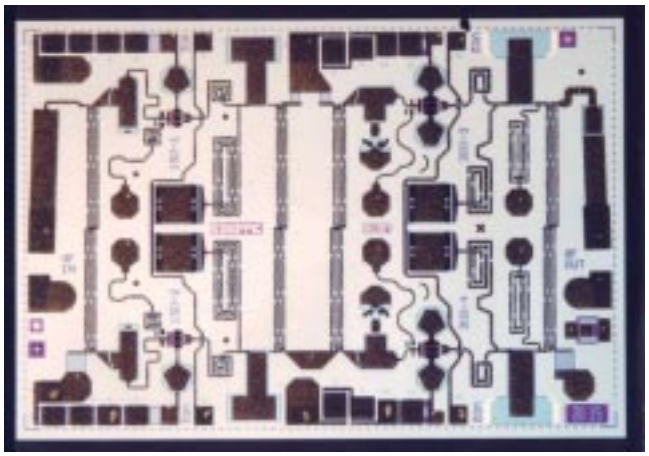
8 - 18 GHz Wideband Driver Amplifier TGA8399C-EPU

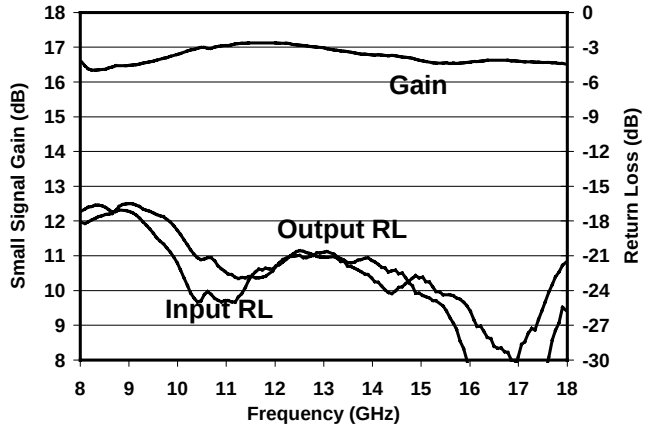


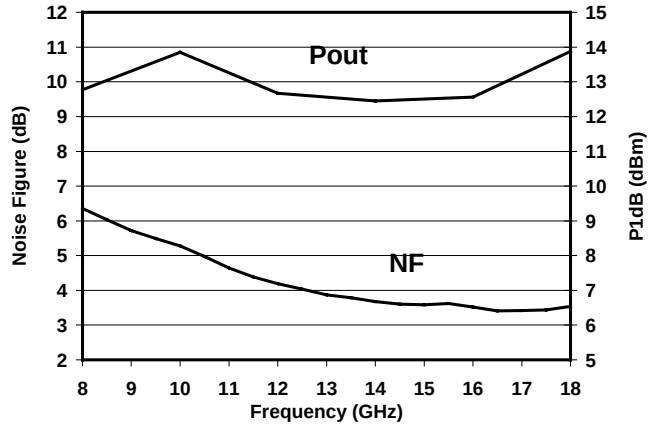
Chip Dimensions: 3.5mm x 2.4mm x 0.1 mm

Key Features and Performance

- Two Stage Driver Amplifier
- 0.25µm pHEMT 2MI Technology
- 8-18 GHz Frequency Range
- 13 dBm Nominal Pout
- 17 dB Nominal Gain
- Balanced In/Out for Low VSWR
- 4.5V @ 50mA Self Bias
- Chip Dimensions: 3.5mm x 2.4mm x 0.1 mm

Fixtured Measured Performance





Primary Applications

- X and Ku band Driver
- Point-to-Point Radio

Note: Devices designated as EPU are typically early in their characterization process prior to finalizing all electrical and process specifications.

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TABLE I
MAXIMUM RATINGS

Symbol	Parameter 1/	Value	Notes
V^+	Positive Supply Voltage	8 V	2/
I^+	Positive Supply Current	180 mA	2/
$\| I_G \|$	Gate Supply Current	3.52 mA	
P_{IN}	Input Continuous Wave Power	17.0 dBm	2/
P_D	Power Dissipation	0.94 W	2/, 3/
T_{CH}	Operating Channel Temperature	150 °C	4/, 5/
T_M	Mounting Temperature (30 seconds)	320 °C	
T_{STG}	Storage Temperature	-65 °C to 150 °C	

1/ These ratings represent the maximum operable values for this device.

