

MODEL NO. ENR0640 SERIES (ACTIVE PFC)

This specification defines the performance characteristics of a single-phase (3-wire) 400Watt power supply with wide range input AC capability (100-240VAC/50-60Hz) under operation temperature 40 degree C. The power supply shall be designed for parallel operation. In the event of a power supply failure, the redundant power supply continues to power the system. The number of power supplies per system will be limited to a maximum of two. The power supply shall be designed for “hot swap” exchange and contain the OR-ing isolation MOSFETs.

1. Input Requirement

1.1 AC input requirements

The Power supply must be having a universal power input with active power correction to reduce the line harmonics in accordance with the EN61000-3-2 standard.

The power supply must be capable of operating with the following Conditions

Parameter	Min	Nom.		Max	Unit
Vin	90	100	240	264	VACrms
Vin Frequency	47	50	60	63	Hz
Iin(400W)		6	3		A

1.2 Power Factor

Power factor correction (PF)>0.9 at full load.

1.3 Inrush current regulation

1.3.1 When input power is applied to the power supply any initial current surge or spike of 10ms or less will not exceed 50A .

1.3.2 It is acceptable that AC line inrush current may reach up to 100A peak within 1 ms caused by capacitors of EMI filter.

1.3.3 Hot Inrush Current

Not applicable

Note: For any conditions during turn-on the inrush current will not open the primary input fuse or damage any other components.

1.4 Efficiency

The Power supply efficiency typical **82%** at normal AC main voltage and full load on all outputs.

2. Output Requirements

All outputs must maintain their regulation with the below limits when measured at the output connector point or across the remote sense(if applicable) in any load condition defined in Section 2.1

Parameter	Range	Min	Nom.	Max	Unit
+3.3V	+/-5%	+3.14	+3.3	+3.47	Volts
+5V	+/-5%	+4.75	+5	+5.25	Volts
+12V	+/-5%	+11.4	+12	+12.6	Volts
-12V	+/-10%	-10.8	-12	-13.2	Volts
+5VSB	+/-5%	+4.75	+5	+5.25	Volts

Note:1>Voltage tolerance is required at main connector and S-ATA connector(if used)

2>Output transient response tested DC voltage regulation range +5V,+12V,+3.3V,+5Vsb±5%,-12V±10%.

2.2 Output Current Requirements

All outputs must maintain their regulation as per Section 2.2 when loaded to the following loading combination:

Parameter	Min	Nom.	Max	Peak	Unit
+3.3V	0	-	20		Amps
+5V	0	-	20		Amps
+12V1	0	-	25		Amps
+12V2	0	-	25		Amps
-12V	0	-	0.3		Amps
+5VSB	0	-	2.5		Amps

Notes:(1) The maximum continuous load on +12V outputs shall not exceed 400W.

(2) Maximum continuous combined load on +3.3VDC and +5VDC outputs shall not exceed 105W.

(3) The +5V standby output shall remain on with the AC input power connected, whether the powersupply DC outputs are disabled (Off) or enabled (On) by the remote on control signal.

2.3 Output Dynamic Loading

The output voltages shall remain within the limits specified in 2.3 for the step loading and within the limits specified in 2.4 for the capacitive loading. The load transient repetition rate shall be tested between 50 Hz and 5 kHz at duty cycles ranging from 10%-90%. The load transient repetition rate is only a test specification. The Δ step load may occur anywhere within the MIN load to the

MAX load shown in 2.2

2.3 Transient Load Requirements

Output	Δ Step Load Size	Load Slew Rate	Capacitive Load
+3.3V	30% of max load	1 A/ μ s	1000 μ F
+5V	30% of max load	1 A/ μ s	1000 μ F
+12V	40% of max load	1 A/ μ s	2200 μ F
+5VSB	25% of max load	1 A/ μ s	330 μ F

2.4 Capacitive Loading

The power supply shall be stable and meet all requirements, except dynamic loading requirements, with the following capacitive loading ranges.

