4 Watt 802.11a Packaged Amplifier TGA2921-EPU-SG

Key Features

- 4.9 - 6 GHz Application Frequency Range
- 11 dB Nominal Gain @ 8V 800mA
- 36 dBm Nominal P1dB @ 8V 800mA
- IMD3 -50dBc @ 24dBm SCL, Typical
- Bias Conditions: 7-9 V @ 700-800 mA (Quiescent)
- 0.5 µm 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

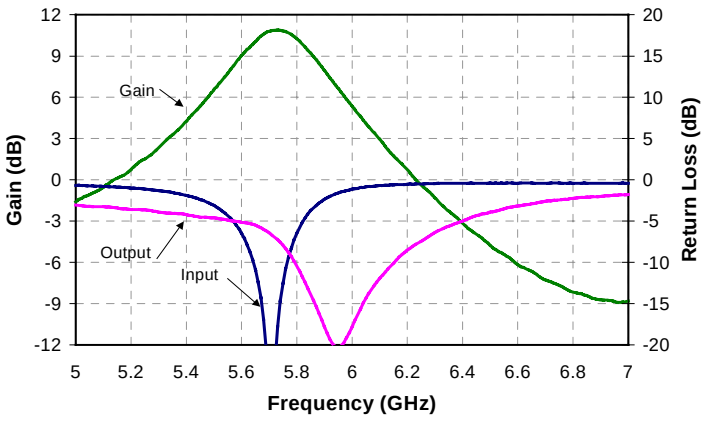
The TGA2921-SG HPA provides 11 dB of gain and 4 W of output power across 4.9 - 6 GHz. The device is ideally suited for high linearity, high power wireless data applications such as 802.11a WLAN Bridge Amplifiers, U-NII and Point-to-Point or Point-to-Multi-Point Non-Line of Sight radios. The surface mount package has a high thermal conductivity copper base. Internal partial matching simplifies system board layout by requiring a minimum of external components.

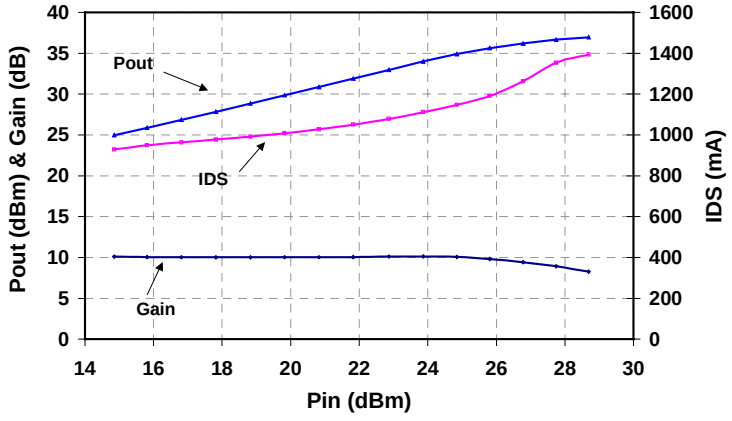
Evaluation Boards are available.

Fixtured Measured Performance

Bias Conditions: Vd = 8 V, Idq =800 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.

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TABLE I
MAXIMUM RATINGS 1/

Symbol	Parameter	Value	Notes
Vd	Drain Supply Voltage	10 V	2/
Vg	Gate Supply Voltage Range	0 V to -5 V	
Idq	Drain Supply Current (Quiescent)	2 A	2/
| Ig |	Gate Current	38 mA	
P_{IN}	Input Continuous Wave Power	30 dBm	2/
P_D	Power Dissipation	7.9 W	2/, 3/
T_{CH}	Operating Channel Temperature	175 °C	4/
T_M	Mounting Temperature (30 Seconds)	320 °C	
T_{STG}	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_D.

3/ When operated at this bias condition with a base plate temperature of 85 ^{0}C, the MTTF life is 2 E+8 hours.

4/ 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.

