

## 2 Watt 802.11a Packaged Amplifier TGA2922-EPU-SG



### Key Features

- 4.9 - 6 GHz Application Frequency Range
- 11 dB Nominal Gain @ 8V 480mA
- 34 dBm Nominal P1dB @ 8V 480mA
- IMD3 -50dBc @ 22dBm SCL, Typical
- Bias Conditions: 7-9 V @ 480 mA (Quiescent)
- 0.5  $\mu$ m HFET Technology
- 2 lead Cu base SMT package

### Primary Applications

- 802.11a WLAN Bridge Amplifiers
- U-NII Band HPA
- C-Band Pt-Pt and Pt-Multi Pt Radio

### Product Description

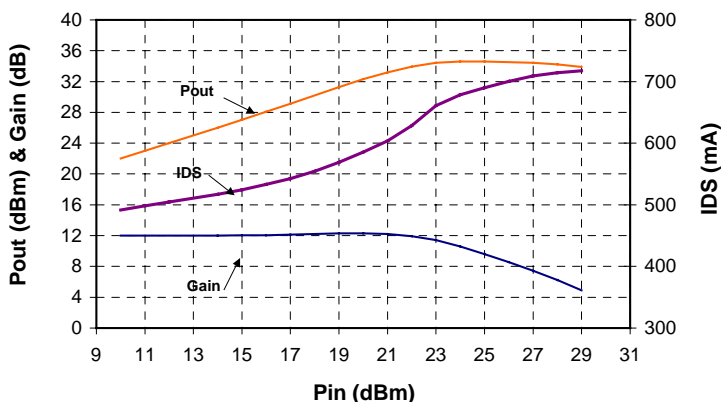
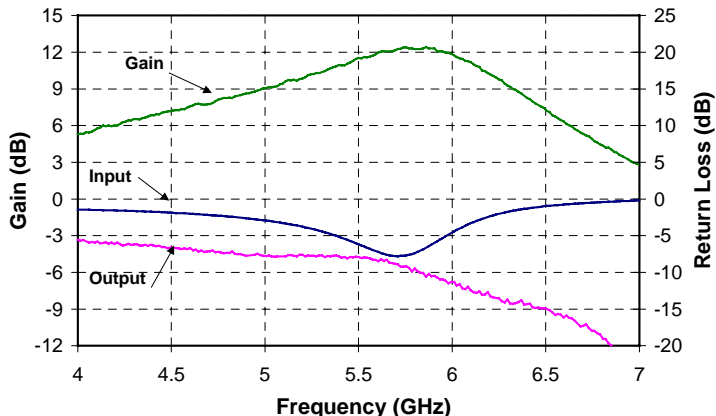
The TGA2922-SG HPA provides 11dB of gain and 2 W of output power across 4.9 - 6 GHz. The device is ideally suited for high linearity, high power wireless data applications such as 802.11a WLAN Bridge Amplifiers, U-NII and Point-to-Point or Point-to-Multi Point Non-Line of Sight radios. The surface mount package has a high thermal conductivity copper base. Internal partial matching simplifies system board layout by requiring a minimum of external components.

Evaluation Boards are available.

### Fixtured Measured Performance

Bias Conditions:  $V_d = 8$  V,  $I_{dq} = 480$  mA

Performance data taken @ in a 5.75GHz application circuit



*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.*

**TABLE I**  
**MAXIMUM RATINGS 1/**

<b>Symbol</b>	<b>Parameter</b>	<b>Value</b>	<b>Notes</b>
V <sub>d</sub>	Drain Supply Voltage	10 V	<u>2/</u>
V <sub>g</sub>	Gate Supply Voltage Range	0 V to -5 V	
I <sub>dq</sub>	Drain Supply Current (Quiescent)	1 A	<u>2/</u>
I <sub>g</sub>	Gate Current	19 mA	
P <sub>IN</sub>	Input Continuous Wave Power	30 dBm	<u>2/</u>
P <sub>D</sub>	Power Dissipation	4.1 W	<u>2/</u> , <u>3/</u>
T <sub>CH</sub>	Operating Channel Temperature	175 °C	4/
T <sub>M</sub>	Mounting Temperature (30 Seconds)	320 °C	
T <sub>STG</sub>	Storage Temperature	-65 to 150 °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<sub>D</sub>.
- 3/ When operated at this bias condition with a base plate temperature of 85 °C, the MTTF life is 2 E+8 hours.
- 4/ Junction operating temperature will directly affect the device median time to failure (T<sub>M</sub>). For maximum life, it is recommended that junction temperatures be maintained at the lowest possible levels.

