



电子元器件系列

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FUTURE PRODUCTS

I.) 3rd Q to 4th Q of 2000

A.) MMICs:

1. EMA103X, 104X, 105X: 7-8.5, 5.5-7, 4-5.5GHz, 2W, 15dB gain PA with low IMD.
2. EMA204X: 17-20GHz, 1W, 15dB gain PA with low IMD.
3. EMA303X: 17-27GHz, 20dBm, 22dB gain Amp.
4. EMA501X: 37-41GHz, 20dBm, 22dB gain Amp.

B.) Internally Matched Power FETs:

1. 2W for 20.8-21.4 GHz (EIA2021-2P) in flange packages.
2. 5W/10W for 10.7-11.7, 12.75-13.25, 13.75-14.5, 14.0-14.5, 14.4-15.35 GHz in flange packages.
3. 4W for 17.3-18.1, 17.7-18.7, 18.15-18.75, and 18.7-19.7 GHz in flange packages.

C.) FETs:

1. More 10V biased low distortion GaAs power FETs (EFC series).
2. High gain low distortion GaAs power FETs (EFB series).
3. High gain hetero-junction power FETs (EPC series).
4. More power FETs with via-hole source grounding.
5. More FETs in low cost surface mount plastic packages: 85mil-uX, SOT23 and SOT89.
6. EH series hetero-junction power FETs with high linearity, breakdown and output power.

II.) 2001 and Beyond

A.) MMICs:

1. 36-40GHz, 30dBm PA.
2. 28-32GHz, 30dBm PA.
3. 20-26GHz, 30dBm PA.
4. 17-20 GHz, 33dBm PA.
5. 10-17GHz, 24-36dBm PA.
6. 0.5-10GHz, LN to PA.

B.) Internally Matched Power FETs:

1. 10-20W, 10-20GHz.
2. 0.5-40W, 1-10GHz.

C.) Enhanced Mode Power FETs (Single Bias)

D.) HBTs

CURRENT PRODUCTS

I.) Super Low Noise High Gain Hetero-junction FETs:

- Chips (non via-hole)
- 70-mil ceramic packages
- 0.5-1dB NF & 10-13 dB Ga @ 12GHz

II.) High Efficiency Hetero-junction Power FETs:

- Chips (non via-hole or via-hole)
- 70-mil ceramic & 100-mil/170-mil flange ceramic packages
- SOT23 and SOT89 surface mount plastic packages and application circuits
- 0.1-10W output power over 0.1-70GHz

III.) Low Distortion GaAs Power FETs:

- Chips (non via-hole or via-hole)
- 70-mil ceramic & 100-mil/170-mil flange ceramic packages
- SOT89 surface mount plastic packages and application circuits
- 0.06-5W output power over 0.1-60GHz

IV.) Internally Matched Power FETs:

- 10.7-11.7, 12.75-13.25, 13.75-14.5, 14.0-14.5, 14.4-15.35, 16.2-16.4, 17.3-18.1, 17.7-18.7, 18.15-18.75 and 18.7-19.7 GHz
- 30-39dBm P-1dB, 37-49dBm OIP3, 5-9.5dB G-1dB, and 20-30% PAE
- non-hermetic metal flange packages

V.) MMICs:

- 9-16, 22-26, and 26-32GHz low noise and power amplifiers
- 18-28dBm P-1dB, 15-21dB gain, 1.5-2.5:1 Input VSWR, and 2-3:1 output VSWR
- 20-32GHz sub-harmonically pumped mixer with LO amplifier
- RF: 20-32GHz, LO: 10-15GHz, IF: DC-5GHz, 11dB conversion loss, 8dBm LO drive
- Chips

EXCELICS PRODUCT LIST-I
(Super Low Noise High Gain Heterojunction FETs)

DEVICE TYPE	SIZE	CHIP SIZE	W(Gate)/Finger	Bias	N.F.*	Ga*	Freq.	Idss	Bvgd**	Freq. Range	Remark
	um ²	um ²	um		dB	dB	GHz	mA	V		
A.) Chips:											
EPB018A5	0.3x180	320X290	30	2V, 15mA	0.50	13.0	12	15-80	6	Up to 65 GHz	P-1 ⁺ =15dBm
EPB018A7	0.3X180	320X290	30	2V, 15mA	0.65	12.5	12	15-80	6	Up to 65 GHz	P-1 ⁺ =15dBm
EPB018A9	0.3X180	320X290	30	2V, 15mA	0.95	12.0	12	15-80	6	Up to 65 GHz	P-1 ⁺ =15dBm
EPB025A	0.3x250	420x260	62.5	2V, 15 mA	0.80	11.0	12	20-80	5	Up to 45 GHz	P-1 ⁺ =15dBm
B.) Non-hermetic Low Cost 70 mil Packages:											
EPB018A5-70	0.3x180	-	-	2V, 15mA	0.50	13.0	12	15-80	6	Up to 30 GHz	P-1 ⁺ =15dBm
EPB018A7-70	0.3x180	-	-	2V, 15mA	0.65	12.5	12	15-80	6	Up to 30 GHz	P-1 ⁺ =15dBm
EPB018A9-70	0.3x180	-	-	2V, 15 mA	0.95	11.5	12	15-80	6	Up to 30 GHz	P-1 ⁺ =15dBm
EPB025A-70	0.3x250	-	-	2V, 15 mA	0.85	10.5	12	20-80	5	Up to 30 GHz	P-1 ⁺ =15dBm

Note: *: Typical Values **: Typical Values measured at I_g=10 uA

*: Typical Values measured at 3V/25mA

(Super Low Noise High Gain Heterojunction FETs)

<u>Excelics</u>	<u>Filtronic</u>	<u>NEC</u>	<u>Fujitsu</u>	<u>Mitsubishi</u>	<u>Celeritrk</u>	<u>Stanford</u>	<u>HP</u>	<u>Toshiba</u>
EPB018A5		NE32400	FHX13X(14X,45X)	MGFC4418D/E				
EPB018A7		NE32400	FHX04X(14X)	MGFC4427D(4417D)				
EPB018A9	LP7512	NE33200	FHX34X(04X,05X,06X)	MGFC4424D(4414E)	CF001-03			JS8905-AS
EPB025A	LP7512	NE33200	FHX34X(04X,05X,06X)	MGFC4414E(4424D)				JS8901-AS
EPB018A5-70		NE32584C	FHX13LG	MGF4919G(4918E, 4418D/E)		SPF-1676	ATF36077	
EPB018A7-70		NE32484A	FHX04LG(14LG)	MGF4916G(4918E, 4318E)	CFA0103L1	SPF-1576		
EPB018A9-70	LP7512-P70	NE33284A(42484A)	FHX05LG	MGF4914E(4714CP, 4314E)	CFA0103L2/L3	SPF-2086		
EPB025A-70	LP7512-P70	NE33284A(42484A)	FHX05LG	MGF4914E(4714CP, 4314E)	CFA0103L2/L3	SPF-2086		

EXCELICS PRODUCT LIST-II
(High Efficiency Heterojunction Power FETs)

DEVICE TYPE	SIZE	CHIP SIZE	W(Gate)/Finger	Bias	P-1dB*	G-1dB*	Freq.	Idss	BVgd**	Freq. Range	Remark
	um ²	um ²	um		dBm	dB	GHz	mA	V	GHz	
A.) Chips:											
EPA018A	0.3x180	320x290	30	6V, 0.5 Idss	20.0	13.0	18	30-80	15	Up to 65	.75dB NF@12GHz
EPA025A	0.3x250	420x260	62.5	8V, 0.5 Idss	22.5	11.0	18	40-105	15	Up to 45	
EPA030C	0.3x300	330x320	37.5	8V, 0.5 Idss	23.0	11.0	18	50-130	15	Up to 50	
EPA040A	0.3x400	350x340	50	8V, 0.5 Idss	24.5	11.0	18	70-160	15	Up to 45	
EPA060A	0.3x600	500x320	37.5	8V, 0.5 Idss	26.5	10.5	18	105-255	15	Up to 45	
EPA060B/EPA060BV	0.3x600	350x350	60	8V, 0.5 Idss	26.5	10/11.5	18	110-250	15	Up to 40/45	V: Via-hole
EPA080A	0.3x800	510x340	50	8V, 0.5 Idss	27.5	9.5	18	130-320	15	Up to 35	
EPA090A	0.3x900	660x320	37.5	8V, 0.5 Idss	28.0	10.0	18	160-380	15	Up to 40	
EPA120A	0.3x1200	670x340	50	8V, 0.5 Idss	29.5	9.5	18	220-500	15	Up to 30	
EPA120B/EPA120BV	0.3x1200	550x350	60	8V, 0.5 Idss	29.5	9/10.5	18	220-500	15	Up to 30/40	V: Via-hole
EPA120E	0.3x1200	830x320	37.5	8V, 0.5 Idss	29.5	9.5	18	210-510	15	Up to 40	
EPA160A	0.3x1600	840x340	50	8V, 0.5 Idss	31.0	8.5	18	290-660	15	Up to 30	
EPA160B	0.3x1600	540x370	80	8V, 0.5 Idss	31.0	5.5	18	290-660	15	Up to 26	
EPA240B/EPA240BV	0.3x2400	960x350	60	8V, 0.5 Idss	32.5	8/9.5	18	440-940	15	Up to 26/30	V: Via-hole
EPA480B/EPA480BV***	0.4x4800	960x420	120	8V, 0.5 Idss	35.5	7.5/12	12	880-1880	15	Up to 18/30	V: Via-hole
EPA240D	0.4x2400	410x620	240	8V, 0.5 Idss	33.0	20.0	2	440-940	15	Up to 15	
EPA480C	0.4x4800	680x620	240	8V, 0.5 Idss	36.0	19.0	2	880-1880	15	Up to 12	
EPA720A***	0.4x7200	940x620	240	8V, 0.5 Idss	37.5	19.0	2	1320-2820	15	Up to 10	
EPA960B***	0.4x9600	1210x620	240	8V, 0.5 Idss	38.5	18.5	2	1760-3760	15	Up to 10	
EPA1200A***	0.4x12000	1470x620	240	8V, 0.5 Idss	39.5	18.0	2	2200-4700	15	Up to 10	
B.) Non-hermetic Low Cost 70 mils Packages:											
EPA018A-70	0.3x180	-	-	6V, 0.5 Idss	20.0	11.0	18	30-80	15	Up to 30	.75dB NF@12GHz
EPA025A-70	0.3x250	-	-	6V, 0.5 Idss	21.5	8.0	18	40-105	15	Up to 26	
EPA040A-70	0.3x400	-	-	6V, 0.5 Idss	23.5	7.0	18	70-160	15	Up to 26	
EPA060B-70	0.3x600	-	-	6V, 0.5 Idss	25.5	9.0	12	110-250	15	Up to 20	0.4dB,NF;28/31dBm,IP3@2GHz
EPA080A-70	0.3x800	-	-	5V, 0.5 Idss	25.5	7.0	12	130-320	15	Up to 20	
C.) Hermetic 100 mils Ceramic Flange Packages:											
EPA080A-100F	0.3x800	-	50	8V, 0.5 Idss	27.5	8.5	12	130-320	15	Up to 18	
EPA120B-100F	0.3x1200	-	60	8V, 0.5 Idss	29.5	7.0	12	220-500	15	Up to 18	
EPA160B-100F	0.3x1600	-	80	8V, 0.5 Idss	31.0	5.5	12	290-660	15	Up to 16	
EPA240B-100F	0.3x2400	-	60	8V, 0.5 Idss	32.5	5.5	12	440-940	15	Up to 15	
D.) Surface Mount Plastic Packages:											
EPA018A-SOT23	0.3x180	-	30	6V, 30mA	20.0	17.0	2	30-80	15	Up to 10	0.7dB,NF;27dBm,IP3@2GHz
EPA240D-SOT89	0.4x2400	-	240	8V, 350mA	33.0	14.0	2	440-940	15	Up to 8	0.4dB,NF;38/40dBm,IP3@2GHz
EPA480C-SOT89	0.4x4800	-	240	8V, 750mA	36.0	13.0	2	880-1880	15	Up to 6	0.5dB,NF;41/43dBm,IP3@2GHz

Note: *: Typical Values **: Typical Values measured at Ig=1mA/mm ***: 25um GaAs + 25um PHS(Plated Gold Heat-Sink)

(High Efficiency Heterojunction Power FETs)

<u>Excelics</u>	<u>Filtronic</u>	<u>Fujitsu</u>	<u>Celeritek</u>	<u>HP</u>	<u>Stanford</u>	<u>NEC</u>	<u>Toshiba</u>
EPA018A	LPD200/LP7612	FLR016XP/XV	CF004-03				
EPA025A	LP7612	FLR016XP/XV	CF001-03				JS8892-AS
EPA040A	LP6836	FLR026XP/XV	CF003-03				JS8893-AS
EPA060B/BV	LP6872/LP750		CF003-03			NE1280100	JS8894-AS
EPA080A	LP6872/LP750	FLR056XV					
EPA090A	LP6872/LP750	FLR056XV					
EPA120B/BV						NE1280200	
EPA160A	LP1500	FLR106XV					
EPA160B	LP1500	FLR106XV					
EPA240B/BV	LP3000	FLR106XV				NE1280400	
EPA018A-70	LPD200/LP7612-70				SPF-2076		
EPA025A-70	LPD200/LP7612-70				SPF-2076		
EPA040A-70	LP6876-70						
EPA060B-70	LP6872/LP750-70		CFB0301	ATF35143			
EPA080A-70	LP6872/LP750-70			ATF34143		NE34018	
EPA018A-SOT23	LP7612-SOT23			ATF34143			
EPA240D-SOT89	LP1500/3000-SOT89			ATF36163			
EPA480C-SOT89	LP3000-SOT89			ATF33143			

EXCELICS PRODUCT LIST-III (Low Distortion GaAs Power FETs)

DEVICE TYPE	SIZE	CHIP SIZE	W(Gate)/Finger	Bias	P-1dB*	G-1dB*	Freq.	Idss	BVgd**	Freq. Range	Remark
	um ²	um ²	um		dBm	dB	GHz	mA	V	GHz	
A.) Chips:											
EFA018A	0.3x180	320x290	30	6V, 0.5 Idss	18.5	9.5	18	25-80	15	Up to 55	1.1dB NF@12GHz
EFA025A	0.3x250	420x260	62.5	8V, 0.5 Idss	21.0	11.0	12	35-105	15	Up to 30	
EFA025AL	0.3x250	420x260	62.5	8V, 0.5 Idss	20.0	11.5	12	20-65	15	Up to 30	
EFA040A	0.3x400	350x340	50	8V, 0.5 Idss	23.0	10.5	12	60-160	15	Up to 30	
EFA060B/EFA060BV	0.3x600	350x350	60	8V, 0.5 Idss	25.0	10.5/12.0	12	100-240	15	Up to 30/30	V: Via-hole
EFC060B	0.3x600	350x350	60	10V, 0.5 Idss	25.0	10.5	12	80-180	20	Up to 30	
EFA080A	0.3x800	510x340	50	8V, 0.5 Idss	26.0	10.0	12	130-300	15	Up to 30	
EFA120A	0.3x1200	670x340	50	8V, 0.5 Idss	28.0	9.5	12	200-440	15	Up to 26	
EFA120B/EFA120BV	0.3x1200	550x350	60	8V, 0.5 Idss	28.0	9.5/11.5	12	200-440	15	Up to 23/30	V: Via-hole
EFC120B	0.3x1200	550x350	60	10V, 0.5 Idss	28.0	9.5	12	160-360	20	Up to 23	
EFA160A	0.3x1600	840x340	50	8V, 0.5 Idss	29.0	9.0	12	260-600	15	Up to 26	
EFA240B/EFA240BV	0.3x2400	960x350	60	8V, 0.5 Idss	31.0	8.5/10.5	12	400-880	15	Up to 23/30	V: Via-hole
EFC240B	0.3x2400	960x350	60	10V, 0.5 Idss	31.0	8.5	12	320-720	20	Up to 23	
EFA480B***	0.3x4800	960x420	120	8V, 0.5 Idss	34.0	6.0	12	800-1760	15	Up to 15	
EFA240D	0.5x2400	410x620	240	8V, 0.5 Idss	31.0	18.5	2	400-880	15	Up to 12	
EFC240D	0.3x2400	410x620	240	10V, 0.5 Idss	31.0	18.5	2	320-720	20	Up to 12	
EFA480C	0.5x4800	680x620	240	8V, 0.5 Idss	34.0	18.0	2	800-1760	15	Up to 10	
EFC480C	0.5x4800	680x620	240	10V, 0.5 Idss	33.5	18.0	2	640-1440	20	Up to 10	
EFA720A***	0.5x7200	940x620	240	8V, 0.5 Idss	35.5	17.5	2	1200-2640	15	Up to 10	
EFA960B***	0.5x9600	1210x620	240	8V, 0.5 Idss	36.5	16.5	2	1600-3520	15	Up to 10	
EFA1200A***	0.5x12000	1470x620	240	8V, 0.5 Idss	37.5	16.0	2	2000-4400	15	Up to 10	
B.) Non-hermetic Low Cost 70 mils Ceramic Packages:											
EFA018A-70	0.3x180	-	30	6V, 0.5 Idss	18.5	10.5	12	25-80	15	Up to 30	1.1dB NF@12GHz
EFA025A-70	0.3x250	-	62.5	6V, 0.5 Idss	20.0	10.0	12	35-105	15	Up to 26	
EFA040A-70	0.3x400	-	50	6V, 0.5 Idss	22.0	8.0	12	60-160	15	Up to 26	
EFA060B-70	0.3x600	-	60	6V, 0.5 Idss	24.0	7.5	12	100-240	15	Up to 23	0.7dB,NF;26/38dBm,IP3@2GHz
EFA080A-70	0.3x800	-	50	5V, 0.5 Idss	23.5	7.0	12	130-300	15	Up to 18	
C.) Hermetic 100 mils Ceramic Flange Packages:											
EFA060B-100F	0.3x800	-	50	8V, 0.5 Idss	25.0	8.0	12	100-240	15	Up to 18	Also available EFC060B-100F
EFA080A-100F	0.3x800	-	50	8V, 0.5 Idss	26.0	7.5	12	130-300	15	Up to 18	
EFA120B-100F	0.3x1200	-	60	8V, 0.5 Idss	28.0	6.0	12	200-440	15	Up to 16	Also available EFC120B-100F
EFA240B-100F	0.3x2400	-	60	8V, 0.5 Idss	31.0	7.0	8	400-880	15	Up to 12	Also available EFC240B-100F
D.) Surface Mount Plastic Packages:											
EFA240D-SOT89	0.5x2400	-	240	7V, 350mA	31.0	13.0	2	440-880	15	Up to 6	0.7dB,NF;36/48dBm,IP3@2GHz
EFA480C-SOT89	0.5x4800	-	240	7V, 750mA	34.0	12.0	2	880-1760	15	Up to 5	0.8dB,NF;39/48dBm,IP3@2GHz

Note: *: IP3 is typical 13 dB higher than P-1 *: Typical Values **: Typical Values measured at Ig=1mA/mm ***: 25um GaAs + 25um PHS(Plated Gold Heat-Sink)

(Low Distortion GaAs Power FETs)

<u>Excelics</u>	<u>MWT</u>	<u>Mitsubishi</u>	<u>Celeritek</u>	<u>NEC</u>	<u>Fujitsu</u>	<u>Stanford</u>	<u>HP</u>	<u>Toshiba</u>
EFA018A	MWT-4	MGFC1403/1423,25	CF004-01/-02	NE700/710/760	FLR016/FLK017			
EFA025A/AL	MWT-7/-3	MGFC1403/1423,25	CF001-01/-02	NE700/710/760	FLK017/FSX017 /FLR016		ATF-13100/-26100	JS8818A/8834 /8850A-AS
EFA040A			CF003-01/-02	NE900000	FSX057			
EFA/EFC060B /BV	MWT-2/-15	MGFC1801/2407	CF003-01/-02		FLK027/FSX027 /FLR026		ATF-10100/-25100 /-21100	JS8835/8851-AS
EFA080A	MWT-9 or MWT-6/-12/-16		CF015-11	NE900100			ATF-46100	
EFA120A	MWT-8/-13	MGFC2415	CF005-01	NE800100	FLK057/FLR056 /FLC087			JS8836/8853-AS
EFA/EFC120B /BV	MWT-8/-13	MGFC2415	CF005-01	NE800100	FLK057/FLK056 /FLC087		ATF-45100/-46100	JS8836/8853-AS
EFA/EFC120D		MGFC0904						
EFA160A		MGFC2415		NE900200				JS8836/8853-AS
EFA160B		MGFC2415		NE900200				JS8836/8853-AS
EFA/EFC240B/BV	MWT-11	MGFC2430/2445	CF010-01		FLK107/FLR106		ATF-44100/-45100	JS8837A/8855-AS
EFA/EFC240D					FLC157			JS8837A/8835-AS
EFA480B/BV				NE800400	FLK207/FLX257			JS8838A/8856-AS
EFA480C		MGFC0905		NE800400	FLC307			JS8838A/8856-AS
EFA720A					FLC307			JS8820-AS
EFA018A-70		Same as below	CFA/CFB0101	NE76084				
EFA025A-70		MGF1303B,23/1403 /1903B,23/1423,25	CFA/CFB0101	NE76084	FSX017LG		ATF-13036/-13136 /-13336/-13736	
EFA025A-85							ATF13786/-21186	
EFA040A-70				NE76184			ATF21186	
EFA060B-70		MGF1601/1801	CFC0301		FSU02LG		ATF-10136/-10236 /10736/-25735	
EFA/EFC060B-100F		MGF2407A	CFC0301		FSX027WF/FLK027WG			
EFA080A-100F				NE900275	FLK057WG		ATF46101	
EFA/EFC120B-100F		MGF2415A			FLC057WG/097WF		ATF45101/46101	
EFA/EFC240B-100F		MGF2430A/2445			FLC107WG/167WF		ATF44101/45101	
EFA/EFC120D-SOT89						SHF0189		
EFA/EFC240D-SOT89						SHF0289		
EFA/EFC480C-SOT89						SHF0589		

