

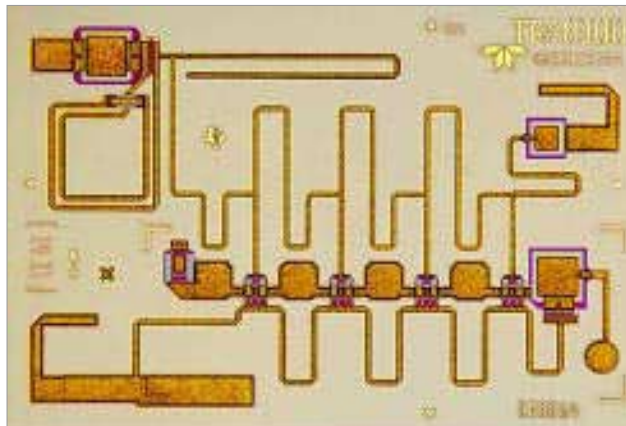
TGA8300-SCC

Gain Block Amplifier

8300

- **2 to 18 GHz Frequency Range**
- **20-dBm Typical Output Power at 1-dB Gain Compression**
- **7.5-dB Typical Gain**
- **Input/Output SWR 1.5:1**
- **On-Chip Blocking Capacitor Allows Easy Cascading**
- **2,362 x 1,625 x 0,152 mm (0.093 x 0.064 x 0.006 in.)**

PHOTO ENLARGEMENT

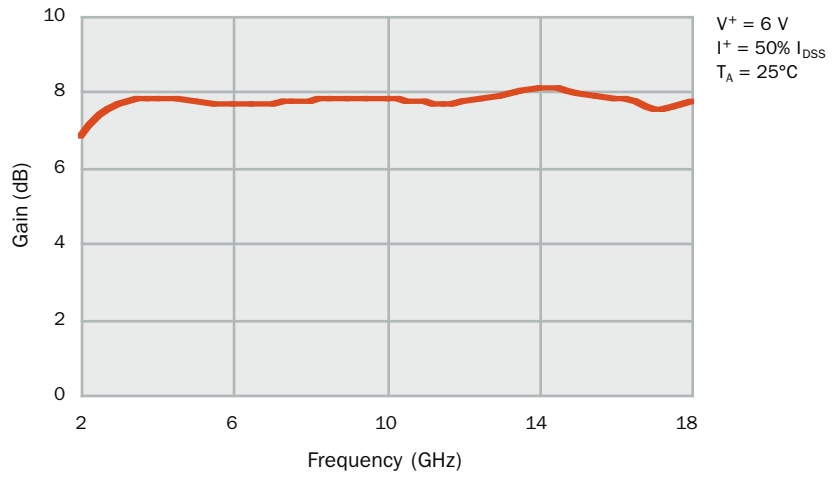


DESCRIPTION

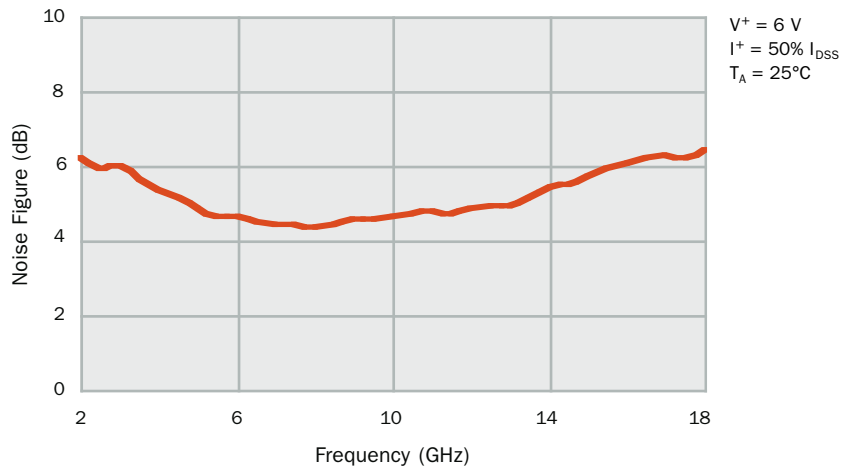
The TriQuint TGA8300 - SCC is a GaAs monolithic distributed amplifier designed for use as a multioctave general - purpose gain block. Four 189 - μm gate width FETs provide 7.5 dB nominal gain and 5.5-dB noise figure from 2 to 18- GHz. Typical power output is 20 - dBm at 1-dB gain compression. Typical input and output SWRs are 1.5:1. Ground is provided to the circuitry through vias to the backside metallization.

