

# be quiet! Pure Power 12 M 1000W

Anex

Lab ID#: BQ10002159 Receipt Date: Feb 17, 2023 Test Date: Mar 24, 2023

### Report: 23PS2159A

Report Date: Mar 30, 2023

DUT INFORMATION	
Brand	be quiet!
Manufacturer (OEM)	HEC
Series	Pure Power 12 M
Model Number	L12-M-1000W
Serial Number	345H2489000008
DUT Notes	

# DUT SPECIFICATIONS

Rated Voltage (Vrms)	100-240
Rated Current (Arms)	12-6
Rated Frequency (Hz)	50-60
Rated Power (W)	1000
Туре	ATX12V
Cooling	120mm Rifle Bearing Fan (BQ QF2-12025-HS)
Semi-Passive Operation	×
Cable Design	Fully Modular

### **TEST EQUIPMENT** Chroma 63601-5 x2 Chroma 63600-2 **Electronic Loads** 63640-80-80 x10 63610-80-20 Chroma 6530, APM SP300VAC4000W-P AC Sources RS HMC8015, N4L PPA1530, N4L PPA5530 **Power Analyzers** Picoscope 4444, Rigol DS7014, Siglent SDS2104X PLUS Oscilloscopes Sound Analyzer Bruel & Kjaer 2270 G4 Microphone Bruel & Kjaer Type 4955-A Temperature Logger Picoscope TC-08 Tachometer **UNI-T UT372** Multimeters Keysight 34465A, Keithley 2015 - THD UPS FSP Champ Tower 3kVA, CyberPower OLS3000E 3kVA 4kVA Isolation Transformer

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# EFFICIENCY AND NOISE LEVEL CERTIFICATIONS

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# RESULTSTemperature Range (°C /°F)30-32 / 86-89.6ErP Lot 3/6 Ready.(EU) No 617/2013 Compliance.ALPM (Alternative Low Power Mode) compatible.ATX v3.0 PSU Power Excursion.

115V		230V	
Average Efficiency	89.674%	Average Efficiency	91.506%
Efficiency With 10W (≤500W) or 2% (>500W)	78.400	Average Efficiency 5VSB	80.284%
Average Efficiency 5VSB	80.629%	Standby Power Consumption (W)	0.0955000
Standby Power Consumption (W)	0.0552000	Average PF	0.955
Average PF	0.983	Avg Noise Output	30.91 dB(A)
Avg Noise Output	30.47 dB(A)	Efficiency Rating (ETA)	PLATINUM
Efficiency Rating (ETA)	PLATINUM	Noise Rating (LAMBDA)	Standard++
Noise Rating (LAMBDA)	Standard++		

### **POWER SPECIFICATIONS**

Rail		3.3V	5V	12V(1)	12V(2)	5VSB	-12V
Max. Power	Amps	22	22	46	42	3	0.3
	Watts	120		1000		15	3.6
Total Max. Power (W)		1000					

### HOLD-UP TIME & POWER OK SIGNAL (230V)

Hold-Up Time (ms)	20.1
AC Loss to PWR_OK Hold Up Time (ms)	17.3
PWR_OK Inactive to DC Loss Delay (ms)	2.8

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# **CABLES AND CONNECTORS**

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Description	Cable Count	Connector Count (Total)	Gauge	In Cable Capacitors
ATX connector 20+4 pin (550mm)	1	1	16-20AWG	No
4+4 pin EPS12V (600mm)	1	1	18AWG	No
8 pin EPS12V (600mm)	1	1	18AWG	No
6+2 pin PCle (500mm+150mm)	2	4	16-18AWG	No
12+4 pin PCle (600mm) (600W)	1	1	16-28AWG	No
SATA (500mm+150mm+150mm+150mm)	1	4	18AWG	No
SATA (500mm+150mm) / 4-pin Molex (+150mm+150mm)	1	2/2	18AWG	No
AC Power Cord (1400mm) - C13 coupler	1	1	18AWG	-

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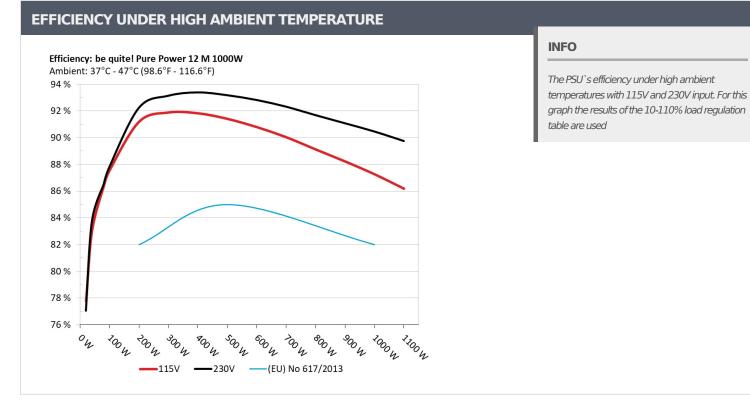
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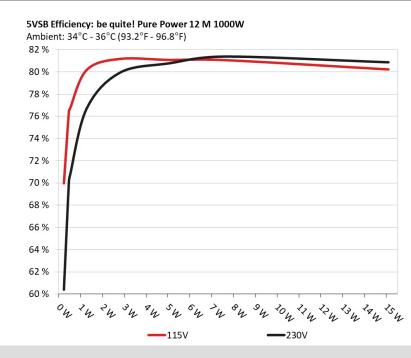


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# **5VSB EFFICIENCY**



INFO

This graph depicts the efficiency levels of the 5VSB rail with 115V and 230V input

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5VSB EFFICIENCY -115V (ERP LOT 3/6 & CEC)						
Test #	5VSB	DC/AC (Watts)	Efficiency	PF/AC Volts		
1	0.045A	0.23W		0.03		
1	5.103V	0.329W	69.975%	114.87V		
2	0.09A	0.459W		0.054		
2	5.102V	0.601W	76.457%	114.87V		
3	0.55A	2.8W	01 1710/	0.25		
	5.092V	3.449W	81.171%	114.87V		
4	1A	5.081W	01 0770/	0.352		
4	5.081V	6.267W	81.077%	114.86V		
-	1.5A	7.605W	01.0000/	0.405		
5	5.07V	9.381W	81.062%	114.87V		
6	3A	15.108W	00.00.40/	0.477		
6	5.036V	18.832W	80.224%	114.86V		