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**TABLE II**  
**RF CHARACTERIZATION TABLE**  
( $T_A = 25^\circ\text{C}$ , Nominal)  
( $V_d = 8\text{ V}$ ,  $I_{dq} = 480\text{ mA}$ )

SYMBOL	PARAMETER	TEST CONDITION	TYPICAL	UNITS
Gain	Small Signal Gain	$F = 5.75\text{ GHz}$	11	dB
IRL	Input Return Loss	$F = 5.75\text{ GHz}$	7	dB
ORL	Output Return Loss	$F = 5.75\text{ GHz}$	7	dB
P1dB	Output Power @ P1dB	$F = 5.75\text{ GHz}$	34	dBm

**TABLE III**  
**THERMAL INFORMATION**

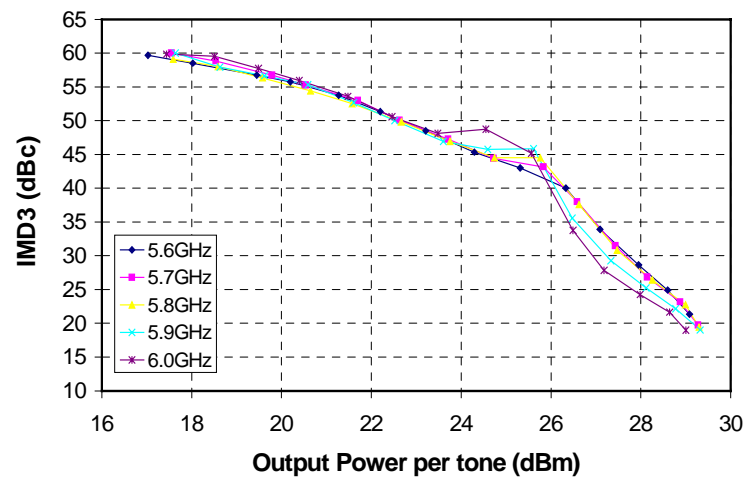
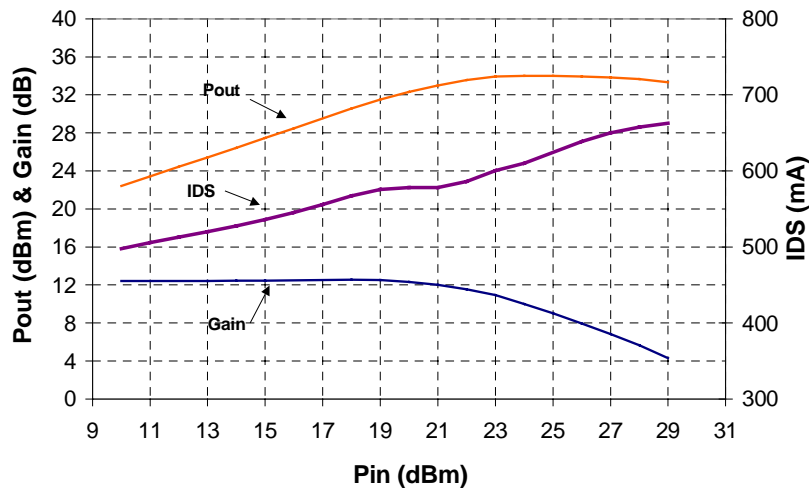
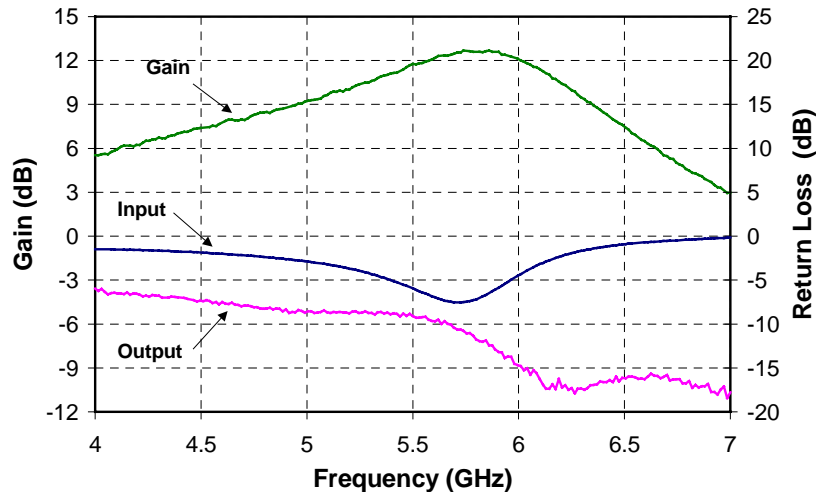
Parameter	Test Conditions	$T_{CH}$ ( $^\circ\text{C}$ )	$R_{\theta JC}$ ( $^\circ\text{C/W}$ )	$T_M$ (HRS)
$R_{\theta JC}$ Thermal Resistance (channel to backside of package)	$V_d = 8\text{ V}$ $I_D = 480\text{ mA}$ $P_{diss} = 3.8\text{ W}$	168	22	4 E+8

