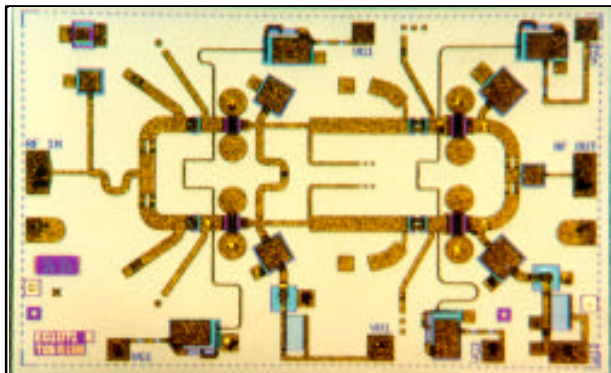


## 36 - 40 GHz Power Amplifier TGA1071-EPU



The TriQuint TGA1071-EPU is a two stage PA MMIC design using TriQuint's proven 0.25 um Power pHEMT process to support a variety of millimeter wave applications including point-to-point digital radio and point-to-multipoint systems.

The two-stage design consists of two 300 um input devices driving a pair of 400 um output devices.

The TGA1071 provides 22dBm of output power across 36-40 GHz with a typical small signal gain of 15dB.

The TGA1071 requires minimum off-chip components. Each device is 100% DC and RF tested on-wafer to ensure performance compliance. The device is available in chip form.

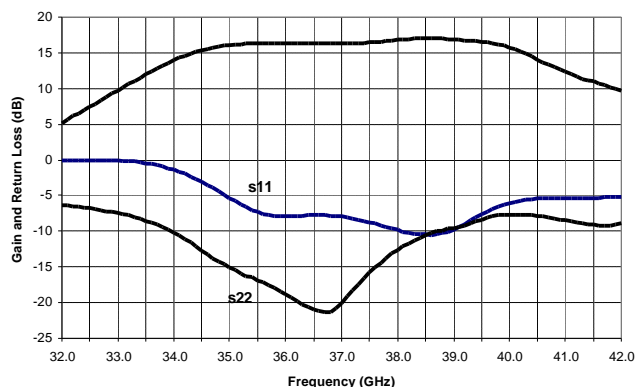
### Key Features and Performance

- 0.25um pHEMT Technology
- 36-40 GHz Frequency Range
- 22 dBm Nominal Pout @ P1dB
- 15 dB Nominal Gain
- 5V, 120 mA Bias
- Chip Dimensions 3.4mm x 2.1mm

### Primary Applications

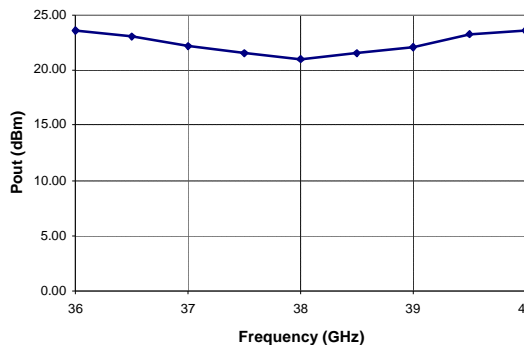
- Point-to-Point Radio
- Point-Multipoint Radio

TGA1071 Typical RF Performance (Fixtured)



Small Signal Gain

TGA1071 RF Probe Summary Data



Pout at 1dB Gain Compression

Note: Devices designated as EPU are typically early in their characterization process prior to finalizing all electrical and process specifications. Specifications subject to change without notice

## Electrical Characteristics

### RECOMMENDED MAXIMUM RATINGS

Symbol	Parameter	Value	Notes
V <sup>+</sup>	Positive Supply Voltage	7 V	
I <sup>+</sup>	Positive Supply Current	.4 A	<u>3/</u>
P <sub>D</sub>	Power Dissipation	2.8 W	
P <sub>IN</sub>	Input Continuous Wave Power	20 dBm	
T <sub>CH</sub>	Operating Channel Temperature	150 °C	<u>1/</u> , <u>2/</u>
T <sub>M</sub>	Mounting Temperature (30 seconds)	320 °C	
T <sub>STG</sub>	Storage Temperature	-65 °C to 150 °C	

- 1/ These ratings apply to each individual FET
- 2/ Junction operating temperature will directly affect the device mean time to failure (MTTF). For maximum life it is recommended that junction temperatures be maintained at the lowest possible levels.
- 3/ Total current for both stages