# 5VSB EFFICIENCY -230V (ERP LOT 3/6 & CEC)

Test #	5VSB	DC/AC (Watts)	Efficiency	PF/AC Volts
1	0.045A	0.23W		0.01
	5.103V	0.382W	60.403%	229.88V
2	0.09A	0.459W	70,1070/	0.018
	5.102V	0.656W	70.127%	229.88V
3	0.55A	2.8W	70.0440/	0.091
	5.092V	3.503W	79.944%	229.88V
4	1A	5.081W	- 00 7000/	0.154
4	5.081V	6.29W	80.788%	229.88V
-	1.5A	7.605W	- 01 200/	0.209
5	5.07V	9.345W	81.39%	229.88V
C	ЗА	15.108W	00.0740/	0.32
6	5.036V	18.68W	80.874%	229.88V

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# **EFFICIENCY AND NOISE LEVEL CERTIFICATIONS**

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# **115V**

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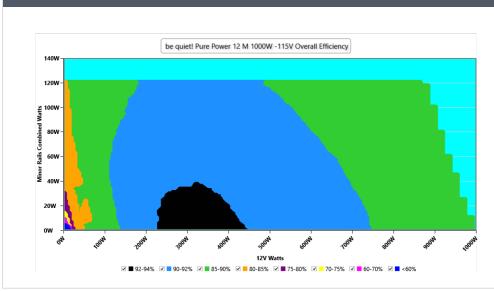
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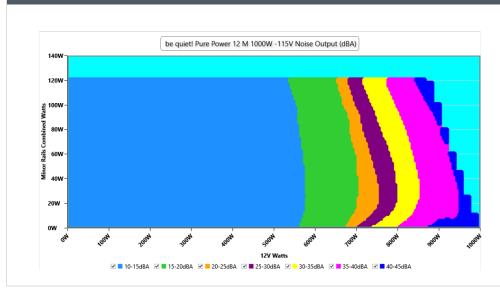
### **EFFICIENCY GRAPH 115V**



### INFO

This graph depicts the PSU's efficiency throughout its entire operational range. For the generation of the efficiency and noise graphs we set our loaders to auto mode through our custom-made software before trying thousands of possible load combinations

## **NOISE GRAPH 115V**



### INFO

The PSU's noise in its entire operational range and under 30-32 °C ambient is depicted in this graph. The X axis represents the load on the +12V rail(s) while the Y axis is the load on the minor rails

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### VAMPIRE POWER -115V

Detailed Results								
	Average	Min	Limit Min	Max	Limit Max	Result		
Mains Voltage RMS:	114.88 V	114.82 V	113.85 V	114.93 V	116.15 V	PASS		
Mains Frequency:	60.00 Hz	59.98 Hz	59.40 Hz	60.01 Hz	60.60 Hz	PASS		
Mains Voltage CF:	1.418	1.417	1.340	1.421	1.490	PASS		
Mains Voltage THD:	0.15 %	0.09 %	N/A	0.27 %	2.00 %	PASS		
Real Power:	0.055 W	0.033 W	N/A	0.080 W	N/A	N/A		
Apparent Power:	11.136 W	11.104 W	N/A	11.170 W	N/A	N/A		
Power Factor:	0.006	N/A	N/A	N/A	N/A	N/A		

### INFO

This graph is generated by the PPA Standby Power Analysis software which takes full control of the power analyzer during the whole procedure. This application features all of the EN50564 & IEC62301 test limits for standby power software testing

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10-1	10-110% LOAD TESTS 115V									
Test	12V	5V	3.3V	5VSB	DC/AC (Watts)	Efficiency	Fan Speed (RPM)	PSU Noise (dB[A])	Temps (In/Out)	PF/AC Volts
10%	6.470A	2.008A	2.008A	0.984A	99.963	87.549%	734	12.4	40.22°C	0.958
10 %	12.113V	4.978V	3.285V	5.081V	114.181	07.04970	754	12.4	44.45°C	114.84V
20%	13.989A	3.014A	3.016A	1.184A	199.899	91.181%	734	12.4	40.81°C	0.975
2070	12.081V	4.975V	3.282V	5.067V	219.231	91.10170	7.54	12.4	45.51°C	114.8V
30%	21.874A	3.518A	3.521A	1.384A	299.934	91.875%	736	12.4	41.36°C	0.978
50%	12.064V	4.974V	3.28V	5.056V	326.462	91.075%	750	12.4	46.39°C	114.77V
400/	29.726A	4.022A	4.027A	1.586A	399.385	01 01 00/	737	12.4	41.72°C	0.982
40%	12.049V	4.972V	3.278V	5.045V	434.974	91.818%	151	12.4	47.21°C	114.74V
50%	37.278A	5.031A	5.038A	1.788A	499.129	91.404%	753	13.3	42.39°C	0.986
JU /0	12.035V	4.969V	3.275V	5.033V	546.074	91.40470	733	13.3	48.41°C	114.7V
60%	44.916A	6.04A	6.052A	1.992A	599.681	90.785%	870	17.7	42.52°C	0.99
00 %	12.020V	4.967V	3.272V	5.021V	660.551	90.76576	870	17.7	49.18°C	114.67V
70%	52.511A	7.05A	7.067A	2.196A	699.435	90.031%	1% 1216	28.4	43.18°C	0.992
7070	12.004V	4.964V	3.269V	5.009V	776.875	90.03176			50.24°C	114.63V
80%	60.199A	8.001A	8.083A	2.3A	799.191	89.119%	1791	39.5	43.92°C	0.994
0070	11.986V	4.962V	3.266V	4.999V	896.772	09.11970	1751	59.5	52.05°C	114.6V
90%	68.242A	8.569A	8.58A	2.405A	899.291	88.219%	1886	1886 41.3	44.5°C	0.995
9070	11.970V	4.96V	3.263V	4.99V	1019.396	00.21970	1000	41.5	53.58°C	114.55V
100%	76.105A	9.077A	9.109A	3.02A	999.339	87.261%	1883	41.2	45.66°C	0.996
10070	11.953V	4.958V	3.26V	4.968V	1145.231	07.20170	1005	41.2	55.69°C	115.04V
110%	83.924A	10.09A	10.223A	3.025A	1099.964	86.174%	1882	41.2	46.65°C	0.997
11070	11.935V	4.955V	3.257V	4.959V	1276.451	00.17470	1002	41.2	57.59°C	115.06V
CL1	0.114A	14.564A	14.572A	0A	121.301	84.078%	797	15.1	41.02°C	0.96
	12.119V	4.958V	3.273V	5.088V	144.272	04.07070	191	13.1	46.56°C	115.93V
CL2	0.114A	22.205A	0A	0A	111.304	82.549%	766	14.0	41.34°C	0.964
	12.125V	4.95V	3.286V	5.096V	134.837	02.34970	700	14.0	48.42°C	115.95V
CL3	0.114A	0A	22.189A	0A	73.982	76.456%	747	13.0	41.19°C	0.953
	12.124V	4.981V	3.272V	5.09V	96.766	/ 0.40/0	/4/	13.0	50.27°C	115.97V
CL4	83.601A	0A	0A	0A	999.875	87.95%	1892	41.6	45.79°C	0.996
	11.960V	4.977V	3.273V	5.049V	1136.882	0/66.10	1092	41.0	56.74°C	115.21V

