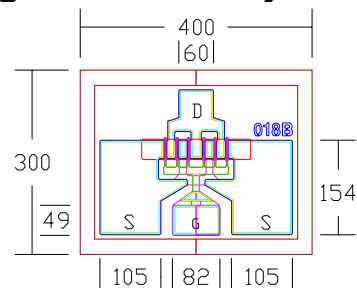


ISSUED 11/01/2007

## Super Low Noise High Gain Heterojunction FET

### FEATURES

- VERY HIGH  $f_{max}$ : 120GHz
- TYPICAL 0.50~0.90dB NOISE FIGURE AND 12.0~13.0dB ASSOCIATED GAIN AT 12GHz
- 0.3 X 180 MICRON RECESSED "MUSHROOM" GATE
- $Si_3N_4$  PASSIVATION
- ADVANCED EPITAXIAL HETEROJUNCTION PROFILE PROVIDES SUPER LOW NOISE, HIGH GAIN AND HIGH RELIABILITY
- $I_{DSS}$  SORTED IN 5 mA PER BIN RANGE


 Chip Thickness: 75±13 microns  
 All Dimensions in Microns

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


**Caution! ESD sensitive device.**

SYMBOL	PARAMETERS/TEST CONDITIONS	MIN	TYP	MAX	UNITS			
NF	Noise Figure, $f = 12GHz$ $V_{DS} = 2 V, I_{DS} \approx 15 mA$				dB			
						EPB018B5	0.50	0.60
						EPB018B7	0.65	0.80
Ga	Associated Gain, $f = 12GHz$ $V_{DS} = 2 V, I_{DS} \approx 15 mA$				dB			
						EPB018B5	12.0	13.0
						EPB018B7	11.5	12.5
P <sub>1dB</sub>	Output Power at 1dB Compression $V_{DS} = 3 V, I_{DS} = 25 mA$				dBm			
						f = 12GHz	15.0	
						f = 18GHz	15.0	
G <sub>1dB</sub>	Gain at 1dB Compression $V_{DS} = 3 V, I_{DS} = 25 mA$				dB			
						f = 12GHz	15.0	
						f = 18GHz	13.0	
I <sub>DSS</sub>	Saturated Drain Current $V_{DS} = 2 V, V_{GS} = 0 V$	15	45	80	mA			
G <sub>M</sub>	Transconductance $V_{DS} = 2 V, V_{GS} = 0 V$	50	90		mS			
V <sub>P</sub>	Pinch-off Voltage $V_{DS} = 2 V, I_{DS} = 1.0 mA$		-0.8	-2.5	V			
BV <sub>GD</sub>	Drain Breakdown Voltage $I_{GD} = 10 uA$	-3	-6		V			
BV <sub>GS</sub>	Source Breakdown Voltage $I_{GS} = 10 uA$	-3	-6		V			
R <sub>TH</sub>	Thermal Resistance (Au-Sn Eutectic Attach)		185		°C/W			

### MAXIMUM RATINGS AT 25°C

SYMBOL	CHARACTERISTIC	ABSOLUTE <sup>1</sup>	CONTINUOUS <sup>2</sup>
V <sub>DS</sub>	Drain to Source Voltage	5V	4 V
V <sub>GS</sub>	Gate to Source Voltage	-3V	- 2 V
I <sub>DS</sub>	Drain Current	I <sub>DSS</sub>	I <sub>DSS</sub>
I <sub>GSF</sub>	Forward Gate Current	2mA	0.3 mA
P <sub>IN</sub>	Input Power	12dBm	@ 1dB compression
T <sub>CH</sub>	Channel Temperature	175°C	150°C
T <sub>STG</sub>	Storage Temperature	-65/175°C	-65/150°C
P <sub>T</sub>	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.

Specifications are subject to change without notice.



