DC-2.8 GHz InGaP HBT
3.3V, Matched Gain Block Amplifier

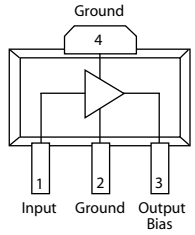
April 2008 - Rev 28-Apr-08

CGB8002-SC
RoHS

Features

- 14 dBm Linear Power @ 2140 MHz
- 17 dB Gain @ 2140 MHz
- 15 dB Gain @ 2700 MHz
- 37dBm OIP3 @ 2700 MHz
- 22 dBm P1dB @ 2140 MHz
- Low Performance Variation Over Temperature
- Low Cost: SOT-89 Package
- 100% DC On-Wafer Testing
- ESD Protection on All Die: >4000V HBM, >400V MM
- Low Thermal Resistance: <35°C/Watt
- Low Volt Supply: 3.3V, On-Board Bias

Functional Block Diagram (SOT-89)



Absolute Maximum Ratings

Max Device Voltage	+4.2 V
Max Device Current	250 mA
Max Device Dissipated Power	1 W
RF Input Power	+15 dBm
Storage Temperature	-55°C to 150°C
Junction Temperature	150°C
Operating Temperature	-40°C to +85°C
Thermal Resistance	35° C/W
ESD (HBM)	4000 V
ESD (MM)	400V

Operation of this device above any of these parameters may cause permanent damage.

Description

The CGB8002-SC is a single stage, high power, high dynamic range, utility gain block amplifier. Designed for 3.3V applications operating within the DC to 2.8 GHz frequency range, Mimix's broadband, cascadable, gain block amplifier is an ideal solution for transmit, receive and IF applications. This MMIC amplifier is available in an industry standard, RoHS compliant, SOT-89 package. Mimix's InGaP HBT technology and thermal resistance offers a thermally robust and reliable gain block solution. The InGaP HBT die have extra pads to enable thorough DC testing. This unique test capability and the inclusion of ESD protection on all die, significantly enhances the quality, reliability and ruggedness of these products. This gain block amplifier offers significant ease of use in a broad range of applications. The combination of high gain, P1dB and high linear power at low current makes the CGB8002-SC an ideal transmit and receive solution when used in applications including 3G, fixed wireless broadband, WLAN and WiMAX services operating from 2.1 to 2.7 GHz. The device is biased with a single +3.3V supply.

Applications

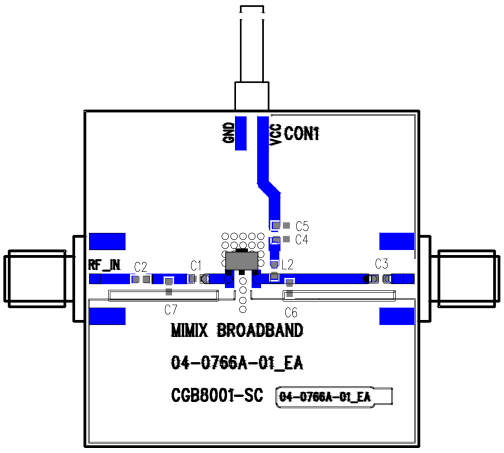
- PA Driver Amp, IF Amp, LO Buffer Amp
- UMTS, 3G, WLAN, WiMAX
- Wireless Broadband, Fixed Wireless, SATCOM
- Transmit and Receive Functions
- CATV

Typical Performance: (3.3V, Iq=120 mA, 25 °C)

Parameters	Symbol	Unit					
Frequency	F	MHz	**900**	**2140**	**2500**	**2700**	**2800**
Small Signal Gain	S21	dB	20.2	17.1	15.8	15.1	14.7
Output Power at 1dB Compression	P1dB	dBm	21.5	22.1	22.5	22.4	22
Third Order Intercept Point	OIP3	dBm	35	35.6	37	37.4	37.7
Noise Figure	NF	dB	4.4	4.5	4.7	5.2	5.6

Notes:
1. OIP3 is @ 8 dBm/tone
2. Typical values reflect performance in recommended application circuit.

