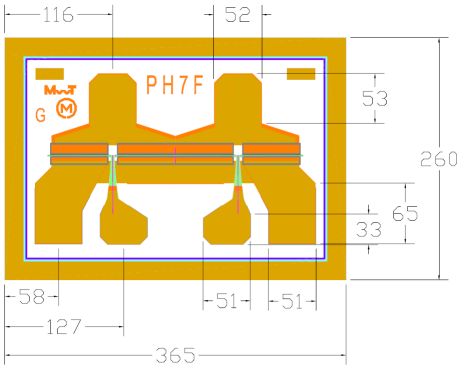
# MwT-PH7F

## 28 GHz Medium Power AlGaAs/InGaAs pHEMT

## Features:

- **24.5 dBm of Power at 18 GHz**
- **15 dB typical Small Signal Gain at 18 GHz**
- **45% typical PAE at 18 GHz**
- **0.25 x 250 Micron Refractory Metal/Gold Gate**
- **Excellent for High Gain, and High Power Added Efficiency**
- **Ideal for Commercial, Military, Hi-Rel Space Applications**




Chip Dimensions: 365 x 260 microns
Chip Thickness: 100 microns

## Description:

The MwT-PH7F is a AlGaAs/InGaAs pHEMT (Pseudomorphic-High-Electron-Mobility-Transistor) device whose nominal 0.25 micron gate length and 250 micron gate width make it ideally suited for applications requiring high-gain and medium power up to 28 GHz frequency range. The device is equally effective for either wideband (e.g. 6 to 18 GHz) or narrow-band applications. The chip is produced using reliable metal systems and passivated to insure excellent reliability.

## Electrical Specifications: *at Ta= 25 °C*

| PARAMETERS & CONDITIONS | SYMBOL | FREQ | UNITS | MIN | TYP |
|---|---|---|---|---|---|
| Output Power at 1dB Compression<br>Vds=8.0V Ids=0.7xIDSS | P1dB | 18 GHz | dBm | | 23.0 |
| Saturated Power<br>Vds=8.0V Ids=0.7xIDSS | Psat | 18 GHz | dBm | | 24.5 |
| Output Third Order Intercept Point<br>Vds=8.0V Ids=0.7xIDSS | OIP3 | 18 GHz | dBm | | 30.0 |
| Small Signal Gain<br>Vds=8.0V Ids=0.7xIDSS | SSG | 18 GHz | dB | | 15.0 |
| Power Added Efficiency at P1dB<br>Vds=8.0V Ids=0.7xIDSS | PAE | 18 GHz | % | | 45 |

Note: Ids should be between 40% and 80% of Idss. Currently, our data shows Ids at 70% of IDSS. Low Ids will improve efficiency, but high Ids will make Psat and IP3 better.

## DC Specifications: *at Ta= 25 °C*

| PARAMETERS & CONDITIONS | SYMBOL | UNITS | MIN | TYP | MAX |
|---|---|---|---|---|---|
| Saturated Drain Current<br>Vds= 3.0 V Vgs= 0.0 V | IDSS | mA | 60 | | 80 |
| Transconductance<br>Vds= 2.5 V Vgs= 0.0 V | Gm | mS | | 90 | |
| Pinch-off Voltage<br>Vds= 3.0 V Ids= 1.0 mA | Vp | V | | -0.8 | -1.0 |
| Gate-to-Source Breakdown Voltage<br>Igs= -0.3 mA | BVGSO | V | | -17.0 | |
| Gate-to-Drain Breakdown Voltage<br>Igd= -0.3 mA | BVGDO | V | | -18.0 | |
| Chip Thermal Resistance | Rth | C/W | | 150<br>350* | |

* Overall Rth depends on case mounting



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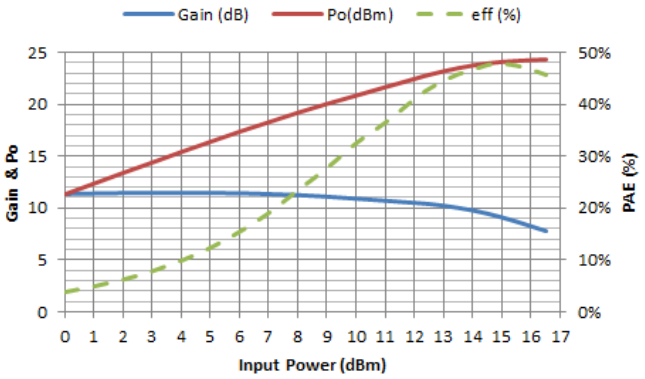
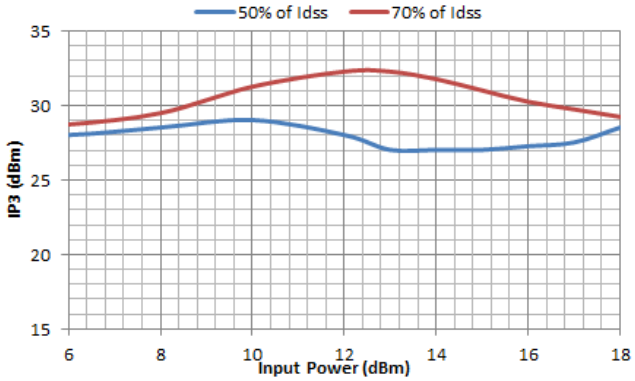
**MwT-PH7F from GCS, Typical Power at 18GHz**
**Vds=8V; Idq=0.7xIDSS**




