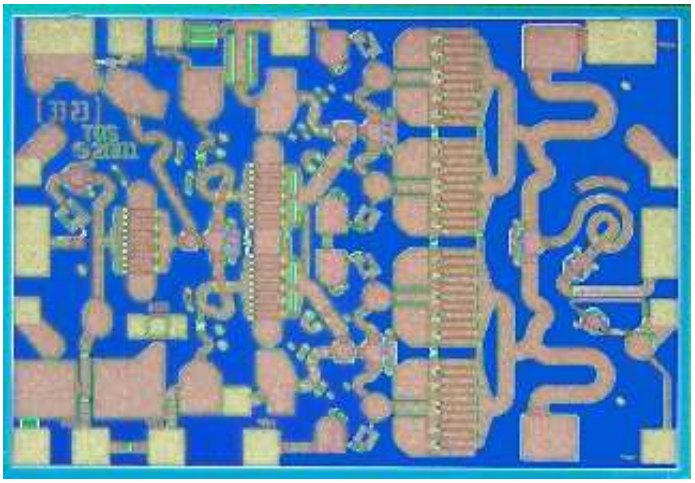
Ku Band, 2 Watt Power Amplifier

TGA2510



Key Features and Performance

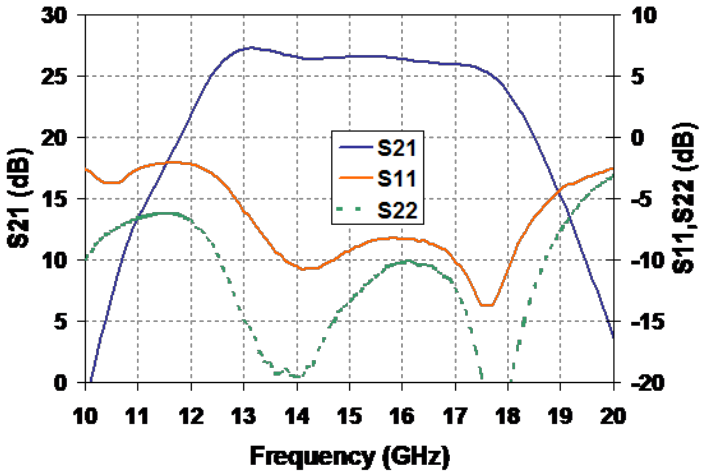
- 34 dBm Midband Psat
- 26 dB Nominal Gain
- 7 dB Typical Input Return Loss
- 12 dB Typical Output Return Loss
- 12.5 - 17 GHz Frequency Range
- Directional Power Detector with Reference
- 0.25µm pHEMT 3MI Technology
- Bias Conditions: 7.5V, 650mA
- Chip Dimensions:
  2.02 x 1.38 x 0.10 mm
  (0.080 x 0.054 x 0.004 inches)

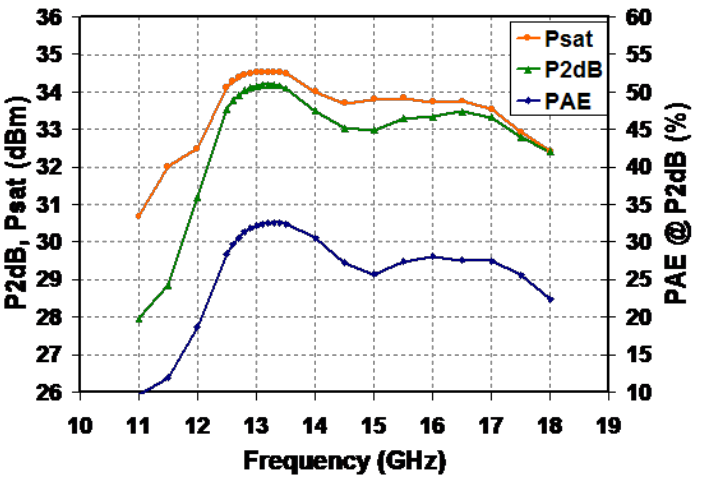
Primary Applications

- VSAT
- Point to Point

Preliminary Measured Performance

Bias Conditions: Vd=7.5V Id=650mA





Note: Datasheet is subject to change without notice.

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TABLE I
ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Notes
V_D	Drain Voltage	8 V	1/ 2/
V_G	Gate Voltage Range	-5V to 0V	1/
I_D	Drain Supply Current	1300 mA	1/ 2/
$\| I_G \|$	Gate Supply Current	18 mA	1/
P_{IN}	Input Continuous Wave Power	24 dBm	1/ 2/
P_D	Power Dissipation	10.4 W	1/ 2/
T_{CH}	Operating Channel Temperature	200 ^{0}C	3/
T_M	Mounting Temperature (30 Seconds)	320 ^{0}C	
T_{STG}	Storage Temperature	-65 to 150 ^{0}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 at a package base temperature of 70°C

3/ Junction operating temperature will directly affect the device median lifetime. For maximum life, it is recommended that channel temperatures be maintained at the lowest possible levels.

