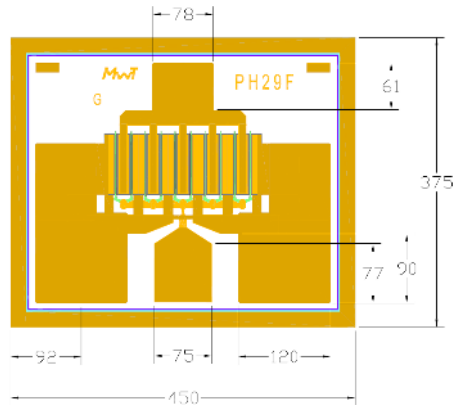


## Features:

- 28.5 dBm of Power at 12 GHz
- 13 dB Small Signal Gain at 12 GHz
- 48% PAE at 12 GHz
- 0.25 x 800 Micron Refractory Metal/Gold Gate
- Excellent for Medium Power, Gain, and High Power Added Efficiency
- Ideal for Commercial, Military, Hi-Rel Space Applications



Chip Dimensions: 450 x 375 microns  
Chip Thickness: 100 microns

## Description:

The MwT-PH29F is a AlGaAs/InGaAs pHEMT (Pseudomorphic-High-Electron-Mobility-Transistor) device whose nominal 0.25 micron gate length and 800 micron gate width make it ideally suited for applications requiring high-gain and medium power up to 18 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>$V_{ds}=8.0\text{V}$ $I_{ds}=0.7 \times I_{DSS}$    | P1dB             | 12 GHz | dBm   |     | 27.5 |
| Saturated Power<br>$V_{ds}=8.0\text{V}$ $I_{ds}=0.7 \times I_{DSS}$                    | P <sub>sat</sub> | 12 GHz | dBm   |     | 28.5 |
| Output Third Order Intercept Point<br>$V_{ds}=8.0\text{V}$ $I_{ds}=0.7 \times I_{DSS}$ | OIP3             | 12 GHz | dBm   |     | 35.0 |
| Small Signal Gain<br>$V_{ds}=8.0\text{V}$ $I_{ds}=0.7 \times I_{DSS}$                  | SSG              | 12 GHz | dB    |     | 13.0 |
| Power Added Efficiency at P1dB<br>$V_{ds}=8.0\text{V}$ $I_{ds}=0.7 \times I_{DSS}$     | PAE              | 12 GHz | %     |     | 48   |

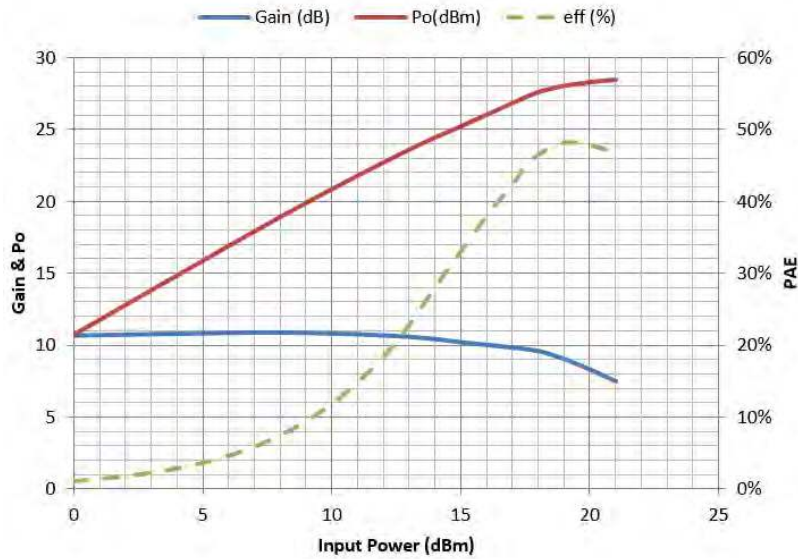
Note:  $I_{ds}$  should be between 40% and 80% of  $I_{DSS}$ . Currently, our data shows  $I_{ds}$  at 70% of  $I_{DSS}$ . Low  $I_{ds}$  will improve efficiency, but high  $I_{ds}$  will make P<sub>sat</sub> and IP3 better.

