Anex

Enermax EMR1800EXT

Lab ID#: EM19180019
Receipt Date: Apr 4, 2019
Test Date: Mar 26, 2019

Report:

Report Date: Mar 28, 2019

DUT INFORMATION

Brand	Enermax
Manufacturer (OEM)	Enermax
Series	MaxRevo
Model Number	EMR1800EXT
Serial Number	18A7100210018
DUT Notes	

DUT SPECIFICATIONS

Rated Voltage (Vrms)	115-240
Rated Current (Arms)	16-8
Rated Frequency (Hz)	50-60
Rated Power (W)	1800
Type	ATX12V
Cooling	135mm Double Ball Bearing Fan (ADN512XB-A91)
Semi-Passive Operation	✗
Cable Design	Fully Modular

POWER SPECIFICATIONS

Rail		3.3V	5V	12V1	12V2	12V3	12V4	12V5	12V6	5VSB	-12V
Max. Power	Amps	25	25	20	35	35	35	35	35	4	0.5
	Watts	140		133A @115-240VAC - 150A @220-240VAC						20	6
Total Max. Power (W) for input 115-240 / 220-240		1600 / 1800									

CABLES AND CONNECTORS

Modular Cables

Description	Cable Count	Connector Count (Total)	Gauge	In Cable Capacitors
ATX connector 20+4 pin (600mm) / 8 pin EPS12V (650mm)	1	1 / 1	16-22AWG	No
8 pin EPS12V (600mm) / 4 pin ATX (600)	1	1 / 1	16AWG	No
2 x 6+2 pin PCIe (500mm)	6	12	16-18AWG	No
SATA (450mm+150mm+150mm+150mm)	3	12	18AWG	No
SATA (450mm+150mm) / 4 pin Molex (+150mm+150mm)	1	2 / 2	18AWG	No
4 pin Molex (450mm+150mm+150mm+150mm) / FDD (+150mm)	2	8 / 2	18-20AWG	No
AC Power Cord (1444mm) - C14 coupler	1	1	14AWG	-

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General Data	
Manufacturer (OEM)	Enermax
PCB Type	Double Sided
Primary Side	
Transient Filter	4x Y caps, 2x X caps, 3x CM chokes,1x DM chokes,1x MOV
Inrush Protection	NTC Thermistor & Relay
Bridge Rectifier(s)	1x Bridge
APFC MOSFETS	2x Infineon SPW35N60C3 (650V, 21.9A @ 100°C, 0.1Ohm)
APFC Boost Diode	1x CREE C3D10060A (600V, 14A @ 135°C)
Hold-up Cap(s)	3x Chemi-Con (420V, 390uF, 2000h @ 105°C, KMR)
Main Switchers	4x Toshiba TK18A60V (600V, 18A @ 150°C, 0.19Ohm)
IC Driver	Texas Instuments UCC27324
APFC Controller	Infineon 2PCS02 & CM03X Green PFC Controller
Main Controller	Texas Instuments UCC28950
Topology	Primary side: Interleaved PFC, Phase Shift ZVT Full-Bridge Secondary side: Synchronous Rectification & DC-DC converters
Secondary Side	
+12V MOSFETS	8x Infineon IPP015N04N (40V, 120A @ 100°C, 1.5mOhm)
5V & 3.3V	DC-DC Converters: 8x Sinopower SM3116NAU (30V, 48A @ 100°C, 6.9mOhm @ 125°C) PWM Controllers: 2x ANPEC APW7073
Filtering Capacitors	Electrolytics: 8x Chemi-Con (4 - 10,000h @ 105°C, KY), 10x Rubycon (4 - 5,000h @ 105°C, ZLK) Polymers: 3x Elite (CS CAP), 8x Apaq
Supervisor IC	SITI PS238 (OCP, OVP, UVP, SCP, PG)
Fan Model	ADDA ADN512XB-A91 (135mm, 12V, 0.66A, Double Ball Bearing Fan)
5VSB Circuit	
Rectifier	TSF10U60C SBR (60V, 10A)
Standby PWM Controller	Power Integrations TOP265EG