TABLE II
RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Value
Vd	Drain Voltage	7.5 V
Id	Drain Current	650 mA
Id_Drive	Drain Current under RF Drive	1200 mA
Vg3, Vg4	Gate Voltage	-0.65 V typical

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TABLE III
RF CHARACTERIZATION TABLE
(T_A = 25°C, Nominal)
(Vd = 7.5V, Idq = 650mA ±5%)

Symbol	Parameter	Test Conditions	Typ	Units	Notes
Gain	Small Signal Gain	F = 12.5 – 17 GHz	26	dB	
IRL	Input Return Loss	F = 12.5 – 17 GHz	7	dB	
ORL	Output Return Loss	F = 12.5 – 17 GHz	12	dB	
PWR	Output Power @ Pin = +15dBm	F = 12.5 – 17 GHz	34.0	dBm	
PAE	Power Added Efficiency @ Pin=+15dBm	F = 12.5 – 17 GHz	31	%	

TABLE IV
THERMAL INFORMATION

Parameter	Test Conditions	T_{CH} (°C)	Θjc (°C/W)	Tm (hrs)
Θjc Thermal Resistance (Channel to Backside of Carrier)	V_D = 7.5V I_D = 650mA P_{DISS} = 4.88W T_{BASE} = 70°C	130.7	12.44	5.5E+6

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

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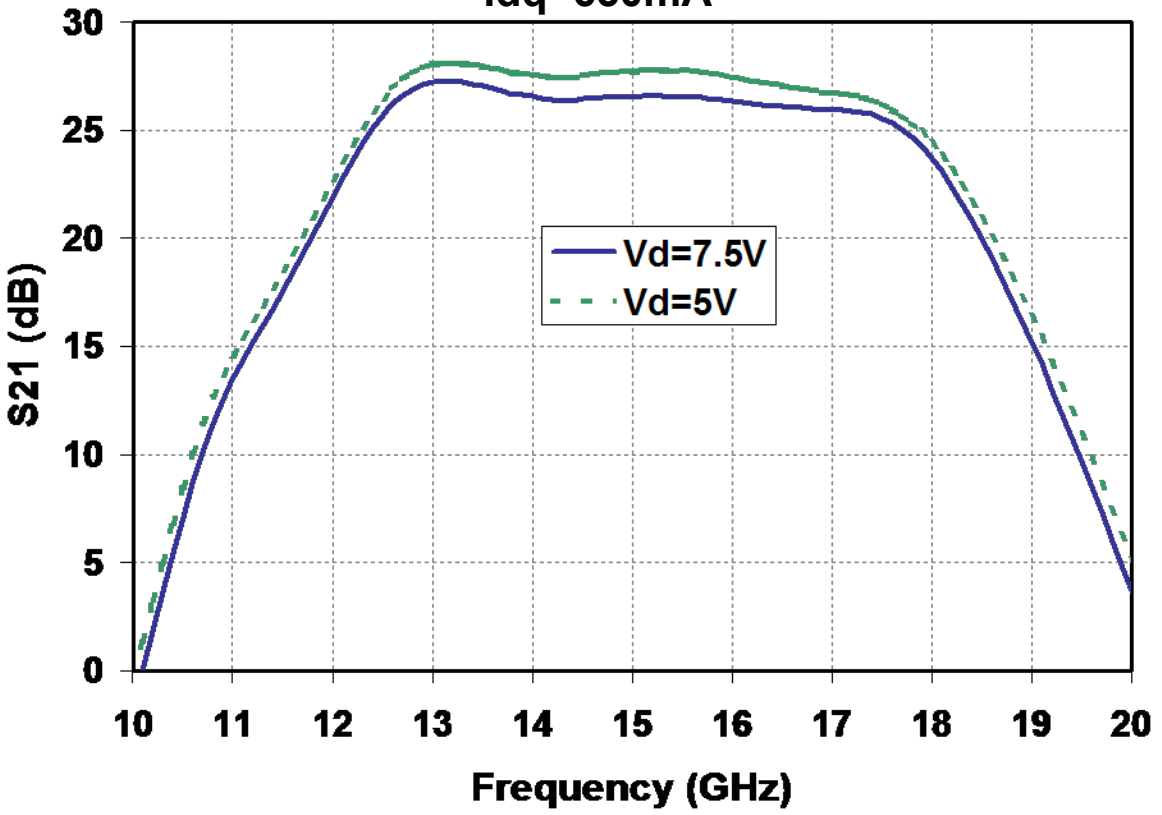
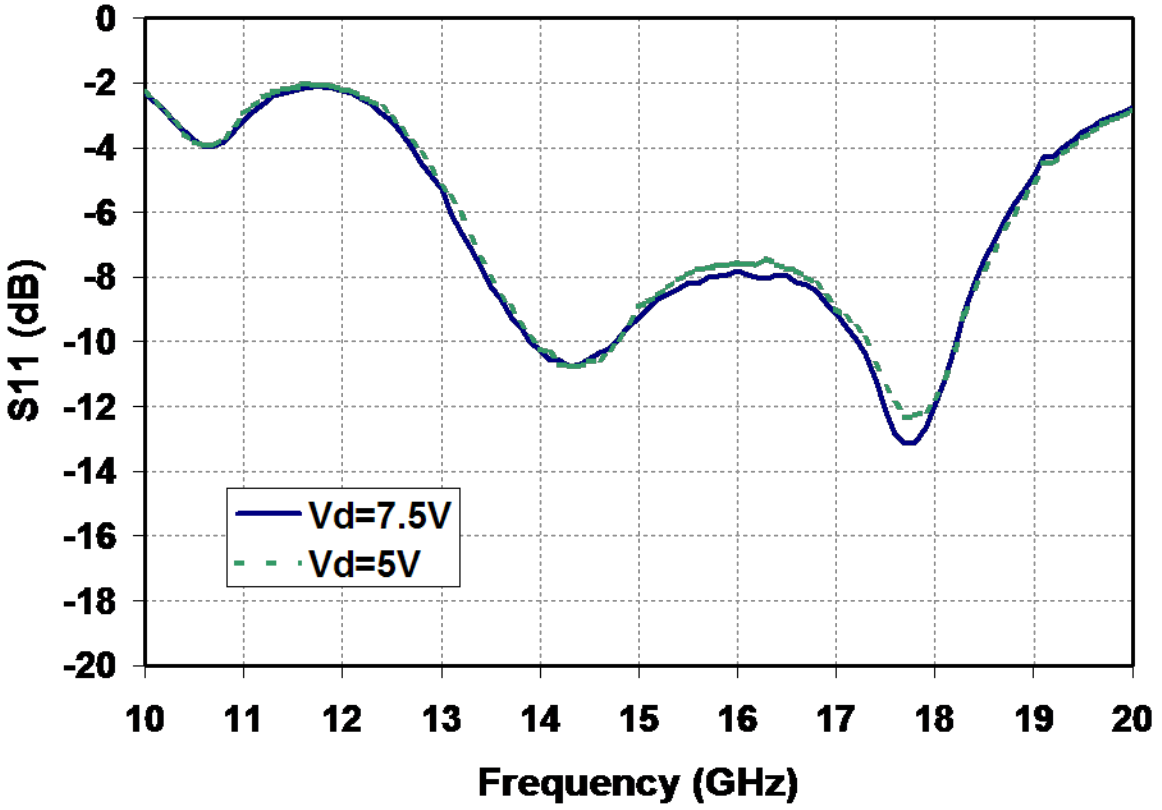
Typical Fixtured Performance
Idq=650mA





