



400 - 465 MHz POWER AMPLIFIER IC WHM04-2045EPU¹

WHM04-2045EPU amplifier is a 4-Watts, high linearity, unconditional stable, and package amplifier IC with leadless SMT design. The amplifier offers typical gain of 20.5 dB, P_{1dB} of 36 dBm, and output IP_3 of 48 dBm at the frequency range from 400 MHz to 465 MHz. WHM04-2045EPU is most suitable for 400 to 500 MHz band radio, cellular micro cell, and pager applications.

Preliminary

Key Features:

Leadless package:	6-pin with built-in DC block capacitors
Low noise:	4.70 dB
Output IP_3 :	48 dBm
Gain:	20.5 dB
Gain flatness:	+/- 0.30 dB MAX
P_{1dB} :	36 dBm
Positive power supply, V_{dd} :	850 mA @ +10V
Negative power supply, V_{gg} :	50 uA MAX @ -2.10V typical
Frequency range:	400 ~ 465 MHz
Operating temperature:	-40 ~ +65 °C
Return losses:	15 dB typical
Package size:	0.200" x 0.400" x 0.098" (5.08 mm x 10.18 mm x 2.50 mm)

Specifications:

a) Table 1 Summary of the electrical specifications WHM04-2045EPU at room temperature

Index	Testing Item	Symbol	Test Constraints	Unit	Nom (RT)	Min	Max	Unit
1	Gain	S_{21}	400 - 465	MHz	20.5			dB
2	Gain Variation	ΔG	400 - 465	MHz	+/- 0.30			dB
3	Input Return Loss	S_{11}	400 - 465	MHz	14	10		dB
4	Output Return Loss	S_{22}	400 - 465	MHz	15	14		dB
5	Reverse Isolation	S_{12}	400 - 465	MHz		30		dB
6	Noise figure	NF	400 - 465	MHz			5.5	dB
7	Output P_{1dB} compression	P_{1dB}	400 - 465	MHz	36	35		dBm
8	Output-Third-Order Interception point	$TOIP_3$	Two-Tone, Pout +20 dBm each, 1 MHz separation	MHz	48	46		dBm
10	Current Consumption	I_{dd}	$V_{dd} = +10$, $V_{gg} = -2.10V$	V	850			mA
11	Positive Supply Voltage	V_{dd}			+10	+8.0	+12.0	V
12	Negative Supply Voltage	V_{gg}			-2.10	-3.0	-1.0	V
13	Thermal Resistance	$R_{th,c}$	Junction to case				10	°C/W
13	Operating Temperature	T_o				-40	+65	°C

¹ Specifications are subject to change without notice.



Wan7com, Inc.

17350 Horizon Trail, SE
Prior Lake, MN 55372
USA
Tel: 1 952 212 8028
Fax: 1 952 447 8028
e-mail: sales@wantcominc.com
www.wantcominc.com

b) Pass band Frequency Response

As shown in **Figure 1**, the typical gain of the WHM04-2045EPU is 20.5 dB across 400 MHz to 465 MHz. The input and output return losses are 15 dB.

