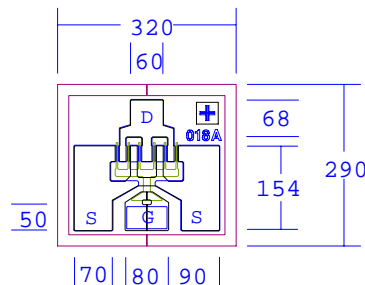


**DATA SHEET**
**High Efficiency Heterojunction Power FET**

- **VERY HIGH  $f_{max}$ : 120GHz**
- **+20.0dBm TYPICAL OUTPUT POWER**
- **13.0dB TYPICAL POWER GAIN AT 18 GHz**
- **TYPICAL 0.75dB NOISE FIGURE AND 12.5dB ASSOCIATED GAIN AT 12GHz**
- **0.3 X 180 MICRON RECESSED “MUSHROOM” GATE**
- **$Si_3N_4$  PASSIVATION**
- **ADVANCED EPITAXIAL HETEROJUNCTION PROFILE PROVIDES EXTRA HIGH POWER EFFICIENCY, AND HIGH RELIABILITY**
- **$I_{dss}$  SORTED IN 5 mA PER BIN RANGE**



Chip Thickness:  $75 \pm 13$  microns  
All Dimensions In Microns

**ELECTRICAL CHARACTERISTICS ( $T_a = 25^\circ C$ )**

SYMBOLS	PARAMETERS/TEST CONDITIONS		MIN	TYP	MAX	UNIT
$P_{1dB}$	Output Power at 1dB Compression	$f=12GHz$ $V_{ds}=6V, I_{ds}=50\% I_{dss}$	18.0	20.0*		dBm
$G_{1dB}$	Gain at 1dB Compression	$f=12GHz$ $V_{ds}=6V, I_{ds}=50\% I_{dss}$	13.0	14.5		dB
$PAE$	Power Added Efficiency at 1dB Compression	$f=12GHz$ $V_{ds}=6V, I_{ds}=50\% I_{dss}$		48		%
$NF$	Noise Figure	$f=12GHz$ $V_{ds}=2V, I_{ds}=15mA$		0.75		dB
$G_a$	Associated Gain	$f=12GHz$ $V_{ds}=2V, I_{ds}=15mA$		12.5		dB
$I_{dss}$	Saturated Drain Current	$V_{ds}=3V, V_{gs}=0V$	30	55	80	mA
$G_m$	Transconductance	$V_{ds}=3V, V_{gs}=0V$	35	60		mS
$V_p$	Pinch-off Voltage	$V_{ds}=3V, I_{ds}=1.0mA$		-1.0	-2.5	V
$BV_{gd}$	Drain Breakdown Voltage	$I_{gd}=0.5mA$	-9	-15		V
$BV_{gs}$	Source Breakdown Voltage	$I_{gs}=0.5mA$	-7	-14		V
$R_{th}$	Thermal Resistance (Au-Sn Eutectic Attach)			185		$^\circ C/W$

\*  $P_{1dB} = 21.5dBm$  can be obtained with 8v/50%  $I_{dss}$  bias. Consult factory for wafer selection.

**MAXIMUM RATINGS AT  $25^\circ C$** 

SYMBOLS	PARAMETERS	ABSOLUTE <sup>1</sup>	CONTINUOUS <sup>2</sup>
$V_{ds}$	Drain-Source Voltage	12V	6V
$V_{gs}$	Gate-Source Voltage	-8V	-3V
$I_{ds}$	Drain Current	$I_{dss}$	$I_{dss}$
$I_{gsf}$	Forward Gate Current	9mA	1.5mA
$P_{in}$	Input Power	16dBm	@3dB Compression
$T_{ch}$	Channel Temperature	175 $^\circ C$	150 $^\circ C$
$T_{stg}$	Storage Temperature	-65/175 $^\circ C$	-65/150 $^\circ C$
$P_t$	Total Power Dissipation	740mW	625mW

