Your Power House
VP ELECTRONIQUE

Power Supply Specification

Model Number: RSAB U3/Q3 Series

AC Input: 100-240Vac, active PFC

DC Output: 420W to 540W

Revision: A-01

Date issued: 01/23/2016

RSABxU Series

RSABxQ Series

Revision History

Rev	Description	Owner	Date
A-01	Initial released	H.P. Zhang	01/23/16

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INDEX

1. Scope

This document defines an industrial quality, 1U 3" wide, 420W to 540W single output power supply for the application of industrial grade system. RSAB series was designed into two different form factors: 1). Open frame with U shape AL heatsink – U3 series, and 2). Enclosed with fan and IEC C14 Inlet installed – Q3 series which were designed for standalone application. The AC input is rated 90-264Vrms with power factor corrected (PFC > 0.95 with loaded 40% or higher of max rated output). A 40mm high reliable fan (if present) was installed to the power supply for cooling the power supply and part of system.

2. Electrical

The electrical specifications that follow are to be met over the environmental ranges specified in Section 3 unless otherwise noted.

2.1. AC Input

Table 1 lists AC input voltage and frequency range for continuous operation. The power supply is capable of supplying full-rated output power over the input voltage ranges specified (420W, 480W, 540W).

Parameter	Min	Nominal Input	Max	Unit
V_{in} Voltage	90	100-240	264	Vrms
V_{in} Frequency	47	50/60	63	Hz
V_{in} Current	---	---	6.3	A

Table 1. AC input

- The inrush current is less than 80A under the conditions of 240Vrms input and 25°C ambient cold start. The inrush current is limited to the extent that no damage will be done to the power supply under any specified line, load, and temperature conditions. The inrush current will not cause external protection devices (fuses) to trip.
- The leakage current of the power supply module is less than 1.50 mA measured at 264Vac input.
- The repetitive ON/OFF cycling of AC input voltage (with 1-2 sec. interval) will not damage the power supply.
- The power supply can automatically recover from AC power loss.
- The power supply is equipped with primary fuse for input over-current protection, and meet product safety requirement.

2.2. DC Output

2.2.1. DC Output Voltage Regulations

The DC output voltages remain within the regulation ranges shown in Table 2 for both power supply module and the completed power system when measured at the load end of the output connectors under all AC line, O/P loads, and environmental conditions. The voltage regulation will be maintained under continuous operation for a period of time equal to the MTBF specified in section 5.2 at any steady state temperature and operating conditions specified in section 3.

Output Rail	Output Voltage	Range	Min	Nom	Max	Unit
V1	+12V	±3%	+11.64	+12V	+12.36	Volt
	+24V	±2%	+23.53	+24V	+24.48	Volt
	+36V	±2%	+35.28	+36V	+36.72	Volt
	+48V	±2%	+47.04	+48V	+48.96	Volt
	+54V	±2%	+52.92	+54V	+55.08	Volt
	+56V	±2%	+54.88	+56V	+57.12	Volt

Table 2. DC Output Voltage Regulations

- The remote sensing is provided to V1 output to compensate for excessive cable drops.

2.2.2. DC Output Load Distributions

The Table 3 defines the power supply typical output load distribution.

Output Rail	Output Voltage	Minimum Current (A)	420W Max. (A)	480W Max. (A)	540W Max. (A)
V1	+12V	1.0	35.00	40.00	45.00
	+24V	0.5	17.50	20.00	22.50
	+36V	0.5	11.67	13.33	15.00
	+48V	0.5	8.75	10.00	11.25
	+54V	0.5	7.78	8.89	10.00
	+56V	0.5	7.50	8.57	9.64

Table 3. DC Output Load Distribution (420W – 540W)

- For U3 series, a minimum of 12CFM force air with the direction in parallel with the U shape heatsink is required to maintain the output wattage specified in Table 3.
- For U3 series, under the condition of convection cool, the output wattage will be de-rated down to 200W max.

2.2.3. DC Output Efficiency

The power supply efficiency is 92% minimum measured at typical load (50%) and nominal line input which is 115Vrms and 230Vrms conditions.

