

SUNSTAR商斯达实业集团是集研发、生产、工程、销售、代理经销、技术咨询、信息服务等为一体的高科技企业，是专业高科技电子产品生产厂家，是具有 10 多年历史的专业电子元器件供应商，是中国最早和最大的仓储式连锁规模经营大型综合电子零部件代理分销商之一，是一家专业代理和分销世界各大品牌IC芯片和电子元器件的连锁经营综合性国际公司。在香港、北京、深圳、上海、西安、成都等全国主要电子市场设有直属分公司和产品展示展销窗口门市部专卖店及代理分销商，已在全国范围内建成强大统一的供货和代理分销网络。我们专业代理经销、开发生产电子元器件、集成电路、传感器、微波光电元器件、工控机/DOC/DOM电子盘、专用电路、单片机开发、MCU/DSP/ARM/FPGA软件硬件、二极管、三极管、模块等，是您可靠的一站式现货配套供应商、方案提供商、部件功能模块开发配套商。专业以现代信息产业（计算机、通讯及传感器）三大支柱之一的传感器为主营业务，专业经营各类传感器的代理、销售生产、网络信息、科技图书资料及配套产品设计、工程开发。我们的专业网站——**中国传感器科技信息网（全球传感器数据库）www.SENSOR-IC.COM** 服务于全球高科技生产商及贸易商，为企业科技产品开发提供技术交流平台。欢迎各厂商互通有无、交换信息、交换链接、发布寻求代理信息。欢迎国外高科技传感器、变送器、执行器、自动控制产品厂商介绍产品到 中国，共同开拓市场。本网站是关于各种传感器-变送器-仪器仪表及工业自动化大型专业网站，深入到工业控制、系统工程计 测量、自动化、安防报警、消费电子等众多领域，把最新的传感器-变送器-仪器仪表买卖信息，最新技术供求，最新采购商，行业动态，发展方向，最新的技术应用和市场资讯及时的传递给广大科技开发、科学研究、产品设计人员。本网站已成功为石油、化工、电力、医药、生物、航空、航天、国防、能源、冶金、电子、工业、农业、交通、汽车、矿山、煤炭、纺织、信息、通信、IT、安防、环保、印刷、科研、气象、仪器仪表等领域从事科学研究、产品设计、开发、生产制造的科技人员、管理人员、和采购人员提供满意服务。**我公司专业生产、代理、经销、销售各种传感器、变送器、敏感元器件、开关、执行器、仪器仪表、自动化控制系统：专门从事设计、生产、销售各种传感器、变送器、各种测控仪表、热工仪表、现场控制器、计算机控制系统、数据采集系统、各类环境监控系统、专用控制系统应用软件以及嵌入式系统开发及应用等工作。如热敏电阻、压敏电阻、温度传感器、温度变送器、湿度传感器、湿度变送器、气体传感器、气体变送器、压力传感器、压力变送、称重传感器、物（液）位传感器、物（液）位变送器、流量传感器、流量变送器、电流（压）传感器、溶氧传感器、霍尔传感器、图像传感器、超声波传感器、位移传感器、速度传感器、加速度传感器、扭距传感器、红外传感器、紫外传感器、火焰传感器、激光传感器、振动传感器、轴角传感器、光电传感器、接近传感器、干簧管传感器、继电器传感器、微型电泵、磁敏（阻）传感器、压力开关、接近开关、光电开关、色标传感器、光纤传感器、齿轮测速传感器、时间继电器、计数器、计米器、温控仪、固态继电器、调压模块、电磁铁、电压表、电流表等特殊传感器。同时承接传感器应用电路、产品设计和自动化工程项目。**

欢迎索取免费详细资料、设计指南和光盘；产品凡多，未能尽录，欢迎来电查询。

更多产品请看本公司产品专用销售网站：

商斯达中国传感器科技信息网：<http://www.sensor-ic.com/>

商斯达工控安防网：<http://www.pc-ps.net/>

商斯达电子元器件网：<http://www.sunstare.com/>

商斯达微波光电产品网：[HTTP://www.rfoe.net/](http://www.rfoe.net/)

商斯达消费电子产品网：<http://www.icasic.com/>

商斯达军工产品网：<http://www.junpinic.com/>

商斯达实业科技产品网：<http://www.sunstars.cn/>传感器销售热线：

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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 | | | ATF35143 | | | |
| EPA060B-70 | LP6872/LP750-70 | | CFB0301 | ATF34143 | | NE34018 | |
| EPA080A-70 | LP6872/LP750-70 | | | ATF34143 | | | |
| EPA018A-SOT23 | LP7612-SOT23 | | | ATF36163 | | | |
| EPA240D-SOT89 | LP1500/3000-SOT89 | | | ATF33143 | | | |
| EPA480C-SOT89 | LP3000-SOT89 | | | | | | |

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 |
| <hr/> | | | | | | | | |
| 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 |
| <hr/> | | | | | | | | |
| 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 |
| <hr/> | | | | | | | | |
| 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 | | |
| <hr/> | | | | | | | | |
| 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 |

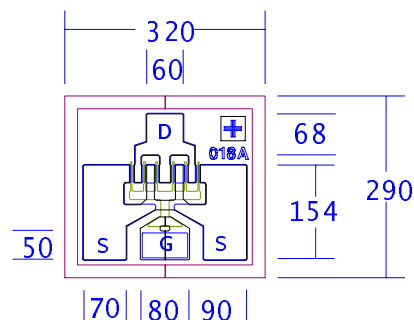
**Large Signal Model Parameters for Curtice-Cubic Model For Low Distortion GaAs Power FETs
(Curtice-Ennenburg Model)**

| <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

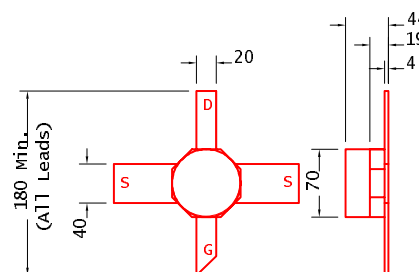
DATA SHEET Super Low Noise High Gain Heterojunction FET

| 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 | | dB |
| | | | 11.5 | | |
| 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 |