EXCELICS PRODUCT LIST-IV & V
(Internally Matched Power FETs and MMICs)

Part number	Op. Freq. GHz	Size um2	P-1* dBm	G-1* dB	IP3* dBm	PAE* %	Bias V/mA	Mea'd. Freq. GHz	Remark
IV.) INTERNALLY-MATCHED POWER FETs :									
EIA/EIB1011-2P**	10.7-11.7	Flange Package	33.5/33	9.5/8.5	40/46	30/25	8/0.5-0.6Idss	10.7-11.7	
EIA/EIB1011-4P**	10.7-11.7	Flange Package	36.5/35.5	9/8	43/49	30/25	8/0.5-0.6Idss	10.7-11.7	
EIA/EIB1213-2P**	12.75-13.25	Flange Package	33.5/33	9.5/8.5	40/46	30/25	8/0.5-0.6Idss	12.75-13.25	
EIA/EIB1213-4P**	12.75-13.25	Flange Package	36.5/35.5	9.5/8.5	43/49	30/25	8/0.5-0.6Idss	12.75-13.25	
EIA/EIB1314-2P**	13.75-14.5	Flange Package	33.5/33	9/8	40/46	30/25	8/0.5-0.6Idss	13.75-14.5	
EIA/EIB1314-4P**	13.75-14.5	Flange Package	36.5/36	8.5/7.5	43/49	27/22	8/0.5-0.6Idss	13.75-14.5	
EIA/EIB1414-2P**	14.0-14.5	Flange Package	33.5/33	9/8	40/46	30/25	8/0.5-0.6Idss	14.0-14.5	
EIA/EIB1414-4P**	14.0-14.5	Flange Package	36.5/35.5	8.5/7.5	43/49	27/22	8/0.5-0.6Idss	14.0-14.5	
EIA/EIB1415-2P**	14.4-15.35	Flange Package	33/32.5	8.5/7.5	40/46	27/22	8/0.5-0.6Idss	14.4-15.35	
EIA/EIB1415-4P**	14.4-15.35	Flange Package	36/35.5	8/7	43/49	27/22	8/0.5-0.6Idss	14.4-15.35	
EIA1616-8P**	16.2-16.4	Flange Package	39	6	-	20	8/0.5Idss	16.2-16.4	
EIA/EIB1718A-1P**	17.3-18.1	Flange Package	30.5/29.5	7.5/6	37/43	30/25	8/0.5-0.6Idss	17.3-18.1	
EIA/EIB1718A-2P**	17.3-18.1	Flange Package	33.5/32.5	7.5/5.5	40	25/20	8/0.5-0.6Idss	17.3-18.1	
EIA/EIB1718-1P**	17.7-18.7	Flange Package	30.0/29.5	6.5/5.5	37/43	25/20	8/0.5-0.6Idss	17.7-18.7	
EIA/EIB1718-2P**	17.7-18.7	Flange Package	33/32.5	6.0/5.0	40/46	25/20	8/0.5-0.6Idss	17.7-18.7	
EIA/EIB1818-1P**	18.15-18.75	Flange Package	30.0/29.5	6.5/5.5	37/43	25/20	8/0.5-0.6Idss	18.15-18.75	
EIA/EIB1818-2P**	18.15-18.75	Flange Package	33.0/32.5	6.0/5.0	40/46	25/20	8/0.5-0.6Idss	18.15-18.75	
EIA/EIB1819-1P**	18.7-19.7	Flange Package	30.0/29.5	6.5/5.5	37/43	25/20	8/0.5-0.6Idss	18.7-19.7	
EIA/EIB1819-2P**	18.7-19.7	Flange Package	33.0/32.5	6.0/5.0	40/46	25/20	8/0.5-0.6Idss	18.7-19.7	
			P-1[†]	S.S.Gain[†]	VSWR[†]	VSWR[†]			
V.) MMICs:			dBm	dB	Input	Output			
EMA302B	22-26	900X1020	28	15	2.5:1 [#]	3.0:1 [#]	6/0.5Idss	22-26	2-stage PA
EMA205B	9-16	2000X1060	18	15	1.5:1	2.0:1	5/160	9-16	2-stage Amp. (NF=4dB), Eng. Sampling.
EMA406C	26-32	2500X1060	20	21	2.0:1	3.0:1	5/140	26-32	3-stage Amp.(NF=6dB), Eng. Sampling.
			ConV.Loss	LO drive	P-1 (in)				
			dB	dBm	dBm				
EMA407A	RF:20-32 (LO:10-15, IF: DC-5)	2500X1060	11	8	6	-	5/160	RF:20-32	Sub-harmonic Mixer with LO Amp. Eng. Sampling.

Note: [†]: Typical Values ^{**}: Non-hermetic Metal Flange Packages. Also available in open modules with 0.5-1dB higher in G-1 and 0.5dBm lower in P-1.

[#]: External matching required with application circuits

(Internally Matched Power FETs & MMICs)

IV-Internally Matched Power FETs:

<u>Excelics</u>	<u>NEC</u>	<u>Fujitsu</u>	<u>Mitsubishi</u>	<u>Toshiba</u>
EIA/EIB1011-2M (-2P)	NEZ1011-2E	FLM1011-2		TIM1011-2
EIA/EIB1011-4M (-4P)		FLM1011-3F/-4F	MGFX36V0717	TIM1011-4/-4L
EIA/EIB1213-2M (-2P)				TIM1213-2
EIA/EIB1213-4M (-4P)		FLM1213-4F	MGFX35V2732	TIM1213-4/-4L
EIA/EIB1414-1M (-1P)			MGFX30V4045	
EIA/EIB1414-2M (-2P)	NEZ1414-2E	FLM1414-2	MGFX33V4045	TIM1414-2
EIA/EIB1414-4M (-4P)	NEZ1414-4E	FLM1414-3F/-4F	MGFX35/37V4045	TIM1414-4/-4L
		FLM1314-3F		
EIA/EIB1415-2M (-2P)				TIM1415-2
EIA/EIB1415-4M (-4P)		FLM1415-3F		TIM1415-4/-4L

V-MMICs*:

<u>Excelics</u>	<u>HP</u>	<u>UMS</u>	<u>Triquint</u>	<u>Toshiba</u>	<u>Filtron</u>
EMA302B		CHA5093	TGA9070		
EMA205B					
EMA406C	HMMC5032/5040	CHA3093	TGA1081	JS9P10-AS	LMA441/442/443
EMA407A					
EMA501X	HMMC5034/5040	CHA3093	TG A1071	JS9P03-AS	LMA444

Note: *: Bandwidth & Gain can be different.

NEW PRODUCT RELEASE

5/24/2000

Part Number	Op. Freq.	Size	P-1	G-1	IP3	NF	Bias	Mea'd. Freq	Eng.	Product'n	Remark
	GHz	um ²	dBm	dB	dBm	dB	V/mA	GHz	Sample		
A.) DISCRETE POWER FETs:											
EPA120D	DC-18	410x560	30.0	9.0	-	-	8/0.5Idss	12	Now	Now	
EFA120D	DC-15	410x560	28.0	8.0	-	-	8/0.5Idss	12	Now	Now	
EFC120D	DC-15	410x560	28.0	7.5	-	-	10/0.5Idss	12	Now	Now	
EPA120D-SOT89	DC-6	SOT89	30.0	16.0	37	0.5*	8/0.5Idss	2	6/00	7/00	
EFA120D-SOT89	DC-4	SOT89	28.0	15.0	45	0.8*	7/170	2	6/00	7/00	
EFC120D-SOT89	DC-4	SOT89	28.0	15.0	45	0.8*	9/150	2	6/00	7/00	
EFC240D-SOT89	DC-4	SOT89	31.0	13.0	48	0.8**	9/300	2	6/00	7/00	
EFA025A-85	DC-12	85mil u-X Plastic	20.0	17.0	30	-	6/40	2	5/00	7/00	
EPA060B-85	DC-12	85mil u-X Plastic	25.0	19.0	31	-	5/90	2	6/00	7/00	
B.) INTERNALLY-MATCHED POWER FETs :											
EIA2021-2P*	20.8-21.4	Flange Package	33	5.5	40	25/20	8/0.5-0.6Idss	20.8-21.4	6/00	7/00	
			P-1	S.S.Gain	VSWR	VSWR					
C.) MMICs											
			dBm	dB	Input	Ouput					
EMA103X	7.0-8.5	2000X1760	33	15	2.0:1	3.0:1 [#]	8/0.5Idss	7.0-8.5	7/00	9/00	2-stage PA (low IMD)
EMA104X	5.5-7.0	2000X1760	33	15	2.0:1	3.0:1 [#]	8/0.5Idss	5.5-7.0	7/00	9/00	2-stage PA (low IMD)
EMA105X	4.0-5.5	2000X1760	33	15	2.0:1	3.0:1 [#]	8/0.5Idss	4.0-5.5	7/00	9/00	2-stage PA (low IMD)
EMA204X	17-20	3000X1500	30	15	2.5:1	2.5:1	8/0.5Idss	17-20	7/00	9/00	3-stage PA (low IMD)
EMA303X	17-27	2500X1060	20	22	2.0:1	3.0:1	5/130	17-27	7/00	9/00	3-stage Amp.
EMA501X	37-41	2000X1060	20	22	2.0:1	3.0:1	5/120	37-41	7/00	9/00	3-stage Amp.
D.) DISCRETE POWER FETs WITH VIA-HOLE:											
For most EFA, EFC, EPA series power FETs (Consult factory for details)									Now	Now	
E.) DISCRETE POWER FETs IN Hermetic 100MIL/170MIL Metal FLANGE PACKAGES:											
For most EFA, EFC, EPA series power FETs (Consult factory for details)									Now	Now	

Note: All parameters are typical and preliminary

*: Non-hermetic Metal Flange Packages.

*: measured at 5V/75mA **: measured at 5V/150mA

[#]: External matching required and application circuit supplied

<u>Device Type</u>	<u>Bias Condition</u>	<u>Frequency</u>	<u>N.F.</u> (Typical)	<u>Ga</u> (Typical)
<u>A.) Power FETs</u>				
EPA080A	6V/25% Idss	12GHz	1.20dB	9.5dB
EPA060B	6V/25% Idss	12GHz	1.15dB	10.0dB
EPA040A	6V/25% Idss	12GHz	1.05dB	10.5dB
EPA025A	2V/15mA	12GHz	0.85dB	11.5dB
	3V/10mA	12GHz	0.85dB	11.0dB
	3V/15mA	12GHz	0.85dB	11.5dB
	3V/25mA	12GHz	1.00dB	12.0dB
	3V/35mA	12GHz	1.30dB	12.5dB
EPA018A	2V/15mA	12GHz	0.75dB	12.5dB
EFA018A	2V/15mA	12GHz	1.10dB	10.5dB
EPA080A-70	6V/25% Idss	12GHz	1.80dB	8.0dB
EPA060B-70	6V/25% Idss	12GHz	1.70dB	8.5dB
EPA040A-70	6V/25% Idss	12GHz	1.25dB	9.5dB
EPA025A-70	2V/15mA	12GHz	0.85dB	11.0dB
EPA018A-70	2V/15mA	12GHz	0.75dB	12.5dB
EFA018A-70	2V/15mA	12GHz	1.10dB	10.5dB
<u>B.) Low Noise FETs</u>				
EPB025A	2V/15mA	12GHz	0.80dB	11.0dB
EPB018A5	2V/15mA	12GHz	0.50dB	13.0dB
EPB018A7	2V/15mA	12GHz	0.65dB	12.5dB
EPB018A9	2V/15mA	12GHz	0.95dB	12.0dB
EPB025A-70	2V/15mA	12GHz	0.80dB	10.5dB
EPB018A5-70	2V/15mA	12GHz	0.50dB	13.0dB
EPB018A7-70	2V/15mA	12GHz	0.65dB	12.5dB
EPB018A9-70	2V/15mA	12GHz	0.95dB	11.5dB

Quick Reference Guide for 2 GHz Application

6/1/1999

Device Type	Bias	P-1	NF	Ga	G-1	IP3	Idss	BVgd**
		dBm	dB	dB	dB	dBm	mA	V
A) Chips:								
EPB018A5	2V/15mA	15 ⁺	0.4	20	20 ⁺		15-80	6
EPB018A7	2V/15mA	15 ⁺	0.5	19	19 ⁺		15-80	6
EPB018A9	2V/15mA	15 ⁺	0.6	19	19 ⁺		15-80	6
EPB025A	2V/15mA	15 ⁺	0.5	19	19 ⁺		20-80	5
EFA Series:								
EFA018A	6V/30mA	18	1.1	17	17	28	25-75	15
EFA025A	6V/40mA	20	1.2	17	17	30	55-100	15
EFA060B	6V/80mA	23	1.3	17	17	33	100-240	15
EPA Series:								
EPA018A	6V/30mA	20	0.7	20	19	27	30-75	15
EPA025A	6V/40mA	21	0.8	20	19	28	40-100	15
EPA060B	5V/50mA	23	0.4	20	19	28	110-250	15
EPA080A	5V/60mA	24	0.4	20	19	29	130-320	15
B) Non-hermetic packages:								
EPB018A7-70	2V/15mA	15 ⁺	0.5	19	14 ⁺		15-80	6
EPB018A9-70	2V/15mA	15 ⁺	0.6	18	14 ⁺		15-80	6
EPB025A-70	2V/15mA	15 ⁺	0.4	19	14 ⁺		20-80	5
EFA Series (70):								
EFA018A-70	6V/30mA	18	1.2	17	17	28	25-75	15
EFA025A-70	6V/40mA	20	1.3	17	17	30	55-100	15
EFA060B-70	5V/50mA	23	0.7	17	17	26	100-240	15
	5V/100mA	23	1.4	17	17	38		
EFA240D-SOT89	5V/150mA	28	0.7	13	13	36	400-880	15
	5-7V/350mA	29-31	1.2	13	13	48		
EFA480C-SOT89	5V/300mA	31	0.8	12	12	39	800-1760	15
	5-7V/750mA	32-34	2.0	12	12	48		
EPA Series (70):								
EPA018A-70	6V/30mA	20	0.8	20	19	27	30-75	15
EPA018A-SOT23	2V/15mA		0.7	16			30-75	15
	6V/30mA	20	0.9	17	17	27		
EPA025A-70	6V/40mA	21	0.9	19	18	28	40-100	15
EPA060B-70	5V/50mA	24	0.4	20	18	28	110-250	15
	5V/90mA	25	0.6	20	19	31		
EPA240D-SOT89	5V/150mA	30	0.4	14	12	38	440-940	15
	5-8V/350mA	31-33	0.8	14	14	40		
EPA480C-SOT89	5V/300mA	32	0.5	13	12	41	880-1880	15
	5-8V/750mA	33-36	1.2	13	13	43		

Note: All parameters are typical and preliminary

⁺3V/25mA, *2V/15mA, **EPB @Igd= 10uA, rest @1mA/mm

Small Signal Model Element Values

High Efficiency Heterojunction Power FETs

<i>Parameter</i>	L_G	R_G	C_{GS}	R_I	R_S	L_S	C_{GD}	R_{DS}	C_{DS}	R_D	L_D	G_M	τ	C_{PG}	C_{PD}
<i>Units</i>	nH	Ω	pF	Ω	Ω	nH	pF	Ω	pF	Ω	nH	mS	pS	pF	pF
Device:															
EPA018A	0.18	0.50	0.30	0.29	0.13	0.057	0.021	680	0.011	1.0	0.22	55	2.5	0.06	0.06
EPA025A	0.10	1.8	0.33	1.9	0.83	0.071	0.014	280	0.044	1.38	0.18	84	2.0	0.17	0.17
EPA030C	0.20	0.55	0.59	1.6	0.69	0.041	0.024	300	0.025	0.41	0.30	110	2.0	0.084	0.084
EPA040A	0.20	0.74	0.67	1.2	0.52	0.037	0.031	210	0.043	0.55	0.30	140	2.0	0.084	0.084
EPA060A	0.10	0.28	1.2	0.80	0.35	0.028	0.046	120	0.044	0.21	0.15	250	2.0	0.17	0.17
EPA060B	0.20	0.71	1.0	0.80	0.35	0.035	0.044	160	0.064	0.53	0.33	190	2.0	0.084	0.084
EPA080A	0.10	0.37	1.4	0.60	0.26	0.028	0.058	96	0.097	0.28	0.18	260	2.0	0.17	0.17
EPA090A	0.067	0.18	1.6	0.53	0.23	0.022	0.060	73	0.078	0.14	0.089	350	2.0	0.25	0.25
EPA120A	0.067	0.25	1.9	0.40	0.17	0.020	0.085	60	0.16	0.18	0.094	400	2.0	0.25	0.25
EPA120B	0.10	0.35	2.1	0.40	0.17	0.023	0.088	75	0.15	0.26	0.13	380	2.0	0.17	0.17
EPA120E	0.050	0.14	2.1	0.40	0.17	0.018	0.078	52	0.12	0.10	0.045	460	2.0	0.34	0.34
EPA160A	0.050	0.18	2.4	0.30	0.13	0.016	0.11	37	0.26	0.14	0.084	570	2.0	0.34	0.34
EPA160B	0.10	0.47	3.8	0.30	0.13	0.022	0.15	83	0.21	0.35	0.09	810	2.0	0.17	0.17
EPA240B	0.050	0.18	3.3	0.20	0.087	0.050	0.17	27	0.47	0.13	0.074	740	2.0	0.34	0.34
EPA240D	0.28	1.2	4.3	0.20	0.27	0.12	0.14	95	0.30	0.067	0.49	350	4.0	0.25	0.25
EPA480A	0.025	0.088	6.7	0.10	0.043	0.010	0.34	14	0.94	0.067	0.046	1300	2.0	0.67	0.67
EPA480B	0.050	0.35	6.7	0.10	0.043	0.020	0.34	14	0.62	0.26	0.93	1300	2.0	0.37	0.37
EPA480C	0.14	0.61	8.1	0.10	0.13	0.080	0.28	47	0.60	1.1	0.25	670	4.0	0.50	0.50
EPA720A	0.090	0.40	12	0.067	0.090	0.060	0.42	32	0.90	0.70	0.16	1000	4.0	0.76	0.76
EPA960B	0.070	0.31	16	0.050	0.070	0.048	0.56	24	1.2	0.53	0.12	1400	4.0	1.0	1.0
EPA1200A	0.056	0.24	20	0.040	0.050	0.040	0.72	19	1.5	0.42	0.10	1700	4.0	1.3	1.3
High Gain Heterojunction Low Noise FET															
EPB025A	0.10	1.8	0.14	1.9	0.83	0.061	0.060	150	0.060	1.4	0.12	78	2.0	0.17	0.17

Small Signal Model Element Values

Low Distortion GaAs Power FETs

<i>Parameter</i>	L_G	R_G	C_{GS}	R_I	R_S	L_S	C_{GD}	R_{DS}	C_{DS}	R_D	L_D	G_M	τ	C_{PG}	C_{PD}
<i>Units</i>	nH	Ω	pF	Ω	Ω	nH	pF	Ω	pF	Ω	nH	mS	pS	pF	pF
Device:															
EFA018A	0.23	0.50	0.17	0.53	0.23	0.063	0.016	560	0.006	1	0.22	32	2.4	0.05	0.05
EFA025A	0.10	1.8	0.27	3.3	2.1	0.41	0.025	250	0.040	0.96	0.18	60	3.0	0.08	0.08
EFA040A	0.20	0.74	0.41	1.3	0.83	0.050	0.031	200	0.040	0.39	0.30	81	3.0	0.084	0.084
EFA060B	0.20	0.71	0.55	1.3	0.80	0.037	0.032	170	0.060	0.37	0.30	90	3.0	0.084	0.084
EFA080A	0.10	0.37	0.80	0.65	0.42	0.034	0.058	97	0.069	0.19	0.16	140	3.0	0.17	0.17
EFA120A	0.067	0.25	1.1	0.43	0.28	0.26	0.082	160	0.13	0.13	0.12	210	3.0	0.25	0.25
EFA120B	0.10	0.35	1.4	0.63	0.40	0.026	0.077	79	0.11	0.19	0.15	170	3.0	0.17	0.17
EFA160A	0.050	0.18	1.9	0.33	0.21	0.021	0.10	51	0.16	0.096	0.067	270	3.0	0.34	0.34
EFA240B	0.050	0.18	2.2	0.31	0.20	0.016	0.15	35	0.32	0.093	0.044	340	3.0	0.34	0.34
EFA240D	0.28	0.50	3.3	0.60	0.20	0.045	0.20	50	0.36	0.40	0.18	300	5.0	0.25	0.25
EFA480A	0.025	0.088	4.4	0.16	0.10	0.011	0.30	17	0.64	0.046	0.022	640	3.0	0.67	0.67
EFA480B	0.050	0.35	7.2	0.63	0.40	0.016	0.11	24	0.86	0.19	0.093	640	5.0	0.34	0.34
EFA480C	0.14	0.25	6.1	0.30	0.10	0.030	0.40	25	0.72	0.20	0.090	600	5.0	0.50	0.50
EFA720A	0.090	0.17	9.2	0.20	0.067	0.023	0.60	17	1.1	0.13	0.060	900	5.0	0.76	0.76
EFA960B	0.070	0.125	12	0.15	0.050	0.018	0.80	13	1.4	0.10	0.045	1200	5.0	1.0	1.0
EFA1200A	0.056	0.10	15	0.12	0.040	0.015	1.0	10	1.8	0.080	0.036	1500	5.0	1.3	1.3

**Large Signal Model Parameters for Curtice-Cubic Model For High Efficiency Heterojunction Power FETs
(Curtice-Ettenburg Model)**