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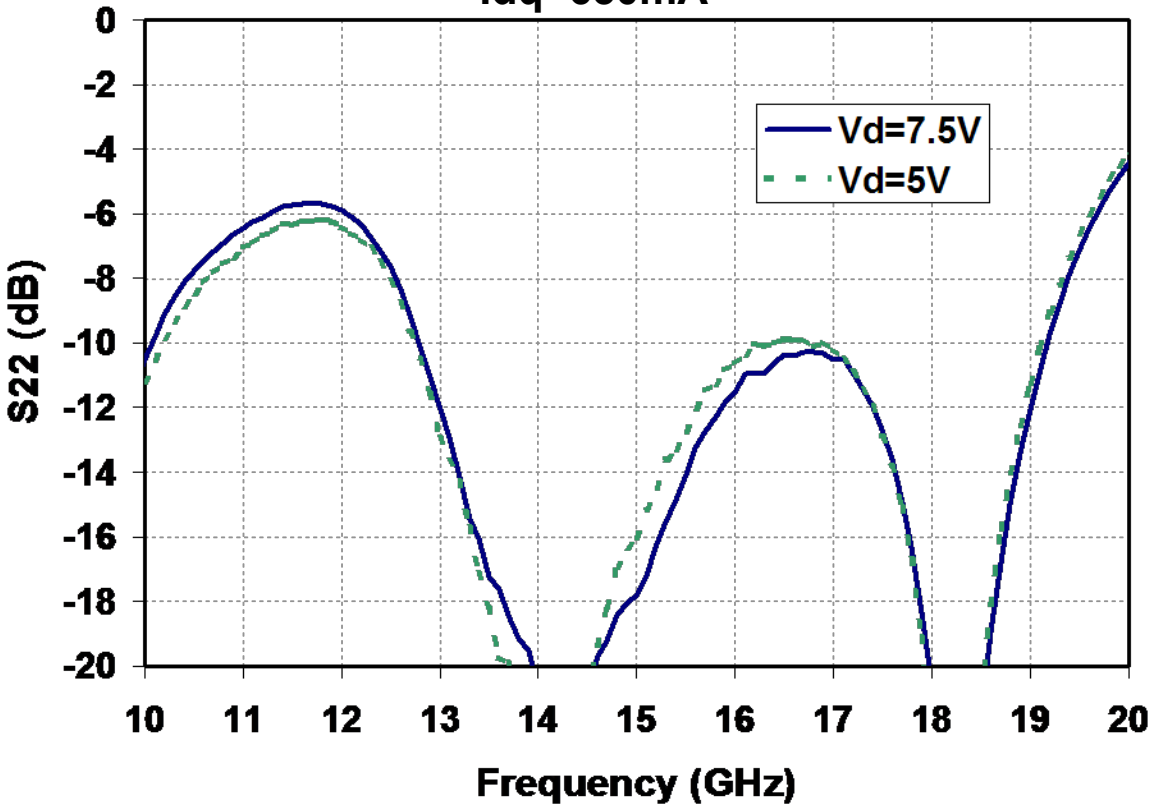
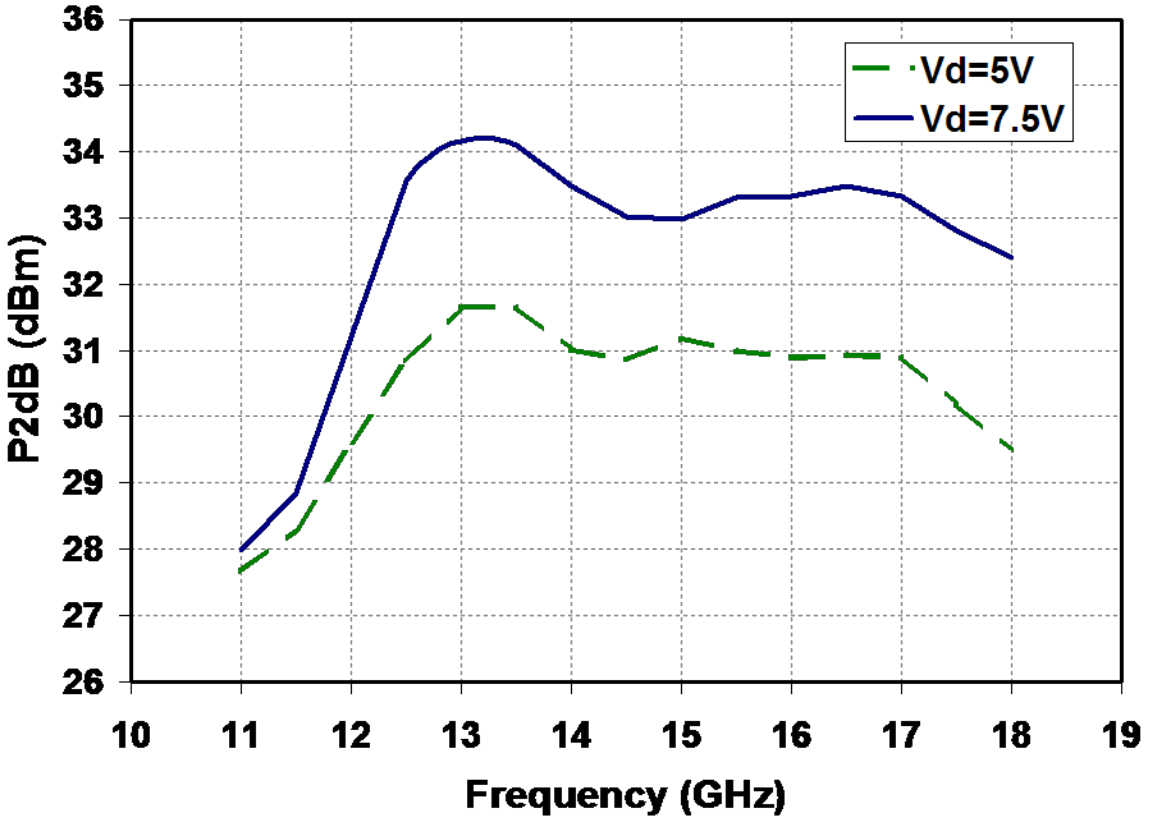
Typical Fixtured Performance
Idq=650mA