2/ Combinations of supply voltage, supply current, input power, and output power shall not exceed P_D.

3/ When operated at this bias condition with a base plate temperature of 70 °C, the median life is 1 E+6 hours.

4/ Junction operating temperature will directly affect the device median time to failure (T_M). For maximum life, it is recommended that junction temperatures be maintained at the lowest possible levels.

5/ These ratings apply to each individual FET.

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TABLE II
DC PROBE TESTS
(T_A = 25 °C, Nominal)

Symbol	Parameter	Minimum	Maximum	Value
V_P	Pinch-off Voltage	-1.5	-0.5	V
BVGS	Breakdown Voltage gate-source	-30	-8	V
BVGD	Breakdown Voltage gate-drain	-30	-8	V

TABLE III
RF CHARACTERIZATION TABLE
(T_A = 25 °C, Nominal)
V_d = 5 V

Symbol	Parameter	Test Condition	Limit			Units
			Min	Nom	Max	
Gain	Small Signal Gain	F = 8 – 18 GHz	12	16	---	dB
IRL	Input Return Loss	F = 8 – 18 GHz	---	-18	-12	dB
ORL	Output Return Loss	F = 8 – 18 GHz	---	-20	-12	dB

TABLE IV
THERMAL INFORMATION

Parameter	Test Conditions	T_{CH} (°C)	$R_{\theta JC}$ (°C/W)	T_M (Hours)
$R_{\theta JC}$ Thermal Resistance (channel to backside of carrier)	Vd = 4.5 V Id = 50 mA Pdiss = 0.225 W	89	85	4.1 E+8

Note: Assumes eutectic attach using 1.5 mil 80/20 AuSn mounted to a 20 mil CuMo Carrier at 70°C baseplate temperature. Worst case condition with no RF applied, 100% of DC power is dissipated.