<i>Parameter</i>	<i>Units</i>	EPA025A	EPA040A	EPA060B	EPA080A	EPA120A	EPA120B	EPA160A	EPA240B	EPA240D	EPA480C	EPA720A	EPA960B	EPA1200A
BETA	1/V	0.00206	0.0318	0	0.0318	0.0318	0	0.0318	0	0.0244	0.0244	0.0244	0.0244	0.0244
GAMMA	1/V	0.993	1.81	1.6	1.81	1.81	1.6	1.81	1.6	2.16	2.16	2.16	2.16	2.16
VOU0	V	3.51	3.95	2	3.95	3.95	2	3.95	2	4.25	4.25	4.25	4.25	4.25
VT0	V	-1.3	-1	-1	-1	-1	-1	-1	-1	-0.9	-0.9	-0.9	-0.9	-0.9
A0	A	0.101	0.143	0.177	0.286	0.429	0.354	0.572	0.708	0.780	1.560	2.34	3.16	3.9
A1	A/V	0.157	0.144	0.16	0.288	0.432	0.32	0.576	0.640	0.840	1.680	2.52	3.36	4.2
A2	A/V ²	0.0762	-0.096	-0.062	-0.192	-0.288	-0.124	-0.384	-0.248	-0.815	-1.630	-2.45	-3.26	-4.08
A3	A/V ³	0.0117	-0.0975	-0.049	-0.195	-0.2925	-0.098	-0.39	-0.196	-0.865	-1.730	-2.60	-3.46	-4.33
TAU	S	3.00E-12	3.00E-12	2.00E-12	3.00E-12	3.00E-12	2.00E-12	3.00E-12	2.00E-12	3.00E-12	3.00E-12	3.00E-12	3.00E-12	3.00E-12
R1	ohm	0	0	1.00E+06	0	0	1.00E+06	0	1.00E+06	0	0	0	0	0
R2	ohm	0	0	0	0	0	0	0	0	0	0	0	0	0
VB0	V	14	14	1.00E+06	14	14	1.00E+06	14	1.00E+06	14	14	14	14	14
VBI	V	1	1	0.85	1	1	0.85	1	0.85	1	1	1	1	1
RF	ohm	0	0	1.00E+06	0	0	1.00E+06	0	1.00E+06	0	0	0	0	0
IS	A	3.30E-14	5.50E-14	1.00E-14	1.10E-13	1.65E-13	1.00E-14	2.20E-13	1.00E-14	3.25E-10	6.50E-10	9.75E-10	1.30E-09	1.63E-09
N	-	1.2	1.2	1	1.2	1.2	1	1.2	1	1.2	1.2	1.2	1.2	1.2
RDS	ohm	482	358	350	179	119	175	90	88	103	51.5	34.3	26	21
CRF	F	1.00E-08	1.00E-08	1.00E-11	1.00E-08	1.00E-08	1.00E-11	1.00E-08	1.00E-11	1.00E-08	1.00E-08	1.00E-08	1.00E-08	1.00E-08
RD	ohm	0.96	0.54	0.53	0.27	0.18	0.265	0.135	0.13	0.500	0.250	0.167	0.125	0.100
RG	ohm	1.8	0.74	0.71	0.37	0.25	0.355	0.185	0.18	1.200	0.600	0.400	0.300	0.240
RS	ohm	2.76	0.52	0.35	0.26	0.17	0.175	0.13	0.09	0.270	0.135	0.090	0.068	0.054
RIN	ohm	4.13	0	0.8	0	0	0.4	0	0.2	0	0	0	0	0
CGSO	F	6.45E-13	9.80E-13	1.00E-12	1.96E-12	2.94E-12	2.00E-12	3.92E-12	4.00E-12	9.95E-12	1.99E-11	2.99E-11	3.98E-11	4.98E-11
CGDO	F	5.18E-14	1.08E-13	4.90E-14	2.16E-13	3.24E-13	9.80E-14	4.32E-13	1.96E-13	3.56E-13	7.12E-13	1.07E-12	1.42E-12	1.78E-12
FC	-	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
CDS	F	8.70E-14	1.08E-13	6.40E-14	2.16E-13	3.24E-13	1.28E-13	4.32E-13	2.56E-13	3.80E-13	7.60E-13	1.14E-12	1.52E-12	1.90E-12
CGS	F	0	0	0	0	0	0	0	0	0	0	0	0	0
CGD	F	0	0	0	0	0	0	0	0	0	0	0	0	0
KF4	-	0	0	0	0	0	0	0	0	0	0	0	0	0
AF	-	1	1	1	1	1	1	1	1	1	1	1	1	1
TNOM	°C	27	27	27	27	27	27	27	27	27	27	27	27	27
XTI		3	3	3	3	3	3	3	3	3	3	3	3	3
EG	eV	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
VTOTC	V/°C	0	0	0	0	0	0	0	0	0	0	0	0	0
BETATCE	%°C	0	0	0	0	0	0	0	0	0	0	0	0	0
FFE	-	1	1	1	1	1	1	1	1	1	1	1	1	1
LD	nH	0.18	0.3	0.33	0.18	0.094	0.13	0.084	0.074	0.49	0.25	0.16	0.12	0.1
LS	nH	0.071	0.037	0.035	0.028	0.02	0.023	0.016	0.05	0.12	0.08	0.06	0.048	0.04
LG	nH	0.1	0.2	0.2	0.1	0.067	0.1	0.05	0.05	0.28	0.14	0.09	0.07	0.056

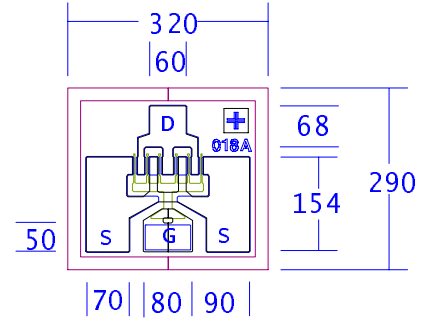
**Large Signal Model Parameters for Curtice-Cubic Model For Low Distortion GaAs Power FETs
(Curtice-Ennenburg Model)**

<i>Parameter</i>	<i>Units</i>	EFA025A	EFA040A	EFA060B	EFA080A	EFA120A	EFA120B	EFA160A	EFA240B	EFA240D	EFA480C	EFA720A	EFA960B	EFA1200A
BETA	1/V	0	0	0	0	0	0	0	0	1.5	1.5	1.5	1.5	1.5
GAMMA	1/V	2.5	2	1.2	2	2	1.2	2	1.2	1.85	1.85	1.85	1.85	1.85
VOU0	V	2	2	2	2	2	2	2	2	2	2	2	2	2
VT0	V	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2
A0	A	0.087	0.1108	0.18	0.2216	0.3324	0.36	0.4432	0.72	0.850	1.700	2.55	3.4	4.25
A1	A/V	0.048	0.067	0.063	0.134	0.201	0.126	0.268	0.252	0.480	0.960	1.44	1.92	2.4
A2	A/V ²	-0.011	-0.0244	-0.018	-0.0488	-0.0732	-0.036	-0.0976	-0.072	-0.075	-0.150	-0.225	-0.3	-0.375
A3	A/V ³	-0.0067	-0.015	-0.0063	-0.03	-0.045	-0.0126	-0.06	-0.0252	-0.046	-0.092	-0.138	-0.184	-0.23
TAU	S	2.00E-12	2.00E-12	2.00E-12	2.00E-12	2.00E-12	2.00E-12	2.00E-12	2.00E-12	2.00E-12	2.00E-12	2.00E-12	2.00E-12	2.00E-12
R1	ohm	1.00E+06	1.00E+06	1.00E+06	1.00E+06	1.00E+06	1.00E+06	1.00E+06	1.00E+06	1.00E+06	1.00E+06	1.00E+06	1.00E+06	1.00E+06
R2	ohm	0	0	0	0	0	0	0	0	0	0	0	0	0
VB0	V	1.00E+06	1.00E+06	1.00E+06	1.00E+06	1.00E+06	1.00E+06	1.00E+06	1.00E+06	1.00E+06	1.00E+06	1.00E+06	1.00E+06	1.00E+06
VBI	V	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
RF	ohm	1.00E+06	1.00E+06	1.00E+06	1.00E+06	1.00E+06	1.00E+06	1.00E+06	1.00E+06	1.00E+06	1.00E+06	1.00E+06	1.00E+06	1.00E+06
IS	A	1.00E-14	1.00E-14	1.00E-14	1.00E-14	1.00E-14	1.00E-14	1.00E-14	1.00E-14	1.00E-14	1.00E-14	1.00E-14	1.00E-14	1.00E-14
N	-	1	1	1	1	1	1	1	1	1	1	1	1	1
RDS	ohm	300	250	350	125	83	175	63	88	90	45	30	23	18
CRF	F	1.00E-11	1.00E-11	1.00E-11	1.00E-11	1.00E-11	1.00E-11	1.00E-11	1.00E-11	1.00E-11	1.00E-11	1.00E-11	1.00E-11	1.00E-11
RD	ohm	3	0.37	0.37	0.185	0.123	0.185	0.0925	0.0925	0.800	0.400	0.267	0.200	0.160
RG	ohm	4	0.71	0.71	0.355	0.237	0.355	0.178	0.178	1.500	0.750	0.500	0.375	0.300
RS	ohm	4	0.8	0.8	0.4	0.267	0.4	0.2	0.2	0.500	0.250	0.167	0.125	0.100
RIN	ohm	0	0.8	0	0.4	0.267	0	0.2	0	0	0	0	0	0
CGSO	F	2.70E-13	4.00E-13	5.50E-13	8.00E-13	1.2E-12	1.10E-12	1.60E-12	2.20E-12	4.00E-12	8.00E-12	1.20E-11	1.60E-11	2.00E-11
CGDO	F	2.50E-14	4.20E-14	3.20E-14	8.40E-14	1.26E-13	6.40E-14	1.68E-13	1.28E-13	5.00E-14	1.00E-13	1.50E-13	2.00E-13	2.50E-13
FC	-	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
CDS	F	6.00E-14	1.10E-13	6.00E-14	2.2E-13	3.3E-13	1.20E-13	4.40E-13	2.40E-13	3.00E-13	6.00E-13	9.00E-13	1.20E-12	1.50E-12
CGS	F	0	0	0	0	0	0	0	0	0	0	0	0	0
CGD	F	0	0	0	0	0	0	0	0	0	0	0	0	0
KF4	-	0	0	0	0	0	0	0	0	0	0	0	0	0
AF	-	1	1	1	1	1	1	1	1	1	1	1	1	1
TNOM	°C	27	27	27	27	27	27	27	27	27	27	27	27	27
XTI		3	3	3	3	3	3	3	3	3	3	3	3	3
EG	eV	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
VTOTC	V/°C	0	0	0	0	0	0	0	0	0	0	0	0	0
BETATCE	%°C	0	0	0	0	0	0	0	0	0	0	0	0	0
FFE	-	1	1	1	1	1	1	1	1	1	1	1	1	1
LD	nH	0.18	0.3	0.33	0.18	0.094	0.13	0.084	0.074	0.49	0.25	0.16	0.12	0.1
LS	nH	0.071	0.037	0.035	0.028	0.02	0.023	0.016	0.05	0.12	0.08	0.06	0.048	0.04
LG	nH	0.1	0.2	0.2	0.1	0.067	0.1	0.05	0.05	0.28	0.14	0.09	0.07	0.056

EPB018A5/A7/A9

DATA SHEET Super Low Noise High Gain Heterojunction FET

- **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 ($T_a = 25^\circ C$)

SYMBOLS	PARAMETERS/TEST CONDITIONS	MIN	TYP	MAX	UNIT
NF	Noise Figure, $f=12GHz$ $V_{ds}=2V, I_{ds}=15mA$	EPB018A5	0.50	0.60	dB
		EPB018A7	0.65	0.80	
		EPB018A9	0.95	1.20	
Ga	Associated Gain, $f=12GHz$ $V_{ds}=2V, I_{ds}=15mA$	EPB018A5	12.0	13.0	dB
		EPB018A7	11.5	12.5	
		EPB018A9	11.0	12.0	
P_{1dB}	Output Power at 1dB Compression $V_{ds}=3V, I_{ds}=25mA$		15.0 15.0		dBm
G_{1dB}	Gain at 1dB Compression $V_{ds}=3V, I_{ds}=25mA$	$f=12GHz$	15.0		dB
		$f=18GHz$	13.0		
I_{dss}	Saturated Drain Current $V_{ds}=2V, V_{gs}=0V$	15	45	80	mA
G_m	Transconductance $V_{ds}=2V, V_{gs}=0V$	50	90		mS
V_p	Pinch-off Voltage $V_{ds}=2V, I_{ds}=1.0mA$		-0.8	-2.5	V
BV_{gd}	Drain Breakdown Voltage $I_{gd}=10uA$	-3	-6		V
BV_{gs}	Source Breakdown Voltage $I_{gs}=10uA$	-3	-6		V
R_{th}	Thermal Resistance (Au-Sn Eutectic Attach)		185		$^\circ C/W$

MAXIMUM RATINGS AT $25^\circ C$

SYMBOLS	PARAMETERS	ABSOLUTE ¹	CONTINUOUS ²
V_{ds}	Drain-Source Voltage	5V	4V
V_{gs}	Gate-Source Voltage	-3V	-2V
I_{ds}	Drain Current	I_{dss}	I_{dss}
I_{gsf}	Forward Gate Current	2mA	0.3mA
P_{in}	Input Power	12dBm	@ 1dB 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

EPB018A5/A7/A9

DATA SHEET Super Low Noise High Gain Heterojunction FET

EPB018A5 S-PARAMETERS 2V, 15mA									EPB018A7 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	0.987	-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 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.

EPB018A5/A7/A9

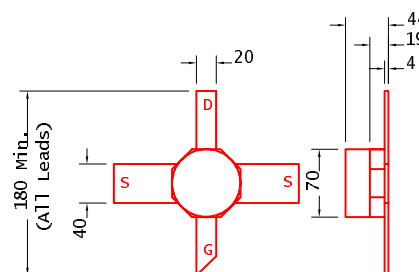
DATA SHEET Super Low Noise High Gain Heterojunction FET

EPB018A7				
Noise Parameters				
Vds=2V, Ids=15mA				
Freq	Gamma Opt		Nfmin	
(GHz)	(MAG)	(ANG)	(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

EPB018A5/A7/A9-70

DATA SHEET Super Low Noise High Gain Heterojunction FET

- NON-HERMETIC LOW COST CERAMIC 70 mil PACKAGE
- TYPICAL 0.50~0.90dB NOISE FIGURE AND 11.5~13.0dB ASSOCIATED GAIN AT 12GHz
- 0.3 X 180 MICRON RECESSED “ MUSHROOM” GATE
- Si₃N₄ PASSIVATION
- ADVANCED EPITAXIAL HETEROJUNCTION PROFILE PROVIDES SUPER LOW NOISE, HIGH GAIN AND HIGH RELIABILITY



All Dimensions In mils.

ELECTRICAL CHARACTERISTICS (T_a = 25 °C)

SYMBOLS	PARAMETERS/TEST CONDITIONS	MIN	TYP	MAX	UNIT
NF	Noise Figure, f=12GHz V _{ds} =2V, I _{ds} =15mA	EPB018A5-70	0.50	0.60	dB
		EPB018A7-70	0.65	0.80	
		EPB018A9-70	0.95	1.20	
Ga	Associated Gain, f=12GHz V _{ds} =2V, I _{ds} =15mA	EPB018A5-70	11.5	13.0	dB
		EPB018A7-70	11.0	12.5	
		EPB018A9-70	10.5	11.5	
P _{1dB}	Output Power at 1dB Compression V _{ds} =3V, I _{ds} =25mA		15.0 15.0		dBm
G _{1dB}	Gain at 1dB Compression V _{ds} =3V, I _{ds} =25mA		14.0 11.5		dB
I _{dss}	Saturated Drain Current V _{ds} =2V, V _{gs} =0V	15	45	80	mA
G _m	Transconductance V _{ds} =2V, V _{gs} =0V	50	90		mS
V _p	Pinch-off Voltage V _{ds} =2V, I _{ds} =1.0mA		-0.8	-2.5	V
BV _{gd}	Drain Breakdown Voltage I _{gd} =10uA	-3	-6		V
BV _{gs}	Source Breakdown Voltage I _{gs} =10uA	-3	-6		V
R _{th}	Thermal Resistance		480*		°C/W

*Overall R_{th} depends on case mounting.

MAXIMUM RATINGS AT 25°C

SYMBOLS	PARAMETERS	ABSOLUTE ¹	CONTINUOUS ²
V _{ds}	Drain-Source Voltage	5V	4V
V _{gs}	Gate-Source Voltage	-3V	-2V
I _{ds}	Drain Current	I _{dss}	60mA
I _{gsf}	Forward Gate Current	2mA	0.3mA
P _{in}	Input Power	12dBm	@ 1dB Compression
T _{ch}	Channel Temperature	175°C	150°C
T _{stg}	Storage Temperature	-65/175°C	-65/150°C
P _t	Total Power Dissipation	285mW	240mW

EPB018A5/A7/A9-70

DATA SHEET Super Low Noise High Gain Heterojunction FET

EPB018A5-70 S-PARAMETERS 2V, 15mA									EPB018A7-70 S-PARAMETERS 2V, 15mA								
FREQ	-- S11 --		-- S21 --		-- S12 --		-- S22 --		FREQ	-- S11 --		-- S21 --		-- S12 --		-- S22 --	
(GHz)	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG	(GHz)	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
1.0	0.983	-18.6	6.245	162.2	0.019	78.9	0.530	-13.5	1.0	0.985	-18.9	5.754	162.0	0.021	77.1	0.677	-13.7
2.0	0.944	-37.5	5.964	144.3	0.036	65.2	0.507	-28.8	2.0	0.949	-38.2	5.495	143.9	0.040	63.1	0.650	-28.9
3.0	0.896	-55.5	5.582	127.7	0.050	53.6	0.485	-42.6	3.0	0.903	-56.2	5.137	127.2	0.055	50.5	0.622	-42.7
4.0	0.849	-72.6	5.327	112.4	0.063	43.6	0.464	-54.2	4.0	0.860	-73.6	4.914	111.8	0.067	39.1	0.595	-54.1
5.0	0.797	-89.2	5.111	97.6	0.074	33.1	0.421	-65.4	5.0	0.812	-90.4	4.726	96.9	0.079	28.5	0.549	-65.4
6.0	0.747	-103.7	4.799	83.4	0.081	23.4	0.370	-78.6	6.0	0.765	-104.9	4.461	82.4	0.086	17.8	0.495	-78.6
7.0	0.691	-118.6	4.503	69.9	0.085	13.9	0.344	-90.7	7.0	0.713	-119.9	4.189	68.6	0.092	7.3	0.464	-90.5
8.0	0.642	-132.8	4.277	57.0	0.088	4.7	0.303	-100.7	8.0	0.664	-134.3	3.982	55.4	0.093	-3.6	0.411	-100.6
9.0	0.600	-155.6	4.189	42.7	0.093	-5.1	0.271	-111.2	9.0	0.621	-157.1	3.908	40.9	0.096	-12.9	0.374	-108.6
10.0	0.567	-178.3	4.012	27.8	0.096	-16.3	0.228	-126.9	10.0	0.591	-179.4	3.759	25.7	0.098	-24.5	0.328	-121.7
11.0	0.534	170.3	3.846	15.5	0.094	-26.5	0.193	-145.5	11.0	0.564	169.0	3.644	12.8	0.099	-33.4	0.295	-140.0
12.0	0.515	155.6	3.758	2.9	0.093	-33.1	0.177	-161.2	12.0	0.541	153.2	3.551	-0.8	0.098	-43.3	0.266	-157.6
13.0	0.555	128.7	3.569	-12.5	0.091	-44.2	0.137	176.3	13.0	0.574	126.2	3.360	-16.6	0.096	-54.9	0.210	-174.2
14.0	0.596	106.0	3.317	-27.1	0.088	-55.6	0.114	151.4	14.0	0.609	103.6	3.093	-31.7	0.090	-66.7	0.173	167.6
15.0	0.592	91.3	3.214	-41.3	0.087	-66.9	0.141	123.9	15.0	0.598	88.8	2.985	-46.4	0.090	-78.4	0.187	139.8
16.0	0.597	74.3	3.086	-56.8	0.083	-81.1	0.158	94.5	16.0	0.597	71.4	2.857	-62.2	0.085	-92.9	0.194	109.8
17.0	0.619	59.2	2.756	-69.5	0.071	-90.3	0.134	68.1	17.0	0.612	55.7	2.548	-75.5	0.072	-102.8	0.155	89.8
18.0	0.670	49.9	2.668	-79.4	0.071	-97.3	0.136	64.0	18.0	0.661	46.6	2.472	-85.8	0.076	-105.2	0.183	89.7
19.0	0.668	33.0	2.623	-95.4	0.069	-115.9	0.169	51.0	19.0	0.657	29.0	2.381	-102.1	0.076	-126.2	0.221	68.8
20.0	0.708	17.3	2.551	-111.1	0.064	-131.4	0.172	37.8	20.0	0.697	13.2	2.286	-118.1	0.071	-141.6	0.240	56.1
21.0	0.757	8.2	2.447	-125.1	0.061	-144.1	0.159	18.7	21.0	0.740	4.4	2.173	-131.8	0.068	-155.3	0.221	40.9
22.0	0.743	-2.5	2.325	-139.4	0.063	-159.2	0.135	14.7	22.0	0.728	-5.8	2.067	-145.9	0.070	-167.9	0.210	36.8
23.0	0.726	-21.1	2.224	-158.5	0.065	179.4	0.115	-1.3	23.0	0.717	-24.4	1.958	-164.5	0.071	172.5	0.188	21.8
24.0	0.747	-39.6	2.063	-178.1	0.067	158.8	0.102	-39.6	24.0	0.743	-41.8	1.807	176.3	0.071	151.8	0.154	-5.5
25.0	0.709	-52.6	2.024	167.9	0.072	144.7	0.136	-56.6	25.0	0.710	-53.5	1.757	161.7	0.075	138.3	0.174	-28.1
26.0	0.683	-70.6	2.006	150.2	0.083	132.8	0.117	-71.3	26.0	0.689	-69.1	1.759	145.4	0.084	124.1	0.152	-47.5

