820-960 MHz 55 W POWER AMPLIFIER WPA08-3055A[1]

WPA08-3055A high power amplifier is a high linearity amplifier with unconditional stable design. The amplifier offers typical minimum output IP3 of 53 dBm with added power efficiency of 31% at total two-tone power of 43 dBm in the frequency range from 820 MHz to 890 MHz and P_{1dB} of 55 W from the frequency range from 800 MHz to 1000 MHz.

The alarm system includes true case temperature measurement output, over heat protection, over power alarm, soft failure alarm, hard failure alarm, branch 1 amp alarm, branch 2 amp alarm, soft alarm open collector, and hard alarm open collector.

WPA08-3055A PA is most suitable for cellular base stations of CDMA, TDMA, and GSM, wireless data communications, cellular micro-cells, last-mile wireless communication systems.

Key Features:

Impedance:	50 Ohm
Unconditional Stability:	k>1
Output IP3:	53 dBm @ two-tone, 40 dBm each @0.82 – 0.90 GHz
ACPR:	-52 dBc, 3kHz integrated bandwidth, 2.5 MHz spacing, 10 W each of two CDMA carriers, 0.82 – 0.90 GHz
High Efficiency	>30%, @ two-tone, 40 dBm each, 0.82 – 0.90 GHz; >42%, 50 W Output, 0.89 – 0.96 GHz
Gain:	30 dB
P1dB:	47.5 dBm typical
Current Consumption:	0.64 A @ +26V w/o signal, V_{dd}: +24V ~ +28V
Frequency Range:	820 ~ 960 MHz
Operating Temperature[2]:	0 ~ +70 ºC
Input Return Losses:	20 dB
Output Return Losses:	16 dB
Temperature monitoring:	0.01V per 1 ^{0}C
Overheat protection:	85~ 90 ^{0}C temperature threshold auto shut down
Over power protection:	> 55W Pout threshold auto show down
TTL Alarm Outputs:	soft failure alarm, hard failure alarm, branch 1 amp alarm, Branch 2 amp alarm, soft alarm open collector, and hard alarm open collector
Compact Size:	3.5” x 2.0” x 0.7”

Absolute Maximum Ratings[3]:

Symbol	Parameters	Units	Absolute Maximum
V_{dd}	DC Power Supply Voltage	V	30
I_{dd}	Drain Current	A	4.5
P_{diss}	Total Power Dissipation	W	130
$P_{In,Max}$	RF Input Power	dBm	23
T_{ch}	Channel Temperature	°C	175
T_{STG}	Storage Temperature	°C	-40 ~ +85
$T_{O,MAX}$	Maximum Operating Temperature	°C	-40 ~ +85
$R_{th,c}$	Thermal Resistance	°C/W	1.50

[1] Specifications are subject to change without notice.
[2] Additional heat sink is required.
[3] Operation of this device above any one of these parameters may cause permanent damage.

Specifications:

a) Table 1 Summary of the electrical specifications WPA08-3055A at room temperature

Index	Testing Item	Symbol	Test Constraints	Nom (RT)	Min	Max	Unit
1	Gain	S_{21}	820 - 960 MHz	31			dB
2	Gain Variation	ΔG	820 - 960 MHz		30	33	dB
3	Input Return Loss	S_{11}	820 - 960 MHz		20		dB
4	Output Return Loss	S_{22}	820 - 960 MHz		16		dB
5	Reverse Isolation	S_{12}	820 - 960 MHz		42		dB
6	Noise figure	NF	820 - 960 MHz	7.0			dB
7	Output P_{1dB} compression	P_{1dB}	820 - 960 MHz	47.5	46		dBm
8	Output-Third-Order Interception point	$TOIP_3$	Two-Tone,Pout +40 dBm each, 1 MHz separation, 0.82~0.89 GHz	55	53		dBm
9	Current Consumption	I_{dd}	V_{dd}= +26 V		0.65	3.0	A
10	Power Supply Voltage	V_{dd}		+26	+22	+30	V
11	Added Power Efficiency	η	Pout =43 dBm	30			%
12	Soft Alarm TTL Output	Vs	Normal/Fail	4.65/0.0			V
	Soft Alarm Open Collector Output	Vso	Normal/Fail, External 10K to an external +Vcc	Low/High			
	Hard Alarm TTL Output	Vh	Normal/Fail	4.65/0.0			V
	Hard Alarm Open Collector Output	Vho	Normal/Fail, External 10K to an external +Vcc	Low/High			
	Branch 1 Alarm TTL Output	Va1	Normal/Fail	4.65/0.0			V
	Branch 2 Alarm TTL Output	Va2	Normal/Fail	4.65/0.0			V
13	Case Temp Output	V_T	0 – 85 ^{0}C	0.250	0.00	0.850	V
14	Over Heat Protection[4]	Tp		85			^{0}C
15	Over Power Protection	Pp		55			W
16	LED Display		Normal/Fail	Green/Red			