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RESULTS	
Temperature Range (°C /°F)	30-32 / 86-89.6
Average Efficiency	90.608
Efficiency With 10W (≤500W) or 2% (>500W) Load -115V	57.397
Average Efficiency 5VSB	79.886
Standby Power Consumption (W) -115V	0.0906253
Standby Power Consumption (W) -230V	0.1146740
Average PF	0.988
ErP Lot 3/6 Ready	✓
(EU) No 617/2013 Compliance	✓
Avg Noise Output	43.70
Efficiency Rating (ETA)	PLATINUM
Noise Rating (LAMBDA)	Standard

TEST EQUIPMENT		
Electronic Loads	Chroma 6314A x2 63123A x6 63102A 63101A	Chroma 63601-5 x4 Chroma 63600-2 x2 63640-80-80 x20 63610-80-20 x2
AC Sources	Chroma 6530, Chroma 61604, Keysight AC6804B	
Power Analyzers	N4L PPA1530 x2, 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 4955-A, Bruel & Kjaer Type 4189	
Data Loggers	Picoscope TC-08 x2, Labjack U3-HV x2	

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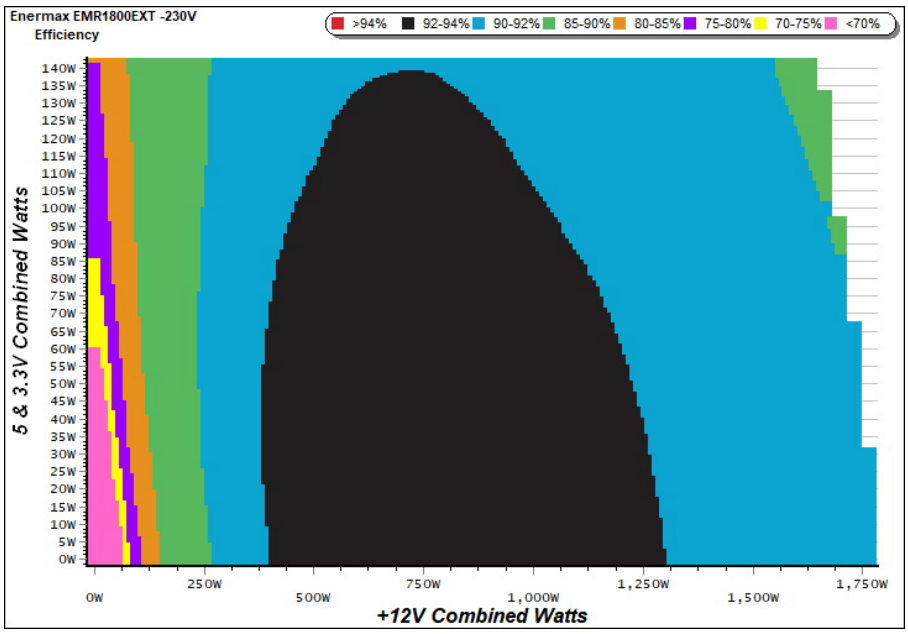
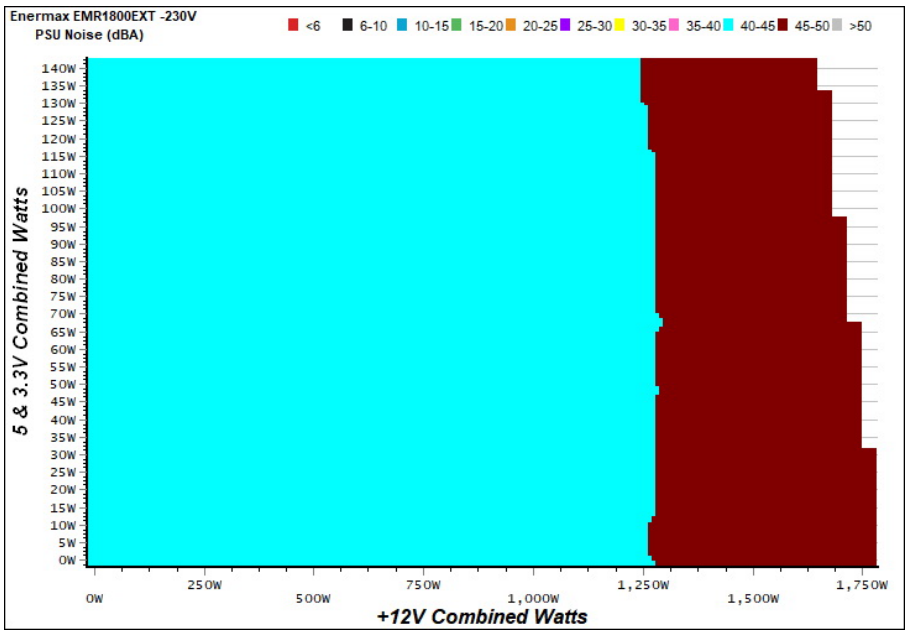
EFFICIENCY GRAPH



