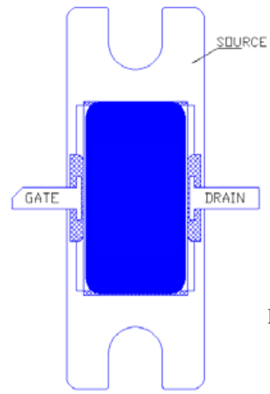
- PERFORMANCE (1.8 GHz)
  - 40 dBm Output Power ($P_{1dB}$)
  - 11 dB Power Gain ($G_{1dB}$)
  - -44 dBc WCDMA ACPR at 30 dBm output power
  - 180 to 300 mA typical quiescent current ($I_{DQ}$)
  - 55% Power-Added Efficiency
  - Evaluation Boards Available
  - Additional Design Data Available on Website
  - Usable Gain to 3.8GHz




**SEE PACKAGE OUTLINE FOR MARKING CODE**

- DESCRIPTION AND APPLICATIONS

The FPD10000AF is a packaged depletion mode AlGaAs/InGaAs pseudomorphic High Electron Mobility Transistor (pHEMT), optimized for power applications in L-Band. The high power flange-mount package has been optimized for low electrical parasitics and optimal heatsinking.

Typical applications include drivers or output stages in PCS/Cellular base station transmitter amplifiers, as well as other power applications in WLL/WLAN amplifiers.

- ELECTRICAL SPECIFICATIONS AT 22°C

| Parameter | Symbol | Test Conditions | Min | Typ | Max | Units |
|---|---|---|---|---|---|---|
| **RF SPECIFICATIONS MEASURED AT *f* = 1.8 GHz USING CW SIGNAL** | | | | | | |
| Power at 1dB Gain Compression<br>Class B Operation | $P_{1dB}$ | $V_{DS}$ = 12V; $I_{DQ}$ = 180 mA | | 40 | | dBm |
| Power Gain at dB Gain Compression | $G_{1dB}$ | $V_{DS}$ = 12V; $I_{DQ}$ = 180 mA<br>$V_{DS}$ = 12V; $I_{DQ}$ = 300 mA | | 10<br>11 | | dB |
| Maximum Stable Gain: $S_{21}/S_{12}$<br>$P_{IN}$ = 0dBm, 50Ω system | MSG | $V_{DS}$ = 12 V; $I_{DQ}$ = 180 mA<br>$V_{DS}$ = 12 V; $I_{DQ}$ = 300 mA | | 16.5<br>18.0 | | dB |
| Power-Added Efficiency<br>at 1dB Gain Compression | PAE | $V_{DS}$ = 12V; $I_{DQ}$ = 180 mA<br>$I_{RF}$ (drive-up current) ~ 1.5A | | 55 | | % |
| Adjacent Channel Power Ratio<br>WCDMA BTS Forward (64 channels)<br>10.15 dB Pk/Avg 0.001% | ACPR | $V_{DS}$ = 12V; $I_{DQ}$ = 180 mA<br>Channel power = 30 dBm | | -44 | | dBc |
| Saturated Drain-Source Current | $I_{DSS}$ | $V_{DS}$ = 3.0 V; $V_{GS}$ = 0 V | | 5.2 | | A |
| Gate-Source Leakage Current | $I_{GSO}$ | $V_{GS}$ = -3 V | | 3 | | mA |
| Pinch-Off Voltage | $\|V_P\|$ | $V_{DS}$ = 3.0 V; $I_{DS}$ = 19 mA | | 1.1 | | V |
| Gate-Drain Breakdown Voltage | $\|V_{BDGD}\|$ | $I_{GD}$ = 19 mA | 30 | 35 | | V |
| Thermal Resistivity (channel-to-case) | $\Theta_{CC}$ | See Note on following page | | 3.5 | | °C/W |

- RECOMMENDED OPERATING BIAS CONDITIONS

  Drain-Source Voltage: From 10 to 12V
  Quiescent Current: From 180 (Class B) to 300 mA (Class AB) operation

- ABSOLUTE MAXIMUM RATINGS[1]

| Parameter | Symbol | Test Conditions | Min | Max | Units |
|---|---|---|---|---|---|
| Drain-Source Voltage | $V_{DS}$ | $-3V < V_{GS} < +0V$ | | 16 | V |
| Gate-Source Voltage | $V_{GS}$ | $0V < V_{DS} < +15V$ | | -3 | V |
| Drain-Source Current | $I_{DS}$ | For $V_{DS} > 2V$ | | 50% $I_{DSS}$ | mA |
| Gate Current | $I_G$ | Forward / Reverse current | | +50/-8 | mA |
| RF Input Power[2] | $P_{IN}$ | Under any acceptable bias state | | 1.75 | W |
| Channel Operating Temperature | $T_{CH}$ | Under any acceptable bias state | | 175 | ºC |
| Storage Temperature | $T_{STG}$ | Non-Operating Storage | -40 | 150 | ºC |
| Total Power Dissipation | $P_{TOT}$ | See De-Rating Note below | | 42 | W |
| Gain Compression | Comp. | Under any bias conditions | | 5 | dB |
| Simultaneous Combination of Limits[3] | | 2 or more Max. Limits | | 80 | % |

