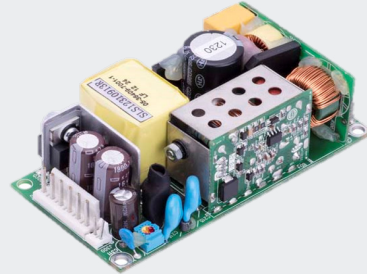


# SL POWER MINT1150 Series

150 Watts Single Output  
Medical Grade



Advanced Energy's SL Power MINT1150 series is a high power density for a power supply in a 2"x4" size. Approved to EN/IEC/UL 60601-1, 3rd edition, with isolation levels which satisfy the 2MOPP requirements. The MINT1150 series is ideal for portable medical devices, and many other applications where medical certifications, power density and cost are critical. The MINT1150 series operates at universal input range of 90 to 264Vac and wide temperature range -10 °C to 70 °C, delivering full rated output power up to +50 °C. In addition, these models feature Power Fail and DC OK signals.

## AT A GLANCE

### Total Power

150 Watts

### Input Voltage

90 to 264 VAC

### # of Outputs

Single

### SPECIAL FEATURES

- 2" x 4" x 1.3" Package
- 150 W with air, 100 W Convection Cooled
- Universal Input 90 to 264 VAC
- Efficiency 89% Typical
- Suitable for 1U Applications
- 2 x MOPP Input to Output Isolation
- Power Fail Signal
- DC OK Signal
- 3 Year Warranty
- RoHS Compliant

### SAFETY

- CSA/IEC/EN/UL60601-1, 3rd Edition
- CE Mark



## ELECTRICAL SPECIFICATIONS

| Input                      |   |
|----------------------------|---|
| Input range                | 90 to 264 VAC, 47 to 63 Hz, 1 $\phi$ ; 120 to 370 VDC   |
| Input current              | 2 A @ 115 VAC, 1 A @ 230 VAC  |
| Inrush current             | 50 A max., cold start @ 264 VAC input   |
| Input fuses                | 4 A, 250 VAC fuses provided in both line & neutral  |
| Turn on input voltage      | 82.7 VAC nom  |
| Turn off input voltage     | 67 VAC nom  |
| Power Factor               | 0.9 min   |
| Earth Leakage current      | <300 $\mu$ A @ 264 VAC, 60 Hz, NC   |
| Efficiency                 | 89% typical @ 115 VAC   |
| Isolation voltage          | Input/Ground: 1800 VAC (1 x MOPP)<br>Input/Output: 4000 VAC (2 x MOPP)<br>Output/Ground: 500 VAC  |
| Output                     |   |
| Output power               | 150 W continuous with 200 LFM airflow, 100 W convection cooled  |
| Ripple and noise           | See "Ordering Information"  |
| Total regulation           | See "Ordering Information"  |
| Output voltage             | See "Ordering Information"  |
| Switching Frequency        | PFC: Variable 30-400kHz. Main Converter: Variable 35-180kHz, 65-70kHz at full load  |
| Adjustment range           | +/-5% from nominal  |
| Turn on time               | < 2 s @ 115 VAC (inversely proportional to input voltage and thermistor temperature)  |
| Hold-up time               | 12 mS min @ full load, 120 Vac input  |
| Minimum load               | Not required  |
| Dynamic load regulation    | < 3% of nominal output voltage @ 50% load change, di/dt = 0.2 A/ $\mu$ S  |
| Reliability                |   |
| MTBF                       | 640,000 hrs @ 100W convection<br>1,500,000 hrs @ 150W with 200LFM air   |
| Protection                 |   |
| Input fuses                | 4 A, 250 VAC fuses provided in both line & neutral  |
| Input transient protection | 2kV (CM) and 1kV (DM) surge   |
| Short circuit protection   | Provided - no damage will occur if the output is shorted. Hiccup mode.  |
| Overload protection        | 150% to 300% above rating for V2, V3, 110% to 200% for V1. Hiccup mode.   |
| Overvoltage protection     | Latching type, recycle AC input to reset. OVP firing reduces output voltage to <50% of nominal in <50 mS. See "Ordering Information" for trip ranges. |
| Overtemperature protection | Automatic power shutdown at T <sub>C</sub> = 155°C  |
| Auxiliary Signals          |   |
| AC power fail              | Stays HIGH during normal operation. Signal will go LOW with at least 5 mS warning before loss of DC output from AC failure.                           |
| DC OK                      | Open collector logic signal goes and stays HIGH, 100mS to 500mS after main output reaches regulation.   |

