

# FHX76LP

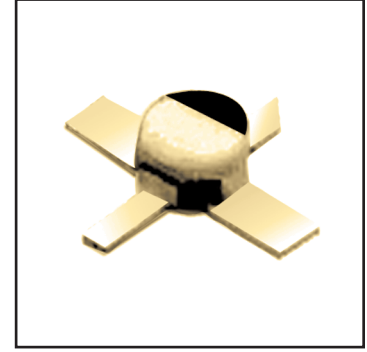
## Super Low Noise HEMT

### FEATURES

- Low Noise Figure: NF=0.40dB (Typ.)@f=12GHz
- High Associated Gain: Gas=13.5dB (Typ.)@f=12GHz
- High Reliability
- Small Size SMT Package
- Tape and Reel Packaging Available

### DESCRIPTION

The FHX76LP is a low noise SuperHEMT™ product designed for DBS applications. This device uses a small ceramic package that is optimized for high volume cost driven requirements.



Eudyna's stringent Quality Assurance Program assures the highest reliability and consistent performance.

### ABSOLUTE MAXIMUM RATINGS (Ambient Temperature Ta = 25°C)

| Parameter               | Symbol           | Condition | Rating     | Unit |
|-------------------------|------------------|-----------|------------|------|
| Drain-Source Voltage    | V <sub>DS</sub>  |           | 3.5        | V    |
| Gate-Source Voltage     | V <sub>GS</sub>  |           | -3.0       | V    |
| Total Power Dissipation | P <sub>t</sub>   | Note      | 180        | mW   |
| Storage Temperature     | T <sub>STG</sub> |           | -65 to 150 | °C   |
| Channel Temperature     | T <sub>CH</sub>  |           | 150        | °C   |

**Note:** Mounted on Al<sub>2</sub>O<sub>3</sub> board (30 x 30 x 0.65mm)

Eudyna recommends the following conditions for the reliable operation of GaAs FETs:

1. The drain-source operating voltage (V<sub>DS</sub>) should not exceed 2 volts.
2. The forward and reverse gate currents should not exceed 0.2 and -0.05 mA respectively with gate resistance of 4000Ω.
3. The operating channel temperature (T<sub>ch</sub>) should not exceed 80°C.

### ELECTRICAL CHARACTERISTICS (Ambient Temperature Ta=25°C)

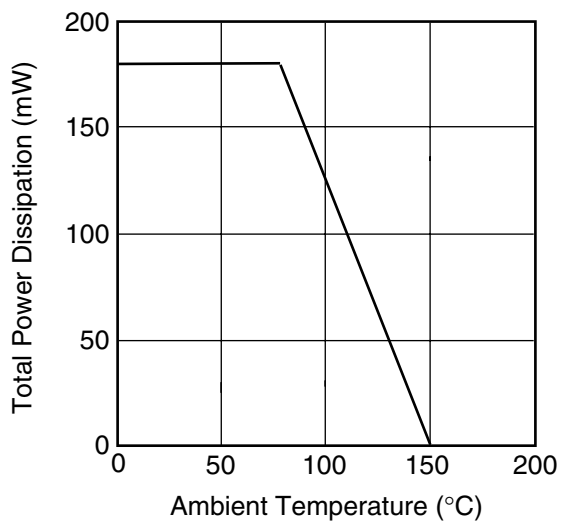
| Item                          | Symbol           | Conditions                                                  | Limits |      |      | Unit |
|-------------------------------|------------------|-------------------------------------------------------------|--------|------|------|------|
|                               |                  |                                                             | Min.   | Typ. | Max. |      |
| Saturated Drain Current       | I <sub>DSS</sub> | V <sub>DS</sub> = 2V, V <sub>GS</sub> =0V                   | 10     | 30   | 60   | mA   |
| Transconductance              | gm               | V <sub>DS</sub> = 2V, I <sub>DS</sub> =10mA                 | 35     | 50   | -    | mS   |
| Pinch-Off Voltage             | V <sub>p</sub>   | V <sub>DS</sub> = 2V, I <sub>DS</sub> =1mA                  | -0.1   | -0.7 | -1.5 | V    |
| Gate-Source Breakdown Voltage | V <sub>GSO</sub> | I <sub>GS</sub> = -10μA                                     | -3.0   | -    | -    | V    |
| Noise Figure                  | NF               | V <sub>DS</sub> = 2V,<br>I <sub>DS</sub> = 10mA,<br>f=12GHz | -      | 0.40 | 0.50 | dB   |
| Associated Gain               | Gas              |                                                             | 12.0   | 13.5 | -    | dB   |
| Thermal Resistance            | R <sub>th</sub>  | Channel to Case                                             | -      | 300  | 400  | °C/W |

