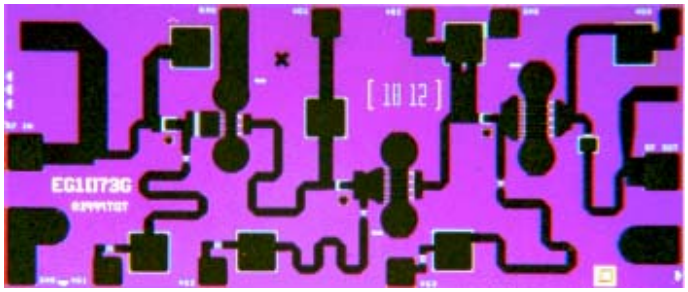
19 - 27 GHz Medium Power Amplifier TGA1073G-SCC



Key Features and Performance

- 0.25 um pHEMT Technology
- 22 dB Nominal Gain
- 25 dBm Nominal Pout @ P1dB
- Bias 5-7V @ 220 mA
- Chip Dimensions 2.55 mm x 1.15mm

Primary Applications

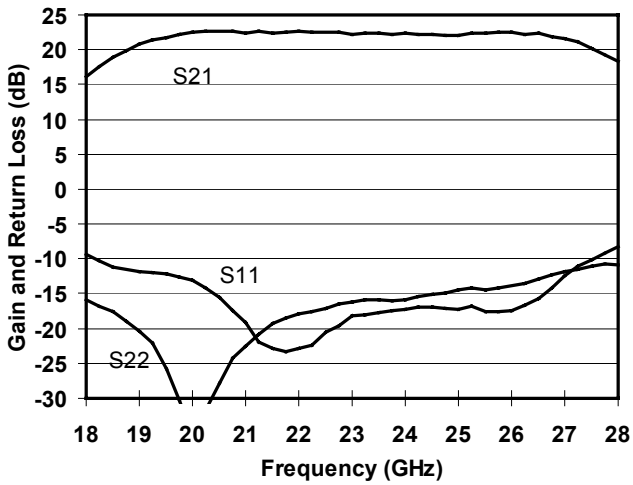
- Point-to-Point Radio
- Point-to-Multipoint Communications

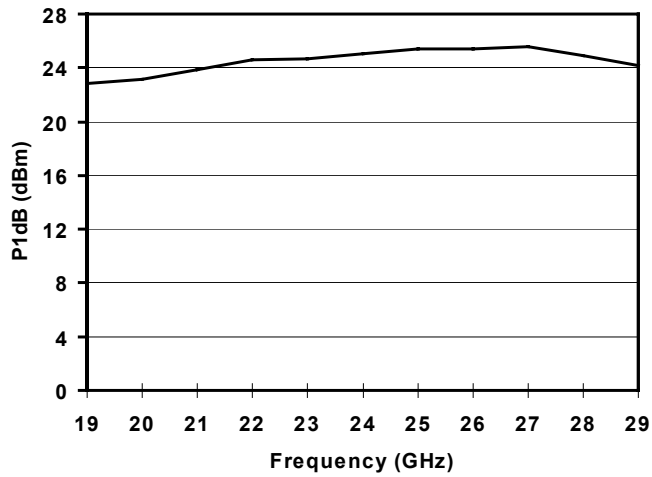
The TriQuint TGA1073G-SCC is a three stage MPA MMIC design using TriQuint's proven 0.25 um Power pHEMT process. The TGA1073G-SCC is designed to support a variety of millimeter wave applications including point-to-point digital radio and point-to-multipoint communications.

The three stage design consists of a 200 um input device driving a 480um interstage device followed by an 800um output device.

The TGA1073G-SCC provides 25dBm nominal output power at 1dB compression across 19-27GHz. Typical small signal gain is 22 dB.

The TGA1073G-SCC 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.