Note: Package backside SnPb soldered to carrier at  $85^\circ\text{C}$  baseplate temperature.  
Worst case condition with no RF applied, 100% of DC power is dissipated.

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**Measured Fixtured Data**  
**Application Circuit tuned to 5.75 GHz**

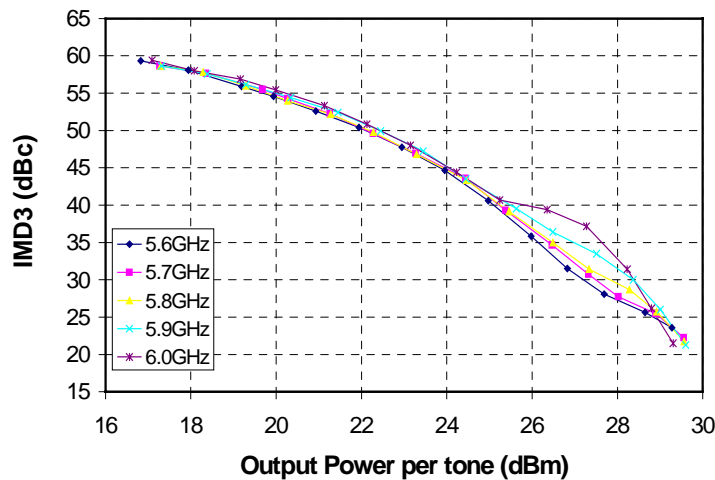
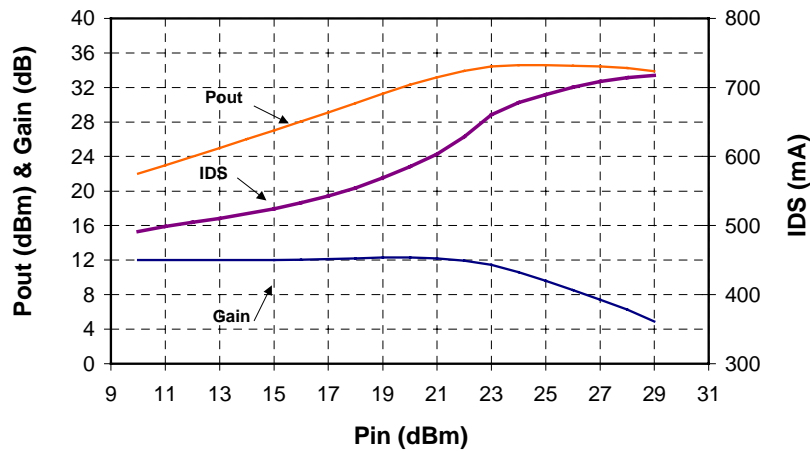
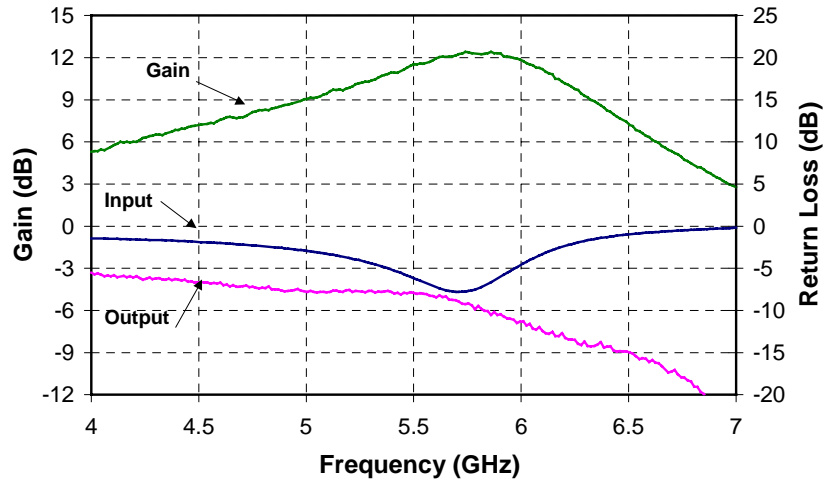
**Bias Conditions:  $V_d = 7\text{ V}$ ,  $I_{dq} = 480\text{ mA}$**