The TGA8300 - SCC is supplied in chip form and is engineered for high -volume automated assembly . All metal surfaces are gold plated to be compatible with thermocompression and thermosonic wire-bonding processes.

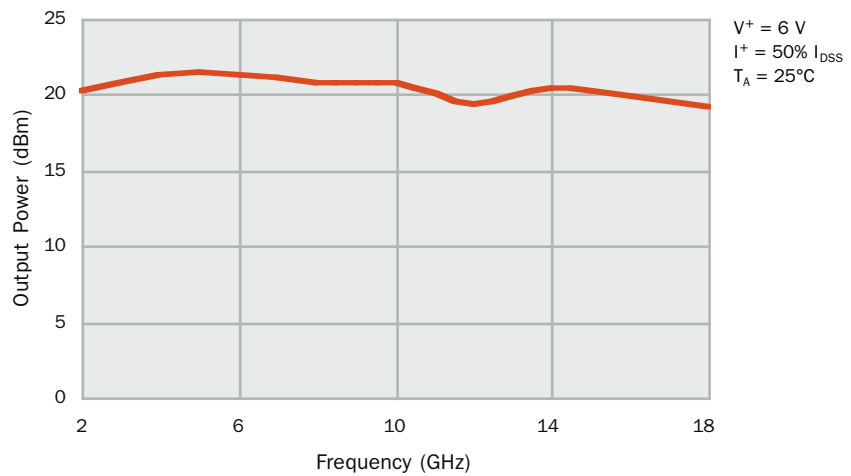
**TYPICAL
SMALL-SIGNAL
POWER GAIN**



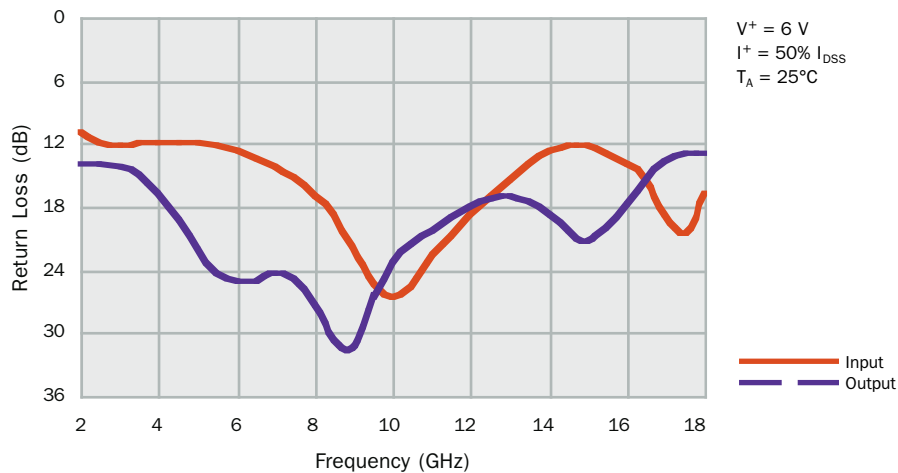
**TYPICAL
NOISE FIGURE**



**TYPICAL
OUTPUT POWER
P_{1dB}**



**TYPICAL
RETURN LOSS**



**ABSOLUTE
MAXIMUM RATINGS**

| | |
|--|--------------|
| Positive supply voltage, V ⁺ | 8 V |
| Negative supply voltage range, V ⁻ | 0 V to -5 V |
| Power dissipation, P _D at (or below) 25 C base-plate temperature* | 1.8 W |
| Operating channel temperature, T _{CH} ** | 150 C |
| Mounting temperature (30 sec), T _M | 320 C |
| Storage temperature range, T _{STG} | -65 to 150 C |

Ratings over operating channel temperature range, T_{CH} (unless otherwise noted)

Stresses beyond those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under “RF Characteristics” is not implied. Exposure to absolute maximum rated conditions for extended periods may affect device reliability.

