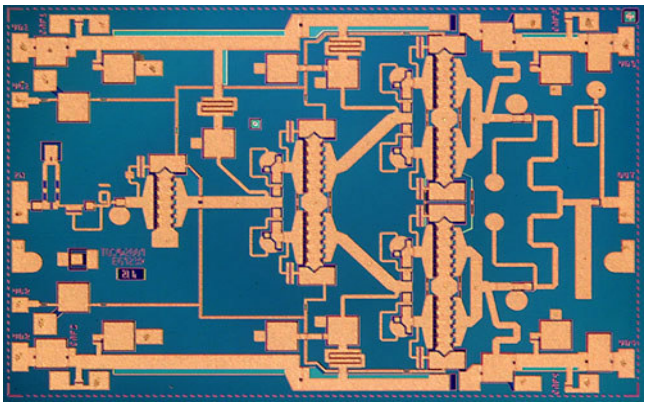
6 - 18 GHz 2.8 Watt, 24 dB Power Amplifier



Key Features and Performance

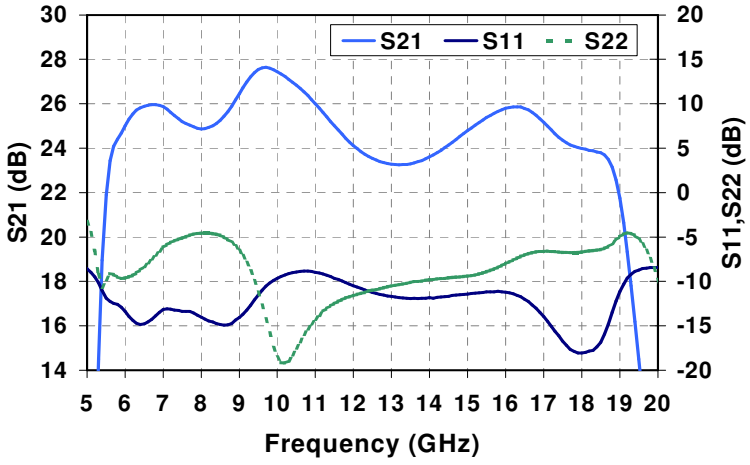
- 34.5 dBm Midband Pout
- 24 dB Nominal Gain
- 10 dB Typical Input Return Loss
- 5 dB Typical Output Return Loss
- Bias Conditions: 8 V @ 1.2 A
- 0.25 µm Ku pHEMT 2MI
- Chip dimensions: 4.3 x 2.9 x 0.1 mm (170 x 115 x 4 mils)

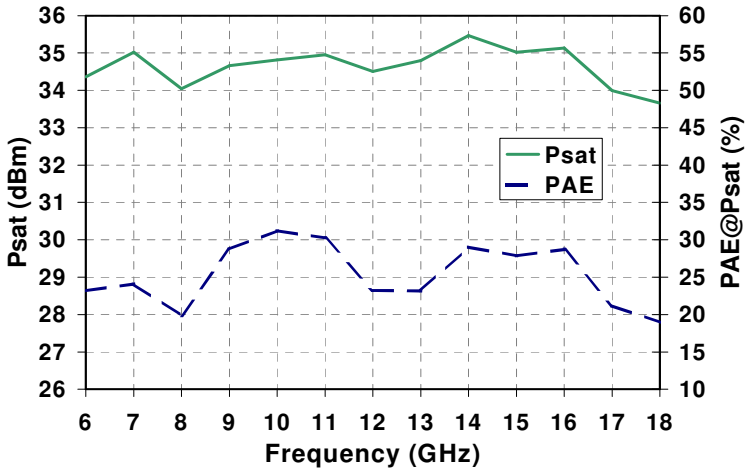
Primary Applications

- X-Ku Point-to-Point
- ECCM

Preliminary Measured Performance

Bias Conditions: V_D = 8 V I_D = 1.2 A





Note: This device is early in the characterization process prior to finalizing all electrical specifications. Specifications are subject to change without notice.

TABLE I
ABSOLUTE MAXIMUM RATINGS 1/

Symbol	Parameter	Value	Notes
V^+	Positive Supply Voltage	9 V	
V^-	Negative Supply Voltage Range	-5 V to 0 V	
I^+	Positive Supply Current (Quiescent)	2.0 A	
$\mid I_G \mid$	Gate Supply Current	52 mA	
P_{IN}	Input Continuous Wave Power	26 dBm	
P_D	Power Dissipation	18.0 W	
Tchannel	Channel Temperature	200 °C	2/
	Mounting Temperature (30 Seconds)	320 °C	
	Storage Temperature	-65 to 150 °C	

1/ These ratings represent the maximum operable values for this device. Stresses beyond those listed under “Absolute Maximum Ratings” may cause permanent damage to the device and/or affect device lifetime. These are stress ratings only, and functional operation of the device at these conditions is not implied.

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

TABLE II
THERMAL INFORMATION

PARAMETER	TEST CONDITION	Tchannel (°C)	θ_{JC} (°C/W)	Tm (HRS)
θ_{JC} Thermal Resistance (Channel to Backside)	V_D = 8 V I_D = 1.2 A P_{DIS} = 9.6 W	144.56	7.77	1.6E+6