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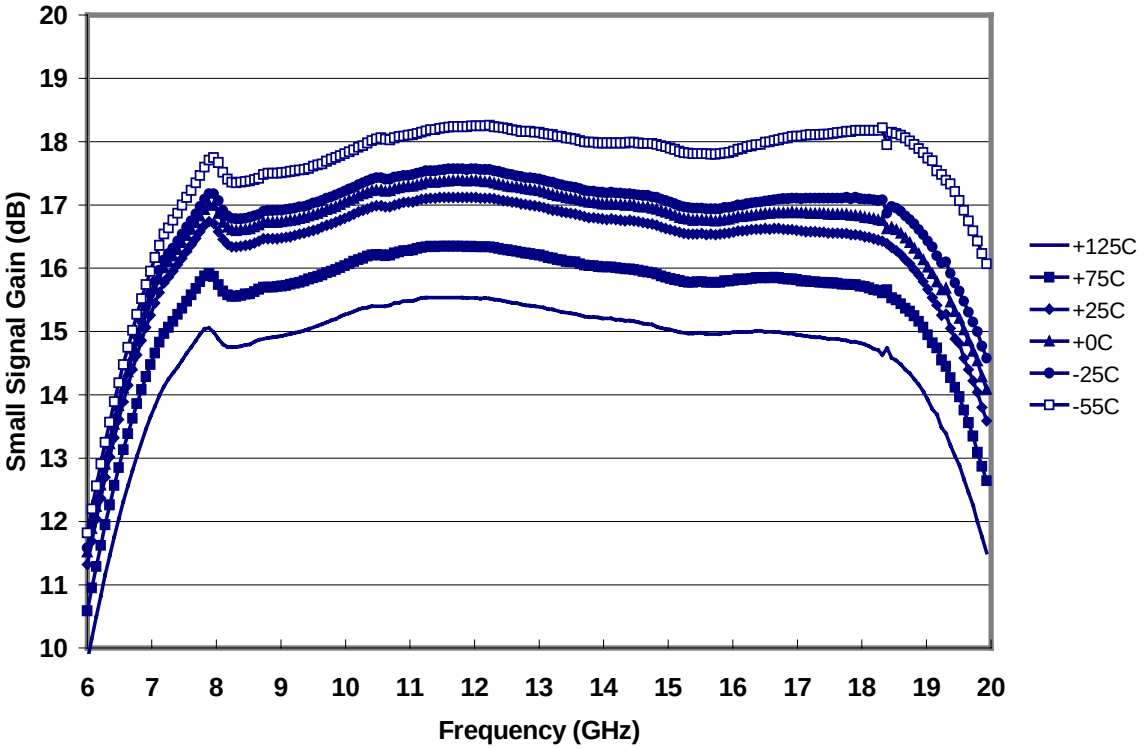
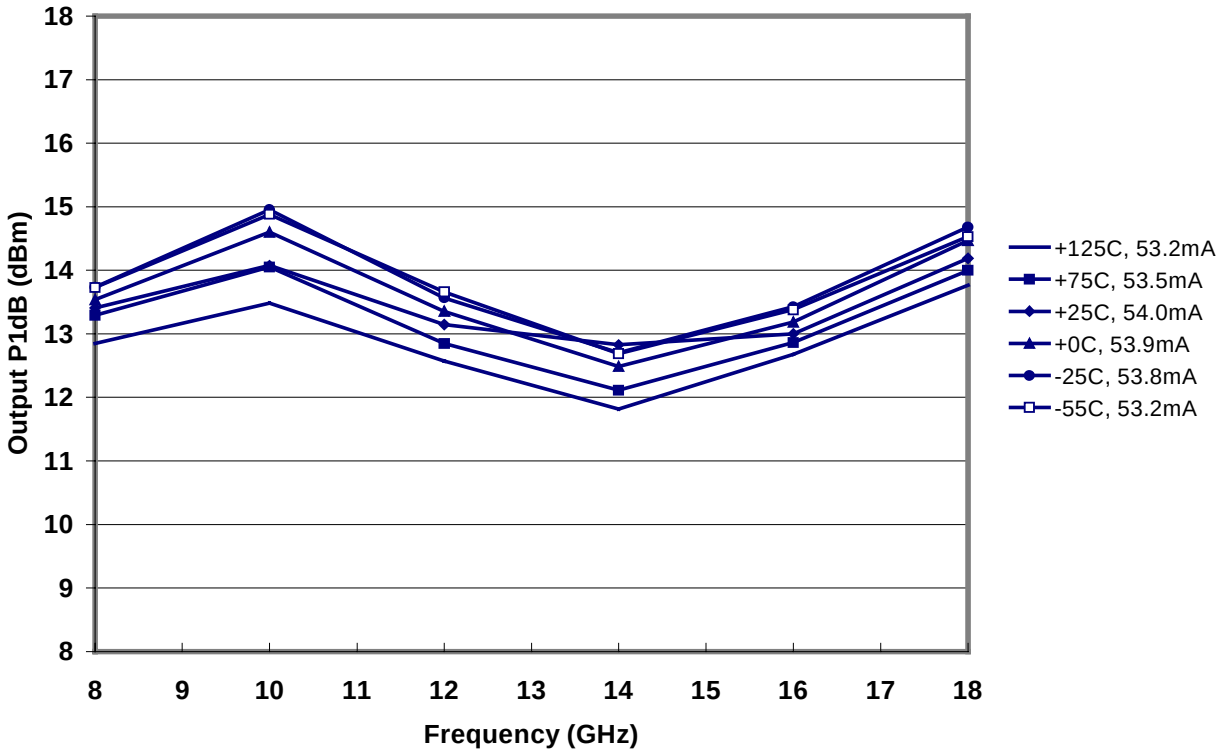
TGA8399C Performance vs. Temperature





