

## Anex

Enermax EMR1800EXT

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

Report:

Report Date: Mar 26, 2019

DUT INFORMATION		DUT SPECIFICATIONS	
Brand	Enermax	Rated Voltage (Vrms)	115-240
Manufacturer (OEM)	Enermax	Rated Current (Arms)	16-8
Series	MaxRevo	Rated Frequency (Hz)	50-60
Model Number	EMR1800EXT	Rated Power (W)	1800
Serial Number	18A7100210018	Type	ATX12V
DUT Notes		Cooling	135mm Double Ball Bearing Fan (ADN512XB-A91)
		Semi-Passive Operation	X
		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 Instruments UCC27324
APFC Controller	Infineon 2PCS02 & CM03X Green PFC Controller
Main Controller	Texas Instruments 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	SMT 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	87.991
Efficiency With 10W (≤500W) or 2% (>500W) Load -115V	57.397
Average Efficiency 5VSB	79.409
Standby Power Consumption (W) -115V	0.0906253
Standby Power Consumption (W) -230V	0.1146740
Average PF	0.998
ErP Lot 3/6 Ready	✓
(EU) No 617/2013 Compliance	✓
Avg Noise Output	43.20
Efficiency Rating (ETA)	PLATINUM
Noise Rating (LAMBDA)	Standard

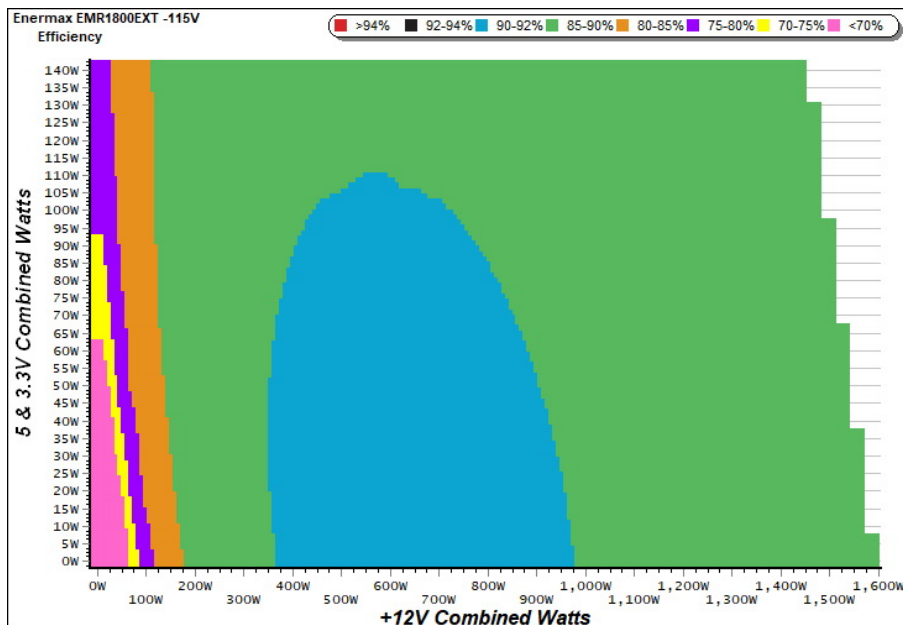
TEST EQUIPMENT		
Electronic Loads	Chroma 6314A x2 63123A x6 63102A 63101A	Chroma 63601-5 x4 Chroma 63600-2 x2 63640-80-80 x20 63610-80-20 x2
AC Sources	Chroma 6530, Chroma 61604, Keysight AC6804B	
Power Analyzers	N4L PPA1530 x2, N4L PPA5530	
Oscilloscopes	Picoscope 4444 & 3424, Keysight DSOX3024A, Rigol 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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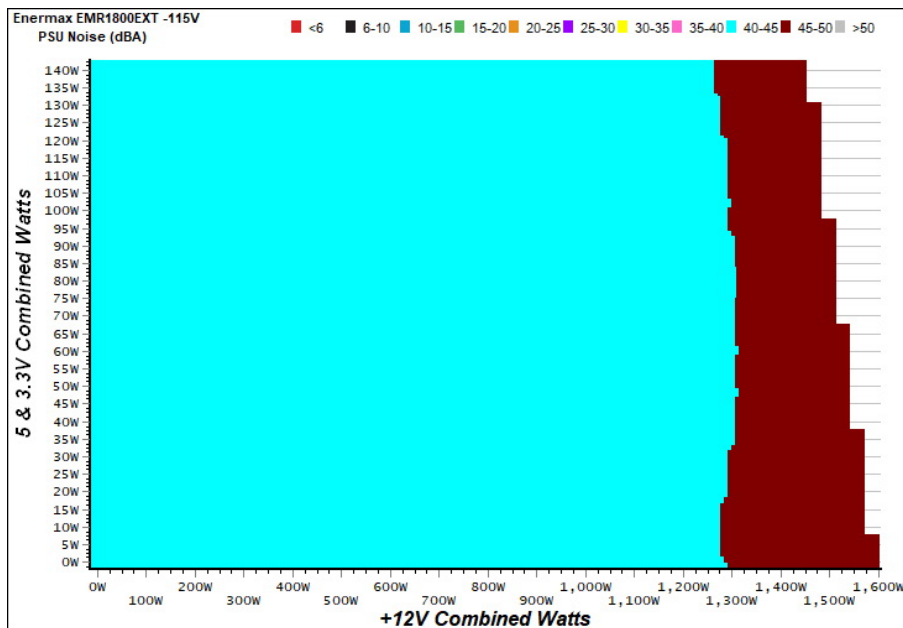
### EFFICIENCY GRAPH



