

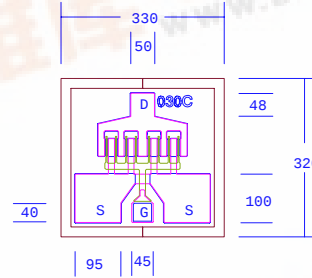


EPA030C

## 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
- $\text{Si}_3\text{N}_4$  PASSIVATION
- ADVANCED EPITAXIAL HETEROJUNCTION PROFILE PROVIDES EXTRA HIGH POWER EFFICIENCY, AND HIGH RELIABILITY
- $\text{Idss}$  SORTED IN 10mA PER BIN RANGE



Chip Thickness:  $75 \pm 13$  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<br>$V_{ds}=8V$ , $I_{ds}=50\% I_{dss}$<br>$f=12\text{GHz}$<br>$f=18\text{GHz}$ | 21.0 | 23.0<br>23.0 |      | dBm                |
| $G_{1dB}$ | Gain at 1dB Compression<br>$V_{ds}=8V$ , $I_{ds}=50\% I_{dss}$<br>$f=12\text{GHz}$<br>$f=18\text{GHz}$         | 12.0 | 13.5<br>11.0 |      | dB                 |
| PAE       | Power Added Efficiency at 1dB Compression<br>$V_{ds}=8V$ , $I_{ds}=50\% I_{dss}$<br>$f=12\text{GHz}$           |      | 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 $V_{ds}=3V$ , $I_{ds}=1.0\text{mA}$                                                          |      | -1.0         | -2.5 | V                  |
| $BV_{gd}$ | Drain Breakdown Voltage $I_{gd}=1.0\text{mA}$                                                                  | -11  | -15          |      | V                  |
| $BV_{gs}$ | Source Breakdown Voltage $I_{gs}=1.0\text{mA}$                                                                 | -7   | -14          |      | V                  |
| $R_{th}$  | Thermal Resistance (Au-Sn Eutectic Attach)                                                                     |      | 125          |      | $^\circ\text{C/W}$ |

MAXIMUM RATINGS AT  $25^\circ\text{C}$ 

| SYMBOLS   | PARAMETERS              | ABSOLUTE <sup>1</sup>   | CONTINUOUS <sup>2</sup> |
|-----------|-------------------------|-------------------------|-------------------------|
| $V_{ds}$  | 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     | $175^\circ\text{C}$     | $150^\circ\text{C}$     |
| $T_{stg}$ | Storage Temperature     | $-65/175^\circ\text{C}$ | $-65/150^\circ\text{C}$ |
| $P_t$     | Total Power Dissipation | 1.1W                    | 900mW                   |

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

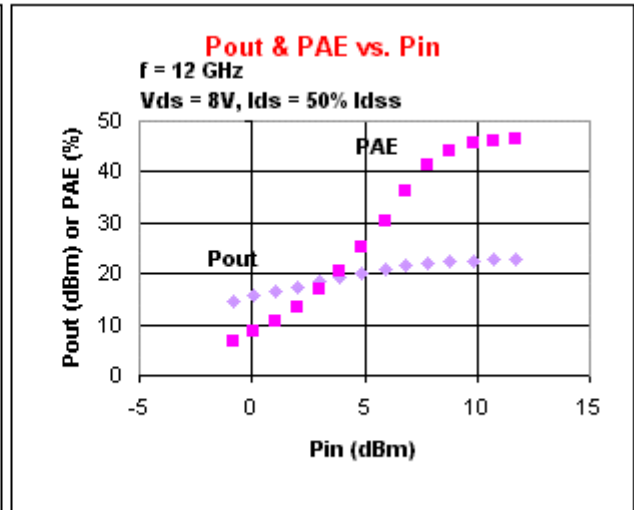
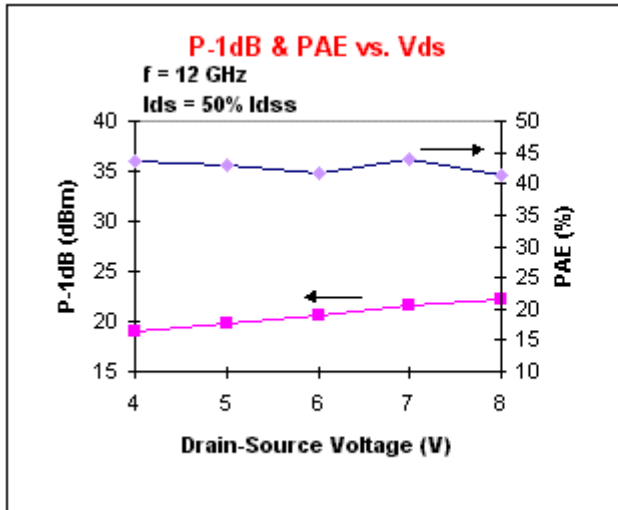
2. Exceeding any of the above ratings may reduce MTTF below design goals.



# EPA030C

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

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