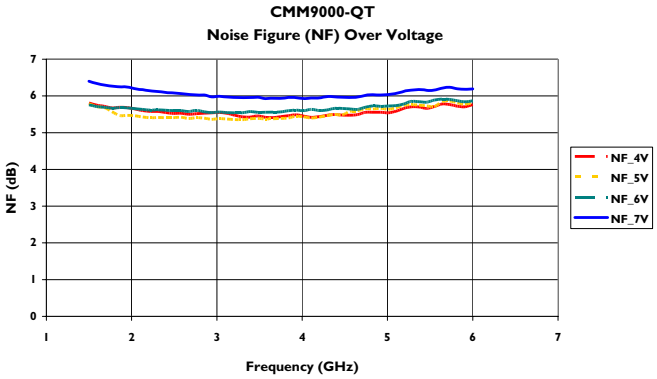


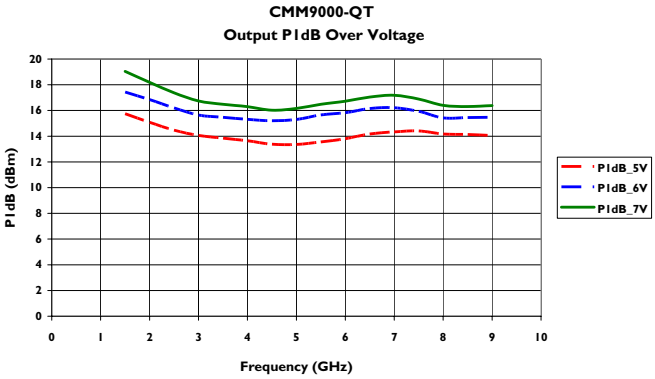


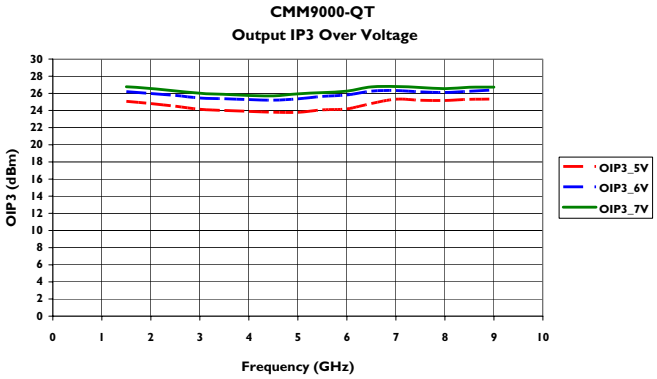


Driver Amplifier Measurements (cont.)



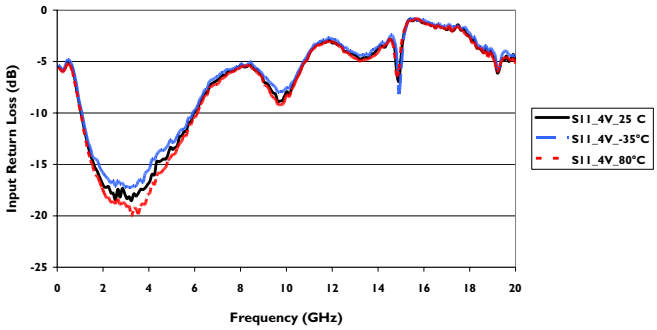




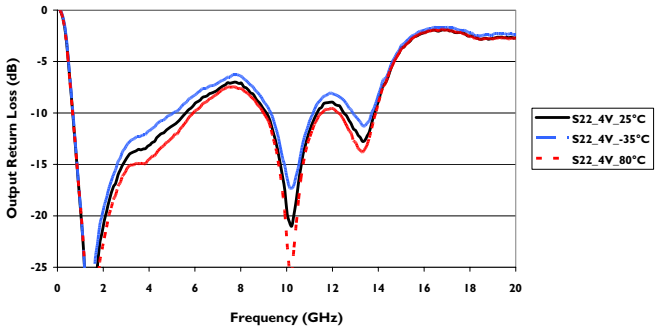


Driver Amplifier Measurements (cont.)

