# MwT-LN300

## 26 GHz Super Low Noise pHEMT Device

### FEATURES

- **0.6 dB Minimum Noise Figure at 12 GHz**
- **10.0 dB Associated Gain at 12 GHz**
- **15.0 dBm P1dB at 12 GHz**
- **0.15 Micron x 300 Micron Gate**

### APPLICATIONS

- **Excellent Choice for Super Low Noise Applications**
- **Ideal for Commercial, Military, Hi-Rel Space Applications**

### DESCRIPTION

The MwT-LN300 is a super low noise, quasi-enhancement-mode pHEMT whose nominal 0.15 micron gate length and 300 micron gate width makes it ideally suited for applications requiring very low noise and high associated gain up to 30 GHz. The device is equally effective for wideband (e.g. 6 to 18 GHz) and narrow-band applications. Each wafer can be screened to meet the high quality and reliability requirements for space and military applications.

### RF SPECIFICATIONS AT Ta = 25 C

| SYMBOL | PARAMETERS & CONDITIONS | FREQ | UNITS | MIN | TYP | MAX |
|---|---|---|---|---|---|---|
| **NF min** | Minimum Noise Figure<br>Vds=2.5V Ids = 25 mA (Vgs=0) | 4 GHz<br>12 GHz | dB | | 0.2<br>0.6 | |
| **SSG** | Associated Gain<br>Vds=2.5V Ids = 25 mA (Vgs=0) | 4 GHz<br>12 GHz | dB | | 13.0<br>10.0 | |
| **P1dB** | Output Power at 1dB Compression<br>Vds=3.0V Ids = 50 mA | 12 GHz | dBm | | 16.0 | |

Note: MWT-LN300 is a quasi enhancement mode device. For best noise figure, Vgs bias voltage should be set at either 0 or slightly positive voltages to achieve the target operating current.

### DC SPECIFICATIONS AT Ta = 25 C

| SYMBOL | PARAMETERS & CONDITIONS | FREQ | UNITS | MIN | TYP | MAX |
|---|---|---|---|---|---|---|
| **Imax** | Saturated Drain Current<br>Vds = 2.5V Vgs = 0.6V | | mA | | 120 | |
| **Gm** | Transconductance<br>Vds = 2.5V Vgs = 0.2V | | mS | 160 | 200 | |
| **Vp** | Pinch-off Voltage<br>Vds = 2.0V Ids = 0.5mA | | V | | -0.2 | |
| **BVGSO** | Gate-to-Source Breakdown Voltage<br>Igs = -0.3mA | | V | -6.0 | -8.0 | |
| **BVGDO** | Gate-to-Drain Breakdown Voltage<br>Igd = -0.3mA | | V | -7.5 | -9.0 | |
| **Rth *** | Chip Thermal Resistance | | ºC/W | | 180 | |

* Overall Rth depends on chip mounting

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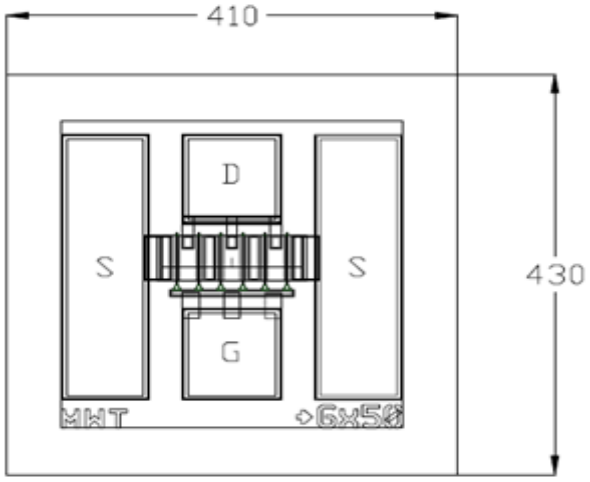
## 26 GHz Super Low Noise pHEMT Device

