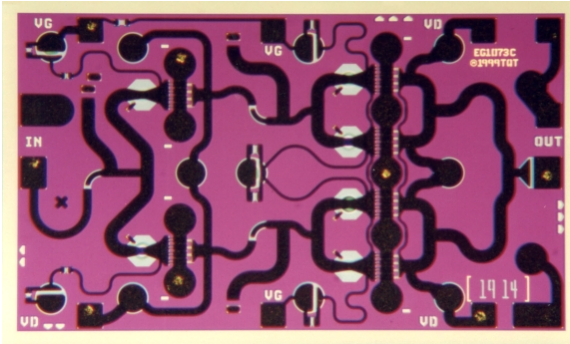


36 - 40 GHz Power Amplifier

TGA1073C-SCC



The TriQuint TGA1073C-SCC is a two stage PA MMIC design using TriQuint's proven 0.25 μ m 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 400 μ m input devices driving four 400 μ m output devices.

The TGA1073C provides 24 dBm of output power at 1dB gain compression and 26 dBm saturated output power across the 36-40 GHz with a typical small signal gain of 15 dB.

The TGA1073C requires a minimum of 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

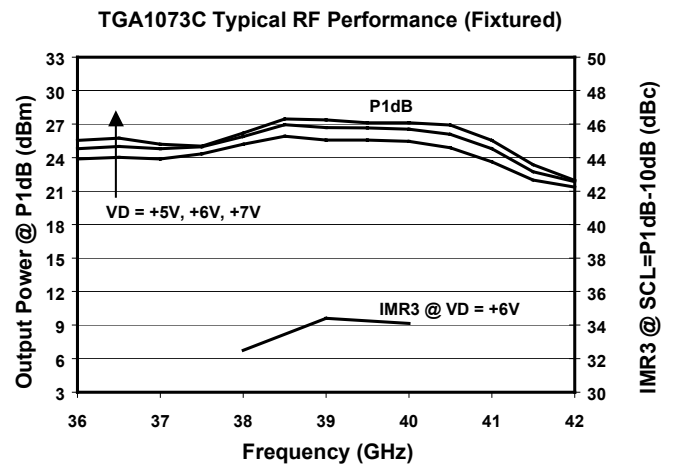
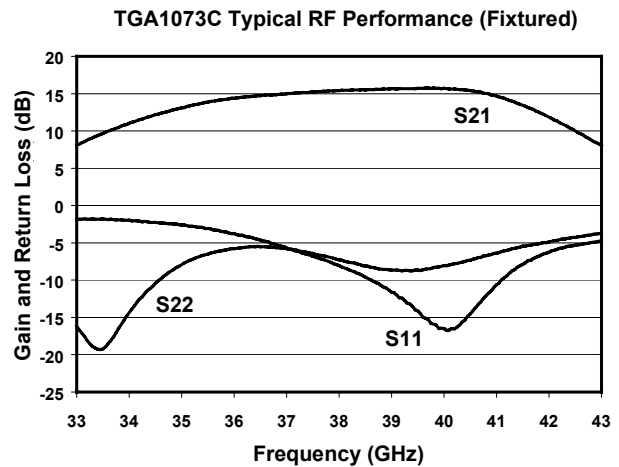
- 0.25 μ m pHEMT Technology
- 36-40 GHz Frequency Range
- 26 dBm Nominal Pout @ P1dB, 38GHz
- 15 dB Nominal Gain
- Bias 5-7V @ 240 mA
- Chip Dimensions 2.4 mm x 1.45 mm

Primary Applications

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

Typical Performance, 36-40 GHz

Parameter	Unit	+5V Supply	+6V Supply	+7V Supply
Small Signal Gain	dB		15	
Gain Flatness	dBpp		1	
Output P1dB	dBm	24	25	26
Saturated Output Power	dBm	26	27	28
Saturated PAE	%	23	22	20
Output OTOI	dBm		34	
IMR3 @ SCL = P1dB - 10dB	dBc		34	
Input Return Loss	dB		-10	
Output Return Loss	dB		-8	
Reverse Isolation	dB		-35	
Quiescent Current	mA	225	240	260



MAXIMUM RATINGS

SYMBOL	PARAMETER <u>5/</u>	VALUE	NOTES
V ⁺	POSITIVE SUPPLY VOLTAGE	8 V	
I ⁺	POSITIVE SUPPLY CURRENT	480 mA	<u>1/</u>
P _{IN}	INPUT CONTINUOUS WAVE POWER	23 dBm	<u>4/</u>
P _D	POWER DISSIPATION	3.84 W	
T _{CH}	OPERATING CHANNEL TEMPERATURE	150 °C	<u>2/ 3/</u>
T _M	MOUNTING TEMPERATURE (30 SECONDS)	320 °C	
T _{STG}	STORAGE TEMPERATURE	-65 to 150 °C	

- 1/ Total current for all stages.
- 2/ These ratings apply to each individual FET.
- 3/ 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.
- 4/ This value reflects an estimate. Actual value will be inserted as soon as it is determined.
- 5/ These ratings represent the maximum operable values for this device.