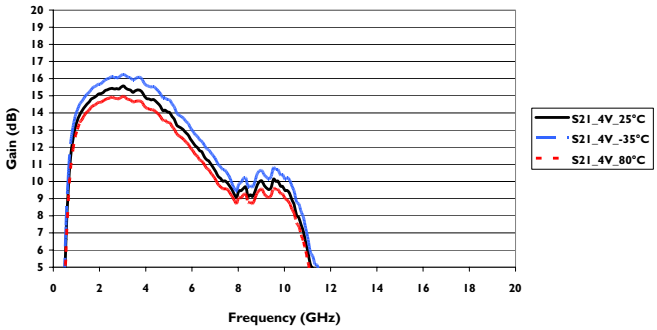
CMM9000-QT
Input Return Loss (S11) Over Temperature, 4V



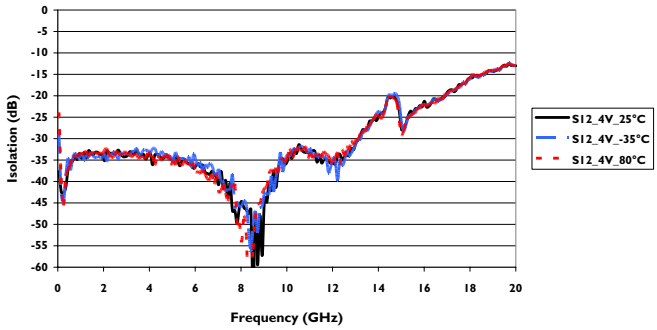
CMM9000-QT
Output Return Loss (S22) Over Temperature, 4V



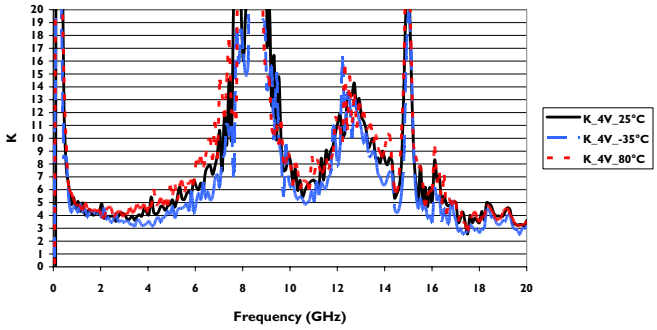
CMM9000-QT
Gain (S21) Over Temperature, 4V



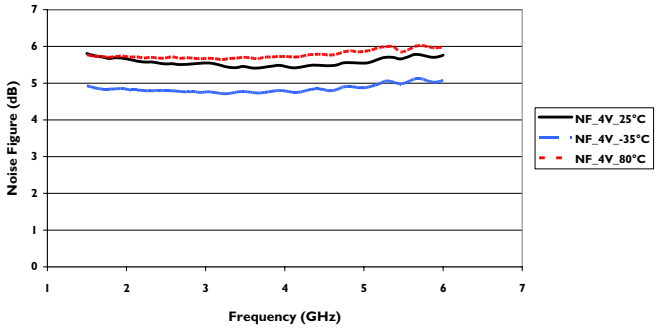
CMM9000-QT
Isolation (S12) Over Temperature, 4V