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20-80W LOAD TESTS 115V										
Test	12V	5V	3.3V	5VSB	DC/AC (Watts)	Efficiency	Fan Speed (RPM)	PSU Noise (dB[A])	Temps (In/Out)	PF/AC Volts
2014	1.225A	0.501A	0.501A	0.196A	19.985	77 7710/	700	10	36.53°C	0.827
20W	12.109V	4.984V	3.29V	5.099V	25.696	77.771%	729	12	39.58°C	114.86V
40144	2.700A	0.702A	0.702A	0.294A	39.987	00.0000/	728	12.1	37.35°C	0.912
40W	12.105V	4.982V	3.288V	5.097V	48.178	82.999%			40.68°C	114.86V
C0144	4.174A	0.903A	0.903A	0.392A	59.986	86.362% 728	10.1	38.02°C	0.941	
60W	12.102V	4.981V	3.288V	5.094V	69.459		728	12.1	41.79°C	114.85V
00144	5.638A	1.104A	1.104A	0.491A	79.914	05 2020/	700	12.2	39.07°C	0.952
80W	12.112V	4.98V	3.287V	5.094V	93.695	85.293%	733		43.05°C	114.84V

### **RIPPLE MEASUREMENTS 115V**

Test	12V	5V	3.3V	5VSB	Pass/Fail
10% Load	11.46mV	10.93mV	9.08mV	11.13mV	Pass
20% Load	18.67mV	11.50mV	9.13mV	11.44mV	Pass
30% Load	14.07mV	10.62mV	9.85mV	11.08mV	Pass
40% Load	13.81mV	11.39mV	9.75mV	11.29mV	Pass
50% Load	14.27mV	11.96mV	11.19mV	11.60mV	Pass
60% Load	14.32mV	11.91mV	11.24mV	12.73mV	Pass
70% Load	14.73mV	12.52mV	11.70mV	12.26mV	Pass
80% Load	15.39mV	11.80mV	12.82mV	12.47mV	Pass
90% Load	15.19mV	13.29mV	12.47mV	12.42mV	Pass
100% Load	22.03mV	14.76mV	14.59mV	16.09mV	Pass
110% Load	23.58mV	14.91mV	15.69mV	17.43mV	Pass
Crossload1	15.23mV	19.20mV	19.66mV	13.14mV	Pass
Crossload2	16.01mV	21.09mV	17.14mV	11.19mV	Pass
Crossload3	17.69mV	15.81mV	16.78mV	10.16mV	Pass
Crossload4	22.41mV	11.49mV	10.12mV	13.04mV	Pass

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# EFFICIENCY AND NOISE LEVEL CERTIFICATIONS

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# **230V**

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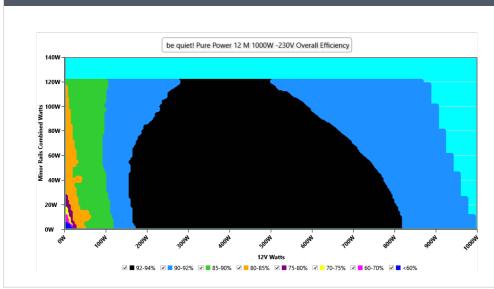
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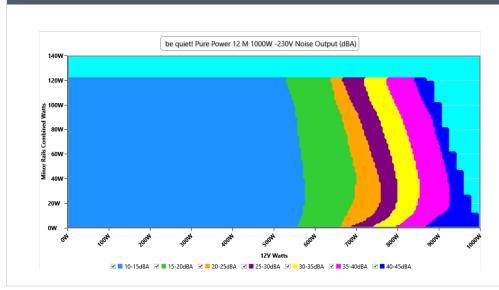
### **EFFICIENCY GRAPH 230V**



### INFO

This graph depicts the PSU's efficiency throughout its entire operational range. For the generation of the efficiency and noise graphs we set our loaders to auto mode through our custom-made software before trying thousands of possible load combinations

## **NOISE GRAPH 230V**



## INFO

The PSU's noise in its entire operational range and under 30-32 °C ambient is depicted in this graph. The X axis represents the load on the +12V rail(s) while the Y axis is the load on the minor rails

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### VAMPIRE POWER -230V

Detailed Results									
	Average	Min	Limit Min	Мах	Limit Max	Result			
Mains Voltage RMS:	229.88 V	229.82 V	227.70 V	229.95 V	232.30 V	PASS			
Mains Frequency:	50.00 Hz	49.99 Hz	49.50 Hz	50.01 Hz	50.50 Hz	PASS			
Mains Voltage CF:	1.416	1.415	1.340	1.417	1.490	PASS			
Mains Voltage THD:	0.13 %	0.09 %	N/A	0.20 %	2.00 %	PASS			
Real Power:	0.095 W	0.049 W	N/A	0.150 W	N/A	N/A			
Apparent Power:	37.542 W	37.496 W	N/A	37.588 W	N/A	N/A			
Power Factor:	0.002	N/A	N/A	N/A	N/A	N/A			