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

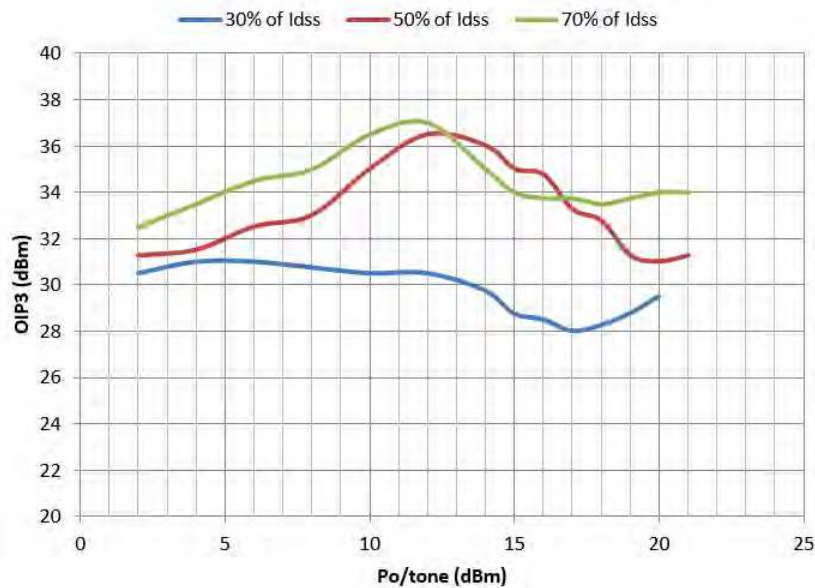
| PARAMETERS & CONDITIONS  | SYMBOL                       | UNITS           | MIN | TYP        | MAX  |
|--|------------------------------|-----------------|-----|------------|------|
| Saturated Drain Current<br>$V_{ds}=3.0\text{V}$ $V_{gs}=0.0\text{V}$ | $I_{DSS}$                    | mA              | 160 |            | 200  |
| Transconductance<br>$V_{ds}=2.5\text{V}$ $V_{gs}=0.0\text{V}$        | G <sub>m</sub>               | mS              |     | 250        |      |
| Pinch-off Voltage<br>$V_{ds}=3.0\text{V}$ $I_{ds}=1.0\text{mA}$      | V <sub>p</sub>               | V               |     | -0.8       | -1.0 |
| Gate-to-Source Breakdown Voltage<br>$I_{gs}=-0.3\text{mA}$           | BVGSO                        | V               |     | -16.0      |      |
| Gate-to-Drain Breakdown Voltage<br>$I_{gd}=-0.3\text{mA}$            | BVGDO                        | V               |     | -18.0      |      |
| Chip Thermal Resistance  | Chip & 71 pkg<br>70 & 73 pkg | R <sub>th</sub> | C/W | 50<br>170* |      |