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

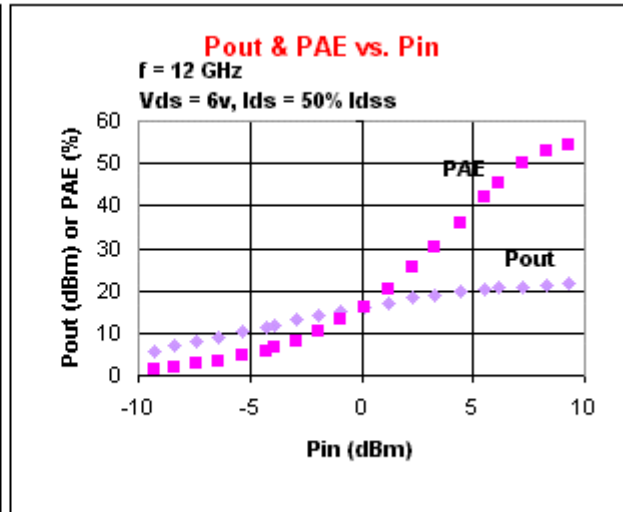
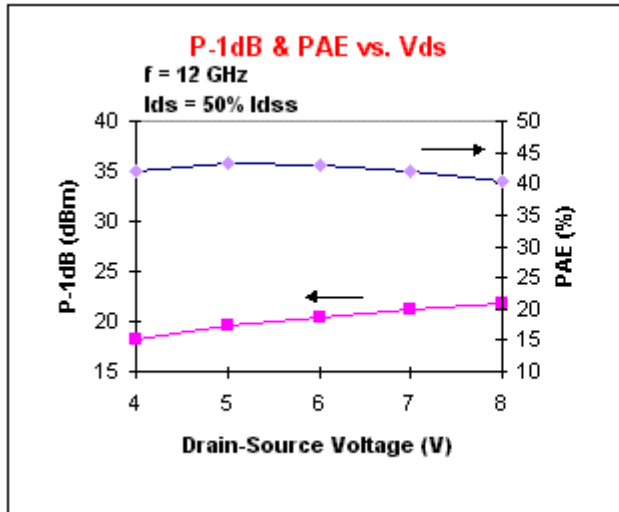
2. Exceeding any of the above ratings may reduce MTTF below design goals.

**Excelics Semiconductor, Inc., 2908 Scott Blvd., Santa Clara, CA 95054**

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

## DATA SHEET

## High Efficiency Heterojunction Power FET



## S-PARAMETERS

6V, 1/2 Idss

FREQ (GHz)	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
1.0	0.980	-13.0	4.681	169.2	0.010	77.2	0.837	-3.5
2.0	0.969	-25.7	4.581	160.2	0.020	71.8	0.830	-7.2
3.0	0.953	-38.3	4.476	151.2	0.030	67.3	0.819	-10.8
4.0	0.933	-50.7	4.339	142.0	0.037	61.9	0.803	-14.8
5.0	0.908	-63.2	4.206	132.9	0.044	54.3	0.783	-18.9
6.0	0.888	-74.6	4.017	124.3	0.050	48.5	0.765	-22.7
7.0	0.868	-84.9	3.825	116.2	0.054	42.9	0.748	-26.8
8.0	0.850	-94.8	3.635	108.5	0.058	37.9	0.734	-30.6
9.0	0.833	-103.7	3.440	101.2	0.061	32.3	0.720	-34.4
10.0	0.815	-111.8	3.260	94.4	0.062	28.2	0.708	-37.7
11.0	0.807	-119.7	3.108	87.9	0.065	23.9	0.700	-41.1
12.0	0.793	-127.2	2.963	81.8	0.066	20.3	0.691	-43.8
13.0	0.785	-135.1	2.852	75.6	0.067	16.4	0.683	-46.4
14.0	0.775	-143.2	2.749	69.6	0.069	12.9	0.676	-48.4
15.0	0.768	-151.8	2.663	63.4	0.070	9.5	0.664	-50.6
16.0	0.763	-161.0	2.585	57.1	0.071	6.7	0.655	-52.6
17.0	0.762	-170.3	2.515	50.6	0.074	3.4	0.641	-54.7
18.0	0.757	-180.0	2.423	44.1	0.076	0.2	0.626	-56.7
19.0	0.765	-170.4	2.341	37.4	0.079	-2.4	0.604	-59.5
20.0	0.767	-162.2	2.254	30.8	0.081	-6.3	0.587	-63.0
21.0	0.780	-155.3	2.138	24.4	0.080	-8.7	0.563	-69.3
22.0	0.791	-148.7	2.031	18.3	0.081	-12.2	0.547	-74.8
23.0	0.795	-143.4	1.918	12.1	0.080	-14.7	0.541	-81.1
24.0	0.804	-138.9	1.824	6.4	0.079	-15.9	0.543	-87.9
25.0	0.811	-136.3	1.743	1.5	0.078	-16.3	0.553	-94.0
26.0	0.807	-134.9	1.676	-3.1	0.077	-17.8	0.564	-100.7
27.0	0.817	-133.7	1.603	-7.8	0.076	-17.2	0.580	-106.7
28.0	0.816	-131.8	1.544	-12.8	0.078	-16.7	0.592	-113.0
29.0	0.806	-130.5	1.520	-17.2	0.078	-16.7	0.611	-117.6
30.0	0.804	-128.8	1.494	-22.0	0.079	-17.3	0.618	-123.0
31.0	0.797	-125.3	1.461	-27.2	0.081	-20.4	0.622	-127.6
32.0	0.795	-121.1	1.435	-32.1	0.081	-20.9	0.615	-133.0
33.0	0.785	-115.8	1.388	-38.3	0.080	-25.9	0.609	-138.5
34.0	0.787	-110.2	1.351	-44.9	0.077	-27.8	0.592	-145.1
35.0	0.813	-103.3	1.322	-51.4	0.077	-29.9	0.585	-152.5
36.0	0.830	-97.4	1.263	-58.0	0.078	-34.9	0.578	-160.7
37.0	0.865	-88.9	1.218	-65.3	0.076	-38.4	0.587	-170.1
38.0	0.886	-84.5	1.144	-72.1	0.079	-43.6	0.599	-178.7
39.0	0.897	-78.4	1.064	-79.8	0.079	-51.9	0.625	-172.4
40.0	0.905	-74.8	0.975	-86.4	0.078	-60.4	0.651	-165.4