### INFO

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10% 10%12112V4.979V3.286V5.08V113.83887.814%74013.144.57°C229.86V20% 12.079V3.014A3.015A1.184A199.904 $_{2.23\%}$ $_{737}$ $_{12.4}$ 40.73°C0.93320% 12.079V4.976V3.283V5.067V216.747 $_{2.23\%}$ $_{737}$ $_{12.4}$ 4.54°C229.85V30% 12.062V4.974V3.51A3.52A1.385A299.38 $_{93.135\%}$ $_{737}$ $_{12.4}$ 4.64°C229.85V40% 12.062V4.974V3.281V5.055V322.042 $_{93.135\%}$ $_{737}$ $_{12.4}$ 4.13°C0.95440% 12.046V4.973V3.276V5.044V427.676 $_{93.135\%}$ $_{738}$ $_{12.7}$ 4.18°C0.96350% 12.02V4.97V3.275V5.033V535.669 $_{93.177\%}$ $_{738}$ $_{12.6}$ 4.33°C2.29.8V60% 12.017V4.968V3.275V5.033V535.669 $_{93.177\%}$ $_{750}$ $_{13.6}$ 43.3°C0.97670% 12.02V4.96V3.275V5.03V55.757 $_{23.27\%}$ $_{23.27\%}$ $_{23.27\%}$ $_{23.17}$ 4.33°C0.97970% 12.02V4.96V3.267V5.V87.1555 $_{20.97\%}$ $_{23.27\%}$ $_{23.17\%}$ $_{33.86\%}$ 0.97270% 12.02V4.96V3.267V5.V87.1555 $_{20.27\%}$ $_{23.17\%}$ $_{23.17\%}$ $_{23.17\%}$ $_{23.17\%}$ $_{23.17\%}$ <	Test	12V	5V	3.3V	5VSB		Efficiency	Speed		-	
12.112v         4.979v         3.286v         5.08v         113.838         44.57°         229.68v           20%         13.993A         3.014A         3.015A         1.184A         199.04u $2.23^{\circ}$ $737$ $12.4$ $40.73^{\circ}$ C $29.33$ 30% $21.079v$ $4.976v$ $32.83v$ $5067v$ $216.747$ $92.33^{\circ}$ $737$ $12.4$ $40.36^{\circ}$ C $229.85v$ $30\%$ $21.078v$ $4.974v$ $3524v$ $1385A$ $299.38v$ $737$ $12.4$ $40.36^{\circ}$ C $229.85v$ $40\%$ $22073v$ $4.974v$ $32.8v$ $505v$ $322.8v$ $738$ $12.7$ $41.8^{\circ}$ C $29.38v$ $40\%$ $4.973v$ $32.78v$ $504v$ $42.767c$ $93.386\%$ $738$ $12.0$ $4.97v$ $229.8v$ $93.17\%$ $12.01v$ $4.97v$ $32.78v$ $5034v$ $52.518$ $7049$ $32.75v$ $50.3v$ $57.57v$ $92.18\%$ $864$ $17.5$ $43.3^{\circ}$ C $9.97v$ $20.02v$ $4.965v$ <td>100/</td> <td>6.470A</td> <td>2.008A</td> <td>2.008A</td> <td>0.984A</td> <td>99.967</td> <td>07 01 /0/</td> <td>740</td> <td>10.1</td> <td>40.36°C</td> <td>0.857</td>	100/	6.470A	2.008A	2.008A	0.984A	99.967	07 01 /0/	740	10.1	40.36°C	0.857
20% 112.079V4.976V3.283V5.067V216.74792.23%73712.445.48°C229.85V30% 12.062V4.974V3.52A1.385A299.9389.3.135%73712.441.36°C0.95430% 12.062V4.974V3.281V5.055V322.0429.3.135%73712.441.66°C229.83V40% 12.062V4.974V3.281V5.055V322.0429.3.86%73812.741.81°C0.96340% 12.046V4.973V3.278V5.044V427.6769.3.86%73812.741.81°C0.96350% 12.032V4.97V3.275V5.033V535.6699.3.17%75013.043.55°C229.8V60% 12.017V4.968V3.273V5.021V646.05992.818%8641.7549.56°C0.97670% 12.002V4.964V3.27V5.009V75.75792.322%1.20549.33°C0.979229.7V70% 12.002V4.964V3.27V5.009V75.7579.1689%1.7643.84°C0.9829.77V80% 11.984V4.964V3.264V4.99V97.21991.689%1.7663.81°C229.75V80% 11.986V4.964V3.264V4.99V97.2811.7663.81°C2.917V80% 11.986V4.961V3.264V4.99V987.2811.7663.81°C2.917V8111.986V4.961V3.264V4.99V987.2811.8851.	10%	12.112V	4.979V	3.286V	5.08V	113.838	07.014%	740	13.1	44.57°C	229.86V
12.079V       4.976V       3.283V       5.067V       216.747       45.48°C       229.85V         30%       21.878A       3.51A       3.52A       1.385A       299.938 $_{3.135%}$ 737 $_{1.24}$ 4.1.36°C       229.85V         40%       20.734A       4.022A       4.026A       1.586A       399.392 $_{3.386\%}$ 737 $_{1.24}$ 4.18°C       0.963         40%       20.734A       4.022A       4.026A       1.586A       399.392 $_{3.386\%}$ 738 $_{1.24}$ 4.18°C       0.963         50%       32.284Z       5.03A       5.03A       1.788A       499.124 $_{3.377}$ $_{737}$ $_{1.02}$ 4.234°C       0.97         2002V       4.97V       3.275V       5.03V       535.669 $_{2.1876}$ $_{7.50}$ $_{1.30}$ 42.36°C       0.976         40.04       6.039A       6.05A       1.992A       599.66 $_{2.2187A}$ $_{2.017V}$ 4.383°C       2.29.87V         12002V       4.964V       3.27V       5.009V       75.57 $_{2.328^{-1}}$ $_{2.318^{-1}}$ $_{2.33^{-1}}$ $_{3.33^{-1}}$ $_{3.33^{-1}}$ $_{3.38^{-1}}$ $_{3.38^{-$	209/	13.993A	3.014A	3.015A	1.184A	199.904	- 02 220/	דכד	10.4	40.73°C	0.933
30%12.062V4.974V3.281V5.055V322.04293.135%73712.446.4°C22.9.33V40%29.734A4.022A4.026A1.586A399.92293.386%73812.741.81°C0.96312.046V4.973V3.278V5.044V427.67693.386%73812.741.81°C229.82V50%37.286A5.03A5.037A1.788A499.12493.177%75013.042.34°C0.9750%44.924A6.039A6.05A1.992A599.6692.818%86417.542.56°C0.97660%12.017V4.968V3.273V5.021V646.05992.818%86417.542.56°C0.97612.002V4.966V3.273V5.01V646.05992.818%86417.543.33°C0.97970%25.18A7.049A7.065A2.196A699.39992.322%120528.143.33°C0.97970%60207A8A808A2.3A799.15191.88%17.63.03°C229.75V80%11.984V4.963V3.267V5V871.59591.68%17.63.18°C229.75V90%11.968V4.961V3.264V4.99V987.28117.63.18°C229.75V100%4.961V3.264V4.99V987.281188341.25.506°C229.72V110%4.961V3.264V4.99V987.281188541.25.506°C229.72	20%	12.079V	4.976V	3.283V	5.067V	216.747	92.2370	151	12.4	45.48°C	229.85V