* For operation above 25 C base-plate temperature, derate linearly at the rate of 3.8 mW/ C.

**Operating channel temperature directly affects the device MTTF . For maximum life, it is recommended that channel temperature be maintained at the lowest possible level.

TYPICAL S-PARAMETERS

| Frequency (GHz) | S ₁₁ | | S ₂₁ | | S ₁₂ | | S ₂₂ | | GAIN (dB) |
|--------------------|-----------------|---------|-----------------|---------|-----------------|---------|-----------------|---------|--------------|
| | MAG | ANG (°) | MAG | ANG (°) | MAG | ANG (°) | MAG | ANG (°) | |
| 1.0 | 0.40 | 4 | 2.32 | -146 | 0.017 | -163 | 0.52 | -110 | 7.3 |
| 1.5 | 0.40 | -151 | 2.00 | 167 | 0.015 | 97 | 0.32 | -172 | 6.0 |
| 2.0 | 0.28 | 180 | 2.20 | 155 | 0.017 | 91 | 0.20 | 109 | 6.8 |
| 2.5 | 0.26 | 167 | 2.34 | 137 | 0.022 | 75 | 0.20 | 56 | 7.4 |
| 3.0 | 0.25 | 158 | 2.41 | 121 | 0.027 | 59 | 0.20 | 27 | 7.6 |
| 3.5 | 0.25 | 151 | 2.45 | 105 | 0.031 | 40 | 0.18 | 10 | 7.8 |
| 4.0 | 0.25 | 143 | 2.46 | 89 | 0.033 | 25 | 0.15 | -2 | 7.8 |
| 4.5 | 0.25 | 137 | 2.45 | 74 | 0.037 | 12 | 0.11 | -10 | 7.8 |
| 5.0 | 0.25 | 132 | 2.44 | 60 | 0.040 | -3 | 0.08 | -13 | 7.7 |
| 5.5 | 0.24 | 127 | 2.42 | 46 | 0.043 | -17 | 0.06 | -11 | 7.7 |
| 6.0 | 0.23 | 122 | 2.42 | 32 | 0.045 | -31 | 0.06 | -9 | 7.7 |
| 6.5 | 0.21 | 116 | 2.41 | 19 | 0.048 | -45 | 0.06 | -10 | 7.6 |
| 7.0 | 0.19 | 112 | 2.43 | 5 | 0.051 | -58 | 0.06 | -16 | 7.7 |
| 7.5 | 0.17 | 106 | 2.45 | -8 | 0.054 | -72 | 0.06 | -30 | 7.8 |
| 8.0 | 0.14 | 101 | 2.45 | -22 | 0.058 | -86 | 0.04 | -44 | 7.8 |
| 8.5 | 0.11 | 97 | 2.45 | -36 | 0.062 | -100 | 0.03 | -81 | 7.8 |
| 9.0 | 0.08 | 95 | 2.46 | -50 | 0.066 | -113 | 0.03 | -143 | 7.8 |
| 9.5 | 0.05 | 105 | 2.47 | -64 | 0.070 | -126 | 0.05 | 174 | 7.8 |
| 10.0 | 0.05 | 130 | 2.46 | -78 | 0.075 | -139 | 0.07 | 148 | 7.8 |
| 10.5 | 0.05 | 148 | 2.45 | -92 | 0.079 | -152 | 0.08 | 126 | 7.8 |
| 11.0 | 0.07 | 146 | 2.44 | -106 | 0.082 | -165 | 0.10 | 105 | 7.7 |
| 11.5 | 0.09 | 134 | 2.42 | -120 | 0.086 | -177 | 0.11 | 82 | 7.7 |
| 12.0 | 0.11 | 117 | 2.43 | -134 | 0.091 | 171 | 0.13 | 60 | 7.7 |
| 12.5 | 0.14 | 97 | 2.46 | -148 | 0.095 | 159 | 0.14 | 38 | 7.8 |
| 13.0 | 0.17 | 76 | 2.49 | -162 | 0.100 | 147 | 0.14 | 17 | 7.9 |
| 13.5 | 0.20 | 58 | 2.51 | -177 | 0.104 | 135 | 0.13 | -4 | 8.0 |
| 14.0 | 0.23 | 42 | 2.54 | -168 | 0.109 | 121 | 0.12 | -32 | 8.1 |
| 14.5 | 0.25 | 27 | 2.54 | -152 | 0.113 | 106 | 0.10 | -66 | 8.1 |
| 15.0 | 0.25 | 15 | 2.51 | -136 | 0.114 | 91 | 0.09 | -110 | 8.0 |
| 15.5 | 0.23 | 6 | 2.47 | -121 | 0.115 | 77 | 0.10 | -158 | 7.9 |
| 16.0 | 0.20 | -1 | 2.46 | -105 | 0.115 | 61 | 0.13 | 165 | 7.8 |
| 16.5 | 0.17 | -3 | 2.44 | -90 | 0.116 | 46 | 0.17 | 134 | 7.7 |
| 17.0 | 0.12 | 2 | 2.39 | -74 | 0.116 | -3 | 0.21 | 116 | 7.6 |
| 17.5 | 0.09 | 32 | 2.40 | -58 | 0.119 | 15 | 0.23 | 98 | 7.6 |
| 18.0 | 0.15 | 60 | 2.44 | -42 | 0.125 | -0 | 0.23 | 80 | 7.7 |
| 18.5 | 0.22 | 59 | 2.53 | -24 | 0.136 | -16 | 0.19 | 66 | 8.1 |
| 19.0 | 0.30 | 44 | 2.64 | 4 | 0.150 | -36 | 0.12 | 65 | 8.4 |
| 19.5 | 0.28 | 21 | 2.62 | -19 | 0.155 | -59 | 0.11 | 100 | 8.4 |
| 20.0 | 0.21 | -8 | 2.44 | -42 | 0.151 | -80 | 0.19 | 107 | 7.7 |