2.4 Capacitive Loading Conditions

Output	MIN	MAX	Units
+3.3V	10	10000	μ F
+5V	10	10000	μ F
12V	10	10000	μ F
-12V	1	350	μ F
+5VSB	1	350	μ F

2.5 Output Ripple and Noise

The following output ripple/noise requirements will be met throughout the load ranges specified in Section 2.2 and under all input voltage conditions specified in Section 2.5 . Ripple and noise are defined as periodic or random signals over the frequency band of 10Hz to 20MHz.

2.5 Output Ripple and Noise

Parameter	Ripple&Noise	Unit
+3.3V	50	mVp-p
+5V	50	mVp-p
+12V	120	mVp-p
-12V	120	mVp-p
+5VSB	50	mVp-p

Measurements will be made with an oscilloscope set to 20MHz bandwidth limit. The ripple voltage of the outputs shall be measured at the pins of the output connector when terminated in the load impedance specified in figure1. Ripple and noise are measured at the connectors with a 0.1uF ceramic capacitor and a 10uF electrolytic capacitor to simulate system loading.

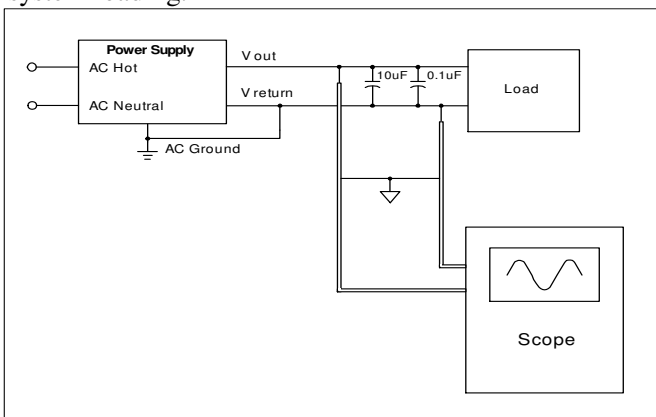


Figure 1. Ripple voltage test circuit

2.6 Overshoot at Turn-on / Turn-off

The output voltage overshoot upon the application or removal of the input voltage, or the assertion/de-assertion of PS_ON# shall be less than 10% above the nominal voltage.

3. Protection Circuits

3.1 Over-power protection

The power supply will be shutdown and latch off when output power at 105~150% of rated DC output.

3.2 Over current protection

In an over current fault occurs, the supply will latch all DC outputs into a shutdown state for +3.3V or +5V or +12V1,+12V2.

Parameter	Min.	Max.	Unit
+3.3V	22	50	A
+5V	22	50	A
+12V1	27	50	A
+12V2	27	50	A

3.3 Over voltage protection

In an over voltage fault occurs, the supply will latch all DC outputs into a shutdown state. The supply shall provide latch mode over voltage protection as defined .

Parameter	Min.	Max.	Unit
+3.3V		5	V
+5V		7	V
+12V	12.5	16.5	V

3.4 Short circuit

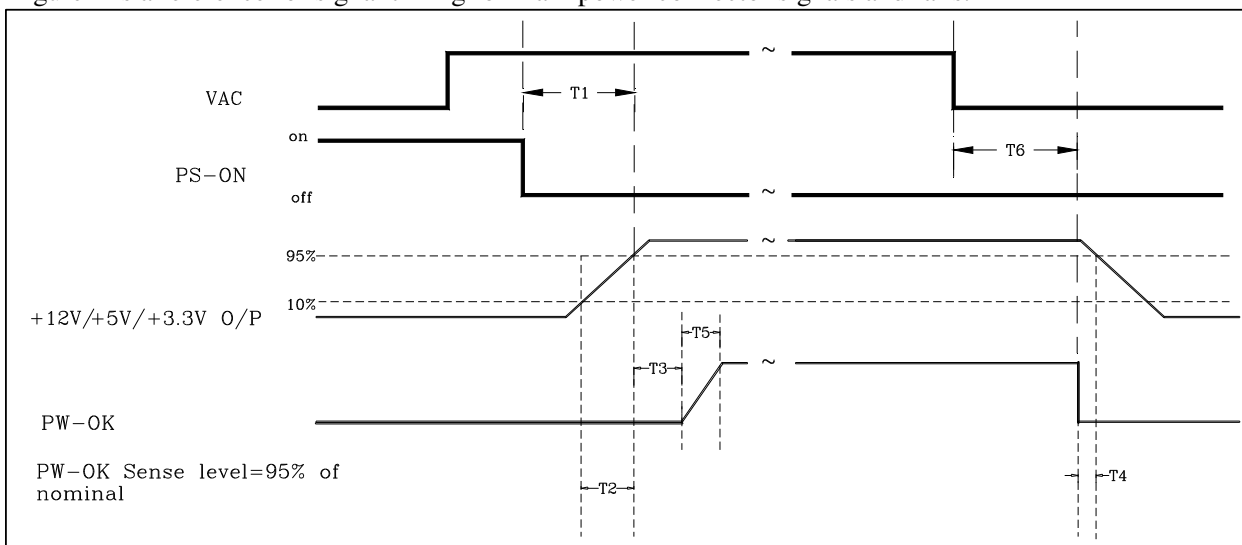
The power supply shall shutdown and latch off for shorting +3.3V, +5V, +12V1,+12V2, -12V rails. The main output short circuit of any impedance shall less than 0.1 ohms.