## S-PARAMETERS

2V, 15mA

FREQ (GHz)	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
1.0	1.000	-11.0	5.013	170.5	0.017	79.9	0.631	-6.1
2.0	0.990	-21.5	4.947	162.8	0.032	73.8	0.622	-12.6
3.0	0.976	-32.1	4.862	154.8	0.047	69.2	0.609	-19.0
4.0	0.962	-42.6	4.759	146.8	0.061	62.5	0.590	-25.7
5.0	0.941	-53.4	4.643	138.3	0.073	56.0	0.558	-33.1
6.0	0.922	-63.6	4.479	130.6	0.084	49.9	0.535	-39.9
7.0	0.905	-73.1	4.298	123.1	0.094	43.9	0.511	-46.9
8.0	0.883	-82.0	4.112	116.0	0.103	38.2	0.490	-53.5
9.0	0.864	-90.4	3.938	109.3	0.108	32.9	0.469	-60.0
10.0	0.846	-97.9	3.753	103.1	0.114	27.6	0.450	-65.4
11.0	0.829	-105.3	3.615	97.0	0.120	23.1	0.436	-70.8
12.0	0.819	-112.4	3.472	91.3	0.124	18.8	0.422	-75.4
13.0	0.804	-120.0	3.360	85.4	0.130	14.1	0.400	-80.2
14.0	0.792	-128.0	3.274	79.7	0.134	9.6	0.379	-84.5
15.0	0.784	-136.3	3.181	74.0	0.139	5.0	0.357	-89.3
16.0	0.777	-145.0	3.116	67.7	0.144	0.6	0.330	-95.2
17.0	0.770	-155.2	3.019	61.0	0.148	-4.3	0.297	-102.0
18.0	0.773	-165.3	2.932	54.4	0.153	-9.5	0.260	-111.1
19.0	0.770	-175.2	2.813	47.7	0.155	-14.3	0.226	-121.2
20.0	0.771	-175.3	2.696	41.0	0.156	-18.8	0.201	-135.4
21.0	0.780	-169.2	2.466	35.3	0.150	-22.9	0.204	-156.1
22.0	0.777	-163.2	2.327	30.2	0.149	-26.0	0.209	-168.6
23.0	0.793	-157.9	2.206	25.0	0.147	-29.1	0.225	-177.7
24.0	0.789	-154.9	2.096	20.6	0.145	-31.6	0.240	-176.0
25.0	0.796	-151.5	2.025	16.6	0.144	-34.3	0.260	-172.7
26.0	0.804	-149.6	1.928	12.1	0.145	-36.0	0.272	-169.4
27.0	0.786	-147.6	1.868	8.6	0.142	-37.7	0.282	-168.5
28.0	0.788	-146.0	1.811	5.0	0.143	-39.3	0.287	-166.7
29.0	0.779	-144.4	1.790	1.1	0.143	-41.4	0.293	-164.7
30.0	0.777	-140.9	1.758	-3.4	0.145	-44.5	0.294	-162.2
31.0	0.769	-137.1	1.723	-7.6	0.145	-46.8	0.292	-157.2
32.0	0.770	-131.7	1.683	-12.6	0.145	-51.5	0.290	-151.7
33.0	0.758	-126.2	1.606	-17.8	0.142	-55.4	0.287	-143.1
34.0	0.764	-120.0	1.541	-22.6	0.140	-61.1	0.293	-134.7
35.0	0.777	-114.3	1.497	-27.1	0.136	-64.6	0.311	-122.2
36.0	0.799	-107.4	1.414	-31.6	0.134	-70.1	0.345	-114.2
37.0	0.824	-101.9	1.339	-37.1	0.134	-75.6	0.384	-104.6
38.0	0.856	-97.2	1.277	-41.9	0.130	-82.7	0.431	-98.0
39.0	0.877	-92.4	1.196	-47.5	0.126	-87.6	0.478	-93.3
40.0	0.884	-89.0	1.100	-52.6	0.123	-92.6	0.517	-91.0

Note: The data included 0.7 mils diameter Au bonding wires:  
1 gate wire, 15 mils each; 1 drain wire, 20 mils each; 6 source wires, 8 mils each.