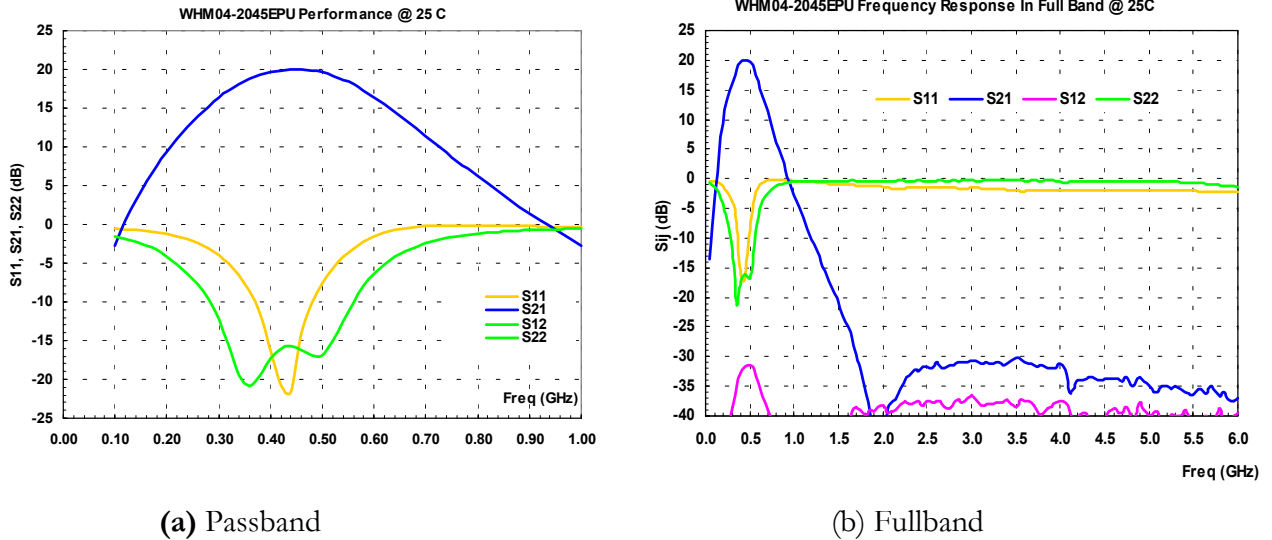
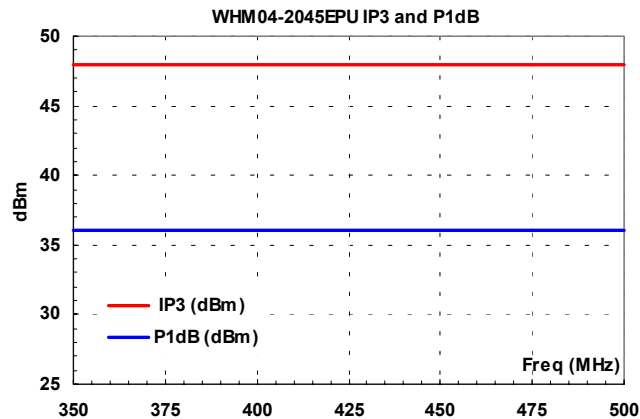


FIG. 1 Typical small signal performance of WHM04-2045EPU

c) Output Power and IP_3

Figure 2 shows the IP_3 and P_{1dB} of WHM04-2045EPU. IP_3 can be improved by increase I_{dd} and V_{dd} .



$V_{dd}=+10.0V$, $I_{dd}=850$ mA

FIG. 2 Typical output power and IP_3 at room temperature.

d) Noise Figure

The noise figure of WHM04-2045EPU is 2.70 dB at room temperature and add 0.25 dB at +85 °C. The noise figures below the frequency of 30 MHz were extrapolated based on the measured S-parameters and noise figures beyond 30 MHz.

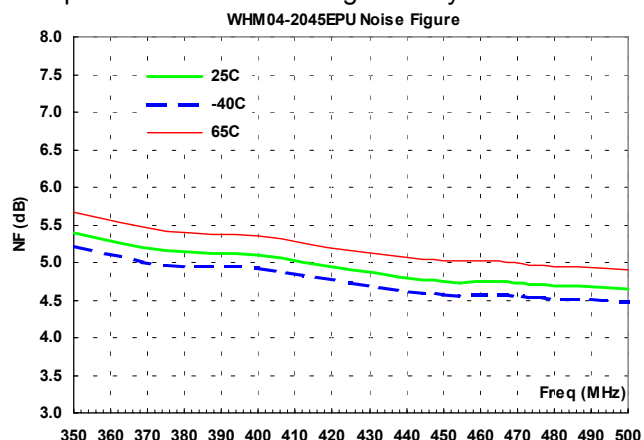


FIG. 3 WHM04-2045EPU noise figure performance at full temperature

e) WHM04-2045EPU Its Foot Print Mechanical Outline:

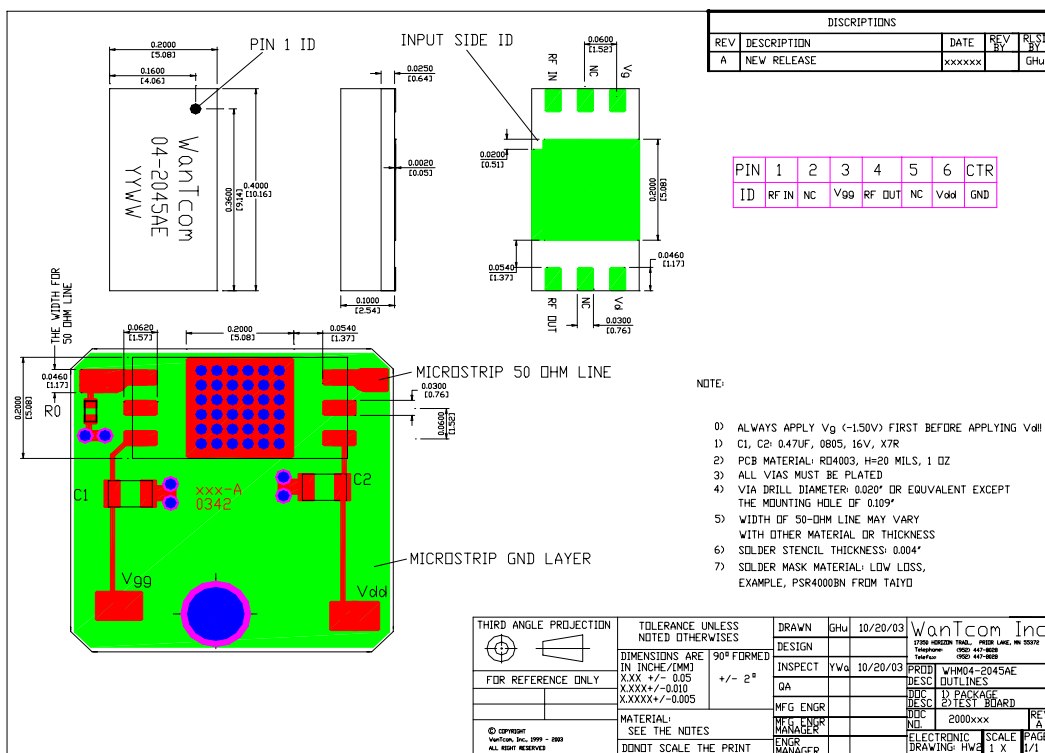


FIG. 4 WHM04-2045EPU and its motherboard or foot print outline



Wan7com, Inc.

17350 Horizon Trail, SE
Prior Lake, MN 55372
USA
Tel: 1 952 212 8028
Fax: 1 952 447 8028
e-mail: sales@wantcominc.com
www.wantcominc.com

f) Ordering Information

Model Number	WHM04-2045EPU
--------------	---------------

g) Small Signal S-Parameters:

! WHM04-2045EPU, WanTcom
! Date: 9/13/03
! $V_{dd}=+10\text{ V}$, $V_{gg}=-2.1\text{ V}$, $I_{dd}=0.85\text{ A}$

