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Hittite
MICROWAVE CORPORATION

HMC261CB1

GaAs MMIC SMT DISTRIBUTED AMPLIFIER 20 - 32 GHz

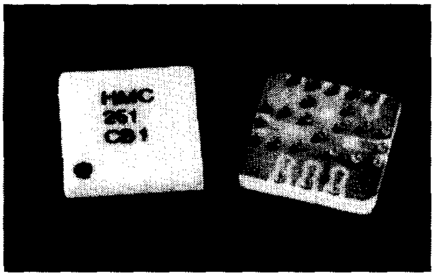
FEBRUARY 2000

Features

RUGGED SMT BGA PACKAGE

P1dB OUTPUT POWER: +12 dBm

SINGLE POSITIVE SUPPLY : +4V



General Description

The HMC261CB1 is a GaAs MMIC distributed amplifier which covers the frequency range of 20 to 32 GHz in a Ball Grid Array (BGA) SMT package. The packaged chip utilizes a GaAs PHEMT process, operating from a single bias supply of + 3 to +4V, with a P1dB output power of +12 dBm. This amplifier can be used in microwave & millimeter wave point-to-point radios, Local Multi-Point Distribution Systems (LMDS), VSAT, and other SATCOM applications. This amplifier complements HMC's line of SMT BGA packaged millimeterwave mixers; HMC258CB1, HMC264CB1, and HMC265CB1.

Guaranteed Performance, *Vdd = +4V, -55 to +85 deg C*

Parameter	Min.	Typ.	Max.	Min.	Typ.	Max.	Units
Frequency Range	20 - 32			27 - 30			GHz
Gain	8	12	18	10	13	18	dB
Input Return Loss	3	10		9	12		dB
Output Return Loss	7	13		9	13		dB
Reverse Isolation	27	40		27	35		dB
Output Power for 1dB Compression (P1dBo)	9	12		9	13		dBm
Saturated Output Power (Psat)	12	14		12	14		dBm
Output Third Order Intercept (IP3)	17	21		17	20		dBm
Noise Figure		8.5	13		8	10	dB
Supply Voltage (Vdd)	2.75	4.0	4.25	2.75	4.0	4.25	Vdc
Supply Current (Idd) (Vdd = 4.0 Vdc)		75	90		75	90	mA

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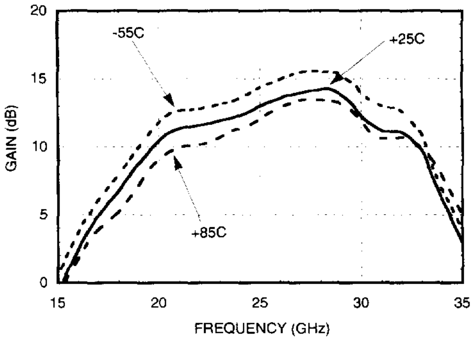
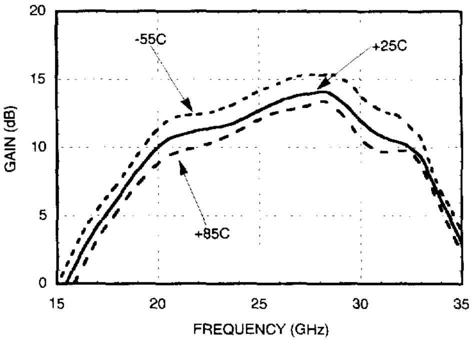
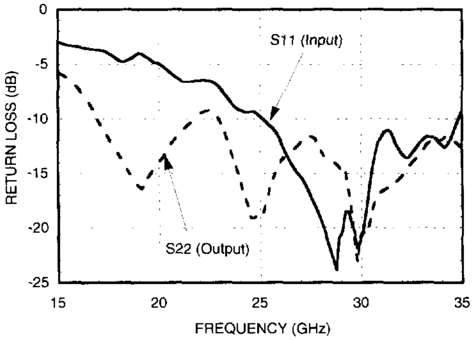
Gain vs. Temperature @ Vdd = +4V