## ENVIRONMENTAL SPECIFICATIONS

|                       |  |
|-----------------------|--|
| Weight                | 183 grams  |
| Dimensions            | 2.0" x 4.0" x 1.3" (W x L x H)   |
| Vibration             | Operating 0.003 g <sup>2</sup> /Hz, 1.5 grms overall, 3 axes, 10 min/axis<br>Non-operating 0.026 g <sup>2</sup> /Hz, 5.0 grms overall, 3 axes, 1 hr/axis |
| Shock                 | Operating Half-sine, 20 gpk, 10 mS, 3 axes, 6 shocks total<br>Non-operating Half-sine, 40 gpk, 10 mS, 3 axes, 6 shocks total                             |
| Operating temperature | -10°C to +70°C   |
| Temperature derating  | Derate output power linearly above 50°C to 50% at 70°C   |
| Storage temperature   | -40°C to +85°C   |
| Altitude              | Operating -500 to 10,000 ft<br>Non-operating -500 to 40,000 ft   |
| Relative humidity     | 5% to 95%, non-condensing  |

## EMI/EMC COMPLIANCE

|   |   |
|---|---|
| Conducted emissions                     | EN55011/22 Class B, FCC Part 15, Subpart B, Class B   |
| Radiated emissions                      | EN55011/22 Class A, FCC Part 15, Subpart B, Class A w/6dB margin                                |
| Static discharge immunity               | EN61000-4-2, 6 kV contact discharge, 8 kV air discharge, criteria A <sup>1</sup>                |
| Radiated RF immunity                    | EN61000-4-3, 3 V/m, criteria A <sup>1</sup>   |
| EFT/Burst immunity                      | EN61000-4-4, 2kV/5kHz, criteria A <sup>1</sup>  |
| Line surge immunity                     | EN61000-4-5, 1 kV differential, 2 kV common mode, criteria A <sup>1</sup>                       |
| Conducted RF immunity                   | EN61000-4-6, 3 Vrms, criteria A <sup>1</sup>  |
| Power frequency magnetic field immunity | EN61000-4-8, 3 A/m, criteria A <sup>1</sup>   |
| Voltage dip immunity                    | EN61000-4-11, 0% Vin, 0.5 cycle; 40% Vin, 5 cycles; 70% Vin, 25 cycles; criteria A <sup>1</sup> |
| Line harmonic emissions                 | EN61000-3-2, class A,B,C & D  |
| Flicker test                            | EN61000-3-3, Complies (dmax < 6%)   |

## Notes:

1. According to the standards, performance criteria are decoded as following:
  - A. Normal performance during and after the test
  - B. Temporary degradation, self-recoverable
  - C. Temporary degradation, operator intervention required to recover the operation
  - D. Permanent damage

ORDERING INFORMATION

| Model Number     | Output Voltage | Maximum Load with Convection Cooling | Maximum Load with 200LFM Forced Air | Total Regulation | Ripple & Noise <sup>2</sup> | OVP Threshold |
|------------------|----------------|--------------------------------------|-------------------------------------|------------------|-----------------------------|---------------|
| MINT1150A1206K01 | 12 V           | 8.33 A                               | 12.5 A                              | ± 5%             | 1.2% pk-pk, 0.5% RMS        | 14.0 ± 1.1 V  |
| MINT1150A1506K01 | 15 V           | 6.67 A                               | 10.0 A                              | ± 5%             | 1.0% pk-pk, 0.5% RMS        | 18.0 ± 1.5 V  |
| MINT1150A2406K01 | 24 V           | 4.17 A                               | 6.25 A                              | ± 5%             | 1.0% pk-pk, 0.5% RMS        | 28.0 ± 2.5 V  |
| MINT1150A4806K01 | 48 V           | 2.08 A                               | 3.13 A                              | ± 5%             | 1.0% pk-pk, 0.5% RMS        | 55.0 ± 4.0 V  |
| MINT1150A5606K01 | 56 V           | 1.79 A                               | 2.68 A                              | ± 5%             | 1.0% pk-pk, 0.5% RMS        | < 59.9 V      |

Notes:

1. Maximum output power is 95 watts for input voltage of 90 to 105 Vac at 50°C convection. For input voltage of 105 Vac or more, the total power is 100 watts at 50°C convection.
2. Measured with noise probe directly across output terminals, and load terminated with 0.1 µF ceramic and 10 µF low ESR capacitors. All specifications are typical at 230 Vac, full load, at 25°C ambient unless noted.