CMM9000-QT
Stability Factor (K) Over Temperature, 4V

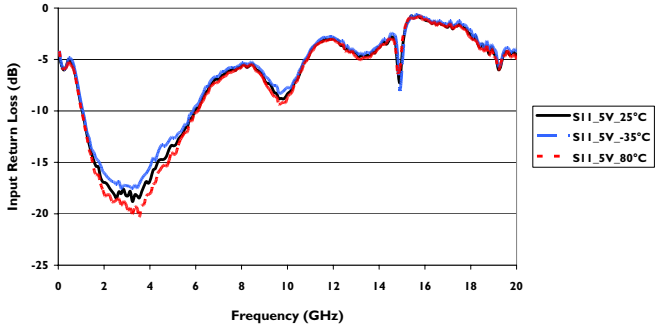


CMM9000-QT
Noise Figure (NF) Over Temperature, 4V

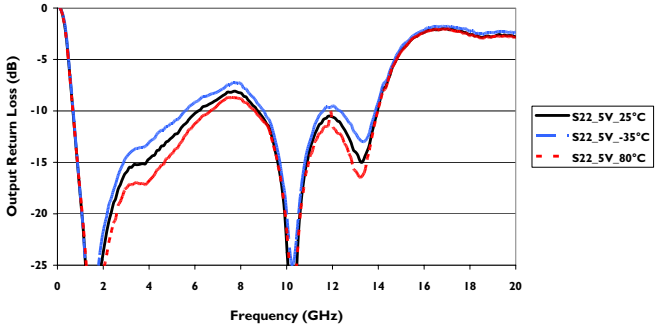


Driver Amplifier Measurements (cont.)

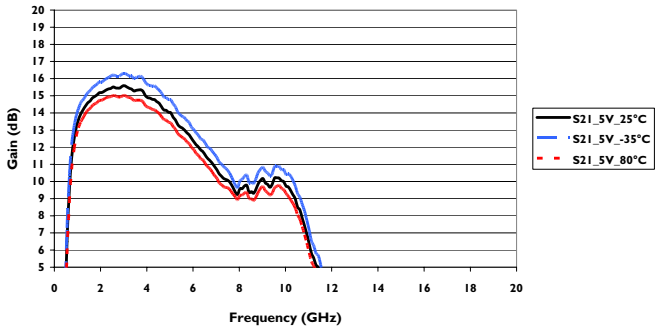
CMM9000-QT
Input Return Loss (S11) Over Temperature, 5V



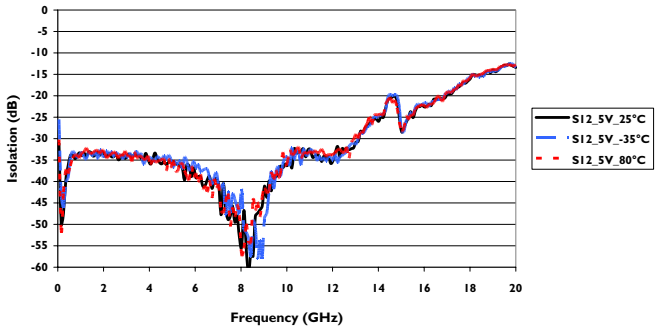
CMM9000-QT
Output Return Loss (S22) Over Temperature, 5V



CMM9000-QT
Gain (S21) Over Temperature, 5V



CMM9000-QT
Isolation (S12) Over Temperature, 5V



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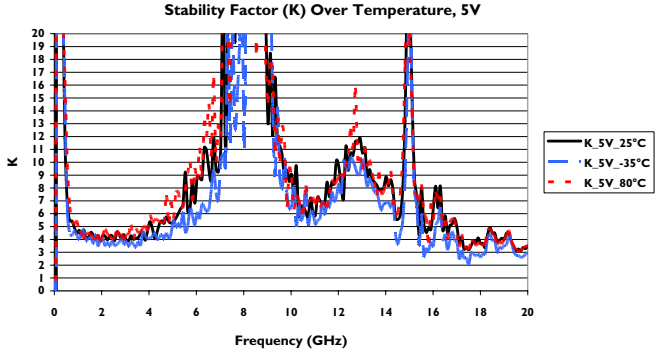
Stability Factor (K) Over Temperature, 5V