Evaluation Board Components Layout

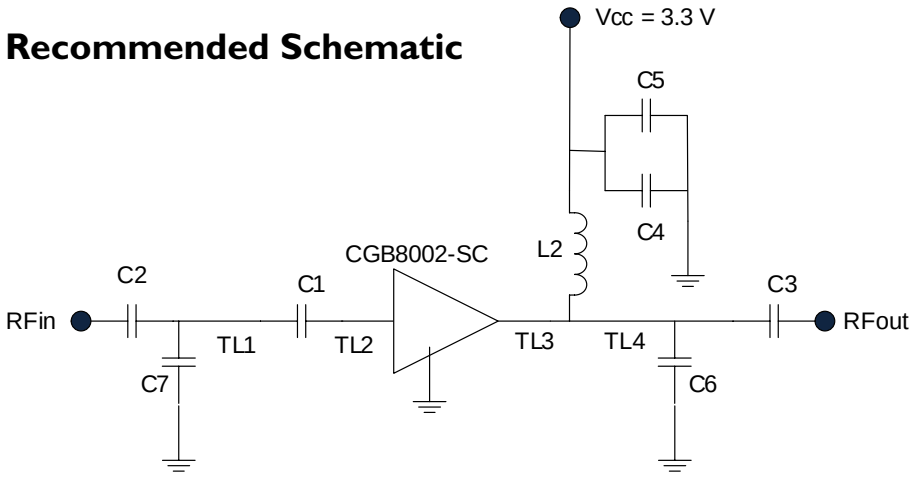


20 mil Rogers 4003, 1 Oz copper, both sides

Component Values

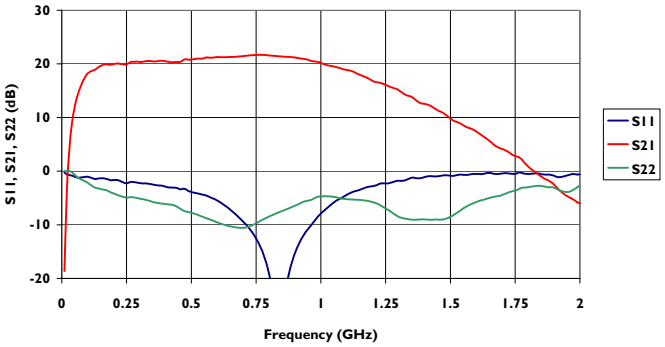
Component Designator	800-1500MHz (E)	800-950 MHz (A)	1800-2200 MHz (B)	2400-2500 MHz (C)	2500-2800 MHz (D)	Vendor, Size
C1	short	short	1.5 pF	3.3 pF	100 pF	KOA 0603 NPO
C2	100 pF	100 pF	100 pF	short	short	KOA 0603 NPO
C3	100 pF	100 pF	100 pF	100 pF	100 pF	KOA 0603 NPO
C4	1000 pF	1000 pF	1000 pF	1000 pF	1000 pF	KOA 0603 NPO
C5	1 uF	1 uF	1 uF	1 uF	1 uF	KOA 0805 X7R
C6	2.2 pF	2.7 pF	1 pF	1 pF	0.8 pF	KOA 0603 NPO
C7	2.2 pF	5.6 pF	DNP	DNP	DNP	KOA 0603 NPO
L2	39 nH	39 nH	27 nH	22 nH	22 nH	Coilcraft 0603 chip
TL1	-1 mm, 50 ohms	3 mm, 50 ohms	0 mm, 50 ohms	N/A	N/A	N/A
TL2	3 mm, 50 ohms	3 mm, 50 ohms	3 mm, 50 ohms	3 mm, 50 ohms	3 mm, 50 ohms	N/A
TL3	1.5 mm, 50 ohms	1.5 mm, 50 ohms	1.5 mm, 50 ohms	1.5 mm, 50 ohms	1.5 mm, 50 ohms	N/A
TL4	5.5 mm, 50 ohms	5.5 mm, 50 ohms	3.5 mm, 50 ohms	0.5 mm, 50 ohms	0.5 mm, 50 ohms	N/A

Recommended Schematic



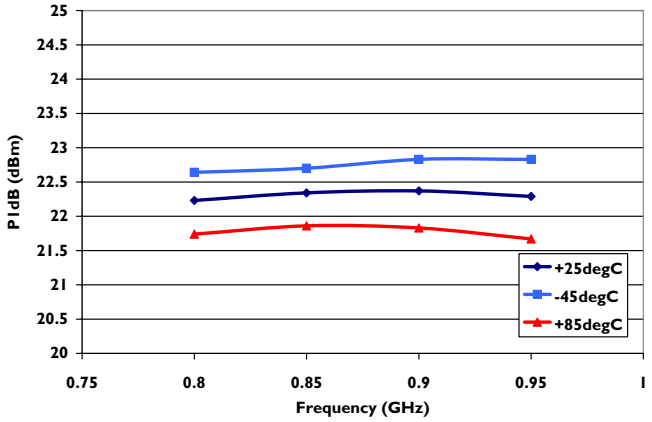
Typical Performance: 900 MHz

App CKT @ 900 MHz
Vcc= 3.3 V, Iq = 120 mA

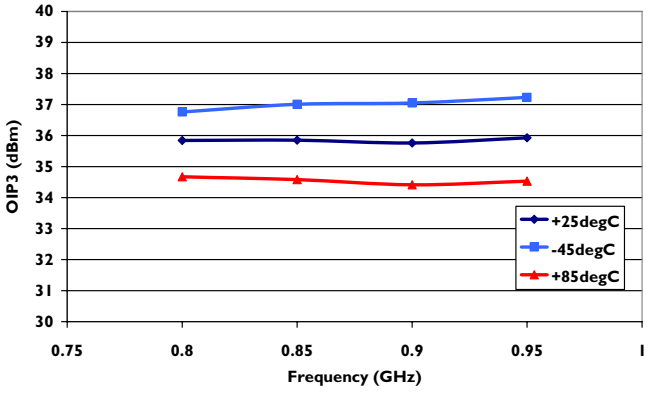


Freq (MHz)	SSG (dB)	P1dB (dBm)	Icc @ P1dB (mA)	OIP3 @ 8 dBm/Tone (dBm)	OIP3 @ 11 dBm/ Tone (dBm)	Nf (dB)
850	21.5	21.9	130.0	35.4	34.8	3.7
900	21.3	22.0	131.0	35.2	34.8	3.8

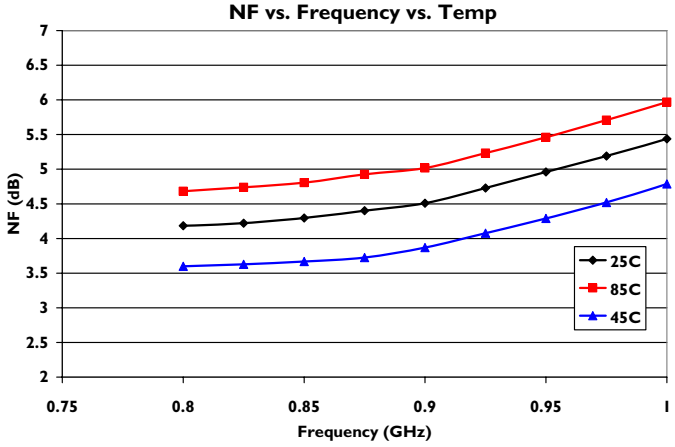
P1dB vs. Frequency vs. Temp



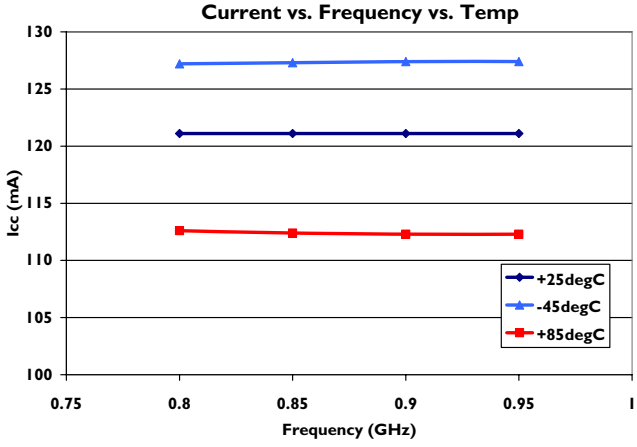
OIP3 vs. Frequency vs. Temp
Pout / Tone = 8dBm