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

NOISE GRAPH



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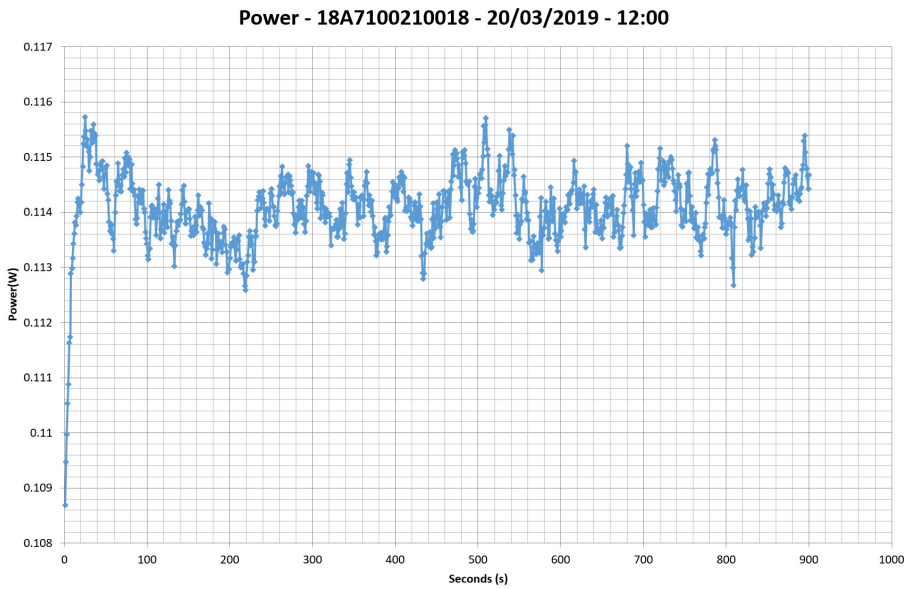
5VSB EFFICIENCY -115V (ERP LOT 3/6 & CEC)

Test #	5VSB	DC/AC (Watts)	Efficiency	PF/AC Volts
1	0.045A	0.231	62.432%	0.059
	5.123V	0.370		115.09V
2	0.090A	0.461	71.142%	0.101
	5.122V	0.648		115.09V
3	0.550A	2.813	80.348%	0.340
	5.114V	3.501		115.08V
4	1.000A	5.106	80.270%	0.418
	5.106V	6.361		115.08V
5	1.500A	7.646	79.737%	0.459
	5.096V	9.589		115.08V
6	4.000A	20.186	78.231%	0.528
	5.047V	25.803		115.08V

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

Test #	5VSB	DC/AC (Watts)	Efficiency	PF/AC Volts
1	0.045A	0.231	57.750%	0.017
	5.123V	0.400		230.25V
2	0.090A	0.462	68.648%	0.028
	5.122V	0.673		230.25V
3	0.550A	2.813	79.061%	0.141
	5.114V	3.558		230.25V
4	1.000A	5.106	80.346%	0.222
	5.105V	6.355		230.26V
5	1.500A	7.645	80.338%	0.285
	5.096V	9.516		230.26V
6	4.001A	20.188	80.610%	0.411
	5.046V	25.044		230.27V