[1]$T_{Ambient}$ = 22°C unless otherwise noted [2]Max. RF Input Limit must be further limited if input VSWR > 2.5:1
[3]Users should avoid exceeding 80% of 2 or more Limits simultaneously

**Notes**:

- Operating conditions that exceed the Absolute Maximum Ratings will result in permanent damage to the device.
- Total Power Dissipation defined as: $P_{TOT} \equiv (P_{DC} + P_{IN}) - P_{OUT}$, where:

  $P_{DC}$: DC Bias Power
  $P_{IN}$: RF Input Power
  $P_{OUT}$: RF Output Power
- Total Power Dissipation to be de-rated as follows above 22°C:

  $P_{TOT}$= 42 - (0.286W/°C) x $T_{PACK}$
  where $T_{PACK}$ = *source tab lead temperature above 22°C*
  (coefficient of de-rating formula is the Thermal Conductivity)

Example: For a 55°C Source flange temperature: $P_{TOT}$ = 42 - (0.286 x (55 – 22)) = 32.6W

- *Note on Thermal Resistivity:* The nominal value of 3.5°C/W is measured with the package mounted on a large heatsink with thermal compound to ensure adequate contact. The package temperature is referred to the Source flange.

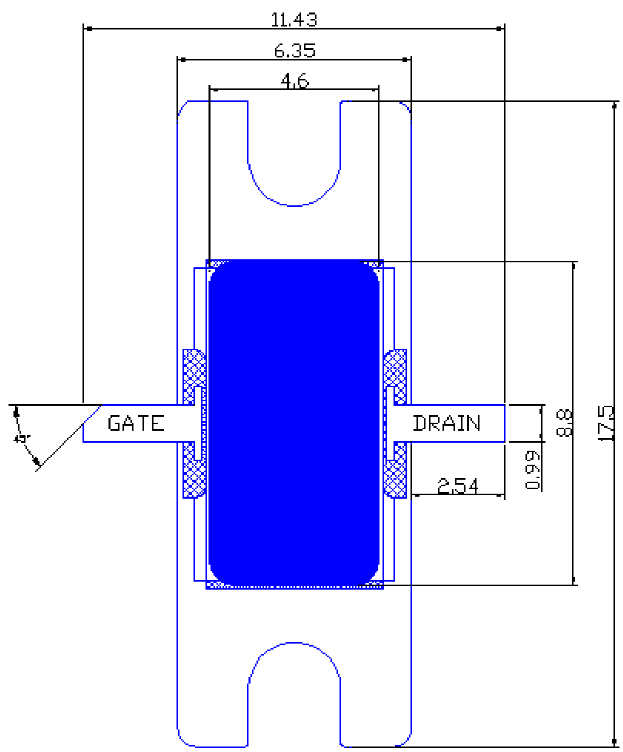
- HANDLING PRECAUTIONS

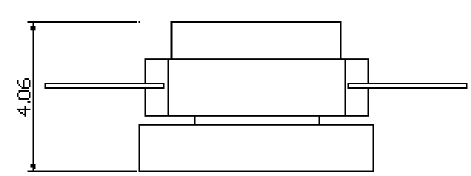
  To avoid damage to the devices care should be exercised during handling. Proper Electrostatic Discharge (ESD) precautions should be observed at all stages of storage, handling, assembly, and testing. These devices should be treated as Class 1A per ESD-STM5.1-1998, Human Body Model. Further information on ESD control measures can be found in MIL-STD-1686 and MIL-HDBK-263.

- BIASING GUIDELINES

  - Dual-bias (separate positive Drain and negative Gate supplies) circuits are recommended, requiring a regulated negative voltage supply for depletion-mode devices such as the FPD10000AF. The Gate bias supply should be capable of sinking / sourcing at least 10mA of current. The bias circuitry must be properly sequenced to ensure that the control Gate voltage (typically -0.6 to -1.0V) is applied to the device *before* the Drain voltage, otherwise large amounts of Drain-Source current will be drawn, potentially leading to instability and self-oscillation.
  - The recommended 180 – 300 mA bias point is nominally a Class B/AB mode. A small amount of RF gain expansion prior to the onset of compression is normal for this operating point, and significant current drive-up should be expected. If a Class A operation is desired, users should check the de-rating limits given in the previous section to ensure reliable operation.

- PACKAGE OUTLINE
  (dimensions in millimeters – mm)




**PACKAGE MARKING CODE**

**Example:**

***f*1ZD**
**P3F**

***f* = Filtronic**
**1ZD = Lot and Date Code**
**P2F = Status, Part Code, Part Type**
**Status: D=Development P = Production**
**Part Code denotes model (e.g. FPD10000AF)**
**Part Type: F = FET (pHEMT)**