 DC SPECIFICATIONS (100%)
 (T_A = 25 °C ± 5 °C)

NOTES	SYMBOL	TEST CONDITIONS <u>2/</u>	LIMITS		UNITS
			MIN	MAX	
	I _{DSS1}	STD	40	188	mA
	G _{M1}	STD	88	212	mS
<u>1/</u>	V _{P1}	STD	0.5	1.5	V
<u>1/</u>	V _{P2}	STD	0.5	1.5	V
<u>1/</u>	V _{P3-6}	STD	0.5	1.5	V
<u>1/</u>	V _{BVGD1,2}	STD	11	30	V
<u>1/</u>	V _{BVGS1}	STD	11	30	V

- 1/ V_P, V_{BVGD}, and V_{BVGS} are negative.
- 2/ The measurement conditions are subject to change at the manufacture's discretion (with appropriate notification to the buyer).

RF SPECIFICATIONS

(T_A = 25°C ± 5°C)

NOTE	TEST	MEASUREMENT CONDITIONS 6V @ 240mA	VALUE			UNITS
			MIN	TYP	MAX	
1/	SMALL-SIGNAL GAIN MAGNITUDE	36 – 39 GHz	12	15		dB
		40 GHz	9	14		dB
	POWER OUTPUT AT 1 dB GAIN COMPRESSION	37 GHz	23	26		dBm
		38.5 GHz	23	26		dBm
		40 GHz	21	25		dBm
1/	INPUT RETURN LOSS MAGNITUDE	36 – 40 GHz		-10		dB
1/	OUTPUT RETURN LOSS MAGNITUDE	36 – 40 GHz		-8		dB
	OUTPUT THIRD ORDER INTERCEPT			33		dBm

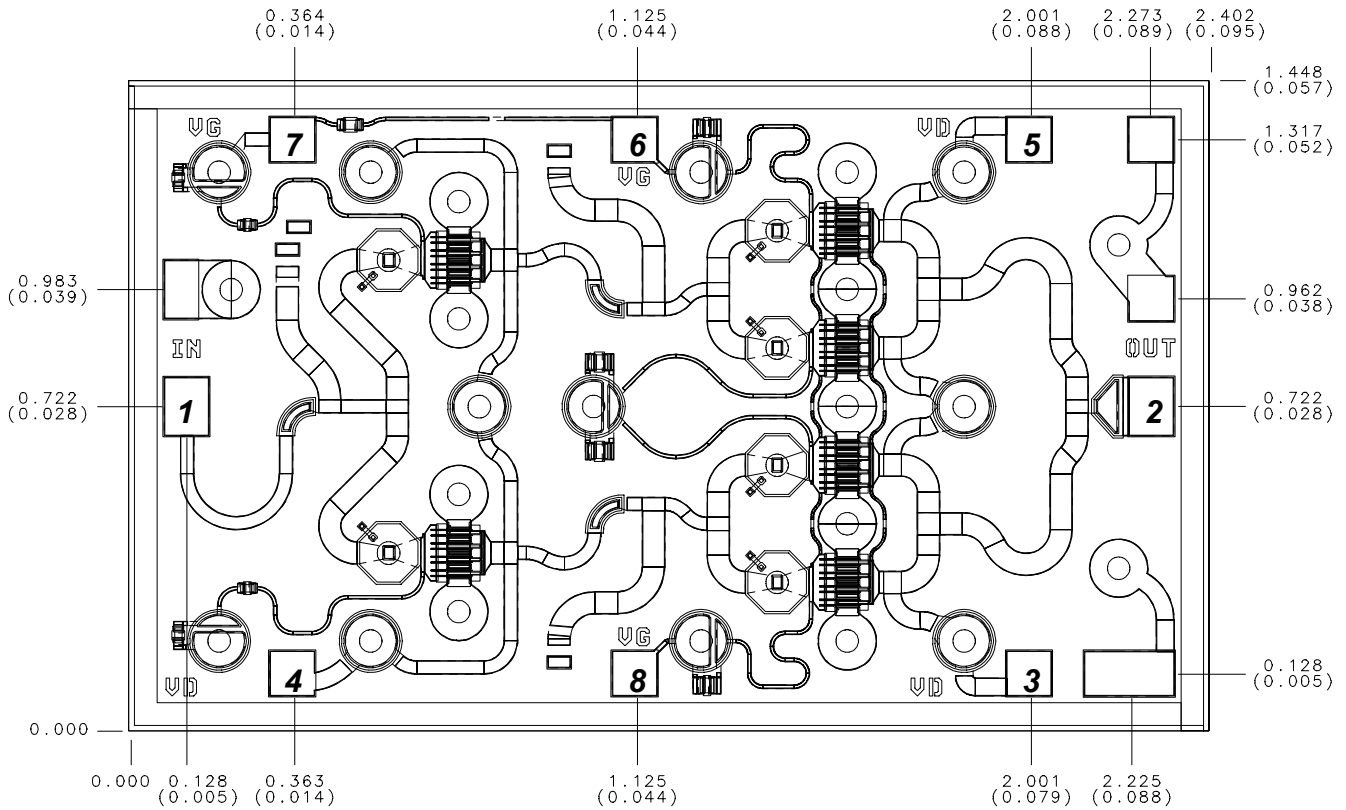
1/ RF probe data is taken at 1 GHz steps.