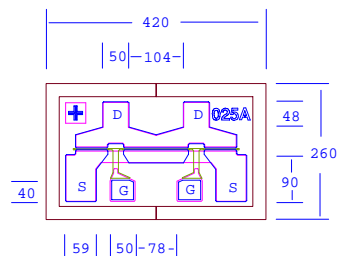
EPB018A7-70 Noise Parameters Vds=2V, Ids=15mA				
Freq.	Gamma Opt		Nfmin	Rn/50
(GHz)	(MAG)	(ANG)	(dB)	
2	0.76	25	0.37	0.26
4	0.65	56	0.43	0.22
6	0.51	84	0.48	0.16
8	0.41	118	0.55	0.11
10	0.26	159	0.61	0.08
12	0.26	-144	0.68	0.08
14	0.32	-82	0.89	0.18
16	0.40	-46	1.10	0.29
18	0.40	-26	1.30	0.45
20	0.51	8	1.45	0.55
22	0.41	27	1.69	0.61
24	0.48	75	1.83	0.59
26	0.52	108	2.05	0.40

EPB025A

DATA SHEET

Low Noise High Gain Heterojunction FET

- TYPICAL 0.8dB NOISE FIGURE AND 11.0dB ASSOCIATED GAIN AT 12GHz
- 0.3 X 250 MICRON RECESSED “MUSHROOM” GATE
- Si₃N₄ PASSIVATION
- ADVANCED EPITAXIAL DOPING PROFILE PROVIDES SUPER LOW NOISE, HIGH GAIN AND HIGH RELIABILITY
- Idss SORTED IN 5mA PER BIN RANGE



ELECTRICAL CHARACTERISTICS (T_a = 25 °C)

SYMBOLS	PARAMETERS/TEST CONDITIONS	MIN	TYP	MAX	UNIT
NF	Noise Figure V _{ds} =2V, I _{ds} =15mA f = 12GHz		0.80	1.0	dB
G _a	Associated Gain V _{ds} =2V, I _{ds} =15mA f = 12GHz	10.0	11.0		dB
P _{1dB}	Output Power at 1dB Compression V _{ds} =3V, I _{ds} =25mA f=12GHz f=18GHz		15.0 15.0		dBm
G _{1dB}	Gain at 1dB Compression V _{ds} =3V, I _{ds} =25mA f=12GHz f=18GHz		13.0 11.0		dB
I _{dss}	Saturated Drain Current V _{ds} =2V, V _{gs} =0V	20	50	80	mA
G _m	Transconductance V _{ds} =2V, V _{gs} =0V	50	80		mS
V _p	Pinch-off Voltage V _{ds} =2V, I _{ds} =1.0mA		-1.0	-2.5	V
BV _{gd}	Drain Breakdown Voltage I _{gd} =10uA	-3	-5		V
BV _{gs}	Source Breakdown Voltage I _{gs} =10uA	-3	-5		V
R _{th}	Thermal Resistance (Au-Sn Eutectic Attach)		155		°C/W

MAXIMUM RATINGS AT 25 °C

SYMBOLS	PARAMETERS	ABSOLUTE ¹	CONTINUOUS ²
V _{ds}	Drain-Source Voltage	5V	3V
V _{gs}	Gate-Source Voltage	-3V	-3V
I _{ds}	Drain Current	I _{dss}	I _{dss}
I _{gsf}	Forward Gate Current	2mA	0.3mA
P _{in}	Input Power	12dBm	@ 1dB Compression
T _{ch}	Channel Temperature	175°C	150°C
T _{stg}	Storage Temperature	-65/175°C	-65/150°C
P _t	Total Power Dissipation	880mW	730mW

EPB025A

DATA SHEET

Low Noise High Gain Heterojunction FET

S-PARAMETERS

2V, 15mA

FREQ (GHz)	--- S11 ---		--- S21 ---		--- S12 ---		--- S22 ---	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
1.0	0.996	-16.0	6.346	166.8	0.028	79.1	0.653	-11.5
2.0	0.968	-31.7	6.153	155.3	0.054	71.3	0.633	-23.4
3.0	0.928	-47.3	5.875	143.9	0.076	61.7	0.604	-35.0
4.0	0.884	-62.7	5.535	132.9	0.095	53.2	0.568	-46.3
5.0	0.836	-78.0	5.137	122.0	0.109	44.4	0.517	-57.9
6.0	0.800	-91.3	4.714	112.8	0.118	37.8	0.485	-67.7
7.0	0.775	-102.9	4.315	104.5	0.125	32.1	0.457	-76.6
8.0	0.749	-113.2	3.933	97.1	0.129	26.8	0.437	-84.2
9.0	0.732	-121.7	3.615	90.5	0.131	22.1	0.419	-90.4
10.0	0.714	-128.3	3.325	85.0	0.131	18.4	0.407	-94.7
11.0	0.701	-134.6	3.112	79.5	0.133	15.2	0.403	-98.8
12.0	0.694	-140.2	2.928	74.6	0.135	12.3	0.400	-102.2
13.0	0.680	-146.4	2.780	69.3	0.137	8.9	0.392	-105.8
14.0	0.666	-153.4	2.660	64.5	0.139	5.8	0.385	-109.1
15.0	0.659	-161.2	2.582	59.0	0.143	2.3	0.377	-112.9
16.0	0.654	-170.0	2.500	52.9	0.147	-1.0	0.367	-118.7
17.0	0.652	179.4	2.408	46.3	0.151	-5.3	0.352	-125.3
18.0	0.662	168.5	2.313	39.5	0.154	-9.7	0.333	-133.9
19.0	0.672	157.8	2.196	32.6	0.155	-14.0	0.319	-142.6
20.0	0.690	147.9	2.072	25.4	0.155	-18.4	0.312	-153.7
21.0	0.716	144.2	1.873	20.3	0.149	-21.0	0.336	-166.1
22.0	0.729	138.6	1.741	15.2	0.145	-23.6	0.347	-173.4
23.0	0.758	134.9	1.629	10.2	0.144	-25.9	0.372	-178.6
24.0	0.760	133.3	1.524	6.1	0.140	-26.5	0.389	178.0
25.0	0.775	131.2	1.456	2.4	0.137	-27.7	0.415	176.2
26.0	0.786	131.9	1.403	-0.9	0.137	-27.1	0.431	176.0
27.0	0.768	131.4	1.345	-3.6	0.139	-27.2	0.449	176.4
28.0	0.766	132.0	1.307	-6.2	0.140	-27.0	0.455	177.4
29.0	0.755	131.6	1.302	-9.7	0.143	-27.0	0.471	177.2
30.0	0.740	129.3	1.292	-13.1	0.147	-27.8	0.470	178.1
31.0	0.717	125.8	1.280	-17.2	0.150	-29.8	0.472	177.2
32.0	0.695	119.5	1.274	-22.5	0.150	-33.0	0.467	175.7
33.0	0.668	111.8	1.236	-28.2	0.148	-37.2	0.447	171.3
34.0	0.663	101.3	1.203	-34.3	0.144	-43.3	0.428	166.4
35.0	0.672	91.2	1.157	-40.4	0.139	-48.5	0.406	157.1
36.0	0.717	79.6	1.108	-46.5	0.134	-56.5	0.405	146.8
37.0	0.762	71.7	1.039	-53.2	0.128	-63.5	0.410	133.6
38.0	0.807	64.5	0.975	-59.6	0.121	-72.3	0.432	122.7
39.0	0.847	60.0	0.898	-65.7	0.112	-81.9	0.462	112.1
40.0	0.858	57.7	0.793	-70.7	0.107	-89.8	0.503	106.4

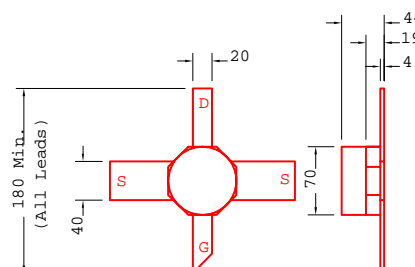
Note: The data included 0.7 mils diameter Au bonding wires:
2 gate wires, 15 mils each; 2 drain wires, 20 mils each; 4 source wires, 7 mils each.

EPB025A-70

DATA SHEET

Low Noise High Gain Heterojunction FET

- NON-HERMETIC LOW COST CERAMIC 70 mil PACKAGE
- TYPICAL 0.85dB NOISE FIGURE AND 10.5dB ASSOCIATED GAIN AT 12GHz
- 0.3 X 250 MICRON RECESSED “MUSHROOM” GATE
- Si₃N₄ PASSIVATION
- ADVANCED EPITAXIAL DOPING PROFILE PROVIDES SUPER LOW NOISE, HIGH GAIN AND HIGH RELIABILITY



ELECTRICAL CHARACTERISTICS (T_a = 25 °C)

SYMBOLS	PARAMETERS/TEST CONDITIONS	MIN	TYP	MAX	UNIT
NF	Noise Figure f = 12GHz V _{ds} =2V, I _{ds} =15mA		0.85	1.0	dB
G _a	Associated Gain f = 12GHz V _{ds} =2V, I _{ds} =15mA	9.5	10.5		dB
P _{1dB}	Output Power at 1dB Compression f=12GHz V _{ds} =3V, I _{ds} =25mA		15.0		dBm
G _{1dB}	Gain at 1dB Compression f=12GHz V _{ds} =3V, I _{ds} =25mA		12.0		dB
I _{dss}	Saturated Drain Current V _{ds} =2V, V _{gs} =0V	20	50	80	mA
G _m	Transconductance V _{ds} =2V, V _{gs} =0V	50	80		mS
V _p	Pinch-off Voltage V _{ds} =2V, I _{ds} =1.0mA		-1.0	-2.5	V
BV _{gd}	Drain Breakdown Voltage I _{gd} =10uA	-3	-5		V
BV _{gs}	Source Breakdown Voltage I _{gs} =10uA	-3	-5		V
R _{th}	Thermal Resistance		370*		°C/W

*Overall R_{th} depends on case mounting

MAXIMUM RATINGS AT 25°C

SYMBOLS	PARAMETERS	ABSOLUTE ¹	CONTINUOUS ²
V _{ds}	Drain-Source Voltage	5V	3V
V _{gs}	Gate-Source Voltage	-3V	-3V
I _{ds}	Drain Current	I _{dss}	50mA
I _{gsf}	Forward Gate Current	2mA	0.3mA
P _{in}	Input Power	12dBm	@ 1dB Compression
T _{ch}	Channel Temperature	175°C	150°C
T _{stg}	Storage Temperature	-65/175°C	-65/150°C
P _t	Total Power Dissipation	370mW	310mW

EPB025A-70

DATA SHEET

Low Noise High Gain Heterojunction FET

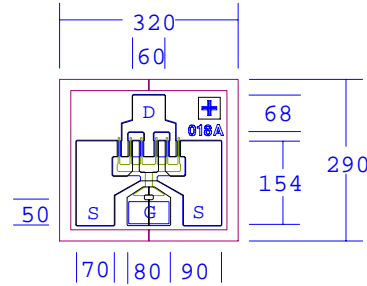
S-PARAMETERS								
2V, 15mA								
FREQ (GHz)	--- S11 ---		--- S21 ---		--- S12 ---		--- S22 ---	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
1.0	0.977	-21.3	5.991	159.2	0.026	75.1	0.641	-16.1
2.0	0.922	-42.4	5.602	138.8	0.048	60.3	0.604	-33.3
3.0	0.857	-61.7	5.110	120.4	0.065	48.3	0.567	-48.6
4.0	0.793	-79.8	4.758	103.7	0.079	38.2	0.532	-61.2
5.0	0.729	-97.0	4.445	87.9	0.091	27.6	0.480	-73.9
6.0	0.672	-111.1	4.087	73.0	0.098	18.2	0.426	-88.7
7.0	0.612	-125.3	3.757	58.9	0.104	9.1	0.399	-101.8
8.0	0.558	-138.7	3.494	45.7	0.105	0.3	0.354	-113.4
9.0	0.508	-160.7	3.354	31.6	0.110	-6.9	0.329	-123.7
10.0	0.473	178.3	3.169	17.1	0.114	-15.8	0.307	-139.6
11.0	0.437	168.8	3.014	4.5	0.117	-23.9	0.299	-159.3
12.0	0.404	154.6	2.898	-8.6	0.120	-31.1	0.298	-177.4
13.0	0.430	127.9	2.734	-23.4	0.122	-40.9	0.276	165.2
14.0	0.460	105.7	2.535	-37.4	0.120	-51.0	0.269	149.4
15.0	0.436	91.0	2.424	-51.6	0.122	-60.3	0.306	130.5
16.0	0.424	73.5	2.311	-66.6	0.123	-71.4	0.328	108.8
17.0	0.450	59.1	2.084	-79.5	0.114	-79.0	0.296	96.1
18.0	0.496	49.9	2.021	-90.2	0.123	-85.3	0.334	92.8
19.0	0.472	30.9	1.938	-104.6	0.121	-99.1	0.376	76.2
20.0	0.518	15.6	1.884	-120.1	0.119	-111.5	0.412	62.4
21.0	0.566	8.9	1.792	-133.9	0.120	-122.4	0.394	51.5
22.0	0.554	0.6	1.713	-147.9	0.123	-134.0	0.388	46.2
23.0	0.534	-18.5	1.639	-164.8	0.124	-149.4	0.378	29.4
24.0	0.575	-35.4	1.557	176.7	0.126	-167.0	0.362	8.2
25.0	0.550	-43.9	1.513	161.6	0.130	-179.0	0.368	-4.3
26.0	0.522	-57.1	1.516	145.7	0.143	166.3	0.346	-15.8

EPA018A

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**
- **Si₃N₄ 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 ($T_a = 25^\circ\text{C}$)

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

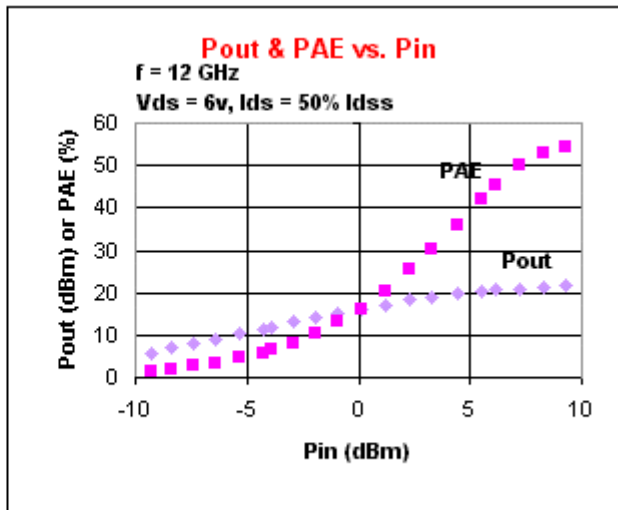
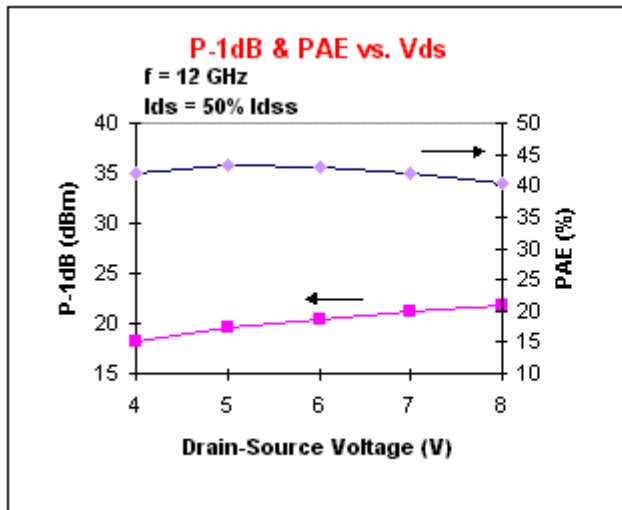
* $P_{1dB} = 21.5\text{dBm}$ can be obtained with 8v/50% Idss bias. Consult factory for wafer selection.

MAXIMUM RATINGS AT 25°C

SYMBOLS	PARAMETERS	ABSOLUTE ¹	CONTINUOUS ²
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 $^\circ\text{C}$	150 $^\circ\text{C}$
T_{stg}	Storage Temperature	-65/175 $^\circ\text{C}$	-65/150 $^\circ\text{C}$
P_t	Total Power Dissipation	740mW	625mW

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

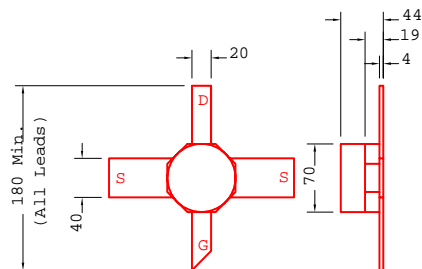
Note: The data included 0.7 mils diameter Au bonding wires:
 1 gate wire, 15 mils each; 1 drain wire, 20 mils each; 6 source wires, 8 mils each.

EPA018A-70

DATA SHEET

High Efficiency Heterojunction Power FET

- NON-HERMETIC LOW COST CERAMIC 70mil PACKAGE
- +20.0dBm TYPICAL OUTPUT POWER
- 11.0dB TYPICAL POWER GAIN AT 18GHz
- TYPICAL 0.75dB NOISE FIGURE AND 12.5dB ASSOCIATED GAIN AT 12GHz
- 0.3 X 180 MICRON RECESSED “MUSHROOM” GATE
- Si₃N₄ PASSIVATION
- ADVANCED EPITAXIAL HETEROJUNCTION PROFILE PROVIDES EXTRA HIGH POWER EFFICIENCY, AND HIGH RELIABILITY



All Dimensions In mils.

ELECTRICAL CHARACTERISTICS (T_a = 25 °C)

SYMBOLS	PARAMETERS/TEST CONDITIONS	MIN	TYP	MAX	UNIT
P _{1dB}	Output Power at 1dB Compression V _{ds} =6V, I _{ds} =50% I _{ds}	f=12GHz 18.5	f=18GHz 20.0 20.0		dBm
G _{1dB}	Gain at 1dB Compression V _{ds} =6V, I _{ds} =50% I _{ds}	f=12GHz 11.0	f=18GHz 13.5 11.0		dB
PAE	Power Added Efficiency at 1dB Compression V _{ds} =6V, I _{ds} =50% I _{ds}	f=12GHz	45		%
NF	Noise Figure V _{ds} =2V, I _{ds} =15mA	f=12GHz	0.75		dB
G _a	Associated Gain V _{ds} =2V, I _{ds} =15mA	f=12GHz	12.5		dB
I _{ds}	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} =1.0mA	-9	-15		V
BV _{gs}	Source Breakdown Voltage I _{gs} =1.0mA	-6	-14		V
R _{th}	Thermal Resistance		480*		°C/W

* Overall R_{th} depends on case mounting.

MAXIMUM RATINGS AT 25°C

SYMBOLS	PARAMETERS	ABSOLUTE ¹	CONTINUOUS ²
V _{ds}	Drain-Source Voltage	10V	6V
V _{gs}	Gate-Source Voltage	-6V	-3V
I _{ds}	Drain Current	I _{ds}	40mA
I _{gsf}	Forward Gate Current	9mA	1.5mA
P _{in}	Input Power	16dBm	@ 3dB Compression
T _{ch}	Channel Temperature	175°C	150°C
T _{stg}	Storage Temperature	-65/175°C	-65/150°C
P _t	Total Power Dissipation	285mW	240mW

EPA018A-70

DATA SHEET

High Efficiency Heterojunction Power FET

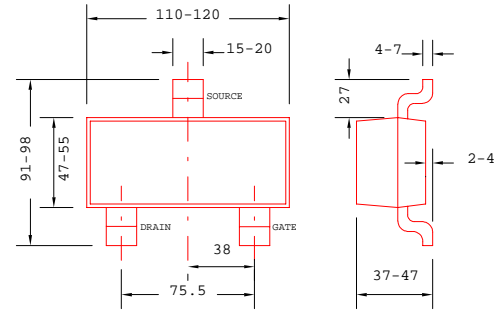
S-PARAMETERS								
6V, 1/2 Idss								
FREQ	--- S11 ---		--- S21 ---		--- S12 ---		--- S22 ---	
(GHz)	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
1.0	0.984	-19.0	5.081	162.1	0.014	75.9	0.813	-11.1
2.0	0.950	-38.2	4.859	144.2	0.026	63.4	0.789	-23.7
3.0	0.906	-56.4	4.547	127.3	0.035	51.4	0.766	-35.3
4.0	0.863	-74.0	4.348	111.9	0.041	42.1	0.745	-44.6
5.0	0.813	-90.7	4.195	97.2	0.047	32.9	0.713	-53.3
6.0	0.764	-105.0	3.973	82.9	0.049	24.2	0.675	-64.4
7.0	0.715	-120.3	3.746	68.8	0.050	15.3	0.649	-74.6
8.0	0.663	-134.7	3.572	55.9	0.046	6.9	0.612	-82.6
9.0	0.614	-157.7	3.501	41.4	0.044	5.6	0.605	-87.5
10.0	0.587	-179.9	3.388	26.4	0.044	2.1	0.585	-97.0
11.0	0.561	168.8	3.307	13.4	0.044	0.2	0.562	-110.8
12.0	0.539	153.6	3.248	0.0	0.045	2.0	0.551	-122.8
13.0	0.573	127.2	3.097	-15.8	0.049	-0.6	0.527	-131.9
14.0	0.611	104.9	2.873	-31.1	0.050	-6.1	0.510	-143.2
15.0	0.613	90.9	2.805	-46.4	0.055	-13.0	0.513	-162.9
16.0	0.620	74.4	2.730	-62.7	0.059	-20.7	0.503	178.0
17.0	0.640	58.9	2.432	-76.4	0.056	-20.7	0.463	169.1
18.0	0.692	49.7	2.365	-87.1	0.075	-32.3	0.522	157.0
19.0	0.691	32.0	2.236	-104.4	0.064	-49.1	0.540	133.7
20.0	0.731	16.7	2.163	-120.6	0.064	-59.8	0.591	117.3
21.0	0.783	7.8	2.061	-134.9	0.065	-70.3	0.578	106.6
22.0	0.771	-2.6	1.923	-148.7	0.062	-85.6	0.592	95.6
23.0	0.752	-20.8	1.800	-166.5	0.058	-103.2	0.592	76.9
24.0	0.776	-37.7	1.693	174.8	0.054	-123.0	0.584	59.7
25.0	0.756	-48.6	1.690	160.0	0.055	-139.5	0.568	45.9
26.0	0.742	-62.4	1.710	144.5	0.060	-154.9	0.555	33.7

EPA018A-SOT23

PRELIMINARY DATA SHEET

DC-6GHz High Efficiency Heterojunction Power FET

- LOW COST SURFACE-MOUNT PLASTIC PACKAGE
- +20.0dBm TYPICAL OUTPUT POWER
- 17.0dB TYPICAL POWER GAIN AT 2GHz
- 0.7dB TYPICAL NOISE FIGURE AT 2GHz
- +27dBm TYPICAL OUTPUT 3rd ORDER INTERCEPT POINT AT 2GHz
- 0.3 X 180 MICRON RECESSED “MUSHROOM” GATE
- Si₃N₄ PASSIVATION
- ADVANCED EPITAXIAL HETEROJUNCTION PROFILE PROVIDES EXTRA HIGH POWER EFFICIENCY, AND HIGH RELIABILITY



ELECTRICAL CHARACTERISTICS (T_a = 25 °C)

SYMBOLS	PARAMETERS/TEST CONDITIONS	MIN	TYP	MAX	UNIT
P_{1dB}	Output Power at 1dB Compression V _{ds} =6V, I _{ds} =30mA		f=2GHz 18.0	20.0	dBm
G_{1dB}	Gain at 1dB Compression V _{ds} =6V, I _{ds} =30mA		f=2GHz 15.0	17.0	dB
NF	Noise Figure, V _{ds} =2V, I _{ds} =15mA V _{ds} =6V, I _{ds} =30mA		f=2GHz 0.7 0.9		dB
IP3	Output 3rd Order Intercept Point V _{ds} =6V, I _{ds} =30mA		f=2GHz 27		dBm
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		450*		°C/W

* Overall R_{th} depends on case mounting.