### CASE STYLES: LP

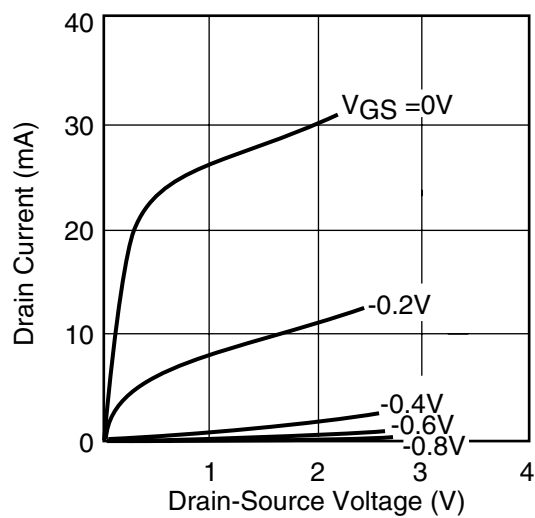
**Note:** RF parameters for LP devices are measured on a sample basis as follows:

| Lot qty.      | Sample qty. | Accept/Reject |
|---------------|-------------|---------------|
| 1200 or less  | 125         | (0,1)         |
| 1201 to 3200  | 200         | (0,1)         |
| 3201 to 10000 | 315         | (1,2)         |
| 10001 or over | 500         | (1,2)         |

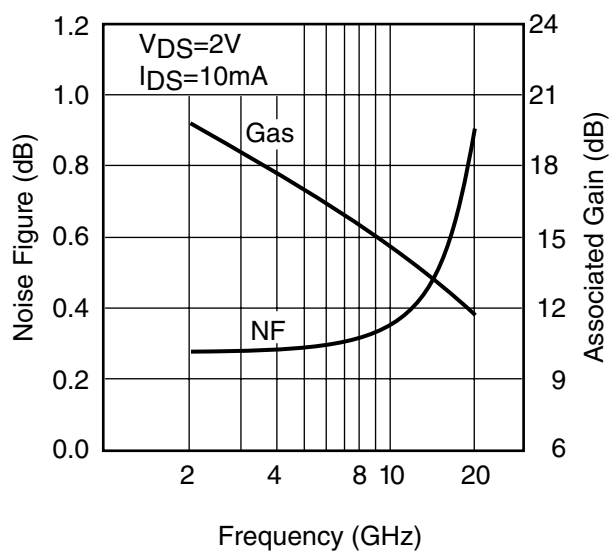
**POWER DERATING CURVE**



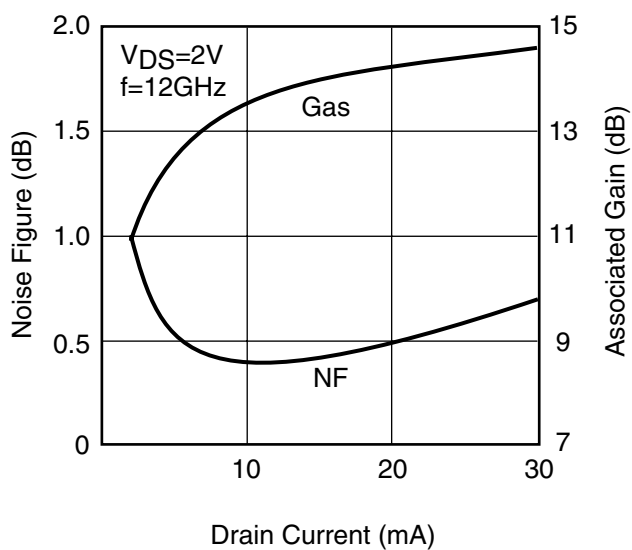
**DRAIN CURRENT vs. DRAIN-SOURCE VOLTAGE**