\* Overall R<sub>th</sub> depends on case mounting

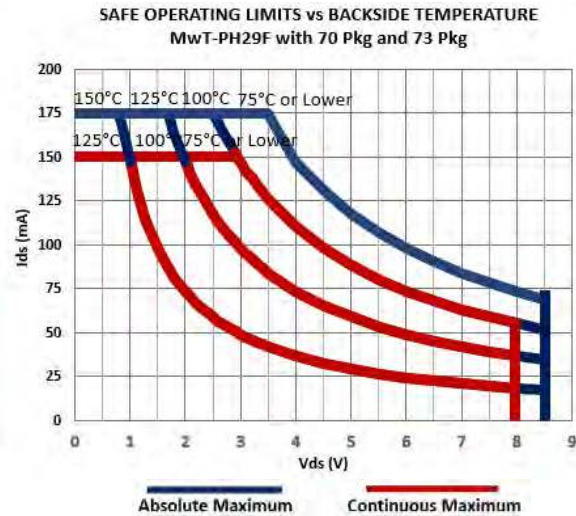
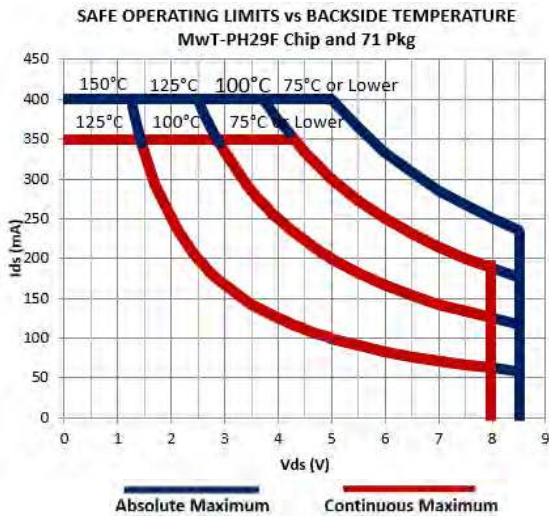
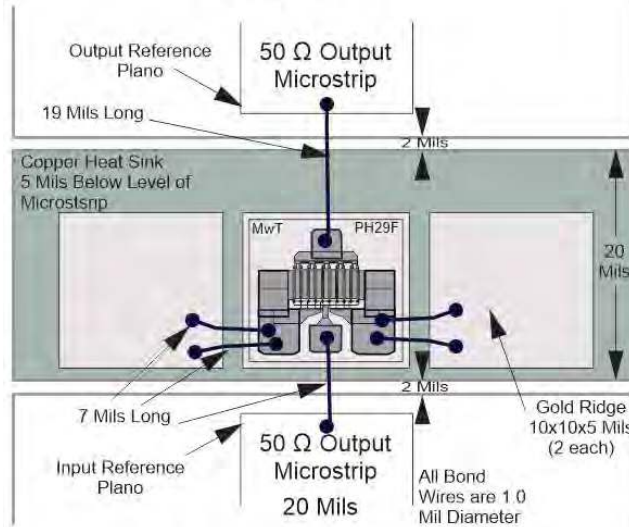
MwT-PH29F, Po, Gain & PAE at 12GHz vs Pin  
 Vds=8V; Idq=0.7xIDSS



OIP3 at 12GHz with different Idq vs Po/tone



### MwT-PH29F DUAL BIAS



### Absolute Maximum Rating

| Symbol | Parameter             | Units | Cont Max1   | Absolute Max2 |
|--------|-----------------------|-------|-------------|---------------|
| VDS    | Drain to Source Volt. | V     | 8.0         | 8.5           |
| Tch    | Channel Temperature   | °C    | +150        | +175          |
| Tst    | Storage Temperature   | °C    | -65 to +150 | +175          |
| Pin    | RF Input Power        | mW    | 300         | 400           |