#### 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)

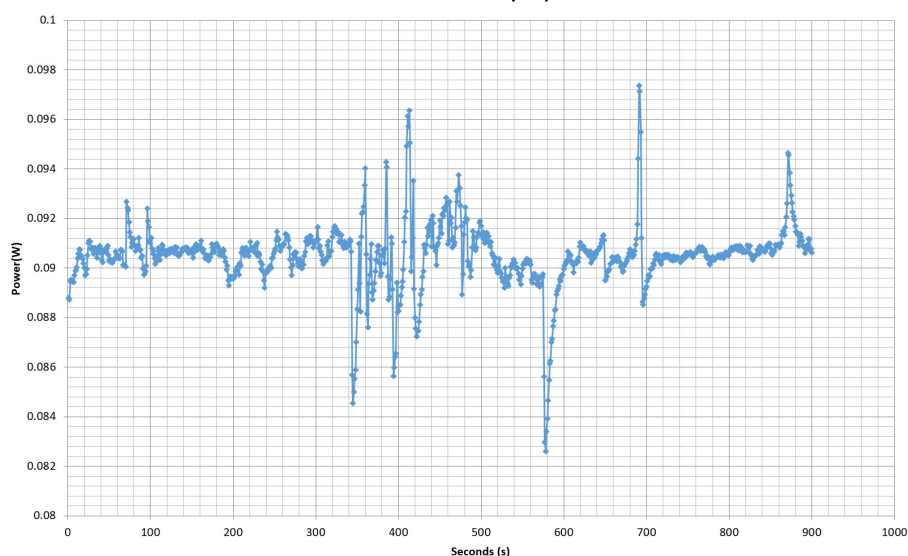
Test #	5VSB	DC/AC (Watts)	Efficiency	PF/AC Volts
1	0.045A	0.231	62.432%	0.059
	5.123V	0.370		115.09V
2	0.090A	0.461	71.142%	0.101
	5.122V	0.648		115.09V
3	0.550A	2.813	80.348%	0.340
	5.114V	3.501		115.08V
4	1.000A	5.106	80.270%	0.418
	5.106V	6.361		115.08V
5	1.500A	7.646	79.737%	0.459
	5.096V	9.589		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 -115V