VAMPIRE POWER -230V



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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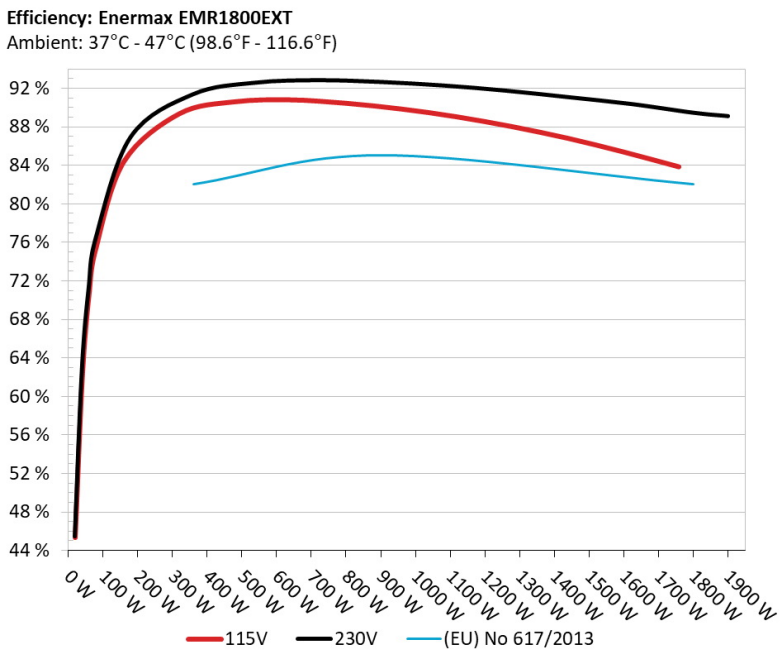
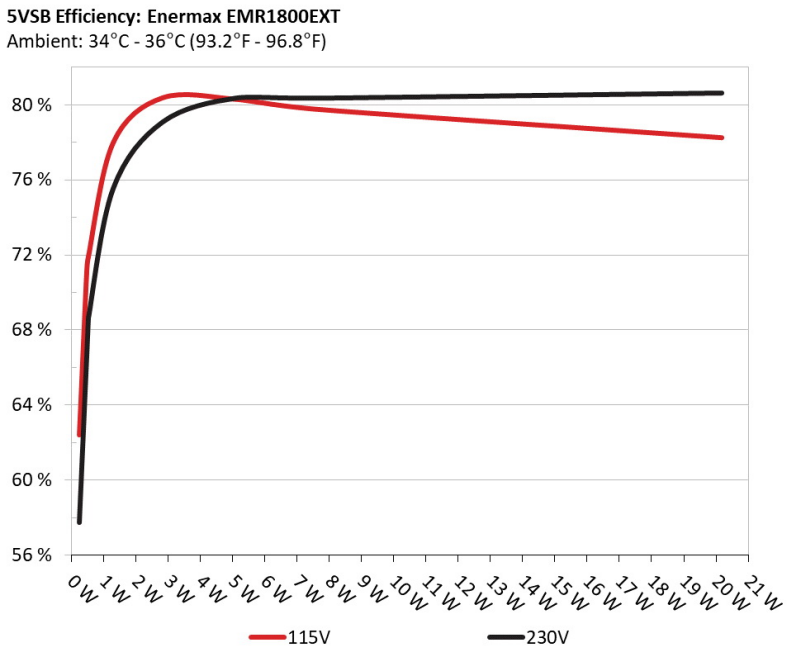
EFFICIENCY UNDER HIGH AMBIENT TEMPERATURE