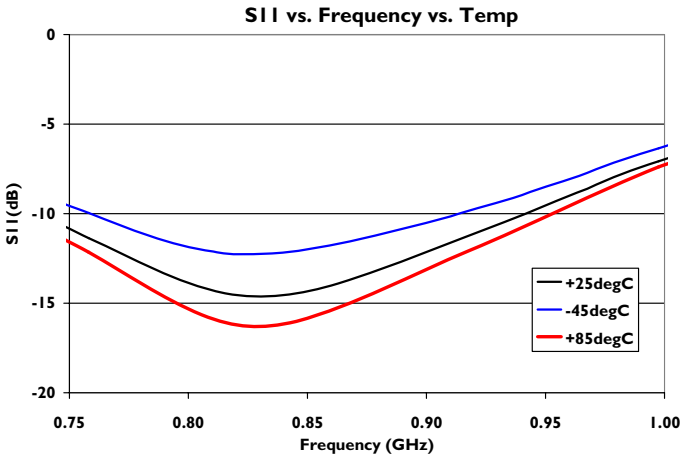
NF vs. Frequency vs. Temp

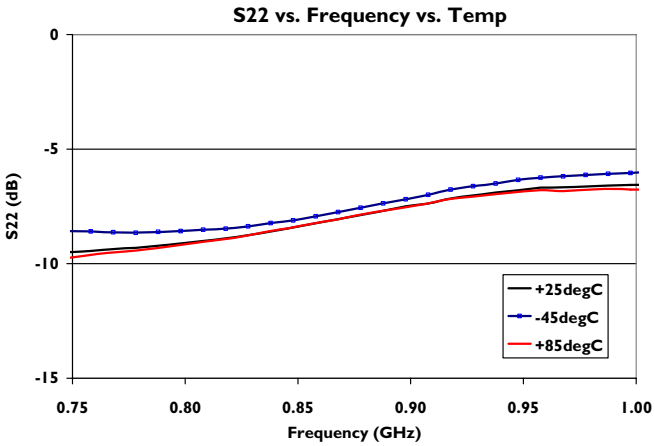


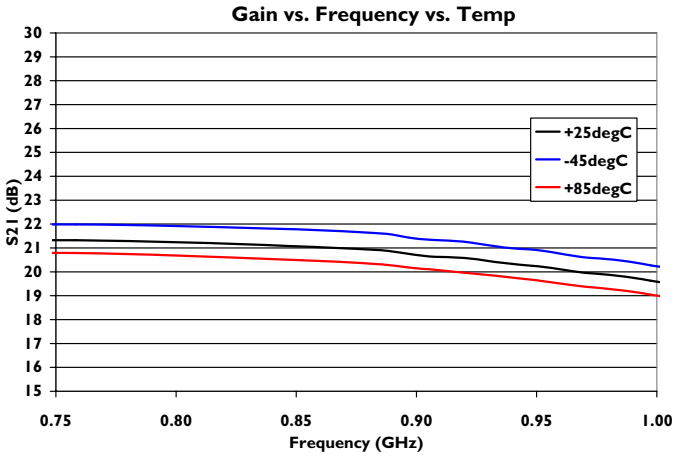
Current vs. Frequency vs. Temp

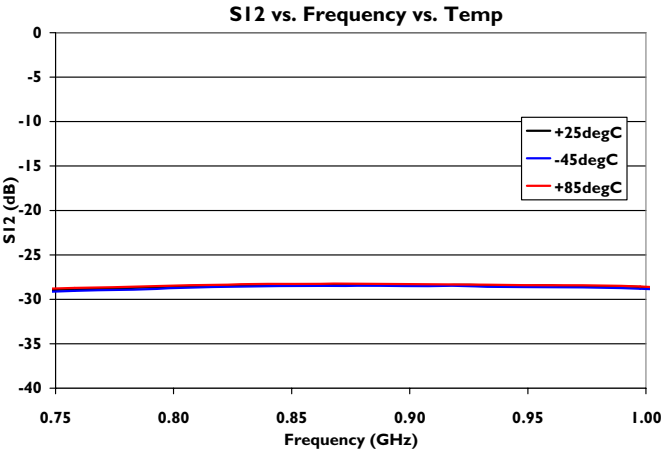


Typical Performance: 900 MHz (cont.)



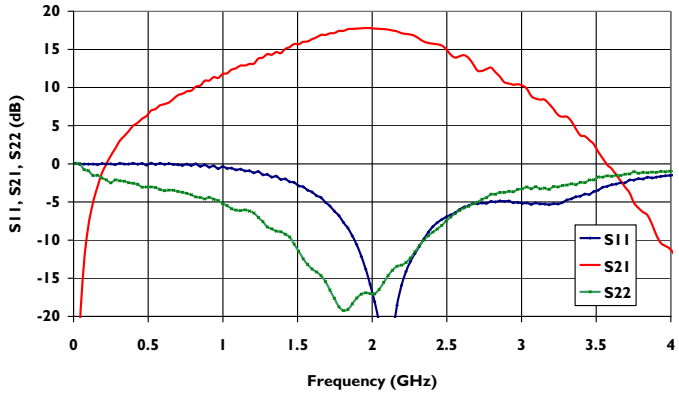






Typical Performance: 2140 MHz

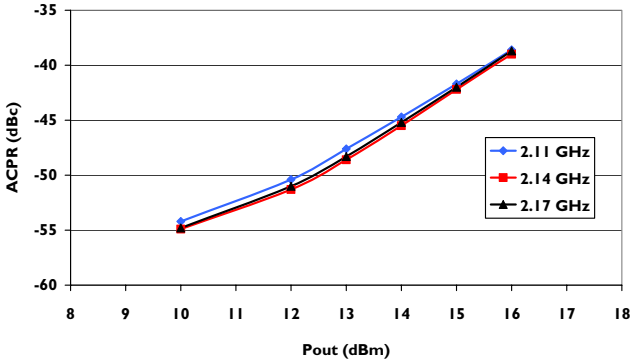
App CKT @ 2140 MHz
Vcc = 3.3 V, Iq = 120 mA



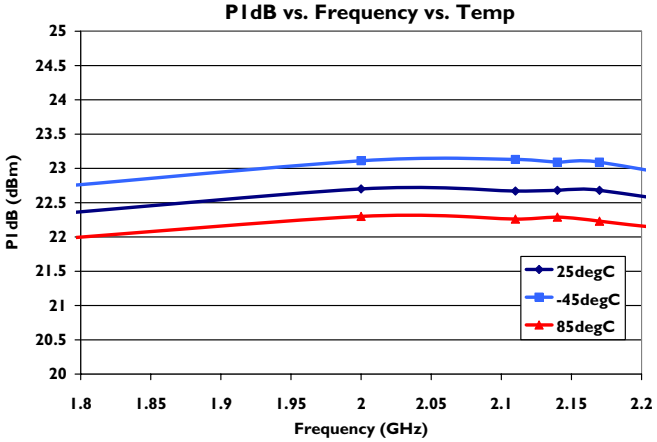
Freq (MHz)	SSG (dB)	P1dB (dBm)	Icc @ P1dB (mA)	OIP3 @ 8 dBm/Tone (dBm)	OIP3 @ 11 dBm/ Tone (dBm)	Nf (dB)
2.11	17.2	22.2	132	35.7	35.5	4.4
2.14	17.1	22.1	131	35.6	35.3	4.5
2.17	17	22.1	131	35.3	35.1	4.6

Typical Performance: 2140 MHz (cont.)