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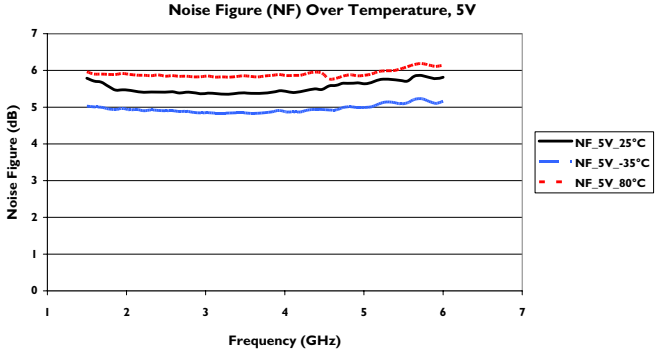
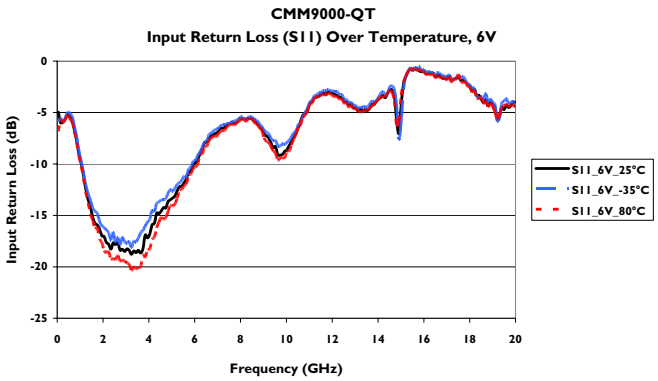
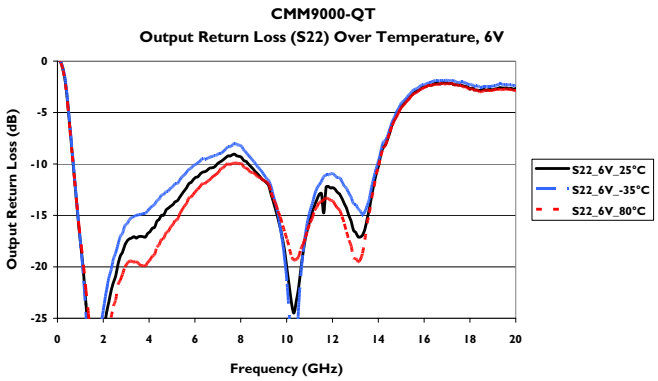
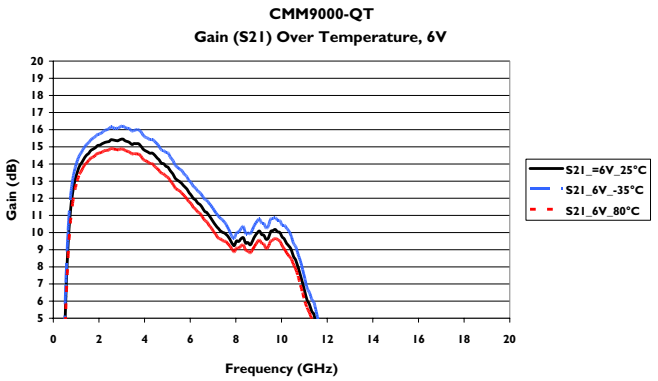
Noise Figure (NF) Over Temperature, 5V

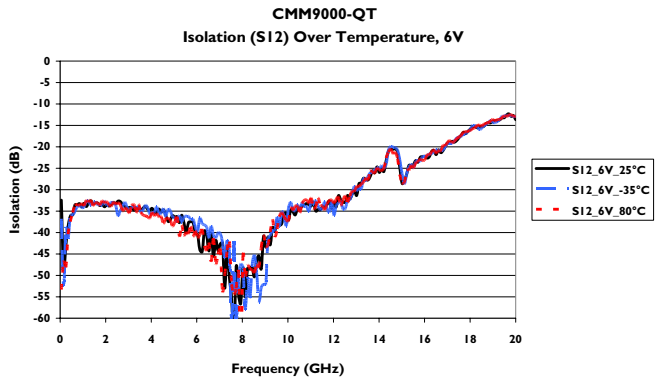


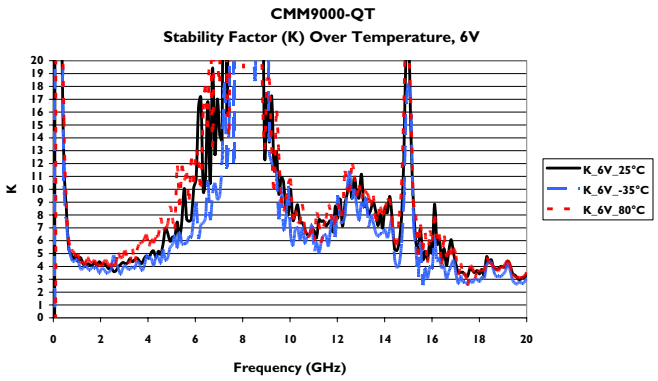
Driver Amplifier Measurements (cont.)