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

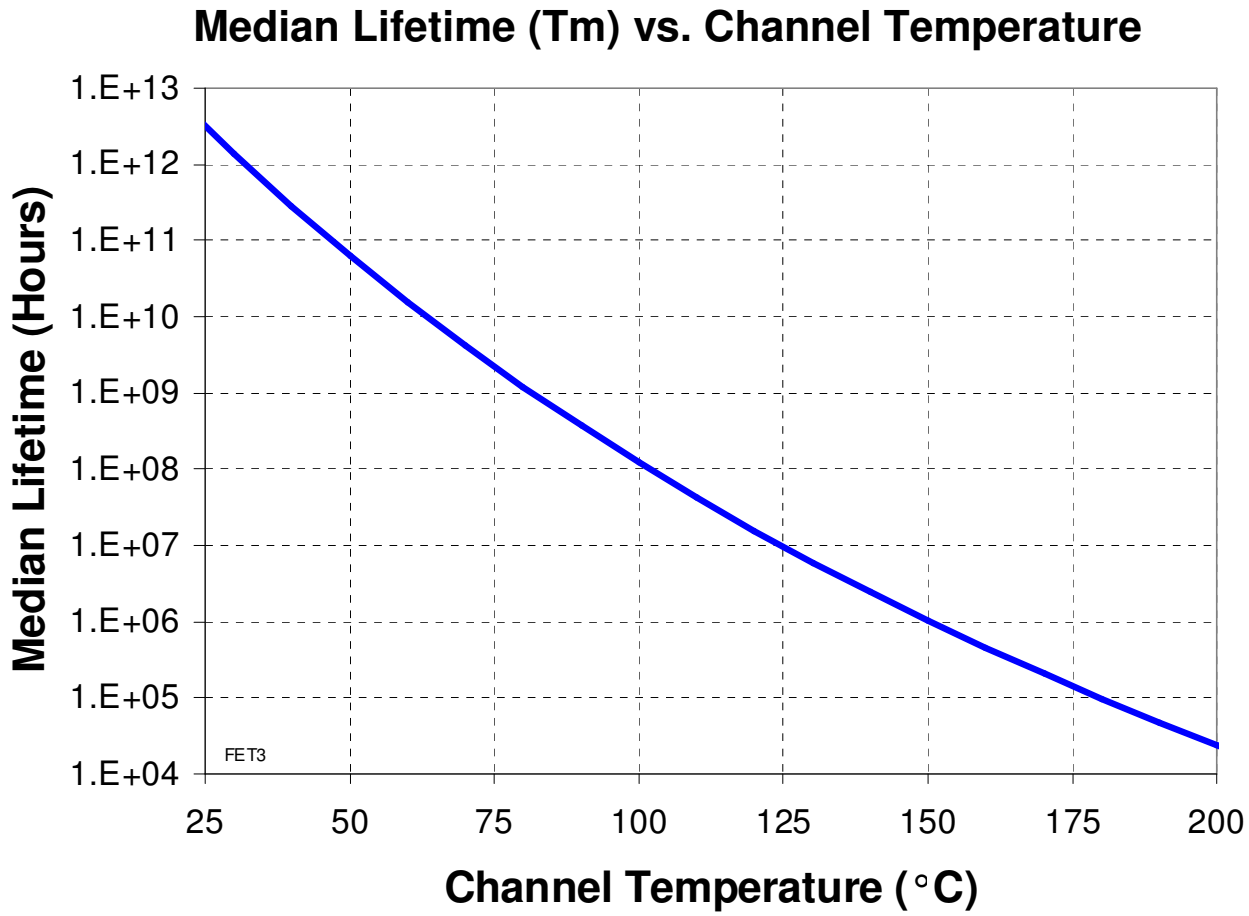


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TABLE III
DC PROBE TEST
(TA = 25 °C, nominal)

NOTES	SYMBOL	LIMITS		UNITS
		MIN	MAX	
1/	$I_{DSS(Q1)}$	120	564	mA
1/	$G_{M\ (Q1)}$	264	636	mS
1/, 2/	$\|V_P\|$	0.5	1.5	V
1/, 2/	$\|V_{BVGS}\|$	13	30	V
1/, 2/	$\|V_{BVGD}\|$	13	30	V

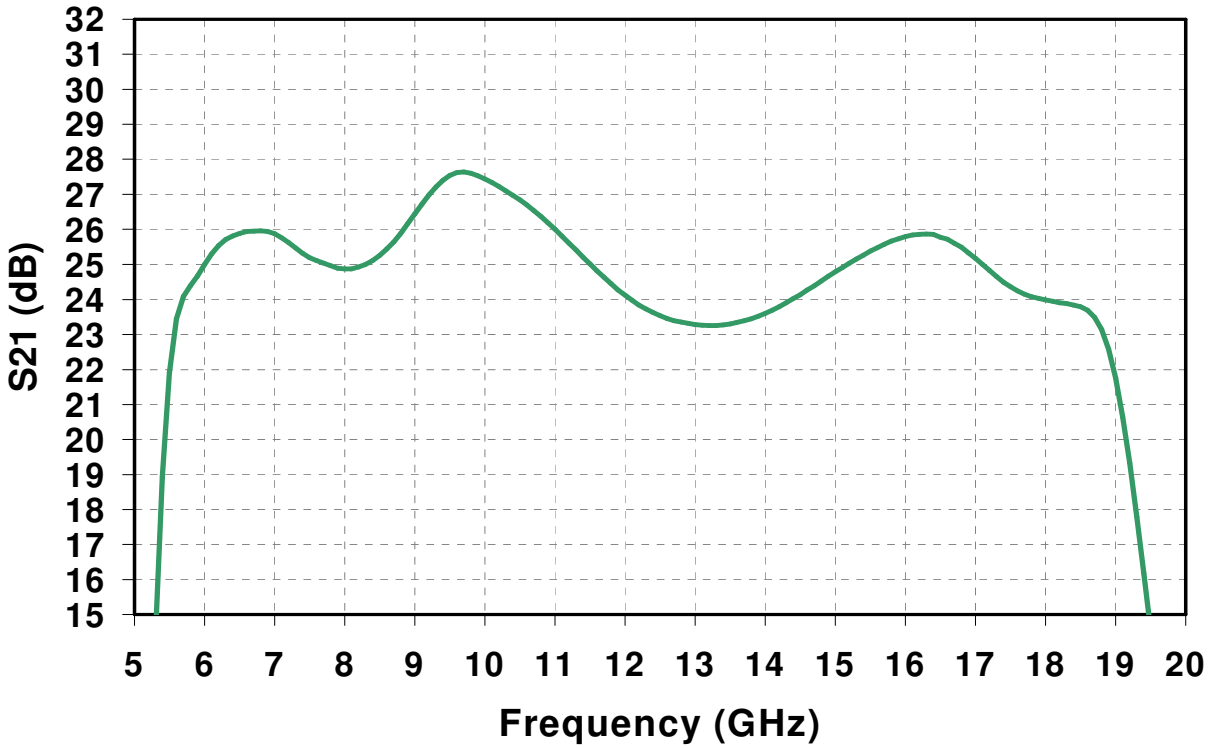
1/ Q1 is a 1200 µm FET
2/ V_P, V_{BVGD}, and V_{BVGS} are negative.