NOTES: 5Vsb will be auto-recovery when the fault removed.

4. Controls and Signal

4.1 Timing Requirements

Figure 2 is a reference for signal timing for main power connector signals and rails.



- (1)T1:Power on delay time (5~400ms)
- (2)T2:Each main output voltage rise time (0.1ms~70ms)
- (3)T3: PW- OK signal turn on delay time (100ms~500ms)
- (4)T4: PW- OK signal turn off delay time (1ms min)
- (5)T5: PW- OK rise time (10ms max)
- (6)T6:Hold up delay time(17mS Min)

4.2 Remote on/off control

When the logic level "PS-ON" is low, the DC outputs are to be enabled.

When the logic level is high or open collector, the DC outputs are to be disabled.

4.3 LED Indicator

A green/red double color Light Emitting Diode (LED) shall be mounted as indicated in mechanical drawing and shall indicate the status of the DC GOOD signal with green color. The LED shall continue to glow under normal operation of the power supply. If this LED is blinking or not lit or in red color, the power supply is not operating properly.

5. Redundancy Requirements

5.1 Current Sharing Operation

The power supply shall be designed for active current sharing.

Two power supplies will be paralleled in a system. Each power supply must be able to share load to within +/- 25% share error measured 25% and share load to within +/- 10% share error measured 50%, 100% of single power load supply full current.

5Vsb requires an “ORing” diode to provide protection against internal short circuit fault.

5.2 Output Isolation Oring MOSFET

The 12.2V output current must pass through an Oring MOSFET to protect the bus voltage against a power supply internal fault.

5.3 Parallel Stability

The power supply shall be unconditionally stable under all system load and AC line conditions while operating alone or in parallel mode.

5.4 Hot Swap

The power supply must be designed with “hot swap” function with or without active AC line cord.

Host existing working power supply shall not be affected by hot swapping power supply.

6.Environmental Requirements

6.1 Normal Operating Ambient(at sea level):

Temperature	0 to 40 °C
Relative Humidity	to 85%,on-condensing

6.2 Shipping and Storage

Temperature	-40 to 70 °C
Relative Humidity	to 95%,non-condensing

6.3 Altitude

Operating	10,000FT max.
Storage	50,000FT max.

6.4Mechanical Shock

The device will withstand the following imposed conditions without electrical or mechanical failure:

Non-operating Square Wave Shock: 40G, Square wave at 200in/sec (508cm/sec); on all six sides

Non-operating Half Sine Shock: Half Sine pulse for 70in/sec (178cm/sec) for 2ms; on all sides except top

Operating Half Sine Shock: Half Sine pulse for 40in/sec (102cm/sec) for 2ms; on all sides except top

6.5 Vibration

Operating: Sinusoidal vibration, 0.5G (0-peak) acceleration. 3-500Hz, sweep at 1/2 octave/min from low to high frequency, and then from high to low. Thirty minute dwell at all resonant points, where resonance is defined as those exciting frequencies at which the device under test experiences excursions two times larger than non-resonant excursions. Plane of vibration to be along three mutually perpendicular axis.