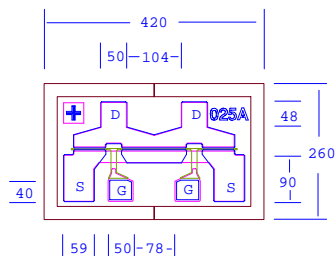
| EPB018A7-70 Noise Parameters Vds=2V, Ids=15mA | | | | |
|---|-----------|-------|-------|-------|
| Freq. | Gamma Opt | | Nfmin | Rn/50 |
| (GHz) | (MAG) | (ANG) | (dB) | |
| 2 | 0.76 | 25 | 0.37 | 0.26 |
| 4 | 0.65 | 56 | 0.43 | 0.22 |
| 6 | 0.51 | 84 | 0.48 | 0.16 |
| 8 | 0.41 | 118 | 0.55 | 0.11 |
| 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 |

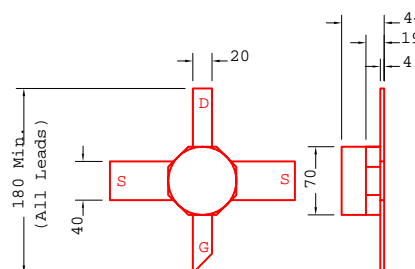
Note: The data included 0.7 mils diameter Au bonding wires:
2 gate wires, 15 mils each; 2 drain wires, 20 mils each; 4 source wires, 7 mils each.

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

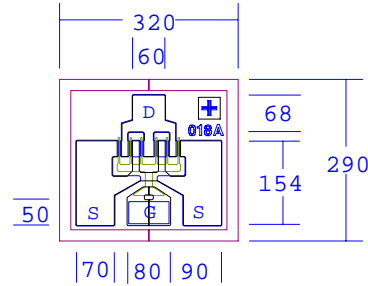
| S-PARAMETERS | | | | | | | | |
|---------------|-------------|--------|-------------|--------|-------------|--------|-------------|--------|
| 2V, 15mA | | | | | | | | |
| FREQ (GHz) | --- S11 --- | | --- S21 --- | | --- S12 --- | | --- S22 --- | |
| | MAG | ANG | MAG | ANG | MAG | ANG | MAG | ANG |
| 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 | | $^\circ\text{C}/\text{W}$ |

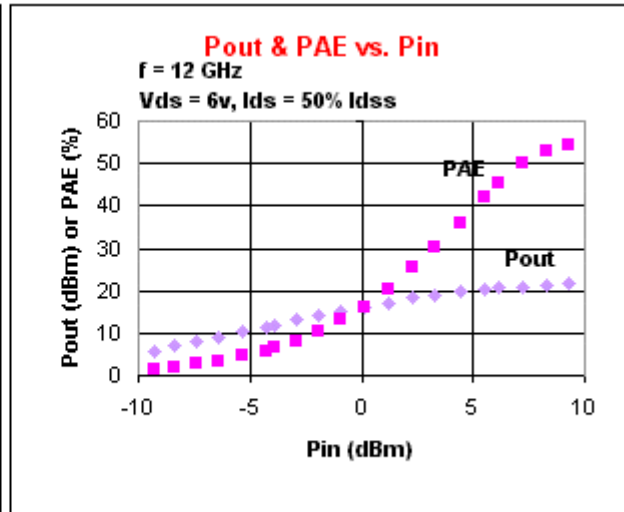
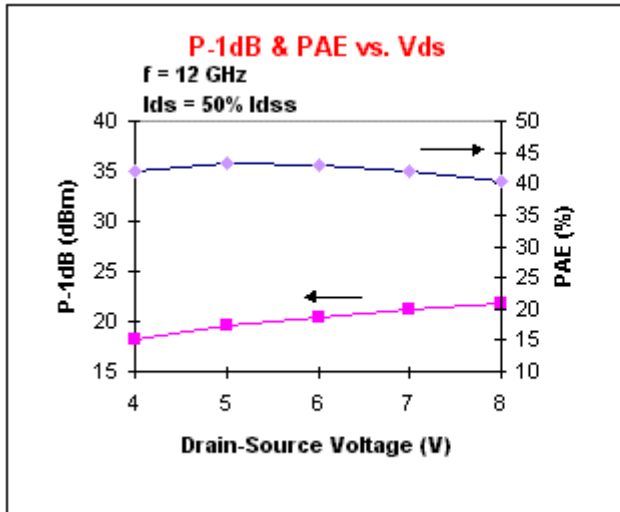
* $P_{1dB} = 21.5\text{dBm}$ can be obtained with 8v/50% Idss bias. Consult factory for wafer selection.

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 |

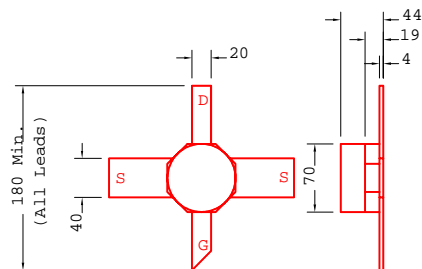
Note: The data included 0.7 mils diameter Au bonding wires:
 1 gate wire, 15 mils each; 1 drain wire, 20 mils each; 6 source wires, 8 mils each.