2.2.4. DC Output Ripple & Noise

The output ripple & noise specifications listed in Table 4 will be met throughout the load ranges as specified in section 2.2.2 and the nominal line input voltage conditions as specified in section 2.1. Ripple & noise is defined as periodic of random signals over a frequency band of 10Hz to 20MHz. Measurements should be made with an oscilloscope with 20MHz bandwidth. Add a 10uF electrolytic capacitor and a 0.1uF ceramic capacitor across output terminal during ripple & noise measurement.

V1	+12V	+24V	+36V	+48V	+54V	+56V
Max. Ripple	120	240	360	400	400	400
Max Ripple & Noise	120	240	360	400	400	400
Unit	mV	mV	mV	mV	mV	mV

Table 4. DC Output Ripple & Noise

2.2.5. DC Output Transient Response

The output voltages will remain within the regulation limits specified in Table 2. The load-changing repetition rate is 50Hz to 10KHz, and the transient load slew rate 0.5A/us. The maximum step load size, and output capacitive loading are specified as followings in Table 5:

	+12V	+24V	+36V	+48V	+54V	+56V
Step Load Size (A)	30% of Max. Load	30% of Max. Load	30% of Max. Load	30% of Max. Load	30% of Max. Load	30% of Max. Load
Capacitive Load (uF)	10000	5000	5000	2000	2000	2000

Table 5. DC Output Step Load

2.2.6. DC Output Voltage Hold-up Time

The power supply will maintain outputs in regulation per section 2.2.1 despite a loss of input power at the nominal range of AC input and at 80% of maximum continuous output load as applicable for a minimum of 10 ms.

