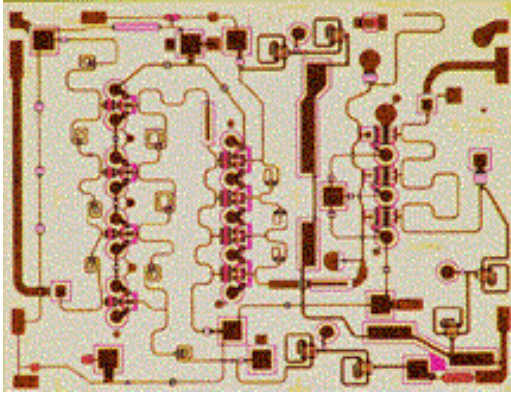


## 2 - 18 GHz Gain Block Amplifier TGA6345-EEU



### Key Features and Performance

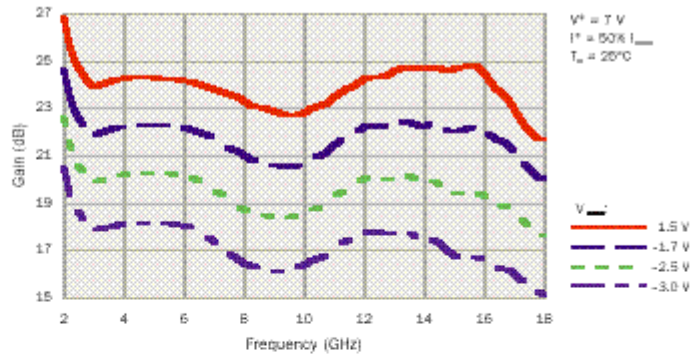
- 2 to 18 GHz Frequency Range
- 23 dB Typical Gain
- 1.6:1 Typical Input / Output SWR
- 22 dBm Typical Output Power at 1 dB Gain Compression
- 6 dB Typical Noise Figure
- 4.140 x 3.175 x 0.102 mm (0.163 x 0.125 x 0.004 in.)

### Description

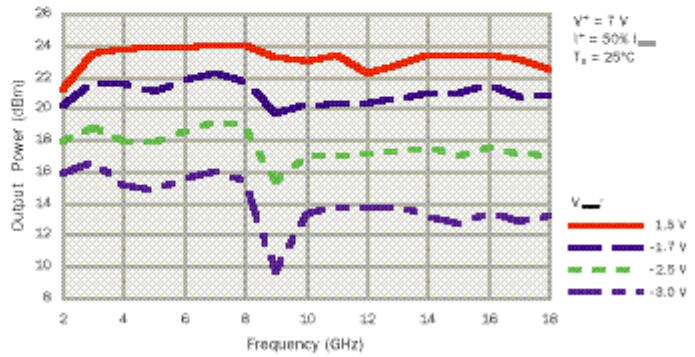
The TriQuint TGA6345-EEU is a monolithic amplifier which operates over the 2 to 18 GHz Frequency range. This device consist of three cascaded distributed amplifier sections. Typical small signal gain is 23 dB, which is adjustable by using the control voltage,  $V_{CTRL}$ . The TGA6345-EEU provides 22 dBm typical output power at 1 dB gain compression.

The TGA6345-EEU is suitable for a variety of applications such as phased array radar's and wide-band electronic warfare systems including jammers and expendable decoys, and electronic counter measures. Bond pad and backside metallization is gold plated for compatibility with eutectic alloy attachment methods as well as the thermosonic wire bonding processes. Ground is provided to the circuitry through vias to the backside metallization.

