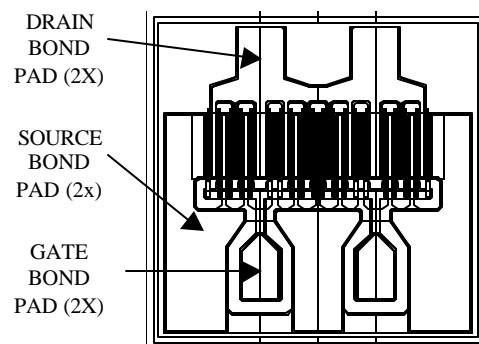


## • FEATURES

- ◆ 31.5 dBm Output Power at 1-dB Compression at 18 GHz
- ◆ 8 dB Power Gain at 18 GHz
- ◆ 28 dBm Output Power at 1-dB Compression at 3.3V
- ◆ 45dBm Output IP3 at 18GHz
- ◆ 50% Power-Added Efficiency



DIE SIZE: 16.5X16.1 mils (420x410  $\mu\text{m}$ )  
DIE THICKNESS: 3 mils (75  $\mu\text{m}$ )  
BONDING PADS: 1.9X2.4 mils (50x60  $\mu\text{m}$ )

## • DESCRIPTION AND APPLICATIONS

The LP1500 is an Aluminum Gallium Arsenide / Indium Gallium Arsenide (AlGaAs/InGaAs) Pseudomorphic High Electron Mobility Transistor (PHEMT), utilizing an Electron-Beam direct-write 0.25  $\mu\text{m}$  by 1500  $\mu\text{m}$  Schottky barrier gate. The recessed “mushroom” gate structure minimizes parasitic gate-source and gate resistances. The epitaxial structure and processing have been optimized for reliable high-power applications. The LP1500 also features  $\text{Si}_3\text{N}_4$  passivation and is available in a P100 flanged ceramic package and in the low cost plastic SOT89 package.

Typical applications include commercial and other narrowband and broadband high-performance amplifiers, including SATCOM uplink transmitters, PCS/Cellular low-voltage high-efficiency output amplifiers, and medium-haul digital radio transmitters.

## • ELECTRICAL SPECIFICATIONS @ $T_{\text{Ambient}} = 25^\circ\text{C}$

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Saturated Drain-Source Current	$I_{\text{DSS}}$	$V_{\text{DS}} = 2 \text{ V}; V_{\text{GS}} = 0 \text{ V}$	375	490	600	mA
Power at 1-dB Compression	P-1dB	$V_{\text{DS}} = 8 \text{ V}; I_{\text{DS}} = 50\% I_{\text{DSS}}$	30	31.5		dBm
Power Gain at 1-dB Compression	G-1dB	$V_{\text{DS}} = 8 \text{ V}; I_{\text{DS}} = 50\% I_{\text{DSS}}$	6	8		dB
Output Third Intercept Point	IP3	$V_{\text{DS}} = 8 \text{ V}; I_{\text{DS}} = 50\% I_{\text{DSS}}$		45		dBm
Power-Added Efficiency	PAE	$V_{\text{DS}} = 8 \text{ V}; I_{\text{DS}} = 50\% I_{\text{DSS}}$		50		%
Maximum Drain-Source Current	$I_{\text{MAX}}$	$V_{\text{DS}} = 2 \text{ V}; V_{\text{GS}} = 1 \text{ V}$		925		mA
Transconductance	$G_{\text{M}}$	$V_{\text{DS}} = 2 \text{ V}; V_{\text{GS}} = 0 \text{ V}$	385	450		mS
Gate-Source Leakage Current	$I_{\text{GSO}}$	$V_{\text{GS}} = -5 \text{ V}$		10	75	$\mu\text{A}$
Pinch-Off Voltage	$V_{\text{P}}$	$V_{\text{DS}} = 2 \text{ V}; I_{\text{DS}} = 5 \text{ mA}$	-0.25	-1.2	-2.0	V
Gate-Source Breakdown Voltage Magnitude	$ V_{\text{BDGS}} $	$I_{\text{GS}} = 8 \text{ mA}$	-12	-15		V
Gate-Drain Breakdown Voltage Magnitude	$ V_{\text{BDGD}} $	$I_{\text{GD}} = 8 \text{ mA}$	-12	-16		V
Thermal Resistivity	$\Theta_{\text{JC}}$			45		$^\circ\text{C/W}$

frequency=18 GHz

## • ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Test Conditions	Min	Max	Units
Drain-Source Voltage	$V_{DS}$	$T_{Ambient} = 22 \pm 3 \text{ }^{\circ}\text{C}$		12	V
Gate-Source Voltage	$V_{GS}$	$T_{Ambient} = 22 \pm 3 \text{ }^{\circ}\text{C}$		-5	V
Drain-Source Current	$I_{DS}$	$T_{Ambient} = 22 \pm 3 \text{ }^{\circ}\text{C}$		$2 \times I_{DSS}$	mA
Gate Current	$I_G$	$T_{Ambient} = 22 \pm 3 \text{ }^{\circ}\text{C}$		15	mA
RF Input Power	$P_{IN}$	$T_{Ambient} = 22 \pm 3 \text{ }^{\circ}\text{C}$		750	mW
Channel Operating Temperature	$T_{CH}$	$T_{Ambient} = 22 \pm 3 \text{ }^{\circ}\text{C}$		175	$^{\circ}\text{C}$
Storage Temperature	$T_{STG}$	—	-65	175	$^{\circ}\text{C}$
Total Power Dissipation	$P_{TOT}$	$T_{Ambient} = 22 \pm 3 \text{ }^{\circ}\text{C}$		3.33	W

### Notes:

- Operating conditions that exceed the Absolute Maximum Ratings could result in permanent damage to the device.
- 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
- Absolute Maximum Power Dissipation to be de-rated as follows above  $25^{\circ}\text{C}$ :  
 $P_{TOT} = 3.33\text{W} - (0.022\text{W}/^{\circ}\text{C}) \times T_{HS}$   
where  $T_{HS}$  = heatsink or ambient temperature.

## • 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 (0-500 V). Further information on ESD control measures can be found in MIL-STD-1686 and MIL-HDBK-263.

## • ASSEMBLY INSTRUCTIONS

The recommended die attach is gold/tin eutectic solder under a nitrogen atmosphere. Stage temperature should be  $280\text{-}290^{\circ}\text{C}$ ; maximum time at temperature is one minute. The recommended wire bond method is thermo-compression wedge bonding with 0.7 or 1.0 mil (0.018 or 0.025 mm) gold wire. Stage temperature should be  $250\text{-}260^{\circ}\text{C}$ .

## • APPLICATIONS NOTES & DESIGN DATA

Applications Notes are available from your local Filtronic Sales Representative or directly from the factory. Complete design data, including S-parameters, noise data, and large-signal models are available on the Filtronic web site.