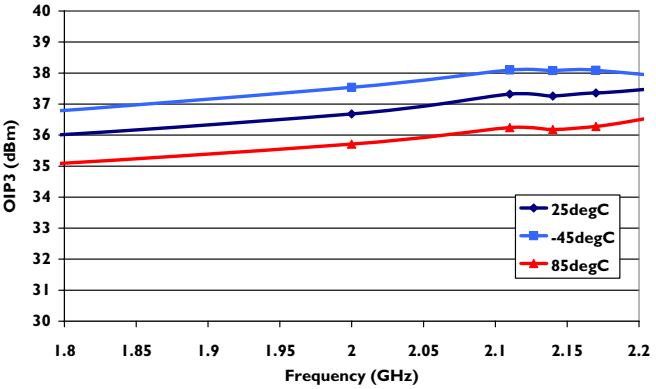
ACPR vs. Pout
WCDMA, TM-1 64 DPCH
Room Temp



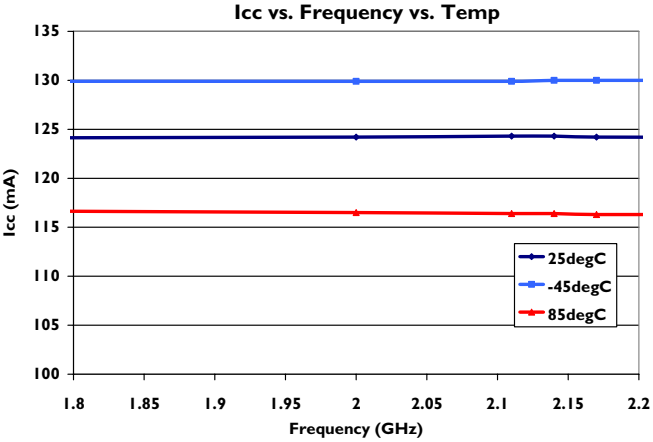
P1dB vs. Frequency vs. Temp



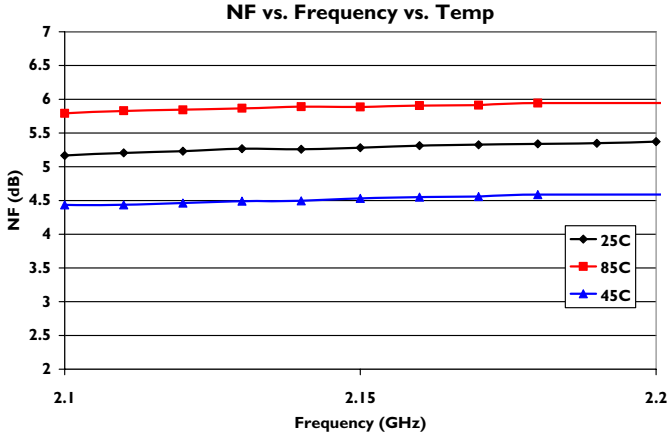
OIP3 vs. Frequency vs. Temp
Pout / Tone = 8dBm