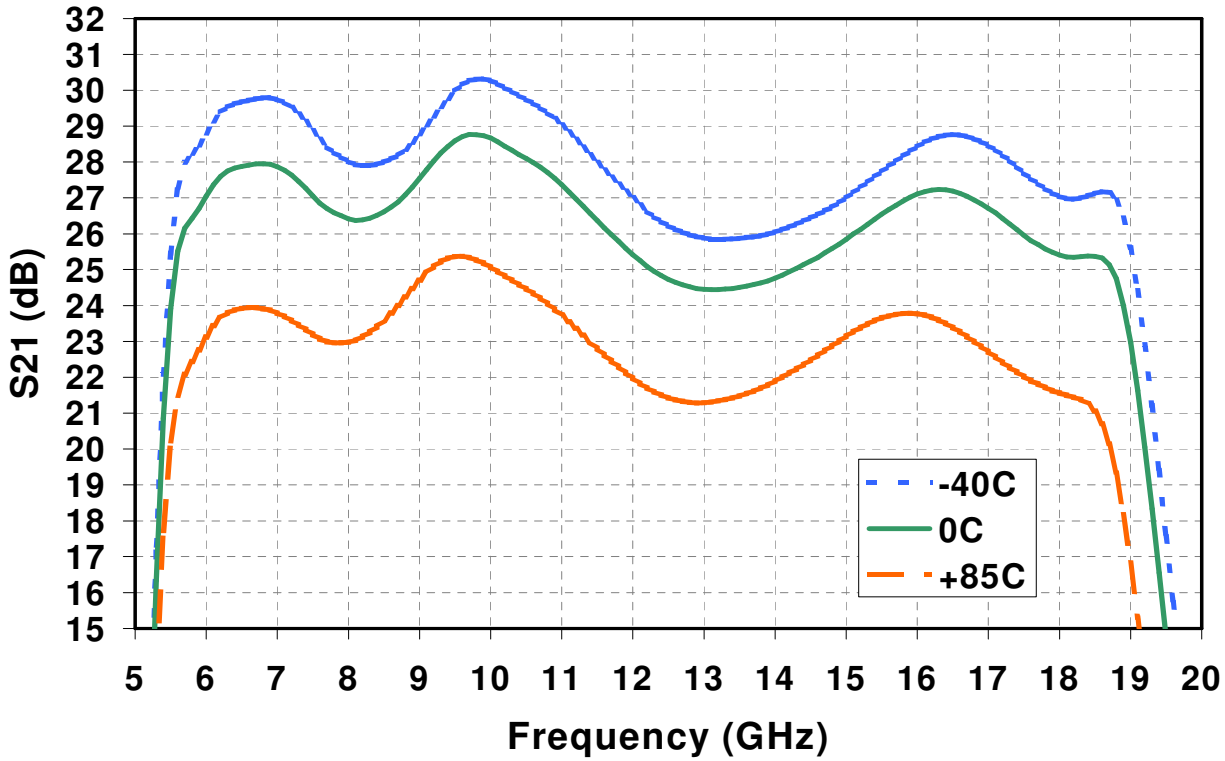
TABLE IV
RF CHARACTERIZATION TABLE
(T_A = 25 °C, nominal)
(Vd = 8 V, Id = 1.2 A ±5%)

SYMBOL	PARAMETER	TEST CONDITION	TYPICAL	UNITS
Gain	Small Signal Gain	F = 6-18 GHz	24	dB
IRL	Input Return Loss	F = 6-18 GHz	10	dB
ORL	Output Return Loss	F = 6-18 GHz	5	dB
PWR	Output Power @ Pin=+15dBm	F = 6-18 GHz	34.5	dBm