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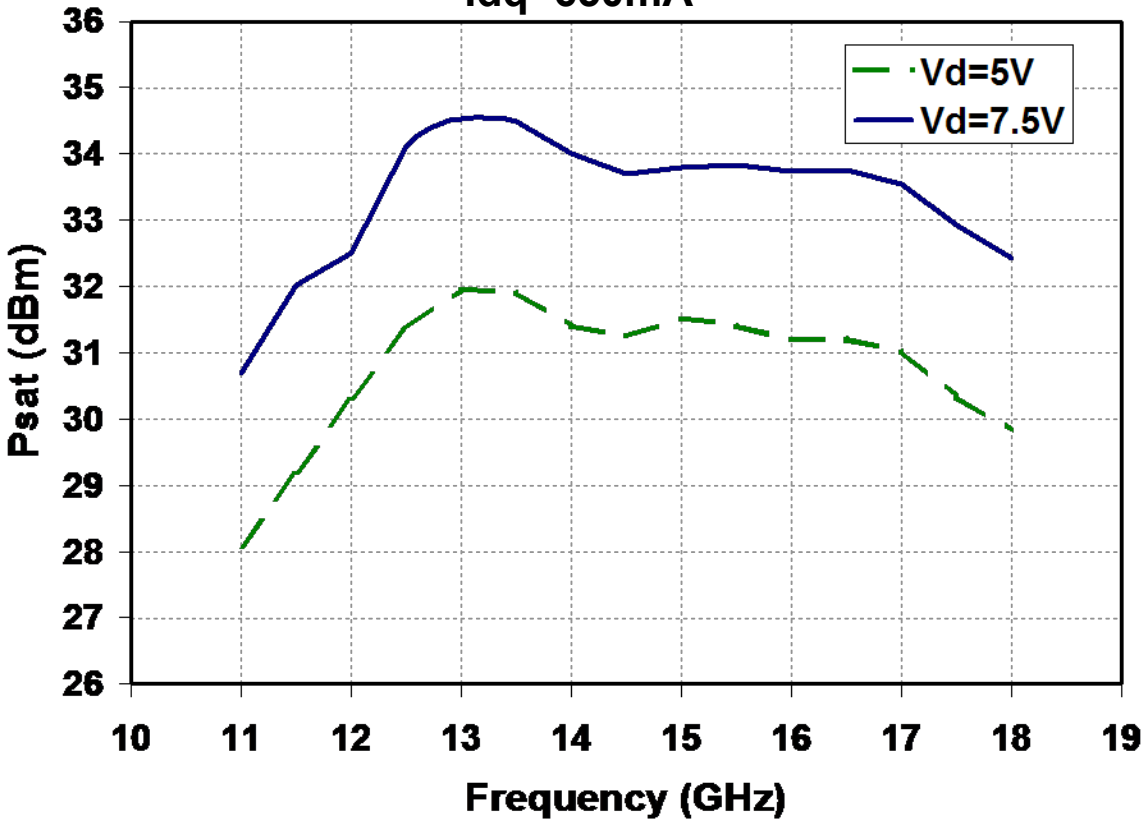
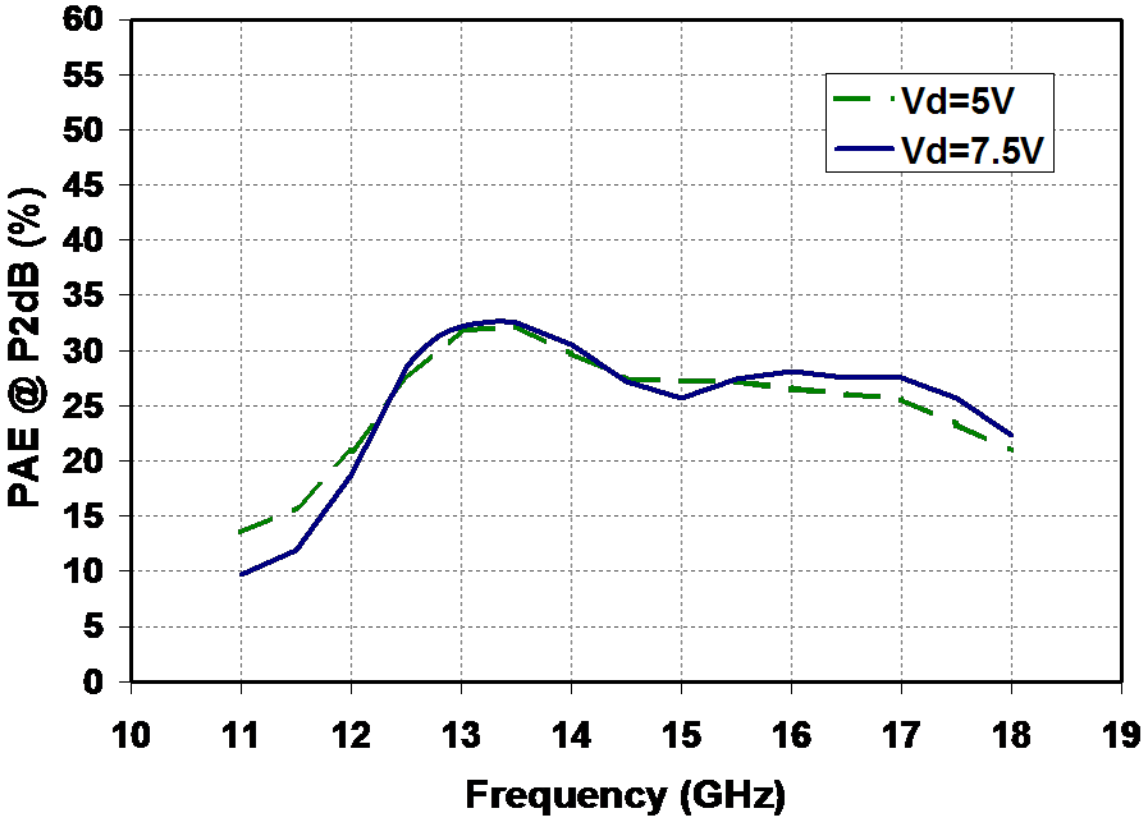