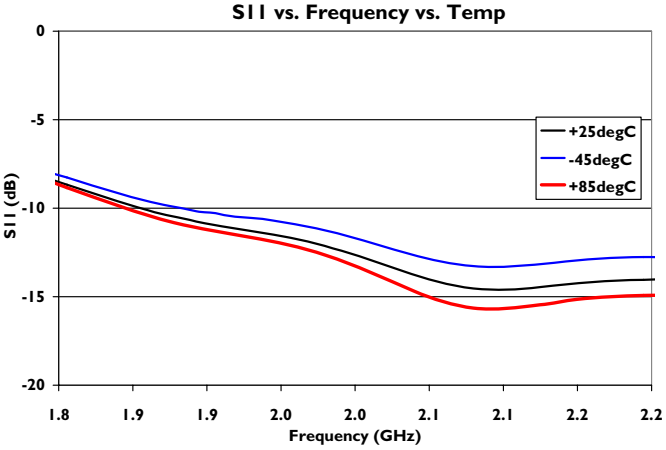
Icc vs. Frequency vs. Temp



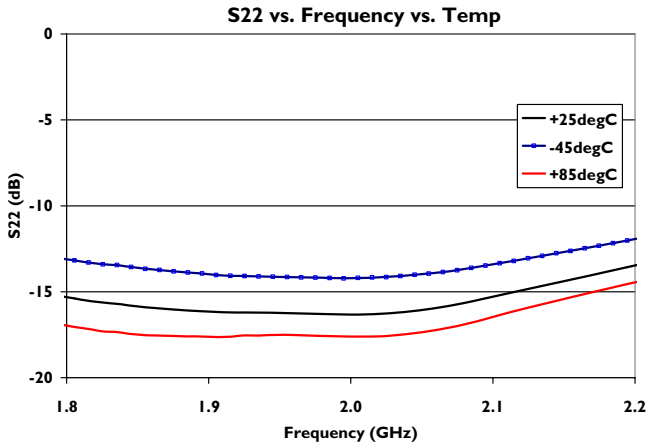
NF vs. Frequency vs. Temp

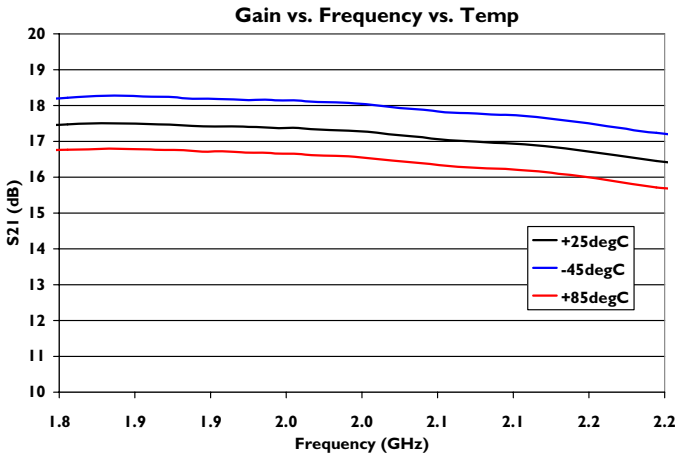


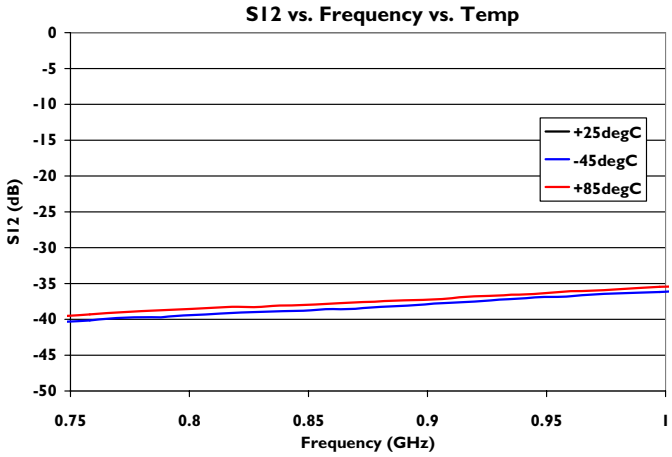
S11 vs. Frequency vs. Temp



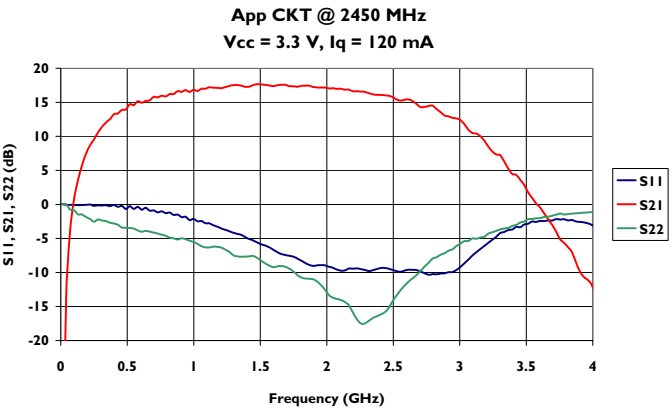
Typical Performance: 2140 MHz (cont.)





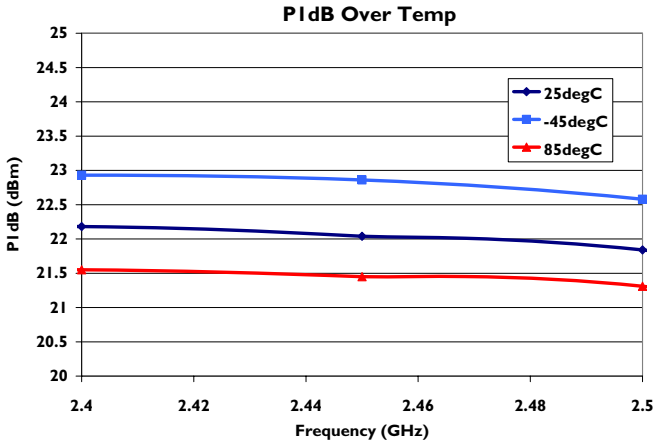


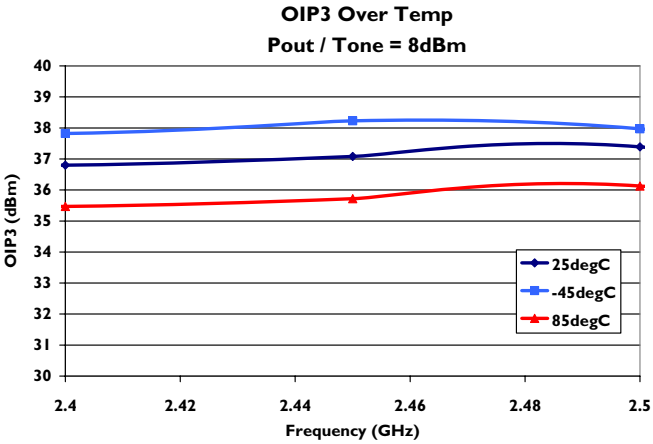
Typical Performance: 2450 MHz

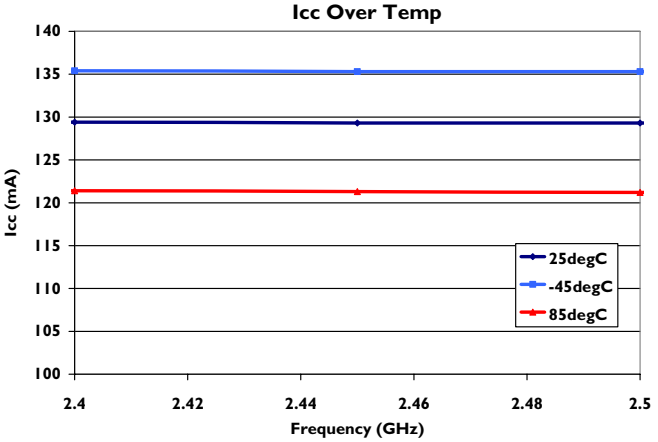


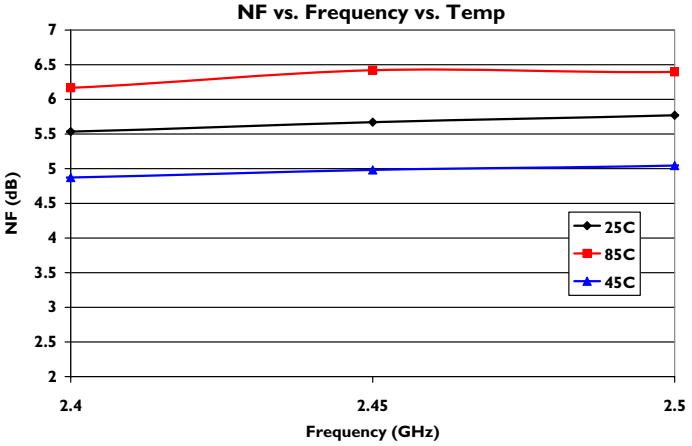
Freq (MHz)	SSG (dB)	P1dB (dBm)	Icc @ P1dB (mA)	OIP3 @ 8 dBm/Tone (dBm)	OIP3 @ 11 dBm/ Tone (dBm)	Nf (dB)
2.4	16.2	22.4	133	37.1	35.9	4.6
2.45	16	22.5	133	37	36	4.7
2.5	15.8	22.5	133	36.9	36	4.8