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**Measured Fixtured Data**  
**Application Circuit tuned to 5.75 GHz**

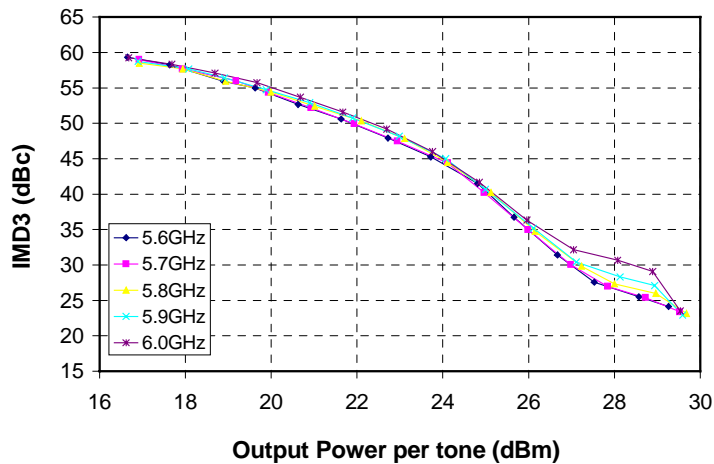
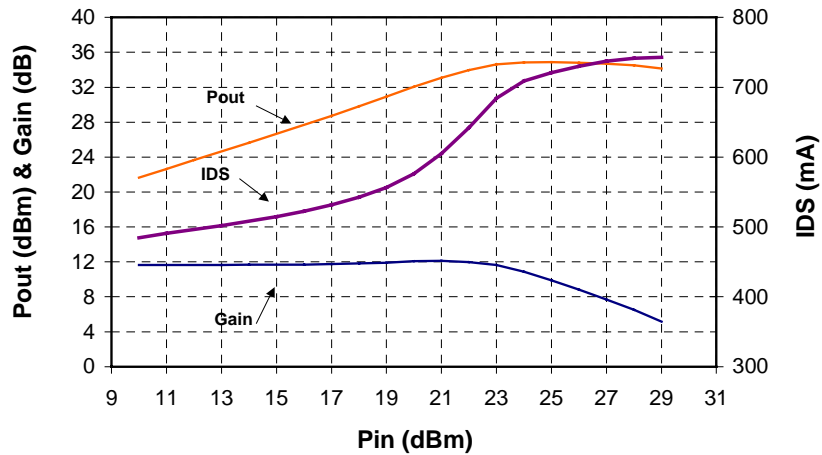
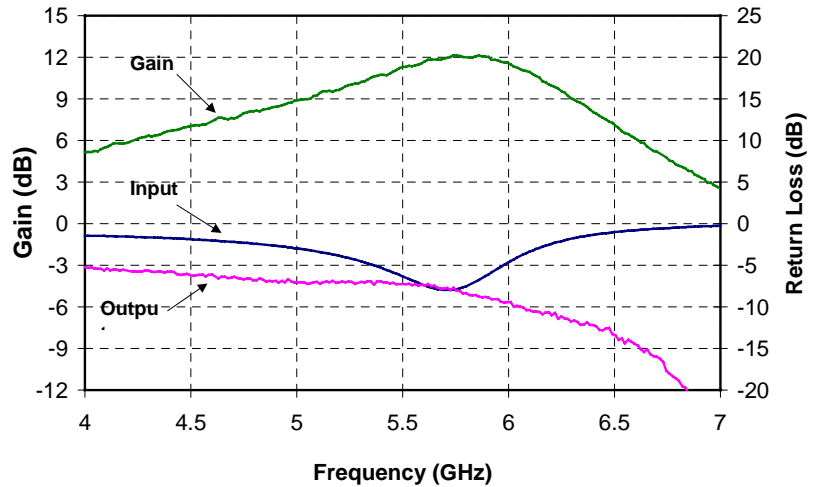
**Bias Conditions:  $V_d = 8\text{ V}$ ,  $I_{dq} = 480\text{ mA}$**