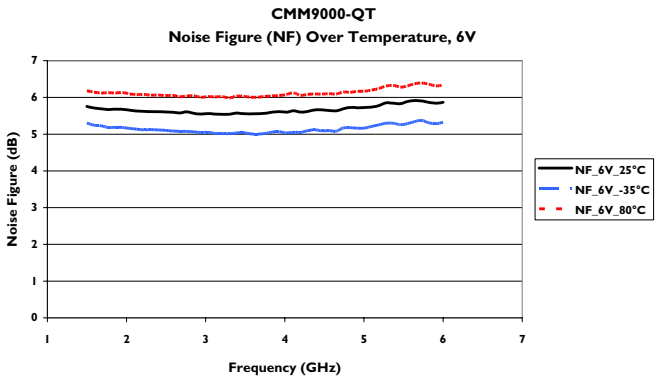




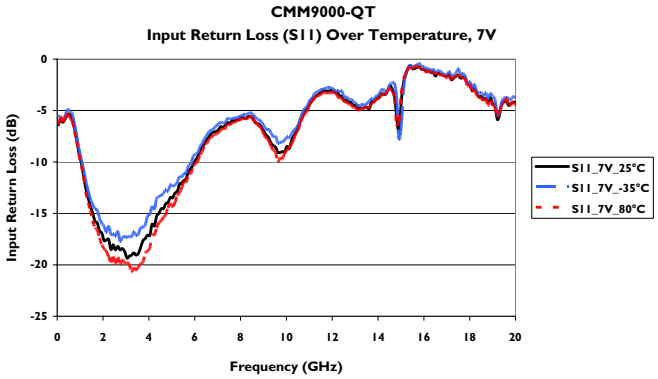


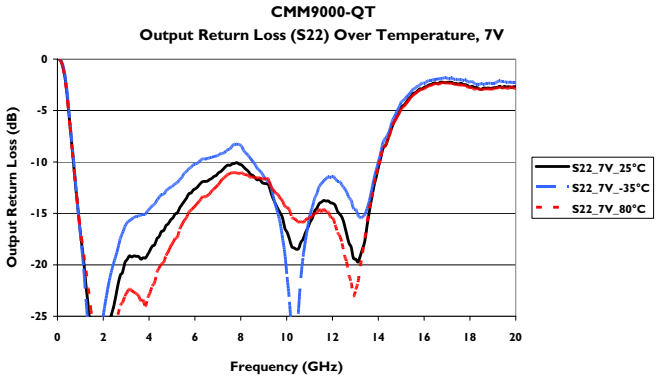


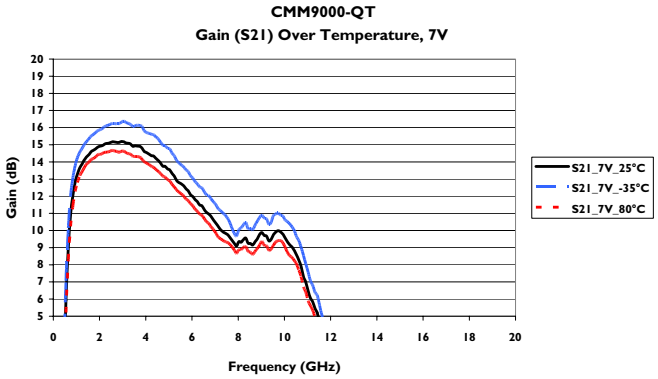


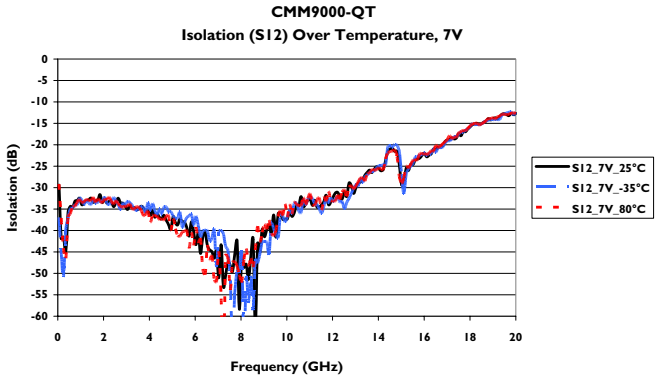


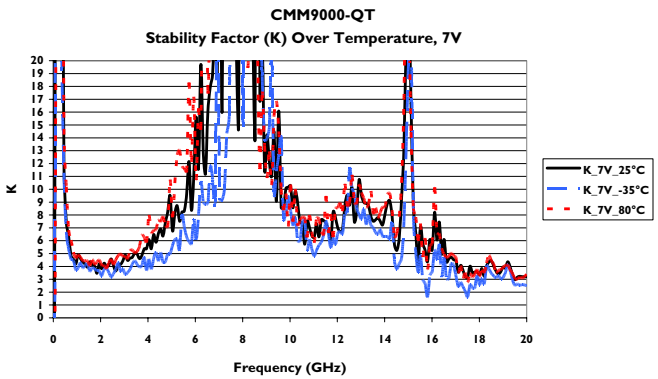
Driver Amplifier Measurements (cont.)