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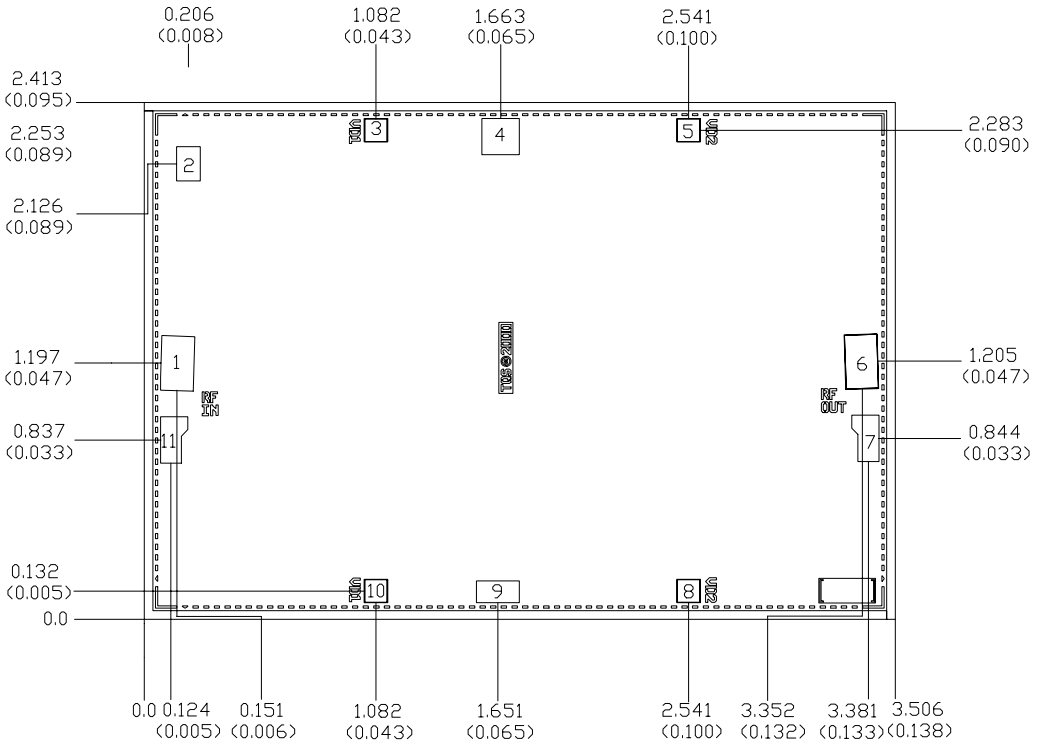
Mechanical Drawing



Units: millimeters (inches)
Thickness: 0.150 (0.006) (reference only)
Chip edge to bond pad dimensions are shown to center of bond pad
Chip size tolerance: +/- 0.051 (0.002)

GND IS BACKSIDE OF MMIC

Bond Pad #1 (RF Input)	0.155 x 0.255 (0.006 x 0.010)
Bond Pad #2 (GND)	0.111 x 0.160 (0.004 x 0.006)
Bond Pad #3,#10 (VD1)	0.110 x 0.110 (0.004 x 0.004)
Bond Pad #4 (GND)	0.170 x 0.175 (0.007 x 0.007)
Bond Pad #5,#8 (VD2)	0.110 x 0.110 (0.004 x 0.004)
Bond Pad #6 (RF Output)	0.155 x 0.255 (0.006 x 0.010)
Bond Pad #7,#11 (GND)	0.098 x 0.217 (0.004 x 0.009)
Bond Pad #9 (GND)	0.102 x 0.200 (0.004 x 0.008)

GaAs MMIC devices are susceptible to damage from Electrostatic Discharge. Proper precautions should be observed during handling, assembly and test.