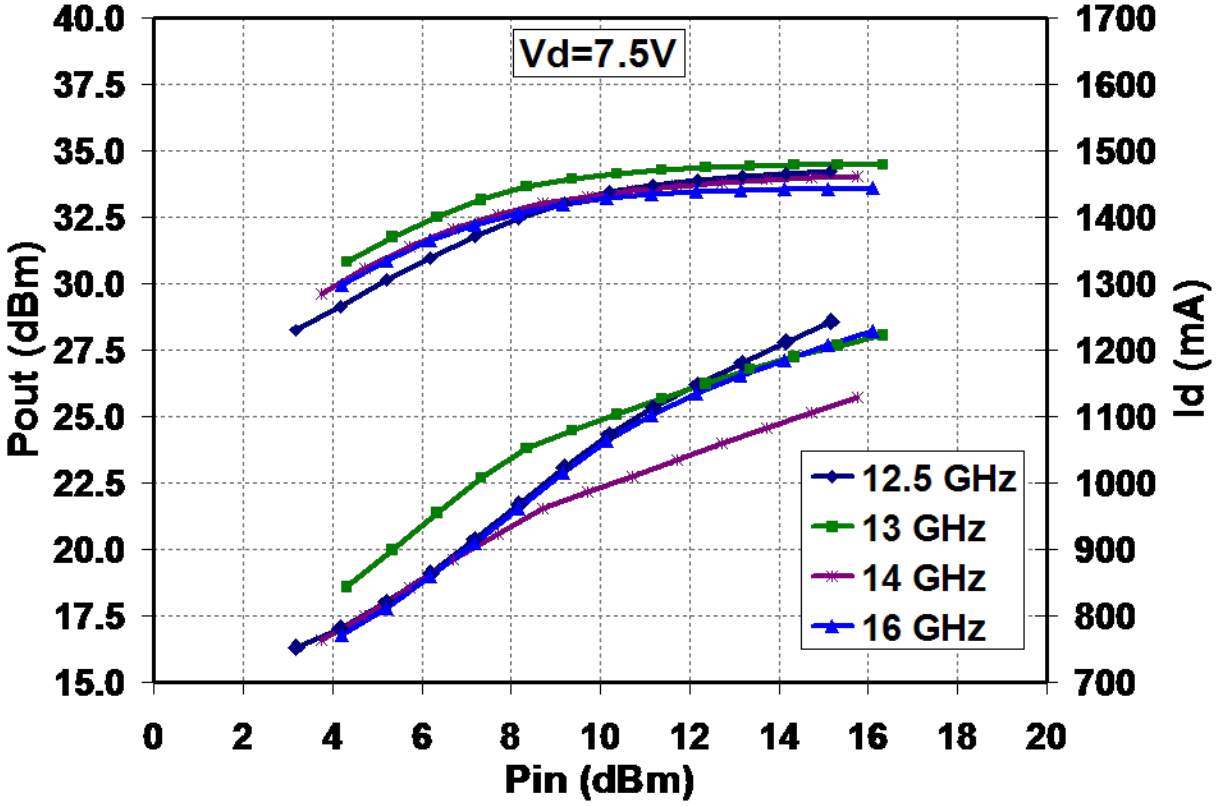
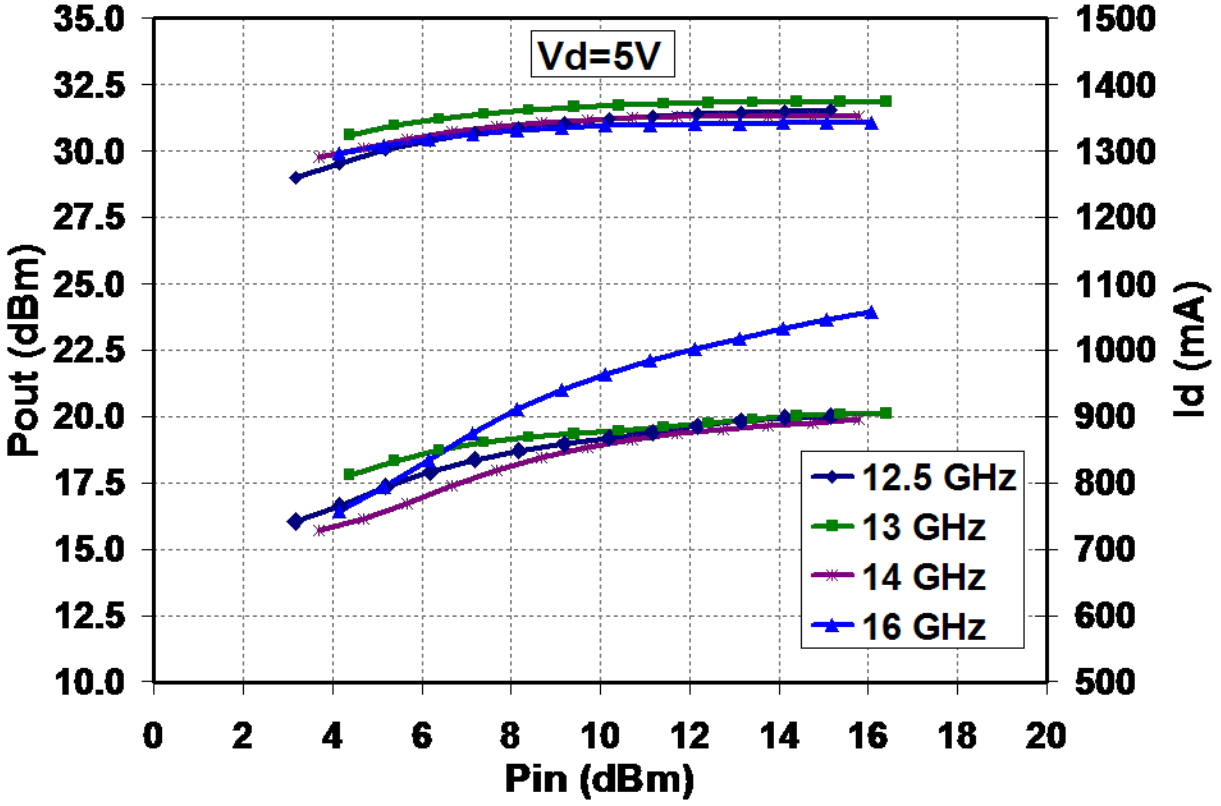
Typical Fixtured Performance
Idq=650mA





