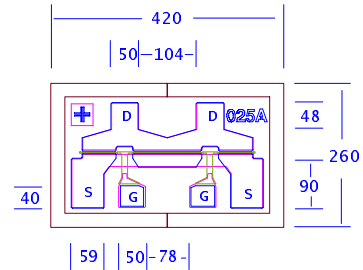


**EPA025A****DATA SHEET****High Efficiency Heterojunction Power FET**

- +22.5dBm TYPICAL OUTPUT POWER
- 11.0dB TYPICAL POWER GAIN AT 18 GHz
- TYPICAL 0.85dB NOISE FIGURE AND 11.0dB ASSOCIATED GAIN AT 12GHz
- 0.3 X 250 MICRON RECESSED “MUSHROOM” GATE
- Si<sub>3</sub>N<sub>4</sub> PASSIVATION
- ADVANCED EPITAXIAL HETEROJUNCTION PROFILE PROVIDES EXTRA HIGH POWER EFFICIENCY, AND HIGH RELIABILITY
- Idss SORTED IN 5 mA PER BIN RANGE



Chip Thickness: 75 ± 13 microns  
All Dimensions In Microns

**ELECTRICAL CHARACTERISTICS (T<sub>a</sub> = 25 °C)**

SYMBOLS	PARAMETERS/TEST CONDITIONS	MIN	TYP	MAX	UNIT
<b>P<sub>1dB</sub></b>	Output Power at 1dB Compression V <sub>ds</sub> =8V, I <sub>ds</sub> =50% I <sub>dss</sub>	f=12GHz 21.0	f=12GHz 22.5		dBm
<b>G<sub>1dB</sub></b>	Gain at 1dB Compression V <sub>ds</sub> =8V, I <sub>ds</sub> =50% I <sub>dss</sub>	f=12GHz 12.0	f=12GHz 13.5		dB
<b>PAE</b>	Gain at 1dB Compression V <sub>ds</sub> =8V, I <sub>ds</sub> =50% I <sub>dss</sub>	f=12GHz	47		%
<b>NF</b>	Noise Figure V <sub>ds</sub> =2V, I <sub>ds</sub> =15mA	f=12GHz	0.85		dB
<b>G<sub>a</sub></b>	Associated Gain V <sub>ds</sub> =2V, I <sub>ds</sub> =15mA	f=12GHz	11.0		dB
<b>I<sub>dss</sub></b>	Saturated Drain Current V <sub>ds</sub> =3V, V <sub>gs</sub> =0V	40	75	105	mA
<b>G<sub>m</sub></b>	Transconductance V <sub>ds</sub> =3V, V <sub>gs</sub> =0V	50	80		mS
<b>V<sub>p</sub></b>	Pinch-off Voltage V <sub>ds</sub> =3V, I <sub>ds</sub> =1.0mA		-1.0	-2.5	V
<b>BV<sub>gd</sub></b>	Drain Breakdown Voltage I <sub>gd</sub> =1.0mA	-11	-15		V
<b>BV<sub>gs</sub></b>	Source Breakdown Voltage I <sub>gs</sub> =1.0mA	-7	-14		V
<b>R<sub>th</sub></b>	Thermal Resistance (Au-Sn Eutectic Attach)		155		°C/W

**MAXIMUM RATINGS AT 25 °C**

SYMBOLS	PARAMETERS	ABSOLUTE <sup>1</sup>	CONTINUOUS <sup>2</sup>
<b>V<sub>ds</sub></b>	Drain-Source Voltage	12V	8V
<b>V<sub>gs</sub></b>	Gate-Source Voltage	-8V	-3V
<b>I<sub>ds</sub></b>	Drain Current	I <sub>dss</sub>	90mA
<b>I<sub>gsf</sub></b>	Forward Gate Current	12mA	2mA
<b>P<sub>in</sub></b>	Input Power	19dBm	@3dB Compression
<b>T<sub>ch</sub></b>	Channel Temperature	175°C	150°C
<b>T<sub>stg</sub></b>	Storage Temperature	-65/175°C	-65/150°C
<b>P<sub>t</sub></b>	Total Power Dissipation	880mW	730mW

Note: 1. Exceeding any of the above ratings may result in permanent damage.