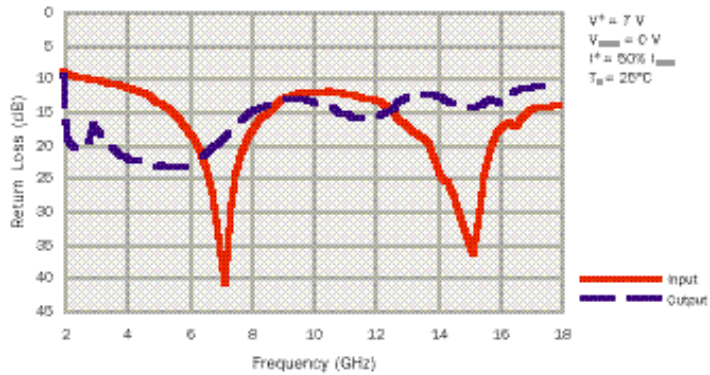
**TYPICAL  
SMALL-SIGNAL  
POWER GAIN**  
 $G_p$  VS.  $V_{CTRL}$



**TYPICAL  
OUTPUT POWER**  
 $P_{sat}$  VS.  $V_{CTRL}$



**TYPICAL  
RETURN LOSS**



**ABSOLUTE  
MAXIMUM RATINGS**

Positive supply voltage, V <sup>+</sup> .....	9 V
Negative supply voltage range, V <sup>-</sup> .....	-5 V to 0 V
Positive supply voltage range with respect to negative supply voltage, V <sup>+</sup> -V <sup>-</sup> .....	0 V to 10 V
Gain control voltage range, V <sub>CTRL</sub> .....	-4V to 5 V
Gain control voltage range with respect to positive supply voltage, V <sub>CTRL</sub> -V <sup>+</sup> .....	0 V to -11 V
Positive supply current, I <sup>+</sup> .....	I <sub>035</sub>
Power dissipation at (or below) 25°C base-plate temperature* .....	6.8 W
Input continuous wave power, P <sub>in</sub> .....	25 dBm
Operating channel temperature, T <sub>ch</sub> ** .....	150°C
Mounting temperature (30 sec), T <sub>M</sub> .....	320°C
Storage temperature range, T <sub>618</sub> .....	-65°C to 150°C

**Ratings over operating channel temperature range, T<sub>ch</sub> (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 14.4 mW/°C.

\*\* Operating channel temperature will directly effect 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 <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>		GAIN (dB)
	MAG	ANG(°)	MAG	ANG(°)	MAG	ANG(°)	MAG	ANG(°)	
0.5	0.71	-45	0.39	75	0.000	-177	0.94	-74	-8.2
1.0	0.50	-67	8.52	-34	0.000	129	0.40	-137	18.6
2.0	0.35	-97	21.40	131	0.001	117	0.19	102	26.6
3.0	0.31	-131	14.81	18	0.001	106	0.14	149	23.4
4.0	0.27	-171	15.56	-72	0.001	96	0.08	143	23.8
5.0	0.21	147	15.66	-159	0.001	89	0.07	154	23.9
6.0	0.12	104	15.44	116	0.001	96	0.07	173	23.8
7.0	0.01	-11	14.74	34	0.001	120	0.11	-176	23.4
8.0	0.13	-156	13.81	-46	0.002	130	0.18	174	22.8
9.0	0.22	162	13.19	-123	0.001	121	0.22	154	22.4
10.0	0.25	115	13.11	162	0.001	123	0.21	132	22.4
11.0	0.24	66	14.26	85	0.001	168	0.17	126	23.1
12.0	0.22	12	15.70	2	0.002	-160	0.16	135	23.9
13.0	0.14	-44	16.07	-83	0.002	-169	0.23	135	24.1
14.0	0.07	-94	16.07	-170	0.002	-174	0.24	116	24.1
15.0	0.02	-46	16.00	103	0.003	-177	0.19	115	24.1
16.0	0.13	-12	16.30	8	0.001	-166	0.21	113	24.2
17.0	0.18	-61	14.18	-86	0.003	164	0.27	106	23.0
18.0	0.20	-116	12.09	-172	0.002	169	0.29	91	21.7
19.0	0.16	-160	13.16	92	0.003	3	0.37	39	22.4
20.0	0.20	-174	12.08	-6	0.005	-76	0.18	-51	21.6

Reference planes for S-parameter data include bond wires as specified in the "Recommended Bias Network". The S-parameters are also available on floppy disk and the world wide web.