MAXIMUM RATINGS 1/

SYMBOL	PARAMETER	VALUE	NOTES
V^+	POSITIVE SUPPLY VOLTAGE	8 V	2/
I^+	POSSITIVE SUPPLY CURRENT	296 mA	2/ 3/
I^-	NEGATIVE GATE CURRENT	8.8 mA	3/
P_{IN}	INPUT CONTINUOUS WAVE POWER	18.2 dBm	2/
P_D	POWER DISSIPATION	1.32 W	2/ 4/
T_{CH}	OPERATING CHANNEL TEMPERATURE	150 ^{0}C	5/ 6/
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.

3/ Total current for all stages.

4/ When operated at this bias condition with a base plate temperature of 55 ^{0}C, the Mean Time To Failure (MTTF) is 1E+6 hrs.

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

6/ These ratings apply to each individual FET.

DC SPECIFICATIONS (100%)
(T_A = 25 °C Nominal)

NOTES	SYMBOL	TEST CONDITIONS 2/	LIMITS		UNITS
			MIN	MAX	
	I_{DSS3}	STD	80	376	mA
	G_{M3}	STD	176	424	mS
1/	$\|V_{P1}\|$	STD	0.5	1.5	V
1/	$\|V_{P2}\|$	STD	0.5	1.5	V
1/	$\|V_{P3}\|$	STD	0.5	1.5	V
1/	$\|V_{BVGD1}\|$	STD	11	30	V
1/	$\|V_{BVGS1}\|$	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 Nominal)

NOTE	TEST	MEASUREMENT CONDITIONS 6V @ 220mA	VALUE			UNITS
			MIN	TYP	MAX	
1/	SMALL-SIGNAL GAIN MAGNITUDE	19 GHz	16	20		dB
		20 – 25 GHz	19	23		dB
	POWER OUTPUT AT 1 dB GAIN COMPRESSION	20 GHz	21	23		dBm
		22 GHz	24	25		dBm
		23.5 GHz	24	26		dBm
1/	INPUT RETURN LOSS MAGNITUDE	19 – 25 GHz		-20		dB
1/	OUTPUT RETURN LOSS MAGNITUDE	19 – 25 GHz		-15		dB
2/	OUTPUT THIRD ORDER INTERCEPT			32		dBm

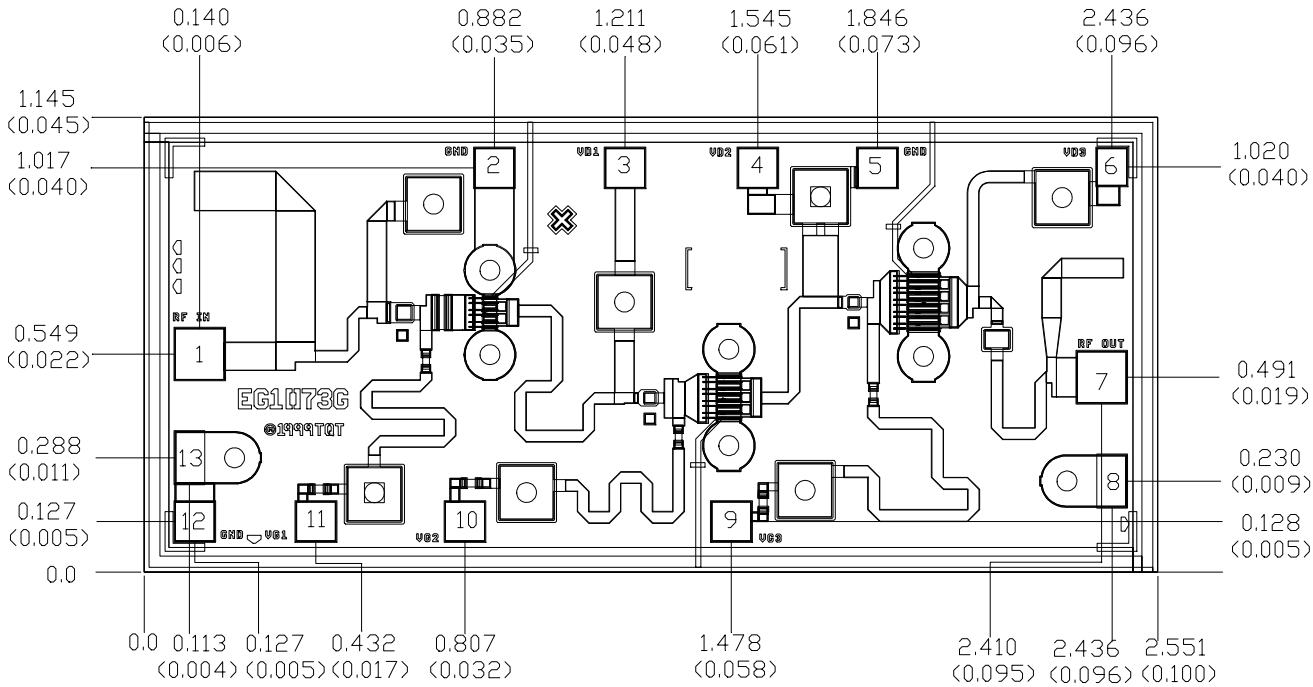
1/ RF probe data is taken at 1 GHz steps.
2/ Minimum output third-order-intercept (OTOI) is generally 6dB minimum above the 1dB compression point (P1dB). Calculations are based on standard two-tone testing with each tone approximately 10dB below the nominal P1dB. Factors that may affect OTOI performance include device bias, measurement frequency, operating temperature, output interface and output power level for each tone.