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

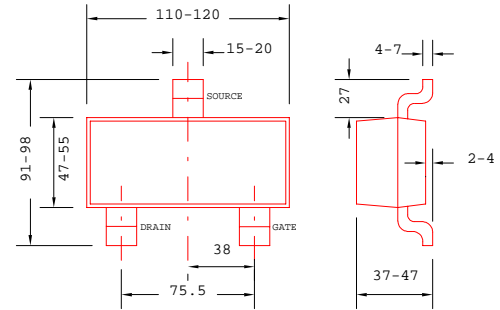
| S-PARAMETERS | | | | | | | | |
|--------------|-------------|--------|-------------|--------|-------------|--------|-------------|--------|
| 6V, 1/2 Idss | | | | | | | | |
| FREQ | --- S11 --- | | --- S21 --- | | --- S12 --- | | --- S22 --- | |
| (GHz) | MAG | ANG | MAG | ANG | MAG | ANG | MAG | ANG |
| 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

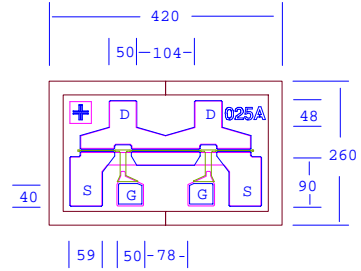
| S-PARAMETERS | | | | | | | | |
|---------------|-------------|--------|-------------|-------|-------------|--------|-------------|--------|
| 6V, 30mA | | | | | | | | |
| FREQ (GHz) | --- S11 --- | | --- S21 --- | | --- S12 --- | | --- S22 --- | |
| | MAG | ANG | MAG | ANG | MAG | ANG | MAG | ANG |
| 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

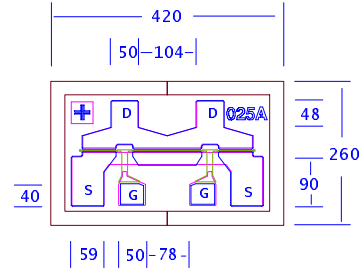
| SYMBOLS | PARAMETERS | ABSOLUTE ¹ | CONTINUOUS ² |
|------------------------|-------------------------|-----------------------|-------------------------|
| V_{ds} | Drain-Source Voltage | 12V | 8V |
| V_{gs} | Gate-Source Voltage | -8V | -3V |
| I_{ds} | Drain Current | I _{dss} | 90mA |
| I_{gsf} | 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)

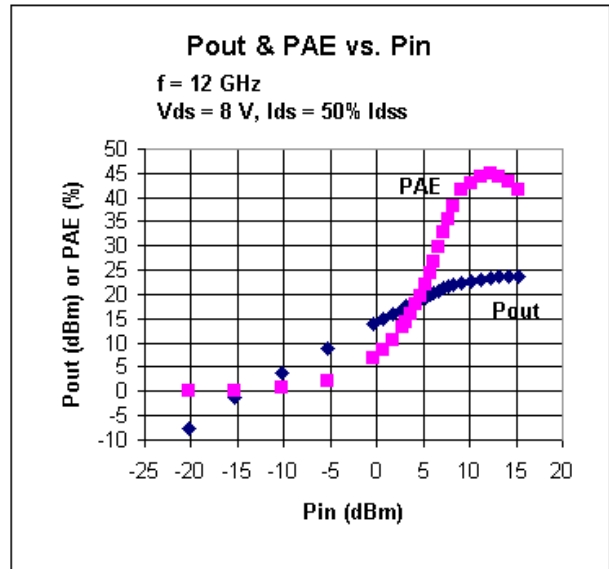
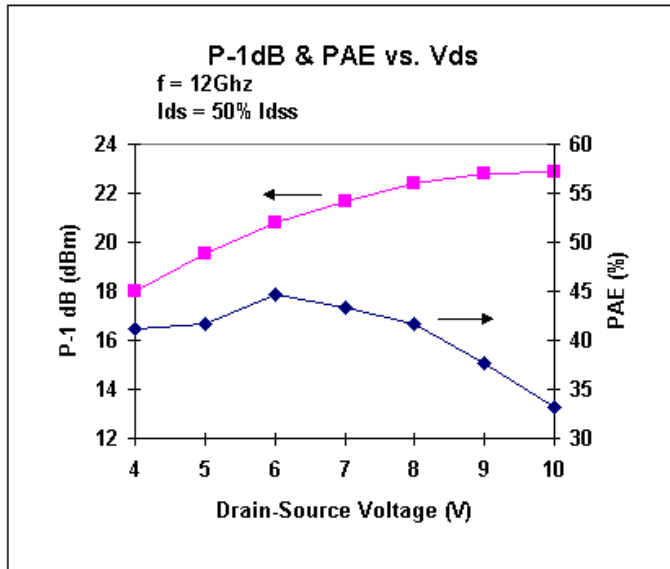
| SYMBOLS | PARAMETERS/TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|------------------------|--|-----------------|--------------|------|------|
| P_{1dB} | Output Power at 1dB Compression V _{ds} =8V, I _{ds} =50% I _{ds} | f=12GHz 21.0 | 22.5 22.5 | | dBm |
| G_{1dB} | Gain at 1dB Compression V _{ds} =8V, I _{ds} =50% I _{ds} | f=12GHz 12.0 | 13.5 11.0 | | dB |
| PAE | Gain at 1dB Compression V _{ds} =8V, I _{ds} =50% I _{ds} | 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_{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 | -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 _{ds} | 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 |

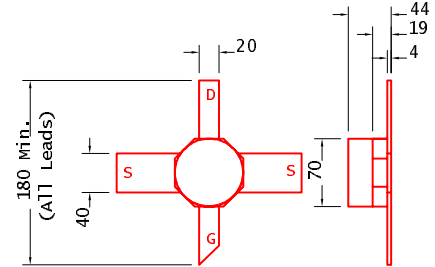
| EPA025A | | | | |
|------------------|-----------|-------|-------|-------|
| Noise Parameters | | | | |
| Vds=2V, Ids=15mA | | | | |
| Freq | Gamma Opt | | Nfmin | Rn/50 |
| (GHz) | (MAG) | (ANG) | (dB) | |
| 2 | 0.82 | 17 | 0.37 | 0.57 |
| 4 | 0.8 | 36 | 0.46 | 0.51 |
| 6 | 0.78 | 49 | 0.56 | 0.49 |
| 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} | | 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 _{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 |