2.3. Timing / Housekeeping / control

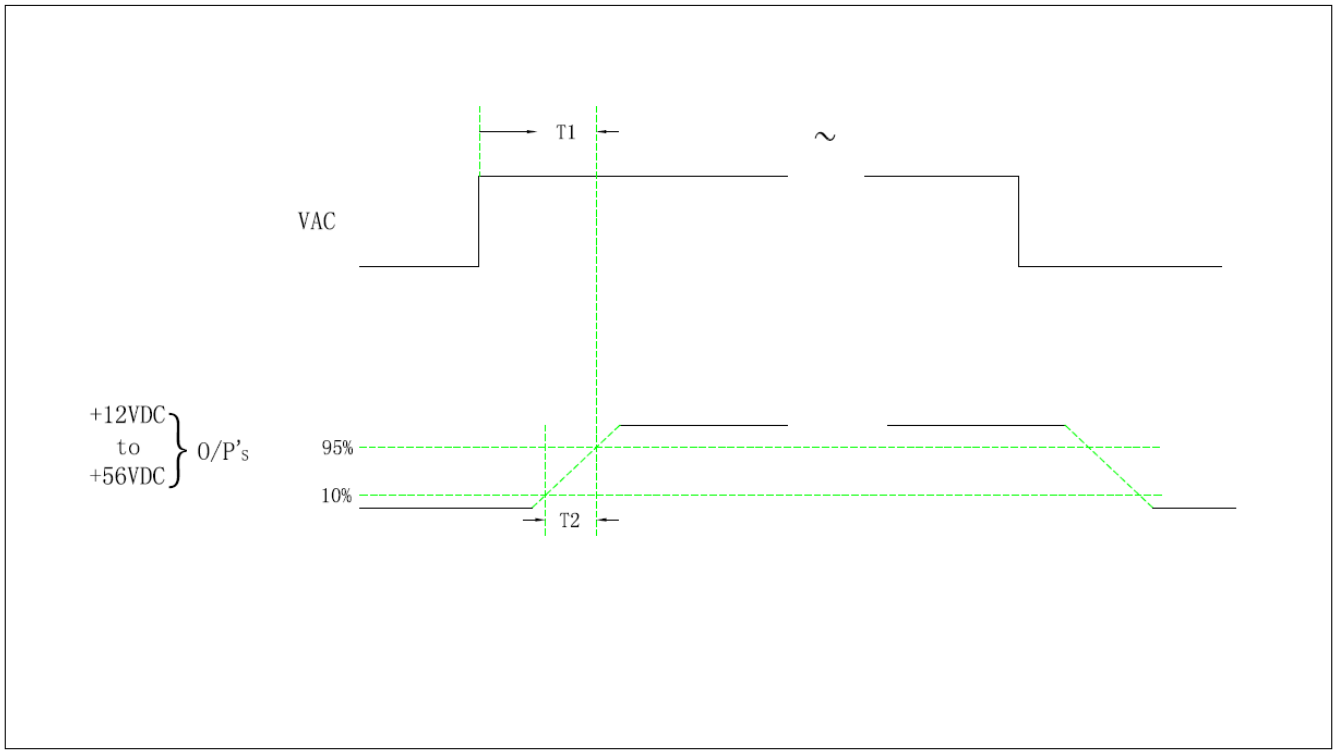

Figure 1. Power Supply Timing

Notes: T1 is defined is section 2.3.1
T2 is defined in section 2.3.2

2.3.1. Power-on Time

The power-on time is defined as the time from AC input voltage applied to when the V1 output is within the regulation ranges specified in Section 2.2.1. The power-on time will be less than 2000ms (T_1 <2000ms).

2.3.2. Rise Time

The output voltage rises from ≤ 10% of nominal to within the regulation range specified in section 2.2.1 within 0.1 ms to 20 ms (0.1 ms ≤ T_2 ≤ 20 ms) for +12V output, and 0.1 ms to 40 ms (0.1 ms ≤ T_2 ≤ 40 ms) for +24V, +36V, +48V, +54V and +56V output.

2.3.3. Overshoot at Turn-on / Turn-off

The output voltage overshoot upon the application or removal of the input voltage will be less than 10% above the nominal voltage.

2.3.4. Reset after Shutdown

If the power supply latches into a shutdown state because of a fault condition on its output, the power supply can return to normal operation only after the fault condition has been removed and the AC input voltage has been cycled OFF/ON with a minimum OFF time of 1 second.

2.4. Output Protection

2.4.1. Over Voltage Protection (Latch-mode)

The power supply can provide latch-mode over voltage protection as defined in Table 8.

Output	+12V	+24V	+36V	+48V	+54V	+56V
Min.	13.6	26.0	38.0	50.0	56.0	58.0
Nom.	14.6	28.0	41.0	53.0	58.0	58.0
Max.	15.6	30.0	44.0	56.0	60.0	60.0
Unit	Volts	Volts	Volts	Volts	Volts	Volts

Table 8. Over Voltage Protection

2.4.2. Over Current Protection (Auto-recover)

The power supply will shut down under the condition of the output current loaded over 110% to 150% of the max. output current specified. It will recover automatically after fault condition been removed.

2.4.3. Short-circuit Protection (Auto-recover)

The power supply will shut down for shorting the V1 output rail to return. When the short is removed, the power supply will recover automatically. The power supply is capable of withstanding a continuous short circuit to the outputs without damage or overstress to the unit (for example, to components, PCB traces, connectors) under the input conditions specified in section 2.1.

2.4.4. Over Temperature Protection (Auto-recover)

The power supply will shut down under the condition of full load and ambient temperature over 60°C (±5°C). It will recover automatically after fault condition been removed.

2.4.5. No-load Operation

No damage or hazardous condition will occur with all the DC output connectors disconnected from the load. The power supply may latch into the shutdown state.

2.4.6. Isolation

Primary to Secondary	3000Vac / 4242Vdc
Primary to Earth GND	1980Vac / 2800Vdc

3. Environmental

The following subsections define recommended environmental specifications and test parameters. Based on the typical conditions to which a power supply may be subjected during operation or shipment.

3.1. Temperature

Operating	-10°C to +50°C
Non-operating	-40°C to +85°C

3.2. Humidity

Operating	10% to 90% relative humidity (non-condensing)
Non-operating	5% to 95% relative humidity (non-condensing)

3.3. Altitude

Operating	0 to 10,000 feet (meet 5000m for CCC)
Storage	0 to 50,000 feet

4. Electromagnetic Compatibility

The following subsections outline applicable product regulatory specifications for this power supply.

4.1. Emissions

The power adaptor complies with FCC Part 15, VCCI, AS/NZS CISPR22:2009, and EN55022:2010 meeting Class B for both conducted and radiated emissions.

