Anex

Cooler Master MPZ-C002-AFBAT

Lab ID#: 85
Receipt Date: -
Test Date: -

Report:
Report Date: Jul 4, 2018

DUT INFORMATION

Brand	Cooler Master
Manufacturer (OEM)	Murata
Series	MasterWatt Maker MIJ
Model Number	MPZ-C002-AFBAT
Serial Number	MPZC002AFBAT1164600010
DUT Notes	Low PF and 5VSB Efficiency

DUT SPECIFICATIONS

Rated Voltage (Vrms)	100-240
Rated Current (Arms)	15-6
Rated Frequency (Hz)	50-60
Rated Power (W)	1200
Type	ATX12V
Cooling	135mm LDB Fan (Silencio FP)
Semi-Passive Operation	✓
Cable Design	Fully Modular

POWER SPECIFICATIONS

Rail		3.3V	5V	12V	5VSB	-12V
Max. Power	Amps	25	25	100	3.5	0.5
	Watts	130		1200	17.5	6
Total Max. Power (W)		1200				

CABLES AND CONNECTORS

Modular Cables

Description	Cable Count	Connector Count (Total)	Gauge
ATX connector 20+4 pin (700mm)	1	1	18-22AWG
4+4 pin EPS12V (700mm) / 4+4 pin EPS12V (800mm)	2	2	16AWG
6+2 pin PCIe (760mm)	4	4	16AWG
6+2 pin PCIe (610mm+120mm)	4	8	16-18AWG
SATA (450mm+110mm+110mm+110mm)	2	8	18AWG
SATA (550mm+110mm+110mm+110mm)	2	8	18AWG
4 pin Molex (550mm+120mm+120mm+120mm)	2	8	18AWG
4 pin Molex (450mm+100mm+100mm+100mm) / FDD Adapter (+100mm)	1	4 / 1	18 / 22AWG

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General Data	
Manufacturer (OEM)	Murata Manufacturing
Platform Model	-
Primary Side	
Transient Filter	6x Y caps, 4x X caps, 2x CM chokes, 1x MOV, 1x CAP200DG
Inrush Protection	NTC Thermistor & Diode
Bridge Rectifier(s)	1x Shindengen D25XB60 (800V, 3.5A @ 25°C - without heatsink)
APFC MOSFETS	4x Infineon IPA65R045C7 (700V, 11A @ 100°C, 0.045Ohm)
APFC Boost Diode	2x SiC SCS220AM (650V, 20A @ 97°C)
Hold-up Cap(s)	2x Chemi-Con (420V, 830uF & 650uF - 1450uF combined, 2000h @ 105 °C, KMW)
Main Switchers	2x Alpha & Omega AOTF27S60 (700V, 110A @ 150°C, 0.16Ohm)
CMOS Logic Shifter	On Semiconductor MC74VHCT50A
MCU1	Microchip PIC24FJ64 (16-bit, 16 MIPS, 64KB Flash, 8KB RAM)
MCU2	Microchip PIC24FJ32GA (16-bit, 16 MIPS, 16KB Flash, 4KB RAM)
APFC Controller	Texas Instruments UCC28070
Resonant Controller	On Semiconductors NCP1399
Topology	Primary side: Bridgeless & Interleaved APFC, Half-Bridge & LLC Resonant Controller Secondary side: Synchronous Rectification & DC-DC converters
Secondary Side	
+12V MOSFETS	unknown number of FETs
Driver IC	IR1168S (max 500 KHz)
5V & 3.3V	DC-DC Converters: 2x Toshiba TPHR9003NL (30V, 220A @ 150°C, 1.1mOhm) Buck Controller: 1x TPS40101
Filtering Capacitors	Electrolytics: Nippon Chemi-Con (1-5,000 @ 105°C, KZE), Rubycon (105°C, ZLH, YXM), Polymers: Chemi-Con
Supervisor IC	MCUs
Fan Model	Cooler Master FA13525L 12LPA (135mm, 12V, 0.50A, 2940 RPM, Loop Dynamic Bearing)
5VSB Circuit	
Switching FET	1x Fairchild FQPF 8N80C (800V, 8A, 1.55Ohm)
Rectifier	1x MOSPEC MBRF20100 SBR (100V, 20A)
Step-Down Converter	Texas Instruments TPS54332 (3.5V - 28V Input, 3.5A)

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RESULTS	
Temperature Range (°C /°F)	30-32 / 86-89.6
Average Efficiency	91.243
Efficiency With 10W (≤500W) or 2% (>500W) Load -115V	0.000
Average Efficiency 5VSB	73.607
Standby Power Consumption (W) -115V	0.0623814
Standby Power Consumption (W) -230V	0.1011400
Average PF	0.956
ErP Lot 3/6 Ready	✓
(EU) No 617/2013 Compliance	✓
Avg Noise Output	-
Efficiency Rating (ETA)	SILVER
Noise Rating (LAMBDA)	None