### DC PROBE TESTS (T<sub>A</sub> = 25 °C ± 5°C)

Symbol	Parameter	Minimum	Maximum	Value
I <sub>DSS</sub>	Saturated Drain Current (info only)	140	658	mA
V <sub>P1-5</sub>	Pinch-off Voltage	-1.5	-0.5	V
BV <sub>GS1</sub>	Breakdown Voltage gate-source	-30	-8	V
BV <sub>GDI-5</sub>	Breakdown Voltage gate-drain	-30	-8	V

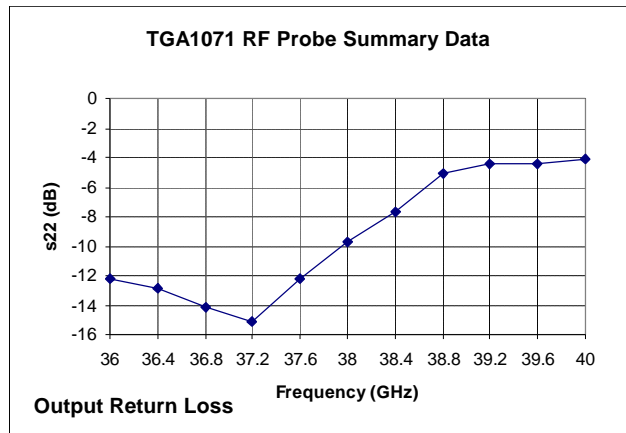
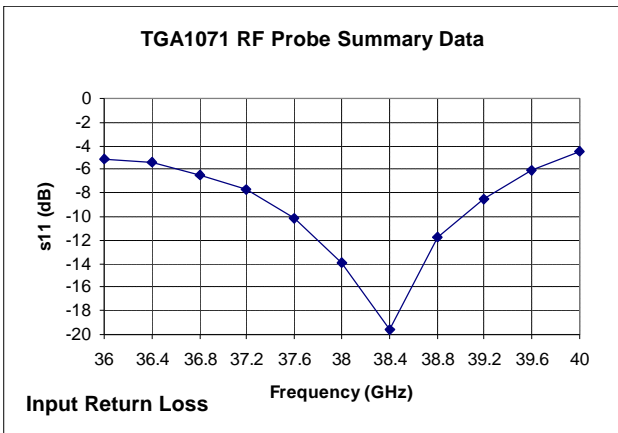
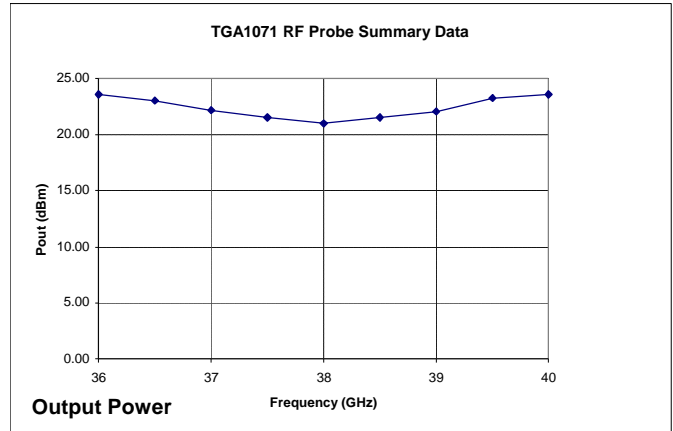
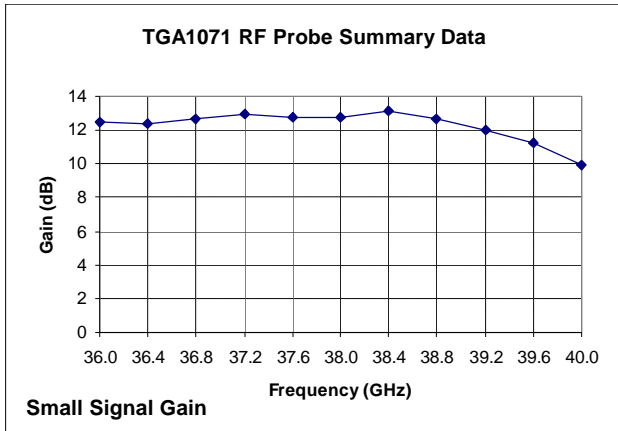
### ON-WAFER RF PROBE CHARACTERISTICS (T<sub>A</sub> = 25 °C ± 5°C)

Symbol	Parameter	Test Condition V <sub>d</sub> =5V, I <sub>d</sub> =120mA	Limit			Units
			Min	Nom	Max	
G <sub>p</sub>	Small-signal Power Gain	F = 36 to 40 GHz		15		dB
		F = 38 GHz	13			dB
						dB
IRL	Input Return Loss	F = 36 to 40 GHz	-	-10	-	dB
ORL	Output Return Loss	F = 36 to 40 GHz	-	-10	-	dB
PWR	Output Power	F = 36 to 40 GHz		22	-	dBm

Note: RF probe data is taken at 0.4 GHz steps

Note: Devices designated as EPU are typically early in their characterization process prior to finalizing all electrical and process specifications. Specifications are subject to change without notice.

