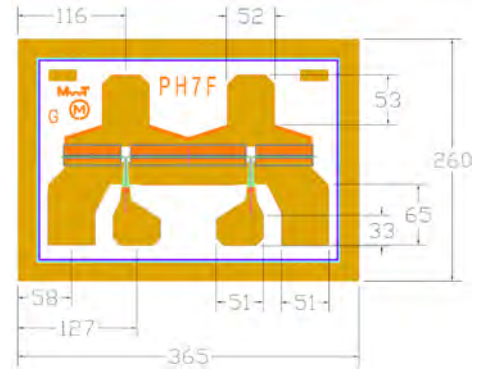


# MwT-PH7F 28 GHz Medium Power AlGaAs/InGaAs pHEMT

## 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 $T_a = 25\text{ }^\circ\text{C}$

PARAMETERS & CONDITIONS	SYMBOL	FREQ	UNITS	MIN	TYP
Output Power at 1dB Compression $V_{ds}=8.0V$ $I_{ds}=0.7 \times I_{DSS}$	P1dB	18 GHz	dBm		23.0
Saturated Power $V_{ds}=8.0V$ $I_{ds}=0.7 \times I_{DSS}$	Psat	18 GHz	dBm		24.5
Output Third Order Intercept Point $V_{ds}=8.0V$ $I_{ds}=0.7 \times I_{DSS}$	OIP3	18 GHz	dBm		30.0
Small Signal Gain $V_{ds}=8.0V$ $I_{ds}=0.7 \times I_{DSS}$	SSG	18 GHz	dB		15.0
Power Added Efficiency at P1dB $V_{ds}=8.0V$ $I_{ds}=0.7 \times I_{DSS}$	PAE	18 GHz	%		45

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 Psat and IP3 better.

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

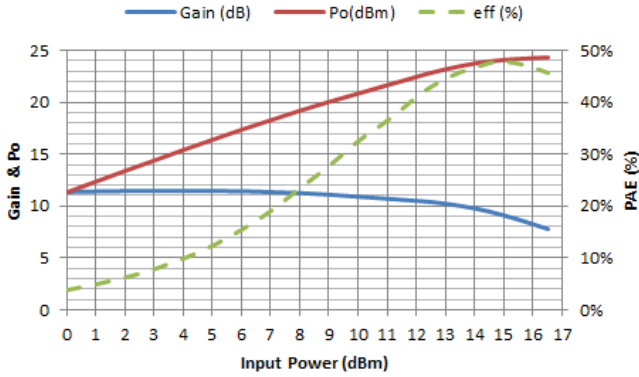
PARAMETERS & CONDITIONS	SYMBOL	UNITS	MIN	TYP	MAX
Saturated Drain Current $V_{ds}= 3.0 V$ $V_{gs}= 0.0 V$	$I_{DSS}$	mA	60		80
Transconductance $V_{ds}= 2.5 V$ $V_{gs}= 0.0 V$	Gm	mS		90	
Pinch-off Voltage $V_{ds}= 3.0 V$ $I_{ds}= 1.0 mA$	$V_p$	V		-0.8	-1.0
Gate-to-Source Breakdown Voltage $I_{gs}= -0.3 mA$	BVGSO	V		-17.0	
Gate-to-Drain Breakdown Voltage $I_{gd}= -0.3 mA$	BVGDO	V		-18.0	
Chip Thermal Resistance	Rth	C/W		150 350*	