TEST EQUIPMENT		
Electronic Loads	Chroma 6314A x2 63123A x6 63102A 63101A	Chroma 63601-5 x2 Chroma 63600-2 63640-80-80 x10 63610-80-20
AC Sources	Chroma 6530, Chroma 61604	
Power Analyzers	N4L PPA1530, N4L PPA5530	
Oscilloscopes	Picoscope 4444 & 3424, Keysight DSOX3024A, Rigol DS2072A	
Voltmeter	Keithley 2015 THD 6.5 Digit	
Sound Analyzer	Bruel & Kjaer 2250-L G4	
Microphone	Bruel & Kjaer Type 4189	
Data Loggers	Picoscope TC-08 x2, Labjack U3-HV x2	

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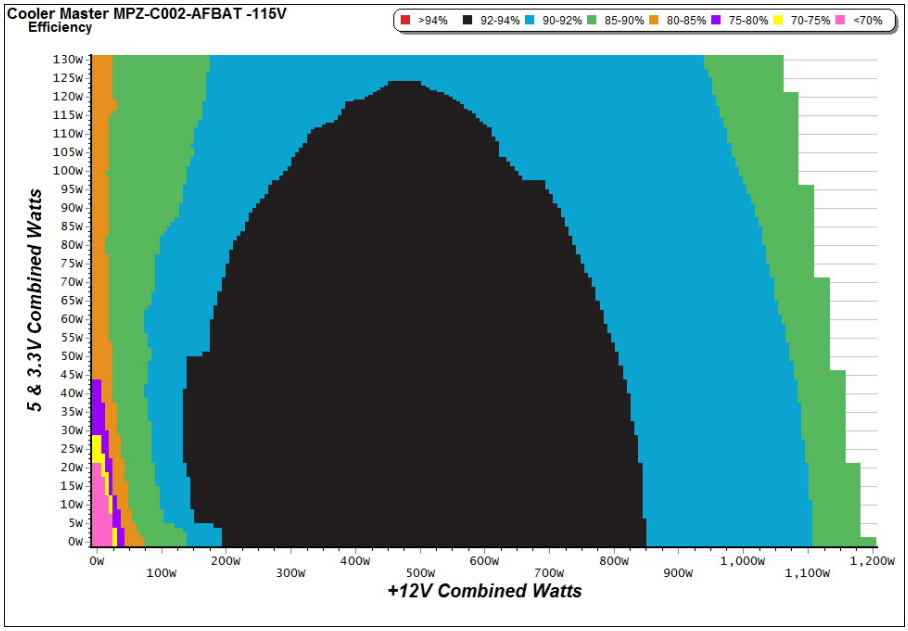
EFFICIENCY GRAPH



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

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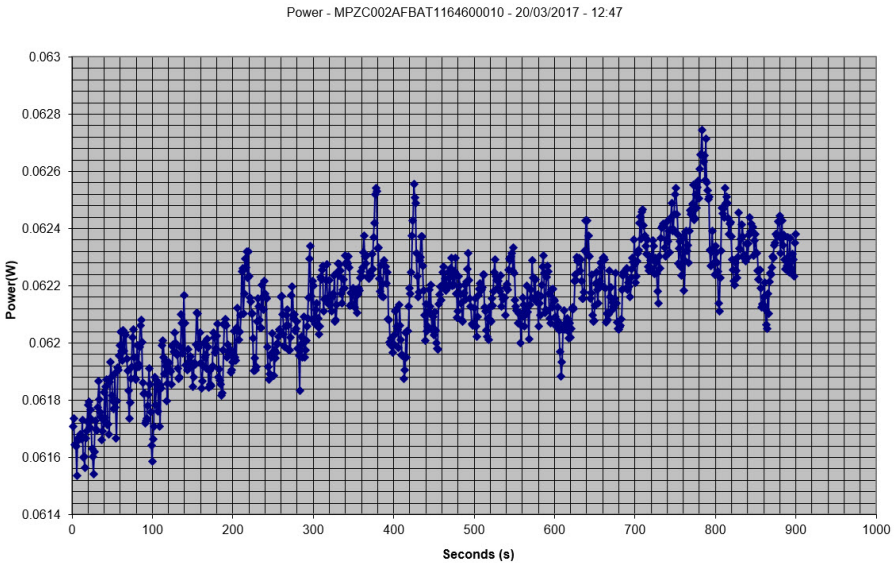
5VSB EFFICIENCY -115V (ERP LOT 3/6 & CEC)