12.062V       4.974V       3.281V       5.055V       322.042       46.46°C       229.83V $40\%$ 29.73AA       4.022A       4.026A       1.586A       39.932 $738$ $12.7$ 41.81°C       0.963 $12.045V$ 4.973V       3.278V       5.044V       427.676 $738$ $12.7$ 41.81°C       0.963 $50\%$ $7.286A$ 5.03A       5.037A       1.788A       49.124 $93.17\%$ $750$ $13.0$ 42.34°C       0.97 $12.032V$ 4.97V       3.275V       5.033V       535669 $91.17\%$ $750$ $13.0$ 42.56°C       0.976 $12.017V$ 4.968V       3.273V       5.021V       646.059 $92.818\%$ $864$ $17.5$ 42.56°C       0.976 $12.017V$ 4.968V       3.273V       5.021V       646.059 $92.818\%$ $864$ $17.5$ 43.33°C       0.979 $12.007V$ 4.964V       3.27V       5.021V       646.059 $92.325\%$ $1205$ $43.33°C$ 0.979 $12.007V$ 4.964V       3.27V       5.039V       75.577 $91.68\%$ $120.5$ $3$	200/	21.878A	3.517A	3.52A	1.385A	299.938	02 1250/	דכד	10.4	41.36°C	0.954
$ \begin{array}{ c c c c c c c c c } \hline \begin{tabular}{ c c c c c } \hline \begin{tabual}{ c c c c c } \hline \begin{tabual}{ c c c c c } \hline \begin{tabual}{ c c c c c c c c } \hline \begin{tabual}{ c c c c c c c } \hline \begin{tabual}{ c c c c c c c } \hline \begin{tabual}{ c c c c c c c } \hline \begin{tabual}{ c c c c c c c } \hline \begin{tabual}{ c c c c c c c c } \hline \begin{tabual}{ c c c c c c c c c c c c c c c c c c c$	50%	12.062V	4.974V	3.281V	5.055V	322.042	95.155%	151	12.4	46.46°C	229.83V
$ \begin{array}{ c c c c c c } \hline 12.046V & 4.973V & 3.278V & 5.044V & 427.576 & 47.37^{\circ}C & 229.82V \\ \hline 12.032V & 4.97V & 3.278V & 5.037V & 535.669 & 9.177\% & 750 & 1.30 & 42.34^{\circ}C & 0.97 \\ \hline 48.35^{\circ}C & 229.8V & 49.7V & 3.275V & 5.033V & 535.669 & 9.2818\% & 864 & 1.75 & 42.56^{\circ}C & 0.976 \\ \hline 44.924A & 6.039A & 6.05A & 1.992A & 599.66 & 9.2818\% & 864 & 1.75 & 42.56^{\circ}C & 0.976 \\ \hline 12.017V & 4.968V & 3.273V & 5.021V & 646.059 & 9.2818\% & 864 & 1.75 & 42.56^{\circ}C & 0.976 \\ \hline 12.017V & 4.968V & 3.273V & 5.021V & 646.059 & 9.2818\% & 864 & 1.75 & 43.33^{\circ}C & 0.979 \\ \hline 12.002V & 4.966V & 3.27V & 5.009V & 75.75 & 9.232\% & 1.05 & 28.1 & 60.939C & 229.77V \\ \hline 12.002V & 4.966V & 3.27V & 5.009V & 75.75 & 9.232\% & 1.05 & 3.019C & 0.982 \\ \hline 11.964V & 4.963V & 3.267V & 5.V & 871.595 & 91.689\% & 1.76 & 3.91 & 1.89^{\circ}C & 2.29.75V \\ \hline 11.968V & 4.961V & 3.264V & 4.99V & 987.281 & 91.689\% & 1.76 & 3.91 & 1.89^{\circ}C & 2.29.75V \\ \hline 11.968V & 4.961V & 3.264V & 4.99V & 987.281 & 91.689\% & 1.76 & 3.18^{\circ}C & 2.29.75V \\ \hline 11.968V & 4.961V & 3.264V & 4.99V & 987.281 & 91.689\% & 1.76 & 3.18^{\circ}C & 2.29.75V \\ \hline 11.968V & 4.961V & 3.264V & 4.99V & 987.281 & 91.689\% & 1.65\% & 0.985 \\ \hline 11.968V & 4.961V & 3.264V & 4.99V & 987.281 & 90.465\% & 1.883 & 41.2 & 55.66^{\circ}C & 2.29.75V \\ \hline 11.968V & 4.961V & 3.264V & 4.969V & 1104.584 & 90.465\% & 1.883 & 41.2 & 55.66^{\circ}C & 2.29.72V \\ \hline 11.952V & 4.959V & 3.261V & 4.969V & 1104.584 & 90.465\% & 1.883 & 41.2 & 55.66^{\circ}C & 2.29.72V \\ \hline 11.952V & 4.957V & 3.258V & 4.961V & 1.225.537 & 8.748\% & 1.877 & 4.11 & 65.99^{\circ}C & 0.986 \\ \hline 11.935V & 4.957V & 3.258V & 4.961V & 1.225.537 & 8.748\% & 7.55 & 1.34 & 40.81^{\circ}C & 0.989 \\ \hline 11.935V & 4.957V & 3.258V & 4.961V & 1.225.537 & 8.478\% & 7.55 & 1.34 & 40.81^{\circ}C & 0.29.6V \\ \hline 11.104V & 4.96V & 3.275V & 5.088V & 142.898 & 8.317\% & 7.63 & 1.38 & 40.36^{\circ}C & 0.29.6V \\ \hline 11.114V & 1.4559A & 1.4567A & 0.4 & 1.11.298 & 8.317\% & 7.63 & 1.38 & 40.36^{\circ}C & 0.98 \\ \hline 11.2116V & 4.96V & 3.275V & 5.088V & 142.898 & 8.317\% & 7.63 & 1.38 & 1.38 & 1.38 & 1.38 & 1.38 & 1.38 & 1$	400/	29.734A	4.022A	4.026A	1.586A	399.392	02 2060/	720	10.7	41.81°C	0.963
$ \begin{array}{ c c c c c c c } \hline \begin{tabular}{ c c c c c } \hline \begin{tabular}{ c c c c c c } \hline \begin{tabular}{ c c c c c c } \hline \begin{tabular}{ c c c c c c c } \hline \begin{tabular}{ c c c c c c c } \hline \begin{tabular}{ c c c c c c c } \hline \begin{tabular}{ c c c c c c c } \hline \begin{tabular}{ c c c c c c c } \hline \begin{tabular}{ c c c c c c c } \hline \begin{tabular}{ c c c c c c c c c c c c c c c c c c c$	40%	12.046V	4.973V	3.278V	5.044V	427.676	95.500%	100	12.7	47.37°C	229.82V