b) Passband Performance

As shown in **FIG. 1**, the typical small signal gain of the WPA08-3055A is 31 dB across 820 MHz to 960MHz. The input and output return losses are typical 25 dB and 17 dB, respectively. The return losses change little with the output power level due to the balance design. The amplifier can handle output open or short load mismatch.

FIG. 2 shows IP_3, I_{dd}, and added power efficiency vs. output power of WPA08-3055A. The added efficiency is better than 30% at 20 W total output power while maintaining the two-tone IP3 better than 53 dBm at the frequency range from 820 MHz to 890 MHz. The Adjacent Channel Power Ratio is –52 dBc for two CDMA carriers with total power of 20 W at the frequency range from 820 MHz to 890 MHz.

FIG. 3 illustrates the stability factor of he amplifier. It is unconditional stable due to k is great than 1 at any frequency.

Sufficient heat sink is required for the normal operation of the power amplifier. The case-to-air thermal resistance of the heat sink should be less than 0.60 ^{0}C/W for a natural cooled heat sink. The fan may be needed.

[4] The normal operation will be restored in 3 to 10 seconds. The LED display turns from Red to Green color

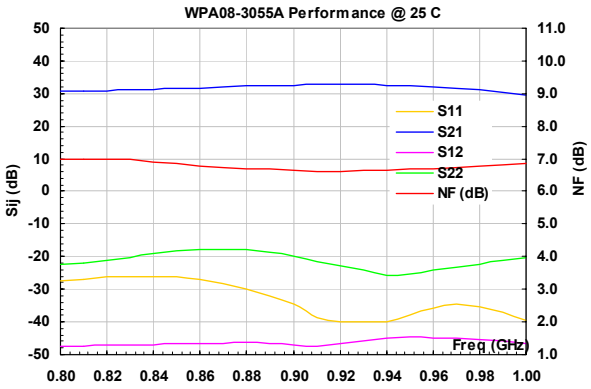

FIG. 1 Small signal performance of WPA08-3055A

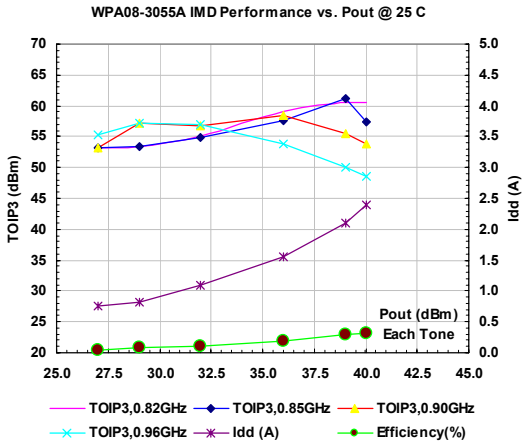

FIG. 2 Output IP_3, I_{dd}, and Added power efficiency

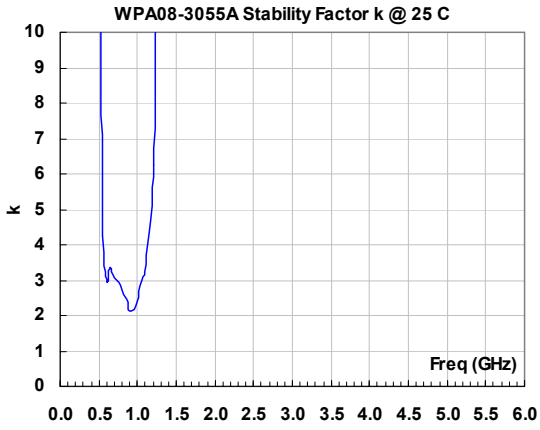

FIG. 3 Stability factor k of WPA08-3055A

Mechanical Outline: WP-1C

Pin	Function
1	Hard Alarm
2	Alarm 1
3	Soft Alarm Open Collector
4	Hard Alarm Open Collector
5	Soft Alarm
6	Alarm 2
7	Ground
8	Temperature Monitoring Output