## NOISE PARAMETERS Vds=2.5V, Ids=25mA

| Freq (GHz) | NFmin (dB) | GA (dB) | Gamma Opt | | Rn/50 |
|---|---|---|---|---|---|
| | | | Mag | Ang | |
| 2 | 0.17 | 16.5 | 0.803 | -7.7 | 0.12 |
| 4 | 0.2 | 13.0 | 0.799 | 19.3 | 0.12 |
| 6 | 0.28 | 11.2 | 0.781 | 42.8 | 0.12 |
| 8 | 0.37 | 10.3 | 0.753 | 63.1 | 0.11 |
| 10 | 0.46 | 9.8 | 0.719 | 80.5 | 0.1 |
| 12 | 0.55 | 9.5 | 0.682 | 95.2 | 0.09 |
| 14 | 0.65 | 9.2 | 0.644 | 107.6 | 0.08 |
| 16 | 0.74 | 9.0 | 0.611 | 118.1 | 0.07 |
| 18 | 0.83 | 8.7 | 0.584 | 126.8 | 0.07 |
| 20 | 0.92 | 8.0 | 0.568 | 134.2 | 0.07 |
| 22 | 1.02 | 7.6 | 0.565 | 140.4 | 0.07 |
| 24 | 1.11 | 7.2 | 0.58 | 145.9 | 0.06 |
| 26 | 1.2 | 6.7 | 0.615 | 150.8 | 0.06 |

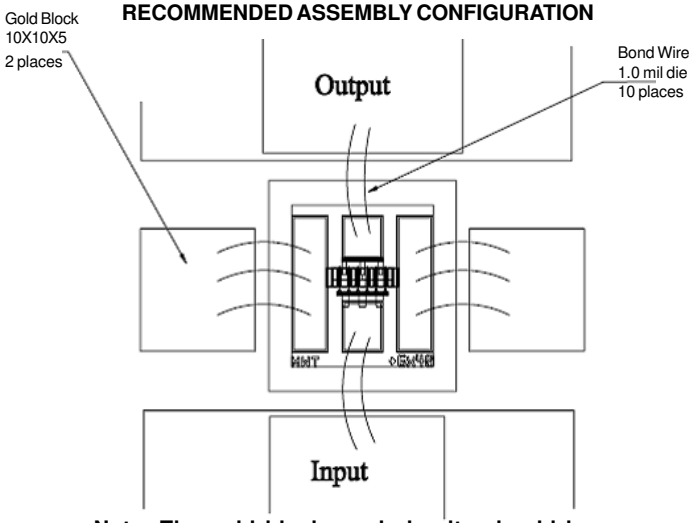



**Chip Dimensions: 410 x 430 microns**
**Source pad: 80 x 280**
**Gate and Drain pad: 90 x 90**
**Chip Thickness: 100 microns**

