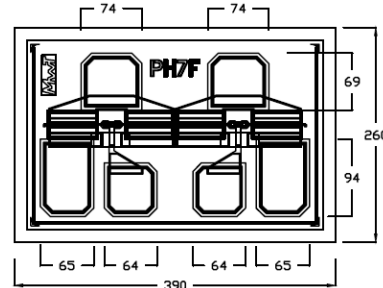


## Features:

- +24.0 dBm typical Output Power at 12 GHz
- 16.0 dB typical Small Signal Gain at 12 GHz
- 50% typical PAE at 12 GHz
- 0.25 x 250 Micron Refractory Metal/Gold Gate
- Excellent for High Power, Gain, and High Power Added Efficiency
- Ideal for Commercial, Military, Hi-Rel Space Applications



Chip Dimensions: 390 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 $T_a = 25^\circ\text{C}$

| PARAMETERS & CONDITIONS   | SYMBOL | FREQ             | UNITS | MIN          | TYP          |
|---|--------|------------------|-------|--------------|--------------|
| Output Power at 1dB Compression<br>$V_{ds}=8.0\text{V}$ $I_{ds}=0.5 \times I_{DSS}$ | P1dB   | 12 GHz           | dBm   | 23.0         | 24.0         |
| Small Signal Gain<br>$V_{ds}=8.0\text{V}$ $I_{ds}=0.5 \times I_{DSS}$               | SSG    | 12 GHz<br>18 GHz | dB    | 14.0<br>12.0 | 16.0<br>13.0 |
| Power Added Efficiency at P1dB<br>$V_{ds}=8.0\text{V}$ $I_{ds}=0.5 \times I_{DSS}$  | PAE    | 12 GHz           | %     |              | 50           |

Note:  $I_{ds}$  should be between 40% and 60% of  $I_{DSS}$ . Low  $I_{ds}$  will improve efficiency, but High  $I_{ds}$  will make  $P_{sat}$  and  $IP_3$  better.

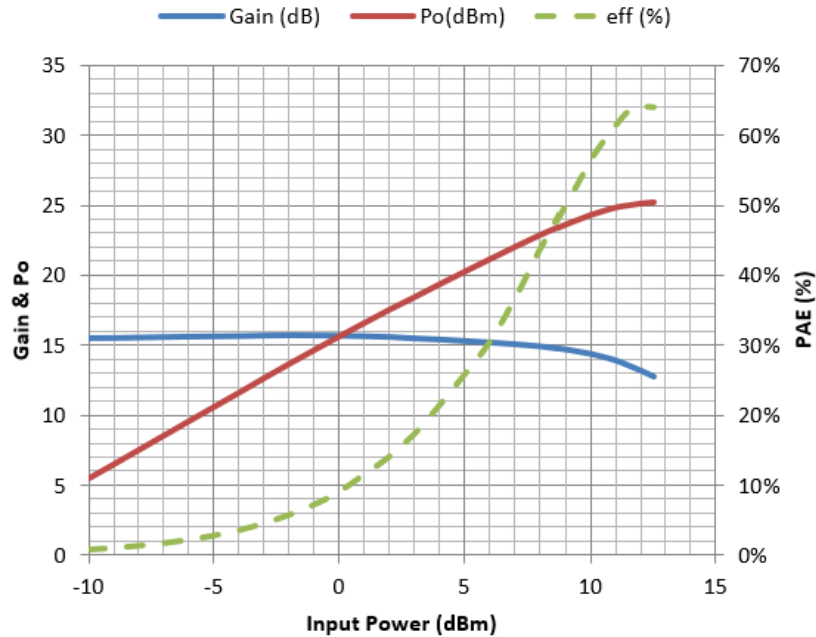
## DC Specifications: at $T_a = 25^\circ\text{C}$