RELIABILITY DATA

PARAMETER	BIAS CONDITIONS		P _{DISS} (W)	R _{θJC} (C/W)	T _{CH} (°C)	T _M (HRS)
	V _D (V)	I _D (mA)				
R _{θJC} Thermal resistance (channel to backside of c/p)	6	240	1.44	32.43	116.7	2.1 E7

Note: Assumes eutectic attach using 1.5 mil thick 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.

Mechanical Characteristics



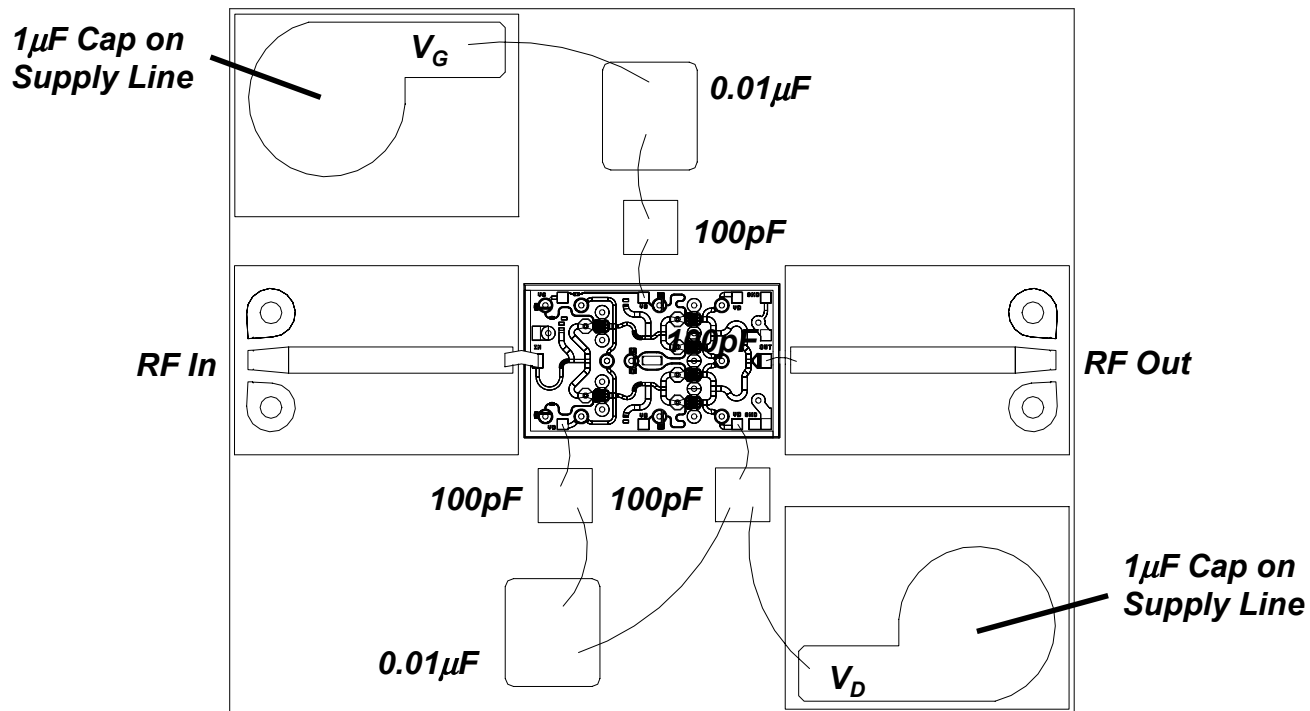
Units: millimeters (inches)

Thickness: 0.1016 (0.004)

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)	0.100 x 0.130 (0.004 x .005)
Bond Pad #2	(RF Output)	0.100 x 0.130 (0.004 x .005)
Bond Pads #3, 4, 5	(VD)	0.100 x 0.100 (0.004 x .004)
Bond Pads #6, 7, 8	(VG)	0.100 x 0.100 (0.004 x .004)



Chip Assembly and Bonding Diagram

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

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

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