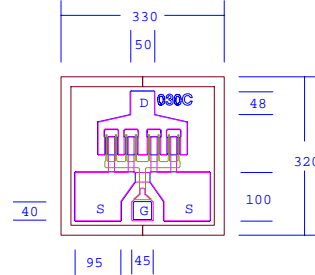
| EPA025A-70 | | | | |
|------------------|-------|-------|-------|-------|
| Noise Parameters | | | | |
| Vds=2V, Ids=15mA | | | | |
| Freq. | Popt | | Nfmin | Rn/50 |
| (GHz) | (MAG) | (ANG) | (dB) | |
| 2 | 0.73 | 25 | 0.37 | 0.22 |
| 4 | 0.64 | 55 | 0.46 | 0.18 |
| 6 | 0.49 | 81 | 0.56 | 0.14 |
| 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)

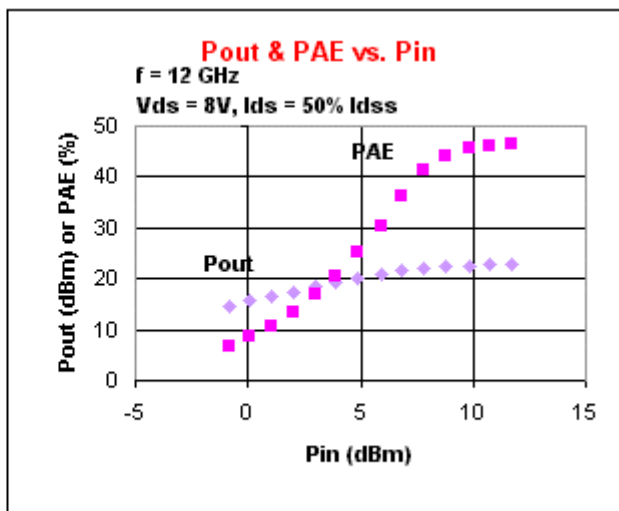
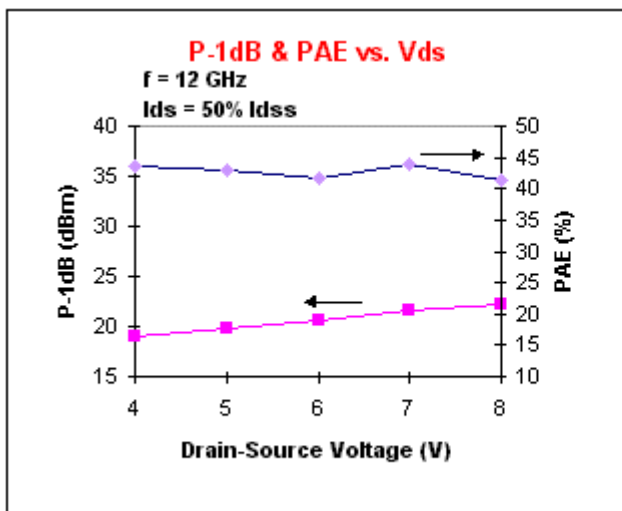
| SYMBOLS | PARAMETERS/TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|------------------------|---|------|--------------|------|------|
| P_{1dB} | Output Power at 1dB Compression V _{ds} =8V, I _{ds} =50% I _{dss} | 21.0 | 23.0 23.0 | | dBm |
| G_{1dB} | Gain at 1dB Compression V _{ds} =8V, I _{ds} =50% I _{dss} | 12.0 | 13.5 11.0 | | 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 | 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 _{dss} | 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 (GHz) | S11 MAG | S11 ANG | S21 MAG | S21 ANG | S12 MAG | S12 ANG | S22 MAG | S22 ANG |
|------------|---------|---------|---------|---------|---------|---------|---------|---------|
| 1.0 | 0.975 | -23.9 | 7.888 | 162.4 | 0.017 | 76.0 | 0.750 | -9.3 |
| 2.0 | 0.951 | -46.7 | 7.419 | 147.5 | 0.032 | 63.5 | 0.726 | -18.3 |
| 3.0 | 0.911 | -67.1 | 6.800 | 133.6 | 0.044 | 53.5 | 0.682 | -25.5 |
| 4.0 | 0.883 | -85.5 | 6.169 | 121.3 | 0.053 | 44.0 | 0.643 | -32.0 |
| 5.0 | 0.859 | -101.4 | 5.542 | 110.4 | 0.059 | 36.3 | 0.605 | -37.1 |
| 6.0 | 0.840 | -114.7 | 4.993 | 100.9 | 0.063 | 30.0 | 0.577 | -41.6 |
| 7.0 | 0.825 | -126.5 | 4.526 | 92.2 | 0.065 | 25.0 | 0.554 | -45.8 |
| 8.0 | 0.814 | -136.9 | 4.125 | 84.2 | 0.067 | 19.6 | 0.535 | -49.6 |
| 9.0 | 0.808 | -146.1 | 3.780 | 76.9 | 0.067 | 15.1 | 0.517 | -53.4 |
| 10.0 | 0.801 | -154.1 | 3.495 | 70.1 | 0.068 | 11.2 | 0.504 | -57.1 |
| 11.0 | 0.799 | -162.0 | 3.255 | 63.3 | 0.067 | 7.9 | 0.491 | -61.3 |
| 12.0 | 0.797 | -169.5 | 3.041 | 56.7 | 0.067 | 4.5 | 0.479 | -65.6 |
| 13.0 | 0.794 | -176.9 | 2.862 | 50.2 | 0.068 | 1.6 | 0.466 | -70.4 |
| 14.0 | 0.791 | -175.9 | 2.700 | 43.7 | 0.068 | -1.9 | 0.453 | -75.2 |
| 15.0 | 0.799 | -168.2 | 2.566 | 37.0 | 0.069 | -4.3 | 0.442 | -80.5 |
| 16.0 | 0.800 | -160.9 | 2.425 | 30.4 | 0.069 | -7.5 | 0.434 | -86.1 |
| 17.0 | 0.807 | -153.3 | 2.282 | 23.6 | 0.070 | -10.9 | 0.421 | -92.3 |
| 18.0 | 0.816 | -146.4 | 2.155 | 17.0 | 0.070 | -12.1 | 0.411 | -98.4 |
| 19.0 | 0.824 | -139.8 | 2.039 | 10.5 | 0.071 | -15.2 | 0.402 | -105.0 |
| 20.0 | 0.832 | -133.9 | 1.913 | 4.3 | 0.071 | -17.8 | 0.400 | -111.3 |
| 21.0 | 0.850 | -130.8 | 1.761 | -0.7 | 0.069 | -18.3 | 0.404 | -121.6 |
| 22.0 | 0.854 | -128.3 | 1.647 | -5.9 | 0.068 | -18.6 | 0.416 | -129.4 |
| 23.0 | 0.856 | -125.8 | 1.554 | -11.0 | 0.067 | -19.4 | 0.435 | -136.1 |
| 24.0 | 0.858 | -123.8 | 1.466 | -16.0 | 0.067 | -19.4 | 0.449 | -142.5 |
| 25.0 | 0.861 | -121.9 | 1.400 | -21.0 | 0.067 | -19.1 | 0.474 | -148.3 |
| 26.0 | 0.857 | -120.7 | 1.336 | -25.3 | 0.067 | -16.9 | 0.489 | -153.1 |
| 27.0 | 0.859 | -118.5 | 1.283 | -30.2 | 0.068 | -17.1 | 0.504 | -158.7 |
| 28.0 | 0.860 | -116.0 | 1.241 | -34.9 | 0.070 | -17.2 | 0.515 | -162.6 |
| 29.0 | 0.863 | -112.5 | 1.204 | -40.3 | 0.072 | -17.4 | 0.523 | -167.9 |
| 30.0 | 0.861 | -108.2 | 1.160 | -45.6 | 0.073 | -19.5 | 0.533 | -173.0 |
| 31.0 | 0.869 | -103.9 | 1.120 | -51.1 | 0.072 | -21.1 | 0.540 | -178.8 |
| 32.0 | 0.871 | -98.2 | 1.071 | -56.8 | 0.072 | -23.7 | 0.552 | -175.1 |
| 33.0 | 0.876 | -93.5 | 1.013 | -62.5 | 0.070 | -26.9 | 0.563 | -168.2 |
| 34.0 | 0.895 | -88.7 | 0.959 | -68.0 | 0.068 | -28.5 | 0.579 | -161.5 |
| 35.0 | 0.926 | -84.1 | 0.910 | -73.5 | 0.069 | -31.3 | 0.610 | -153.7 |
| 36.0 | 0.952 | -81.3 | 0.858 | -79.0 | 0.072 | -36.4 | 0.642 | -146.1 |
| 37.0 | 0.984 | -77.8 | 0.815 | -84.5 | 0.075 | -43.8 | 0.677 | -137.7 |
| 38.0 | 1.015 | -74.8 | 0.765 | -91.0 | 0.073 | -51.4 | 0.702 | -130.2 |
| 39.0 | 1.032 | -71.4 | 0.702 | -97.1 | 0.074 | -65.3 | 0.712 | -123.9 |
| 40.0 | 1.002 | -70.1 | 0.650 | -103.1 | 0.072 | -70.2 | 0.725 | -119.1 |