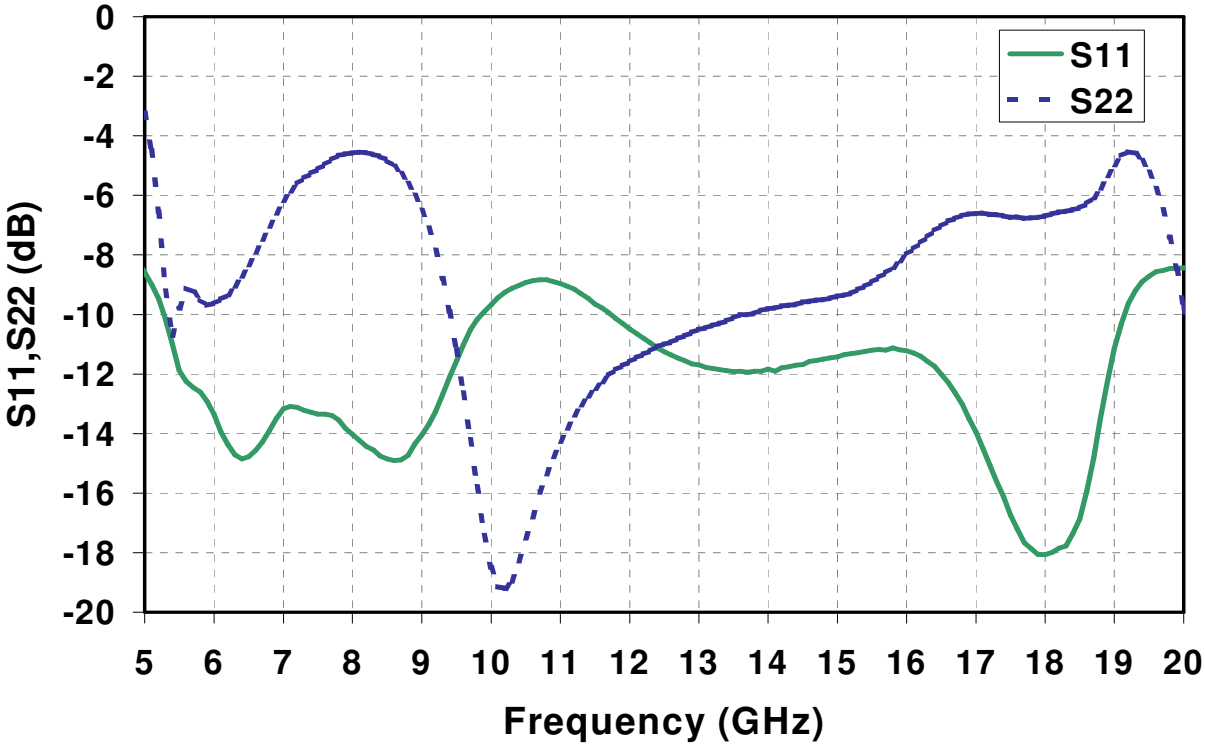
Note: Table IV Lists the RF Characteristics of typical devices as determined by fixtured measurements.