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TABLE II
RF CHARACTERIZATION TABLE
(T_A = 25°C, Nominal)
(Vd = 8 V, Idq = 800 mA)

SYMBOL	PARAMETER	TEST CONDITION	TYPICAL	UNITS
Gain	Small Signal Gain	F = 5.75 GHz	11	dB
IRL	Input Return Loss	F = 5.75 GHz	12	dB
ORL	Output Return Loss	F = 5.75 GHz	7	dB
P1dB	Output Power @ P1dB	F = 5.75 GHz	36	dBm

TABLE III
THERMAL INFORMATION

Parameter	Test Conditions	T_{CH} (°C)	$R_{\theta JC}$ (°C/W)	T_M (HRS)
$R_{\theta JC}$ Thermal Resistance (channel to backside of package)	Vd = 8 V I_D = 800 mA Pdiss = 6.4 W	155	11	1.6 E+9

Note: Package backside SnPb soldered to carrier at 85°C baseplate temperature. Worst case condition with no RF applied, 100% of DC power is dissipated.

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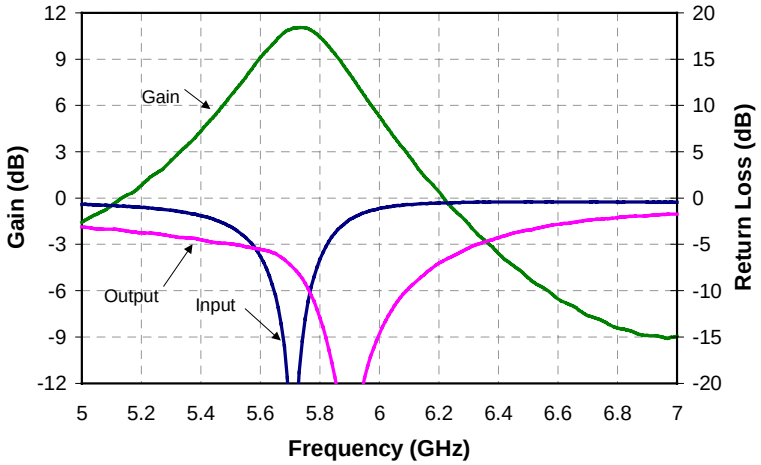
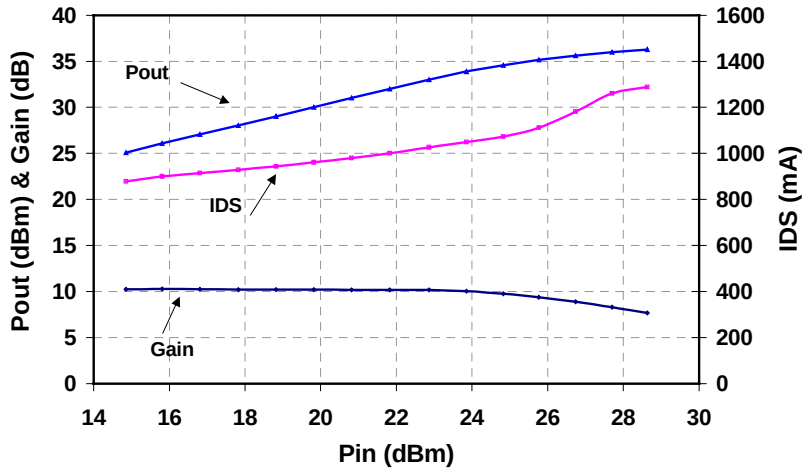
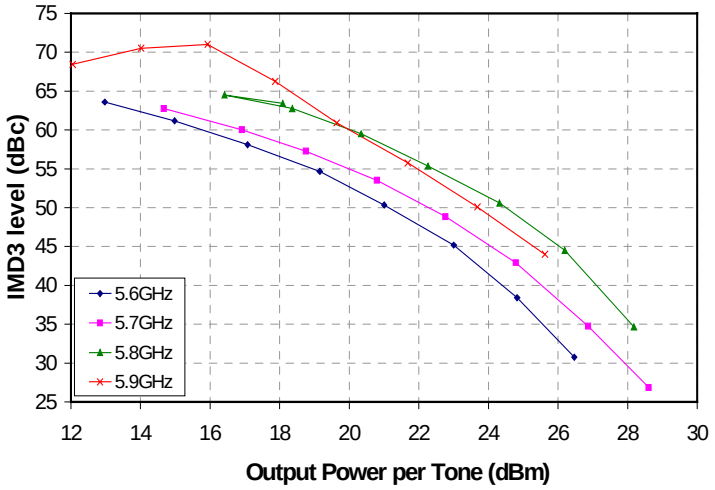
Measured Fixtured Data
Application Circuit tuned to 5.75 GHz