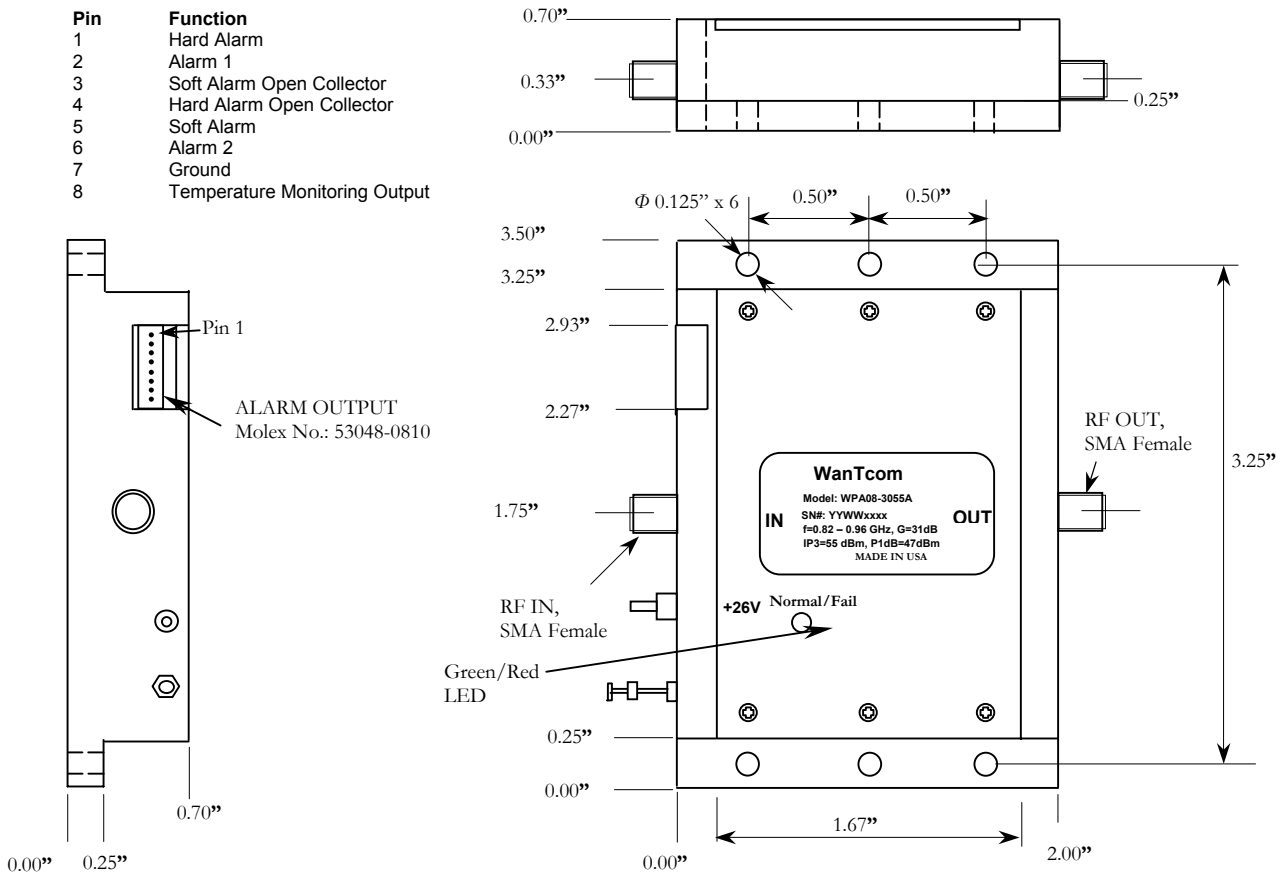

FIG. 4 Mechanical outline of WPA08-3055A

WPA08-3055A Mechanical Outline, WP-1C:

FIG. 4 shows the mechanical outline of WPA08-3055A. It is a WanTcom's standard WP-1C housing without plating. Both RF input and output ports are equipped with SMA female connectors and the DC port connector is an EMI filtered feed thru pin.