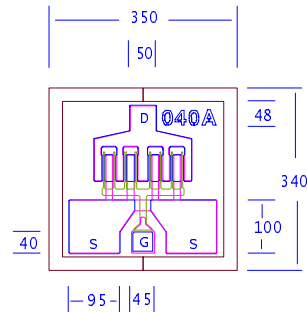
Note: The data included 0.7 mils diameter Au bonding wires:
 1 gate wires, 15 mils each; 1 drain wires, 20 mils each; 4 source wires, 7 mils each.

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)

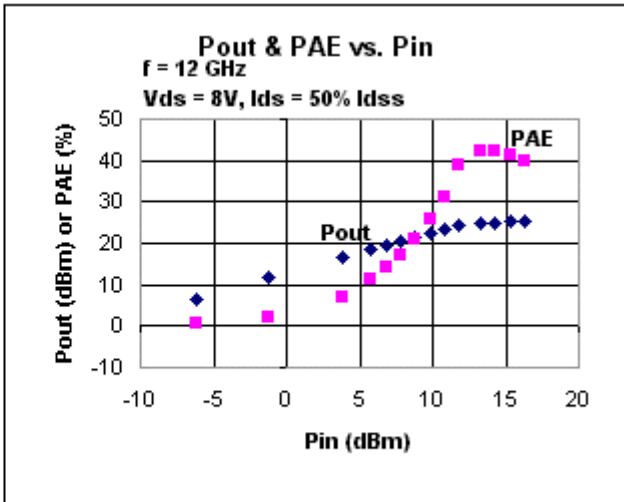
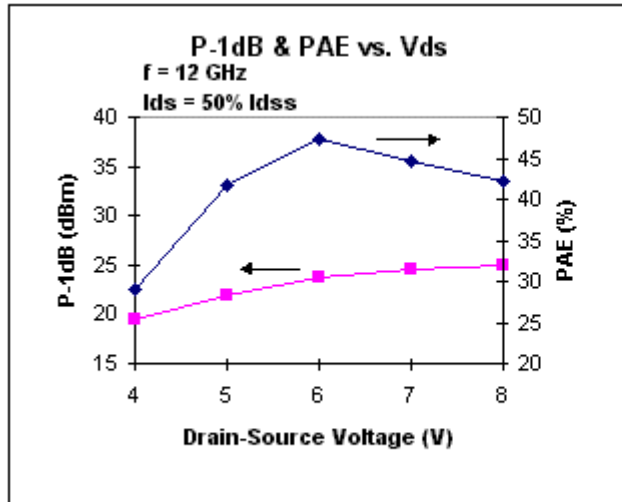
| SYMBOLS | PARAMETERS/TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|------------------------|---|-----|------------------------------------|------|------|
| P_{1dB} | Output Power at 1dB Compression V _{ds} =8V, I _{ds} =50% I _{dss} | | f=12GHz 24.5 f=18GHz 24.5 | | dBm |
| G_{1dB} | Gain at 1dB Compression V _{ds} =8V, I _{ds} =50% I _{dss} | | 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 |