Power - 18A7100210018 - 20/03/2019 - 12:54



#### 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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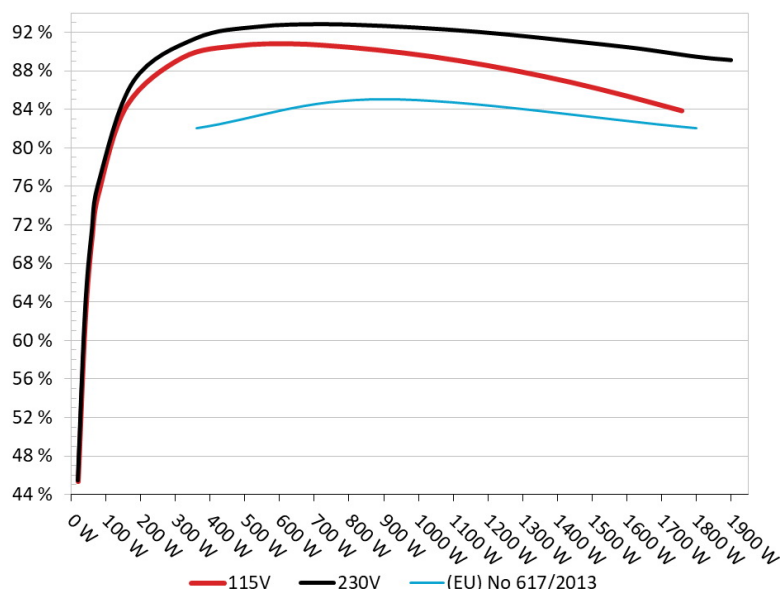
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### EFFICIENCY UNDER HIGH AMBIENT TEMPERATURE

#### Efficiency: Enermax EMR1800EXT

Ambient: 37°C - 47°C (98.6°F - 116.6°F)



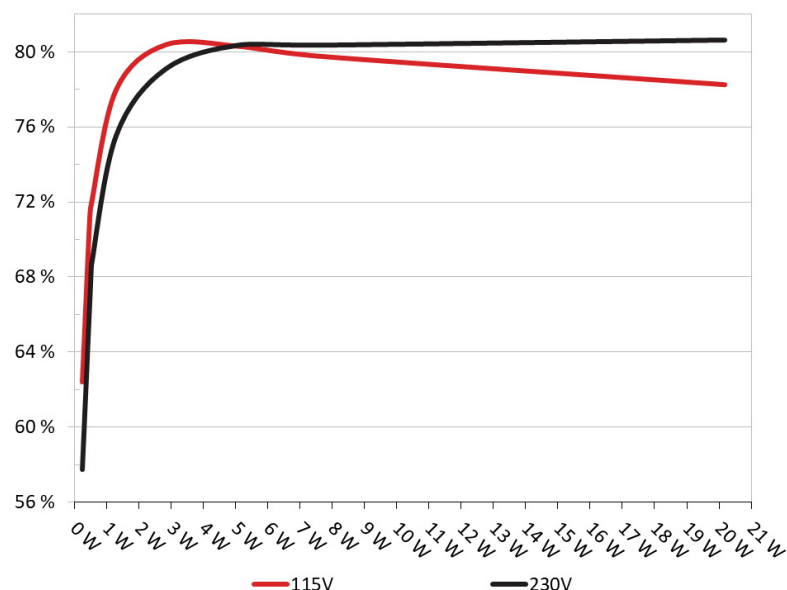
#### INFO

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

#### 5VSB Efficiency: Enermax EMR1800EXT

Ambient: 34°C - 36°C (93.2°F - 96.8°F)