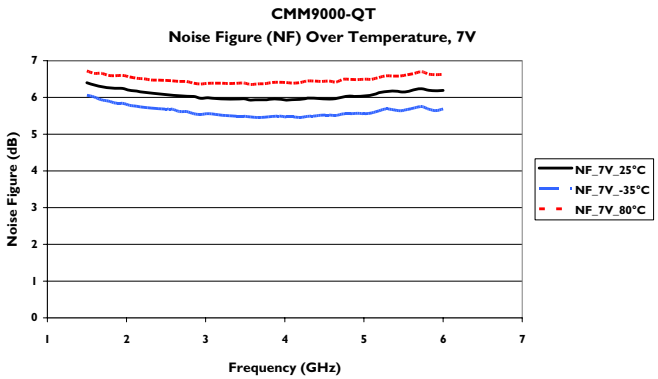




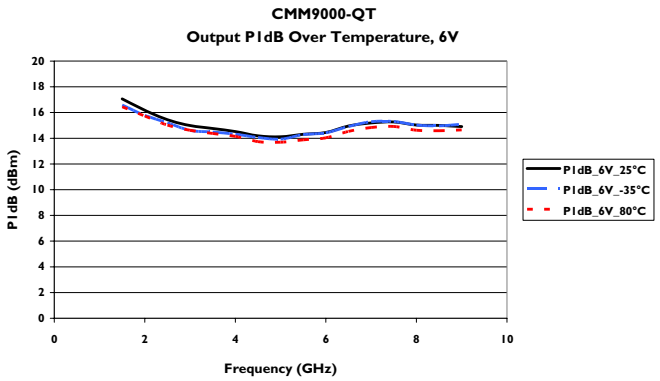


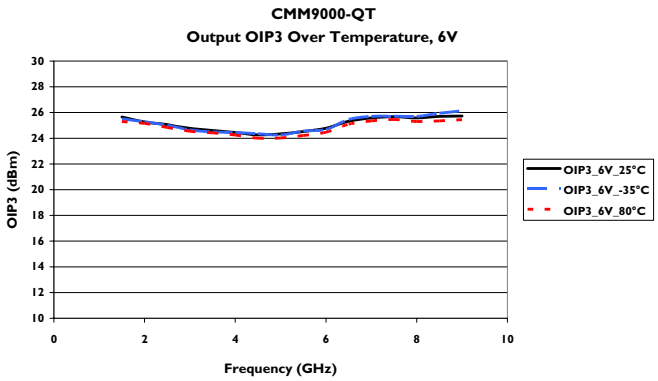




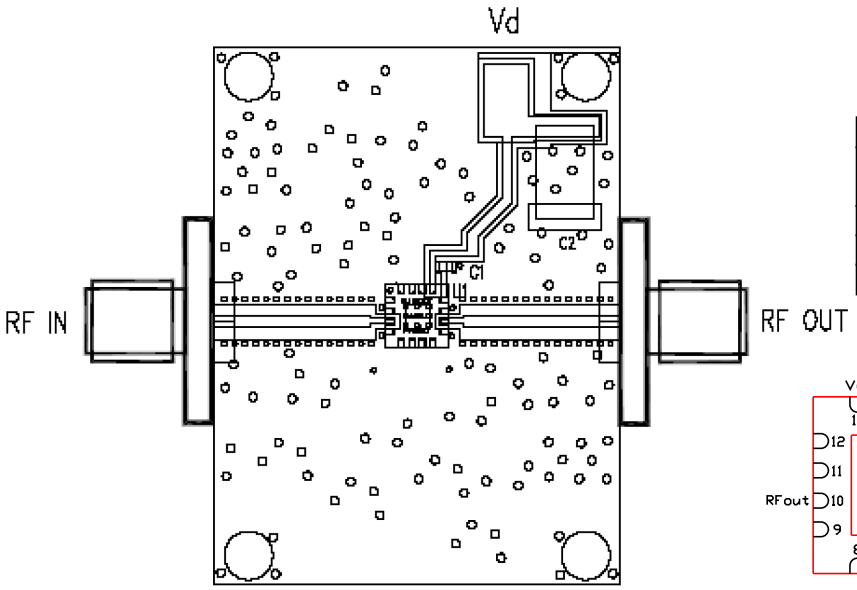


Driver Amplifier Measurements (cont.)