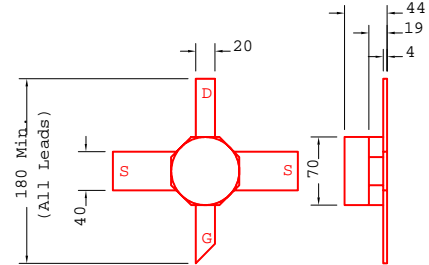
Note: The data included 0.7 mils diameter Au bonding wires:
 1 gate wires, 15 mils each; 1 drain wires, 20 mils each; 4 source wires, 7 mils each.

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

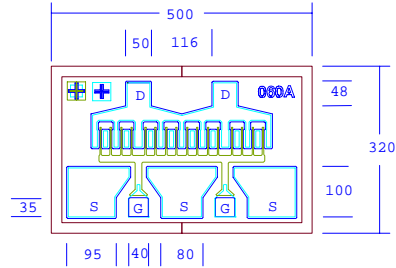
| S-PARAMETERS | | | | | | | | | |
|---------------------|-------------|--------|-------------|--------|-------------|--------|-------------|--------|--|
| 6V, 1/2 Idss | | | | | | | | | |
| FREQ | --- S11 --- | | --- S21 --- | | --- S12 --- | | --- S22 --- | | |
| (GHz) | MAG | ANG | MAG | ANG | MAG | 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} | 25.0 | 26.5 | | dBm |
| G_{1dB} | Gain at 1dB Compression V _{ds} =8V, I _{ds} =50% I _{dss} | 11.5 | 13.0 | | 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 | 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 |

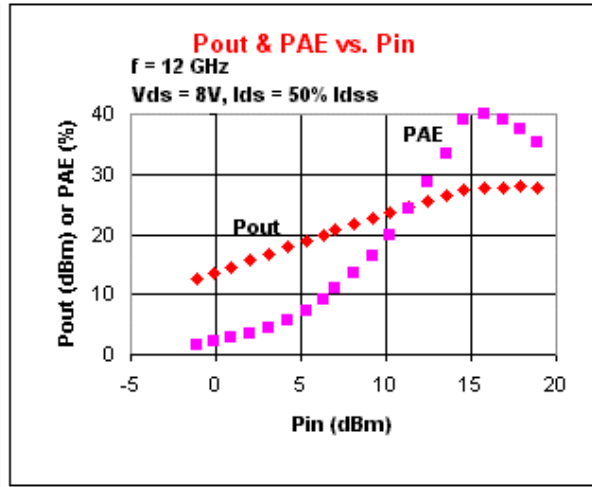
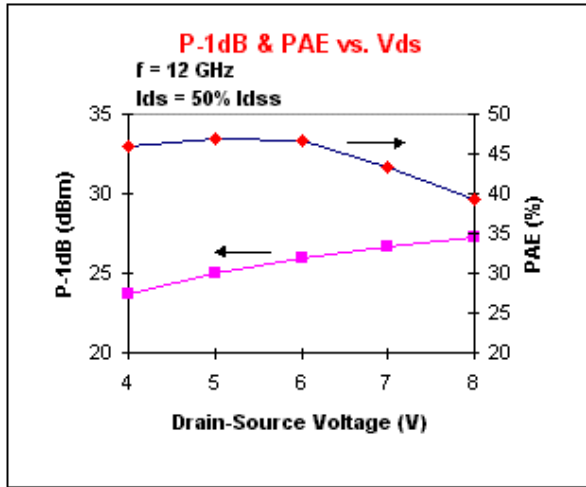
MAXIMUM RATINGS AT 25°C

| 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 |

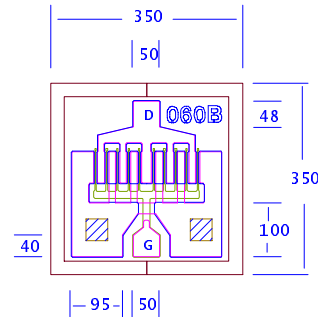
Note: The data included 0.7 mils diameter Au bonding wires:
 2 gate wires, 15 mils each; 2 drain wires, 20 mils each; 6 source wires, 7 mils each.