\* Overall Rth depends on case mounting

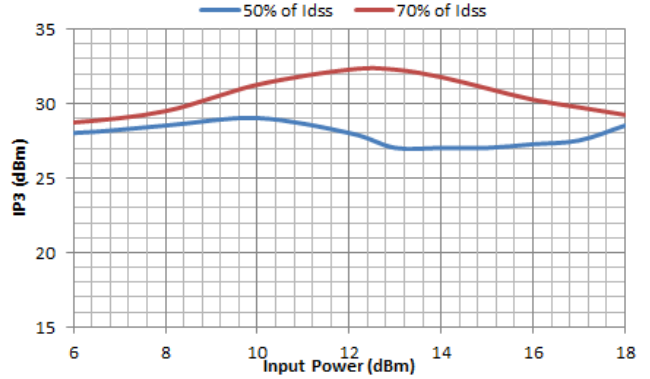
# MwT-PH7F

## 28 GHz Medium Power AlGaAs/InGaAs pHEMT

**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**

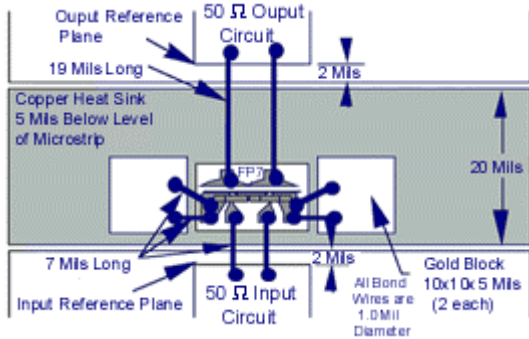
Freq (GHz)	Z <sub>s</sub>		Z <sub>L</sub>		P <sub>sat</sub> (dBm)
	Mag	phase	mag	phase	
2	0.90	34.0	0.37	9.4	23.8
4	0.85	64.0	0.42	23.4	23.4
6	0.79	84.0	0.40	26.3	23.7
8	0.82	105.0	0.43	33.8	23.4
10	0.85	115.0	0.45	38.6	23.2
12	0.87	125.0	0.42	42.2	23.6
14	0.87	133.0	0.47	50.8	23.5
16	0.86	144.0	0.47	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.