4.2. Immunity

The power adaptor complies with EN 55024:2010.

4.3. CE Testing

The following standards are applied during the CE testing

EN 55022: 2010 Class B
EN 61000-3-2: 2006+A1:2009+A2:2009 Class D
EN 61000-3-3: 2008
EN 55024: 2010, including
IEC 61000-4-2:2008 Criterion A
IEC 61000-4-3:2010 Criterion A
IEC 61000-4-4:2004+A1:2010 Criterion A
IEC 61000-4-5:2005 Criterion A
IEC 61000-4-6:2008 Criterion A
IEC 61000-4-8:2009 Criterion A
IEC 61000-4-11:2004 Criterion A/C

5. Reliability

5.1. Component De-rating

The derating process promotes quality and high reliability. All electronic components are designed with conservative derating for use in commercial and industrial environments.

5.2. Mean Time between Failures (MTBF)

100K hours minimum at full load 25^{o}C per Bellcore_TR-332_ISSUE6

6. Safety

6.1. Safety (pending)

cTUVus	UL 60950-1, 2nd Edition, 2011-12-19 / CSA C22.2 No. 60950-1-07, 2nd Edition, 2011-12
TUV	EN 60950-1:2006+A11+A1+A12+A2
CB	IEC 60950-1:2005 (2nd Edition)+Am1:2009+Am2:2013
CCC	GB4943.1-2011; GB9254-2008; GB17625.1-2012 (5000m)

6.2. RoHS/REACH Compliance

The power supply meets the requirements of RoHS & REACH Compliance specified as followings:

- European Directive for Waste of electrical and electronic equipment (WEEE) 2012/19/EU

- European Directive for Restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS) 2011/65/EU

- ACPEIP, Administration on the Control of Pollution caused by Electronic Information Products (China RoHS), e.g. SJ/T 11363-2006 Requirements for Concentration Limits for Certain Hazardous Substances in EIP, SJ/T 11364-2006 Marking for Control of Pollution Caused by EIP

- Plastic and rubber parts are within the limits for 16 PAH and Benzopyrene polycyclic aromatic hydrocarbons
  - PAH (Polycyclic Aromatic Hydrocarbons):
    - 200mg/kg for components touched less than 30 seconds
    - 10mg/kg for components touched longer than 30 seconds
  - Benzopyrene are within the limits of:
    - 20mg/kg for components touched less than 30 seconds
    - 1mg/kg for components touched longer than 30 seconds

- Phthalate concentration is below 1mg/kg for:
  - Diisononyl phthalate
  - Bis(2-ethylhexyl)phthalate
  - Di-n-octyl phthalate
  - Diisodecyl phthalate
  - Butyl benzyl phthalate
  - Bis(n-butyl)phthalate

- Polychlorinated biphenyl (PCB) concentration limits are less than two (2) parts per million (ppm).

Regulation (EC) No 1907/2006 ... concerning the Registration, Evaluation, Authorization and Restriction of Chemicals (REACH): No substance of Very High Concern of the "Candidate List" exceeds more than 0.1 % of the global weight of the delivered item (without packaging of the item)

7. Mechanical

Please see attached outline drawing and output cable drawing in details.

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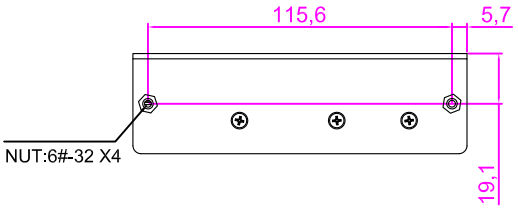
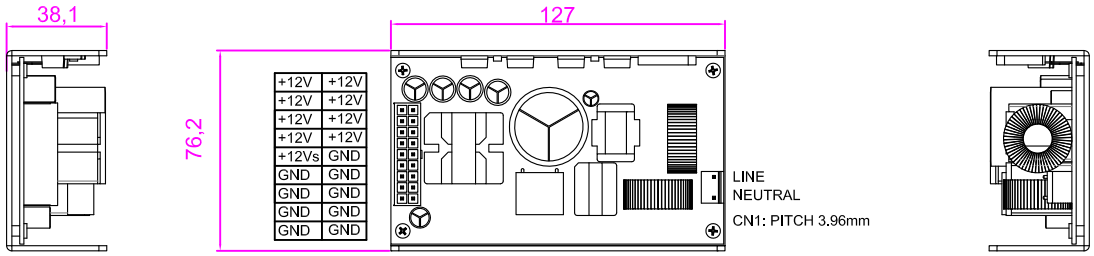
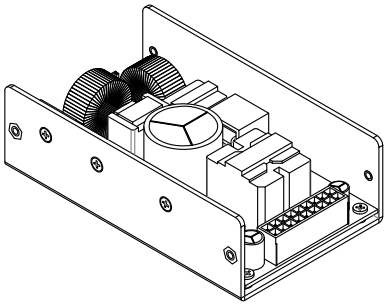