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**Measured Fixtured Data**  
**Application Circuit tuned to 5.75 GHz**

**Bias Conditions:  $V_d = 9\text{ V}$ ,  $I_{dq} = 480\text{ mA}$**

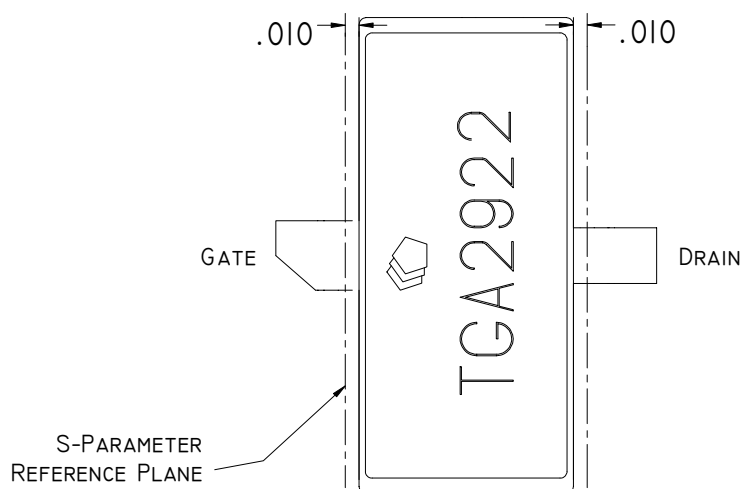


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# S-Parameter Data

Bias Conditions: Vd = 8V, Idq = 480 mA

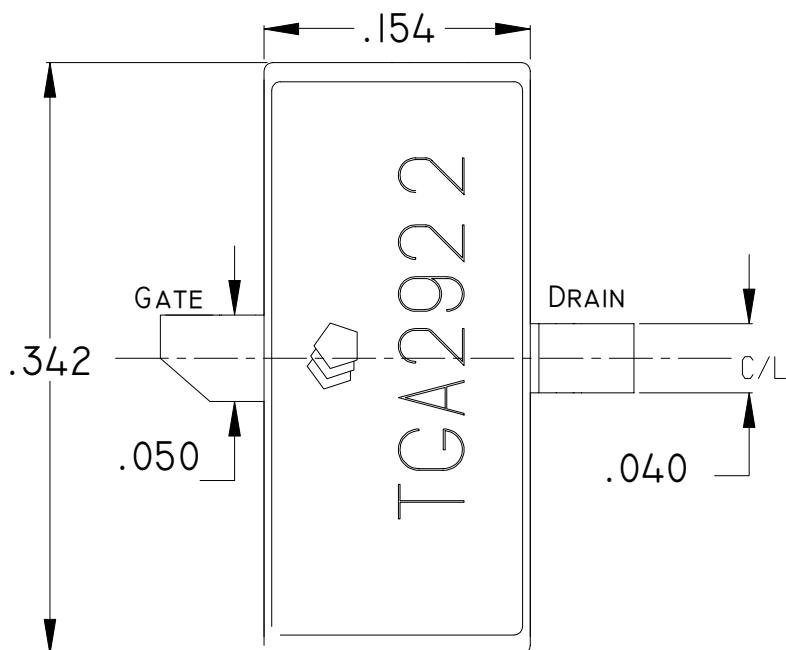
Frequency GHz	S11		S21		S12		S22	
	Mag (dB)	Deg	Mag (dB)	Deg	Mag (dB)	Deg	Mag (dB)	Deg
2	-1.064	159.46	8.711	24.329	-30.877	-37.657	-5.692	164.69
2.2	-1.097	152.93	7.986	16.119	-30.802	-40.661	-5.391	161.15
2.4	-1.121	146.43	7.341	7.38	-31.149	-47.878	-5.193	157.74
2.6	-1.158	139.91	6.781	-0.744	-31.068	-51.566	-5	154.45
2.8	-1.148	133.37	6.261	-9.122	-31.133	-60.217	-4.851	150.4
3	-1.187	126.29	5.795	-17.347	-31.547	-62.038	-4.653	146.75
3.2	-1.256	118.87	5.41	-25.881	-31.602	-67.517	-4.47	143.06
3.4	-1.308	111.87	5.055	-34.21	-30.933	-72.012	-4.386	140.23
3.6	-1.319	104.46	4.757	-42.632	-31.724	-75.875	-4.268	136.38
3.8	-1.349	96.508	4.499	-51.255	-30.792	-84.39	-4.26	132.8
4	-1.367	88.673	4.273	-60.27	-31.334	-89.74	-4.279	128.97
4.2	-1.291	80.496	4.131	-69.363	-31.513	-97.338	-4.206	124.8
4.4	-1.299	72.709	3.994	-78.577	-31.395	-103.45	-4.239	120.77
4.6	-1.318	65.357	3.845	-88.02	-31.303	-107.77	-4.261	116.11