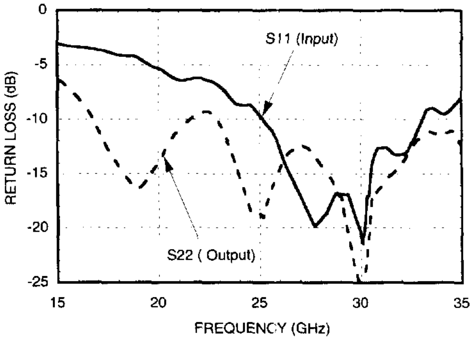
Gain vs. Temperature @ Vdd = +3V



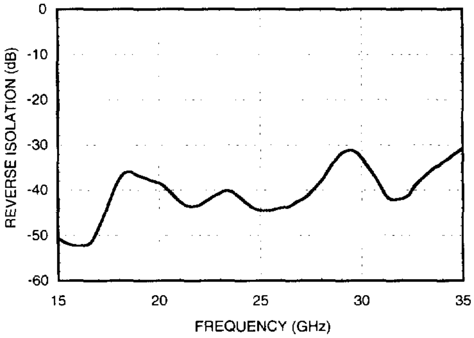
Return Loss @ Vdd = +4V



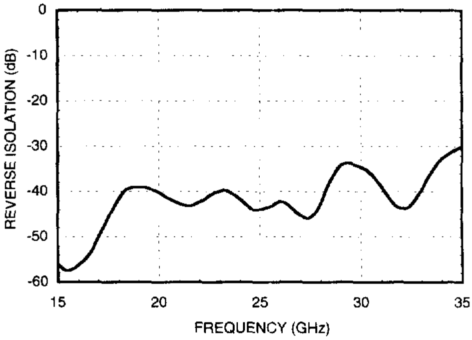
Return Loss @ Vdd = +3V



Reverse Isolation @Vdd = +4V



Reverse Isolation @Vdd = +3V



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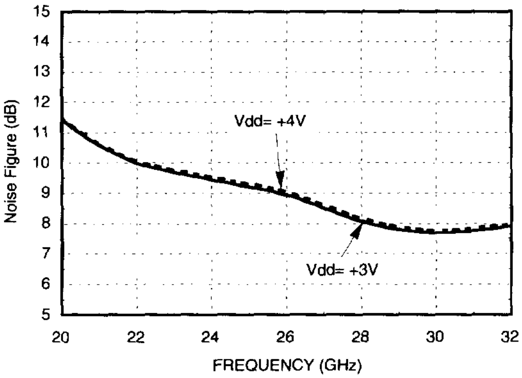
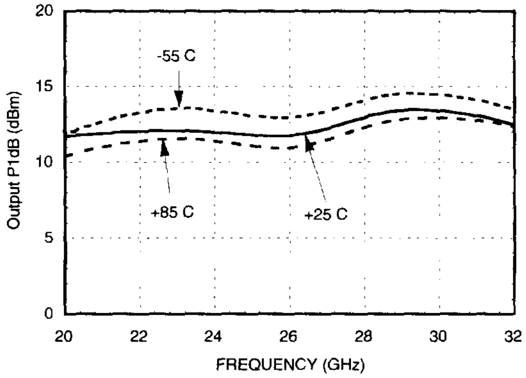
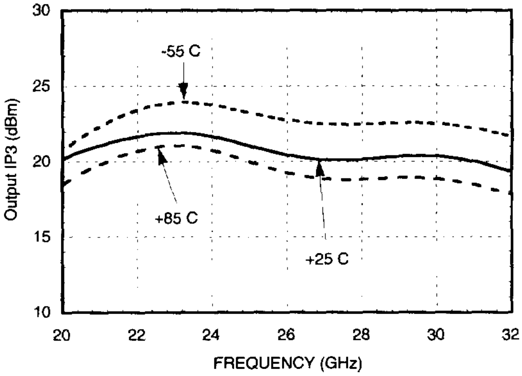
Noise Figure vs. Vdd



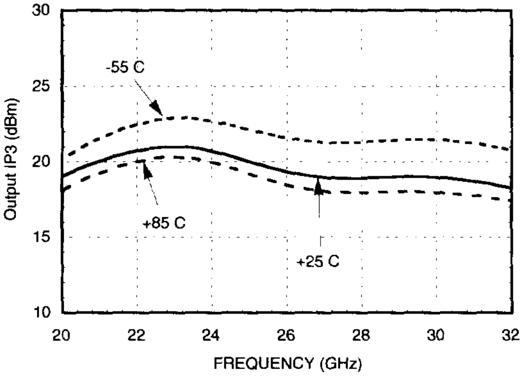
P1dB Output Power vs. Temperature @ Vdd = +4V



Output IP3 vs. Temperature @ Vdd = +4V



Output IP3 vs. Temperature @ Vdd = +3V



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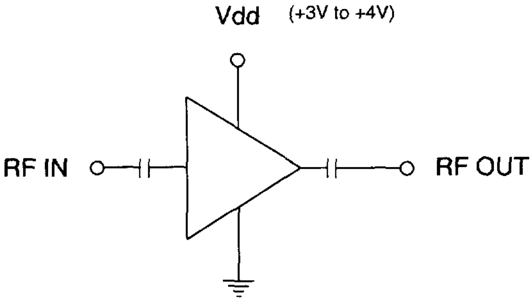
Schematic