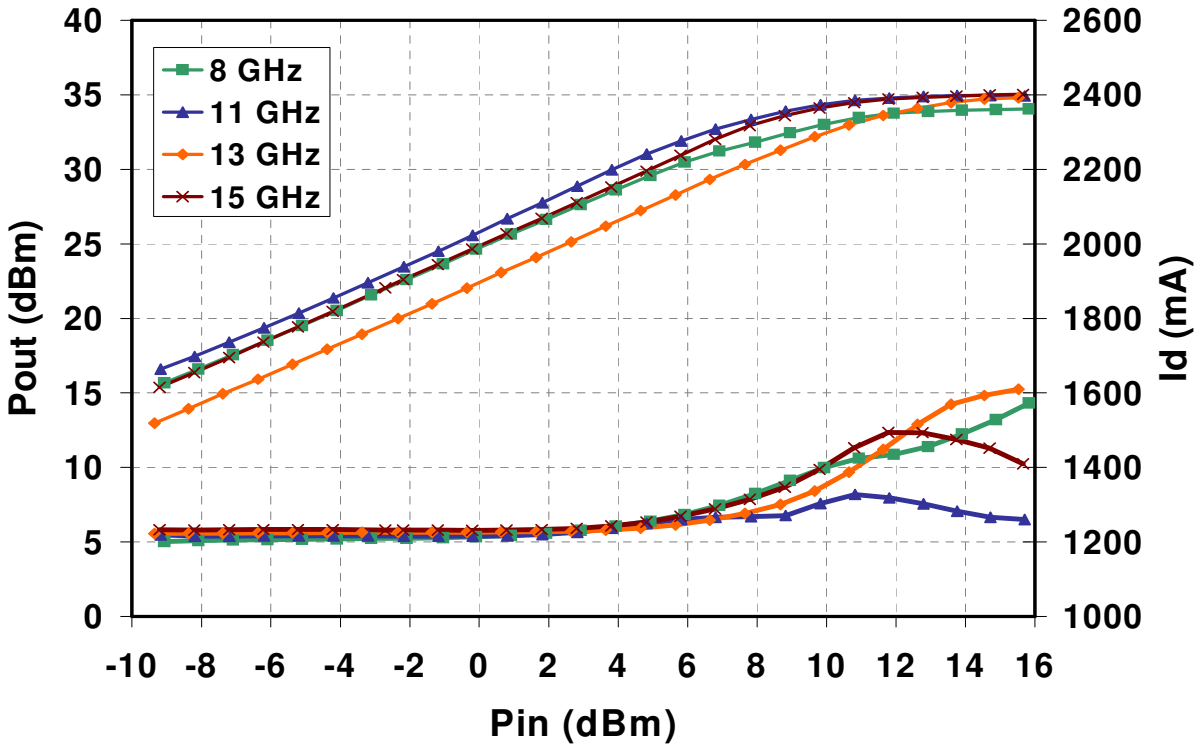
Fixtured Performance



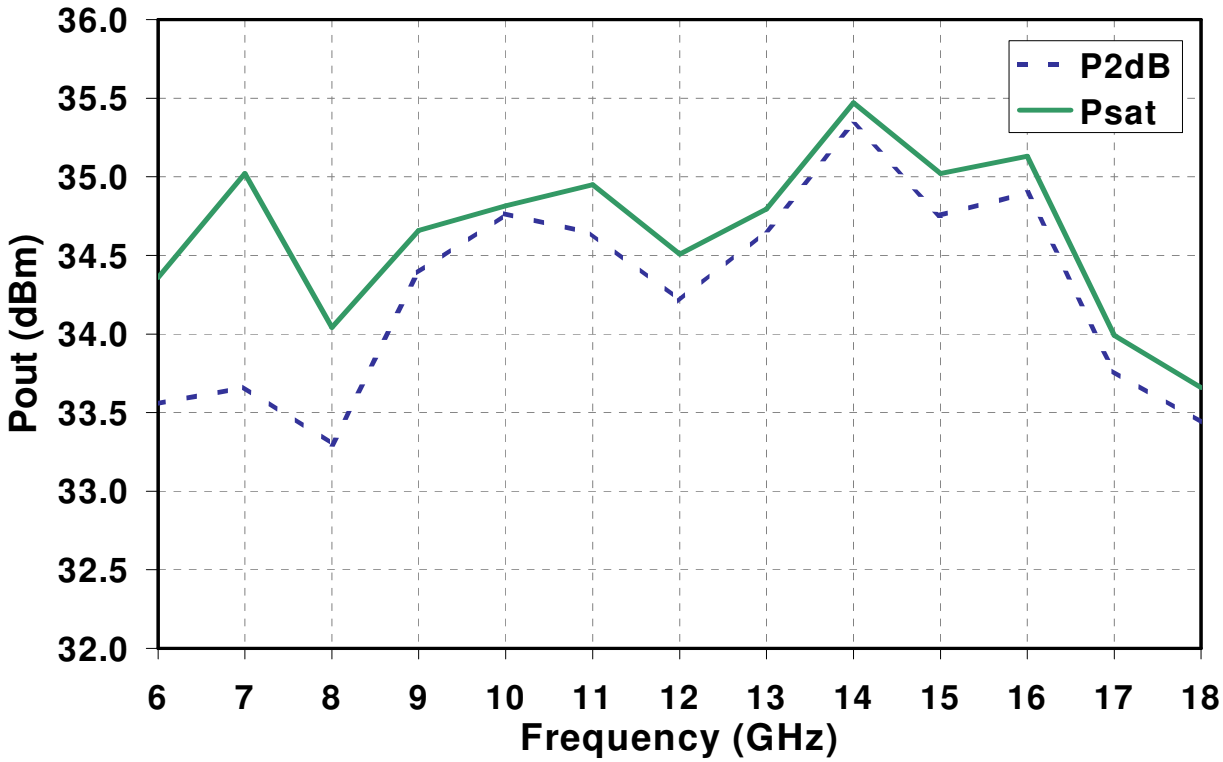


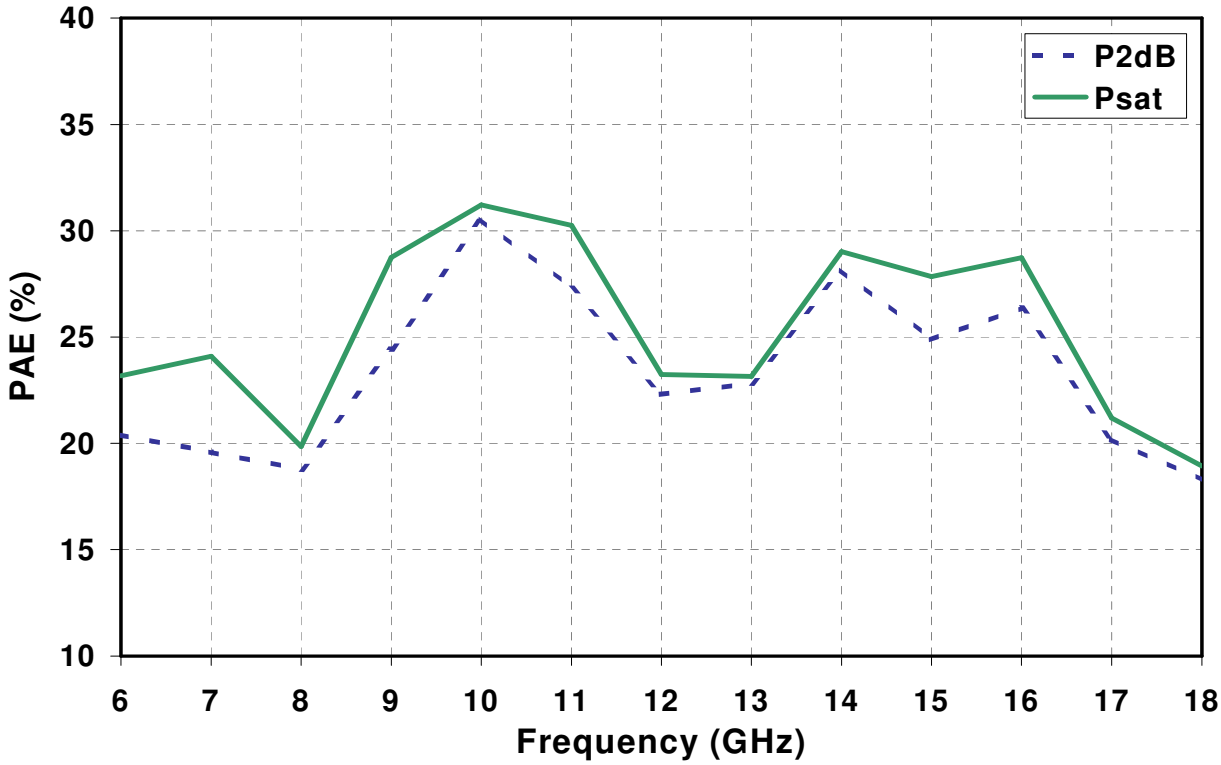
Fixtured Performance



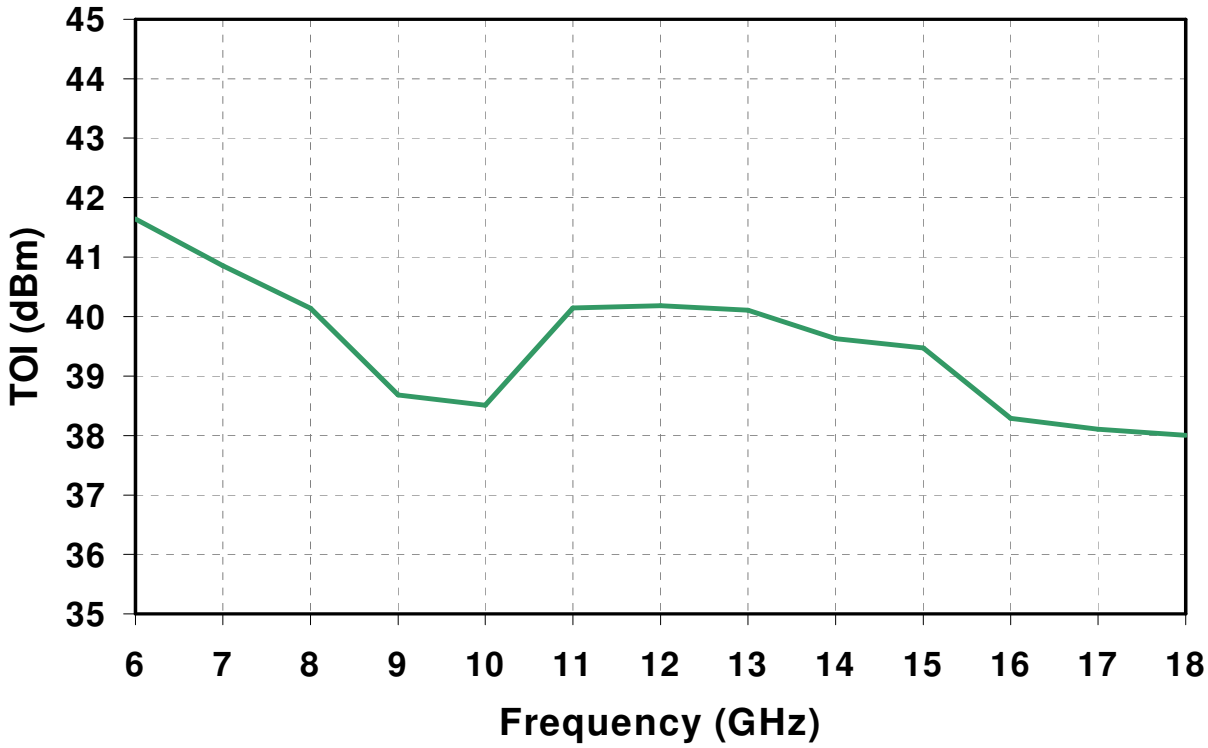


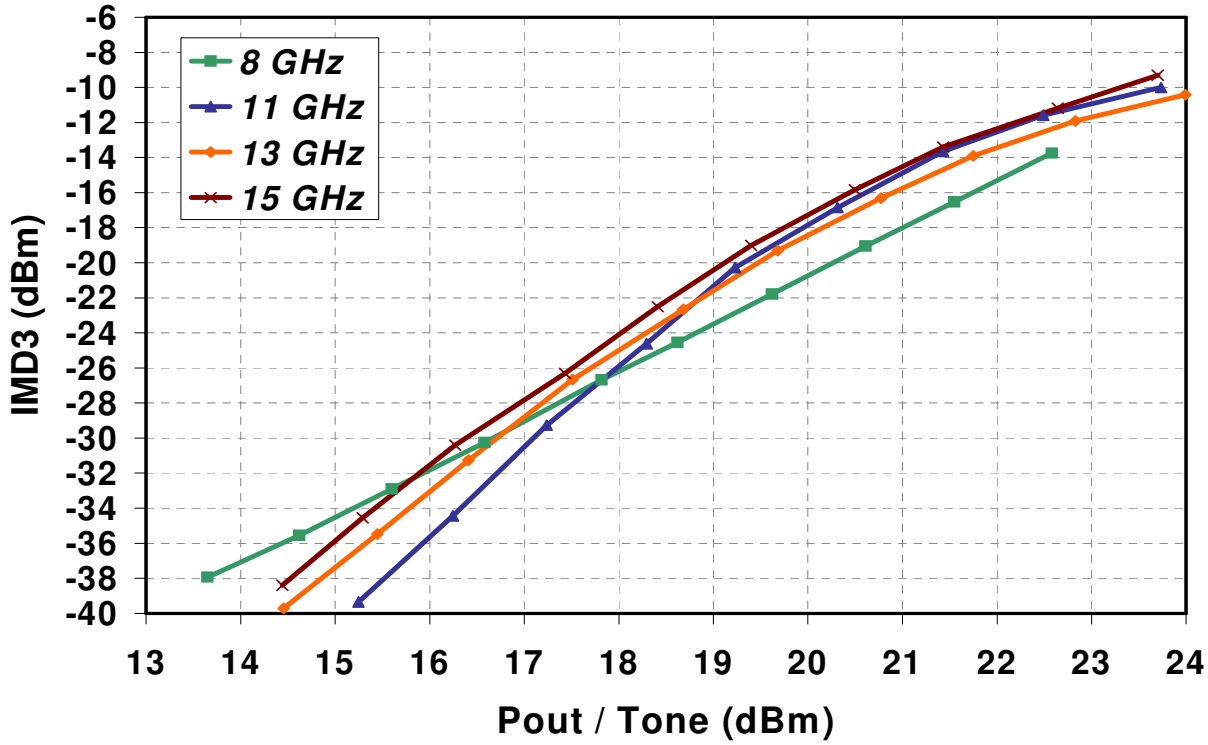
Fixtured Performance



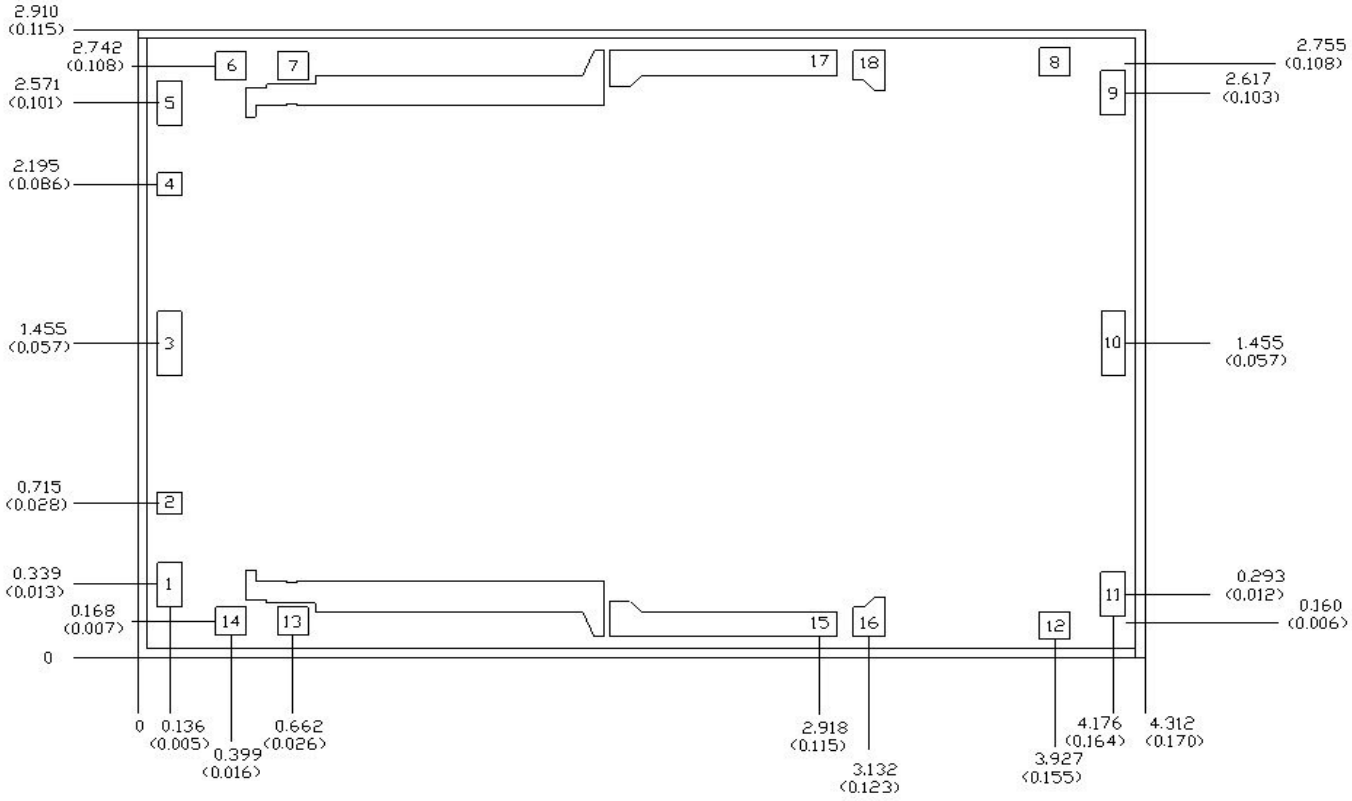


Fixtured Performance





Mechanical Drawing



Units: millimeters (inches)
Thickness: 0.1016 (0.004) (reference only)
Chip edge to bond pad dimensions are shown to center of Bond pads.
Chip size tolerance: +/- 0.0508 (0.002)
RF Ground on backside of MMIC

Bond Pad #1,5 (Vd1&Vd2)	0.100 x 0.200	(0.004 x 0.008)
Bond Pad #9,11 (Vd3)	0.100 x 0.200	(0.004 x 0.008)
Bond Pad #2,4 (Vg)	0.100 x 0.100	(0.004 x 0.004)
Bond Pad #3 (RF Input)	0.100 x 0.300	(0.004 x 0.012)
Bond Pad #10 (RF Output)	0.100 x 0.300	(0.004 x 0.012)
Bond Pad #6,7,13,14 (DQ)	0.125 x 0.125	(0.005 x 0.005)
Bond Pad #15,16,17,18 (Vd)	0.100 x 0.100	(0.004 x 0.004)