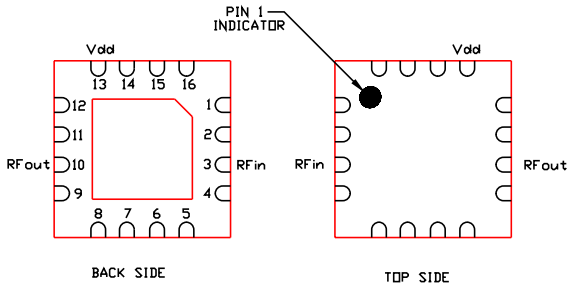
Evaluation Board Layout



C1 = 1000pF
C2 = 1µF

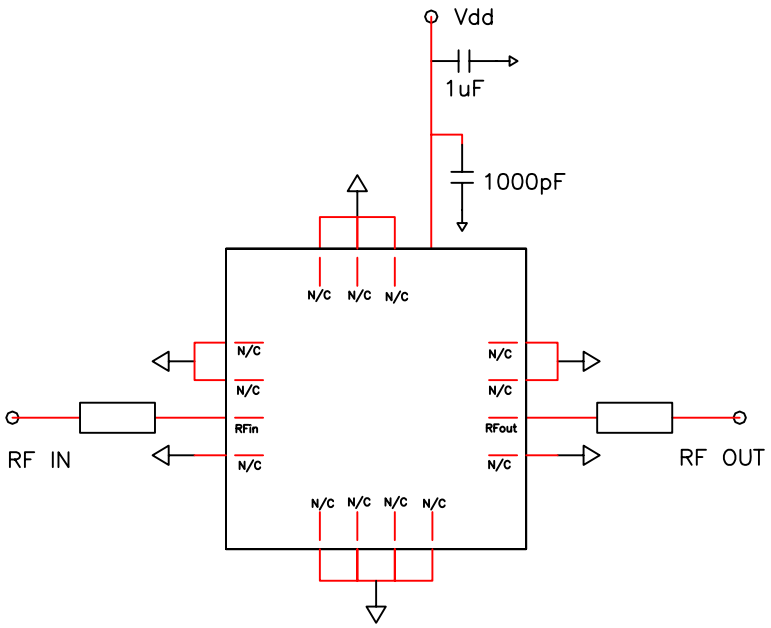
Package Pin-out Table

Pin Designator	Description
1,2,4,5,6,7,8,9, 11,12,14,15,16	NC
3	RF Input
10	RF Output
13	Vd