Typical Fixtured Performance
Idq=650mA





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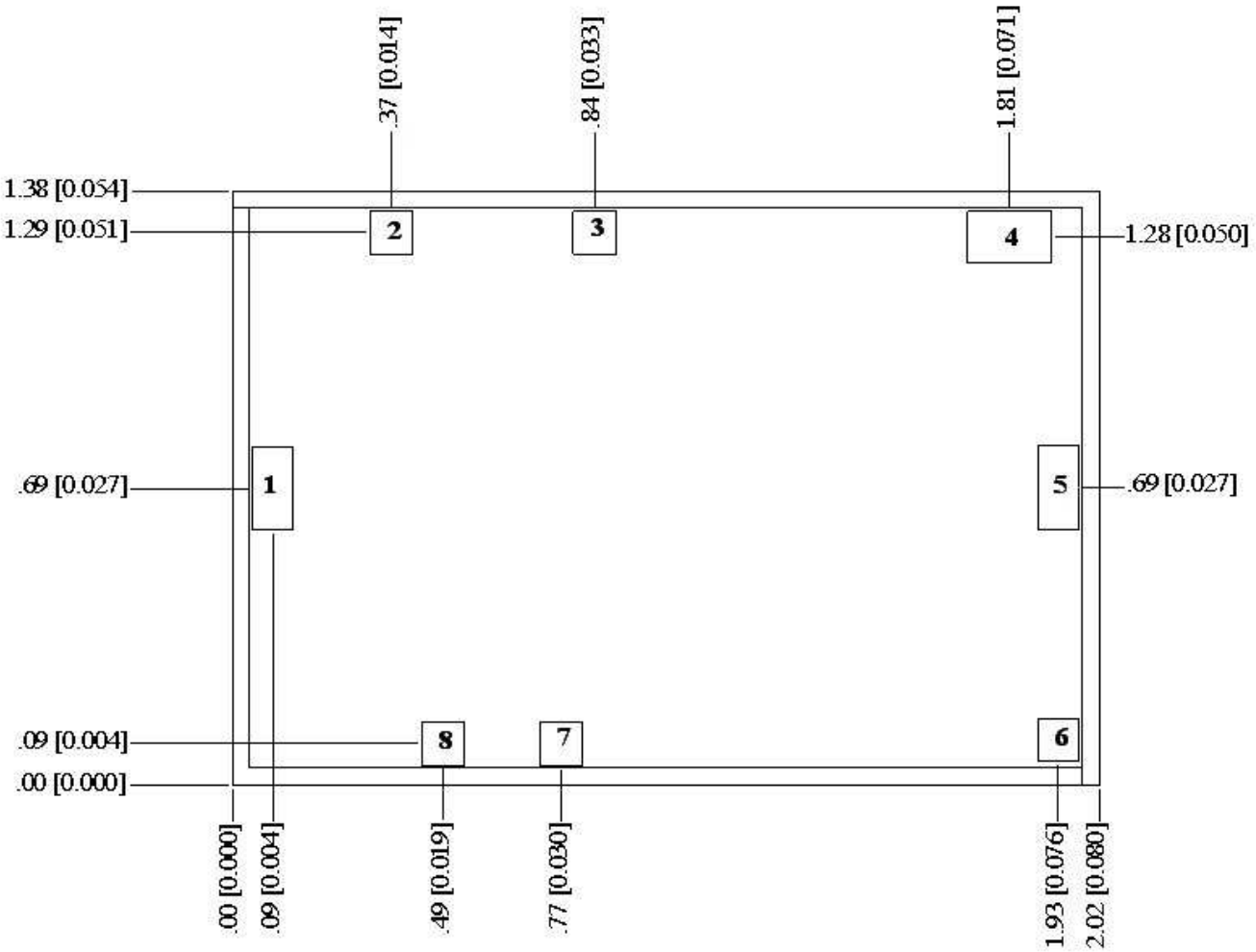
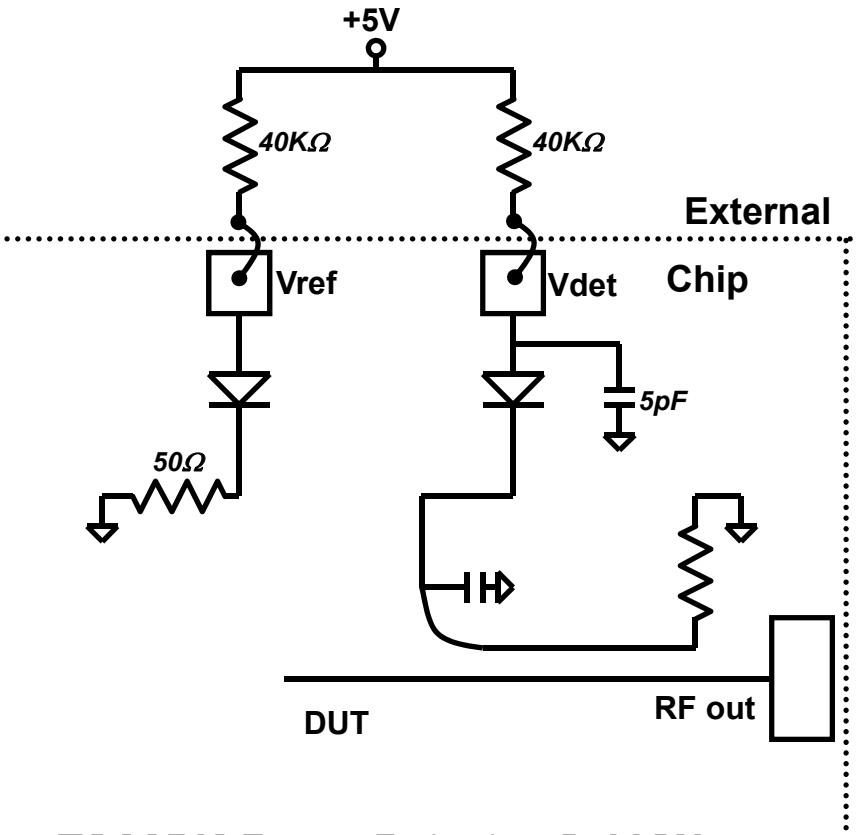
Mechanical Drawing