## Statistical Performance Summary

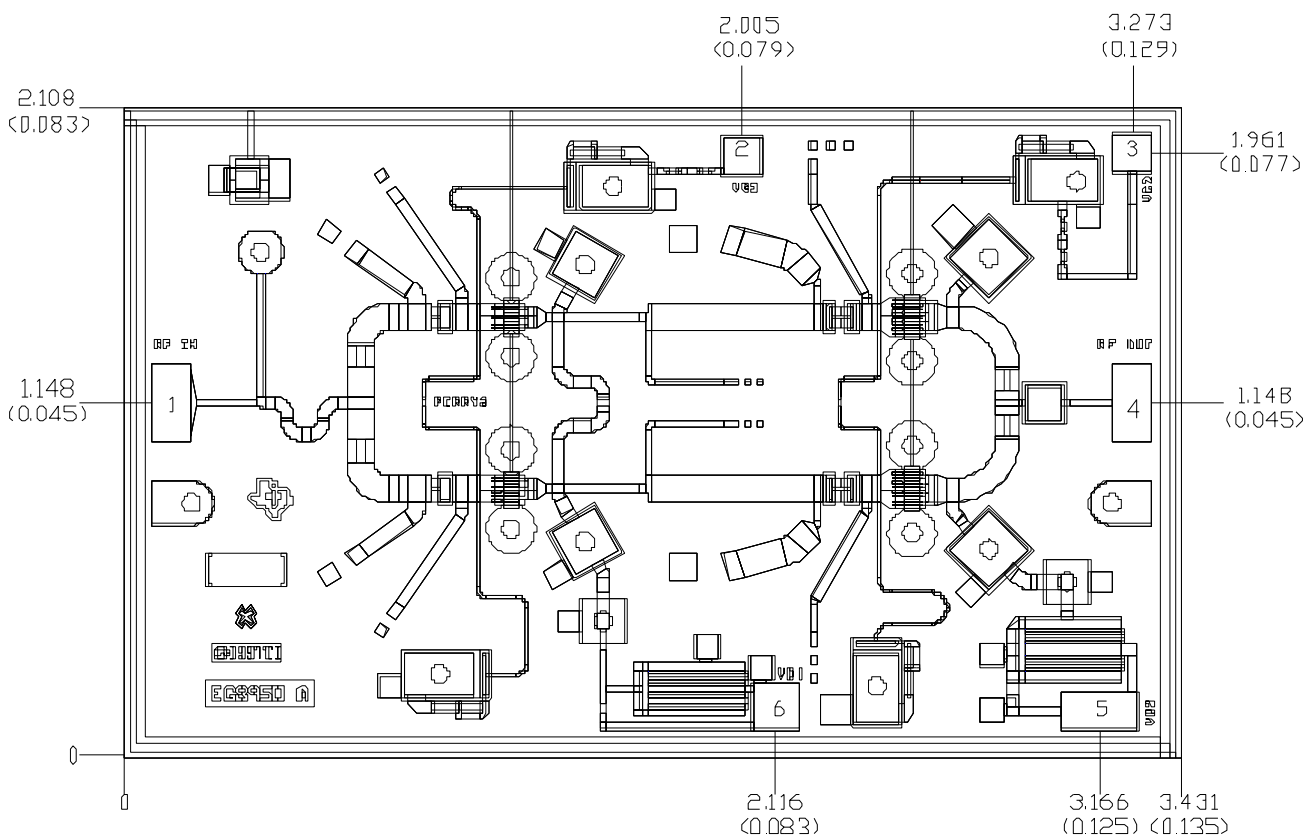


Freq (GHz)	S11 Mag	S11 Ang	S21 Mag	S21 Ang	S12 Mag	S12 Ang	S22 Mag	S22 Ang
36.0	0.593	88.8	5.060	-116.0	0.024	179.8	0.215	125.6
36.4	0.569	83.3	5.037	-136.2	0.030	163.2	0.210	122.5
36.8	0.508	75.6	5.174	-156.1	0.031	148.6	0.182	136.4
37.2	0.448	66.9	5.327	-172.3	0.035	133.6	0.159	151.4
37.6	0.328	59.0	5.142	170.3	0.036	119.4	0.228	170.4
38.0	0.191	48.8	5.109	151.1	0.036	106.1	0.293	180.0
38.4	0.086	-18.0	5.480	132.6	0.040	90.8	0.353	-175.6
38.8	0.202	-147.6	5.274	108.3	0.036	69.8	0.494	174.7
39.2	0.324	-159.9	4.896	88.1	0.032	55.1	0.554	166.0
39.6	0.460	-170.3	4.527	67.1	0.029	44.9	0.566	161.5
40.0	0.567	179.8	3.929	47.1	0.023	27.3	0.576	157.2

