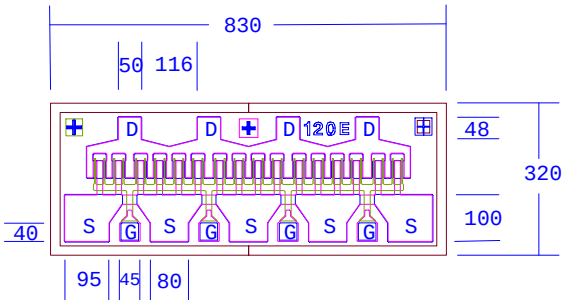
# Excelics EPA120E

## DATA SHEET
## High Efficiency Heterojunction Power FET

- **+29.5dBm TYPICAL OUTPUT POWER**
- **9.5dB TYPICAL POWER GAIN AT 18GHz**
- **0.3 X 1200 MICRON RECESSED "MUSHROOM" GATE**
- **$Si_3N_4$ PASSIVATION**
- **ADVANCED EPITAXIAL HETEROJUNCTION PROFILE PROVIDES EXTRA HIGH POWER EFFICIENCY, AND HIGH RELIABILITY**
- **Idss SORTED IN 30mA PER BIN RANGE**




Chip Thickness: 75 ± 13 microns
All Dimensions In Microns

## ELECTRICAL CHARACTERISTICS ($T_a$ = 25 °C)

| SYMBOLS | PARAMETERS/TEST CONDITIONS | | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|
| **$P_{1dB}$** | Output Power at 1dB Compression<br>Vds=8V, Ids=50% Idss | f=12GHz<br>f=18GHz | 28.0 | 29.5<br>29.5 | | dBm |
| **$G_{1dB}$** | Gain at 1dB Compression<br>Vds=8V, Ids=50% Idss | f=12GHz<br>f=18GHz | 10.0 | 12.0<br>9.5 | | dB |
| **PAE** | Power Added Efficiency at 1dB Compression<br>Vds=8V, Ids=50% Idss | f=12GHz | | 46 | | % |
| **Idss** | Saturated Drain Current Vds=3V, Vgs=0V | | 210 | 360 | 510 | mA |
| **Gm** | Transconductance Vds=3V, Vgs=0V | | 240 | 380 | | mS |
| **Vp** | Pinch-off Voltage Vds=3V, Ids=3.5mA | | | -1.0 | -2.5 | V |
| **BVgd** | Drain Breakdown Voltage Igd=1.2mA | | -12 | -15 | | V |
| **BVgs** | Source Breakdown Voltage Igs=1.2mA | | -7 | -14 | | V |
| **Rth** | Thermal Resistance (Au-Sn Eutectic Attach) | | | 35 | | °C/W |

## MAXIMUM RATINGS AT 25°C

| SYMBOLS | PARAMETERS | ABSOLUTE[1] | CONTINUOUS[2] |
|---|---|---|---|
| **Vds** | Drain-Source Voltage | 12V | 8V |
| **Vgs** | Gate-Source Voltage | -8V | -3V |
| **Ids** | Drain Current | Idss | 405mA |
| **Igsf** | Forward Gate Current | 60mA | 10mA |
| **Pin** | Input Power | 27dBm | @3dB Compression |
| **Tch** | Channel Temperature | 175°C | 150°C |
| **Tstg** | Storage Temperature | -65/175°C | -65/150°C |
| **Pt** | Total Power Dissipation | 3.9W | 3.2W |

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.