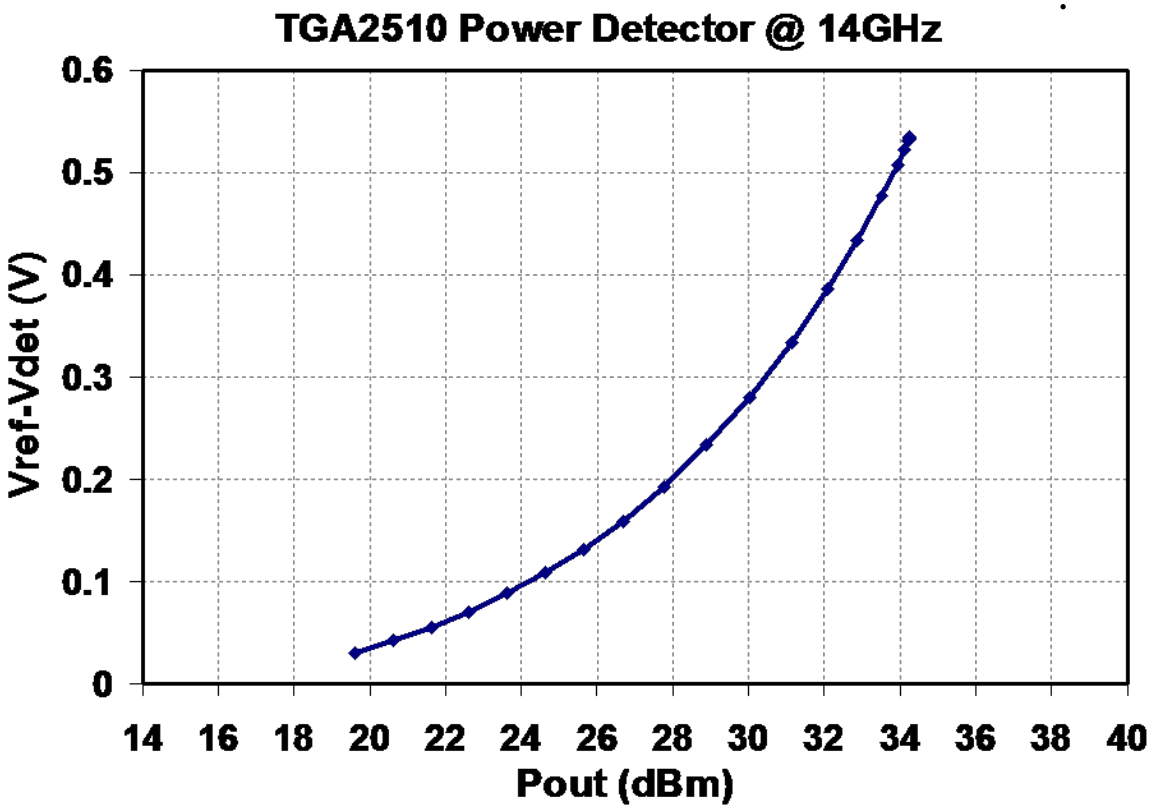


Units: millimeters [inches]
Thickness: 0.10 [0.004] (reference only)
Chip edge to bond pad dimensions are shown to center of bond pads.
Chip size tolerance: ±0.05 [0.002]
RF ground through backside

Bond Pad #1	RF Input	0.10 x 0.20	[0.004 x 0.008]
Bond Pad #2	Vref	0.10 x 0.10	[0.004 x 0.004]
Bond Pad #3	Vd3	0.10 x 0.20	[0.004 x 0.008]
Bond Pad #4	Vd4	0.20 x 0.13	[0.008 x 0.005]
Bond Pad #5	RF Output	0.10 x 0.20	[0.004 x 0.008]
Bond Pad #6	Vdet	0.10 x 0.10	[0.004 x 0.004]