4.8	-1.192	58.18	3.784	-97.07	-32.059	-114.7	-4.288	110.84
5	-1.182	51.453	3.838	-106.89	-31.656	-120.07	-4.515	105.45
5.2	-1.235	45.268	3.87	-116.75	-32.521	-123.03	-4.643	99.838
5.4	-1.247	39.194	4.068	-127.04	-32.507	-131.7	-4.746	94.391
5.6	-1.312	33.505	4.469	-137.12	-32.851	-133.64	-4.955	88.582
5.8	-1.572	27.224	5.407	-147.36	-32.677	-145.33	-5.109	84.622
6	-2.144	18.052	7.048	-163.92	-33.493	-158.52	-4.447	82.265
6.2	-3.929	0.706	9.007	173.85	-36.037	-172.13	-4.587	75.642
6.4	-16.53	-70.915	11.343	131.87	-47.443	-136.43	-4.953	73.309
6.6	-3.064	107.16	8.577	71.657	-34.576	-106.6	-4.3	78.064
6.8	-0.629	77.321	2.49	37.621	-33.05	-128.44	-3.285	76.841
7	-0.265	65.853	-3.052	18.739	-33.513	-143.12	-2.722	75.552
7.2	-0.219	59.846	-8.546	6.741	-34.784	-146.11	-2.165	75.642
7.4	-0.317	56.083	-14.725	4.867	-35.404	-151.89	-1.72	76.43
7.6	-1.162	54.327	-15.078	45.009	-33.594	-123.56	-1.219	78.725
7.8	-0.616	60.535	-16.014	-9.842	-31.155	-155.16	-0.837	79.245
8	-0.392	60.121	-22.085	-26.956	-31.923	-159.11	-0.663	81.487
8.2	-0.402	61.336	-27.313	-38.375	-32.698	-159.63	-0.497	83.83
8.4	-0.367	64.333	-32.49	-62.676	-31.776	-162.16	-0.396	86.319
8.6	-0.286	68.382	-35.569	-110.66	-31.509	-164.23	-0.278	88.199
8.8	-0.23	73.502	-32.658	-144.4	-30.737	-164.75	-0.249	89.022
9	-0.108	79.406	-31.547	-167.6	-29.564	-168.44	-0.325	88.608