Non-operating: Sinusoidal vibration, 1.0G (0-peak) acceleration. 3-500Hz, sweep at 1/2 octave/min from low to high frequency, and then from high to low. Thirty minute dwell at all resonant points, where resonance is defined excursions.

7. SAFETY

7.1 The power supply designed to meet CCC

8. ELECTROMAGNETIC COMPATIBILITY (EMC)

8.1 ELECTROSTATIC DISCHARGE (ESD) - IEC 61000 – 4 - 2 : 2008

8.2 ELECTRICAL FAST TRANSIENT / BURST (EFT/B) – IEC 61000 – 4 - 4 : 2012

8.3 SURGE – IEC 61000 – 4 - 5 : 2005

8.4 POWER FREQUENCY MAGNETIC FIELD – IEC 61000 – 4 - 8 : 2009

8.5 VOLTAGE DIPS – IEC 61000 – 4 - 11 : 2004

8.6 RADIATED SUSCEPTIBILITY – IEC 61000 – 4 – 3 : 2006+A1 : 2007+A2 : 2010

8.7 CONDUCTED SUSCEPTIBILITY – IEC 61000 – 4 - 6 : 2008

8.8 VOLTAGE FLUCTUATION - EN 61000 – 3 – 3 : 2008

8.9 EN61000-3-2 : 2006+A2 : 2009 harmonic current emissions.

If applicable to sales in Europe, the power supply shall meet the requirements of EN 61000-3-2 Class D and the Guidelines for the Suppression of Harmonics in Appliances and General Use Equipment Class D for harmonic line current content at full-rated power.

8.10 EN55022 : 2010/AC : 2011 Class B Radio interference (CISPR 22).

8.11 ANSI C63.4-2009 / FCC Part 15 Subpart B / ICE-003 Issue 5 class B 115VAC operation.

9. MTBF

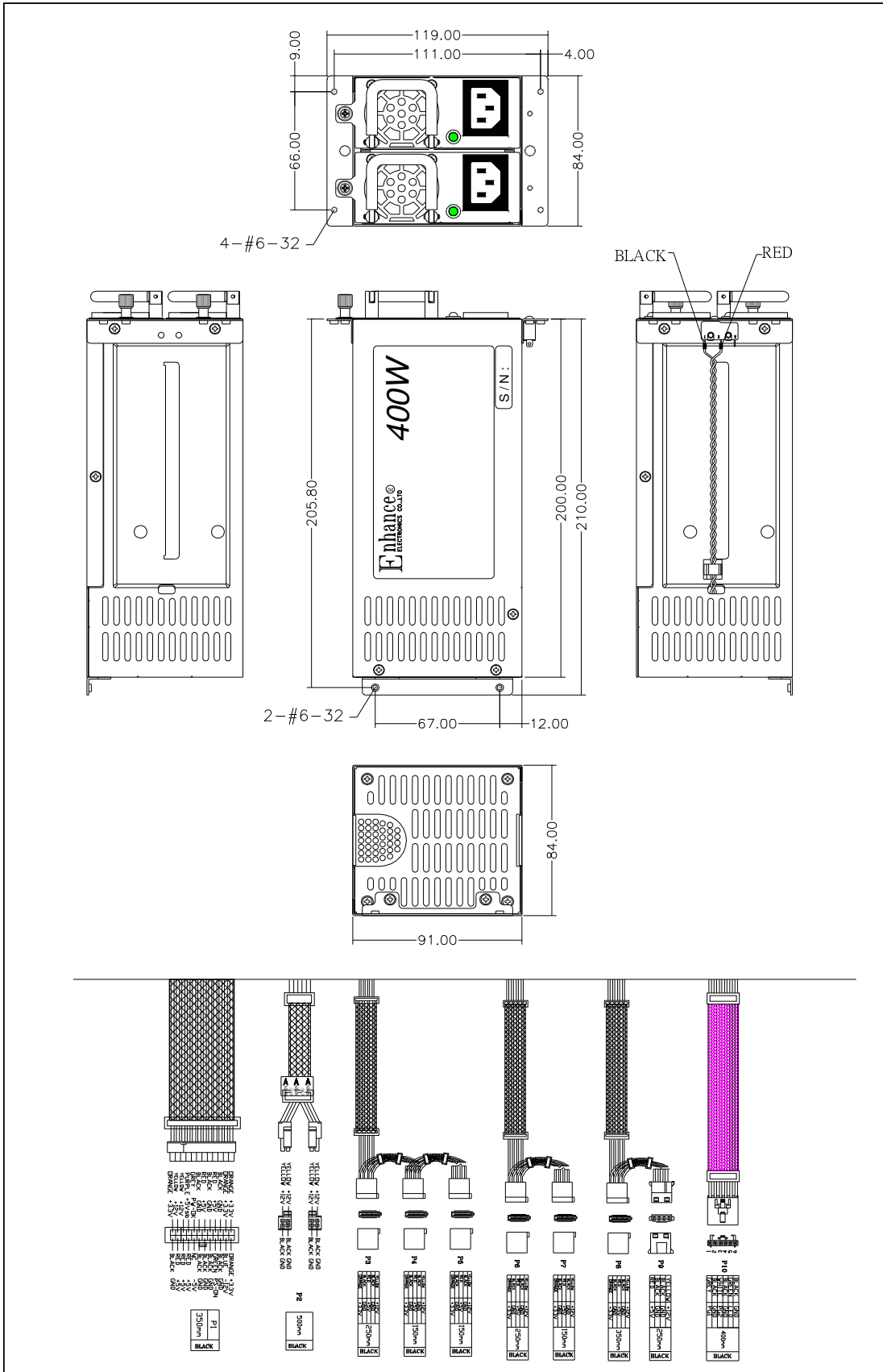
9.1 MTBF (mean time between failures) calculation