Bond Pad #7	Vg4	0.10 x 0.10	[0.004 x 0.004]
Bond Pad #8	Vg3	0.10 x 0.10	[0.004 x 0.004]

Power Detector





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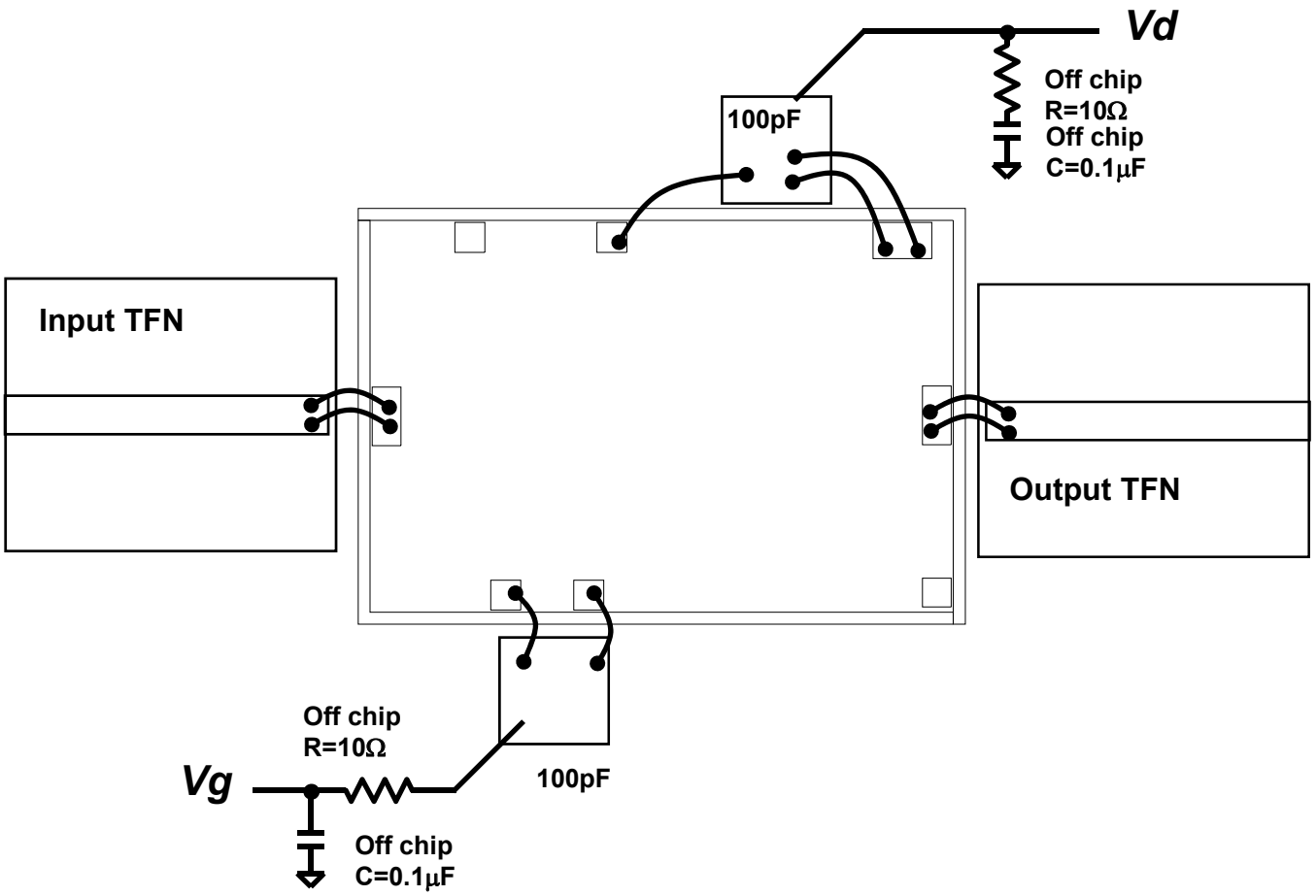
Chip Assembly & Bonding Diagram



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

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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. (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.
- Maximum stage temperature is 200°C.

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