**RF CHARACTERISTICS**

PARAMETER		TEST CONDITIONS	TYP	UNITS
$G_p$	Small-signal power gain	f = 2 to 18 GHz	23	dB
$SWR_{(in)}$	Input standing wave ratio	f = 2 to 18 GHz	1.6:1	–
$SWR_{(out)}$	Output standing wave ratio	f = 2 to 18 GHz	1.6:1	–
NF	Noise Figure	f = 2 to 10 GHz f = 10 to 18 GHz	5.5 7.5	dB
$P_{1dB}$	Output power at 1-dB gain compression	f = 2 to 18 GHz	22	dBm
$IP_3$	Output third-order intercept point	f = 2 GHz	31.0	dBm
		f = 6 GHz	33.0	
		f = 9 GHz	32.5	
		f = 12 GHz	31.5	
		f = 18 GHz	32.5	
	Output second-order intercept point	$f_o$ = 2 GHz	37.0	dBm
		$f_o$ = 4 GHz	40.0	
		$f_o$ = 6 GHz	40.5	
		$f_o$ = 9 GHz	46.5	
	Output second harmonic at 1-dB gain compression	$f_o$ = 2 GHz	-23.0	dBc
		$f_o$ = 4 GHz	-26.5	
		$f_o$ = 6 GHz	-23.5	
		$f_o$ = 9 GHz	-27.5	
	Output third harmonic at 1-dB gain compression	$f_o$ = 2 GHz	-34.5	dBc
		$f_o$ = 4 GHz	-25.0	
		$f_o$ = 6 GHz	-23.5	
	Output fourth harmonic at 1-dB gain compression	$f_o$ = 2 GHz	-58	dBc
		$f_o$ = 4 GHz	-47	

**$V_+ = 7\text{ V}, V_{CNTL} = 0\text{ V}, I_+ = 50\% I_{DSS}, T_A = 25^\circ\text{C}$**

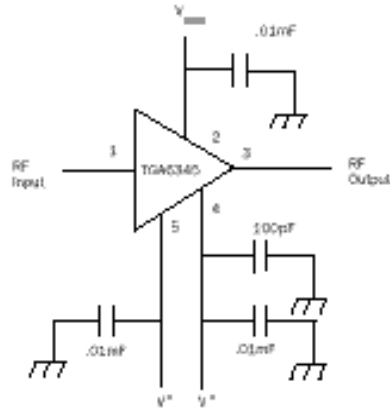
**DC CHARACTERISTICS**

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
$I_{DSS}$	Total zero-gate-voltage drain current at saturation	$V_{GS} = 0, V_{DS1} \leq 5.0$	342	684	1026	mA
		$V_{GS} = 0, V_{DS2} \leq 4.0$				
		$V_{GS} = 0, 0.5\text{ V to }3.5\text{ V}$				

