Texas Instruments TGA8220

Monolithic Distributed 2- to 18-GHz Amplifier

Features

- 0.3-watt output power at 1-dB gain compression
- 2:1 input/output SWR
- Via grounds
- Size: 0.131 x 0.074 x 0.006 inch

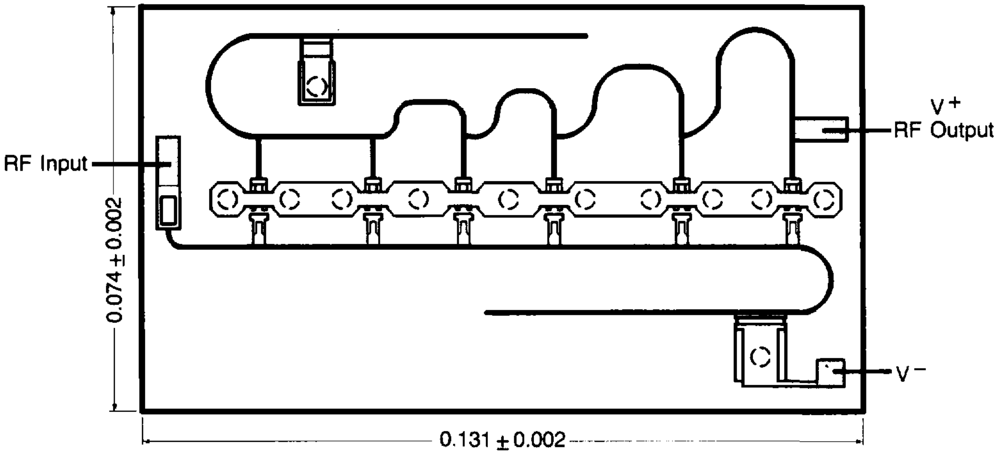
Description

The Texas Instruments TGA8220 is a GaAs monolithic distributed amplifier which operates over the 2- to 18-GHz frequency range. Six 335-μm gatewidth FETs provide 25 dBm of output power at 1-dB gain compression and 10% power-added efficiency. Small-signal gain is typically greater than 4.5 dB with positive gain slope across the band. Input return loss is typically greater than 10 dB. This medium power amplifier is suitable for a variety of wideband applications such as distribution networks, logging stages, and oscillator buffers. The TGA8220 is also cascadable with the Texas Instruments TGA8300 and/or TGA8622.

Bond pad and backside metallization is gold plated for compatibility with eutectic alloy attach methods as well as thermocompression and thermosonic wire-bonding processes. The TGA8220 is available in chip form and is readily assembled using automated equipment.

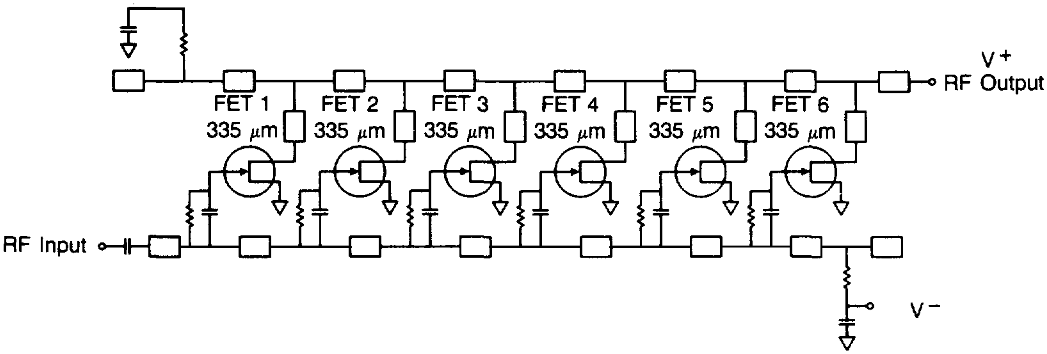
Advance Information documents contain information on new products in the sampling or preproduction stage of development. Characteristic data and other specifications are subject to change without notice.