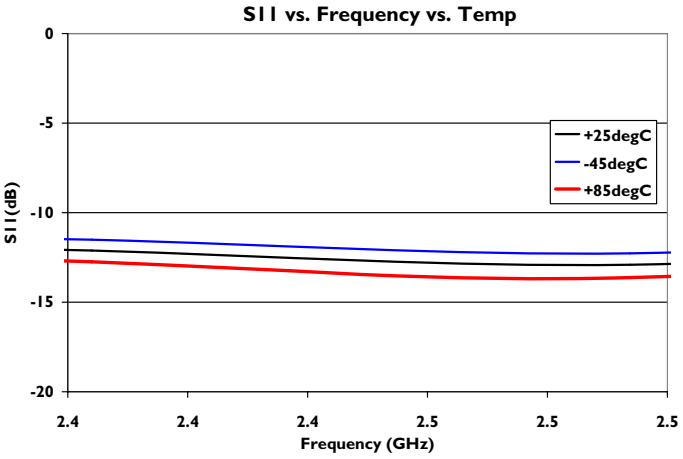
Typical Performance: 2450 MHz (cont.)

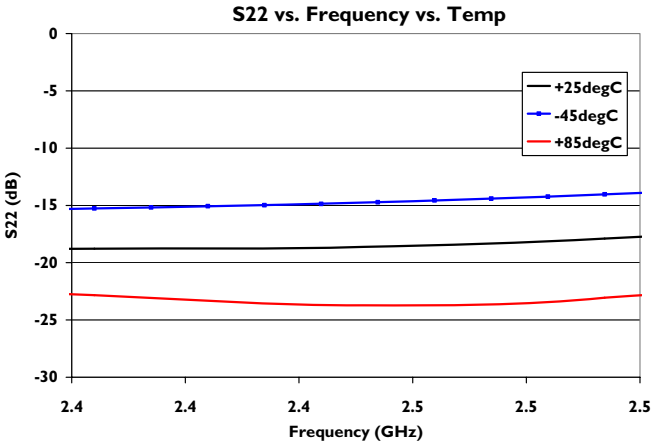




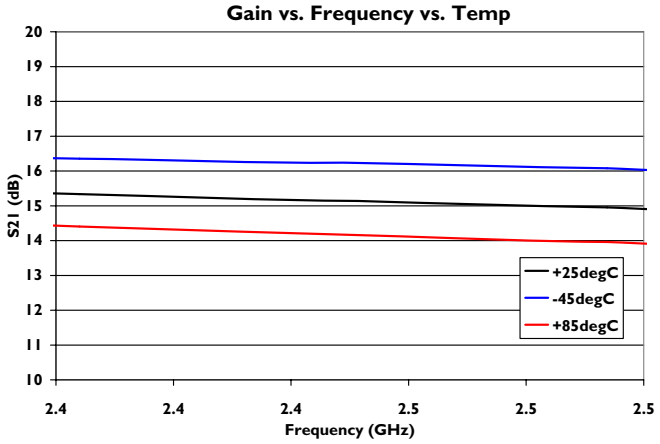


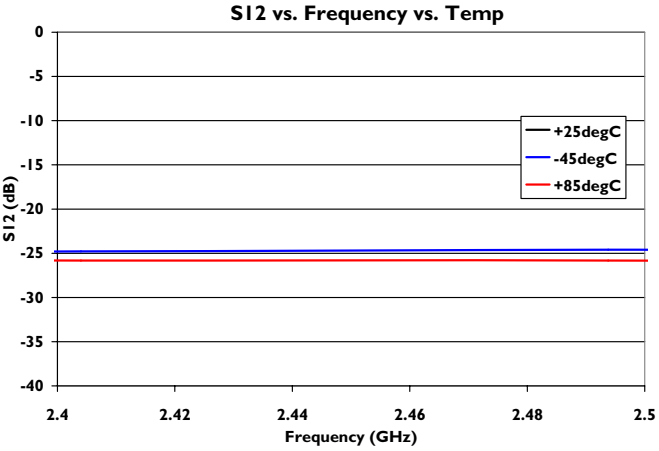




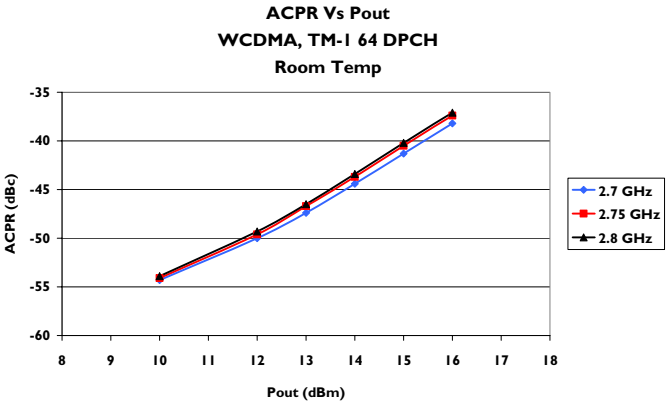


Typical Performance: 2450 MHz (cont.)