Bias Conditions: Vd = 7 V, Idq = 700 mA







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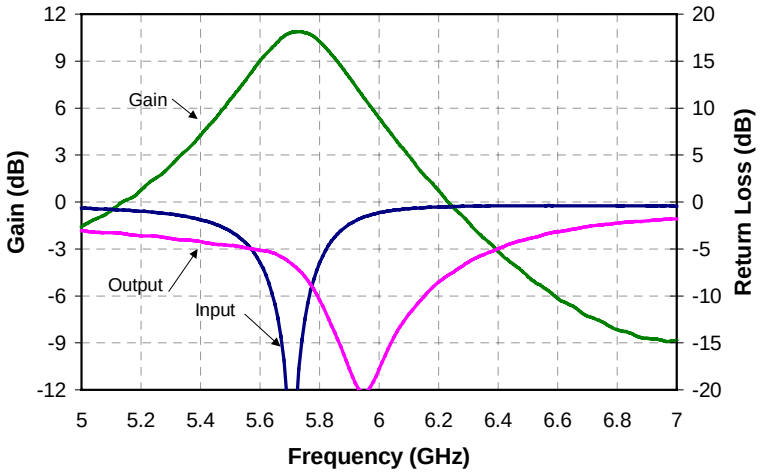
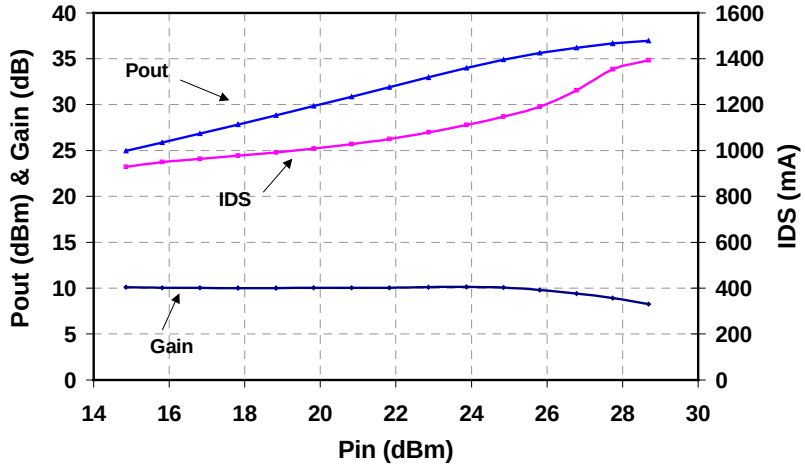
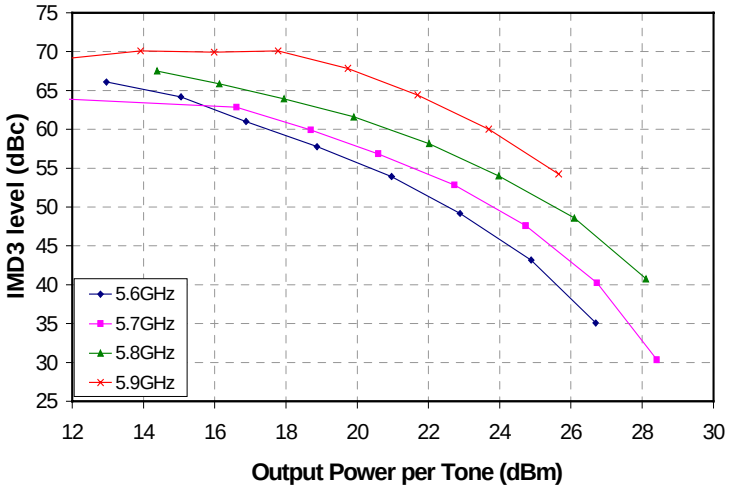
Measured Fixtured Data
Application Circuit tuned to 5.75 GHz