### Typical s-parameters

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**Mechanical Characteristics**



Units: millimeter (inches)

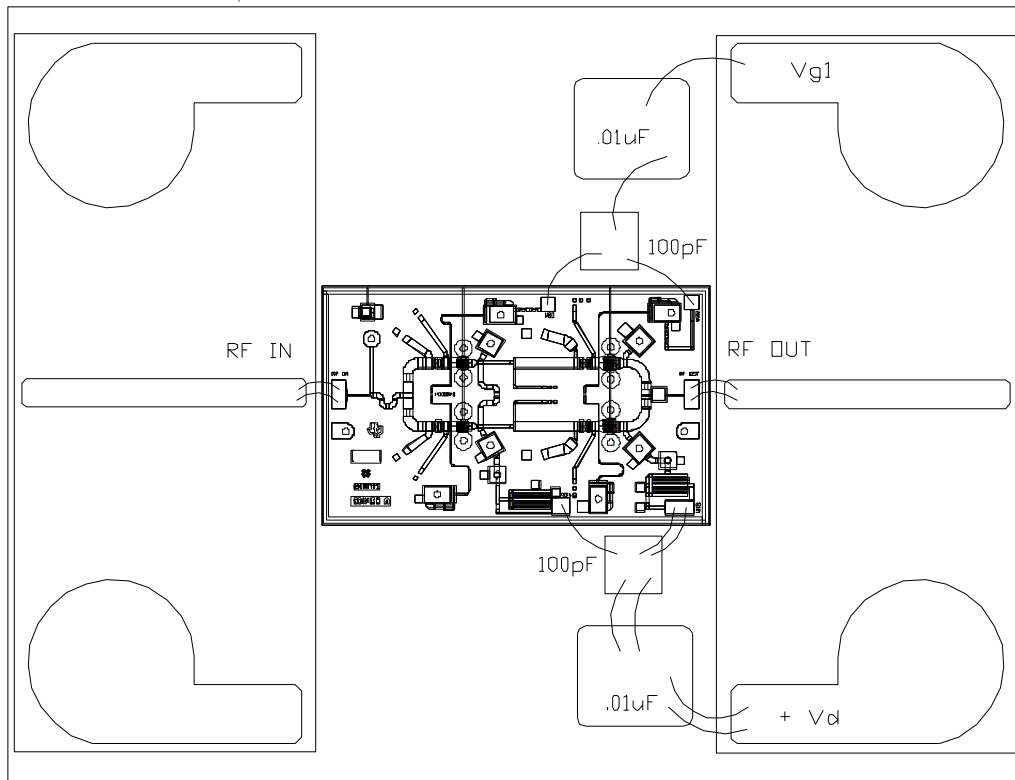
Thickness: 0.1016 (0.004) (reference only)

Chip edge to bond pad dimensions are shown to center of bond pad.

Chip size tolerance: +/- 0.0508 (0.002)

Bond Pad #1 (RF Input)	0.125 x 0.250	(0.005 x 0.010)
Bond Pad #2 (Vg1)	0.125 x 0.125	(0.005 x 0.005)
Bond Pad #3 (Vg2)	0.125 x 0.125	(0.005 x 0.005)
Bond Pad #4 (RF Output)	0.125 x 0.250	(0.005 x 0.010)
Bond Pad #5 (Vd2)	0.250 x 0.125	(0.010 x 0.005)
Bond Pad #6 (Vd1)	0.150 x 0.150	(0.006 x 0.006)

*Note: Devices designated as EPU are typically early in their characterization process prior to finalizing all electrical and process specifications. Specifications are subject to change without notice.*



Chip Assembly and Bonding Diagram

Reflow process assembly notes:

- AuSn (80/20) solder with limited exposure to temperatures at or above 300°C
- alloy station or conveyor furnace with reducing atmosphere
- no fluxes should be utilized
- coefficient of thermal expansion matching is critical for long-term reliability
- storage in dry nitrogen atmosphere

Component placement and adhesive attachment assembly notes:

- vacuum pencils and/or vacuum collets preferred method of pick up
- avoidance of air bridges during placement
- force impact 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: 200°C

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