RELIABILITY DATA

PARAMETER	BIAS CONDITIONS		P_{DISS} (W)	$R_{\theta JC}$ (C/W)	T_{CH} (°C)	T_M (HRS)
	V_D (V)	I_D (mA)				
$R_{\theta JC}$ Thermal resistance (channel to backside of c/p)	6	220	1.32	71.7	149.6	1.0 E6

Note: Assumes eutectic attach using 1.5 mil 80/20 AuSn mounted to a 20mil CuMo Carrier at 55°C baseplate temperature. Worst case condition with no RF applied, 100% of DC power is dissipated.

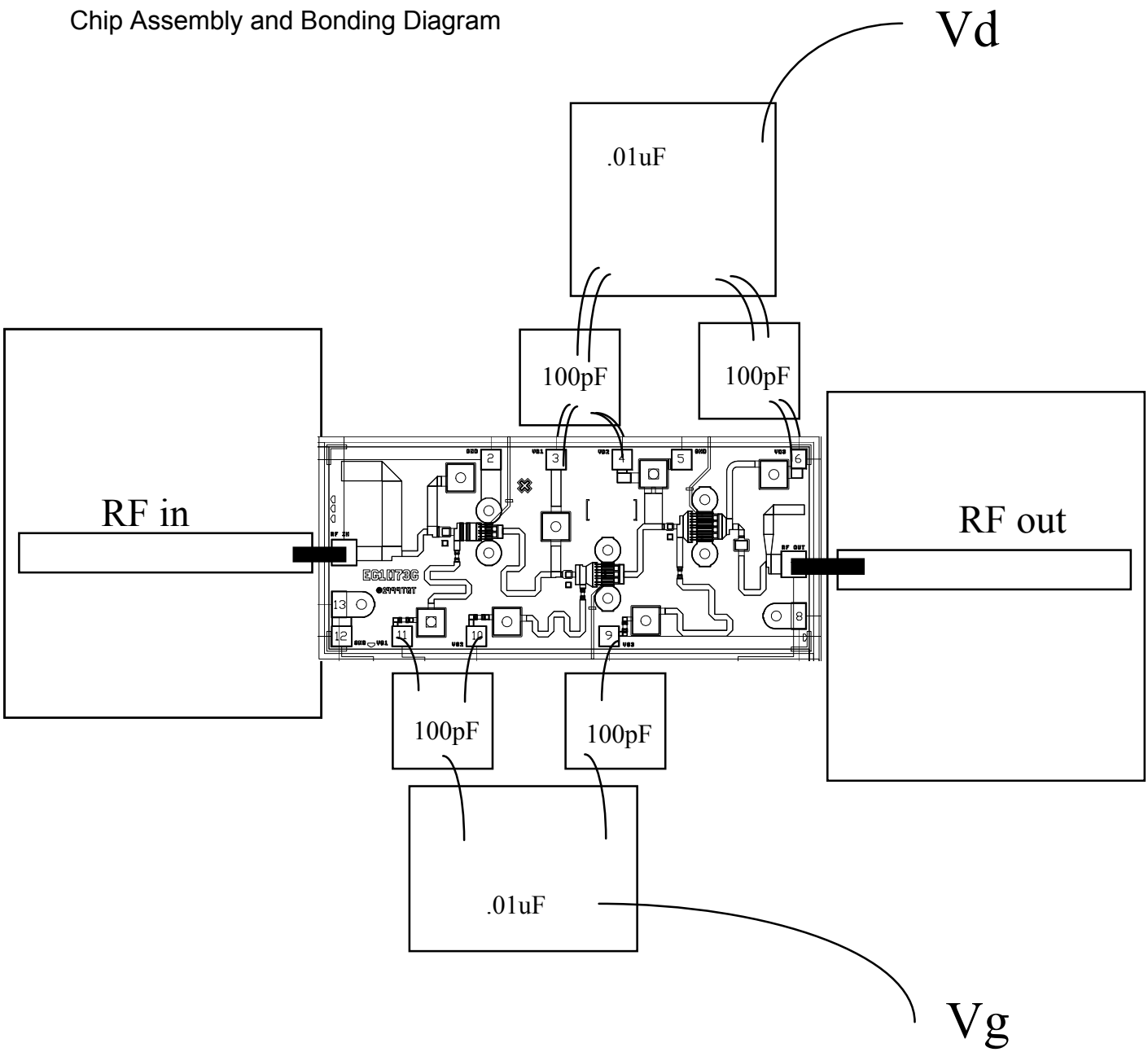
Mechanical Characteristics



Units: millimeters (inches)
Thickness: 0.1016 (0.004)
Chip edge to bond pad dimensions are shown to center of bond pad
Chip size tolerance: +/- 0.051 (0.002)

Bond Pad #1 (RF Input)	0.130 x 0.135 (0.005 x 0.005)
Bond Pad #2 (GND)	0.105 x 0.105 (0.004 x 0.004)
Bond Pad #3 (VD1)	0.105 x 0.105 (0.004 x 0.004)
Bond Pad #4 (VD2)	0.105 x 0.105 (0.004 x 0.004)
Bond Pad #5 (GND)	0.105 x 0.105 (0.004 x 0.004)
Biond Pad #6 (VD3)	0.081 x 0.100 (0.003 x 0.004)
Bond Pad #7 (RF Output)	0.130 x 0.135 (0.005 x 0.005)
Bond Pad #8 (GND)	0.078 x 0.136 (0.003 x 0.005)
Bond Pad #9 (VG3)	0.105 x 0.105 (0.004 x 0.004)
Bond Pad #10 (VG2)	0.105 x 0.105 (0.004 x 0.004)
Bond Pad #11 (VG1)	0.105 x 0.105 (0.004 x 0.004)
Bond Pad #12 (GND)	0.105 x 0.105 (0.004 x 0.004)
Bond Pad #13 (GND)	0.105 x 0.105 (0.004 x 0.004)

Chip Assembly and Bonding Diagram



Assembly Process Notes

Reflow process assembly notes:

- Use AuSn (80/20) solder with limited exposure to temperatures at or above 300°C (30 seconds 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.
- Maximum stage temperature is 200°C.

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