Bias Conditions: Vd = 8 V, Idq = 800 mA







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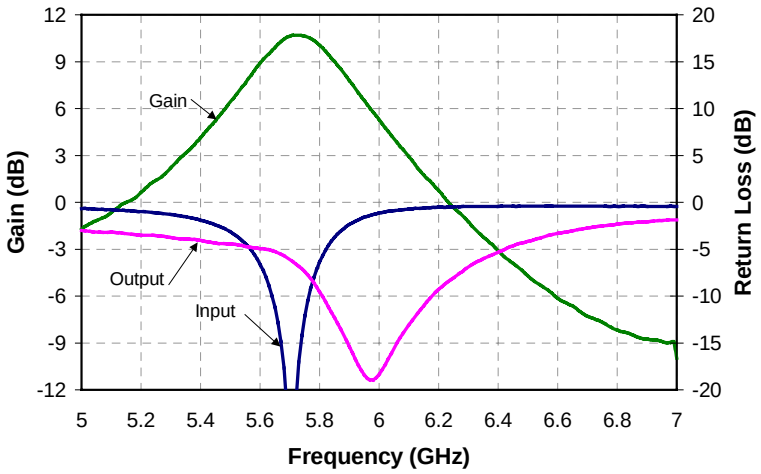
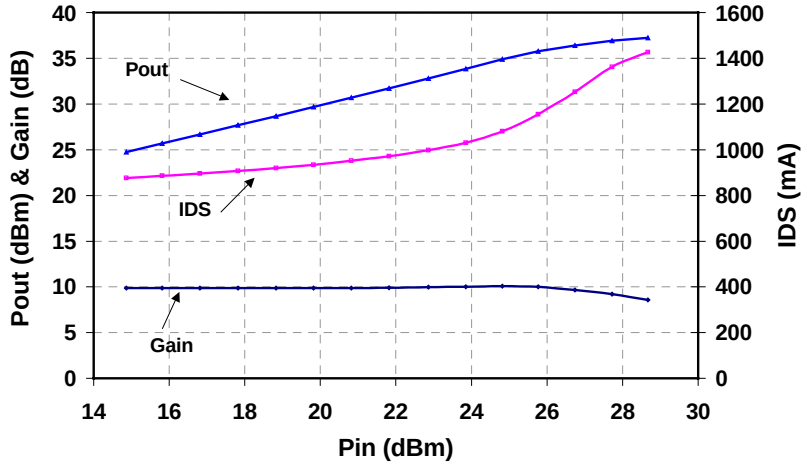
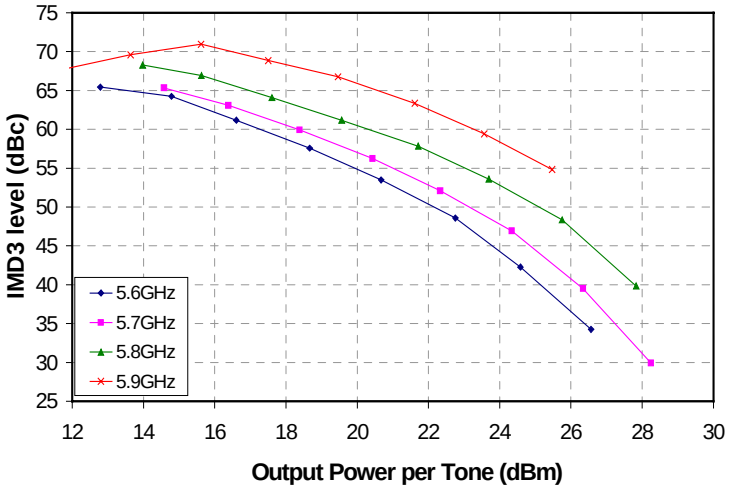
Measured Fixtured Data
Application Circuit tuned to 5.75 GHz