Test #	5VSB	DC/AC (Watts)	Efficiency	PF/AC Volts
1	0.041A	0.211	52.750%	0.027
	5.095V	0.400		115.12V
2	0.087A	0.443	64.577%	0.045
	5.092V	0.686		115.12V
3	0.532A	2.698	75.574%	0.207
	5.074V	3.570		115.13V
4	3.502A	17.439	70.569%	0.504
	4.980V	24.712		115.11V

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

Test #	5VSB	DC/AC (Watts)	Efficiency	PF/AC Volts
1	0.042A	0.212	47.111%	0.009
	5.094V	0.450		230.28V
2	0.087A	0.444	60.081%	0.015
	5.091V	0.739		230.28V
3	0.532A	2.699	73.743%	0.071
	5.074V	3.660		230.28V
4	3.502A	17.440	71.472%	0.327
	4.980V	24.401		230.28V

VAMPIRE POWER -115V



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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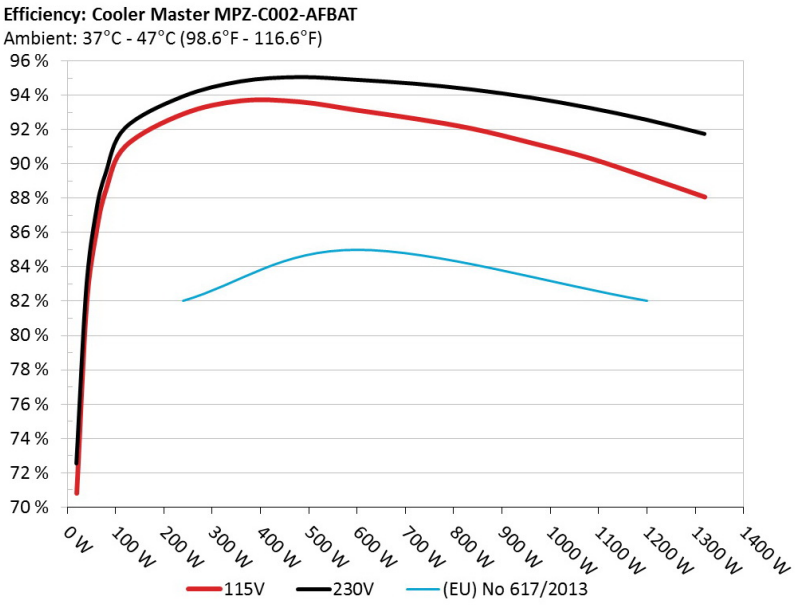
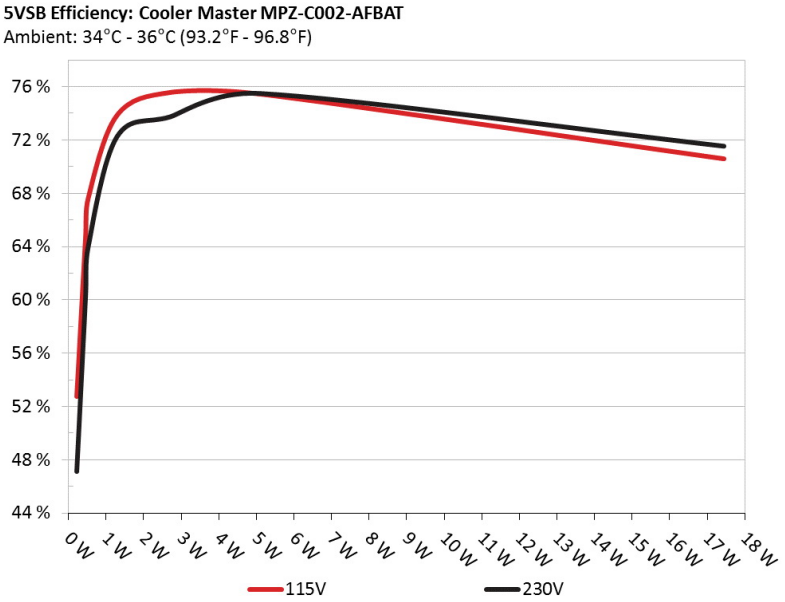
EFFICIENCY UNDER HIGH AMBIENT TEMPERATURE



INFO

The PSU`s efficiency under high ambient temperatures with 115V and 230V input. For this graph the results of the 10-110% load regulation table are used