MAXIMUM RATINGS AT 25 °C

SYMBOLS	PARAMETERS	ABSOLUTE ¹	CONTINUOUS ²
V_{ds}	Drain-Source Voltage	12V	6V
V_{gs}	Gate-Source Voltage	-8V	-3V
I_{ds}	Drain Current	I _{dss}	45mA
I_{gsf}	Forward Gate Current	9mA	1.5mA
P_{in}	Input Power	16dBm	@3dB Compression
T_{ch}	Channel Temperature	175°C	150°C
T_{stg}	Storage Temperature	-65/175°C	-65/150°C
P_t	Total Power Dissipation	330mW	280mW

EPA018A-SOT23

PRELIMINARY DATA SHEET

DC-6GHz High Efficiency Heterojunction Power FET

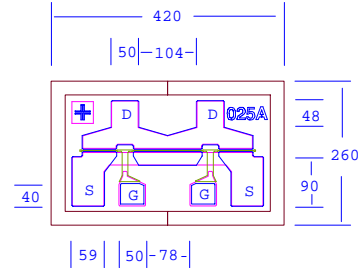
S-PARAMETERS								
6V, 30mA								
FREQ (GHz)	--- S11 ---		--- S21 ---		--- S12 ---		--- S22 ---	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
0.1	1.016	-3.8	6.436	176.9	0.001	-173.4	0.828	-1.2
0.2	1.008	-7.6	6.387	174.0	0.006	79.5	0.822	-4.0
0.3	1.009	-11.4	6.371	170.9	0.009	81.1	0.822	-6.2
0.4	1.004	-15.4	6.355	167.7	0.012	79.8	0.821	-8.4
0.5	1.006	-19.2	6.351	164.6	0.016	80.6	0.821	-10.4
1.0	0.984	-39.1	6.167	148.0	0.031	67.2	0.805	-21.7
1.5	0.898	-44.3	4.608	136.1	0.033	62.1	0.812	-22.8
2.0	0.834	-60.3	4.347	120.9	0.041	53.6	0.777	-31.5
2.5	0.773	-74.7	3.971	107.2	0.045	45.6	0.746	-39.1
3.0	0.719	-86.1	3.620	95.6	0.047	40.2	0.727	-45.3
3.5	0.667	-95.1	3.357	85.6	0.048	39.1	0.713	-49.5
4.0	0.606	-103.0	3.204	76.5	0.050	39.6	0.703	-53.0
4.5	0.529	-111.7	3.113	66.9	0.055	42.2	0.686	-56.6
5.0	0.448	-123.5	3.048	56.8	0.062	44.9	0.660	-60.7
5.5	0.376	-140.5	2.932	46.2	0.072	44.8	0.627	-66.0
6.0	0.338	-160.8	2.767	35.5	0.085	43.0	0.592	-72.5
6.5	0.332	-179.3	2.542	25.4	0.099	37.5	0.549	-79.5
7.0	0.312	171.0	2.288	18.2	0.105	27.2	0.494	-83.0
7.5	0.254	168.2	2.134	15.0	0.082	26.1	0.505	-78.5
8.0	0.215	179.1	2.204	11.5	0.093	52.4	0.617	-80.4
8.5	0.208	172.4	2.298	3.6	0.145	53.8	0.691	-88.7
9.0	0.186	145.9	2.317	-5.4	0.184	46.1	0.698	-96.8
9.5	0.214	116.9	2.337	-14.0	0.224	41.7	0.716	-105.7
10.0	0.302	102.2	2.295	-23.1	0.268	34.6	0.689	-118.2
10.5	0.381	98.9	2.263	-29.0	0.309	28.8	0.668	-128.1
11.0	0.433	105.6	2.386	-33.9	0.368	24.9	0.725	-136.4
11.5	0.542	117.3	2.658	-41.4	0.485	19.4	0.905	-148.9
12.0	0.897	108.0	3.059	-56.2	0.673	-2.8	1.112	-172.8

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
- Si₃N₄ PASSIVATION
- ADVANCED EPITAXIAL HETEROJUNCTION PROFILE PROVIDES EXTRA HIGH POWER EFFICIENCY, AND HIGH RELIABILITY
- Idss SORTED IN 5 mA PER BIN RANGE



ELECTRICAL CHARACTERISTICS (T_a = 25 °C)

SYMBOLS	PARAMETERS/TEST CONDITIONS	MIN	TYP	MAX	UNIT
P_{1dB}	Output Power at 1dB Compression V _{ds} =8V, I _{ds} =50% I _{dss}	f=12GHz 21.0	f=18GHz 22.5 22.5		dBm
G_{1dB}	Gain at 1dB Compression V _{ds} =8V, I _{ds} =50% I _{dss}	f=12GHz 12.0	f=18GHz 13.5 11.0		dB
PAE	Gain at 1dB Compression V _{ds} =8V, I _{ds} =50% I _{dss}	f=12GHz	47		%
NF	Noise Figure V _{ds} =2V, I _{ds} =15mA	f=12GHz	0.85		dB
G_a	Associated Gain V _{ds} =2V, I _{ds} =15mA	f=12GHz	11.0		dB
I_{dss}	Saturated Drain Current V _{ds} =3V, V _{gs} =0V	40	75	105	mA
G_m	Transconductance V _{ds} =3V, V _{gs} =0V	50	80		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} =1.0mA	-11	-15		V
BV_{gs}	Source Breakdown Voltage I _{gs} =1.0mA	-7	-14		V
R_{th}	Thermal Resistance (Au-Sn Eutectic Attach)		155		°C/W

MAXIMUM RATINGS AT 25°C

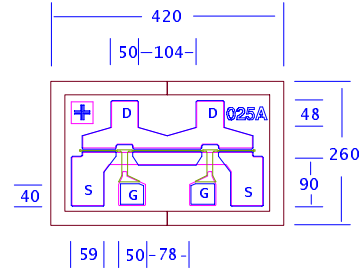
SYMBOLS	PARAMETERS	ABSOLUTE ¹	CONTINUOUS ²
V_{ds}	Drain-Source Voltage	12V	8V
V_{gs}	Gate-Source Voltage	-8V	-3V
I_{ds}	Drain Current	I _{dss}	90mA
I_{gsf}	Forward Gate Current	12mA	2mA
P_{in}	Input Power	19dBm	@3dB Compression
T_{ch}	Channel Temperature	175°C	150°C
T_{stg}	Storage Temperature	-65/175°C	-65/150°C
P_t	Total Power Dissipation	880mW	730mW

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
- Si₃N₄ PASSIVATION
- ADVANCED EPITAXIAL HETEROJUNCTION PROFILE PROVIDES EXTRA HIGH POWER EFFICIENCY, AND HIGH RELIABILITY
- Idss SORTED IN 5 mA PER BIN RANGE



ELECTRICAL CHARACTERISTICS (T_a = 25 °C)

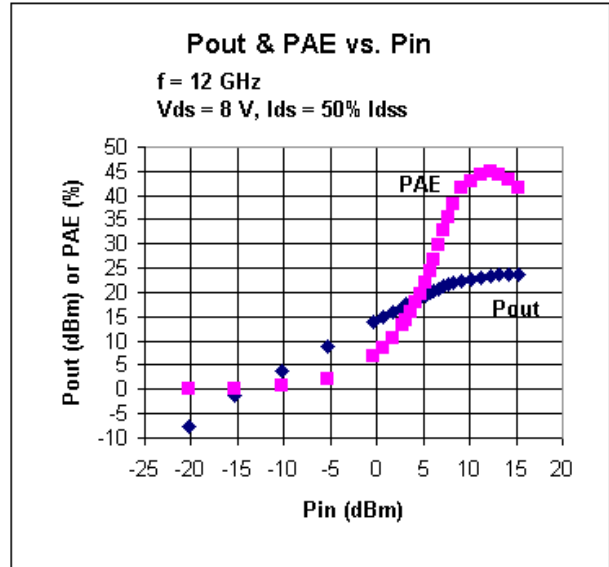
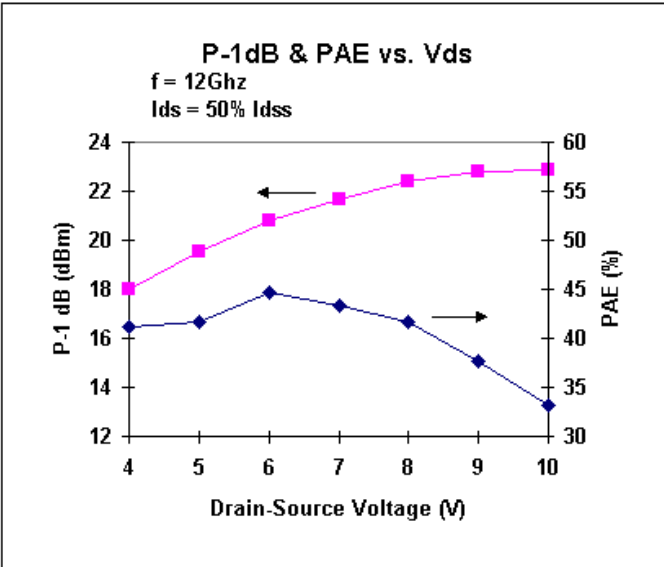
SYMBOLS	PARAMETERS/TEST CONDITIONS	MIN	TYP	MAX	UNIT
P_{1dB}	Output Power at 1dB Compression V _{ds} =8V, I _{ds} =50% I _{dss}	f=12GHz 21.0	22.5 22.5		dBm
G_{1dB}	Gain at 1dB Compression V _{ds} =8V, I _{ds} =50% I _{dss}	f=12GHz 12.0	13.5 11.0		dB
PAE	Gain at 1dB Compression V _{ds} =8V, I _{ds} =50% I _{dss}	f=12GHz	47		%
NF	Noise Figure V _{ds} =2V, I _{ds} =15mA	f=12GHz	0.85		dB
G_a	Associated Gain V _{ds} =2V, I _{ds} =15mA	f=12GHz	11.0		dB
I_{dss}	Saturated Drain Current V _{ds} =3V, V _{gs} =0V	40	75	105	mA
G_m	Transconductance V _{ds} =3V, V _{gs} =0V	50	80		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} =1.0mA	-11	-15		V
BV_{gs}	Source Breakdown Voltage I _{gs} =1.0mA	-7	-14		V
R_{th}	Thermal Resistance (Au-Sn Eutectic Attach)		155		°C/W

MAXIMUM RATINGS AT 25°C

SYMBOLS	PARAMETERS	ABSOLUTE ¹	CONTINUOUS ²
V_{ds}	Drain-Source Voltage	12V	8V
V_{gs}	Gate-Source Voltage	-8V	-3V
I_{ds}	Drain Current	I _{dss}	90mA
I_{gsf}	Forward Gate Current	12mA	2mA
P_{in}	Input Power	19dBm	@3dB Compression
T_{ch}	Channel Temperature	175°C	150°C
T_{stg}	Storage Temperature	-65/175°C	-65/150°C
P_t	Total Power Dissipation	880mW	730mW

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

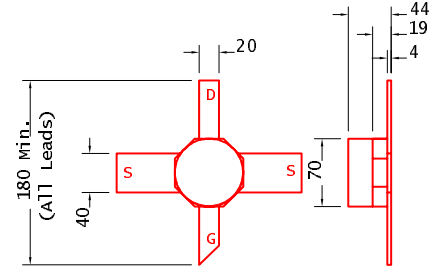
EPA025A				
Noise Parameters				
Vds=2V, Ids=15mA				
Freq	Gamma Opt		Nfmin	Rn/50
(GHz)	(MAG)	(ANG)	(dB)	
2	0.82	17	0.37	0.57
4	0.8	36	0.46	0.51
6	0.78	49	0.56	0.49
8	0.76	63	0.64	0.44
10	0.73	79	0.76	0.39
12	0.71	94	0.88	0.35
14	0.69	103	1.08	0.31
16	0.68	118	1.31	0.26
18	0.68	131	1.51	0.19
20	0.67	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

EPA025A-70

DATA SHEET

High Efficiency Heterojunction Power FET

- NON-HERMETIC LOW COST CERAMIC 70mil PACKAGE
- +21.5dBm TYPICAL OUTPUT POWER
- 8.0dB TYPICAL POWER GAIN AT 18GHz
- TYPICAL 0.85dB NOISE FIGURE AND 11.0dB ASSOCIATED GAIN AT 12GHz
- 0.3 X 250 MICRON RECESSED “MUSHROOM” GATE
- Si₃N₄ PASSIVATION
- ADVANCED EPITAXIAL HETEROJUNCTION PROFILE PROVIDES EXTRA HIGH POWER EFFICIENCY, AND HIGH RELIABILITY



ELECTRICAL CHARACTERISTICS (T_a = 25 °C)

SYMBOLS	PARAMETERS/TEST CONDITIONS	MIN	TYP	MAX	UNIT
P _{1dB}	Output Power at 1dB Compression V _{ds} =6V, I _{ds} =50% I _{ds}	f=12GHz	19.5	21.5	dBm
		f=18GHz		21.5	
G _{1dB}	Gain at 1dB Compression V _{ds} =6V, I _{ds} =50% I _{ds}	f=12GHz	9.5	11.0	dB
		f=18GHz		8.0	
PAE	Power Added Efficiency at 1dB Compression V _{ds} =6V, I _{ds} =50% I _{ds}		47		%
NF	Noise Figure V _{ds} =2V, I _{ds} =15mA		0.85		dB
G _a	Associated Gain V _{ds} =2V, I _{ds} =15mA		11.0		dB
I _{ds}	Saturated Drain Current V _{ds} =3V, V _{gs} =0V	40	75	105	mA
G _m	Transconductance V _{ds} =3V, V _{gs} =0V	50	80		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} =1.0mA	-9	-15		V
BV _{gs}	Source Breakdown Voltage I _{gs} =1.0mA	-6	-14		V
R _{th}	Thermal Resistance		370*		°C/W

* Overall R_{th} depends on case mounting.

MAXIMUM RATINGS AT 25°C

SYMBOLS	PARAMETERS	ABSOLUTE ¹	CONTINUOUS ²
V _{ds}	Drain-Source Voltage	10V	6V
V _{gs}	Gate-Source Voltage	-6V	-3V
I _{ds}	Drain Current	I _{ds}	50mA
I _{gsf}	Forward Gate Current	12mA	2mA
P _{in}	Input Power	18dBm	@ 3dB Compression
T _{ch}	Channel Temperature	175°C	150°C
T _{stg}	Storage Temperature	-65/175°C	-65/150°C
P _t	Total Power Dissipation	370mW	310mW

EPA025A-70

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	0.963	-26.2	6.488	155.5	0.015	75.3	0.795	-12.4
2.0	0.886	-51.2	5.91	132.5	0.026	60.1	0.76	-25.4
3.0	0.799	-73.4	5.223	112.3	0.033	49.6	0.729	-37
4.0	0.716	-94.3	4.709	94.4	0.038	44.2	0.707	-45.9
5.0	0.638	-113.8	4.296	77.9	0.042	39.6	0.68	-54.4
6.0	0.579	-129.1	3.913	62.7	0.045	37.7	0.651	-65.5
7.0	0.517	-145.7	3.559	47.9	0.047	34.2	0.637	-76
8.0	0.462	-161.5	3.288	34.4	0.048	33.9	0.619	-84.4
9.0	0.424	172.2	3.097	19.9	0.055	34.3	0.627	-90.9
10.0	0.409	148.3	2.9	4.8	0.064	31	0.623	-102.3
11.0	0.381	134.7	2.794	-9.1	0.074	25.6	0.62	-118
12.0	0.366	115.9	2.692	-23.3	0.086	19.6	0.629	-132.5
13.0	0.429	92.8	2.521	-38.3	0.098	10.5	0.618	-144.4
14.0	0.483	73.8	2.324	-53.1	0.106	0.1	0.612	-157.7
15.0	0.488	56.6	2.209	-69.6	0.115	-12	0.633	-178.6
16.0	0.506	38.2	2.089	-86.7	0.123	-25.8	0.642	160.4
17.0	0.52	26.1	1.874	-99.9	0.124	-33.2	0.607	149.2
18.0	0.559	17.4	1.823	-112.1	0.142	-46.2	0.673	136.7
19.0	0.579	-2.4	1.637	-128.6	0.132	-60.9	0.687	115.8
20.0	0.625	-15.5	1.561	-144.3	0.135	-73.4	0.744	98.8
21.0	0.622	-23.3	1.49	-159.8	0.141	-86.7	0.733	86.7
22.0	0.583	-35.7	1.399	-173.6	0.144	-99.4	0.738	76.6
23.0	0.605	-55.5	1.27	170.1	0.141	-115.7	0.727	58.1
24.0	0.639	-69.2	1.179	152.8	0.144	-132.1	0.73	38.8
25.0	0.571	-84.8	1.157	135.4	0.156	-149.3	0.736	25.1
26.0	0.554	-106.7	1.153	118.9	0.174	-164.6	0.733	13.3

S-PARAMETERS

2V, 15mA

FREQ (GHz)	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
1.0	1.014	-22.6	8.052	156.7	0.030	72.3	0.546	-27.0
2.0	0.927	-42.6	5.927	138.8	0.043	62.6	0.591	-31.6
3.0	0.861	-62.4	5.434	120.8	0.058	49.9	0.564	-45.7
4.0	0.801	-79.1	4.978	104.7	0.069	41.5	0.524	-57.2
5.0	0.736	-95.5	4.683	89.0	0.080	31.5	0.466	-69.3
6.0	0.657	-111.4	4.309	73.9	0.086	22.2	0.437	-84.8
7.0	0.589	-129.0	3.951	60.4	0.091	15.0	0.427	-91.9
8.0	0.549	-148.7	3.736	46.7	0.097	6.7	0.399	-99.8
9.0	0.531	-155.8	3.519	33.3	0.101	-3.0	0.276	-120.8
10.0	0.472	-170.6	3.390	20.1	0.102	-6.0	0.294	-144.1
11.0	0.427	160.9	3.173	6.5	0.106	-14.1	0.330	-145.0
12.0	0.443	138.7	3.007	-6.3	0.107	-21.1	0.291	-146.4
13.0	0.484	128.8	2.870	-20.5	0.114	-29.6	0.254	168.5
14.0	0.443	112.4	2.679	-34.6	0.113	-39.6	0.304	139.3
15.0	0.464	88.7	2.434	-47.9	0.109	-46.4	0.293	145.2
16.0	0.514	66.6	2.344	-61.5	0.110	-54.6	0.255	144.9
17.0	0.532	68.8	2.277	-75.2	0.116	-63.1	0.339	91.6
18.0	0.532	50.3	2.024	-87.9	0.113	-70.5	0.411	89.7
19.0	0.573	35.5	1.955	-98.2	0.118	-80.0	0.347	88.4
20.0	0.634	21.2	1.904	-111.2	0.113	-91.2	0.314	77.2
21.0	0.587	15.3	1.823	-129.0	0.114	-103.3	0.483	47.3
22.0	0.585	7.8	1.672	-139.1	0.110	-110.5	0.529	52.6
23.0	0.628	-10.7	1.658	-153.8	0.117	-124.2	0.375	43.3
24.0	0.642	-26.5	1.611	-172.2	0.120	-140.5	0.404	15.5
25.0	0.572	-40.1	1.491	171.7	0.115	-154.2	0.553	6.6
26.0	0.623	-43.2	1.455	160.9	0.124	-162.8	0.465	5.2

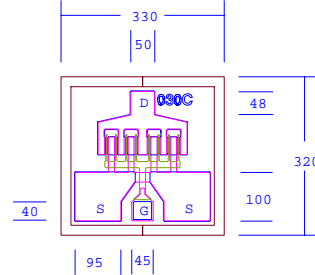
EPA025A-70				
Noise Parameters				
Vds=2V, Ids=15mA				
Freq.	Popt		Nfmin	Rn/50
(GHz)	(MAG)	(ANG)	(dB)	
2	0.73	25	0.37	0.22
4	0.64	55	0.46	0.18
6	0.49	81	0.56	0.14
8	0.42	107	0.64	0.11
10	0.32	135	0.76	0.08
12	0.26	173	0.88	0.08
14	0.28	-156	1.08	0.12
16	0.32	-103	1.31	0.24
18	0.37	-55	1.51	0.37
20	0.44	-25	1.65	0.51
22	0.44	-15	1.88	0.59
24	0.46	25	2.05	0.69
26	0.44	39	2.29	0.49