$$V^* = 6 \text{ V}, I^* = 50\% I_{\text{DSS}}, T_A = 25^\circ\text{C}$$

Reference planes for S - parameter data include bond wires as specified in the "Recommended Assembly Diagram."

RF CHARACTERISTICS

| | PARAMETER | TEST CONDITIONS | TYP | UNIT |
|-----------|---------------------------------------|-------------------|-------|------|
| G_P | Small-signal power gain | $f = 2$ to 18 GHz | 7.5 | dB |
| SWR(in) | Input standing wave ratio | $f = 2$ to 18 GHz | 1.5:1 | - |
| SWR(out) | Output standing wave ratio | $f = 2$ to 18 GHz | 1.4:1 | - |
| P_{1dB} | Output power at 1-dB gain compression | $f = 2$ to 18 GHz | 20 | dBm |
| NF | Noise figure | $f = 2$ to 18 GHz | 5.5 | dB |
| | | $f = 8$ GHz | 32 | |
| IP_3 | Output third-order intercept point | $f = 12$ GHz | 28 | dBm |
| | | $f = 18$ GHz | 27 | |

$V^+ = 6$ V, $I^+ = 50\% I_{DSS}$, $T_A = 25^\circ\text{C}$

DC CHARACTERISTICS

| | PARAMETER | TEST CONDITIONS | MIN | MAX | UNIT |
|-----------|---|---|-----|-----|------|
| I_{DSS} | Total zero-gate-voltage drain current at saturation | $V_{DS} = 0.5$ V to 3.5 V, $V_{GS} = 0$ | 130 | 300 | mA |