GHz s MA R 50

!Freq (GHz)		MAGS11	ANGS11	MAGS21	ANGS21	MAGS12	ANGS12	MAGS22	ANGS22
0.05	0.958	-163.2	0.209	4.8	0.0004	129.3	0.928	-101.2	
0.1	0.937	177.6	0.724	-31.7	0.0006	-155.5	0.834	-141.0	
0.2	0.868	143.8	2.948	-94.1	0.0032	166.7	0.623	152.3	
0.3	0.637	108.8	6.535	-157.2	0.0120	117.0	0.246	110.2	
0.4	0.153	64.7	9.615	133.2	0.0230	49.6	0.138	-173.6	
0.5	0.420	-146.4	9.563	64.5	0.0270	-18.3	0.143	-153.1	
0.6	0.835	173.5	6.641	1.0	0.0190	-82.5	0.477	-139.5	
0.7	0.973	144.3	3.740	-44.3	0.0110	-139.4	0.755	-171.7	
0.8	0.985	123.9	2.048	-75.1	0.0075	166.2	0.872	162.6	
0.9	0.974	108.2	1.177	-97.3	0.0069	120.7	0.919	143.2	
1	0.958	95.1	0.725	-115.7	0.0073	93.4	0.939	126.6	
1.1	0.945	83.1	0.469	-129.7	0.0081	67.4	0.953	112.5	
1.2	0.937	71.9	0.305	-142.0	0.0083	43.0	0.955	99.5	
1.3	0.921	61.4	0.198	-153.8	0.0079	34.1	0.957	87.4	
1.4	0.909	51.3	0.136	-164.2	0.0085	23.7	0.953	76.5	
1.5	0.895	41.6	0.090	-170.4	0.0083	18.6	0.954	65.8	
1.6	0.890	31.8	0.057	-177.9	0.0092	15.5	0.959	54.9	
1.7	0.883	23.1	0.033	174.5	0.0120	2.1	0.961	45.0	
1.8	0.871	13.4	0.016	164.7	0.0100	-0.6	0.955	35.3	
1.9	0.859	4.0	0.008	-151.3	0.0110	-15.5	0.958	25.4	
2	0.850	-5.2	0.006	-79.4	0.0120	-10.2	0.961	15.9	
2.1	0.828	-12.6	0.013	-62.7	0.0110	-26.7	0.956	6.4	
2.2	0.828	-20.3	0.018	-64.2	0.0130	-18.0	0.965	-3.1	
2.3	0.835	-28.3	0.022	-66.0	0.0130	-23.5	0.962	-12.1	
2.4	0.839	-36.8	0.024	-70.5	0.0130	-38.4	0.966	-21.1	
2.5	0.837	-45.3	0.026	-85.3	0.0130	-32.2	0.961	-30.0	
2.6	0.838	-53.7	0.029	-83.5	0.0140	-44.4	0.961	-40.0	
2.7	0.840	-62.0	0.025	-90.3	0.0120	-49.7	0.964	-49.3	
2.8	0.835	-70.0	0.026	-91.6	0.0130	-58.7	0.965	-58.1	
2.9	0.831	-78.0	0.028	-100.4	0.0130	-61.2	0.965	-67.0	
3	0.834	-86.3	0.029	-98.7	0.0150	-71.1	0.966	-76.2	
3.1	0.832	-93.9	0.028	-108.9	0.0120	-74.9	0.959	-85.3	
3.2	0.829	-101.9	0.027	-109.6	0.0130	-74.3	0.967	-93.4	
3.3	0.823	-110.2	0.029	-112.5	0.0130	-79.9	0.971	-102.9	
3.4	0.808	-117.7	0.028	-116.4	0.0140	-78.3	0.964	-111.7	
3.5	0.798	-125.7	0.031	-122.4	0.0120	-85.7	0.966	-119.8	
3.6	0.783	-131.4	0.029	-126.9	0.0130	-97.1	0.963	-128.0	
3.7	0.795	-138.3	0.027	-130.0	0.0120	-96.0	0.966	-136.7	
3.8	0.800	-145.4	0.027	-128.9	0.0100	-96.1	0.962	-145.5	
3.9	0.796	-152.7	0.025	-134.6	0.0120	-105.3	0.967	-153.3	
4	0.799	-159.5	0.028	-148.2	0.0130	-114.9	0.946	-161.9	
4.1	0.799	-166.6	0.016	-151.4	0.0110	-114.2	0.939	-168.3	
4.2	0.807	-173.2	0.020	-140.3	0.0098	-125.0	0.955	-175.1	
4.3	0.799	-179.8	0.021	-141.5	0.0100	-131.2	0.964	177.3	
4.4	0.803	173.7	0.021	-141.1	0.0088	-117.9	0.956	168.5	
4.5	0.804	166.8	0.020	-149.4	0.0093	-132.6	0.950	161.8	
5	0.801	134.4	0.018	-155.9	0.0100	-144.0	0.950	123.9	
5.5	0.793	103.2	0.015	-167.3	0.0084	-151.6	0.916	85.5	
6	0.768	72.2	0.014	172.8	0.0110	172.3	0.857	50.6	