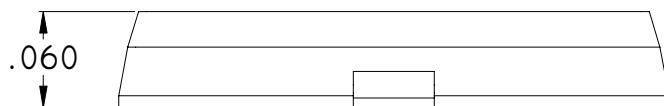
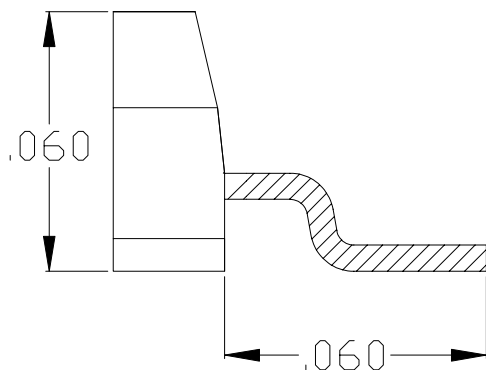
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**Packaged Dimensional Drawing TGA2922-EPU - SG**

Top  
View



Side  
View



**Bias Procedure**

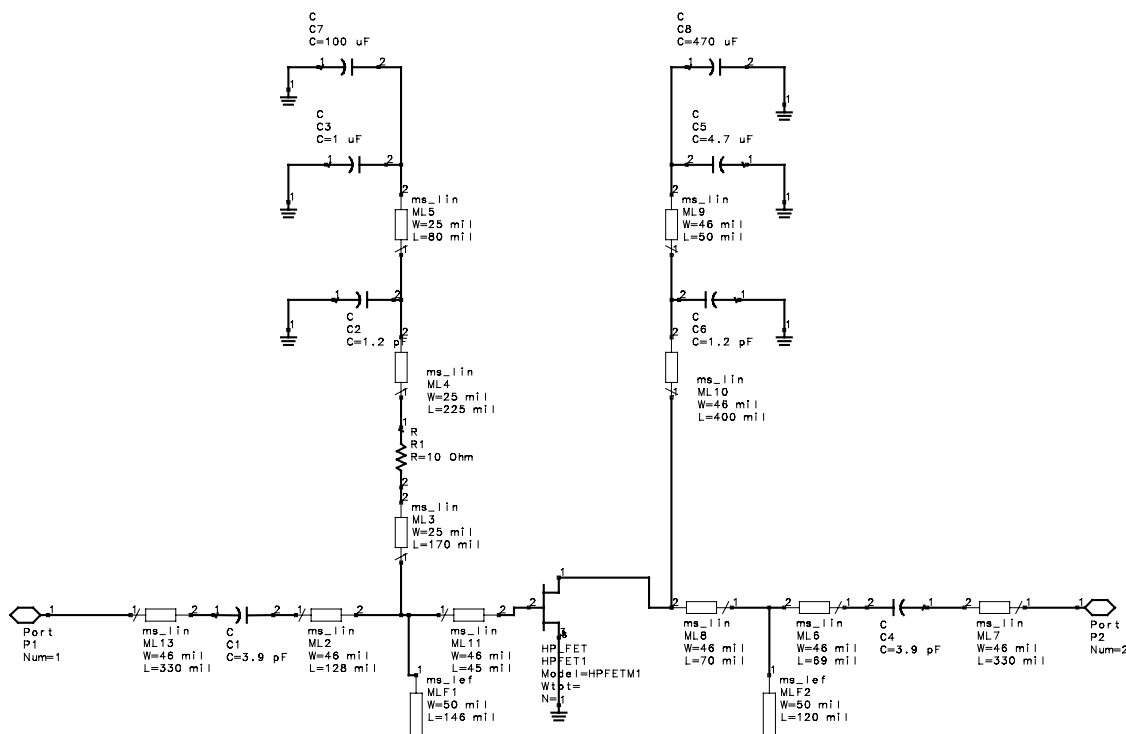
1. Ensure no RF power is applied to the device.
2. Pinch off device by setting  $V_g$  to  $-3V$ .
3. Increase  $V_d$  to 8.0V while monitoring drain current.
4. Increase  $V_g$  until drain current reaches 480 mA.
5. Apply RF power.