EPA030C

DATA SHEET

High Efficiency Heterojunction Power FET

- +23.0dBm TYPICAL OUTPUT POWER
- 11.0dB TYPICAL POWER GAIN AT 18GHz
- 0.3 X 300 MICRON RECESSED “MUSHROOM” GATE
- Si₃N₄ PASSIVATION
- ADVANCED EPITAXIAL HETEROJUNCTION PROFILE PROVIDES EXTRA HIGH POWER EFFICIENCY, AND HIGH RELIABILITY
- Idss SORTED IN 10mA PER BIN RANGE



ELECTRICAL CHARACTERISTICS (T_a = 25 °C)

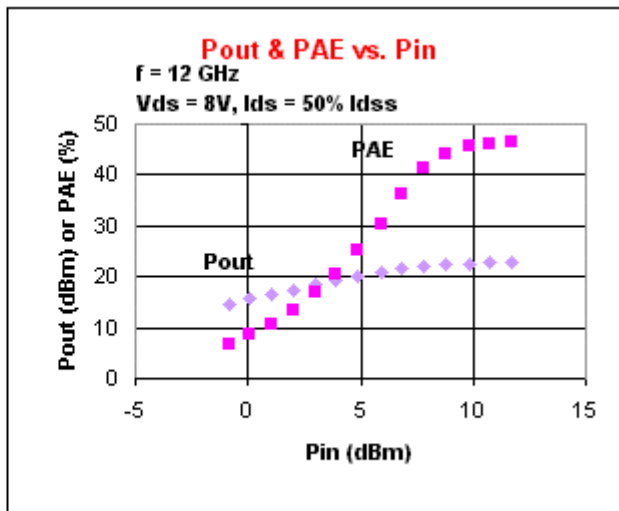
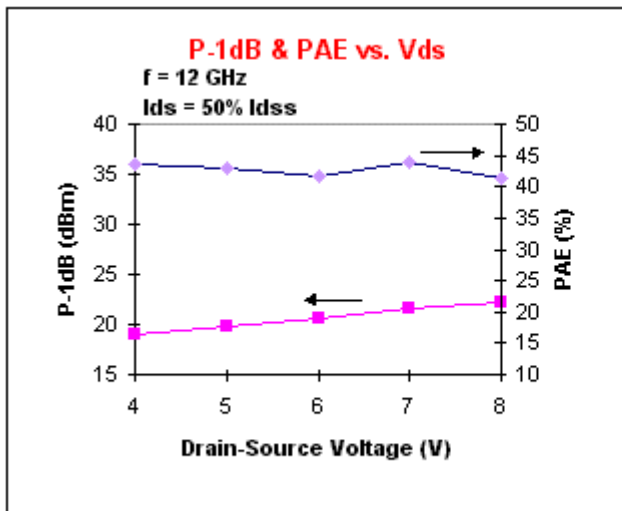
SYMBOLS	PARAMETERS/TEST CONDITIONS	MIN	TYP	MAX	UNIT
P_{1dB}	Output Power at 1dB Compression V _{ds} =8V, I _{ds} =50% I _{ds}	21.0	23.0 23.0		dBm
G_{1dB}	Gain at 1dB Compression V _{ds} =8V, I _{ds} =50% I _{ds}	12.0	13.5 11.0		dB
PAE	Power Added Efficiency at 1dB Compression V _{ds} =8V, I _{ds} =50% I _{ds}		45		%
I_{ds}	Saturated Drain Current V _{ds} =3V, V _{gs} =0V	50	90	130	mA
G_m	Transconductance V _{ds} =3V, V _{gs} =0V	60	95		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} =1.0mA	-11	-15		V
BV_{gs}	Source Breakdown Voltage I _{gs} =1.0mA	-7	-14		V
R_{th}	Thermal Resistance (Au-Sn Eutectic Attach)		125		°C/W

MAXIMUM RATINGS AT 25 °C

SYMBOLS	PARAMETERS	ABSOLUTE ¹	CONTINUOUS ²
V_{ds}	Drain-Source Voltage	12V	8V
V_{gs}	Gate-Source Voltage	-8V	-3V
I_{ds}	Drain Current	I _{ds}	110mA
I_{gsf}	Forward Gate Current	15mA	2.5mA
P_{in}	Input Power	21dBm	@3dB Compression
T_{ch}	Channel Temperature	175°C	150°C
T_{stg}	Storage Temperature	-65/175°C	-65/150°C
P_t	Total Power Dissipation	1.1W	900mW

DATA SHEET

High Efficiency Heterojunction Power FET



S-PARAMETERS

8V, 1/2 Idss

FREQ	--- S11 ---		--- S21 ---		--- S12 ---		--- S22 ---		FREQ	--- S11 ---		--- S21 ---		--- S12 ---		--- S22 ---	
(GHz)	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG	(GHz)	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
1.0	0.975	-23.9	7.888	162.4	0.017	76.0	0.750	-9.3	21.0	0.850	130.8	1.761	-0.7	0.069	-18.3	0.404	-121.6
2.0	0.951	-46.7	7.419	147.5	0.032	63.5	0.726	-18.3	22.0	0.854	128.3	1.647	-5.9	0.068	-18.6	0.416	-129.4
3.0	0.911	-67.1	6.800	133.6	0.044	53.5	0.682	-25.5	23.0	0.856	125.8	1.554	-11.0	0.067	-19.4	0.435	-136.1
4.0	0.883	-85.5	6.169	121.3	0.053	44.0	0.643	-32.0	24.0	0.858	123.8	1.466	-16.0	0.067	-19.4	0.449	-142.5
5.0	0.859	-101.4	5.542	110.4	0.059	36.3	0.605	-37.1	25.0	0.861	121.9	1.400	-21.0	0.067	-19.1	0.474	-148.3
6.0	0.840	-114.7	4.993	100.9	0.063	30.0	0.577	-41.6	26.0	0.857	120.7	1.336	-25.3	0.067	-16.9	0.489	-153.1
7.0	0.825	-126.5	4.526	92.2	0.065	25.0	0.554	-45.8	27.0	0.859	118.5	1.283	-30.2	0.068	-17.1	0.504	-158.7
8.0	0.814	-136.9	4.125	84.2	0.067	19.6	0.535	-49.6	28.0	0.860	116.0	1.241	-34.9	0.070	-17.2	0.515	-162.6
9.0	0.808	-146.1	3.780	76.9	0.067	15.1	0.517	-53.4	29.0	0.863	112.5	1.204	-40.3	0.072	-17.4	0.523	-167.9
10.0	0.801	-154.1	3.495	70.1	0.068	11.2	0.504	-57.1	30.0	0.861	108.2	1.160	-45.6	0.073	-19.5	0.533	-173.0
11.0	0.799	-162.0	3.255	63.3	0.067	7.9	0.491	-61.3	31.0	0.869	103.9	1.120	-51.1	0.072	-21.1	0.540	-178.8
12.0	0.797	-169.5	3.041	56.7	0.067	4.5	0.479	-65.6	32.0	0.871	98.2	1.071	-56.8	0.072	-23.7	0.552	175.1
13.0	0.794	-176.9	2.862	50.2	0.068	1.6	0.466	-70.4	33.0	0.876	93.5	1.013	-62.5	0.070	-26.9	0.563	168.2
14.0	0.791	175.9	2.700	43.7	0.068	-1.9	0.453	-75.2	34.0	0.895	88.7	0.959	-68.0	0.068	-28.5	0.579	161.5
15.0	0.799	168.2	2.566	37.0	0.069	-4.3	0.442	-80.5	35.0	0.926	84.1	0.910	-73.5	0.069	-31.3	0.610	153.7
16.0	0.800	160.9	2.425	30.4	0.069	-7.5	0.434	-86.1	36.0	0.952	81.3	0.858	-79.0	0.072	-36.4	0.642	146.1
17.0	0.807	153.3	2.282	23.6	0.070	-10.9	0.421	-92.3	37.0	0.984	77.8	0.815	-84.5	0.075	-43.8	0.677	137.7
18.0	0.816	146.4	2.155	17.0	0.070	-12.1	0.411	-98.4	38.0	1.015	74.8	0.765	-91.0	0.073	-51.4	0.702	130.2
19.0	0.824	139.8	2.039	10.5	0.071	-15.2	0.402	-105.0	39.0	1.032	71.4	0.702	-97.1	0.074	-65.3	0.712	123.9
20.0	0.832	133.9	1.913	4.3	0.071	-17.8	0.400	-111.3	40.0	1.002	70.1	0.650	-103.1	0.072	-70.2	0.725	119.1

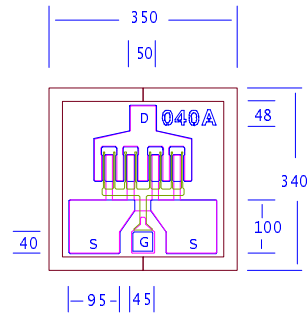
Note: The data included 0.7 mils diameter Au bonding wires:
 1 gate wires, 15 mils each; 1 drain wires, 20 mils each; 4 source wires, 7 mils each.

EPA040A

DATA SHEET

High Efficiency Heterojunction Power FET

- +24.5dBm TYPICAL OUTPUT POWER
- 11.0dB TYPICAL POWER GAIN AT 18GHz
- 0.3 X 400 MICRON RECESSED “ MUSHROOM” GATE
- Si₃N₄ PASSIVATION
- ADVANCED EPITAXIAL HETEROJUNCTION PROFILE PROVIDES EXTRA HIGH POWER EFFICIENCY, AND HIGH RELIABILITY
- Idss SORTED IN 10mA PER BIN RANGE



ELECTRICAL CHARACTERISTICS (T_a = 25 °C)

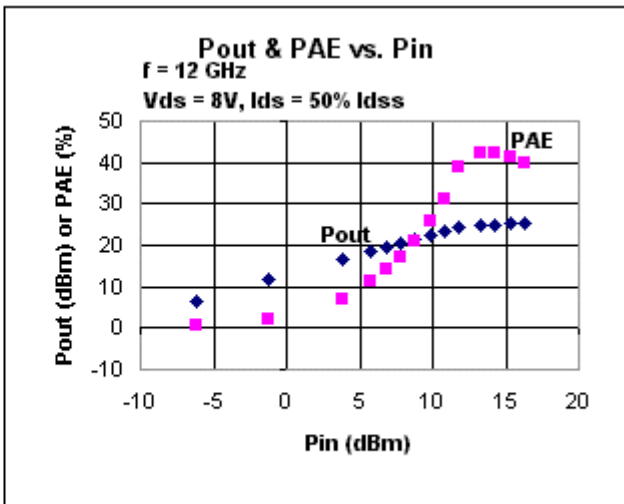
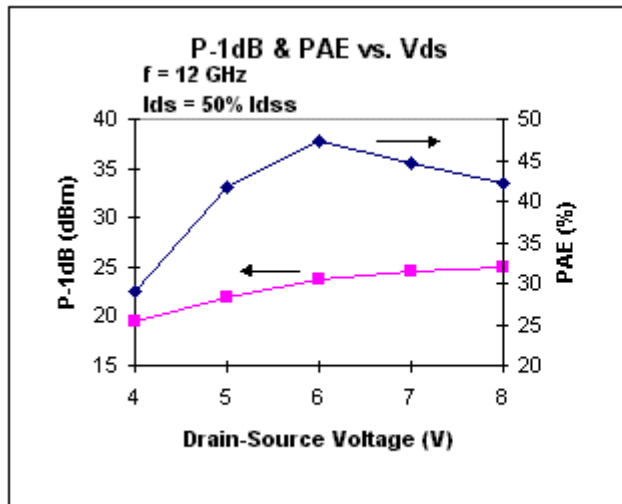
SYMBOLS	PARAMETERS/TEST CONDITIONS	MIN	TYP	MAX	UNIT
P_{1dB}	Output Power at 1dB Compression V _{ds} =8V, I _{ds} =50% I _{dss}		f=12GHz 24.5 f=18GHz 24.5		dBm
G_{1dB}	Gain at 1dB Compression V _{ds} =8V, I _{ds} =50% I _{dss}	11.5	f=12GHz 13.5 f=18GHz 11.0		dB
PAE	Power Added Efficiency at 1dB Compression V _{ds} =8V, I _{ds} =50% I _{dss}		f=12GHz 45		%
I_{dss}	Saturated Drain Current V _{ds} =3V, V _{gs} =0V	70	120	160	mA
G_m	Transconductance V _{ds} =3V, V _{gs} =0V	80	130		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} =1.0mA	-11	-15		V
BV_{gs}	Source Breakdown Voltage I _{gs} =1.0mA	-7	-14		V
R_{th}	Thermal Resistance (Au-Sn Eutectic Attach)		105		°C/W

MAXIMUM RATINGS AT 25°C

SYMBOLS	PARAMETERS	ABSOLUTE ¹	CONTINUOUS ²
V_{ds}	Drain-Source Voltage	12V	8V
V_{gs}	Gate-Source Voltage	-8V	-3V
I_{ds}	Drain Current	I _{dss}	135mA
I_{gsf}	Forward Gate Current	20mA	3mA
P_{in}	Input Power	21dBm	@3dB Compression
T_{ch}	Channel Temperature	175°C	150°C
T_{stg}	Storage Temperature	-65/175°C	-65/150°C
P_t	Total Power Dissipation	1.3W	1.1W

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	0.972	-32.9	10.341	157.6	0.021	72.5	0.666	-12.8	21.0	0.856	132.6	1.642	-6.5	0.065	-8.2	0.341	-155.6
2.0	0.933	-62.1	9.244	139.3	0.036	57.7	0.611	-24.0	22.0	0.862	128.5	1.512	-12.2	0.064	-7.9	0.382	-165.1
3.0	0.893	-86.0	8.024	123.8	0.046	45.6	0.546	-33.0	23.0	0.868	125.3	1.397	-17.8	0.063	-8.5	0.434	-172.6
4.0	0.863	-105.4	6.944	110.9	0.053	36.4	0.493	-40.6	24.0	0.865	122.5	1.295	-22.5	0.063	-8.1	0.481	-177.0
5.0	0.826	-123.4	6.013	99.3	0.057	29.0	0.451	-48.3	25.0	0.875	120.9	1.219	-26.9	0.063	-6.6	0.524	179.3
6.0	0.812	-135.8	5.262	89.9	0.059	24.0	0.425	-54.7	26.0	0.870	119.4	1.140	-30.9	0.065	-6.1	0.563	177.6
7.0	0.805	-145.7	4.649	81.8	0.060	19.9	0.412	-60.7	27.0	0.877	117.9	1.082	-34.2	0.067	-4.3	0.597	176.5
8.0	0.801	-153.8	4.162	74.6	0.060	15.8	0.405	-66.4	28.0	0.873	117.6	1.038	-37.9	0.071	-1.3	0.616	174.5
9.0	0.797	-160.7	3.745	67.9	0.060	13.0	0.401	-71.6	29.0	0.868	116.4	1.015	-41.4	0.073	-3.3	0.628	173.3
10.0	0.800	-166.7	3.415	61.7	0.060	10.9	0.405	-75.8	30.0	0.869	114.9	1.002	-45.6	0.078	-3.2	0.634	170.8
11.0	0.798	-172.5	3.140	55.8	0.059	9.2	0.409	-80.0	31.0	0.877	112.6	0.991	-50.6	0.079	-5.2	0.624	167.1
12.0	0.803	-177.9	2.903	49.7	0.059	7.4	0.411	-83.9	32.0	0.872	109.8	0.979	-56.0	0.084	-7.8	0.611	161.4
13.0	0.807	176.4	2.710	44.0	0.059	6.5	0.408	-87.1	33.0	0.876	105.5	0.948	-62.3	0.086	-11.6	0.587	152.9
14.0	0.813	170.4	2.546	38.2	0.060	4.5	0.403	-90.6	34.0	0.888	101.7	0.933	-68.8	0.089	-15.1	0.586	142.2
15.0	0.815	164.3	2.386	32.0	0.059	3.4	0.393	-94.4	35.0	0.915	96.8	0.888	-75.6	0.090	-22.0	0.588	129.2
16.0	0.820	157.9	2.259	25.5	0.060	0.7	0.379	-99.0	36.0	0.944	92.3	0.834	-82.9	0.091	-29.9	0.612	116.3
17.0	0.826	151.5	2.128	19.2	0.062	-1.1	0.358	-105.9	37.0	0.974	86.3	0.772	-90.1	0.089	-40.0	0.654	103.9
18.0	0.835	144.8	2.007	12.6	0.063	-2.3	0.340	-113.4	38.0	0.989	82.3	0.699	-97.4	0.082	-49.1	0.712	95.1
19.0	0.839	139.0	1.891	5.7	0.063	-3.9	0.323	-124.1	39.0	0.997	77.6	0.618	-103.3	0.077	-61.4	0.751	89.9
20.0	0.847	133.3	1.780	-1.0	0.065	-6.1	0.319	-137.0	40.0	0.988	76.1	0.552	-107.6	0.068	-67.3	0.786	88.5

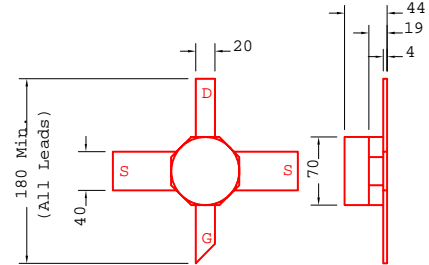
Note: The data included 0.7 mils diameter Au bonding wires:
 1 gate wires, 15 mils each; 1 drain wires, 20 mils each; 4 source wires, 7 mils each.

EPA040A-70

DATA SHEET

High Efficiency Heterojunction Power FET

- NON-HERMETIC LOW COST CERAMIC 70mil PACKAGE
- +23.5dBm TYPICAL OUTPUT POWER
- 7.0dB TYPICAL POWER GAIN AT 18GHz
- 0.3 X 400 MICRON RECESSED “MUSHROOM” GATE
- Si₃N₄ PASSIVATION
- ADVANCED EPITAXIAL HETEROJUNCTION PROFILE PROVIDES EXTRA HIGH POWER EFFICIENCY, AND HIGH RELIABILITY



ELECTRICAL CHARACTERISTICS (T_a = 25 °C)

SYMBOLS	PARAMETERS/TEST CONDITIONS	MIN	TYP	MAX	UNIT
P_{1dB}	Output Power at 1dB Compression V _{ds} =6V, I _{ds} =50% I _{dss}	21.5	23.5 23.5		dBm
G_{1dB}	Gain at 1dB Compression V _{ds} =6V, I _{ds} =50% I _{dss}	9.0	10.5 7.0		dB
PAE	Power Added Efficiency at 1dB Compression V _{ds} =6V, I _{ds} =50% I _{dss}		45		%
I_{dss}	Saturated Drain Current V _{ds} =3V, V _{gs} =0V	70	120	160	mA
G_m	Transconductance V _{ds} =3V, V _{gs} =0V	80	130		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} =1.0mA	-9	-15		V
BV_{gs}	Source Breakdown Voltage I _{gs} =1.0mA	-6	-14		V
R_{th}	Thermal Resistance		250*		°C/W

* Overall R_{th} depends on case mounting.