**MwT-PH7F, OIP3 vs Po/tone**
**with different Idq (% of Idss)**




**MwT-PH7F, Load Pull Data, Vdq=8V; Idq=0.7xIdss**

| Freq (GHz) | $Z_S$ | | $Z_L$ | | $P_{sat}$ |
|---|---|---|---|---|---|
| | Mag | phase | mag | phase | dBm |
| 2 | 0.90 | 34.0 | 0.37 | 9.4 | 23.8 |
| 4 | 0.85 | 64.0 | 0.42 | 23.4 | 23.4 |
| 6 | 0.79 | 84.0 | 0.40 | 26.3 | 23.7 |
| 8 | 0.82 | 105.0 | 0.43 | 33.8 | 23.4 |
| 10 | 0.85 | 115.0 | 0.45 | 38.6 | 23.2 |
| 12 | 0.87 | 125.0 | 0.42 | 42.2 | 23.6 |
| 14 | 0.87 | 133.0 | 0.47 | 50.8 | 23.5 |
| 16 | 0.86 | 144.0 | 0.47 | 53.9 | 23.3 |
| 18 | 0.85 | 145.0 | 0.47 | 60.0 | 23.2 |

The load pull data is based on nonlinear model provided by the foundry that processes the device.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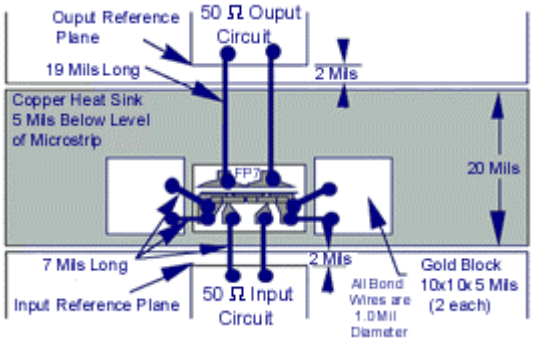
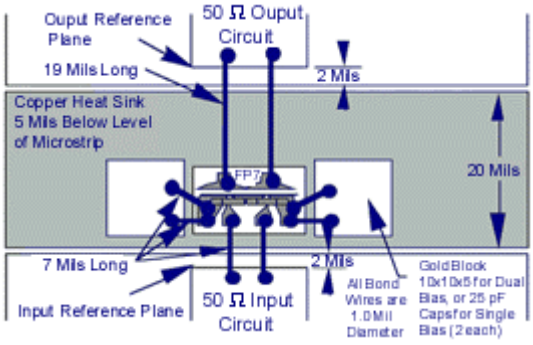
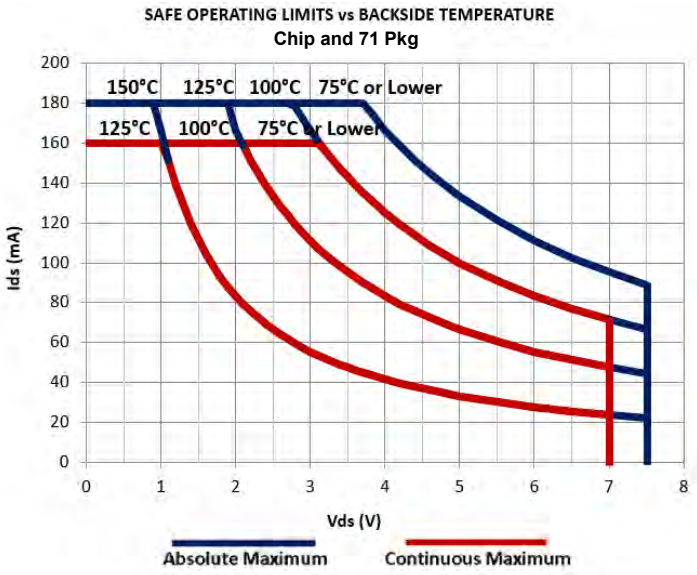
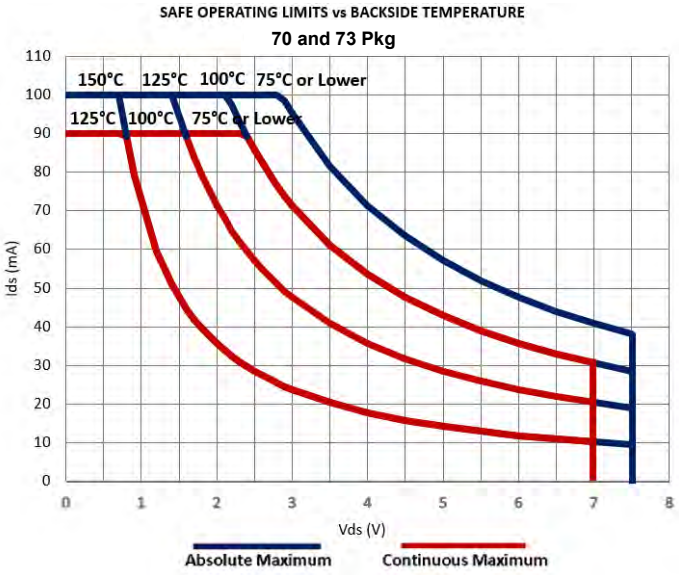
MwT-PH7F
DUAL BIAS




MwT-PH7F
SELF BIAS




## Absolute Maximum Rating

| Symbol | Parameter | Units | Cont Max1 | Absolute Max2 |
|---|---|---|---|---|
| VDS | Drain to Source Volt. | V | 6.5 | 7.5 |
| Tch | Channel Temperature | °C | +150 | +175 |
| Tst | Storage Temperature | °C | -65 to +150 | +175 |
| Pin | RF Input Power | mW | 80 | 120 |

**Notes:**

**1.** Exceeding any one of these limits in continuous operation may reduce the mean-time- to-failure below the design goal.
**2.** Exceeding any one of these limits may cause permanent damage.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