5VSB EFFICIENCY



INFO

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

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10-110% LOAD TESTS

Test #	12V	5V	3.3V	5VSB	DC/AC (Watts)	Efficiency	Fan Speed (RPM)	Temps (In/Out)	PF/AC Volts
1	8.174A	1.954A	1.972A	0.981A	119.773	91.028%	0	45.19°C	0.701
	12.017V	5.104V	3.343V	5.078V	131.578			41.14°C	115.11V
2	17.383A	2.929A	2.963A	1.180A	239.611	92.922%	0	46.02°C	0.977
	12.011V	5.104V	3.336V	5.076V	257.863			41.85°C	115.09V
3	26.973A	3.427A	3.479A	1.379A	359.871	93.693%	0	46.52°C	0.980
	12.005V	5.103V	3.329V	5.070V	384.095			42.46°C	115.08V
4	36.546A	3.917A	3.971A	1.575A	479.634	93.635%	0	47.50°C	0.984
	11.998V	5.102V	3.322V	5.066V	512.238			43.52°C	115.07V
5	45.794A	4.902A	4.975A	1.776A	599.608	93.142%	640	42.33°C	0.988
	11.991V	5.102V	3.314V	5.065V	643.757			45.13°C	115.06V
6	55.047A	5.879A	5.983A	1.974A	719.505	92.648%	850	42.79°C	0.991
	11.985V	5.101V	3.307V	5.062V	776.603			45.20°C	115.06V
7	64.308A	6.864A	7.001A	2.169A	839.352	92.057%	975	43.52°C	0.993
	11.978V	5.100V	3.298V	5.060V	911.777			45.75°C	115.08V
8	73.579A	7.849A	8.020A	2.370A	959.301	91.243%	1140	44.38°C	0.994
	11.972V	5.100V	3.291V	5.059V	1051.365			46.39°C	115.06V
9	83.296A	8.335A	8.553A	2.369A	1079.306	90.355%	1320	45.62°C	0.996
	11.966V	5.099V	3.285V	5.061V	1194.516			47.60°C	115.06V
10	92.564A	8.826A	9.063A	3.481A	1199.151	89.243%	1500	46.99°C	0.996
	11.959V	5.099V	3.277V	5.020V	1343.695			48.70°C	115.07V
11	102.655A	8.826A	9.078A	3.484A	1319.120	88.076%	1500	47.32°C	0.997
	11.952V	5.099V	3.271V	5.020V	1497.699			49.53°C	115.07V
CL1	0.099A	16.026A	16.006A	0.003A	135.999	83.196%	1015	45.78°C	0.693
	12.021V	5.096V	3.319V	5.200V	163.469			47.80°C	115.13V
CL2	99.928A	1.003A	1.003A	1.002A	1208.249	89.251%	1500	45.79°C	0.996
	11.956V	5.104V	3.295V	5.074V	1353.760			47.75°C	115.07V

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20-80W LOAD TESTS

Test #	12V	5V	3.3V	5VSB	DC/AC (Watts)	Efficiency	Fan Speed (RPM)	PF/AC Volts
1	1.213A	0.482A	0.476A	0.196A	19.640	70.782%	0	0.674
	12.024V	5.106V	3.350V	5.099V	27.747			115.11V
2	2.456A	0.970A	0.985A	0.390A	39.762	81.724%	0	0.684
	12.022V	5.105V	3.348V	5.095V	48.654			115.11V
3	3.696A	1.460A	1.491A	0.585A	59.850	85.995%	0	0.713
	12.021V	5.105V	3.346V	5.090V	69.597			115.11V
4	4.927A	1.954A	1.971A	0.786A	79.784	88.459%	0	0.691
	12.019V	5.105V	3.345V	5.086V	90.193			115.12V

RIPPLE MEASUREMENTS

Test	12V	5V	3.3V	5VSB	Pass/Fail
10% Load	17.4 mV	8.9 mV	9.8 mV	5.2 mV	Pass
20% Load	15.4 mV	9.5 mV	10.0 mV	5.5 mV	Pass
30% Load	17.4 mV	9.2 mV	9.7 mV	6.1 mV	Pass
40% Load	17.5 mV	10.3 mV	9.3 mV	6.5 mV	Pass
50% Load	22.5 mV	12.4 mV	14.7 mV	10.4 mV	Pass
60% Load	18.5 mV	10.5 mV	9.9 mV	9.3 mV	Pass
70% Load	23.3 mV	12.5 mV	11.5 mV	10.1 mV	Pass
80% Load	23.0 mV	13.0 mV	11.8 mV	11.4 mV	Pass
90% Load	25.5 mV	13.5 mV	12.3 mV	13.1 mV	Pass
100% Load	30.5 mV	15.9 mV	14.6 mV	16.7 mV	Pass
110% Load	34.6 mV	17.5 mV	16.1 mV	18.3 mV	Pass
Crossload 1	22.9 mV	11.5 mV	11.3 mV	9.3 mV	Pass
Crossload 2	30.9 mV	13.3 mV	15.3 mV	15.2 mV	Pass

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HOLD-UP TIME & POWER OK SIGNAL (230V)	
Hold-Up Time (ms)	23.954
AC Loss to PWR_OK Hold Up Time (ms)	21.9
PWR_OK Inactive to DC Loss Delay (ms)	2.054

Top side

Power specifications label

CERTIFICATIONS

CYBENETICS SILVER