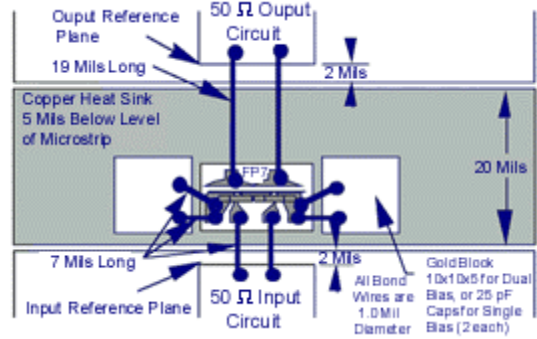
# MwT-PH7F

28 GHz Medium Power AlGaAs/InGaAs pHEMT

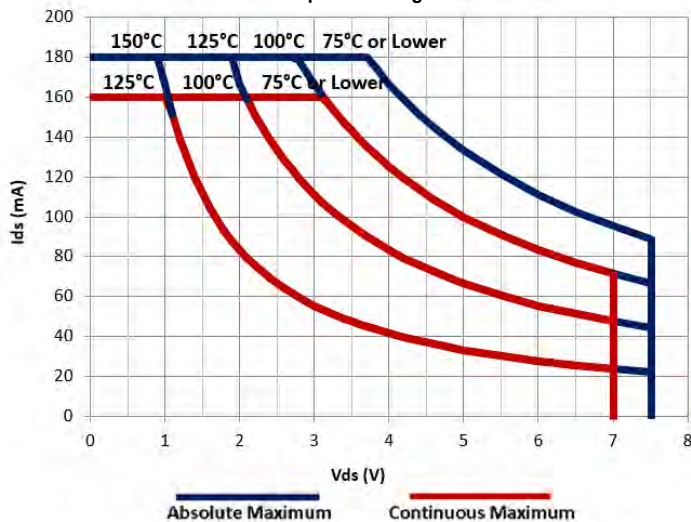
## MwT-PH7F DUAL BIAS



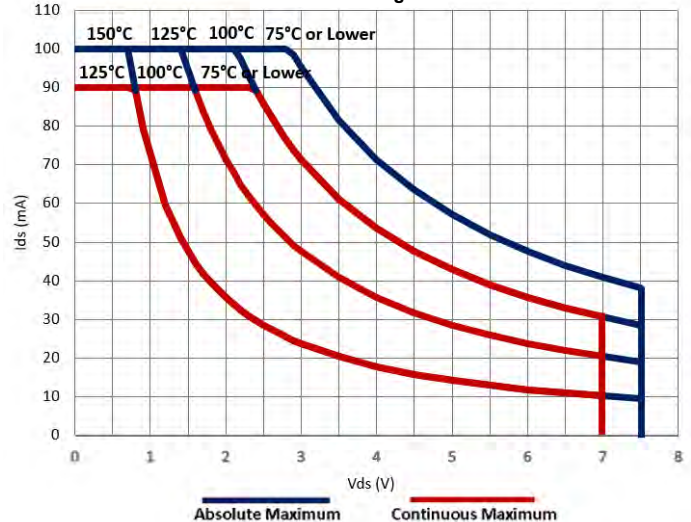
## MwT-PH7F SELF BIAS



SAFE OPERATING LIMITS vs BACKSIDE TEMPERATURE  
Chip and 71 Pkg



SAFE OPERATING LIMITS vs BACKSIDE TEMPERATURE  
70 and 73 Pkg



## 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.

## S-Parameters

S-PARAMETER Vds=8V, Ids= 0.7 x Idss										
Freq.	S11		S21		S12		S22		K	GMAX
GHz	dB	Ang (°)	dB	Ang (°)	dB	Ang (°)	dB	Ang (°)		dB
1	-0.127	-22.315	17.170	164.614	-38.359	78.544	-1.486	-6.306	0.066	27.764
2	-0.340	-42.930	16.703	150.627	-32.557	67.366	-1.655	-12.009	0.114	24.630
3	-0.628	-61.534	15.960	137.974	-29.902	57.742	-1.985	-17.385	0.164	22.931
4	-0.919	-77.536	15.079	127.010	-28.426	50.326	-2.329	-21.455	0.216	21.753
5	-1.331	-91.023	14.155	117.711	-27.387	43.749	-2.569	-24.967	0.297	20.771
6	-1.588	-100.697	13.248	111.134	-26.781	40.591	-2.661	-25.792	0.351	20.015
7	-1.879	-110.878	12.409	103.834	-26.248	37.292	-2.802	-28.527	0.406	19.329
8	-1.886	-120.668	11.811	96.115	-25.956	32.294	-2.947	-33.388	0.417	18.883
9	-2.075	-130.004	10.948	89.527	-25.649	29.639	-3.341	-35.101	0.514	18.299
10	-2.099	-138.262	10.264	83.300	-25.652	25.851	-3.384	-38.703	0.547	17.958
11	-2.222	-145.187	9.527	77.544	-25.593	24.051	-3.522	-40.515	0.633	17.560
12	-2.233	-151.908	8.934	72.273	-25.466	22.490	-3.525	-44.023	0.642	17.200
13	-2.229	-157.323	8.315	67.095	-25.608	20.481	-3.627	-47.214	0.709	16.962
14	-2.272	-162.784	7.651	62.100	-25.697	20.252	-3.733	-50.239	0.786	16.674
15	-2.292	-166.358	7.208	58.170	-25.838	19.830	-3.720	-52.742	0.838	16.523
16	-2.331	-172.000	6.588	52.902	-25.991	18.308	-3.712	-56.953	0.917	16.289
17	-2.300	-175.927	6.020	48.575	-26.138	18.204	-3.665	-60.224	0.964	16.079
18	-2.125	179.674	5.544	43.935	-26.231	17.805	-3.576	-64.067	0.915	15.887
19	-2.227	177.235	5.093	40.219	-26.436	19.671	-3.571	-66.725	1.030	14.706
20	-2.257	173.458	4.561	36.044	-26.460	21.483	-3.702	-70.766	1.131	13.308
21	-2.193	172.206	4.265	31.720	-26.665	22.933	-3.525	-73.204	1.120	13.357
22	-2.162	169.060	3.716	28.317	-26.575	23.580	-3.431	-77.331	1.121	13.029
23	-2.063	166.292	3.225	23.906	-26.806	23.991	-3.470	-81.943	1.179	12.457
24	-2.079	163.714	2.945	20.160	-26.982	27.872	-3.326	-85.873	1.185	12.359
25	-2.125	161.572	2.440	16.852	-26.683	28.686	-3.235	-88.774	1.207	11.813
26	-2.074	159.356	1.924	13.822	-26.630	30.449	-3.163	-91.931	1.215	11.481
27	-2.060	157.319	1.406	10.463	-26.377	33.538	-3.047	-94.680	1.190	11.257
28	-1.912	155.285	1.111	6.408	-25.970	35.045	-2.965	-98.947	1.019	12.694
29	-1.953	153.124	0.709	3.143	-25.711	34.352	-2.803	-102.608	0.997	13.210
30	-1.879	152.092	0.372	-0.613	-25.508	36.644	-2.759	-106.288	0.941	12.940

### Available Packaging:

70 Package - MwT-PH7F70  
 71 Package - MwT-PH7F71  
 73 Package - MwT-PH7F73

# MwT-PH7F

## 28 GHz Medium Power AlGaAs/InGaAs pHEMT

### Contact Information

For additional information please visit [www.cmlmicro.com](http://www.cmlmicro.com) or contact a sales office.

Europe	America	Asia
<ul style="list-style-type: none"><li>• Maldon, UK</li><li>• Tel +44 (0) 1621 875500</li><li>• <a href="mailto:sales@cmlmicro.com">sales@cmlmicro.com</a></li></ul>	<ul style="list-style-type: none"><li>• Winston-Salem, NC</li><li>• Tel +1 336 744 5050</li><li>• <a href="mailto:us.sales@cmlmicro.com">us.sales@cmlmicro.com</a></li></ul>	<ul style="list-style-type: none"><li>• Singapore</li><li>• Tel +65 6288129</li><li>• <a href="mailto:sg.sales@cmlmicro.com">sg.sales@cmlmicro.com</a></li></ul>

Although the information contained in this document is believed to be accurate, no responsibility is assumed by CML for its use. The product and product information is subject to change at any time without notice. CML has a policy of testing every product shipped using calibrated test equipment to ensure compliance with product specification.

© 2022 CML Microsystems Plc