$ \begin{array}{ c c c c c c } \hline 12.032V & 4.97V & 3.275V & 5.033V & 535.669 \\ \hline 12.032V & 49.7V & 3.275V & 5.033V & 535.669 \\ \hline 44.924A & 6.039A & 6.05A & 1.992A & 599.66 \\ \hline 12.017V & 4.968V & 3.273V & 5.021V & 646.059 \\ \hline 12.017V & 4.968V & 3.273V & 5.021V & 646.059 \\ \hline 12.002V & 4.966V & 3.27V & 5.09V & 757.57 \\ \hline 12.002V & 4.966V & 3.27V & 5.09V & 757.57 \\ \hline 12.002V & 4.966V & 3.27V & 5.09V & 757.57 \\ \hline 60.207A & 8A & 8.08A & 2.3A & 799.151 \\ \hline 11.984V & 4.963V & 3.267V & 5V & 871.595 \\ \hline 11.984V & 4.963V & 3.267V & 5V & 871.595 \\ \hline 68.247A & 8.566A & 8.577A & 2.404A & 899.219 \\ \hline 11.968V & 4.961V & 3.264V & 4.99V & 987.281 \\ \hline 11.968V & 4.961V & 3.264V & 4.99V & 987.281 \\ \hline 11.968V & 4.961V & 3.264V & 4.99V & 987.281 \\ \hline 11.952V & 4.959V & 3.261V & 4.969V & 1104.584 \\ \hline 11.952V & 4.959V & 3.261V & 4.969V & 1104.584 \\ \hline 11.952V & 4.959V & 3.261V & 4.969V & 1104.584 \\ \hline 11.952V & 4.959V & 3.261V & 4.969V & 1104.584 \\ \hline 11.952V & 4.959V & 3.261V & 4.969V & 1104.584 \\ \hline 11.935V & 4.957V & 3.258V & 4.961V & 1.225.537 \\ \hline 11.935V & 4.957V & 3.258V & 4.961V & 1.225.537 \\ \hline 11.16V & 4.96V & 3.275V & 5.088V & 142.898 \\ \hline 11.121 & 4.96V & 3.275V & 5.088V & 142.898 \\ \hline 11.121 & 4.96V & 3.275V & 5.088V & 142.898 \\ \hline 11.1228 & 8.317\% & 763 & 1.38 \\ \hline 11.128 & 8.317\% & 763 & 1.38 \\ \hline 11.128 & 8.317\% & 763 & 1.38 \\ \hline 11.128 & 4.036^{2} & 0.985 \\ \hline 11.128 & 4.036^{2} & 0.985 \\ \hline 11.128 & 8.317\% & 763 & 1.38 \\ \hline 11.12$	E00/	37.286A	5.03A	5.037A	1.788A	499.124	02 1770/	750	12.0	42.34°C	0.97
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	50%	12.032V	4.97V	3.275V	5.033V	535.669	95.177%	750	15.0	48.35°C	229.8V
$ \begin{array}{ c c c c c c c c c c } \hline 12.017V & 4.968V & 3.273V & 5.021V & 646.059 \\ \hline 12.017V & 4.968V & 3.273V & 5.021V & 646.059 \\ \hline 5.2518A & 7.049A & 7.065A & 2.196A & 699.399 \\ \hline 12.002V & 4.966V & 3.27V & 5.009V & 757.57 \\ \hline 12.002V & 4.966V & 3.27V & 5.009V & 757.57 \\ \hline 60.207A & 8A & 8.08A & 2.3A & 799.151 \\ \hline 11.984V & 4.963V & 3.267V & 5V & 871.595 \\ \hline 11.984V & 4.963V & 3.267V & 5V & 871.595 \\ \hline 68.247A & 8.566A & 8.577A & 2.404A & 899.219 \\ \hline 11.968V & 4.961V & 3.264V & 4.99V & 987.281 \\ \hline 11.968V & 4.961V & 3.264V & 4.99V & 987.281 \\ \hline 11.968V & 4.961V & 3.264V & 4.99V & 987.281 \\ \hline 11.952V & 4.959V & 3.261V & 4.96V & 1104.584 \\ \hline 11.952V & 4.959V & 3.261V & 4.969V & 1104.584 \\ \hline 11.952V & 4.959V & 3.261V & 4.969V & 1104.584 \\ \hline 11.952V & 4.957V & 3.258V & 4.961V & 1225.537 \\ \hline 11.935V & 4.957V & 3.258V & 4.961V & 1225.537 \\ \hline 11.935V & 4.957V & 3.258V & 4.961V & 1225.537 \\ \hline 11.935V & 4.957V & 3.258V & 4.961V & 1225.537 \\ \hline 11.935V & 4.957V & 3.258V & 4.961V & 1225.537 \\ \hline 11.935V & 4.957V & 3.258V & 4.961V & 1225.537 \\ \hline 11.910W & 1.0114A & 14.559A & 14.567A & 0A & 121.29 \\ \hline 11.912W & 4.96V & 3.275V & 5.088V & 142.898 \\ \hline 11.912W & 4.96V & 3.275V & 5.088V & 142.898 \\ \hline 11.912W & 4.96V & 3.275V & 5.088V & 142.898 \\ \hline 11.912W & 4.96V & 3.275V & 5.088V & 142.898 \\ \hline 11.912W & 4.96V & 3.275V & 5.088V & 142.898 \\ \hline 11.912W & 4.96V & 3.275V & 5.088V & 142.898 \\ \hline 11.912W & 4.96V & 3.275V & 5.088V & 142.898 \\ \hline 11.912W & 4.96V & 3.275V & 5.088V & 142.898 \\ \hline 11.912W & 4.96V & 3.275V & 5.088V & 142.898 \\ \hline 11.912W & 763 & 13.8 \\ \hline 11.912W & 4.96C & 0.88 \\ \hline 11$	60%	44.924A	6.039A	6.05A	1.992A	599.66	02.0100/	964	175	42.56°C	0.976
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	00 /0	12.017V	4.968V	3.273V	5.021V	646.059	92.01070	004	17.5	49.17°C	229.78V
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	70%	52.518A	7.049A	7.065A	2.196A	699.399	- 02 3220/	1205	20.1	43.33°C	0.979
80%         11.984V         4.963V         3.267V         5V         871.595         91.689%         1776         39.1         51.89°C         229.75V           90%         68.247A         8.566A         8.577A         2.404A         899.219 $_{1088\%}$ $_{1885}$ $_{122}$ $_{44.17°C}$ 0.982           90%         11.968V         4.961V         3.264V         4.99V         987.281 $_{1088\%}$ $_{1885}$ $_{122}$ $_{44.17°C}$ 0.982           100%         76.108A         9.073A         9.105A         3.019A         999.263 $_{90.465\%}$ $_{1883}$ $_{1.2}$ $_{45.05°C}$ 0.985           11.052V         4.959V         3.261V         4.969V         1104.584 $_{90.465\%}$ $_{1883}$ $_{1.2}$ $_{45.05°C}$ 0.985           11.052V         4.959V         3.261V         4.969V         1104.584 $_{99.483}$ $_{89.748\%}$ $_{1877}$ $_{41.1}$ $_{45.05°C}$ 0.986           11.052V         4.957V         3.258V         4.961V         1225.537 $_{89.748\%}$ $_{87.75\%}$ $_{13.4}$ $_{40.81°C}$ 0.89	7076	12.002V	4.966V	3.27V	5.009V	757.57	92.32270	1205	20.1	50.39°C	229.77V