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

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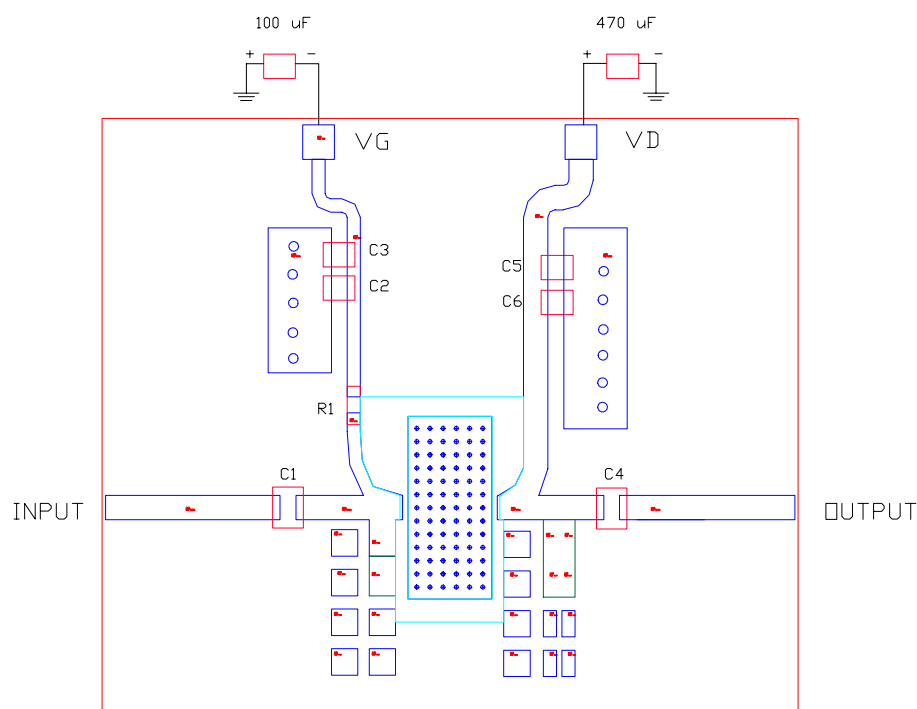
## 5.75 GHz Application Circuit Schematic



PCB is 20 mil thick Rogers 4003 substrate

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## Typical Evaluation Board Layout \*



\*The layout is a general purpose drawing that needs to be tuned for the specific application.

PCB is RO4003 20 mil thickness, 0.5 oz standard copper cladding, with  $E_r = 3.38$ .

### External Component Listing

Part Type	Reference	Description
Capacitor	C1	0603, 3.9 pF
Capacitor	C2	0603, 1.2 pF
Capacitor	C3	1uF
Capacitor	C4	0603, 3.9 pF
Capacitor	C5	4.7 uF
Capacitor	C6	0603, 1.2 pF
Resistor	R1	0805, 10 $\Omega$

**Contact TriQuint Applications Engineering for additional info**

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## **Assembly of a TGA2922-EPU Surface Mount Package onto a Motherboard**

1. Clean the motherboard or the similar module with Acetone. Rinse with alcohol and DI water. Allow the circuit to fully dry.
2. To improve the thermal and RF performance, we recommend a heat sink attach to the bottom of the package and apply SN63 solder or any other Tin Lead solder to the bottom of TGA2922.
3. Apply Tin Lead solder to each pin of TGA2922 and to the backside of the package.
- 4 Clean the assembly with alcohol.

### **Ordering Information**

<b>Part</b>	<b>Package Style</b>
TGA2922-EPU-SG	SMT Gull Wing (Formed Leads)

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