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# EPA120E

## DATA SHEET

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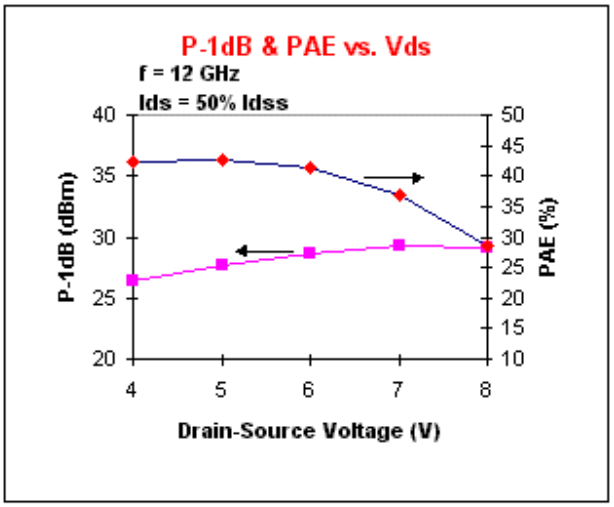


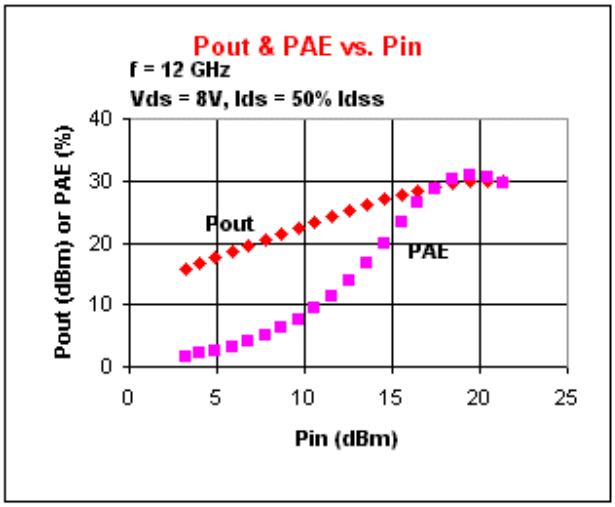


## S-PARAMETERS

### 8V, 1/2 Idss

| FREQ | --- S11 --- | | --- S21 --- | | --- S12 --- | | --- S22 --- | |
|---|---|---|---|---|---|---|---|---|
| (GHz) | MAG | ANG | MAG | ANG | MAG | ANG | MAG | ANG |
| 1.0 | 0.898 | -97.8 | 14.488 | 124.9 | 0.034 | 39.3 | 0.300 | -95.1 |
| 2.0 | 0.885 | -134.7 | 8.805 | 103.0 | 0.041 | 22.6 | 0.313 | -125.6 |
| 3.0 | 0.882 | -150.7 | 6.129 | 90.7 | 0.042 | 16.0 | 0.322 | -135.8 |
| 4.0 | 0.887 | -159.7 | 4.668 | 81.9 | 0.042 | 10.9 | 0.338 | -140.7 |
| 5.0 | 0.896 | -165.0 | 3.747 | 74.9 | 0.042 | 9.3 | 0.349 | -143.7 |
| 6.0 | 0.898 | -168.8 | 3.128 | 68.6 | 0.040 | 8.5 | 0.366 | -145.2 |
| 7.0 | 0.901 | -171.8 | 2.674 | 62.8 | 0.040 | 7.3 | 0.390 | -146.7 |
| 8.0 | 0.904 | -174.2 | 2.329 | 57.5 | 0.039 | 6.7 | 0.411 | -148.1 |
| 9.0 | 0.908 | -176.0 | 2.057 | 52.2 | 0.037 | 5.3 | 0.433 | -150.2 |
| 10.0 | 0.912 | -177.2 | 1.842 | 47.7 | 0.037 | 5.6 | 0.458 | -152.2 |
| 11.0 | 0.916 | -178.7 | 1.657 | 42.9 | 0.035 | 5.4 | 0.483 | -154.7 |
| 12.0 | 0.917 | -179.9 | 1.501 | 38.2 | 0.035 | 6.4 | 0.511 | -157.7 |
| 13.0 | 0.920 | 178.8 | 1.370 | 33.5 | 0.033 | 6.8 | 0.538 | -160.3 |
| 14.0 | 0.922 | 177.5 | 1.256 | 28.9 | 0.033 | 6.5 | 0.564 | -163.1 |
| 15.0 | 0.927 | 175.6 | 1.163 | 24.2 | 0.033 | 4.8 | 0.590 | -165.9 |
| 16.0 | 0.927 | 173.8 | 1.077 | 19.4 | 0.033 | 5.8 | 0.616 | -168.7 |
| 17.0 | 0.929 | 171.4 | 0.998 | 14.4 | 0.033 | 3.9 | 0.638 | -171.4 |
| 18.0 | 0.934 | 169.1 | 0.934 | 9.9 | 0.034 | 6.0 | 0.658 | -173.5 |