| PARAMETERS & CONDITIONS  | SYMBOL    | UNITS | MIN   | TYP         | MAX  |
|--|-----------|-------|-------|-------------|------|
| Saturated Drain Current<br>$V_{ds}= 3.0\text{V}$ $V_{gs}= 0.0\text{V}$ | $I_{DSS}$ | mA    | 85    |             | 110  |
| Transconductance<br>$V_{ds}= 2.5\text{V}$ $V_{gs}= 0.0\text{V}$        | $G_m$     | mS    | 75    | 80          |      |
| Pinch-off Voltage<br>$V_{ds}= 3.0\text{V}$ $I_{ds}= 1.0\text{mA}$      | $V_p$     | V     |       | -1.2        | -2.0 |
| Gate-to-Source Breakdown Voltage<br>$I_{gs}= -0.3\text{mA}$            | BVGSO     | V     | -13.0 | -15.0       |      |
| Gate-to-Drain Breakdown Voltage<br>$I_{gd}= -0.3\text{mA}$             | BVGDO     | V     | -16.0 | -18.0       |      |
| Chip Thermal Resistance  | $R_{th}$  | C/W   |       | 150<br>350* |      |

\* Overall  $R_{th}$  depends on case mounting

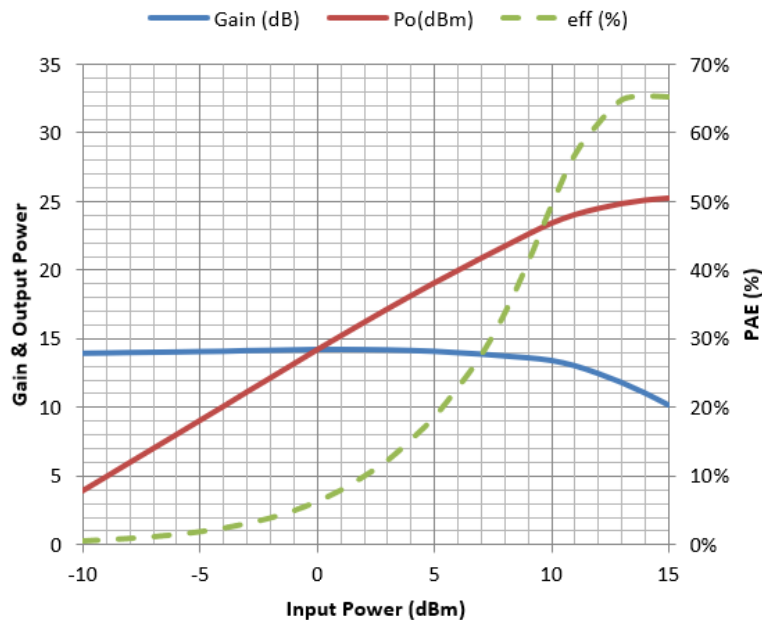
## Output Power, Gain & PAE at 12GHz

Vds=8V; Ids=50% of Idss

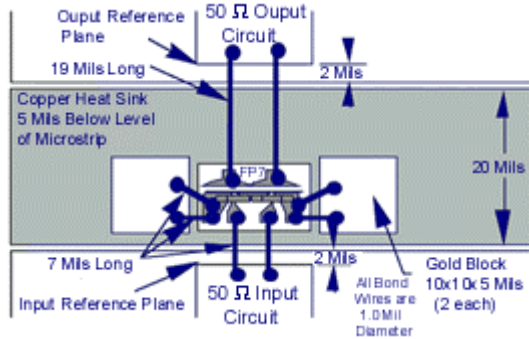


## Output Power ,Gain & PAE at 18GHz

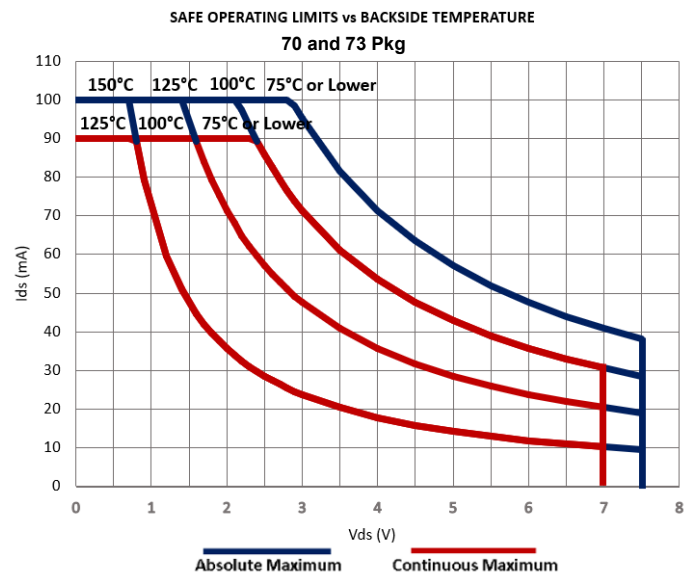
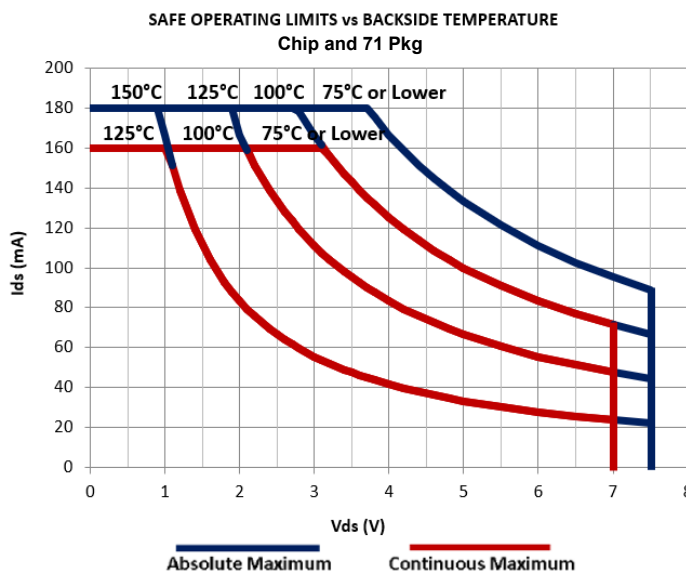
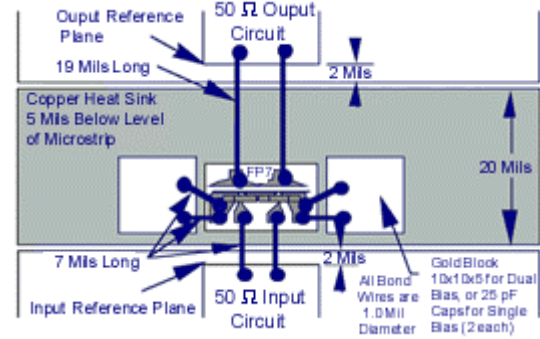
Vds=8V, Ids=50% of Idss