CN2: MOLEX 39-28-1183 or EQUIVALENT

NOTE: CN1 WILL BE REPLACED
BY 0.25' FASTON TERMINAL
FOR 480W AND 540W MODEL



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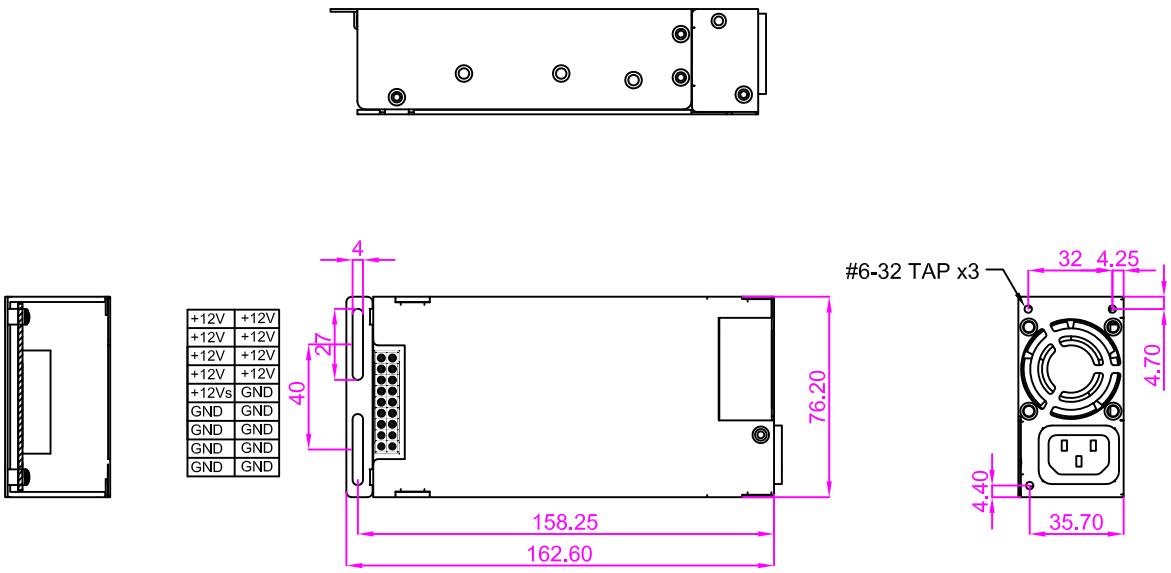

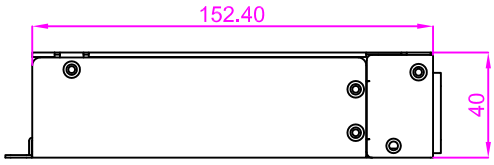

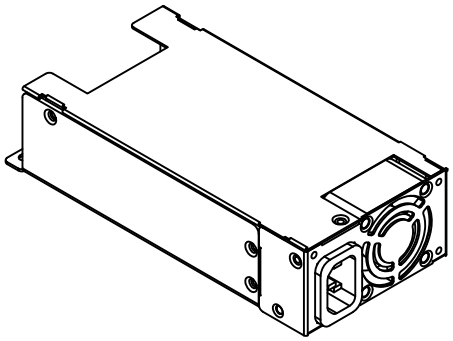

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