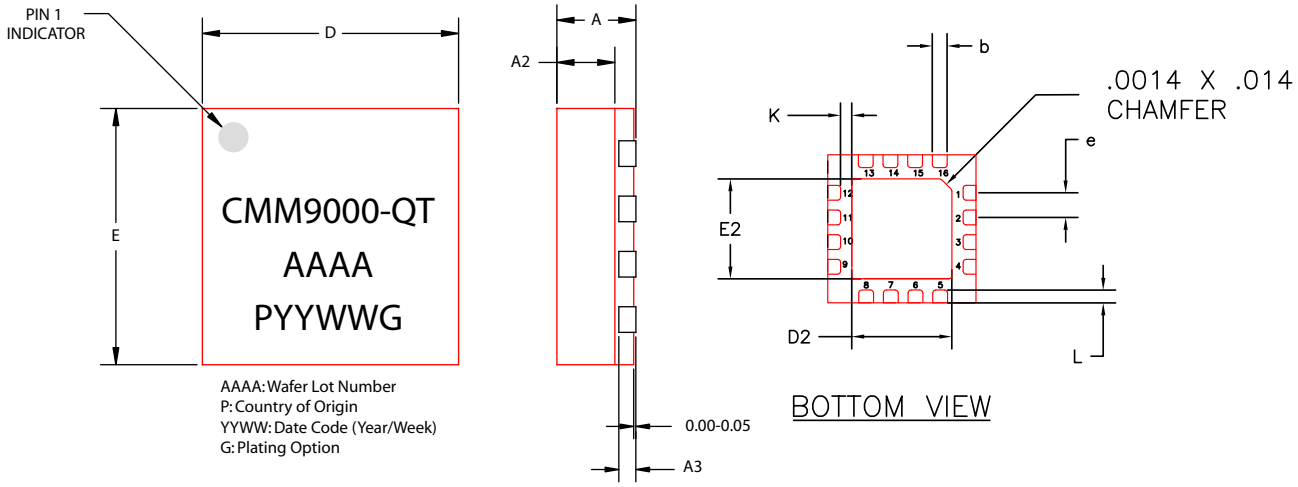
We recommend to ground all non-connected pins and to have as many via holes as possible under the ground paddle.

Evaluation Board Schematic

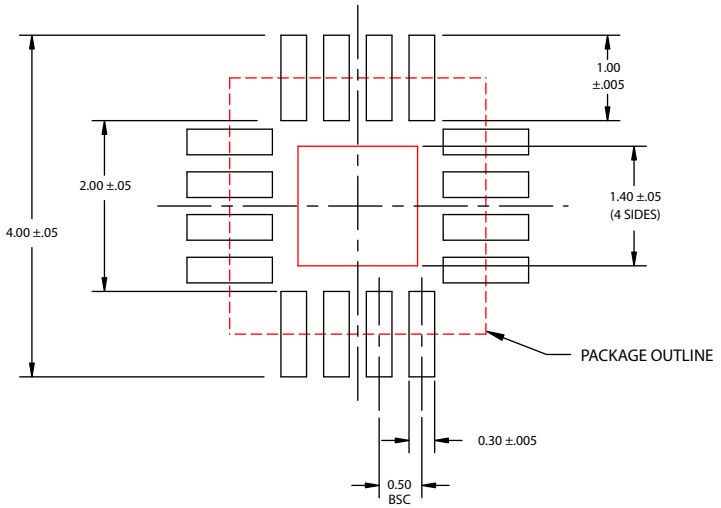


The input requires DC blocking capacitor if DC voltage is present on the input RF line.

Package Outline and Assembly



RECOMMENDED SOLDER PAD PITCH AND DIMENSIONS



NOTE:
1. ALL DIMENSIONS ARE IN mm

	MIN	NOM	MAX
A	0.80	0.90	1.00
A3		0.20 REF	
A2	0	0.65	1.00
b	0.20	0.25	0.30
K	0.20	-	-
D		3.00 BSC	
E		3.00 BSC	
e		0.50	
D2	1.50	1.65	1.80
E2	1.50	1.65	1.80
L	0.16	0.26	0.36

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% matte 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.

Ordering Information

Part Number for Ordering	Description
CMM9000-QT-0G00	Matte Tin plated RoHS compliant 3x3 16L QFN surface mount package in bulk quantity
CMM9000-QT-0G0T	Matte Tin plated RoHS compliant 3x3 16L QFN surface mount package in tape and reel
PB-CMM9000-QT-0000	CMM9000-QT evaluation board

Caution: ESD Sensitive
Appropriate precautions in handling, packaging and testing devices must be observed.

Proper ESD procedures should be followed when handling this device.