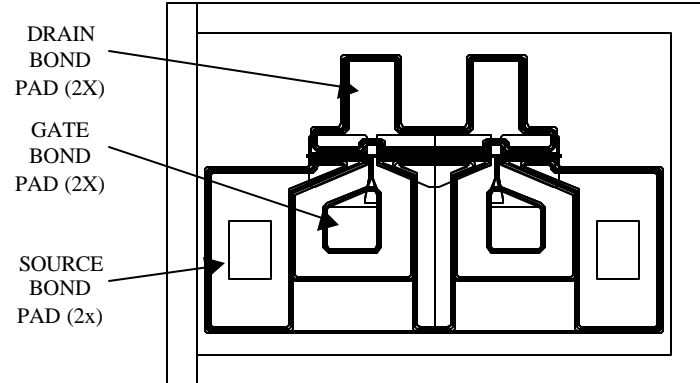


## FEATURES

- ◆ 0.6 dB Noise Figure at 12 GHz
- ◆ 12 dB Associated Gain at 12 GHz
- ◆ Low DC Power Consumption
- ◆ Excellent Phase Noise



DIE SIZE: 18.0X13.0 mils (460x330  $\mu\text{m}$ )  
 DIE THICKNESS: 3.9 mils (100  $\mu\text{m}$ )  
 BONDING PADS: 1.9X1.9 mils (50x50  $\mu\text{m}$ )

## DESCRIPTION AND APPLICATIONS

The LP7512 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 200  $\mu\text{m}$  Schottky barrier gate. The recessed “mushroom” gate structure minimizes parasitic gate-source and gate resistances. The epitaxial structure and processing have been optimized for ultra low noise and usable gain to 40 GHz. The LP7512 also features  $\text{Si}_3\text{N}_4$  passivation and is available in a variety of packages.

Typical applications include low noise receiver preamplifiers for commercial applications including wireless systems and radio link systems.

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

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Saturated Drain-Source Current	$I_{\text{DSS}}$	$V_{\text{DS}} = 2 \text{ V}; V_{\text{GS}} = 0 \text{ V}$	15	35	50	mA
Noise Figure	NF	$V_{\text{DS}} = 2 \text{ V}; I_{\text{DS}} = 25\% I_{\text{DSS}}; f=12 \text{ GHz}$ $f=18 \text{ GHz}$		0.6	0.9	dB
				1.0	1.4	dB
Associated Gain at minimum NF	$G_{\text{A}}$	$V_{\text{DS}} = 2 \text{ V}; I_{\text{DS}} = 25\% I_{\text{DSS}}; f=12 \text{ GHz}$ $f=18 \text{ GHz}$	9	10		dB
			7.5	8.5		dB
Transconductance	$G_{\text{M}}$	$V_{\text{DS}} = 2 \text{ V}; V_{\text{GS}} = 0 \text{ V}$	60	90		mS
Gate-Source Leakage Current	$I_{\text{GSO}}$	$V_{\text{GS}} = -3 \text{ V}$		1	10	$\mu\text{A}$
Gate-Drain Leakage Current	$I_{\text{GDO}}$	$V_{\text{GD}} = -3 \text{ V}$		1	10	$\mu\text{A}$
Pinch-Off Voltage	$V_{\text{P}}$	$V_{\text{DS}} = 2 \text{ V}; I_{\text{DS}} = 1 \text{ mA}$	-0.25	-0.8	-1.5	V
Thermal Resistivity	$\Theta_{\text{JC}}$			325		$^\circ\text{C/W}$

frequency=18 GHz

- **ABSOLUTE MAXIMUM RATINGS**

Parameter	Symbol	Test Conditions	Min	Max	Units
Drain-Source Voltage	$V_{DS}$	$T_{Ambient} = 22 \pm 3 \text{ }^{\circ}\text{C}$		4	V
Gate-Source Voltage	$V_{GS}$	$T_{Ambient} = 22 \pm 3 \text{ }^{\circ}\text{C}$		-2	V
Drain-Source Current	$I_{DS}$	$T_{Ambient} = 22 \pm 3 \text{ }^{\circ}\text{C}$		$I_{DSS}$	mA
Gate Current	$I_G$	$T_{Ambient} = 22 \pm 3 \text{ }^{\circ}\text{C}$		5	mA
RF Input Power	$P_{IN}$	$T_{Ambient} = 22 \pm 3 \text{ }^{\circ}\text{C}$		50	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	$P_{TOT}$	$T_{Ambient} = 22 \pm 3 \text{ }^{\circ}\text{C}$		460	mW

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 $^{\circ}\text{C}$ :  
 $P_{TOT} = 460\text{mW} - (3.1\text{mW}/^{\circ}\text{C}) \times T_{HS}$   
 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 280-290 $^{\circ}\text{C}$ ; 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 250-260 $^{\circ}\text{C}$ .

- **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.

All information and specifications are subject to change without notice.