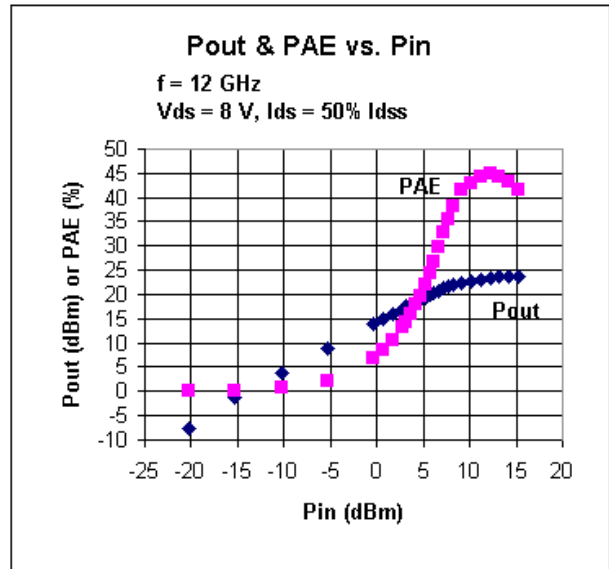
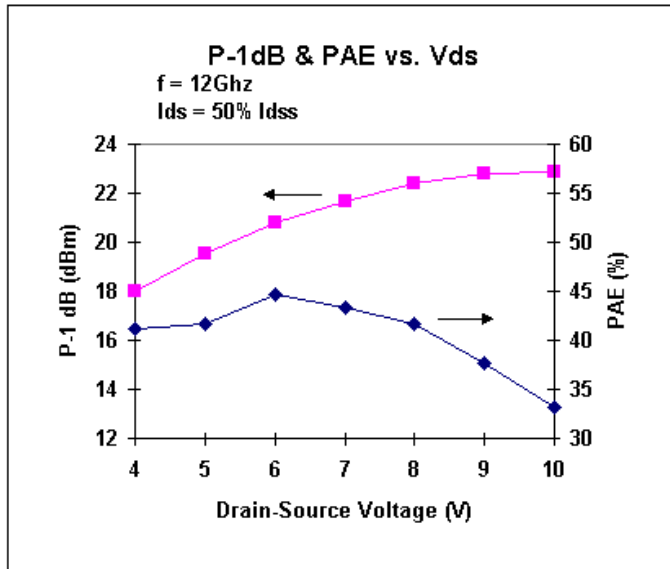
2. Exceeding any of the above ratings may reduce MTTF below design goals.

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**Phone: (408) 970-8664 Fax: (408) 970-8998 Web Site: [www.excelics.com](http://www.excelics.com)**