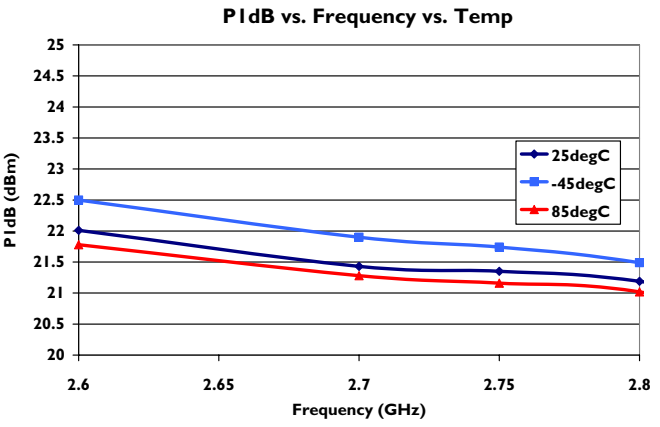


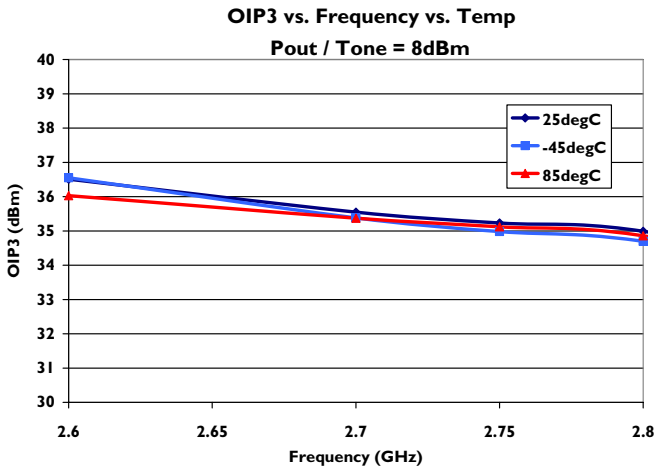


Typical Performance: 2750 MHz

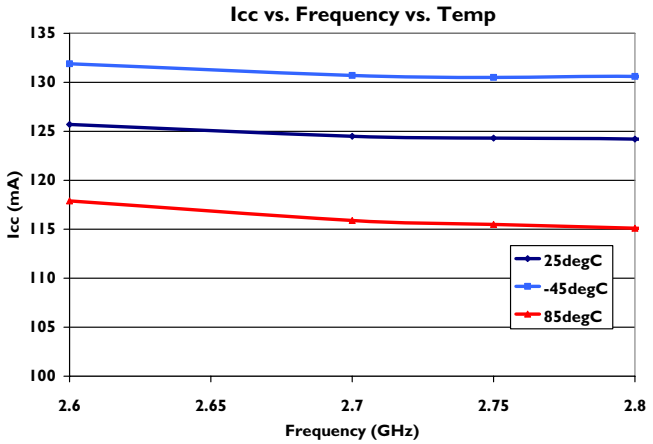


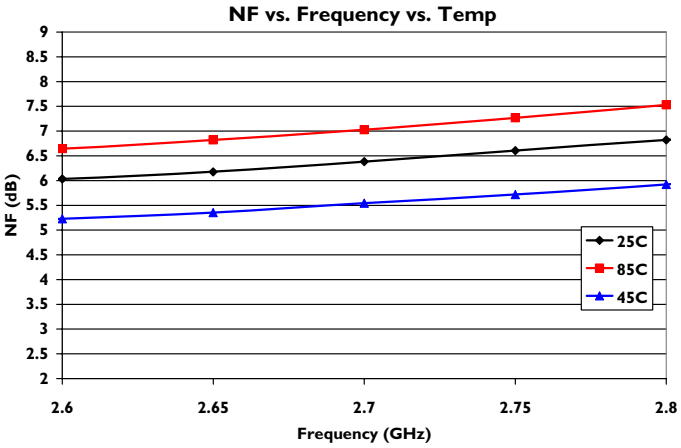
Freq (MHz)	SSG (dB)	P1dB (dBm)	Icc @ P1dB (mA)	OIP3 @ 8 dBm/Tone (dBm)	OIP3 @ 11 dBm/ Tone (dBm)	Nf (dB)
2.7	15.1	22.4	132	37.1	36.1	5.2
2.75	14.9	22.2	131	37.4	36	5.4
2.8	14.7	22	130	37.7	35.8	5.6

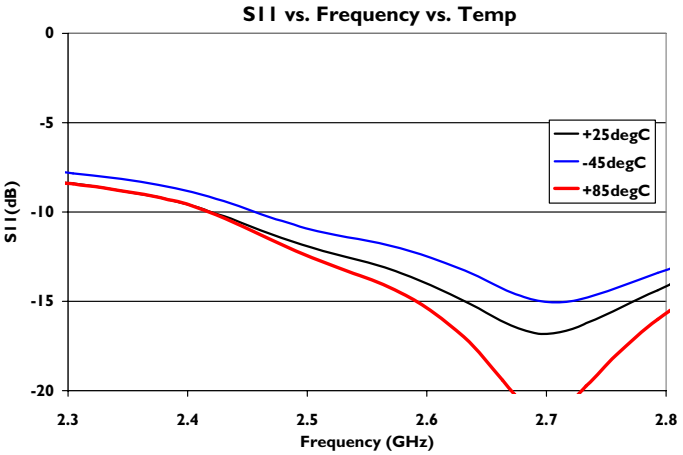


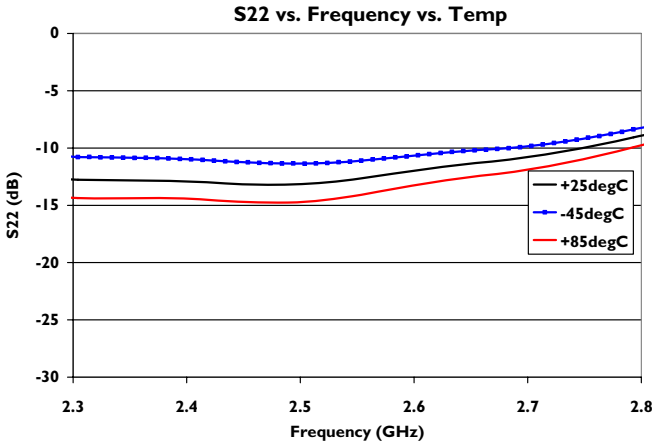


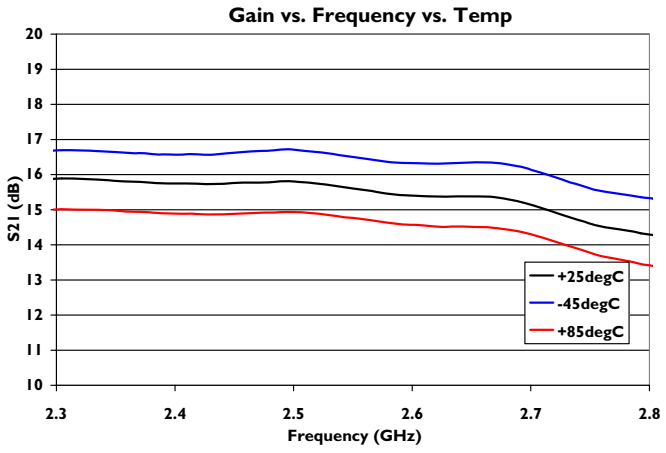
Typical Performance: 2750 MHz (cont.)