# EPB018B5/B7/B9

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## Super Low Noise High Gain Heterojunction FET

### S-PARAMETERS (Vds=2V, Ids=15mA)

EPB018A5									EPB018A7								
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	0.987	-12.7	6.651	169.6	0.019	81.2	0.504	-9.6	1.0	0.987	-13.3	6.211	169.5	0.021	80.6	0.675	-8.0
2.0	0.972	-25.2	6.514	160.5	0.038	73.7	0.497	-19.6	2.0	0.972	-26.3	6.132	159.7	0.041	73.0	0.661	-16.1
3.0	0.954	-38.0	6.378	151.5	0.054	66.6	0.482	-30.0	3.0	0.951	-41.2	5.989	149.8	0.060	65.6	0.638	-25.5
4.0	0.930	-50.6	6.163	142.4	0.069	59.5	0.462	-39.9	4.0	0.931	-55.4	5.766	139.8	0.076	56.3	0.599	-34.0
5.0	0.900	-64.2	5.929	133.0	0.083	51.9	0.428	-50.9	5.0	0.905	-70.2	5.504	129.7	0.091	48.5	0.550	-42.9
6.0	0.876	-76.5	5.630	124.6	0.094	44.9	0.403	-60.5	6.0	0.880	-83.1	5.156	120.6	0.101	40.9	0.501	-51.0
7.0	0.854	-87.9	5.303	116.7	0.103	38.5	0.378	-70.2	7.0	0.860	-94.9	4.793	112.3	0.110	34.3	0.456	-58.2
8.0	0.832	-98.6	4.993	109.3	0.110	32.8	0.353	-79.3	8.0	0.840	-106.1	4.460	104.8	0.116	28.3	0.425	-64.8
9.0	0.815	-108.2	4.681	102.6	0.115	27.2	0.332	-87.9	9.0	0.819	-115.6	4.151	98.2	0.120	22.5	0.400	-70.4
10.0	0.800	-116.8	4.409	96.5	0.119	22.3	0.313	-95.8	10.0	0.802	-123.8	3.878	92.2	0.123	18.2	0.381	-75.4
11.0	0.788	-124.4	4.168	90.7	0.123	17.9	0.298	-103.5	11.0	0.784	-131.7	3.667	86.5	0.128	14.1	0.372	-79.9
12.0	0.779	-131.3	3.959	85.3	0.127	13.7	0.286	-111.2	12.0	0.768	-139.7	3.492	81.1	0.131	10.1	0.366	-83.5
13.0	0.767	-138.7	3.779	79.9	0.131	9.5	0.277	-118.8	13.0	0.757	-147.5	3.344	75.8	0.135	5.9	0.359	-87.4
14.0	0.759	-146.1	3.631	74.5	0.135	5.3	0.269	-126.9	14.0	0.744	-154.7	3.243	70.3	0.141	1.7	0.343	-92.4
15.0	0.747	-153.4	3.487	69.1	0.138	1.0	0.262	-135.2	15.0	0.736	-162.2	3.142	64.6	0.145	-2.8	0.319	-98.1
16.0	0.742	-161.8	3.377	63.1	0.142	-3.3	0.259	-144.5	16.0	0.735	-172.3	3.043	57.8	0.149	-7.4	0.296	-105.3
17.0	0.736	-171.4	3.222	56.8	0.144	-8.1	0.258	-155.7	17.0	0.736	176.7	2.896	51.0	0.151	-12.9	0.271	-113.2
18.0	0.737	179.0	3.077	50.5	0.146	-12.7	0.254	-166.7	18.0	0.750	168.0	2.762	44.3	0.153	-17.5	0.235	-125.2
19.0	0.741	170.3	2.899	44.7	0.146	-16.8	0.252	-178.0	19.0	0.766	162.6	2.605	38.3	0.152	-21.7	0.197	-143.1
20.0	0.746	162.9	2.727	38.9	0.145	-20.5	0.253	172.6	20.0	0.776	158.2	2.436	32.2	0.151	-25.6	0.172	-164.5
21.0	0.755	156.4	2.483	34.1	0.140	-24.0	0.278	164.1	21.0	0.790	149.4	2.161	27.0	0.142	-28.9	0.197	-172.1
22.0	0.766	149.9	2.324	29.5	0.136	-26.7	0.284	157.1	22.0	0.807	145.4	2.010	22.4	0.136	-31.8	0.201	180.0