# EPA025A

## DATA SHEET

### High Efficiency Heterojunction Power FET



## S-PARAMETERS

8V, 1/2 Idss

FREQ (GHz)	S11		S21		S12		S22		FREQ (GHz)	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG		MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
1.0	0.977	-18.0	5.880	165.4	0.013	76.4	0.824	-5.7	21.0	0.778	-176.3	1.773	15.8	0.064	21.3	0.640	-112.8
2.0	0.956	-35.4	5.651	153.1	0.024	69.4	0.811	-11.6	22.0	0.782	179.5	1.687	8.8	0.068	18.9	0.650	-122.9
3.0	0.920	-51.6	5.344	141.0	0.033	62.0	0.780	-16.7	23.0	0.788	175.3	1.592	1.5	0.071	16.5	0.667	-132.8
4.0	0.890	-67.1	4.998	129.8	0.040	53.8	0.752	-22.2	24.0	0.792	172.1	1.488	-5.4	0.074	15.5	0.689	-142.0
5.0	0.860	-81.1	4.600	119.2	0.046	48.5	0.721	-27.3	25.0	0.805	170.2	1.390	-11.8	0.075	15.4	0.715	-150.5
6.0	0.837	-93.0	4.216	109.7	0.048	43.0	0.701	-32.5	26.0	0.800	169.2	1.272	-17.1	0.078	17.5	0.751	-156.8
7.0	0.820	-103.5	3.858	101.0	0.050	38.3	0.684	-38.0	27.0	0.806	168.2	1.179	-21.7	0.080	18.7	0.763	-162.7
8.0	0.808	-112.4	3.521	93.0	0.051	34.3	0.672	-43.4	28.0	0.818	168.3	1.103	-25.2	0.085	20.1	0.789	-166.0
9.0	0.798	-119.7	3.208	85.7	0.050	30.0	0.660	-48.9	29.0	0.828	168.0	1.033	-28.4	0.092	23.5	0.800	-169.2
10.0	0.790	-125.1	2.942	79.7	0.047	27.3	0.658	-53.7	30.0	0.820	167.7	0.974	-31.4	0.098	23.1	0.808	-171.5
11.0	0.788	-130.0	2.717	73.5	0.046	26.3	0.660	-58.6	31.0	0.824	167.4	0.927	-34.1	0.104	23.6	0.809	-173.9
12.0	0.784	-134.0	2.525	68.0	0.045	25.8	0.663	-63.4	32.0	0.819	166.8	0.903	-36.6	0.106	22.6	0.811	-176.6
13.0	0.781	-137.6	2.362	62.8	0.044	24.4	0.665	-67.7	33.0	0.809	165.5	0.873	-39.9	0.109	21.1	0.813	-179.6
14.0	0.779	-140.9	2.239	58.1	0.043	25.2	0.665	-71.4	34.0	0.803	163.0	0.869	-44.4	0.110	19.2	0.809	-174.9
15.0	0.781	-144.5	2.153	52.9	0.043	25.7	0.669	-75.3	35.0	0.799	159.4	0.865	-49.8	0.111	17.2	0.820	-167.7
16.0	0.780	-148.3	2.088	47.9	0.044	28.7	0.675	-79.2	36.0	0.800	155.1	0.858	-56.9	0.113	16.4	0.837	-158.4
17.0	0.776	-153.2	2.022	42.2	0.048	27.3	0.669	-84.2	37.0	0.810	149.3	0.856	-65.2	0.118	10.1	0.864	-146.7
18.0	0.776	-158.1	1.975	36.6	0.053	26.8	0.662	-88.9	38.0	0.823	142.4	0.832	-74.5	0.120	0.4	0.875	-134.4
19.0	0.776	-163.2	1.943	30.3	0.057	26.4	0.654	-94.8	39.0	0.832	132.4	0.787	-85.9	0.121	-12.8	0.895	-122.9
20.0	0.773	-169.1	1.902	23.6	0.062	23.9	0.651	-101.7	40.0	0.822	125.1	0.716	-96.2	0.111	-27.3	0.899	-113.0

Note: The data included 0.7 mils diameter Au bonding wires  
2 gate wires, 15 mils each; 2 drain wires, 20 mils each; 4 source wires, 7 mils each.