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

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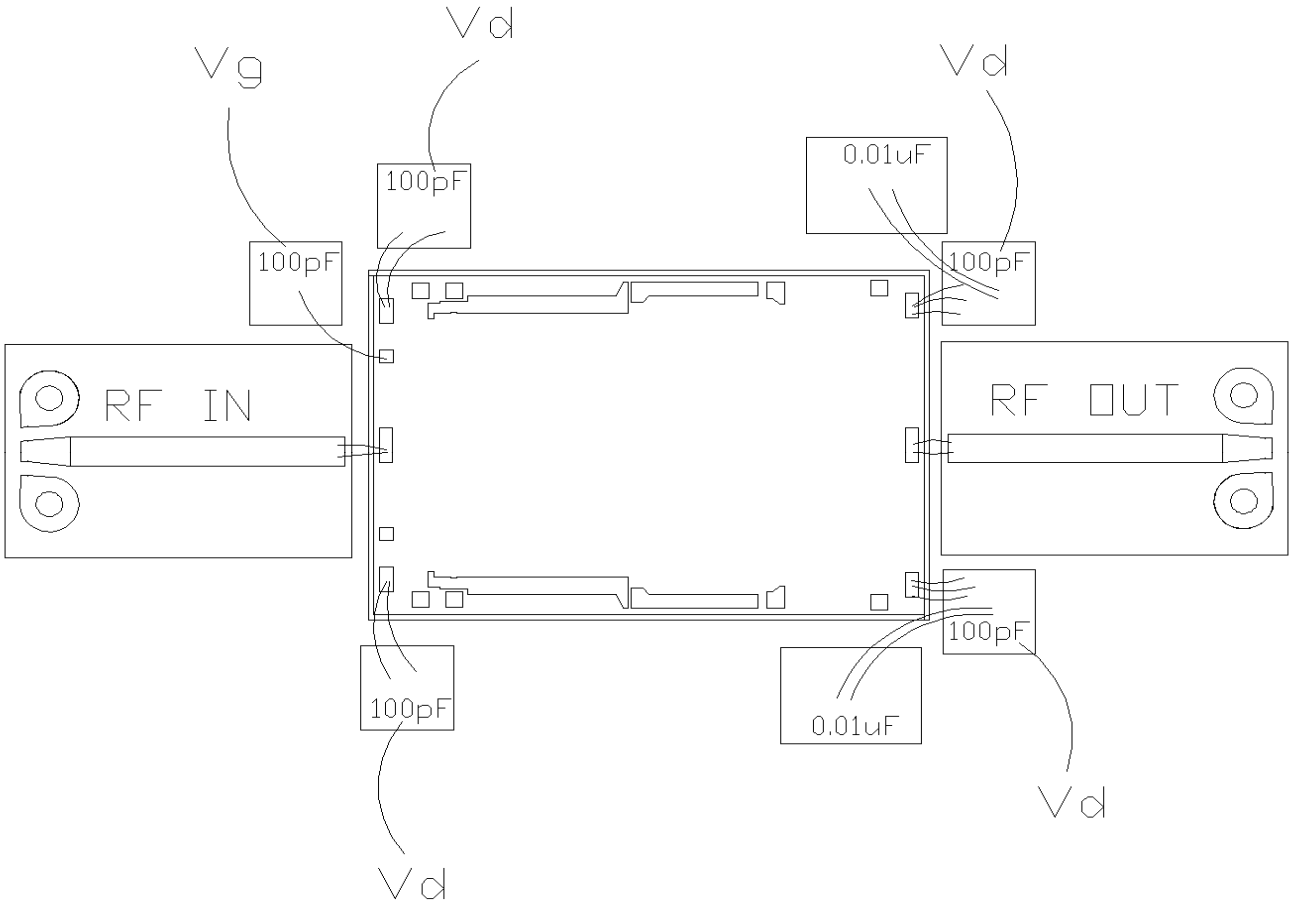
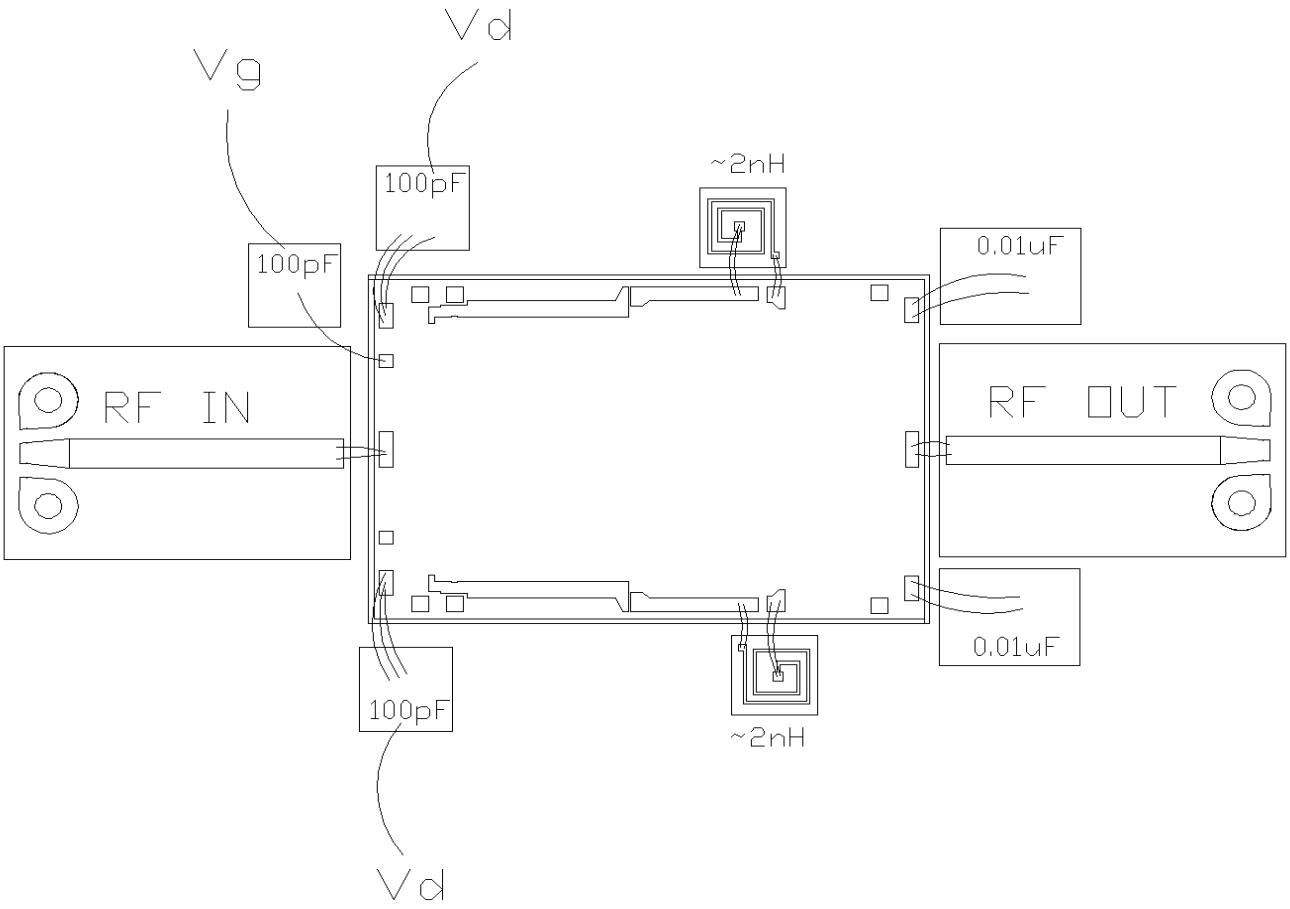
Chip Assembly & Bonding Diagram



1uF or larger capacitors (not shown) should be on the gate and drain line.

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

Alternative Chip Assembly & Bonding Diagram



1uF or larger capacitors (not shown) should be on the gate and drain line.

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

Assembly Process Notes

Reflow process assembly notes:

- Use AuSn (80/20) solder with limited exposure to temperatures at or above 300 °C. (30 seconds maximum)
- 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.

Ordering Information

Part	Package Style
TGA2501	GaAs MMIC Die

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