23.0	0.773	144.6	2.175	24.9	0.134	-29.4	0.285	150.8	23.0	0.811	141.8	1.880	18.4	0.133	-33.8	0.214	174.3
24.0	0.783	141.4	2.060	21.1	0.132	-31.2	0.294	145.9	24.0	0.816	139.4	1.763	14.7	0.130	-35.5	0.223	168.3
25.0	0.787	139.2	1.965	17.3	0.133	-32.9	0.300	140.6	25.0	0.822	138.3	1.681	11.7	0.128	-36.3	0.226	165.9
26.0	0.784	136.5	1.908	13.7	0.129	-34.2	0.309	137.1	26.0	0.822	137.0	1.618	8.8	0.127	-37.5	0.238	166.1
27.0	0.784	134.8	1.828	10.2	0.133	-36.7	0.317	133.4	27.0	0.809	136.1	1.586	5.8	0.128	-39.5	0.254	165.4
28.0	0.775	133.2	1.771	7.3	0.130	-38.2	0.321	130.8	28.0	0.801	134.3	1.571	2.4	0.130	-39.8	0.270	165.8
29.0	0.772	131.3	1.734	3.5	0.133	-40.0	0.337	128.2	29.0	0.776	131.3	1.548	-0.9	0.130	-41.5	0.270	163.4
30.0	0.764	129.9	1.695	0.1	0.132	-42.5	0.343	124.5	30.0	0.772	125.8	1.541	-5.3	0.134	-44.9	0.276	163.8
31.0	0.755	126.3	1.655	-3.9	0.130	-45.6	0.362	121.5	31.0	0.746	119.2	1.530	-11.0	0.134	-49.3	0.295	160.6
32.0	0.753	122.3	1.607	-7.9	0.130	-48.8	0.376	118.2	32.0	0.716	111.1	1.487	-17.0	0.133	-54.6	0.307	155.5
33.0	0.740	117.6	1.530	-12.0	0.128	-52.3	0.398	116.5	33.0	0.696	100.1	1.419	-22.8	0.131	-61.3	0.308	150.4
34.0	0.743	113.3	1.463	-15.7	0.127	-56.3	0.416	113.3	34.0	0.707	90.2	1.348	-28.4	0.130	-67.6	0.315	143.9
35.0	0.752	107.4	1.404	-19.5	0.125	-60.9	0.437	111.1	35.0	0.734	82.8	1.273	-33.3	0.126	-74.0	0.334	135.6
36.0	0.779	101.2	1.356	-23.1	0.126	-64.7	0.455	108.0	36.0	0.777	76.6	1.188	-37.8	0.119	-79.8	0.348	127.1
37.0	0.814	95.0	1.293	-26.9	0.124	-72.7	0.474	105.5	37.0	0.836	72.4	1.108	-42.4	0.123	-86.0	0.365	120.4
38.0	0.850	90.5	1.228	-30.9	0.124	-77.6	0.490	100.6	38.0	0.884	70.6	1.030	-46.5	0.116	-93.0	0.377	112.8
39.0	0.872	86.8	1.155	-35.2	0.118	-83.1	0.496	97.5	39.0	0.925	71.2	0.945	-50.5	0.112	-99.2	0.394	105.8
40.0	0.880	84.0	1.078	-39.5	0.117	-87.9	0.498	94.1	40.0	0.932	74.1	0.863	-54.6	0.107	-103.4	0.417	100.8

Note: The data includes 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.

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# EPB018B5/B7/B9

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## Super Low Noise High Gain Heterojunction FET

Noise Parameters (V<sub>ds</sub>=2V, I<sub>ds</sub>=15mA)

EPB018A7				
Freq (GHz)	Gamma Opt (MAG)	Opt (ANG)	Nfmin (dB)	Rn/50
2	0.85	15	0.37	0.24
4	0.72	35	0.43	0.2
6	0.69	43	0.48	0.19
8	0.65	52	0.55	0.18
10	0.64	71	0.61	0.16
12	0.63	79	0.68	0.15
14	0.62	87	0.89	0.14
16	0.6	112	1.1	0.1
18	0.58	131	1.3	0.071
20	0.57	142	1.45	0.055
22	0.56	152	1.69	0.05
24	0.56	169	1.83	0.037
26	0.55	-176	2.05	0.045

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