Bias Conditions: Vd = 9 V, Idq = 800 mA







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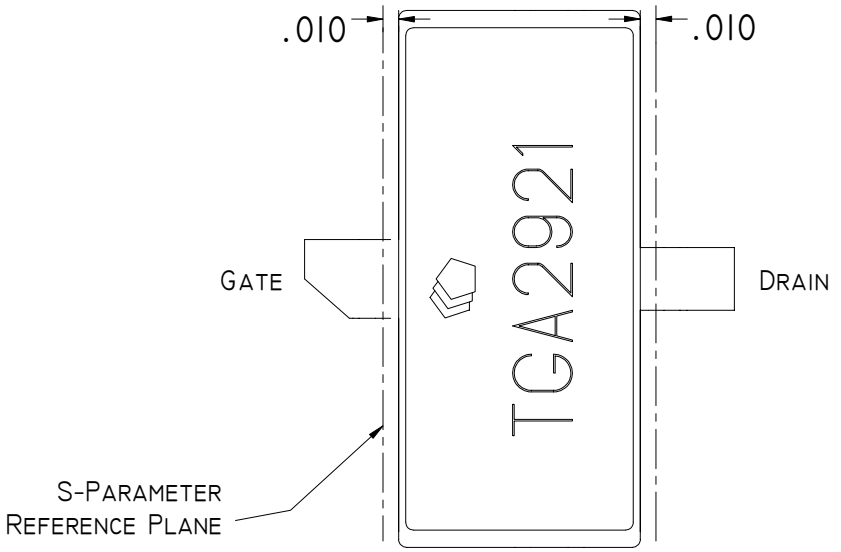
S-Parameter Data