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

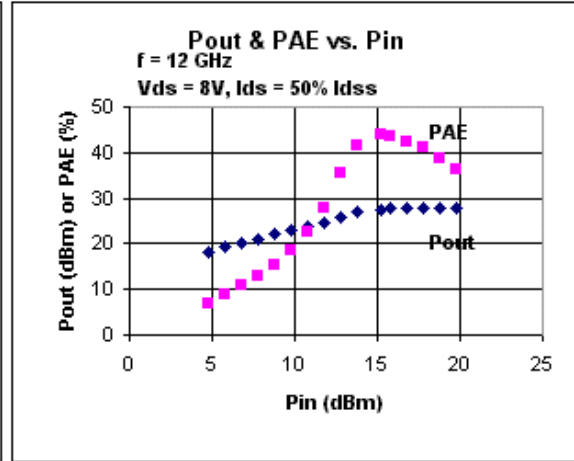
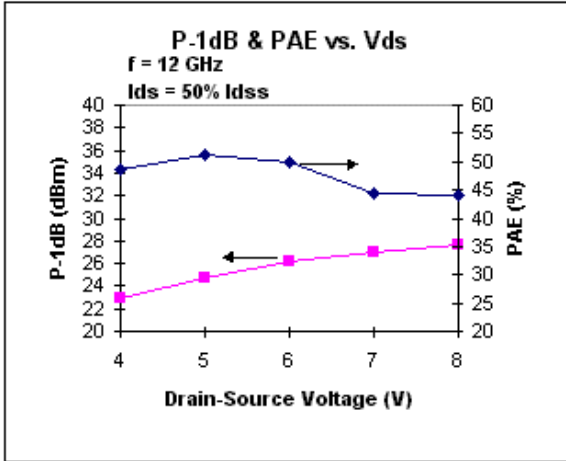
| SYMBOLS | PARAMETERS | EPA060B | | EPA060BV | |
|------------------|-------------------------|-----------------------|-------------------------|-----------------------|-------------------------|
| | | ABSOLUTE ¹ | CONTINUOUS ² | ABSOLUTE ¹ | CONTINUOUS ² |
| V _{ds} | Drain-Source Voltage | 12V | 8V | 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 |

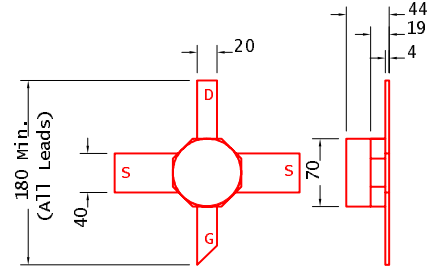
EPA060B-70

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

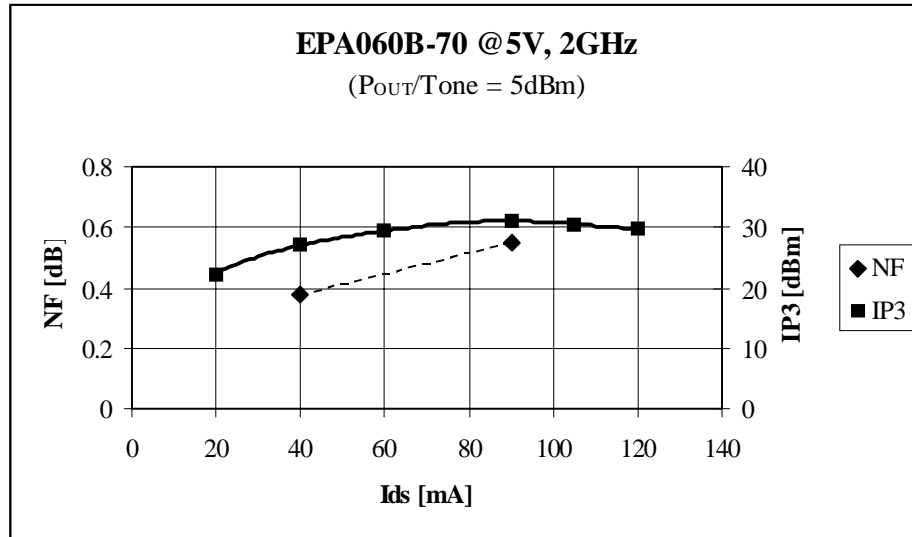
| SYMBOLS | PARAMETERS | ABSOLUTE ¹ | CONTINUOUS ² |
|------------------|-------------------------|-----------------------|-------------------------|
| V _{ds} | Drain-Source Voltage | 10V | 6V |
| V _{gs} | Gate-Source Voltage | -6V | -3V |
| I _{ds} | Drain Current | I _{ds} | 110mA |
| I _{gsf} | 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 |

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

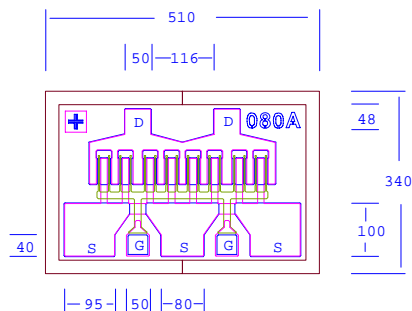
| Freq. (GHz) | Gamma Opt | | Nfmin (dB) | Rn/50 |
|----------------|-----------|-------|---------------|-------|
| | (MAG) | (ANG) | | |
| 2 | 0.46 | 44 | 0.45 | 0.11 |
| 4 | 0.35 | 96 | 0.55 | 0.08 |
| 6 | 0.23 | 165 | 0.75 | 0.06 |
| 8 | 0.27 | -145 | 0.92 | 0.08 |
| 10 | 0.35 | -85 | 1.37 | 0.23 |
| 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)