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	000/	60.207A	8A	8.08A	2.3A	799.151	01 680%	1776	20.1	43.84°C	0.98
$ \begin{array}{ c c c c c c c c c c } \hline 90\% & 11.968 & 4.961 & 3.264 & 4.99 & 987.281 & 91.081\% & 1885 & 41.2 & 53.18^{\circ} C & 229.73 & \\ \hline 11.968 & 9.073 & 9.105 & 3.019 & 999.263 & 90.465\% & 1883 & 41.2 & 45.05^{\circ} C & 0.985 & \\ \hline 11.952 & 4.959 & 3.261 & 4.969 & 1104.584 & 90.465\% & 1883 & 41.2 & 55.06^{\circ} C & 229.72 & \\ \hline 11.952 & 4.959 & 3.261 & 4.969 & 1104.584 & 1099.893 & 90.465\% & 1883 & 41.2 & 55.06^{\circ} C & 229.72 & \\ \hline 11.935 & 4.957 & 3.258 & 4.961 & 1225.537 & 89.748\% & 1877 & 41.1 & 46.59^{\circ} C & 0.986 & \\ \hline 11.935 & 4.957 & 3.258 & 4.961 & 1225.537 & 89.748\% & 1877 & 41.1 & 46.59^{\circ} C & 0.986 & \\ \hline 11.935 & 4.957 & 3.258 & 4.961 & 1225.537 & 89.748\% & 755 & 13.4 & 40.81^{\circ} C & 0.89 & \\ \hline 11.916 & 4.96 & 3.275 & 5.088 & 142.898 & 84.879\% & 755 & 13.4 & 40.81^{\circ} C & 0.89 & \\ \hline 12.116 & 4.96 & 3.275 & 5.088 & 142.898 & 83.17\% & 763 & 13.8 & 40.36^{\circ} C & 0.88 & \\ \hline 11.916 & 40.36^{\circ} C & 0.88 & 111.298 & 83.17\% & 763 & 13.8 & 40.36^{\circ} C & 0.88 & \\ \hline 11.916 & 40.36^{\circ} C & 0.88 & 111.298 & 83.17\% & 763 & 13.8 & 40.36^{\circ} C & 0.88 & \\ \hline 11.916 & 40.36^{\circ} C & 0.88 & 111.298 & 83.17\% & 763 & 13.8 & 40.36^{\circ} C & 0.88 & \\ \hline 11.916 & 40.36^{\circ} C & 0.88 & 40.36^{\circ} C & 0.88 & \\ \hline 11.916 & 40.36^{\circ} C & 0.88 & 111.298 & 83.17\% & 763 & 13.8 & 40.36^{\circ} C & 0.88 & \\ \hline 11.916 & 40.36^{\circ} C & 0.88 & 40.36^{\circ} C & 0.88 & \\ \hline 11.916 & 40.36^{\circ} C & 0.88 & 111.298 & 83.17\% & 763 & 13.8 & \\ \hline 11.916 & 40.36^{\circ} C & 0.88 & 111.298 & 83.17\% & 763 & 13.8 & \\ \hline 11.916 & 40.36^{\circ} C & 0.88 & 140.36^{\circ} C & 0.88 & \\ \hline 11.916 & 40.36^{\circ} C & 0.88 & 110.28 & 11$	00 /0	11.984V	4.963V	3.267V	5V	871.595	91.00970	1770	59.1	51.89°C	229.75V
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	0.00/	68.247A	8.566A	8.577A	2.404A	899.219	01 0010/	1005	<i>4</i> 1 C	44.17°C	0.982
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	9076	11.968V	4.961V	3.264V	4.99V	987.281	91.00170	1003	41.2	53.18°C	229.73V
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	100%	76.108A	9.073A	9.105A	3.019A	999.263	00.465%	1000	<i>4</i> 1 C	45.05°C	0.985
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	10070	11.952V	4.959V	3.261V	4.969V	1104.584	90.40370	1003	41.2	55.06°C	229.72V
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	1100/	83.919A	10.087A	10.219A	3.024A	1099.893	00 7/00/	1077	<i>4</i> 1 1	46.59°C	0.986
CL1       12.116V       4.96V       3.275V       5.088V       142.898       755       13.4       46.27°C       229.86V         0.114A       22.197A       0A       0A       111.298       83.17%       763       13.8       40.36°C       0.88	11070	11.935V	4.957V	3.258V	4.961V	1225.537	09.74070	10//	41.1	57.51°C	229.7V
12.116V       4.96V       3.275V       5.088V       142.898       46.27°C       229.86V         0.114A       22.197A       0A       0A       111.298       83.17%       763       13.8       40.36°C       0.88	CI 1	0.114A	14.559A	14.567A	0A	121.29	04.0700/	755	13.4	40.81°C	0.89
CL2 83.17% 763 13.8		12.116V	4.96V	3.275V	5.088V	142.898	04.079%	755		46.27°C	229.86V
12.122V         4.952V         3.287V         5.096V         133.825         765         15.6         47.38°C         229.86V	CI 2	0.114A	22.197A	0A	0A	111.298	93 1 7%	762	12.0	40.36°C	0.88
		12.122V	4.952V	3.287V	5.096V	133.825	05.1770	705	15.0	47.38°C	229.86V
CL3 0.113A 0A 22.186A 0A 73.98 77.294% 745 12.8 41.38°C 0.832	CL 3	0.113A	0A	22.186A	0A	73.98	77.294%	745	12.8	41.38°C	0.832
12.122V         4.981V         3.272V         5.091V         95.707         74.5         12.6         50.41°C         229.86V		12.122V	4.981V	3.272V	5.091V	95.707				50.41°C	229.86V
83.603A         0A         0A         999.834         91.071%         1891         41.5         45.04°C         0.984	CL /	83.603A	0A	0A	0A	999.834	01 0710/	1001	<i>/</i> 11 5	45.04°C	0.984
CL4 11.959V 4.978V 3.273V 5.05V 1097.864 91.071% 1891 41.5 55.99°C 229.72V	UL4	11.959V	4.978V	3.273V	5.05V	1097.864	91.0/170	1021	41.J	55.99°C	229.72V