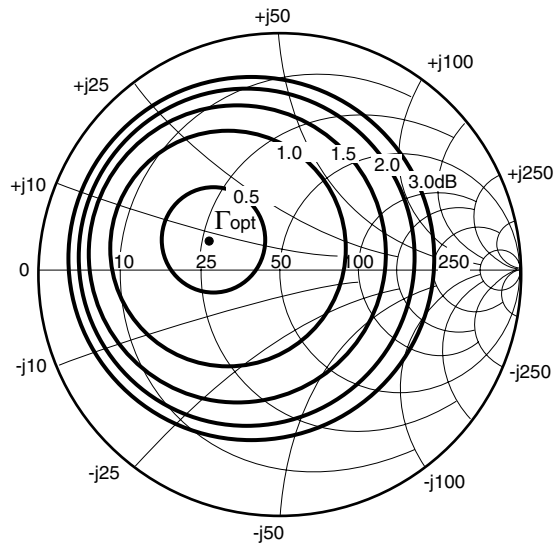
**NF & Gas vs. FREQUENCY**



**NF & Gas vs.  $I_{DS}$**



## TYPICAL NOISE FIGURE CIRCLE



$f=12\text{GHz}$   
 $V_{DS}=2\text{V}$   
 $I_{DS}=10\text{mA}$

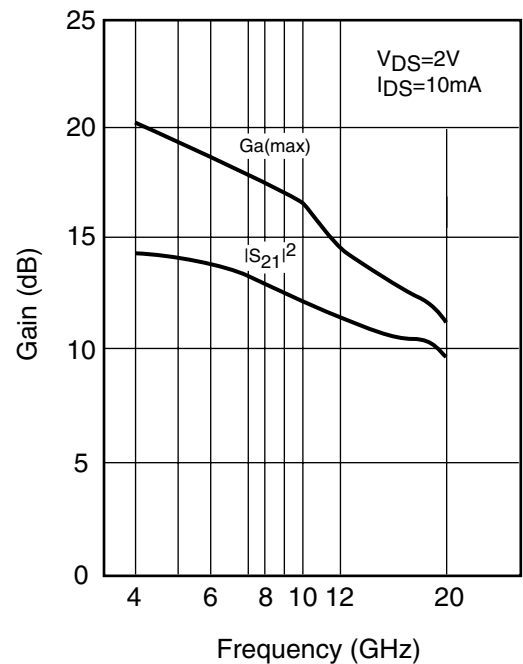
$\Gamma_{opt}=0.32\angle 153.8^\circ$   
 $R_n/50=0.06$   
 $NF_{min}=0.40\text{dB}$

## NOISE PARAMETERS

$V_{DS}=2\text{V}, I_{DS}=10\text{mA}$

| Freq.<br>(GHz) | $\Gamma_{opt}$ |        | NFmin<br>(dB) | Rn/50 |
|----------------|----------------|--------|---------------|-------|
|                | (MAG)          | (ANG)  |               |       |
| 2              | 0.79           | 12.5   | 0.28          | .24   |
| 4              | 0.62           | 30.0   | 0.29          | .20   |
| 6              | 0.50           | 54.1   | 0.30          | .16   |
| 8              | 0.41           | 83.6   | 0.32          | .12   |
| 10             | 0.35           | 117.3  | 0.35          | .08   |
| 12             | 0.32           | 153.8  | 0.40          | .06   |
| 14             | 0.30           | -168.0 | 0.48          | .06   |
| 16             | 0.29           | -129.5 | 0.60          | .09   |
| 18             | 0.29           | -91.8  | 0.72          | .14   |
| 20             | 0.29           | -56.3  | 0.91          | .19   |