## 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:

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



# MwT-PH7F

## 28 GHz Medium Power AlGaAs/InGaAs PHEMT

### S-Parameters

S-PARAMETER Vds=7V, Ids= 0.7 x Idss

| Freq. | S11    |          | S21    |         | S12     |         | S22    |          | K     | GMAX   |
|-------|--------|----------|--------|---------|---------|---------|--------|----------|-------|--------|
| GHz   | dB     | Ang (°)  | dB     | Ang (°) | dB      | Ang (°) | dB     | Ang (°)  |       | dB     |
| 1     | -0.356 | -13.928  | 17.306 | 168.863 | -41.532 | 81.950  | -2.148 | -5.510   | 0.277 | 29.419 |
| 2     | -0.509 | -27.881  | 17.085 | 158.527 | -35.730 | 74.135  | -2.260 | -10.944  | 0.231 | 26.407 |
| 3     | -0.745 | -41.184  | 16.758 | 148.587 | -32.605 | 68.334  | -2.427 | -16.161  | 0.238 | 24.681 |
| 4     | -1.032 | -53.421  | 16.270 | 139.975 | -30.494 | 62.003  | -2.641 | -20.154  | 0.282 | 23.382 |
| 5     | -1.154 | -64.652  | 15.853 | 130.663 | -29.128 | 56.437  | -2.833 | -24.455  | 0.298 | 22.491 |
| 6     | -1.659 | -72.734  | 15.138 | 124.033 | -28.243 | 51.818  | -2.980 | -27.186  | 0.408 | 21.691 |
| 7     | -1.856 | -84.479  | 14.737 | 116.099 | -27.383 | 47.573  | -3.199 | -31.132  | 0.415 | 21.060 |
| 8     | -2.283 | -93.789  | 14.015 | 108.842 | -27.074 | 43.530  | -3.616 | -34.035  | 0.541 | 20.545 |
| 9     | -2.341 | -100.574 | 13.703 | 104.083 | -26.438 | 41.955  | -3.409 | -37.464  | 0.481 | 20.070 |
| 10    | -2.783 | -109.827 | 12.991 | 96.864  | -26.494 | 37.725  | -3.851 | -39.790  | 0.650 | 19.743 |
| 11    | -2.825 | -117.852 | 12.494 | 91.391  | -26.153 | 35.829  | -3.956 | -43.184  | 0.649 | 19.324 |
| 12    | -3.041 | -126.103 | 12.006 | 85.383  | -26.065 | 32.466  | -4.102 | -45.899  | 0.726 | 19.036 |
| 13    | -3.052 | -132.810 | 11.529 | 80.106  | -26.065 | 31.275  | -4.226 | -49.049  | 0.760 | 18.797 |
| 14    | -3.289 | -139.919 | 11.001 | 74.929  | -26.060 | 30.756  | -4.329 | -50.395  | 0.855 | 18.531 |
| 15    | -3.339 | -145.594 | 10.575 | 70.249  | -26.248 | 28.383  | -4.344 | -52.497  | 0.927 | 18.412 |
| 16    | -3.389 | -151.118 | 10.093 | 65.000  | -26.350 | 29.183  | -4.491 | -57.462  | 0.993 | 18.222 |
| 17    | -3.455 | -156.610 | 9.643  | 60.832  | -26.571 | 28.967  | -4.517 | -60.502  | 1.077 | 16.418 |
| 18    | -3.394 | -162.199 | 9.281  | 55.891  | -26.480 | 30.844  | -4.408 | -63.522  | 1.046 | 16.564 |
| 19    | -3.371 | -165.983 | 8.853  | 52.111  | -26.663 | 31.863  | -4.381 | -66.287  | 1.101 | 15.822 |
| 20    | -3.391 | -169.492 | 8.458  | 48.258  | -26.699 | 34.280  | -4.417 | -69.261  | 1.156 | 15.180 |
| 21    | -3.211 | -173.349 | 8.136  | 44.589  | -26.144 | 35.389  | -4.285 | -71.781  | 1.020 | 16.278 |
| 22    | -3.135 | -176.568 | 7.760  | 40.208  | -26.474 | 37.878  | -4.215 | -75.570  | 1.063 | 15.586 |
| 23    | -3.087 | -179.464 | 7.487  | 36.271  | -26.376 | 43.025  | -4.189 | -78.764  | 1.039 | 15.717 |
| 24    | -3.074 | -176.519 | 7.139  | 33.149  | -26.405 | 41.505  | -3.976 | -82.791  | 1.032 | 15.668 |
| 25    | -3.060 | -173.628 | 6.786  | 29.105  | -26.123 | 45.532  | -3.973 | -85.593  | 1.025 | 15.479 |
| 26    | -2.925 | -170.455 | 6.374  | 25.031  | -25.182 | 49.216  | -3.868 | -89.133  | 0.863 | 15.778 |
| 27    | -2.837 | -167.977 | 6.035  | 21.413  | -25.192 | 51.952  | -3.729 | -92.533  | 0.840 | 15.613 |
| 28    | -2.701 | -165.985 | 5.866  | 17.891  | -24.587 | 54.924  | -3.545 | -96.152  | 0.687 | 15.227 |
| 29    | -2.611 | -163.524 | 5.608  | 14.571  | -24.172 | 55.331  | -3.347 | -99.179  | 0.587 | 14.890 |
| 30    | -2.539 | -161.620 | 5.389  | 11.233  | -23.528 | 56.465  | -3.083 | -102.965 | 0.453 | 14.458 |

### ORDERING INFORMATION:

When placing order or inquiring, please specify wafer number, if known. For details of Safe Handling Procedure please see supplementary information in available PDF on our website [www.mwtinc.com](http://www.mwtinc.com). For package information, please see supplementary application note in PDF format by clicking located on our website.

Chip MwT-PH7F  
 Package 70 MwT-PH770F  
 Package 73 MwT-PH773F