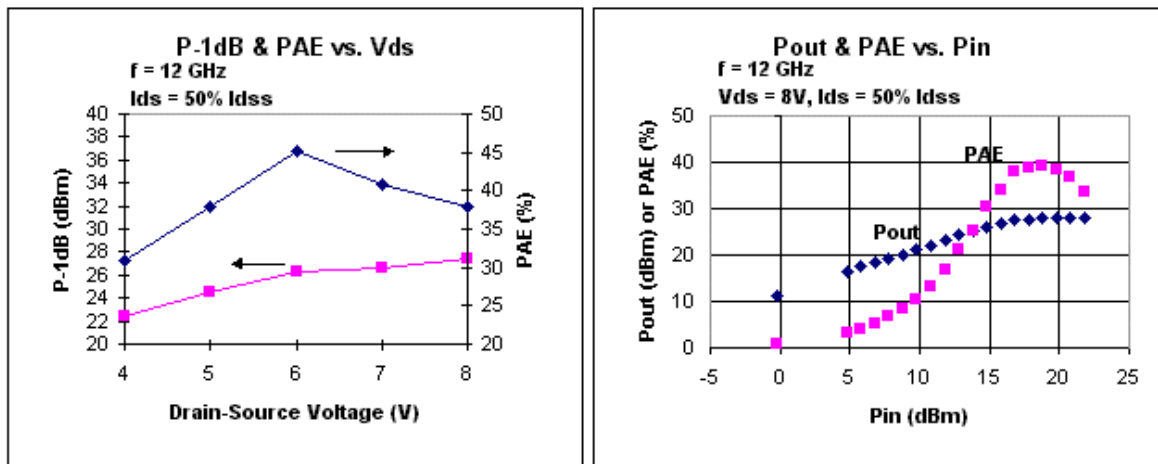
| SYMBOLS | PARAMETERS/TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|------------------|---|------|--------------|------|------|
| P _{1dB} | Output Power at 1dB Compression V _{ds} =8V, I _{ds} =50% I _{dss} | 26.0 | 27.5 27.5 | | dBm |
| G _{1dB} | Gain at 1dB Compression V _{ds} =8V, I _{ds} =50% I _{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 |

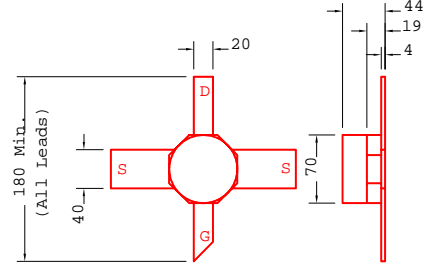
Note: The data included 0.7 mils diameter Au bonding wires:
 2 gate wires, 15 mils each; 2 drain wires, 20 mils each; 6 source wires, 7 mils each.

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 V _{ds} =5V, I _{ds} =50% I _{dss} f=12GHz | 24.0 | 25.5 | | dBm |
| G_{1dB} | Gain at 1dB Compression V _{ds} =5V, I _{ds} =50% I _{dss} f=12GHz | 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 |

SUNSTAR商斯达实业集团是集研发、生产、工程、销售、代理经销、技术咨询、信息服务等为一体的高科技企业，是专业高科技电子产品生产厂家，是具有 10 多年历史的专业电子元器件供应商，是中国最早和最大的仓储式连锁规模经营大型综合电子零部件代理分销商之一，是一家专业代理和分销世界各大品牌 IC 芯片和电子元器件的连锁经营综合性国际公司。在香港、北京、深圳、上海、西安、成都等全国主要电子市场设有直属分公司和产品展示展销窗口门市部专卖店及代理分销商，已在全国范围内建成强大统一的供货和代理分销网络。我们专业代理经销、开发生产电子元器件、集成电路、传感器、微波光电元器件、工控机/DOC/DOM 电子盘、专用电路、单片机开发、MCU/DSP/ARM/FPGA 软件硬件、二极管、三极管、模块等，是您可靠的一站式现货配套供应商、方案提供商、部件功能模块开发配套商。专业以现代信息产业（计算机、通讯及传感器）三大支柱之一的传感器为主营业务，专业经营各类传感器的代理、销售生产、网络信息、科技图书资料及配套产品设计、工程开发。我们的专业网站——**中国传感器科技信息网（全球传感器数据库）www.SENSOR-IC.COM** 服务于全球高科技生产商及贸易商，为企业科技产品开发提供技术交流平台。欢迎各厂商互通有无、交换信息、交换链接、发布寻求代理信息。欢迎国外高科技传感器、变送器、执行器、自动控制产品厂商介绍产品到 中国，共同开拓市场。本网站是关于各种传感器-变送器-仪器仪表及工业自动化大型专业网站，深入到工业控制、系统工程计 测量、自动化、安防报警、消费电子等众多领域，把最新的传感器-变送器-仪器仪表买卖信息，最新技术供求，最新采购商，行业动态，发展方向，最新的技术应用和市场资讯及时的传递给广大科技开发、科学研究、产品设计人员。本网站已成功为石油、化工、电力、医药、生物、航空、航天、国防、能源、冶金、电子、工业、农业、交通、汽车、矿山、煤炭、纺织、信息、通信、IT、安防、环保、印刷、科研、气象、仪器仪表等领域从事科学研究、产品设计、开发、生产制造的科技人员、管理人员、和采购人员提供满意服务。**我公司专业开发生产、代理、经销、销售各种传感器、变送器、敏感元器件、开关、执行器、仪器仪表、自动化控制系统：专门从事设计、生产、销售各种传感器、变送器、各种测控仪表、热工仪表、现场控制器、计算机控制系统、数据采集系统、各类环境监控系统、专用控制系统应用软件以及嵌入式系统开发及应用等工作。如热敏电阻、压敏电阻、温度传感器、温度变送器、湿度传感器、湿度变送器、气体传感器、气体变送器、压力传感器、压力变送、称重传感器、物（液）位传感器、物（液）位变送器、流量传感器、流量变送器、电流（压）传感器、溶氧传感器、霍尔传感器、图像传感器、超声波传感器、位移传感器、速度传感器、加速度传感器、扭距传感器、红外传感器、紫外传感器、火焰传感器、激光传感器、振动传感器、轴角传感器、光电传感器、接近传感器、干簧管传感器、继电器传感器、微型电泵、磁敏（阻）传感器、压力开关、接近开关、光电开关、色标传感器、光纤传感器、齿轮测速传感器、时间继电器、计数器、计米器、温控仪、固态继电器、调压模块、电磁铁、电压表、电流表等特殊传感器。同时承接传感器应用电路、产品设计和自动化工程项目。**

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