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

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

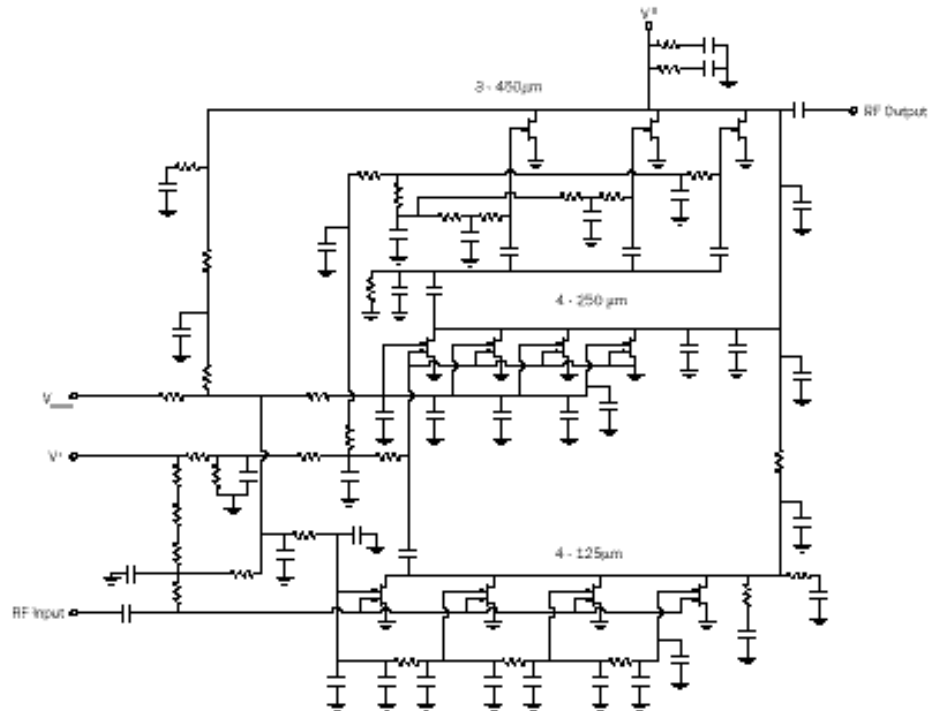
**RECOMMENDED  
BIAS NETWORK**



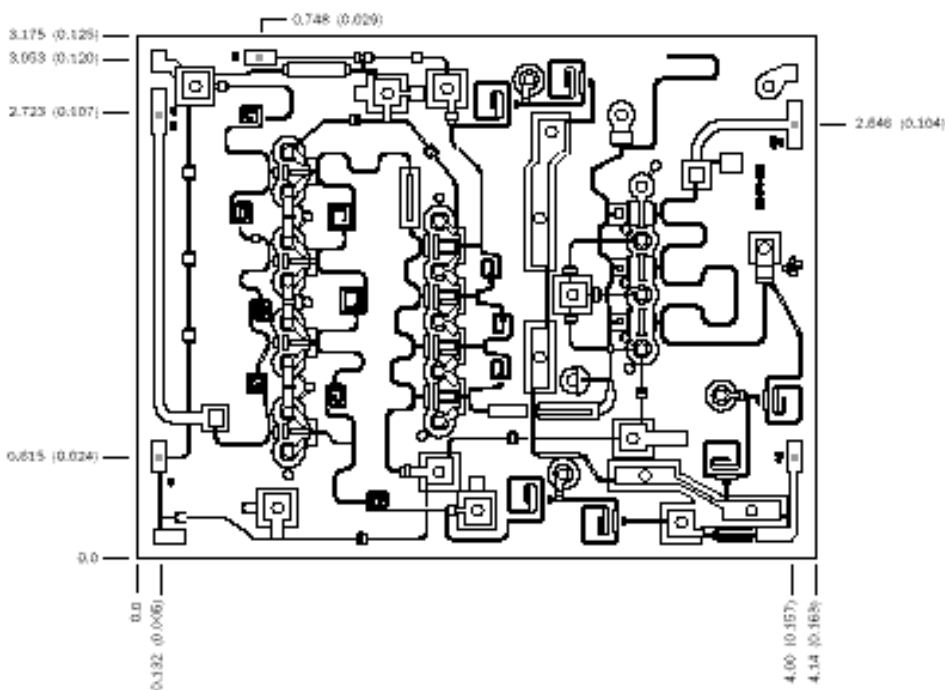
RF connections: Bond two 1-mil diameter, 25-mil-length gold bond wires at both RF Input and RF Output for optimum RF performance.  
Close placement of external components is essential to stability.

Refer to TriQuint's Recommended Assembly Instructions for GaAs Products.

**EQUIVALENT SCHEMATIC**



**MECHANICAL DATA**



Units: millimeters (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):	0,076 x 0,279 (0.003 x 0.011)
Bond pad #2 ( $V_{CTH}$ ):	0,178 x 0,076 (0.007 x 0.003)
Bond pad #3 (RF Output):	0,076 x 0,279 (0.003 x 0.011)
Bond pad #4 ( $V^*$ ):	0,076 x 0,178 (0.003 x 0.007)
Bond pad #5 ( $V^*$ ):	0,076 x 0,178 (0.003 x 0.007)

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