TGA2921-EPU-SG

Bias Conditions: Vd = 8V, Idq = 800 mA

Frequency	S11		S21		S12		S22	
GHz	Mag (dB)	Deg	Mag (dB)	Deg	Mag (dB)	Deg	Mag (dB)	Deg
2	-0.922	149.46	4.656	24.256	-29.3	-37.522	-3.505	150.7
2.2	-0.981	143.96	3.92	16.783	-29.209	-42.194	-3.475	147.28
2.4	-1.05	138.28	3.307	9.155	-29.406	-47.499	-3.418	143.98
2.6	-1.036	132.61	2.795	1.767	-29.243	-53.754	-3.339	140.6
2.8	-1.03	126.31	2.386	-5.879	-29.775	-57.493	-3.311	137.76
3	-1.106	119.81	2.016	-13.755	-29.396	-61.715	-3.271	134.27
3.2	-1.098	113.17	1.728	-21.748	-29.382	-66.942	-3.201	131.09
3.4	-1.158	106	1.449	-29.653	-28.846	-68.808	-3.296	128.07
3.6	-1.199	99.251	1.243	-37.913	-29.221	-75.622	-3.28	125.27
3.8	-1.197	91.493	1.095	-46.321	-28.642	-80.881	-3.367	121.37
4	-1.227	83.195	1.01	-55.325	-28.672	-86.873	-3.489	118.05
4.2	-1.264	75.815	0.951	-64.172	-28.853	-88.318	-3.638	114.71
4.4	-1.243	67.974	0.965	-73.477	-28.391	-94.42	-3.798	111.03
4.6	-1.316	60.333	1.001	-82.808	-28.139	-99.236	-3.988	106.7
4.8	-1.289	53.55	1.067	-92.017	-28.186	-107.82	-4.162	102.8
5	-1.294	46.85	1.281	-102.18	-27.341	-112.38	-4.502	97.583
5.2	-1.386	40.476	1.557	-112.99	-26.85	-117.15	-4.839	93.32
5.4	-1.525	35.141	2.047	-124.38	-25.843	-122.68	-5.124	90.569
5.6	-1.722	30.104	2.69	-137.43	-25.035	-129.03	-5.22	87.491
5.8	-2.236	25.326	3.567	-152.77	-24.04	-140.21	-4.99	85.128
6	-3.267	20.912	4.543	-172.21	-22.9	-152.51	-4.534	81.826
6.2	-5.727	20.622	5.836	161.48	-21.466	-171.62	-3.592	76.362
6.4	-8.146	54.06	6.174	121.79	-20.988	155.54	-3.108	62.283
6.6	-3.358	70.677	3.551	76.907	-23.371	115.14	-5.439	54.397
6.8	-1.106	62.277	-1.382	42.823	-27.734	90.23	-6.671	72.529
7	-0.517	55.836	-7.259	20.341	-33.708	71.447	-4.576	84.699
7.2	-0.449	51.619	-14.016	11.985	-39.475	67.146	-2.75	86.182
7.4	-0.855	48.505	-18.186	50.179	-42.265	15.613	-1.661	85.135
7.6	-1.164	57.94	-13.962	6.444	-36.502	-86.187	-0.821	84.391
7.8	-0.463	56.854	-21.186	-27.207	-38.617	-127.41	-0.482	83.611
8	-0.351	57.361	-29.004	-44.161	-38.272	-104.42	-0.436	83.279
8.2	-0.301	59.013	-36.991	-63.144	-29.615	-137.1	-0.986	89.948
8.4	-0.324	62.41	-39.741	-104.49	-31.885	-159.36	-0.308	92.761
8.6	-0.231	67.099	-36.528	-157.52	-31.506	-162.78	-0.12	94.847
8.8	-0.16	72.616	-34.932	-167.76	-31.247	-163.91	-0.054	96.36
9	-0.061	78.923	-30.382	-177.25	-30.393	-165.96	-0.043	96.806



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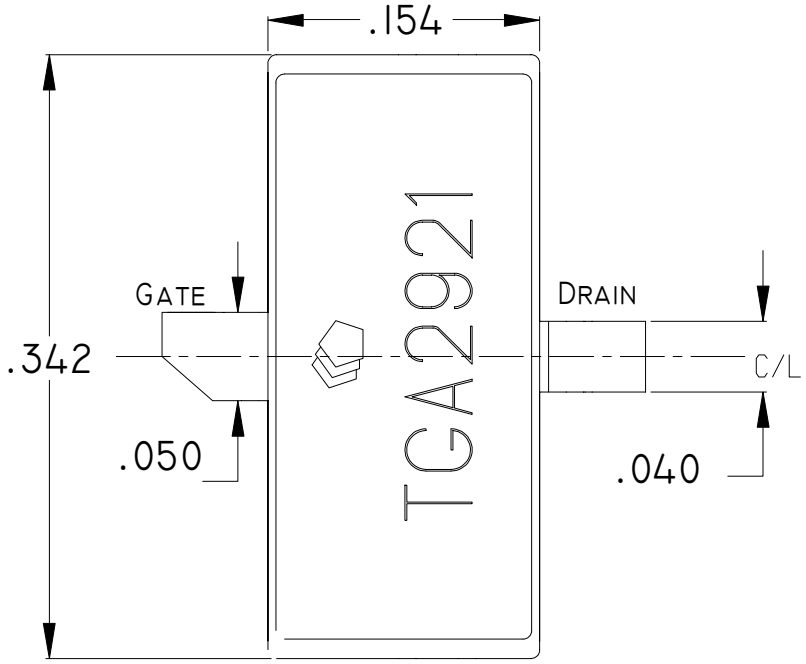
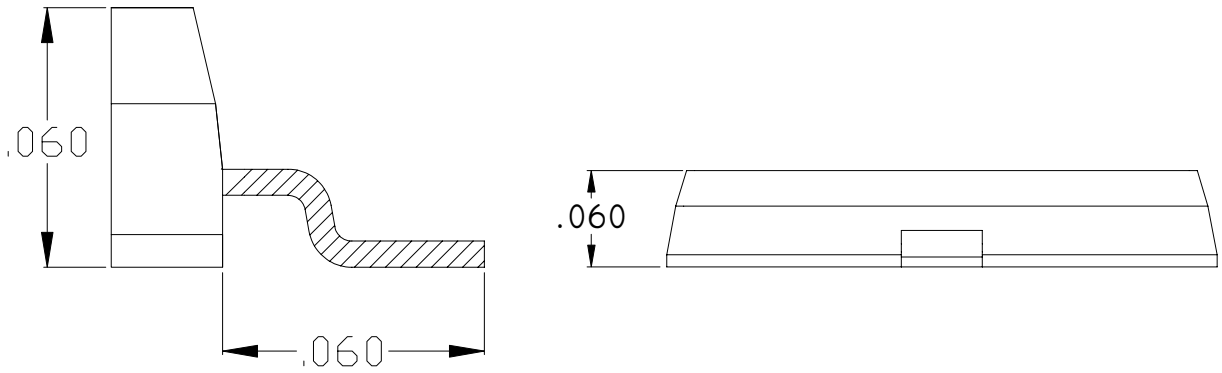
Packaged Dimensional Drawing TGA2921-EPU - SG