Device Layout



Units: inches
Thickness: 0.006 (Ref. only)
☐ **Bonding pad area**

Circuit Topology



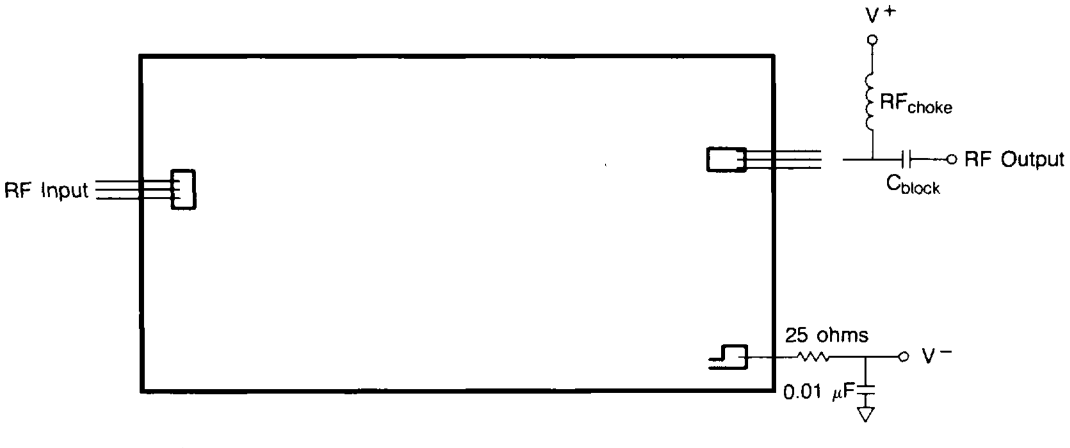
Absolute Maximum Ratings (T_A = 25°C)

Parameter	Symbol	Value	Units	Notes
Positive supply voltage	V^+	9.0	volts	
Negative supply voltage	V^-	0 to −5.0	volts	
Power dissipation	P_{DISS}	4.8	watts	1
Operating channel temperature	T_{CH}	150	°C	2
Mounting temperature (30 seconds)	T_M	320	°C	
Storage temperature	T_{STG}	−65 to 150	°C	

(1) Power devices should be mounted using alloy, as specified in the *Texas Instruments Recommended Assembly Instructions for GaAs Products.*

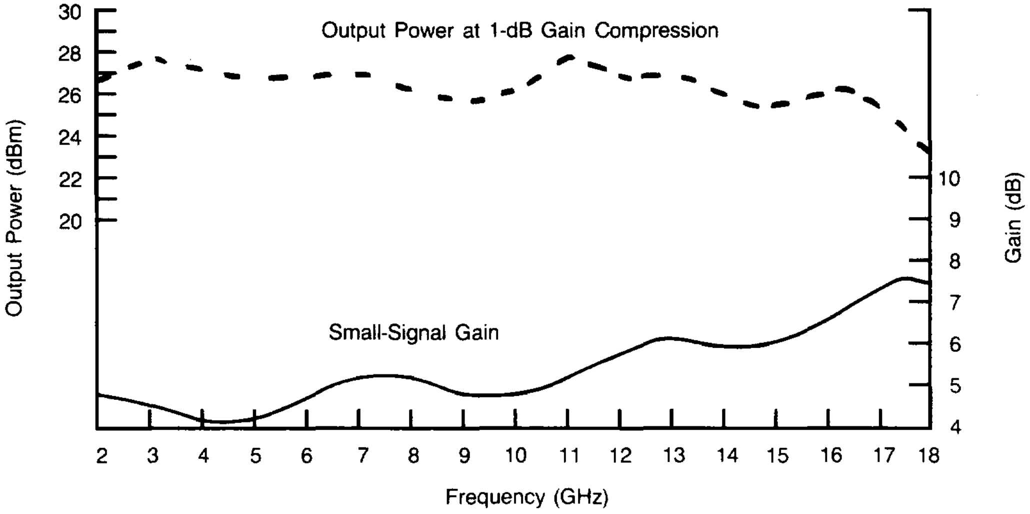
(2) Operating channel temperature will directly affect the device MTTF. For maximum life, it is recommended that channel temperature be maintained at the lowest possible level.