| 19.0 | 0.934 | 166.8 | 0.880 | 5.2 | 0.034 | 5.7 | 0.675 | -176.4 |
| 20.0 | 0.936 | 164.2 | 0.827 | 0.5 | 0.035 | 4.2 | 0.692 | -178.4 |
| 21.0 | 0.938 | 162.3 | 0.751 | -2.6 | 0.036 | 7.9 | 0.725 | 179.6 |
| 22.0 | 0.938 | 161.2 | 0.701 | -6.4 | 0.036 | 6.4 | 0.743 | 177.5 |
| 23.0 | 0.939 | 160.1 | 0.659 | -10.5 | 0.037 | 7.6 | 0.758 | 175.3 |
| 24.0 | 0.939 | 159.3 | 0.622 | -14.1 | 0.039 | 10.6 | 0.769 | 173.4 |
| 25.0 | 0.948 | 158.8 | 0.592 | -18.1 | 0.040 | 12.3 | 0.776 | 170.9 |
| 26.0 | 0.946 | 158.7 | 0.559 | -21.2 | 0.041 | 12.6 | 0.783 | 168.3 |
| 27.0 | 0.945 | 158.5 | 0.535 | -24.4 | 0.044 | 15.2 | 0.790 | 166.0 |
| 28.0 | 0.946 | 158.0 | 0.513 | -27.1 | 0.046 | 16.3 | 0.791 | 164.0 |
| 29.0 | 0.958 | 157.6 | 0.493 | -30.1 | 0.049 | 16.5 | 0.790 | 161.3 |
| 30.0 | 0.948 | 156.9 | 0.472 | -33.6 | 0.050 | 11.6 | 0.799 | 158.5 |
| 31.0 | 0.961 | 155.8 | 0.451 | -36.8 | 0.051 | 12.6 | 0.802 | 156.0 |
| 32.0 | 0.955 | 154.5 | 0.430 | -40.1 | 0.049 | 10.4 | 0.813 | 152.9 |
| 33.0 | 0.951 | 153.2 | 0.405 | -42.9 | 0.048 | 13.5 | 0.824 | 150.1 |
| 34.0 | 0.959 | 151.2 | 0.388 | -46.3 | 0.048 | 11.3 | 0.836 | 147.6 |
| 35.0 | 0.963 | 148.9 | 0.369 | -49.0 | 0.048 | 13.2 | 0.856 | 144.8 |
| 36.0 | 0.967 | 147.5 | 0.348 | -51.4 | 0.050 | 9.7 | 0.875 | 141.4 |
| 37.0 | 0.978 | 145.4 | 0.338 | -54.7 | 0.052 | 7.8 | 0.891 | 138.2 |
| 38.0 | 0.993 | 143.3 | 0.325 | -58.0 | 0.055 | 0.1 | 0.891 | 134.7 |
| 39.0 | 1.005 | 139.3 | 0.320 | -64.0 | 0.057 | -12.6 | 0.883 | 131.9 |
| 40.0 | 0.994 | 137.0 | 0.312 | -67.9 | 0.058 | -21.3 | 0.876 | 130.0 |

Note: The data included 0.7 mils diameter Au bonding wires:
4 gate wires, 15 mils each; 4 drain wires, 20 mils each; 10 source wires, 7 mils each.