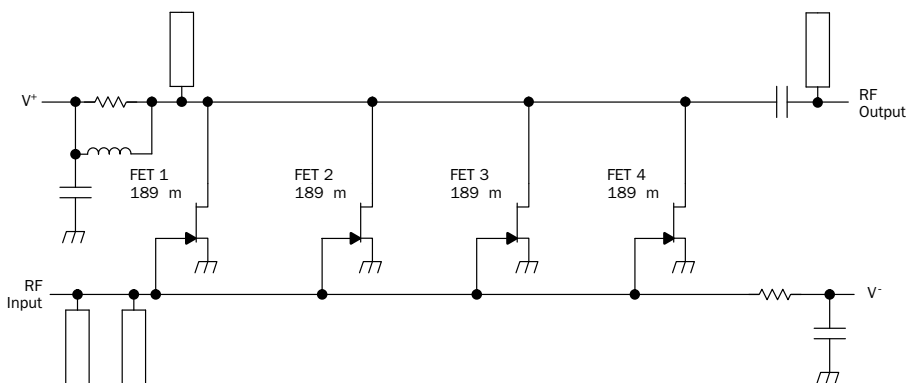
$T_A = 25^\circ\text{C}$

V_{DS} for I_{DSS} is the drain voltage between 0.5 V and 3.5 V at which drain current is highest at DC autoprobe.

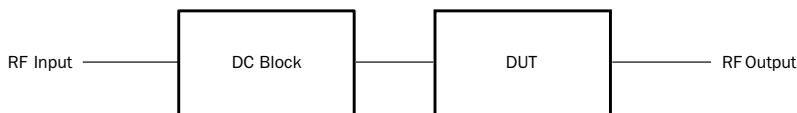
THERMAL INFORMATION

| | PARAMETER | TEST CONDITIONS | NOM | UNIT |
|----------|---|-----------------------------------|-----|--------------------|
| R_{JC} | Thermal resistance, channel-to-backside | $V^+ = 6$ V, $I^+ = 50\% I_{DSS}$ | 45 | $^\circ\text{C/W}$ |