Top View



Side View



Bias Procedure

1. Ensure no RF power is applied to the device.
2. Pinch off device by setting Vg to –3V.
3. Increase Vd to 8.0V while monitoring drain current.
4. Increase Vg until drain current reaches 800 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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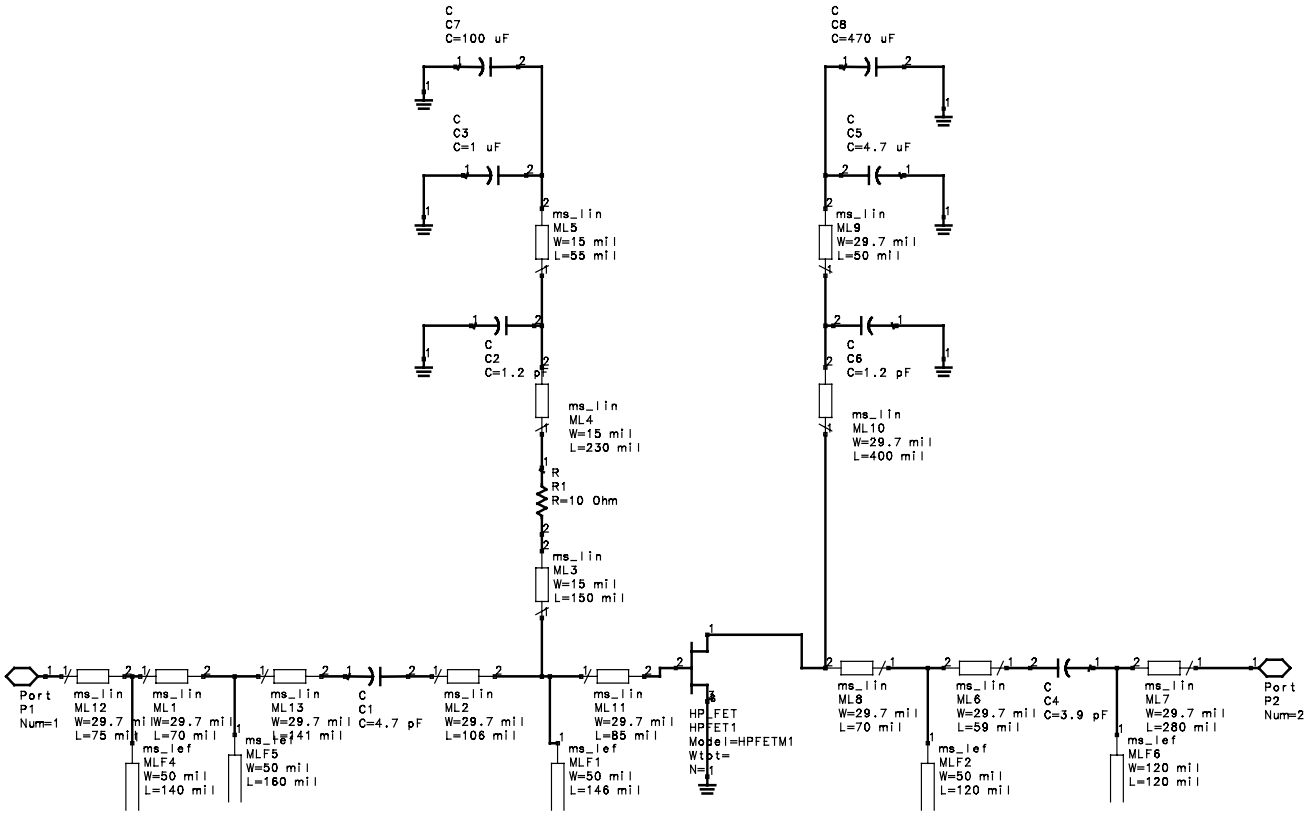
5.75 GHz Application Circuit Schematic