MAXIMUM RATINGS AT 25 °C

SYMBOLS	PARAMETERS	ABSOLUTE ¹	CONTINUOUS ²
V_{ds}	Drain-Source Voltage	10V	6V
V_{gs}	Gate-Source Voltage	-6V	-3V
I_{ds}	Drain Current	I _{dss}	75mA
I_{gsf}	Forward Gate Current	20mA	3mA
P_{in}	Input Power	20dBm	@ 3dB Compression
T_{ch}	Channel Temperature	175°C	150 °C
T_{stg}	Storage Temperature	-65/175°C	-65/150 °C
P_t	Total Power Dissipation	550mW	455mW

EPA040A-70

DATA SHEET

High Efficiency Heterojunction Power FET

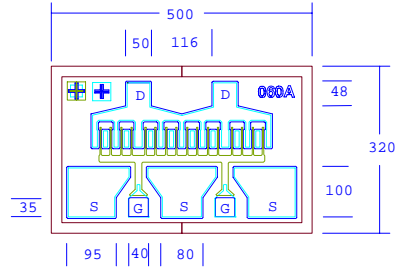
S-PARAMETERS									
6V, 1/2 Idss									
FREQ	--- S11 ---		--- S21 ---		--- S12 ---		--- S22 ---		
(GHz)	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG	
1.0	0.948	-35.2	9.101	150.6	0.021	70.0	0.643	-17.1	
2.0	0.846	-66.9	7.892	124.5	0.035	55.8	0.585	-33.4	
3.0	0.753	-93.4	6.667	103.2	0.043	44.7	0.538	-46.2	
4.0	0.676	-118.2	5.797	84.5	0.049	36.8	0.503	-55.8	
5.0	0.620	-140.9	5.131	67.6	0.053	30.8	0.459	-65.0	
6.0	0.584	-158.2	4.584	52.4	0.056	27.7	0.417	-77.2	
7.0	0.552	-177.3	4.133	37.4	0.059	23.8	0.401	-88.6	
8.0	0.527	165.1	3.768	23.5	0.060	21.8	0.370	-97.7	
9.0	0.540	139.6	3.473	8.3	0.066	20.1	0.363	-107.1	
10.0	0.567	119.0	3.201	-7.1	0.072	13.6	0.348	-122.4	
11.0	0.573	105.6	3.058	-21.8	0.080	7.2	0.338	-143.5	
12.0	0.596	89.7	2.916	-37.2	0.088	-0.9	0.344	-163.9	
13.0	0.668	73.3	2.662	-52.4	0.092	-10.0	0.329	176.9	
14.0	0.717	58.9	2.395	-66.9	0.094	-19.8	0.337	157.9	
15.0	0.731	44.4	2.248	-83.7	0.097	-32.4	0.382	134.6	
16.0	0.748	28.6	2.067	-101.6	0.095	-46.9	0.411	110.5	
17.0	0.744	18.0	1.835	-114.4	0.093	-52.3	0.405	96.9	
18.0	0.772	8.9	1.768	-127.1	0.101	-70.2	0.471	85.8	
19.0	0.784	-7.3	1.597	-143.9	0.086	-85.7	0.503	68.2	
20.0	0.809	-20.0	1.484	-160.4	0.081	-101.5	0.551	52.0	
21.0	0.788	-29.3	1.401	-175.3	0.081	-116.7	0.549	38.9	
22.0	0.747	-41.8	1.337	170.2	0.082	-133.9	0.538	29.7	
23.0	0.762	-59.5	1.218	152.4	0.083	-153.9	0.515	10.7	
24.0	0.772	-73.4	1.100	133.5	0.088	-173.7	0.502	-11.8	
25.0	0.693	-89.6	1.067	116.8	0.103	169.3	0.529	-25.6	
26.0	0.679	-111.5	1.065	98.2	0.130	151.4	0.500	-42.5	

EPA060A

DATA SHEET

High Efficiency Heterojunction Power FET

- +26.5dBm TYPICAL OUTPUT POWER
- 10.5dB TYPICAL POWER GAIN AT 18GHz
- 0.3 X 600 MICRON RECESSED “MUSHROOM” GATE
- Si₃N₄ PASSIVATION
- ADVANCED EPITAXIAL HETEROJUNCTION PROFILE PROVIDES EXTRA HIGH POWER EFFICIENCY, AND HIGH RELIABILITY
- Idss SORTED IN 15mA PER BIN RANGE



ELECTRICAL CHARACTERISTICS (T_a = 25 °C)

SYMBOLS	PARAMETERS/TEST CONDITIONS	MIN	TYP	MAX	UNIT
P _{1dB}	Output Power at 1dB Compression V _{ds} =8V, I _{ds} =50% I _{dss} f=12GHz f=18GHz	25.0	26.5 26.5		dBm
G _{1dB}	Gain at 1dB Compression V _{ds} =8V, I _{ds} =50% I _{dss} f=12GHz f=18GHz	11.5	13.0 10.5		dB
PAE	Power Added Efficiency at 1dB Compression V _{ds} =8V, I _{ds} =50% I _{dss} f=12GHz		45		%
I _{dss}	Saturated Drain Current V _{ds} =3V, V _{gs} =0V	105	180	255	mA
G _m	Transconductance V _{ds} =3V, V _{gs} =0V	120	190		mS
V _p	Pinch-off Voltage V _{ds} =3V, I _{ds} =2.0mA		-1.0	-2.5	V
BV _{gd}	Drain Breakdown Voltage I _{gd} =1.0mA	-11	-15		V
BV _{gs}	Source Breakdown Voltage I _{gs} =1.0mA	-7	-14		V
R _{th}	Thermal Resistance (Au-Sn Eutectic Attach)		65		°C/W

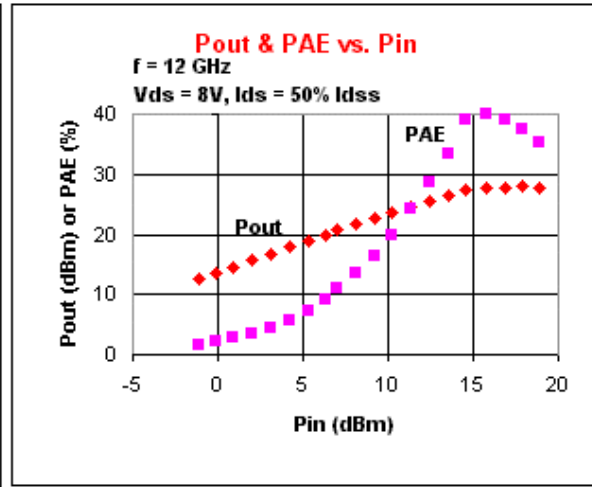
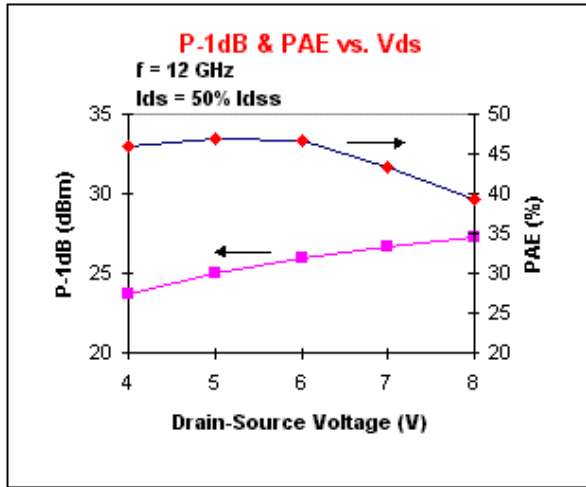
MAXIMUM RATINGS AT 25°C

SYMBOLS	PARAMETERS	ABSOLUTE ¹	CONTINUOUS ²
V _{ds}	Drain-Source Voltage	12V	8V
V _{gs}	Gate-Source Voltage	-8V	-3V
I _{ds}	Drain Current	I _{dss}	220mA
I _{gsf}	Forward Gate Current	30mA	5mA
P _{in}	Input Power	24dBm	@3dB Compression
T _{ch}	Channel Temperature	175°C	150°C
T _{stg}	Storage Temperature	-65/175°C	-65/150°C
P _t	Total Power Dissipation	2.1W	1.7W

EPA060A

DATA SHEET

High Efficiency Heterojunction Power FET



S-PARAMETERS

8V, 1/2 Idss

FREQ	S11		S21		S12		S22		FREQ	S11		S21		S12		S22	
(GHz)	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG	(GHz)	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
1.0	0.944	-49.2	12.673	148.9	0.027	63.8	0.506	-26.9	21.0	0.863	154.4	1.284	3.3	0.049	-0.4	0.523	-161.7
2.0	0.898	-85.9	10.129	127.1	0.043	44.6	0.428	-47.2	22.0	0.866	152.6	1.207	-1.1	0.050	0.1	0.547	-166.3
3.0	0.862	-110.2	8.004	111.6	0.051	33.7	0.364	-60.8	23.0	0.872	151.2	1.140	-5.4	0.051	1.2	0.572	-170.4
4.0	0.850	-126.7	6.507	100.2	0.054	26.2	0.329	-71.5	24.0	0.877	149.9	1.078	-9.9	0.053	2.5	0.594	-174.5
5.0	0.848	-138.3	5.426	91.1	0.055	22.0	0.306	-80.2	25.0	0.885	148.7	1.023	-14.1	0.054	2.9	0.620	-178.5
6.0	0.845	-146.8	4.644	83.5	0.057	17.1	0.301	-87.7	26.0	0.893	148.0	0.987	-18.2	0.055	3.6	0.642	178.5
7.0	0.845	-153.7	4.056	76.5	0.057	14.6	0.306	-95.1	27.0	0.896	146.6	0.931	-22.1	0.058	3.5	0.657	175.3
8.0	0.843	-159.5	3.585	70.2	0.057	12.3	0.315	-101.2	28.0	0.902	144.8	0.895	-26.1	0.061	5.8	0.675	172.9
9.0	0.844	-164.5	3.205	64.3	0.056	9.4	0.327	-106.9	29.0	0.904	143.4	0.853	-29.8	0.062	6.2	0.684	170.5
10.0	0.846	-168.3	2.897	59.2	0.053	6.7	0.342	-111.8	30.0	0.898	141.4	0.817	-33.6	0.064	5.1	0.699	168.4
11.0	0.849	-172.2	2.638	53.5	0.053	5.8	0.359	-116.6	31.0	0.906	139.0	0.786	-37.2	0.065	4.0	0.708	166.3
12.0	0.851	-175.6	2.416	48.4	0.052	4.9	0.379	-121.3	32.0	0.898	136.0	0.752	-41.1	0.064	3.0	0.720	163.8
13.0	0.852	-179.3	2.234	43.2	0.051	2.5	0.396	-125.6	33.0	0.890	133.2	0.705	-45.4	0.065	0.7	0.733	161.2
14.0	0.855	-177.3	2.068	38.0	0.050	1.9	0.413	-129.8	34.0	0.891	129.2	0.671	-49.3	0.064	2.6	0.740	157.9
15.0	0.859	-173.7	1.931	32.7	0.050	1.0	0.431	-134.2	35.0	0.896	125.5	0.641	-53.4	0.066	-2.0	0.759	154.2
16.0	0.857	-170.3	1.801	27.5	0.049	1.0	0.447	-138.3	36.0	0.891	122.5	0.604	-58.2	0.066	-4.6	0.774	149.6
17.0	0.855	-166.4	1.685	22.0	0.049	-2.8	0.461	-142.9	37.0	0.903	119.1	0.577	-62.3	0.066	-12.0	0.788	143.8
18.0	0.856	-162.7	1.576	16.9	0.050	-2.9	0.472	-146.6	38.0	0.914	116.3	0.551	-67.0	0.069	-21.6	0.789	138.7
19.0	0.854	-159.4	1.486	11.8	0.049	-3.1	0.479	-151.6	39.0	0.923	111.4	0.520	-72.6	0.070	-33.8	0.788	133.9
20.0	0.854	-156.5	1.404	7.1	0.048	-2.1	0.492	-155.7	40.0	0.909	108.9	0.497	-79.1	0.073	-41.6	0.786	129.4

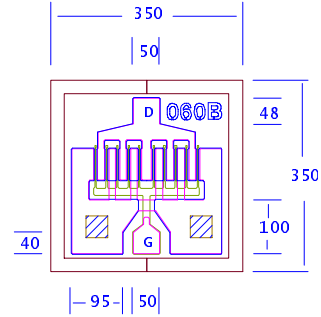
Note: The data included 0.7 mils diameter Au bonding wires:
 2 gate wires, 15 mils each; 2 drain wires, 20 mils each; 6 source wires, 7 mils each.

EPA060B/EPA060BV

DATA SHEET

High Efficiency Heterojunction Power FET

- +26.5dBm TYPICAL OUTPUT POWER
- 10.0dB TYPICAL POWER GAIN FOR EPA060B AND 11.5dB FOR EPA060BV AT 18GHz
- 0.4dB TYPICAL NOISE FIGURE AT 2GHz
- 0.3 X 600 MICRON RECESSED “MUSHROOM” GATE
- Si₃N₄ PASSIVATION
- ADVANCED EPITAXIAL DOPING PROFILE PROVIDES HIGH POWER EFFICIENCY, LINEARITY AND RELIABILITY
- EPA060BV WITH VIA HOLE SOURCE GROUNDING
- Idss SORTED IN 15mA PER BIN RANGE



ELECTRICAL CHARACTERISTICS (T_a = 25 °C)

SYMBOLS	PARAMETERS/TEST CONDITIONS	EPA060B			EPA060BV			UNIT
		MIN	TYP	MAX	MIN	TYP	MAX	
P _{1dB}	Output Power at 1dB Compression f=12GHz	25	26.5		25	26.5		dBm
	V _{ds} =8V, I _{ds} =50% I _{dss} f=18GHz		26.5			26.5		
G _{1dB}	Gain at 1dB Compression f=12GHz	11	13		13	14.5		dB
	V _{ds} =8V, I _{ds} =50% I _{dss} f=18GHz		10			11.5		
PAE	Gain at 1dB Compression V _{ds} =8V, I _{ds} =50% I _{dss} f=12GHz		45			46		%
NF	Noise Figure V _{ds} =5V, I _{ds} =50mA f=2GHz		0.4			0.4		dB
GA	Associated Gain V _{ds} =5V, I _{ds} =50mA f=2GHz		20			20		dB
I _{dss}	Saturated Drain Current V _{ds} =3V, V _{gs} =0V	110	180	250	110	180	250	mA
G _m	Transconductance V _{ds} =3V, V _{gs} =0V	120	190		120	190		mS
V _p	Pinch-off Voltage V _{ds} =3V, I _{ds} =2.0mA		-1	-2.5		-1	-2.5	V
BV _{gd}	Drain Breakdown Voltage I _{gd} =1.0mA	-11	-15		-11	-15		V
BV _{gs}	Source Breakdown Voltage I _{gs} =1.0mA	-7	-14		-7	-14		V
R _{th}	Thermal Resistance (Au-Sn Eutectic Attach)		75			55		°C/W

MAXIMUM RATINGS AT 25 °C

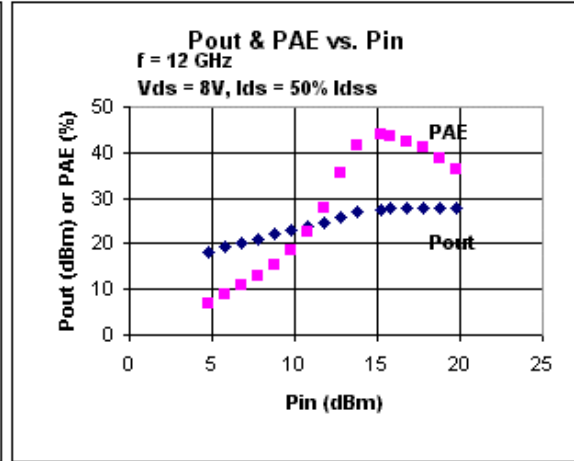
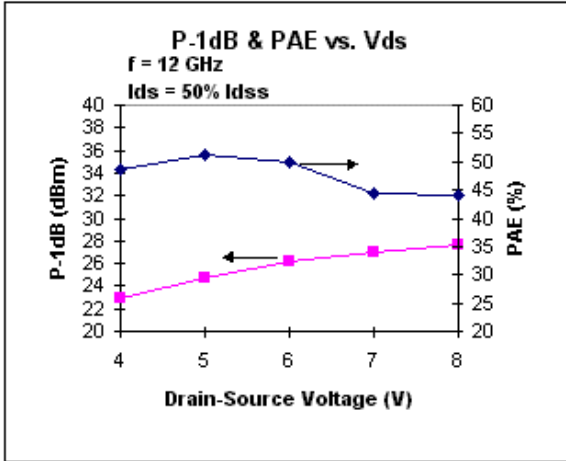
SYMBOLS	PARAMETERS	EPA060B		EPA060BV	
		ABSOLUTE ¹	CONTINUOUS ²	ABSOLUTE ¹	CONTINUOUS ²
V _{ds}	Drain-Source Voltage	12V	8V	12V	8V
V _{gs}	Gate-Source Voltage	-8V	-3V	-8V	-3V
I _{ds}	Drain Current	I _{dss}	190mA	I _{dss}	I _{dss}
I _{gsf}	Forward Gate Current	30mA	5mA	30mA	5mA
P _{in}	Input Power	24dBm	@ 3dB Compression	24dBm	@ 3dB Compression
T _{ch}	Channel Temperature	175°C	150°C	175°C	150°C
T _{stg}	Storage Temperature	-65/175°C	-65/150°C	-65/175°C	-65/150°C
P _t	Total Power Dissipation	1.8W	1.5W	2.5W	2.1W

EPA060B/EPA060BV

DATA SHEET

High Efficiency Heterojunction Power FET

EPA060B



S-PARAMETERS

EPA060B 8V, 1/2 Idss

FREQ (GHz)	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
1.0	0.912	-55.0	13.184	146.1	0.025	58.3	0.496	-22.8
2.0	0.875	-91.9	10.384	124.2	0.038	43.8	0.408	-38.2
4.0	0.831	-134.1	6.817	94.7	0.047	24.8	0.291	-61.2
6.0	0.769	-161.8	4.779	73.1	0.047	15.2	0.247	-80.4
8.0	0.729	-179.0	3.510	57.1	0.045	10.0	0.238	-94.5
10.0	0.721	171.2	2.712	45.6	0.040	8.6	0.231	-104.0
12.0	0.747	165.5	2.232	35.7	0.040	10.8	0.227	-117.4
14.0	0.793	162.5	1.952	26.3	0.041	11.1	0.217	-136.4
16.0	0.842	158.5	1.790	14.4	0.046	9.0	0.234	-164.1
18.0	0.879	150.7	1.670	-0.5	0.053	3.2	0.291	171.1
20.0	0.871	138.7	1.509	-18.9	0.061	-4.6	0.375	149.3

EPA060BV 8V, 1/2 Idss

FREQ (GHz)	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
1.0	0.940	-46.3	11.322	150.5	0.023	61.4	0.573	-19.4
2.0	0.906	-82.2	9.363	129.0	0.037	45.1	0.505	-33.8
4.0	0.874	-126.4	6.297	100.2	0.049	23.1	0.405	-50.3
6.0	0.874	-150.7	4.561	80.9	0.051	11.2	0.363	-62.0
8.0	0.872	-166.4	3.551	65.9	0.052	2.5	0.353	-73.2
10.0	0.871	-179.0	2.893	52.3	0.051	-5.8	0.357	-84.9
12.0	0.874	169.9	2.437	39.3	0.049	-11.2	0.365	-98.2
14.0	0.881	158.8	2.092	26.0	0.049	-18.8	0.375	-113.0
16.0	0.890	148.2	1.810	12.6	0.049	-24.5	0.395	-128.0
18.0	0.897	138.4	1.557	-1.0	0.050	-31.8	0.418	-144.2
20.0	0.907	129.8	1.350	-14.2	0.048	-37.9	0.450	-159.5

Note: The data included 0.7 mils diameter Au bonding wires; 1 gate wires, 15 mils each; 1 drain wires, 20 mils each; 4 source wires, 7 mils each; no source wires for EPA060BV.

EPA060B/EPA060BV

DATA SHEET

High Efficiency Heterojunction Power FET

S-Parameters

EPA060B, 5V,50mA

FREQ	--- S11 ---		--- S21 ---		--- S12 ---		--- S22 ---		FREQ	--- S11 ---		--- S21 ---		--- S12 ---		--- S22 ---	
(GHz)	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG	(GHz)	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
1.0	0.953	-52.8	12.712	147.4	0.025	62.4	0.520	-23.3	21.0	0.860	128.5	1.258	-13.6	0.060	-2.4	0.393	-173.4
2.0	0.897	-92.2	9.967	124.4	0.039	44.7	0.427	-38.2	22.0	0.868	125.1	1.158	-19.1	0.059	-3.5	0.409	177.8
3.0	0.863	-118.3	7.789	108.0	0.046	32.5	0.347	-49.2	23.0	0.874	122.9	1.067	-24.1	0.061	-3.3	0.446	170.6
4.0	0.855	-136.6	6.274	95.7	0.049	24.9	0.301	-57.5	24.0	0.884	121.7	0.980	-28.3	0.060	-2.1	0.488	166.0
5.0	0.843	-149.0	5.236	86.4	0.051	20.4	0.290	-63.3	25.0	0.896	120.9	0.930	-32.0	0.062	0.1	0.509	163.3
6.0	0.831	-158.6	4.464	78.3	0.051	17.2	0.268	-69.4	26.0	0.880	121.3	0.849	-35.2	0.063	0.1	0.552	159.2
7.0	0.827	-167.1	3.891	70.5	0.051	15.5	0.261	-78.0	27.0	0.872	120.0	0.812	-37.7	0.065	1.9	0.574	160.4
8.0	0.832	-174.2	3.433	63.7	0.051	12.7	0.260	-84.5	28.0	0.856	117.8	0.789	-41.1	0.070	1.8	0.597	157.8
9.0	0.833	179.9	3.080	57.3	0.050	10.2	0.261	-90.1	29.0	0.860	113.9	0.771	-46.2	0.073	-0.1	0.607	154.4
10.0	0.832	174.3	2.781	51.1	0.050	8.5	0.255	-97.0	30.0	0.860	108.2	0.742	-51.5	0.075	-3.0	0.627	151.6
11.0	0.835	168.5	2.529	44.6	0.050	8.7	0.261	-105.6	31.0	0.848	101.5	0.725	-58.0	0.077	-6.4	0.622	147.5
12.0	0.845	164.3	2.291	38.9	0.050	7.4	0.265	-113.5	32.0	0.823	93.6	0.680	-65.2	0.075	-10.4	0.646	142.1
13.0	0.852	161.8	2.105	33.8	0.050	7.0	0.288	-121.4	33.0	0.841	85.8	0.638	-71.4	0.077	-14.7	0.654	136.6
14.0	0.849	158.9	1.968	28.8	0.050	7.1	0.311	-123.0	34.0	0.859	82.8	0.585	-76.1	0.074	-16.5	0.672	130.6
15.0	0.849	154.0	1.860	23.0	0.051	5.9	0.304	-125.2	35.0	0.900	81.7	0.554	-80.3	0.075	-22.0	0.703	124.3
16.0	0.851	147.2	1.743	15.8	0.052	3.5	0.297	-136.0	36.0	0.889	79.3	0.531	-85.4	0.075	-30.0	0.716	120.8
17.0	0.859	142.0	1.605	9.5	0.053	1.1	0.323	-145.6	37.0	0.888	74.3	0.510	-94.2	0.077	-41.9	0.717	105.9
18.0	0.863	138.8	1.491	4.4	0.053	0.8	0.340	-150.6	38.0	0.908	72.4	0.449	-101.4	0.071	-55.9	0.789	92.3
19.0	0.870	135.6	1.410	-1.7	0.056	0.4	0.350	-159.2	39.0	0.925	77.0	0.407	-101.4	0.064	-57.5	0.828	94.7
20.0	0.865	131.0	1.321	-8.2	0.058	-1.7	0.385	-167.2	40.0	0.939	83.8	0.396	-100.7	0.069	-61.8	0.789	100.3

EPA060B				
Noise Parameters				
Vds=5V, Ids=50mA				
Freq	Gamma Opt		Nfmin	Rn/50
(GHz)	(MAG)	(ANG)	(dB)	
2	0.4	44	0.45	0.09
4	0.46	89	0.55	0.07
6	0.52	108	0.75	0.06
8	0.52	137	0.92	0.05
10	0.53	162	1.37	0.04
12	0.54	174	1.47	0.04
14	0.58	-176	1.92	0.05
16	0.62	-162	2.47	0.06
18	0.68	-153	3.03	0.09
20	0.69	-147	3.24	0.14
22	0.7	-141	3.43	0.24
24	0.72	-132	3.65	0.38
26	0.74	-128	3.86	0.6

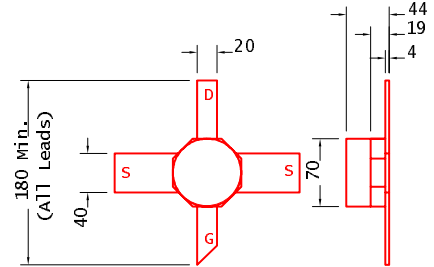
EPA060B-70

DATA SHEET

High Efficiency Heterojunction Power FET

Features

- NON-HERMETIC LOW COST CERAMIC 70mil PACKAGE
- +26dBm TYPICAL OUTPUT POWER
- 9.0dB TYPICAL POWER GAIN AT 12 GHz
- 0.4 dB TYPICAL NOISE FIGURE AT 2GHz
- 20 dB TYPICAL ASSOCIATED GAIN AT 2 GHz
- 0.3 X 600 MICRON RECESSED "MUSHROOM" GATE
- Si₃N₄ PASSIVATION
- ADVANCED EPITAXIAL HETEROJUNCTION PROFILE PROVIDES EXTRA HIGH POWER EFFICIENCY, AND HIGH RELIABILITY



Applications

- High Dynamic Range LNA
- DC to 18 GHz

ELECTRICAL CHARACTERISTICS (T_a = 25 °C)

SYMBOLS	PARAMETERS/TEST CONDITIONS	MIN	TYP	MAX	UNIT
P _{1dB}	Output Power at 1dB Compression V _{ds} =6V, I _{ds} =50% I _{ds}	f=2GHz 24.0	f=12GHz 26.0 25.5		dBm
G _{1dB}	Gain at 1dB Compression V _{ds} =6V, I _{ds} =50% I _{ds}	f=2GHz 17.0	f=12GHz 19.0 9.0		dB
PAE	Power Added Efficiency at 1dB Compression V _{ds} =6V, I _{ds} =50% I _{ds}	f=2GHz	f=12GHz 55 45		%
IP3	+5dBm P _{OUT} /Tone (5V/50mA) (5V/90mA)	f=2GHz	28 31		dBm
NF	Noise Figure (5V/50mA) (5V/90mA)	f=2GHz	0.4 0.6		dB
G _A	Associated Gain (5V/50mA) (5V/90mA)	f=2GHz	20.0 20.0		dB
I _{ds}	Saturated Drain Current V _{ds} =3V, V _{gs} =0V	110	180	250	mA
G _m	Transconductance V _{ds} =3V, V _{gs} =0V	120	190		mS
V _p	Pinch-off Voltage V _{ds} =3V, I _{ds} =2.0mA		-1.0	-2.5	V
BV _{gd}	Drain Breakdown Voltage I _{gd} =1.0mA	-10	-15		V
BV _{gs}	Source Breakdown Voltage I _{gs} =1.0mA	-6	-14		V
R _{th}	Thermal Resistance		175*		°C/W

* Overall R_{th} depends on case mounting.