#### 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)	PSU Noise (dB[A])	Temps (In/Out)	PF/AC Volts
1	11.352A	1.963A	1.948A	0.981A	159.946	84.363%	1960	42.1	40.18°C	0.994
	12.188V	5.092V	3.385V	5.095V	189.592				42.36°C	115.10V
2	23.744A	2.950A	2.926A	1.181A	319.665	89.318%	1972	42.2	40.92°C	0.998
	12.162V	5.085V	3.379V	5.083V	357.896				43.50°C	115.11V
3	36.517A	3.446A	3.408A	1.381A	479.207	90.561%	1991	42.4	41.10°C	0.999
	12.137V	5.078V	3.374V	5.071V	529.152				44.20°C	115.11V
4	49.416A	3.943A	3.916A	1.581A	639.667	90.762%	2021	43.5	41.86°C	0.999
	12.111V	5.072V	3.369V	5.059V	704.777				45.55°C	115.11V
5	62.007A	4.937A	4.907A	1.784A	799.857	90.411%	2053	44.4	42.07°C	0.999
	12.085V	5.064V	3.362V	5.047V	884.694				46.28°C	115.12V
6	74.649A	5.934A	5.900A	1.987A	959.928	89.814%	2090	44.7	42.64°C	0.999
	12.058V	5.056V	3.357V	5.034V	1068.797				47.86°C	115.12V
7	87.322A	6.934A	6.896A	2.191A	1119.684	89.005%	2121	44.9	43.18°C	0.999
	12.031V	5.049V	3.350V	5.021V	1258.002				49.44°C	115.12V
8	100.116A	7.937A	7.896A	2.397A	1280.206	87.979%	2170	45.4	43.80°C	0.999
	12.004V	5.041V	3.343V	5.009V	1455.120				51.94°C	115.12V
9	113.317A	8.444A	8.386A	2.401A	1439.578	86.778%	2239	45.6	44.35°C	0.999
	11.976V	5.033V	3.338V	4.999V	1658.928				54.03°C	115.14V
10	125.985A	8.956A	8.911A	4.038A	1599.856	85.361%	2307	46.5	45.25°C	0.999
	11.947V	5.025V	3.333V	4.955V	1874.232				55.66°C	115.15V
11	139.724A	8.968A	8.923A	4.045A	1759.943	83.818%	2393	47.8	46.67°C	0.999
	11.918V	5.018V	3.329V	4.946V	2099.720				58.05°C	115.14V
CL1	0.157A	17.001A	16.998A	0.000A	144.981	79.019%	2109	44.8	42.22°C	0.994
	12.170V	5.069V	3.347V	5.100V	183.476				46.60°C	115.15V
CL2	133.357A	1.003A	1.000A	1.000A	1608.243	85.593%	2306	46.5	45.56°C	0.999
	11.959V	5.035V	3.353V	5.024V	1878.947				55.65°C	115.14V

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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	1.186A	0.489A	0.470A	0.195A	19.565	45.347%	1945	42.0	0.935
	12.210V	5.097V	3.391V	5.118V	43.145				115.12V
2	2.425A	0.980A	0.971A	0.391A	39.887	61.926%	1939	42.0	0.961
	12.207V	5.097V	3.389V	5.113V	64.411				115.11V
3	3.598A	1.472A	1.445A	0.587A	59.306	70.587%	1942	42.0	0.976
	12.204V	5.096V	3.388V	5.108V	84.018				115.11V
4	4.847A	1.963A	1.947A	0.784A	79.727	75.434%	1953	42.1	0.979
	12.200V	5.094V	3.386V	5.103V	105.691				115.11V

## RIPPLE MEASUREMENTS

Test	12V	5V	3.3V	5VSB	Pass/Fail
10% Load	12.1 mV	7.9 mV	12.1 mV	14.0 mV	Pass
20% Load	12.3 mV	9.8 mV	11.8 mV	16.0 mV	Pass
30% Load	13.0 mV	10.8 mV	12.3 mV	17.5 mV	Pass
40% Load	13.8 mV	12.3 mV	13.4 mV	17.8 mV	Pass
50% Load	14.5 mV	14.4 mV	14.2 mV	19.3 mV	Pass
60% Load	16.0 mV	15.7 mV	14.6 mV	20.4 mV	Pass
70% Load	15.9 mV	17.0 mV	15.1 mV	22.5 mV	Pass
80% Load	16.9 mV	18.9 mV	18.3 mV	25.1 mV	Pass
90% Load	30.6 mV	30.2 mV	43.8 mV	39.8 mV	Pass
100% Load	30.7 mV	30.5 mV	41.4 mV	43.3 mV	Pass
110% Load	31.6 mV	32.4 mV	42.9 mV	47.0 mV	Pass
Crossload 1	14.1 mV	19.5 mV	23.3 mV	13.5 mV	Pass
Crossload 2	27.9 mV	26.2 mV	35.9 mV	36.4 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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