The demonstrated MTBF shall be 100,000 hours of continuous operation at 25°C, full load and 115V AC input. The MTBF of the power supply shall be calculated in accordance with MIL-HDBK-217F. The DC FAN is not included.

10. MECHANICAL REQUIREMENTS

10.1 Physical dimension : L200mm*W91mm*H84mm

(線材組合 & 外露長度僅供參考，可根據客戶要求更改或新增。)



P1 (Motherboard 20+4Pin) Power Connector

18AWG wire	Signal	Pin	Pin	Signal	16AWG wire
Orange	+3.3V	11	1	+3.3V	Orange
Orange(22AWG)	3.3V sense				
Blue(20AWG)	-12VDC	12	2	+3.3V	Orange
Black	COM	13	3	COM	Black
Black(22AWG)	COM sense				
Green(20AWG)	PS-ON	14	4	+5VDC	Red
Black	COM	15	5	COM	Black
Black	COM	16	6	+5VDC	Red
Black	COM	17	7	COM	Black
Black(22AWG)	COM sense				
White	NC	18	8	POK	Grey(20AWG)
Red	+5VDC	19	9	+5VSB	Purple
Red(22AWG)	+5V sense			+12V1DC	Yellow
Red	+5VDC	20	10	+12Vsense	Yellow(22AWG)
Red	+5VDC	B3	B1	+12V1DC	Yellow
Black	COM	B4	B2	+3.3VDC	Orange

P2 (CPU 4+4Pin) Power Connector

18 AWG wire	Signal	Pin	Pin	Signal	18AWG wire
Black	GND	1	3	Yellow/Black	+12V2
Black	GND	2	4	Yellow/Black	+12V2

P3,P4 ,P5 ,P6,P7,P8SATA Power Connector

18AWG wire	Signal	Pin
Yellow	+3.3V	1
Black	COM	2
Red	+5V	3
Black	COM	4
Orange	+12V	5

P9 HDD

18AWG wire	Signal	Pin
Yellow	+12V1	1
Black	COM	2
Black	COM	3
Red	+5VDC	4

P10 6PIN

22AWG wire	Signal	Pin
Grey	PG1	1
Black	COM	2
White	PG2	3
Black	COM	4
Green	LED+	5
Black	COM	6

11. FAN SPEED CONTROL (optional)

Fan voltage varies with the ambient temperature or output power.

Fan speed control with NTC