PCB is 20 mil thick Rogers 4003 substrate

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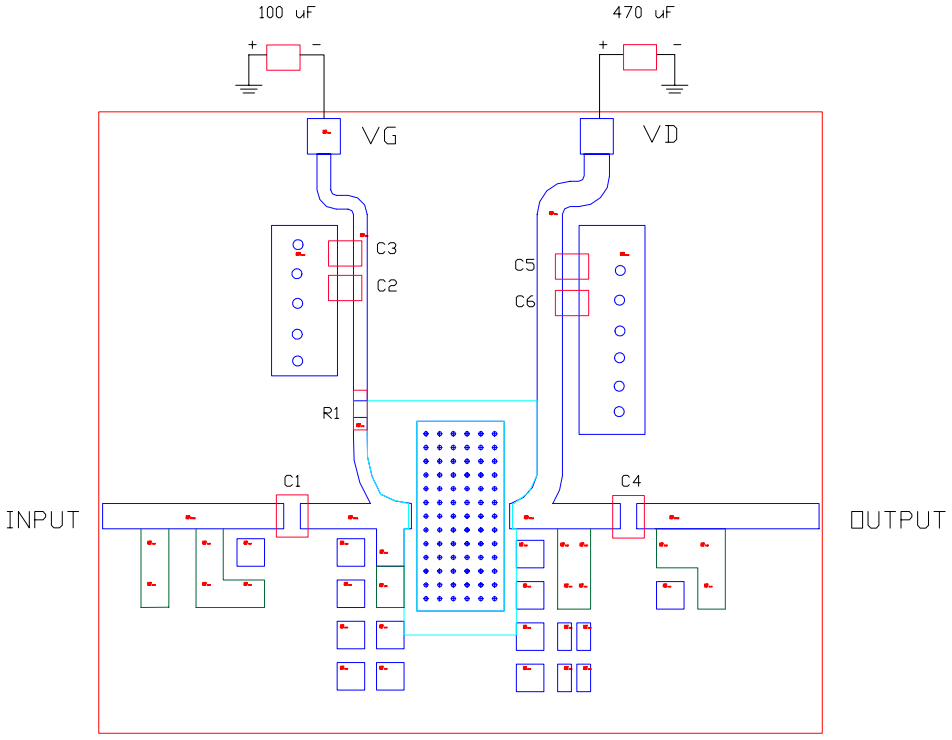
Typical Evaluation Board Layout *



*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, 4.7 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 Ω

Contact TriQuint Applications Engineering for additional info

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Assembly of a TGA2921-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 TGA2921.

3. Apply Tin Lead solder to each pin of TGA2921 and to the backside of the package.

4 Clean the assembly with alcohol.

Ordering Information

Part	Package Style
TGA2921-EPU-SG	SMT Gull Wing (Formed Leads)

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