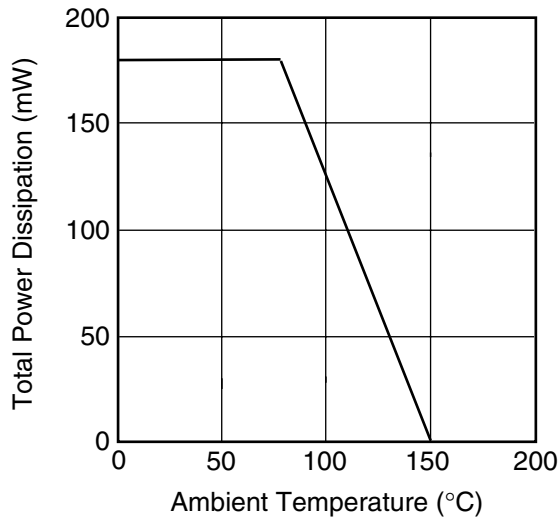
## Ga(max) AND $|S_{21}|$ vs. FREQUENCY



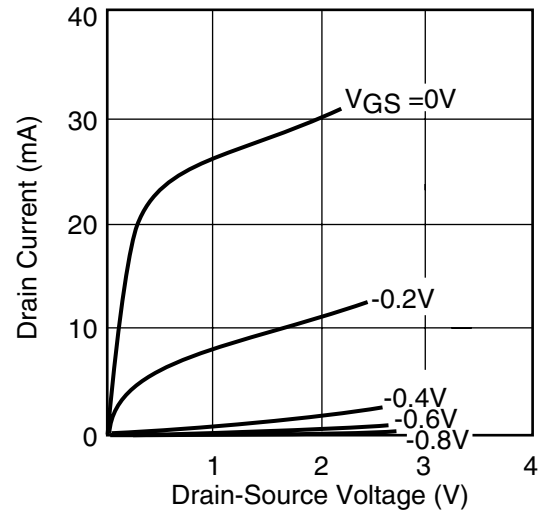
# FHX76LP

## Super Low Noise HEMT

**POWER DERATING CURVE**



**DRAIN CURRENT vs. DRAIN-SOURCE VOLTAGE**



### S-PARAMETERS

$V_{DS} = 2V, I_{DS} = 10mA$

| FREQUENCY<br>(MHZ) | S11  |        | S21   |       | S12  |       | S22  |        |
|--------------------|------|--------|-------|-------|------|-------|------|--------|
|                    | MAG  | ANG    | MAG   | ANG   | MAG  | ANG   | MAG  | ANG    |
| 1000               | .987 | -14.8  | 5.535 | 164.2 | .014 | 80.2  | .585 | -11.4  |
| 2000               | .965 | -29.4  | 5.463 | 148.8 | .027 | 70.2  | .567 | -22.9  |
| 3000               | .925 | -44.6  | 5.334 | 133.2 | .041 | 57.7  | .538 | -34.7  |
| 4000               | .878 | -58.3  | 5.154 | 118.8 | .049 | 50.0  | .511 | -45.2  |
| 5000               | .828 | -72.9  | 5.019 | 104.3 | .059 | 40.6  | .480 | -56.4  |
| 6000               | .776 | -87.8  | 4.825 | 89.8  | .067 | 32.4  | .446 | -68.4  |
| 7000               | .719 | -102.8 | 4.606 | 75.6  | .075 | 23.2  | .413 | -80.6  |
| 8000               | .669 | -116.6 | 4.354 | 61.9  | .079 | 15.2  | .394 | -92.6  |
| 9000               | .631 | -129.4 | 4.130 | 49.5  | .083 | 6.3   | .374 | -102.4 |
| 10000              | .590 | -141.7 | 3.982 | 37.0  | .086 | .2    | .365 | -112.5 |
| 11000              | .548 | -155.3 | 3.849 | 24.7  | .088 | -7.6  | .335 | -121.9 |
| 12000              | .507 | -169.6 | 3.689 | 12.4  | .091 | -14.2 | .323 | -134.1 |
| 13000              | .482 | 177.0  | 3.545 | -.2   | .095 | -20.8 | .313 | -145.0 |
| 14000              | .459 | 164.7  | 3.425 | -11.9 | .096 | -28.7 | .315 | -155.9 |
| 15000              | .439 | 152.3  | 3.330 | -24.4 | .098 | -36.4 | .324 | -165.4 |
| 16000              | .419 | 138.7  | 3.264 | -37.1 | .102 | -44.1 | .322 | -174.3 |
| 17000              | .404 | 123.9  | 3.238 | -50.3 | .103 | -54.6 | .321 | 175.4  |
| 18000              | .383 | 107.3  | 3.176 | -63.5 | .108 | -63.4 | .316 | 165.3  |
| 19000              | .377 | 93.2   | 3.101 | -78.0 | .105 | -74.5 | .320 | 153.2  |
| 20000              | .348 | 76.5   | 3.028 | -92.3 | .110 | -87.6 | .301 | 146.1  |

NOTE:\* The data includes bonding wires.

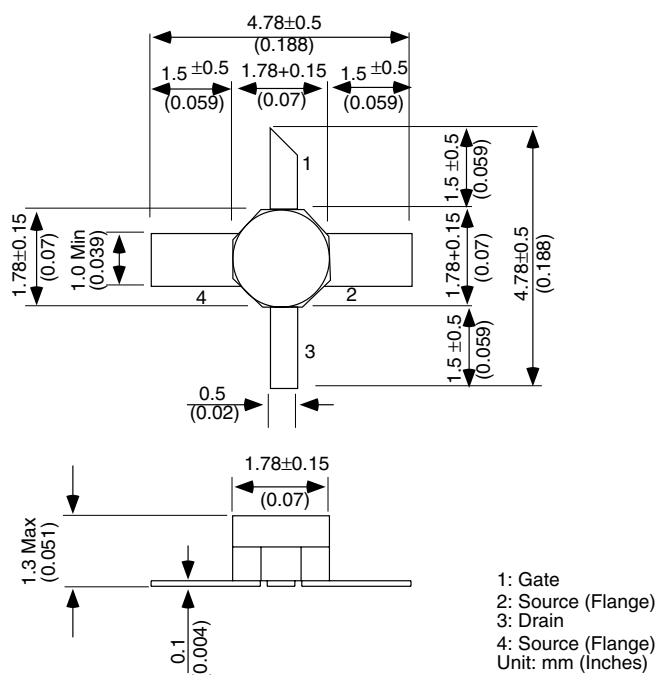
n: number of wires

Gate n=1 (0.1mm length, 25μm Dia Au wire)

Drain n=1 (0.1mm length, 25μm Dia Au wire)

Source n=4 (0.2mm length, 25μm Dia Au wire)

**Case Style "LP"**  
**Metal-Ceramic Package**



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