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



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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)	PSU Noise (dB[A])	Temps (In/Out)	PF/AC Volts
1	13.003A	1.965A	1.950A	0.982A	180.019	86.969%	1970	42.2	40.34°C	0.955
	12.183V	5.090V	3.384V	5.094V	206.991				42.41°C	230.31V
2	27.056A	2.952A	2.929A	1.181A	359.735	91.416%	1982	42.3	40.62°C	0.985
	12.154V	5.082V	3.378V	5.081V	393.516				43.20°C	230.33V
3	41.505A	3.449A	3.409A	1.381A	539.286	92.622%	2005	42.6	41.05°C	0.994
	12.126V	5.075V	3.372V	5.068V	582.244				44.20°C	230.33V
4	56.095A	3.947A	3.918A	1.583A	719.774	92.879%	2040	43.9	41.92°C	0.995
	12.097V	5.067V	3.367V	5.055V	774.959				45.13°C	230.33V
5	70.390A	4.942A	4.912A	1.786A	899.900	92.693%	2076	44.7	42.46°C	0.996
	12.067V	5.059V	3.359V	5.041V	970.844				46.40°C	230.33V
6	84.748A	5.940A	5.905A	1.990A	1079.993	92.331%	2111	44.8	42.72°C	0.997
	12.038V	5.050V	3.352V	5.028V	1169.694				46.86°C	230.33V
7	99.174A	6.944A	6.905A	2.195A	1259.790	91.793%	2182	45.5	43.31°C	0.998
	12.006V	5.041V	3.345V	5.013V	1372.428				48.99°C	230.33V
8	113.730A	7.949A	7.910A	2.401A	1440.330	91.117%	2249	46.0	43.81°C	0.998
	11.975V	5.033V	3.338V	4.999V	1580.741				50.77°C	230.33V
9	128.685A	8.460A	8.401A	2.406A	1619.658	90.413%	2321	46.7	44.93°C	0.998
	11.945V	5.025V	3.333V	4.989V	1791.409				52.96°C	230.33V
10	143.173A	8.975A	8.928A	4.047A	1799.899	89.498%	2406	47.9	45.69°C	0.998
	11.910V	5.015V	3.326V	4.943V	2011.114				54.91°C	230.33V
11	151.780A	8.980A	8.935A	4.051A	1899.831	89.144%	2384	47.8	46.84°C	0.998
	11.893V	5.012V	3.324V	4.938V	2131.195				57.11°C	230.33V
CL1	0.152A	17.000A	17.001A	0.000A	144.908	80.289%	2113	44.8	42.22°C	0.946
	12.169V	5.069V	3.346V	5.100V	180.482				46.22°C	230.34V
CL2	150.020A	1.003A	0.999A	1.000A	1802.390	89.788%	2380	47.7	45.53°C	0.998
	11.925V	5.028V	3.349V	5.014V	2007.393				54.57°C	230.33V

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20-80W LOAD TESTS

Test #	12V	5V	3.3V	5VSB	DC/AC (Watts)	Efficiency	Fan Speed (RPM)	PSU Noise (dB[A])	PF/AC Volts
1	1.179A	0.489A	0.469A	0.196A	19.482	45.458%	1941	42.0	0.662
	12.210V	5.097V	3.391V	5.118V	42.857				230.29V
2	2.425A	0.980A	0.970A	0.391A	39.879	62.857%	1944	42.0	0.768
	12.206V	5.096V	3.389V	5.112V	63.444				230.29V
3	3.601A	1.472A	1.443A	0.588A	59.333	71.309%	1952	42.1	0.836
	12.203V	5.095V	3.387V	5.107V	83.205				230.30V
4	4.852A	1.962A	1.947A	0.784A	79.776	76.484%	1961	42.1	0.879
	12.199V	5.094V	3.386V	5.102V	104.304				230.31V

RIPPLE MEASUREMENTS

Test	12V	5V	3.3V	5VSB	Pass/Fail
10% Load	12.1 mV	7.6 mV	11.8 mV	13.6 mV	Pass
20% Load	12.7 mV	9.7 mV	11.5 mV	15.4 mV	Pass
30% Load	13.2 mV	11.5 mV	13.3 mV	17.0 mV	Pass
40% Load	13.8 mV	13.0 mV	13.6 mV	17.3 mV	Pass
50% Load	15.0 mV	14.8 mV	13.9 mV	19.1 mV	Pass
60% Load	15.5 mV	16.2 mV	15.0 mV	20.5 mV	Pass
70% Load	16.5 mV	17.9 mV	15.6 mV	22.8 mV	Pass
80% Load	17.7 mV	19.6 mV	18.0 mV	25.6 mV	Pass
90% Load	18.4 mV	20.5 mV	18.8 mV	27.1 mV	Pass
100% Load	19.7 mV	22.1 mV	20.1 mV	34.1 mV	Pass
110% Load	21.1 mV	22.8 mV	21.0 mV	35.3 mV	Pass
Crossload 1	14.8 mV	13.9 mV	23.5 mV	12.0 mV	Pass
Crossload 2	19.9 mV	18.3 mV	16.5 mV	30.2 mV	Pass

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HOLD-UP TIME & POWER OK SIGNAL (230V)	
Hold-Up Time (ms)	12.50
AC Loss to PWR_OK Hold Up Time (ms)	14.90
PWR_OK Inactive to DC Loss Delay (ms)	-2.40

Top side

Power specifications label

CERTIFICATIONS

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