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# Anex

# be quiet! Pure Power 12 M 1000W

20-8	OW LOAD	TESTS	230V							
Test	12V	5V	3.3V	5VSB	DC/AC (Watts)	Efficiency	Fan Speed (RPM)	PSU Noise (dB[A])	Temps (In/Out)	PF/AC Volts
2014	1.226A	0.501A	0.501A	0.196A	19.985	77.0400/	705	11.0	36.52°C	0.468
20W	12.102V	2V         4.984V         3.291V         5.099V         25.941         77.048%         725	725	11.9	39.57°C	229.88V				
40144	2.700A	0.702A	0.702A	0.294A	39.987	00.676%	700	10	37.2℃	0.659
4077	40W 12.099V 4.982V 3	3.289V	5.097V	47.79	83.676%	726	12	40.56°C	229.89V	
COLM	4.176A	0.903A	0.903A	0.393A	59.987	06 40 40/	700	10.1	38.01°C	0.761
60W	12.098V 4.981V 3.288V 5.094V 69.368	86.484%	728	12.1	41.54°C	229.88V				
00144	5.638A	1.104A	1.104A	0.491A	79.917	00.0070/	735	12.4	39.12°C	0.827
80W 12.1	12.110V	4.981V	3.288V	5.094V	92.852	86.067%			42.96°C	229.87V

### **RIPPLE MEASUREMENTS 230V**

12V	5V	3.3V	5VSB	Pass/Fail
12.58mV	11.44mV	9.23mV	10.72mV	Pass
19.64mV	10.98mV	9.44mV	11.14mV	Pass
15.75mV	10.83mV	9.54mV	10.62mV	Pass
15.09mV	11.96mV	9.90mV	11.60mV	Pass
15.04mV	11.29mV	10.52mV	11.24mV	Pass
15.09mV	12.37mV	10.88mV	11.55mV	Pass
15.34mV	12.32mV	11.34mV	12.31mV	Pass
15.04mV	13.60mV	12.83mV	12.78mV	Pass
16.32mV	12.99mV	12.98mV	12.37mV	Pass
22.76mV	14.91mV	15.00mV	15.82mV	Pass
23.78mV	15.72mV	16.08mV	16.74mV	Pass
15.76mV	18.65mV	19.08mV	12.59mV	Pass
18.05mV	22.53mV	17.91mV	10.72mV	Pass
16.27mV	16.12mV	16.78mV	10.21mV	Pass
23.58mV	12.89mV	10.22mV	11.74mV	Pass
	12.58mV         19.64mV         19.64mV         15.75mV         15.75mV         15.09mV         15.04mV         15.04mV         15.04mV         15.04mV         2000000000000000000000000000000000000	12.58mV       11.44mV         19.64mV       10.98mV         15.75mV       10.83mV         15.09mV       11.96mV         15.04mV       11.29mV         15.04mV       12.37mV         15.09mV       12.37mV         15.04mV       12.32mV         15.04mV       12.32mV         15.04mV       12.90mV         15.04mV       13.60mV         15.04mV       12.99mV         15.04mV       15.04mV         15.04mV       13.60mV         15.04mV       13.60mV         15.04mV       12.99mV         16.32mV       15.76mV         18.05mV       22.53mV         18.05mV       22.53mV         16.27mV       16.12mV	12.58mV       11.44mV       9.23mV         19.64mV       10.98mV       9.44mV         15.75mV       10.83mV       9.54mV         15.09mV       11.96mV       9.90mV         15.09mV       11.29mV       10.52mV         15.04mV       12.37mV       10.88mV         15.04mV       12.37mV       10.88mV         15.04mV       12.32mV       11.34mV         15.04mV       12.32mV       11.34mV         15.04mV       12.90mV       12.83mV         15.04mV       13.60mV       12.98mV         16.32mV       12.99mV       12.98mV         16.32mV       15.72mV       16.08mV         15.76mV       18.65mV       19.08mV         18.05mV       22.53mV       17.91mV         16.27mV       16.12mV       16.78mV	12.58mV         11.44mV         9.23mV         10.72mV           19.64mV         10.98mV         9.44mV         11.14mV           15.75mV         10.83mV         9.54mV         10.62mV           15.09mV         11.96mV         9.90mV         11.60mV           15.09mV         11.96mV         9.90mV         11.60mV           15.09mV         11.29mV         10.52mV         11.24mV           15.04mV         12.37mV         10.88mV         11.55mV           15.34mV         12.37mV         10.88mV         12.31mV           15.04mV         13.60mV         12.83mV         12.78mV           16.32mV         12.99mV         12.98mV         12.37mV           16.32mV         15.72mV         15.00mV         15.82mV           15.76mV         18.65mV         19.08mV         12.59mV           15.76mV         18.65mV         19.08mV         12.59mV           18.05mV         22.53mV         17.91mV         10.72mV           16.27mV         16.12mV         16.78mV         10.21mV

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