Ordering Information

Model Number	WPA08-3055A

Small Signal S-Parameters:

! WPA08-3055A 50W PA.
! Vdd =+26V, Idd = 640 mA, Ta= 25 C, Date: 5-4-03

ghz s ma r 50

0.05	0.99	-17.4	0.00	-102.5	0.0007	37.1	0.99	-54.9
0.1	0.98	-35.4	0.00	-81.2	0.0010	179.4	0.99	-99.6
0.2	0.93	-78.1	0.01	64.5	0.0004	166.0	0.95	-165.7
0.3	0.63	-147.5	0.04	76.6	0.0004	108.8	0.77	150.4
0.4	0.13	45.5	0.71	-76.4	0.0006	11.2	0.75	117.4
0.5	0.30	-81.7	6.33	160.3	0.0010	37.7	0.55	39.5
0.55	0.26	-115.1	17.90	62.6	0.0010	135.6	0.31	111.0
0.6	0.20	-144.6	25.37	-31.5	0.0024	65.7	0.40	87.7
0.65	0.12	-172.9	30.94	-112.5	0.0027	3.5	0.37	63.9
0.7	0.06	158.4	32.08	174.0	0.0037	-39.6	0.30	33.5
0.75	0.02	35.3	32.85	109.1	0.0035	-63.9	0.17	6.0
0.8	0.04	-54.9	33.72	48.5	0.0042	-109.7	0.07	26.2
0.85	0.05	-91.8	37.08	-10.9	0.0046	-134.1	0.13	37.2
0.9	0.02	-144.0	42.58	-79.5	0.0045	177.3	0.10	-39.3
0.95	0.01	-12.4	41.24	-156.7	0.0058	142.0	0.06	164.4
1	0.01	-129.2	30.57	127.9	0.0048	100.8	0.10	118.0
1.1	0.14	61.5	12.28	-5.7	0.0038	30.5	0.41	14.7
1.2	0.28	18.0	3.43	-119.8	0.0027	-51.4	0.70	-83.0
1.3	0.42	-17.1	0.80	154.0	0.0010	-70.4	0.87	-150.9
1.4	0.55	-50.0	0.20	94.0	0.0010	-148.4	0.93	163.4
1.5	0.66	-83.1	0.06	44.5	0.0006	153.6	0.95	128.0
1.6	0.73	-116.8	0.02	2.9	0.0011	100.5	0.96	96.8
1.7	0.76	-151.7	0.00	-39.9	0.0006	-155.6	0.95	68.4
1.8	0.76	171.0	0.01	94.1	0.0006	-155.9	0.92	38.6
1.9	0.74	131.1	0.01	34.3	0.0007	-31.7	0.84	4.0
2	0.69	90.4	0.00	-12.2	0.0009	-72.4	0.66	-40.7
2.1	0.64	51.5	0.01	-104.5	0.0003	-122.1	0.34	-99.4
2.2	0.63	15.7	0.01	-157.3	0.0006	171.3	0.08	131.7
2.3	0.63	-16.6	0.01	151.2	0.0007	-77.0	0.18	11.2
2.4	0.63	-46.6	0.01	134.5	0.0010	-7.8	0.19	-55.2
2.5	0.64	-73.6	0.01	53.7	0.0026	-123.9	0.12	-134.5
2.6	0.65	-99.4	0.01	65.4	0.0077	122.5	0.10	-142.0
2.7	0.66	-124.5	0.02	-73.5	0.0063	175.4	0.16	154.7
2.8	0.67	-155.9	0.01	167.5	0.0066	60.3	0.62	152.9
2.9	0.56	162.7	0.00	98.0	0.0042	21.9	0.81	95.2
3	0.27	114.6	0.01	98.5	0.0032	47.6	0.88	56.3
3.5	0.21	-175.2	0.01	174.9	0.0082	163.6	0.63	-149.6
4	0.53	171.4	0.02	-82.9	0.0170	-79.0	0.33	-132.2
4.5	0.59	80.2	0.00	77.9	0.0023	32.6	0.28	-121.5
5	0.41	20.2	0.00	129.3	0.0031	137.6	0.84	-119.8
5.5	0.31	-28.0	0.01	121.1	0.0076	140.8	0.54	156.4
6	0.21	-110.1	0.00	-153.5	0.0016	118.4	0.35	-111.9

******