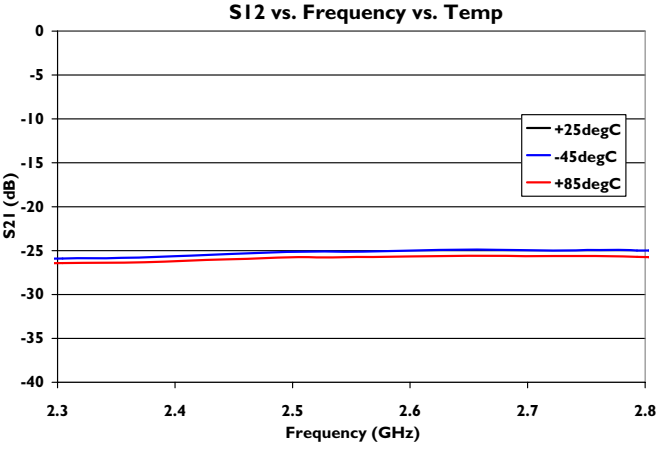




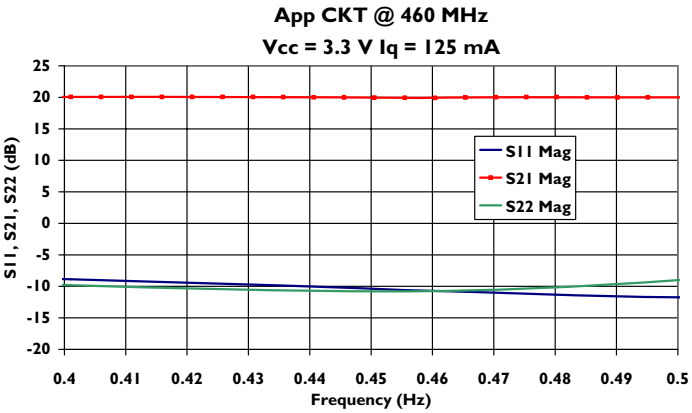






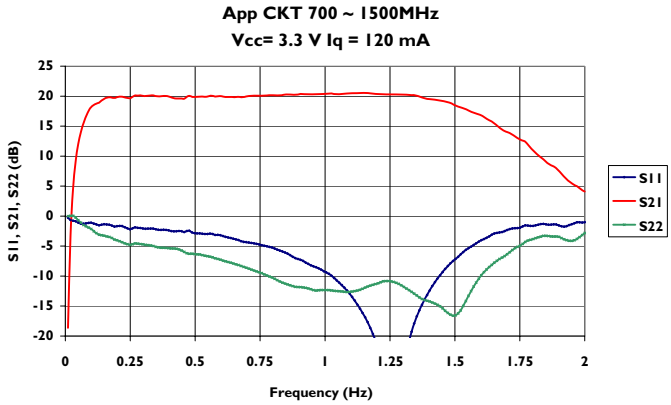


Typical Performance: 460 MHz



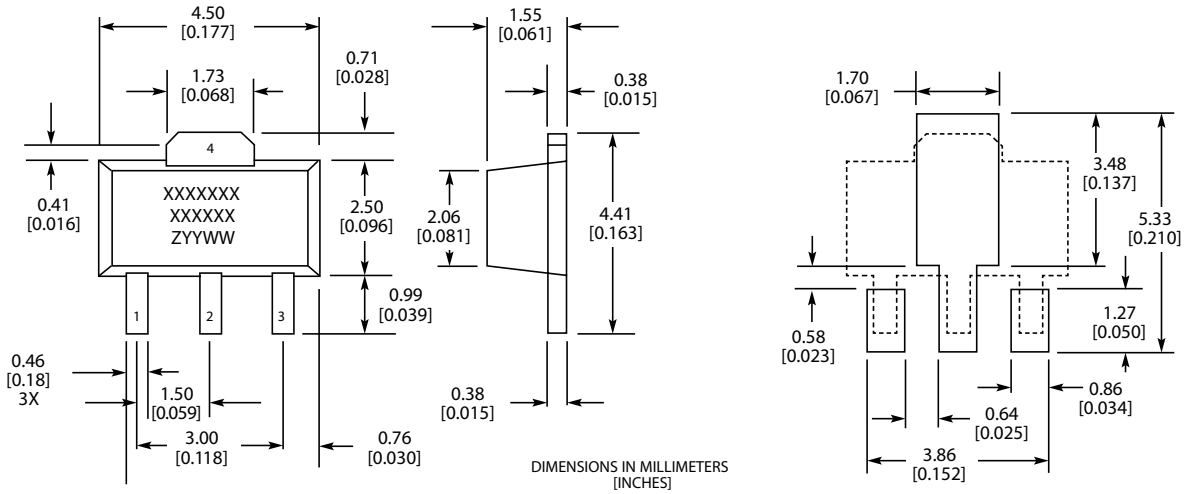
Frequency	Vcc (V)	Iq (mA)	SSG (dB)	Noise Figure (dB)	P1dB (dBm)	PAE @ P1dB (%)	P3dB (dBm)	PAE @ P3dB (%)
460	3.3	125.0	20.0	6.5	23.1	40.0	24.5	52.0

Typical Performance: 700 MHz~1500 MHz



Freq (MHz)	SSG (dB)	P1dB (dBm)	Icc @ P1dB (mA)	OIP3 @ 8 dBm/Tone (dBm)	Nf (dB)
800	19.9	21.5	129	34.3	4.7
900	20.2	21.6	130	34.3	4.4
1100	20.4	21.2	131	33.6	3.8
1300	20.3	20.8	132	33.5	4.1
1500	18.9	22.9	145	33.8	5.6

Physical Dimensions - SC Package (SOT-89)



MARKINGS:
XXXXXXX = MIMIX MODEL NO.
XXXXXX = WAFER LOT NO.
ZYYWW = DATE CODE (YR/WEEK)
FIRST LETTER COUNTRY OF ORIGIN IF OTHER THAN USA

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. Care should be taken not to apply heavy pressure to the top or base material to avoid package damage. 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.

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
CGB8002-SC-0G00	Matte Tin plated RoHS compliant SOT-89 surface mount package in bulk quantity
CGB8002-SC-0G0T	Matte Tin plated RoHS compliant SOT-89 surface mount package in tape and reel
PB-CGB8002-SC-00A0	Evaluation Board for 800-950 MHz
PB-CGB8002-SC-00B0	Evaluation Board for 1800-2200 MHz
PB-CGB8002-SC-00C0	Evaluation Board for 2400-2500 MHz
PB-CGB8002-SC-00D0	Evaluation Board for 2500-2800 MHz
PB-CGB8002-SC-00E0	Evaluation Board for 700-1500 MHz

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

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

Proper ESD procedures should be followed when handling this device.