Recommended Bias Circuit

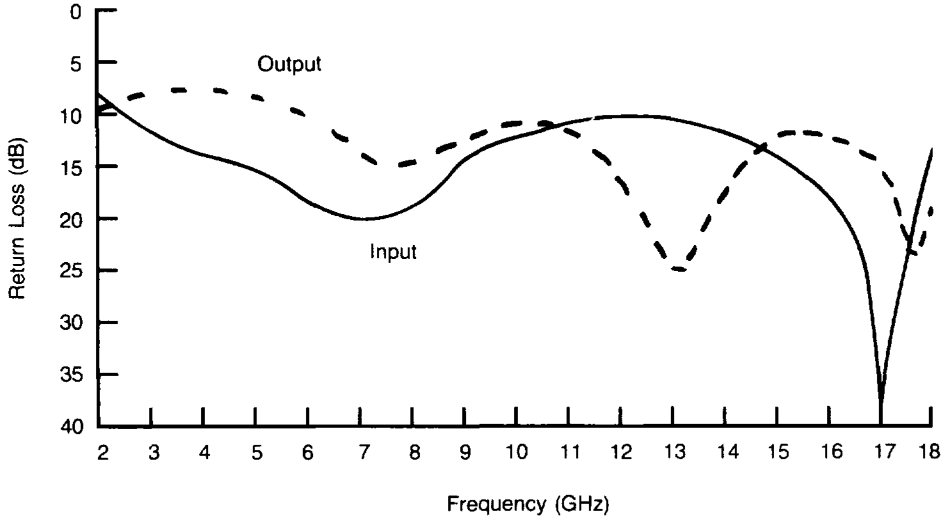


- Measuring I_{DSS}: Short V^- to ground. Increase V^+ from 0 V and measure I^+ maximum for $V^+ \leq 2$ V. I^+ maximum is I_{DSS}.
- RF connections: Bond using three 1.0-mil diameter, 10 to 15-mil length gold bond wires at both input and output.
- Close placement of external components is essential for stability.

Typical Performance
(V^+ = 8 V, I^+ = 50% I_{DSS}, T_A = 25°C)



Typical Return Loss
(V^+ = 8 V, I^+ = 50% I_{DSS}, T_A = 25°C)



Typical S-Parameters
($V^+ = 8$ V, $I^+ = 50\%$ I_{DSS}, $T_A = 25$°C)

Frequency (GHz)	S_{11}		S_{21}		S_{12}		S_{22}		$\lvert S_{21} \rvert$ (dB)
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG	
2.0	0.37	-139	1.74	123	0.010	43	0.33	174	4.8
3.0	0.26	-178	1.68	98	0.012	24	0.38	157	4.5
4.0	0.21	152	1.62	74	0.015	10	0.41	134	4.2
5.0	0.16	128	1.62	52	0.018	-6	0.37	107	4.2
6.0	0.13	120	1.72	28	0.022	-26	0.31	74	4.7
7.0	0.10	125	1.80	0	0.027	-54	0.21	20	5.1
8.0	0.12	139	1.82	-29	0.029	-84	0.16	-63	5.2
9.0	0.17	136	1.74	-56	0.029	-108	0.22	-129	4.8
10.0	0.22	124	1.74	-81	0.031	-127	0.26	-156	4.8
11.0	0.28	103	1.82	-106	0.038	-144	0.25	142	5.2
12.0	0.32	78	1.95	-134	0.047	-169	0.14	91	5.8
13.0	0.30	53	1.97	-167	0.054	164	0.05	-7	5.9
14.0	0.26	30	1.97	163	0.058	136	0.13	-143	5.9
15.0	0.20	14	2.00	134	0.061	114	0.22	152	6.0
16.0	0.14	-4	2.14	103	0.071	87	0.24	128	6.6
17.0	0.01	29	2.29	68	0.087	55	0.16	95	7.2
18.0	0.21	104	2.34	27	0.098	16	0.10	53	7.4

NOTE: Reference planes for S-parameters include bond wires, as specified in the Recommended Bias Circuit.

Typical Electrical Characteristics

($V^+ = 8$ V, $I^+ = 50\%$ I_{DSS}, $T_A = 25°C$)

Parameter	Symbol	Test Conditions	Value	Units
Positive supply current	I^+	$V^+ = 8$ V	320	mA
Output power at 1-dB gain compression	P_{1dB}	2 GHz	27	dBm
		6 GHz	27	dBm
		12 GHz	27	dBm
		18 GHz	24	dBm
Output third-order intercept	IP_3	2 GHz	36	dBm
		6 GHz	38	dBm
		12 GHz	40	dBm
		18 GHz	37	dBm
Noise figure	NF	2 GHz	8.0	dB
		6 GHz	7.6	dB
		12 GHz	7.4	dB
		18 GHz	8.2	dB

NOTE: DC specification limits available upon request.