**EPA025A****DATA SHEET****High Efficiency Heterojunction Power FET****S-PARAMETERS****2V, 15mA**

Freq GHz	---S11---		---S21---		---S12---		---S22---		Freq GHz	---S11---		---S21---		---S12---		---S22---	
	Mag	Ang	Mag	Ang	Mag	Ang	Mag	Ang		Mag	Ang	Mag	Ang	Mag	Ang	Mag	Ang
1.0	0.990	-16.2	6.768	167.3	0.020	80.0	0.615	-10.6	21.0	0.711	179.5	2.038	33.0	0.116	-6.7	0.353	-136.9
2.0	0.961	-32.3	6.535	155.4	0.039	70.1	0.597	-20.8	22.0	0.722	174.6	1.933	27.9	0.114	-8.8	0.343	-146.9
3.0	0.933	-48.0	6.261	144.1	0.055	61.5	0.561	-31.3	23.0	0.723	171.1	1.838	23.1	0.113	-10.9	0.361	-156.4
4.0	0.897	-63.8	5.880	133.0	0.069	53.2	0.523	-41.8	24.0	0.724	166.4	1.713	18.0	0.111	-12.5	0.390	-165.8
5.0	0.866	-76.5	5.414	123.7	0.078	46.3	0.503	-50.0	25.0	0.739	163.2	1.600	14.2	0.108	-13.3	0.418	-168.9
6.0	0.833	-88.2	4.964	115.0	0.086	40.0	0.468	-57.7	26.0	0.739	161.9	1.487	10.8	0.104	-13.4	0.458	-172.1
7.0	0.810	-98.6	4.585	107.0	0.091	34.6	0.441	-66.2	27.0	0.740	161.8	1.405	9.1	0.104	-12.2	0.482	-169.3
8.0	0.789	-108.0	4.215	99.9	0.095	29.8	0.419	-73.2	28.0	0.730	161.3	1.356	6.6	0.103	-11.3	0.519	-168.9
9.0	0.769	-115.9	3.893	93.4	0.098	25.3	0.406	-80.1	29.0	0.715	159.4	1.333	4.5	0.106	-10.4	0.521	-166.2
10.0	0.753	-122.8	3.614	87.6	0.099	21.1	0.390	-86.4	30.0	0.709	155.1	1.307	0.7	0.107	-10.6	0.530	-166.6
11.0	0.738	-129.6	3.371	81.6	0.101	18.0	0.388	-93.0	31.0	0.710	151.4	1.292	-2.3	0.111	-12.3	0.508	-166.0
12.0	0.728	-136.3	3.141	76.0	0.101	14.3	0.378	-99.2	32.0	0.691	149.3	1.273	-6.0	0.113	-13.2	0.511	-169.7
13.0	0.722	-141.0	2.925	71.2	0.102	11.9	0.390	-105.0	33.0	0.685	143.3	1.280	-11.0	0.115	-16.8	0.493	-174.4
14.0	0.711	-144.8	2.754	67.0	0.102	9.2	0.407	-106.6	34.0	0.678	137.2	1.238	-15.8	0.115	-19.8	0.492	179.1
15.0	0.700	-149.3	2.635	62.5	0.104	7.6	0.408	-106.9	35.0	0.692	132.2	1.211	-19.7	0.116	-23.0	0.490	171.5
16.0	0.696	-156.8	2.550	57.2	0.107	5.0	0.396	-110.5	36.0	0.702	129.0	1.182	-24.3	0.115	-26.4	0.490	167.3
17.0	0.698	-164.6	2.430	51.6	0.108	1.8	0.389	-115.8	37.0	0.709	122.3	1.173	-29.7	0.117	-30.7	0.469	156.7
18.0	0.704	-170.3	2.298	46.7	0.109	-0.6	0.377	-119.9	38.0	0.740	114.8	1.112	-37.4	0.118	-39.7	0.494	140.6
19.0	0.710	-174.8	2.201	41.9	0.111	-2.9	0.369	-125.2	39.0	0.776	113.3	1.009	-41.2	0.112	-43.4	0.553	135.6
20.0	0.709	-179.4	2.117	36.8	0.112	-5.4	0.373	-131.6	40.0	0.793	118.4	0.919	-40.8	0.108	-42.6	0.547	142.6

<b>EPA025A</b>				
<b>Noise Parameters</b>				
<b>V<sub>ds</sub>=2V, I<sub>ds</sub>=15mA</b>				
Freq	Gamma Opt		Nfmin	Rn/50
(GHz)	(MAG)	(ANG)	(dB)	
2	0.82	17	0.37	0.57
4	0.8	36	0.46	0.51
6	0.78	49	0.56	0.49
8	0.76	63	0.64	0.44
10	0.73	79	0.76	0.39
12	0.71	94	0.88	0.35
14	0.69	103	1.08	0.31
16	0.68	118	1.31	0.26
18	0.68	131	1.51	0.19
20	0.67	142	1.65	0.14
22	0.66	149	1.88	0.12
24	0.64	162	2.05	0.076
26	0.62	172	2.29	0.064

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