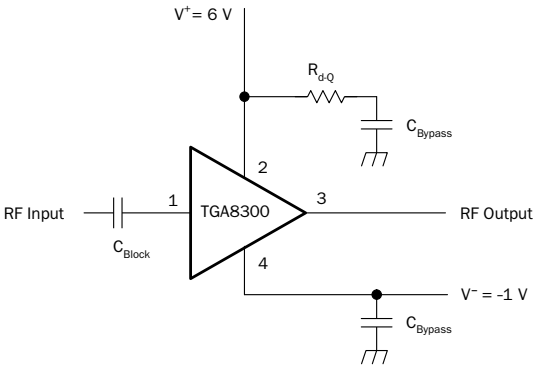
EQUIVALENT SCHEMATIC



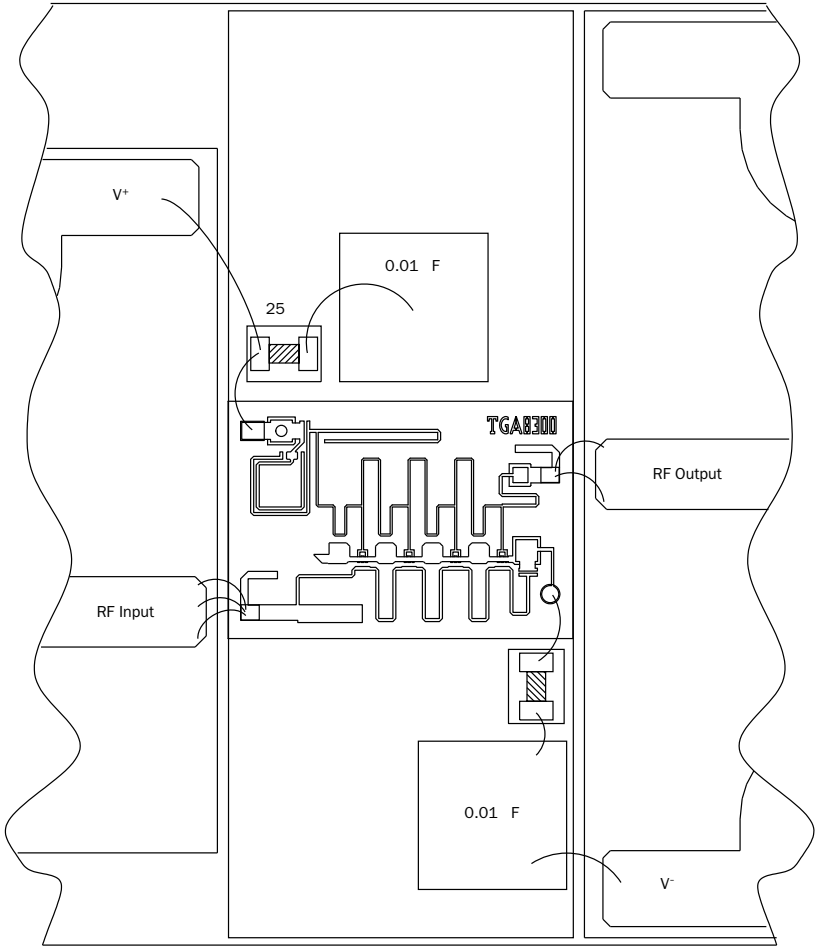
RECOMMENDED TEST CONFIGURATION



TYPICAL BIAS NETWORK



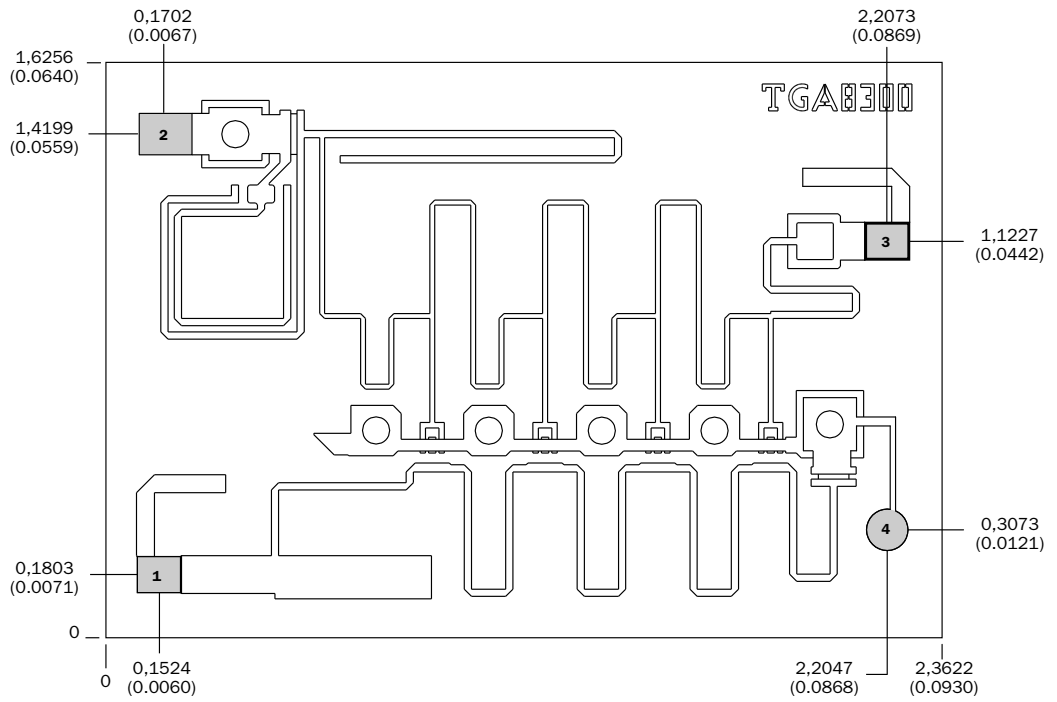
RECOMMENDED ASSEMBLY DIAGRAM



RF connections: Bond using three 1-mil diameter, 20 to 30-mil-length gold bond wires at RF input and two 1-mil diameter, 20 to 30-mil-length gold bond wires at RF output for optimum RF performance.

Close placement of external components is essential to stability.

MECHANICAL DRAWING



Units: millimeters (inches)

Thickness: 0,1524 (0.0060) (reference only)

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

Chip size tolerance: $\pm 0,0508$ (0.0020)

| | |
|--------------------------------|-----------------------------------|
| Bond pad #1 (RF Input): | 0,1270 x 0,1016 (0.0050 x 0.0040) |
| Bond pad #2 (V ⁺): | 0,1575 x 0,1245 (0.0062 x 0.0049) |
| Bond pad #3 (RF Output): | 0,1321 x 0,1016 (0.0052 x 0.0040) |
| Bond pad #4 (V ⁻): | 0,0635 (0.0025) (radius) |