## S-PARAMETERS V=2.5V, Ids=25mA

| F | S11 | | S21 | | S12 | | S22 | | K | GMAX |
|---|---|---|---|---|---|---|---|---|---|---|
| GHz | Mag | Ang | Mag | Ang | Mag | Ang | Mag | Ang | | dB |
| 1 | 0.93 | -31.9 | 12.22 | 158.6 | 0.032 | 69.9 | 0.40 | -31.2 | 0.20 | 25.9 |
| 2 | 0.90 | -58.9 | 10.82 | 144.5 | 0.056 | 56.3 | 0.41 | -61.2 | 0.15 | 22.8 |
| 3 | 0.87 | -80.5 | 9.37 | 132.7 | 0.073 | 45.1 | 0.41 | -83.7 | 0.14 | 21.1 |
| 4 | 0.86 | -97.0 | 8.09 | 123.5 | 0.084 | 36.9 | 0.42 | -99.8 | 0.15 | 19.8 |
| 5 | 0.84 | -109.9 | 7.03 | 116.1 | 0.091 | 30.5 | 0.42 | -112.0 | 0.15 | 18.9 |
| 6 | 0.84 | -119.7 | 6.18 | 110.2 | 0.097 | 25.4 | 0.43 | -120.7 | 0.16 | 18.0 |
| 7 | 0.83 | -127.7 | 5.49 | 105.1 | 0.100 | 21.1 | 0.43 | -127.7 | 0.17 | 17.4 |
| 8 | 0.83 | -134.6 | 4.92 | 100.6 | 0.102 | 17.9 | 0.44 | -133.4 | 0.18 | 16.8 |
| 9 | 0.83 | -139.8 | 4.46 | 96.8 | 0.104 | 14.6 | 0.44 | -137.8 | 0.18 | 16.3 |
| 10 | 0.83 | -144.7 | 4.06 | 93.3 | 0.104 | 11.9 | 0.44 | -141.8 | 0.21 | 15.9 |
| 11 | 0.82 | -148.5 | 3.72 | 90.2 | 0.106 | 10.3 | 0.44 | -144.9 | 0.24 | 15.5 |
| 12 | 0.81 | -151.7 | 3.45 | 87.6 | 0.106 | 8.0 | 0.44 | -147.2 | 0.26 | 15.1 |
| 13 | 0.82 | -154.4 | 3.20 | 84.8 | 0.106 | 5.9 | 0.44 | -149.2 | 0.27 | 14.8 |
| 14 | 0.81 | -157.2 | 3.00 | 82.2 | 0.106 | 4.5 | 0.45 | -151.2 | 0.30 | 14.5 |
| 15 | 0.82 | -159.7 | 2.80 | 79.6 | 0.105 | 2.8 | 0.45 | -153.0 | 0.30 | 14.3 |
| 16 | 0.82 | -162.0 | 2.63 | 77.3 | 0.107 | 0.8 | 0.45 | -154.2 | 0.29 | 13.9 |
| 17 | 0.82 | -164.4 | 2.49 | 74.9 | 0.106 | -0.6 | 0.45 | -156.1 | 0.33 | 13.7 |
| 18 | 0.80 | -166.3 | 2.35 | 72.9 | 0.106 | -1.2 | 0.45 | -157.0 | 0.40 | 13.5 |
| 19 | 0.80 | -167.9 | 2.22 | 70.6 | 0.106 | -3.5 | 0.45 | -158.2 | 0.42 | 13.2 |
| 20 | 0.81 | -169.2 | 2.11 | 68.3 | 0.107 | -3.9 | 0.45 | -159.4 | 0.43 | 12.9 |
| 21 | 0.81 | -170.7 | 2.02 | 66.8 | 0.105 | -5.5 | 0.46 | -159.7 | 0.43 | 12.8 |
| 22 | 0.80 | -172.1 | 1.93 | 64.4 | 0.105 | -4.3 | 0.46 | -161.2 | 0.51 | 12.6 |
| 23 | 0.80 | -172.9 | 1.84 | 62.9 | 0.105 | -7.8 | 0.46 | -161.6 | 0.50 | 12.4 |
| 24 | 0.81 | -173.6 | 1.77 | 61.1 | 0.103 | -8.6 | 0.46 | -162.7 | 0.52 | 12.3 |
| 25 | 0.79 | -175.6 | 1.69 | 59.2 | 0.102 | -8.5 | 0.47 | -163.1 | 0.60 | 12.2 |
| 26 | 0.79 | -176.9 | 1.62 | 57.4 | 0.107 | -7.89 | 0.46 | -163.5 | 0.61 | 11.8 |

**RECOMMENDED ASSEMBLY CONFIGURATION**




**Note: The gold blocks and circuits should be placed as close to the device as possible. The bond wire should be as short as possible.**

## MAXIMUM RATINGS at Ta = 25 C

| Symbol | Parameters | Units | Cont Max 1 | Absolute Max 2 |
|---|---|---|---|---|
| VDS | Drain to Source Voltage | V | 4.0 | 4.5 |
| Tch | Channel Temperature | ºC | +150 | +175 |
| Tst | Storage Temperature | ºC | -65 to +160 | +180 |
| Pin | RF Input Power | mW | 20 | 40 |
| Pt | Total Power Dissipation | mW | 300 | 400 |