MAXIMUM RATINGS AT 25°C

SYMBOLS	PARAMETERS	ABSOLUTE ¹	CONTINUOUS ²
V _{ds}	Drain-Source Voltage	10V	6V
V _{gs}	Gate-Source Voltage	-6V	-3V
I _{ds}	Drain Current	I _{ds}	110mA
I _{gsf}	Forward Gate Current	30mA	5mA
P _{in}	Input Power	23dBm	@ 3dB Compression
T _{ch}	Channel Temperature	175°C	150°C
T _{stg}	Storage Temperature	-65/175°C	-65/150°C
P _t	Total Power Dissipation	780mW	650mW

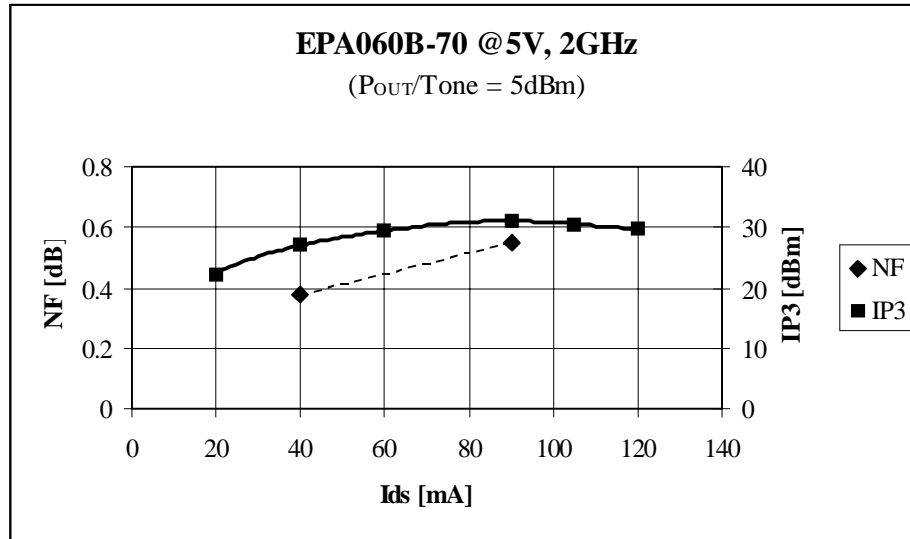
EPA060B-70

DATA SHEET

High Efficiency Heterojunction Power FET

Typical Performance

Noise Figure & IP3



S-PARAMETERS

FREQ (GHz)	--- S11 ---		--- S21 ---		--- S12 ---		--- S22 ---	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
1.0	0.863	-58.2	12.375	135.5	0.026	63.8	0.523	-24.4
2.0	0.696	-101.1	9.063	104.4	0.039	49.7	0.433	-41.0
3.0	0.604	-132.0	6.850	82.3	0.049	43.5	0.388	-51.9
4.0	0.555	-159.5	5.508	63.6	0.055	39.1	0.360	-60.8
5.0	0.538	177.3	4.614	47.0	0.065	35.5	0.322	-70.3
6.0	0.534	160.5	4.002	31.8	0.074	30.5	0.288	-84.5
7.0	0.533	141.8	3.532	16.7	0.083	25.3	0.281	-98.4
8.0	0.540	125.9	3.168	2.3	0.092	19.2	0.254	-111.5
9.0	0.582	105.0	2.817	-12.9	0.101	11.6	0.235	-125.6
10.0	0.622	88.1	2.532	-28.1	0.108	2.7	0.220	-148.1
11.0	0.642	74.5	2.370	-43.9	0.119	-8.1	0.225	-176.6
12.0	0.674	60.3	2.195	-60.1	0.129	-19.3	0.238	155.7
13.0	0.727	47.7	1.970	-74.8	0.132	-30.2	0.244	130.0
14.0	0.764	36.4	1.758	-88.3	0.133	-40.6	0.263	110.6
15.0	0.776	22.6	1.618	-104.8	0.137	-54.2	0.316	90.1
16.0	0.790	8.5	1.441	-122.5	0.134	-69.5	0.358	66.2
17.0	0.781	-1.1	1.285	-135.3	0.133	-78.3	0.363	51.0
18.0	0.792	-9.8	1.221	-147.7	0.144	-91.0	0.396	41.9
19.0	0.811	-22.2	1.106	-163.8	0.142	-106.2	0.418	23.9
20.0	0.836	-32.5	1.016	-179.0	0.144	-121.0	0.445	6.7
21.0	0.800	-41.8	0.975	166.9	0.157	-134.6	0.461	-8.4
22.0	0.761	-54.5	0.941	152.3	0.176	-148.9	0.426	-22.5
23.0	0.800	-68.3	0.861	134.7	0.190	-167.5	0.399	-50.3
24.0	0.799	-80.2	0.764	117.1	0.204	173.5	0.417	-78.5
25.0	0.719	-98.1	0.751	103.1	0.239	157.7	0.451	-87.9
26.0	0.718	-119.4	0.750	85.7	0.291	137.6	0.450	-110.4

EPA060B-70

DATA SHEET

High Efficiency Heterojunction Power FET

S-Parameters

5V,50ma

FREQ (GHz)	--- S11 ---		--- S21 ---		--- S12 ---		--- S22 ---	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
1.0	0.948	-57.7	14.366	129.2	0.032	54.0	0.439	-48.4
2.0	0.739	-100.4	9.162	106.8	0.042	45.1	0.438	-44.9
3.0	0.656	-132.4	7.008	84.9	0.050	36.7	0.392	-56.7
4.0	0.619	-155.0	5.629	67.5	0.056	31.8	0.352	-64.7
5.0	0.597	-176.9	4.740	51.0	0.062	26.9	0.298	-74.4
6.0	0.577	162.1	4.086	35.5	0.069	22.1	0.284	-90.6
7.0	0.580	141.7	3.546	21.4	0.075	18.2	0.287	-96.4
8.0	0.616	122.1	3.145	6.6	0.081	11.3	0.264	-103.5
9.0	0.618	117.3	2.918	-7.4	0.088	4.0	0.148	-131.4
10.0	0.633	99.5	2.657	-22.4	0.097	-1.1	0.185	-169.4
11.0	0.673	76.6	2.345	-36.9	0.101	-10.0	0.208	-168.3
12.0	0.718	63.1	2.142	-50.5	0.108	-18.0	0.156	179.2
13.0	0.761	59.0	1.999	-65.3	0.117	-27.9	0.223	117.8
14.0	0.777	44.3	1.767	-81.5	0.118	-40.9	0.321	97.0
15.0	0.779	30.7	1.543	-91.8	0.115	-46.4	0.287	96.4
16.0	0.816	14.8	1.418	-107.4	0.117	-59.0	0.265	77.7
17.0	0.827	11.9	1.307	-123.3	0.121	-70.7	0.445	49.2
18.0	0.822	2.7	1.114	-132.8	0.114	-77.5	0.460	49.8
19.0	0.852	-9.8	1.090	-144.6	0.123	-87.1	0.424	38.2
20.0	0.868	-19.9	1.001	-158.4	0.122	-99.4	0.442	21.5
21.0	0.846	-31.4	0.911	-174.9	0.120	-114.7	0.576	9.4
22.0	0.838	-32.7	0.856	176.8	0.125	-121.6	0.515	9.9
23.0	0.860	-47.9	0.832	160.7	0.130	-137.4	0.446	-22.9
24.0	0.835	-66.2	0.763	141.8	0.128	-156.0	0.536	-40.8
25.0	0.819	-80.1	0.710	126.8	0.130	-170.6	0.536	-41.4
26.0	0.868	-78.4	0.699	111.8	0.145	174.2	0.383	-78.0

EPA060B-70 Noise Parameters

Vds=5V, Ids=50mA

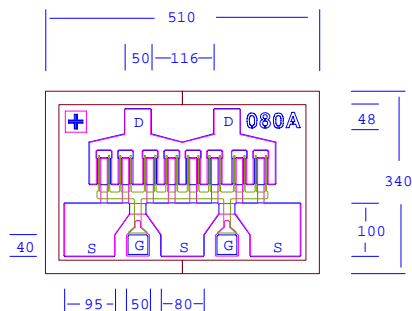
Freq. (GHz)	Gamma Opt		Nfmin (dB)	Rn/50
	(MAG)	(ANG)		
2	0.46	44	0.45	0.11
4	0.35	96	0.55	0.08
6	0.23	165	0.75	0.06
8	0.27	-145	0.92	0.08
10	0.35	-85	1.37	0.23
12	0.46	-58	1.47	0.44
14	0.58	-33	1.92	0.89
16	0.68	-6	2.47	1.3
18	0.63	7	3.03	1.78
20	0.68	33	3.24	1.87
22	0.63	50	3.43	1.81
24	0.67	92	3.65	1.56
26	0.72	120	3.86	1.16

EPA080A

DATA SHEET

High Efficiency Heterojunction Power FET

- +27.5dBm TYPICAL OUTPUT POWER
- 9.5dB TYPICAL POWER GAIN AT 18GHz
- 0.3 X 800 MICRON RECESSED “MUSHROOM” GATE
- Si₃N₄ PASSIVATION
- ADVANCED EPITAXIAL HETEROJUNCTION PROFILE PROVIDES EXTRA HIGH POWER EFFICIENCY, AND HIGH RELIABILITY
- Idss SORTED IN 20 mA PER BIN RANGE



ELECTRICAL CHARACTERISTICS (T_a = 25 °C)

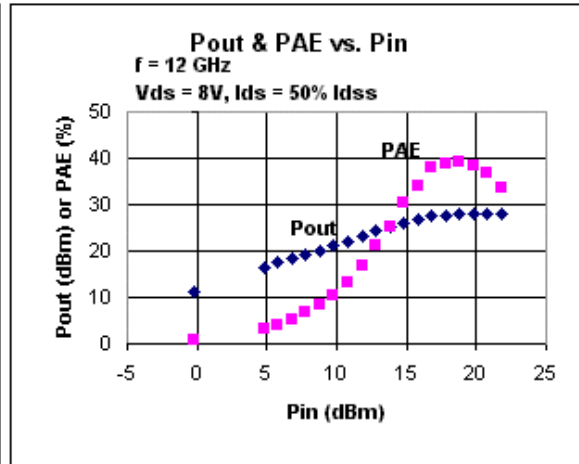
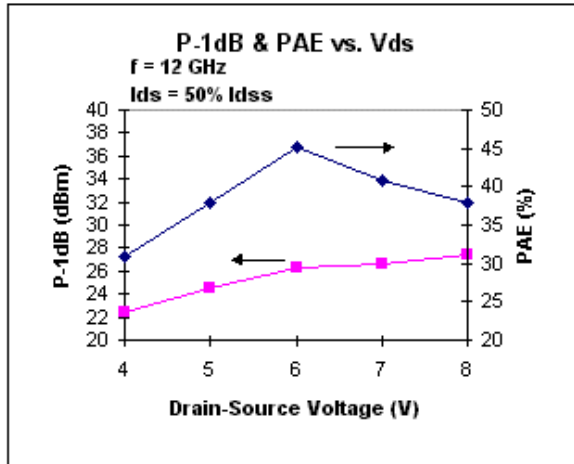
SYMBOLS	PARAMETERS/TEST CONDITIONS	MIN	TYP	MAX	UNIT
P _{1dB}	Output Power at 1dB Compression V _{ds} =8V, I _{ds} =50% I _{dss}	26.0	27.5 27.5		dBm
G _{1dB}	Gain at 1dB Compression V _{ds} =8V, I _{ds} =50% I _{dss}	10.5	12.5 9.5		dB
PAE	Power Added Efficiency at 1dB Compression V _{ds} =8V, I _{ds} =50% I _{dss}		45		%
I _{dss}	Saturated Drain Current V _{ds} =3V, V _{gs} =0V	130	240	320	mA
G _m	Transconductance V _{ds} =3V, V _{gs} =0V	160	260		mS
V _p	Pinch-off Voltage V _{ds} =3V, I _{ds} =2.5mA		-1.0	-2.5	V
BV _{gd}	Drain Breakdown Voltage I _{gd} =1.0mA	-11	-15		V
BV _{gs}	Source Breakdown Voltage I _{gs} =1.0mA	-7	-14		V
R _{th}	Thermal Resistance (Au-Sn Eutectic Attach)		55		°C/W

MAXIMUM RATINGS AT 25°C

SYMBOLS	PARAMETERS	ABSOLUTE ¹	CONTINUOUS ²
V _{ds}	Drain-Source Voltage	12V	8V
V _{gs}	Gate-Source Voltage	-8V	-3V
I _{ds}	Drain Current	I _{dss}	260mA
I _{gsf}	Forward Gate Current	40mA	7mA
P _{in}	Input Power	25dBm	@3dB Compression
T _{ch}	Channel Temperature	175°C	150°C
T _{stg}	Storage Temperature	-65/175°C	-65/150°C
P _t	Total Power Dissipation	2.5W	2.1W

DATS SHEET

High Efficiency Heterojunction Power FET



S-PARAMETERS

8V, 1/2 Idss

FREQ	--- S11 ---		--- S21 ---		--- S12 ---		--- S22 ---		FREQ	--- S11 ---		--- S21 ---		--- S12 ---		--- S22 ---	
(GHz)	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG	(GHz)	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
1.0	0.929	-63.0	13.172	141.6	0.035	56.2	0.478	-36.9	21.0	0.892	151.7	1.076	-6.7	0.060	1.8	0.546	-173.4
2.0	0.885	-102.9	9.639	117.9	0.051	36.9	0.380	-60.7	22.0	0.893	148.0	1.015	-11.2	0.060	1.7	0.566	-176.3
3.0	0.863	-125.7	7.251	102.8	0.056	26.6	0.319	-75.8	23.0	0.898	144.4	0.958	-16.1	0.061	0.9	0.587	-179.8
4.0	0.856	-140.4	5.741	91.7	0.058	20.1	0.290	-86.4	24.0	0.895	140.9	0.909	-21.0	0.062	1.6	0.606	176.9
5.0	0.842	-153.1	4.704	82.3	0.059	15.5	0.288	-95.4	25.0	0.908	138.0	0.862	-25.6	0.065	2.7	0.626	172.3
6.0	0.843	-160.5	3.991	74.6	0.059	12.5	0.288	-102.3	26.0	0.905	136.3	0.814	-30.3	0.068	2.1	0.644	167.6
7.0	0.848	-166.4	3.455	67.8	0.059	10.2	0.293	-108.2	27.0	0.916	133.9	0.785	-34.5	0.070	2.1	0.665	163.6
8.0	0.853	-171.0	3.045	61.6	0.059	8.2	0.304	-114.3	28.0	0.924	133.4	0.745	-39.2	0.074	2.6	0.687	158.0
9.0	0.857	-174.5	2.701	55.8	0.058	7.2	0.315	-120.2	29.0	0.919	133.0	0.700	-42.7	0.075	0.6	0.704	153.5
10.0	0.866	-177.6	2.437	50.3	0.056	5.6	0.331	-125.3	30.0	0.928	133.6	0.675	-46.9	0.079	0.1	0.721	149.1
11.0	0.867	179.4	2.212	44.8	0.056	5.4	0.353	-130.8	31.0	0.936	133.6	0.644	-50.4	0.079	0.4	0.736	145.4
12.0	0.874	176.9	2.011	39.2	0.055	5.0	0.375	-136.0	32.0	0.931	133.2	0.616	-54.2	0.080	-0.5	0.749	141.4
13.0	0.877	174.3	1.842	34.1	0.054	3.9	0.398	-140.7	33.0	0.918	130.9	0.574	-58.3	0.081	-1.4	0.753	137.7
14.0	0.883	171.6	1.698	29.1	0.053	3.6	0.423	-145.0	34.0	0.922	129.9	0.547	-61.2	0.081	-1.4	0.771	135.0
15.0	0.884	168.8	1.567	23.8	0.053	4.1	0.445	-148.4	35.0	0.925	127.6	0.518	-64.5	0.080	-2.1	0.779	132.2
16.0	0.886	166.1	1.457	18.7	0.053	3.4	0.466	-152.1	36.0	0.935	125.9	0.494	-67.2	0.088	-6.5	0.784	129.7
17.0	0.885	163.7	1.362	13.9	0.054	2.5	0.487	-155.5	37.0	0.929	122.6	0.478	-70.2	0.087	-7.8	0.790	126.3
18.0	0.885	160.2	1.287	8.8	0.055	2.3	0.501	-158.3	38.0	0.929	119.1	0.465	-75.0	0.094	-14.2	0.797	122.8
19.0	0.883	156.3	1.226	3.3	0.057	1.5	0.514	-161.9	39.0	0.919	114.3	0.446	-79.0	0.091	-21.0	0.797	119.5
20.0	0.885	152.0	1.166	-2.2	0.059	0.6	0.524	-165.7	40.0	0.913	109.5	0.439	-83.8	0.096	-29.3	0.799	115.9

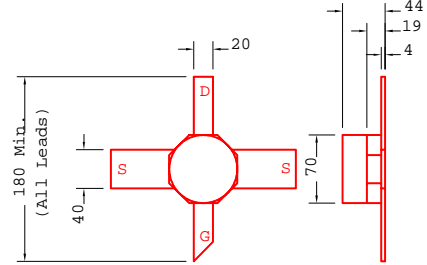
Note: The data included 0.7 mils diameter Au bonding wires:
2 gate wires, 15 mils each; 2 drain wires, 20 mils each; 6 source wires, 7 mils each.

EPA080A-70

DATA SHEET

High Efficiency Heterojunction Power FET

- NON-HERMETIC LOW COST CERAMIC 70mil PACKAGE
- +25.5dBm TYPICAL OUTPUT POWER
- 7.0dB TYPICAL POWER GAIN AT 12GHz
- 0.3 X 800 MICRON RECESSED “MUSHROOM” GATE
- Si₃N₄ PASSIVATION
- ADVANCED EPITAXIAL HETEROJUNCTION PROFILE PROVIDES EXTRA HIGH POWER EFFICIENCY, AND HIGH RELIABILITY



ELECTRICAL CHARACTERISTICS (T_a = 25 °C)

SYMBOLS	PARAMETERS/TEST CONDITIONS	MIN	TYP	MAX	UNIT
P_{1dB}	Output Power at 1dB Compression f=12GHz V _{ds} =5V, I _{ds} =50% I _{dss}	24.0	25.5		dBm
G_{1dB}	Gain at 1dB Compression f=12GHz V _{ds} =5V, I _{ds} =50% I _{dss}	5.5	7.0		dB
PAE	Power Added Efficiency at 1dB Compression V _{ds} =5V, I _{ds} =50% I _{dss} f=12GHz		40		%
I_{dss}	Saturated Drain Current V _{ds} =3V, V _{gs} =0V	130	240	320	mA
G_m	Transconductance V _{ds} =3V, V _{gs} =0V	160	260		mS
V_p	Pinch-off Voltage V _{ds} =3V, I _{ds} =2.5mA		-1.0	-2.5	V
BV_{gd}	Drain Breakdown Voltage I _{gd} =1.0mA	-10	-15		V
BV_{gs}	Source Breakdown Voltage I _{gs} =1.0mA	-6	-14		V
R_{th}	Thermal Resistance		135*		°C/W

* Overall R_{th} depends on case mounting.

MAXIMUM RATINGS AT 25 °C

SYMBOLS	PARAMETERS	ABSOLUTE ¹	CONTINUOUS ²
V_{ds}	Drain-Source Voltage	8V	5V
V_{gs}	Gate-Source Voltage	-5V	-3V
I_{ds}	Drain Current	I _{dss}	185mA
I_{gsf}	Forward Gate Current	40mA	7mA
P_{in}	Input Power	23dBm	@ 3dB Compression
T_{ch}	Channel Temperature	175°C	150°C
T_{stg}	Storage Temperature	-65/175°C	-65/150°C
P_t	Total Power Dissipation	1.1W	0.9W