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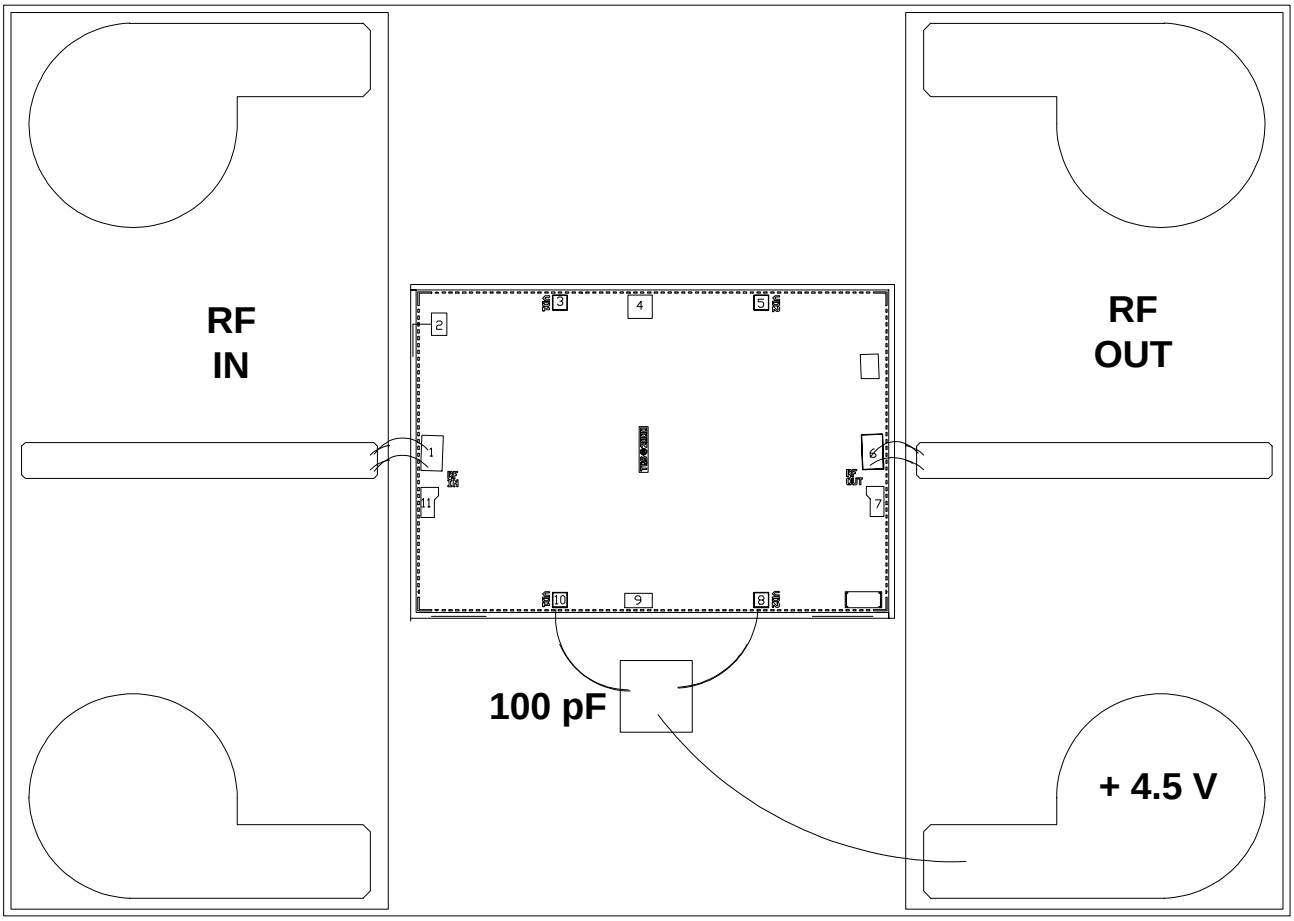
Recommended Assembly Layout



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Assembly Process Notes

Reflow process assembly notes:

- Use AuSn (80/20) solder with limited exposure to temperatures at or above 300°C (for 30 sec max).
- An alloy station or conveyor furnace with reducing atmosphere should be used.
- No fluxes should be utilized.
- Coefficient of thermal expansion matching is critical for long-term reliability.
- Devices must be stored in a dry nitrogen atmosphere.

Component placement and adhesive attachment assembly notes:

- Vacuum pencils and/or vacuum collets are the preferred method of pick up.
- Air bridges must be avoided during placement.
- The force impact is critical during auto placement.
- Organic attachment can be used in low-power applications.
- Curing should be done in a convection oven; proper exhaust is a safety concern.
- Microwave or radiant curing should not be used because of differential heating.
- Coefficient of thermal expansion matching is critical.

Interconnect process assembly notes:

- Thermosonic ball bonding is the preferred interconnect technique.
- Force, time, and ultrasonics are critical parameters.
- Aluminum wire should not be used.
- Discrete FET devices with small pad sizes should be bonded with 0.0007-inch wire.
- Maximum stage temperature is 200°C.

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