Exceeding any on of these limits in continuous operation may reduce the mean-time-to-failure below the design goal and may cause permanent damage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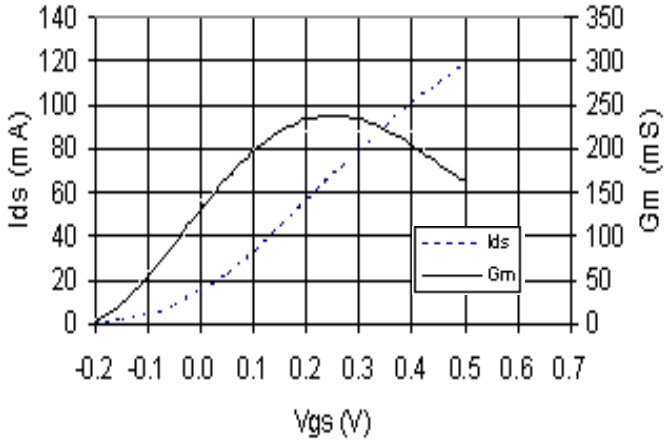
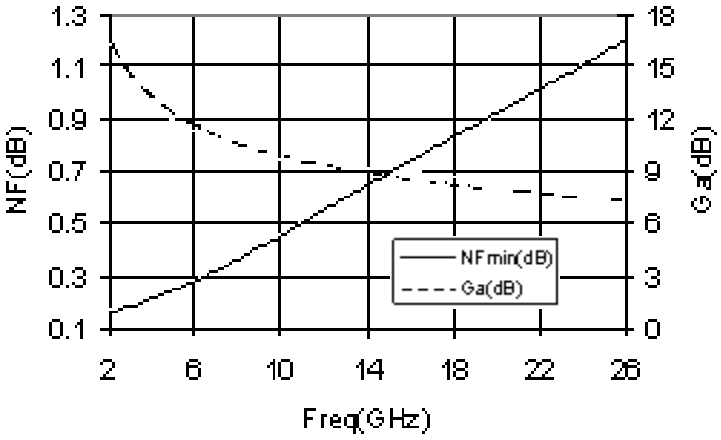
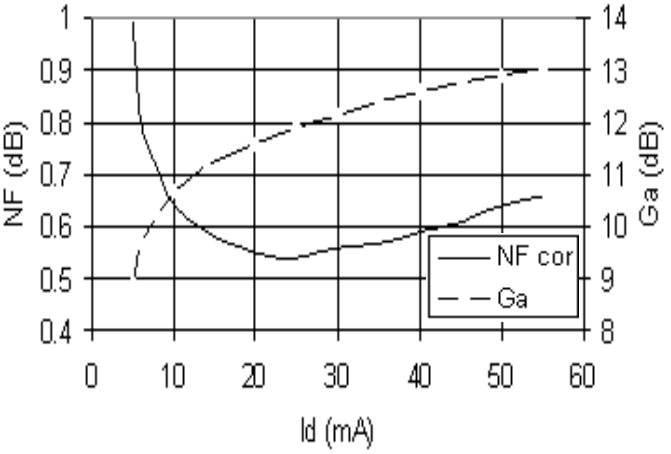
### Gm & Ids vs. Vgs
### Vds = 2.5V



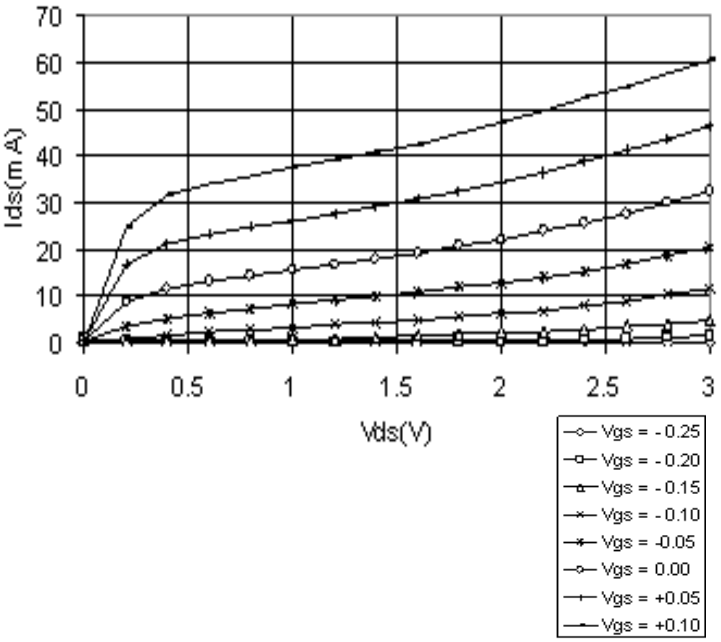

### NF & Associated Gain vs. Freq
### Vds = 2.5V, Ids = 20mA




### NF & Ga vs. Ids
### Freq = 12GHz, Vds = 2.5V




### DC IV Characteristics

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