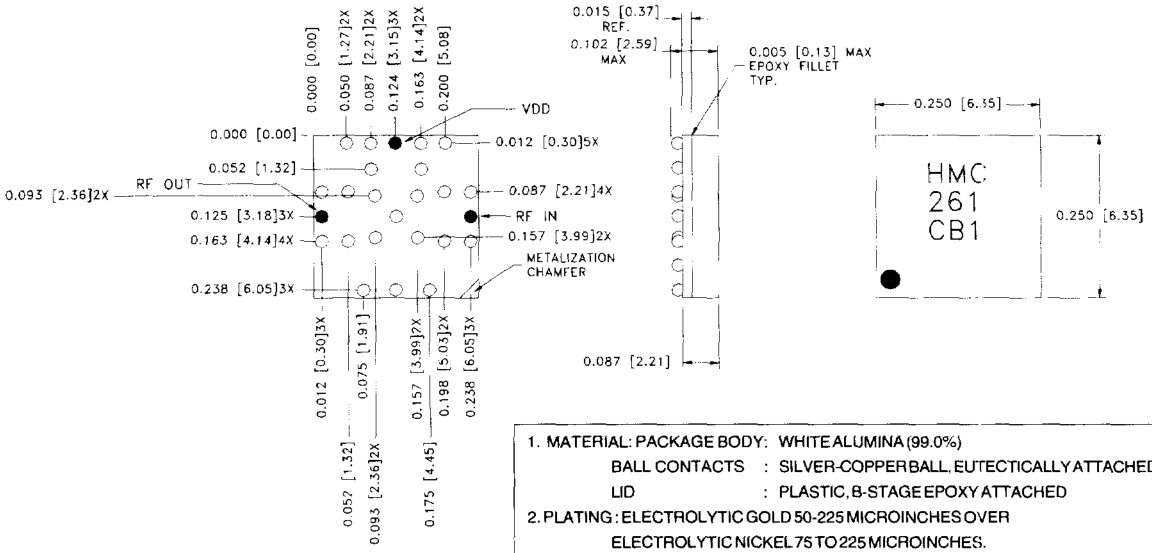


Absolute Maximum Ratings

Input Power (RFin) (Vdd = +4V)	+16 dBm
Supply Voltage (Vdd)	+5.5 Vdc Max.
Storage Temperature	-65 to +150 deg C
Operating Temperature	-55 to +85 deg C

A by pass capacitor is required on Vdd, mounted as close to the device as possible (within 0.10" (2.54 mm). Typical capacitance is 100 pF. Size should be as small as possible, 0402.

Outline Drawing *(See Mounting Note Page 1 - 44)*



1. MATERIAL: PACKAGE BODY: WHITE ALUMINA (99.0%)
   BALL CONTACTS : SILVER-COPPER BALL, EUTECTICALLY ATTACHED
   LID : PLASTIC, B-STAGE EPOXY ATTACHED
2. PLATING : ELECTROLYTIC GOLD 50-225 MICROINCHES OVER ELECTROLYTIC NICKEL 75 TO 225 MICROINCHES.
3. DIMENSIONS ARE IN INCHES (MILLIMETERS). UNLESS OTHERWISE SPECIFIED ALL TOLERANCES ARE ± 0.005 (± 0.13).
4. ALL UNLABELED BALL CONTACTS ARE GROUND.
5. ALL GROUNDS MUST BE SOLDERED TO THE PCB RF GROUND

All unlabeled balls are ground.

Mounting

The BGA package is back-metallized and can be mounted with either eutectic solder or electrically conductive epoxy. The mounting surface should be clean and flat. Placement of the BGA package can be done manually or with available automatic placement machines.

Eutectic Attach:

Eutectic solder paste may be applied manually or automatically by screen print/dispense methods to the PCB. Geometry and process should be such as to supply sufficient solder volume to obtain adequate solder fillets around the balls of the package after reflow without shorting RF/DC ball signal contacts. The solder should be reflowed in an infrared reflow oven with the appropriate temperature profile for that solder. The finished fillet should resemble a cylindrical column with a flared pedestal at the substrate surface when viewed from the side.
Do not expose the BGA package to temperature greater than 220°C for more than 20 seconds.

Epoxy Attach:

Electrically conductive epoxy may be applied in the same manner as mentioned above. Again geometry and process parameters should be such as to supply sufficient epoxy around each of the balls of the package without shorting RF/DC ball signal contact . Cure the epoxy per the recommended manufacture's schedule.

Handling Precautions:

Follow these precautions to avoid permanent damage.
Cleanliness: Handle the devices in a clean environment.

Static Sensitivity: Follow ESD precautions to protect against ESD strikes (*see page 8 - 2*).
Transients: Suppress instrument and bias supply transients while bias is applied. Use shielded signal and bias cables to minimize inductive pick-up.
General Handling: Handle the BGA package along the edges with a vacuum collet or with a sharp pair of bent tweezers. Avoiding damaging the solder balls on the package bottom.