**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.



## S-Parameters

S-PARAMETER Vds=8.0V, Ids= 0.7 x Idss

| Freq.<br>GHz | S11    |          | S21    |         | S12     |         | S22    |          | K     | GMAX<br>dB |
|--------------|--------|----------|--------|---------|---------|---------|--------|----------|-------|------------|
|              | dB     | Ang (°)  | dB     | Ang (°) | dB      | Ang (°) | dB     | Ang (°)  |       |            |
| 1            | -0.712 | -67.337  | 23.023 | 139.525 | -32.599 | 57.496  | -5.155 | -23.436  | 0.169 | 27.811     |
| 2            | -1.353 | -108.137 | 20.085 | 115.840 | -29.767 | 41.079  | -6.895 | -34.175  | 0.300 | 24.926     |
| 3            | -1.665 | -131.813 | 17.484 | 100.794 | -28.622 | 34.042  | -7.978 | -40.417  | 0.423 | 23.053     |
| 4            | -1.763 | -146.856 | 15.400 | 89.895  | -28.156 | 31.334  | -8.553 | -45.057  | 0.530 | 21.778     |
| 5            | -1.885 | -157.678 | 13.551 | 81.830  | -28.171 | 31.322  | -9.010 | -50.315  | 0.699 | 20.861     |
| 6            | -1.916 | -165.644 | 12.211 | 74.642  | -27.788 | 33.022  | -9.071 | -53.629  | 0.786 | 20.000     |
| 7            | -1.895 | -173.359 | 10.986 | 67.218  | -27.597 | 34.315  | -9.208 | -58.792  | 0.877 | 19.291     |
| 8            | -1.799 | -178.234 | 9.805  | 61.180  | -27.386 | 35.942  | -9.089 | -66.587  | 0.920 | 18.596     |
| 9            | -1.812 | 176.799  | 8.648  | 54.437  | -27.206 | 39.784  | -9.273 | -73.885  | 1.057 | 16.466     |
| 10           | -1.777 | 171.859  | 7.816  | 48.903  | -26.686 | 40.303  | -8.856 | -79.598  | 1.045 | 15.947     |
| 11           | -1.680 | 166.906  | 7.074  | 42.841  | -26.328 | 44.397  | -8.779 | -86.121  | 1.033 | 15.586     |
| 12           | -1.603 | 163.630  | 6.265  | 37.485  | -25.918 | 47.483  | -8.540 | -93.146  | 1.026 | 15.103     |
| 13           | -1.640 | 160.115  | 5.521  | 31.985  | -25.233 | 49.370  | -8.271 | -100.349 | 1.050 | 14.016     |
| 14           | -1.615 | 157.560  | 4.698  | 27.199  | -24.623 | 52.216  | -7.926 | -107.380 | 1.050 | 13.287     |
| 15           | -1.533 | 152.951  | 4.147  | 22.340  | -24.021 | 54.193  | -7.658 | -113.008 | 0.987 | 14.084     |
| 16           | -1.353 | 150.924  | 3.478  | 16.561  | -22.985 | 54.691  | -7.219 | -121.113 | 0.798 | 13.231     |
| 17           | -1.425 | 148.177  | 2.835  | 11.779  | -22.403 | 55.650  | -6.777 | -127.836 | 0.839 | 12.619     |
| 18           | -1.311 | 146.809  | 2.236  | 7.466   | -21.459 | 56.044  | -6.257 | -135.260 | 0.706 | 11.848     |
| 19           | -1.286 | 145.148  | 1.551  | 3.522   | -20.735 | 55.550  | -6.003 | -140.108 | 0.675 | 11.143     |
| 20           | -1.136 | 140.448  | 1.032  | -1.969  | -20.112 | 54.770  | -5.697 | -145.992 | 0.573 | 10.572     |
| 21           | -1.230 | 137.630  | 0.160  | -7.121  | -19.229 | 55.449  | -5.186 | -151.442 | 0.604 | 9.695      |
| 22           | -1.163 | 135.653  | -0.361 | -11.359 | -18.769 | 54.385  | -4.748 | -156.476 | 0.539 | 9.204      |
| 23           | -1.003 | 134.207  | -0.870 | -15.331 | -18.253 | 51.773  | -4.515 | -162.925 | 0.435 | 8.691      |
| 24           | -1.066 | 131.414  | -1.646 | -19.291 | -17.634 | 50.708  | -4.317 | -168.685 | 0.490 | 7.994      |
| 25           | -1.027 | 129.270  | -2.280 | -24.007 | -17.122 | 48.641  | -3.752 | -174.041 | 0.420 | 7.421      |
| 26           | -0.915 | 127.789  | -2.841 | -27.153 | -16.387 | 45.878  | -3.430 | -178.848 | 0.320 | 6.773      |
| 27           | -0.862 | 125.477  | -3.472 | -30.993 | -15.709 | 44.780  | -3.126 | -176.329 | 0.280 | 6.119      |
| 28           | -0.863 | 124.404  | -4.116 | -33.323 | -15.403 | 42.689  | -2.958 | -171.827 | 0.287 | 5.643      |
| 29           | -0.850 | 121.049  | -4.841 | -36.377 | -14.913 | 40.266  | -2.709 | -167.484 | 0.284 | 5.036      |
| 30           | -0.883 | 119.313  | -5.459 | -38.681 | -14.322 | 37.936  | -2.480 | -163.570 | 0.282 | 4.431      |

### 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.

### Available Packaging:

- 70 Package - MwT-PH29F70
- 71 Package - MwT-PH29F71
- 73 Package - MwT-PH29F73