PIN ASSIGNMENTS

| Connector                  | MINT1150 |                  |
|----------------------------|----------|------------------|
| J100 (Input connector)     | PIN 1    | AC Neutral       |
|                            | PIN 2    | SPARE            |
|                            | PIN 3    | AC Line          |
| J200 (DC output connector) | PIN 1    | +Vo              |
|                            | PIN 2    | +Vo              |
|                            | PIN 3    | +Vo              |
|                            | PIN 4    | -Vo              |
|                            | PIN 5    | -Vo              |
|                            | PIN 6    | -Vo              |
| J300 (Signal connector)    | PIN 1    | Power Fail/DC_OK |
|                            | PIN 2    | Common           |

CONNECTORS

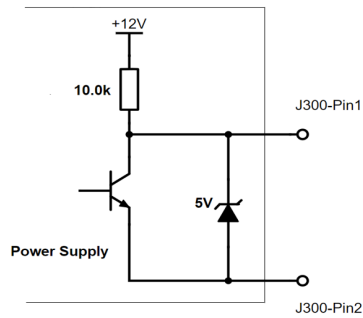
|                            | Connector         | Mating Connector                    |
|----------------------------|-------------------|-------------------------------------|
| J100 (Input connector)     | /                 | MOLEX 09-50-3031. Pins = 08-52-0072 |
| J102 (DC output connector) | /                 | AMP #640250-6. Pin = Amp #640252-1  |
| J300 (Signal connector)    | /                 | AMP #1375820-2. Pin = Amp #1375819  |
| J101 (Ground)              | 0.187" FASTON TAB | MOLEX 01-90020005                   |

## CONNECTORS

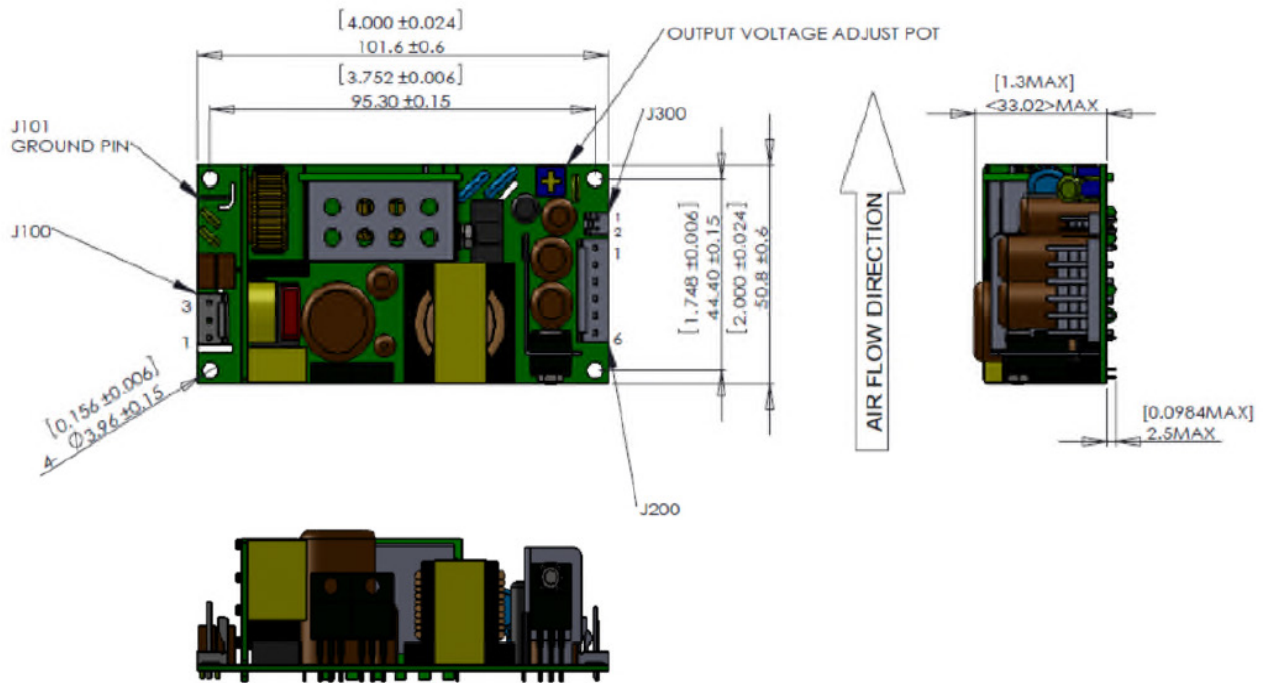
Power Fail/DC OK Signals - J300:

During normal operation stays HIGH - goes HIGH, 100-500 mS after main output.

- goes LOW, with 5 mS warning before loss of output from AC failure.



## MECHANICAL DRAWING



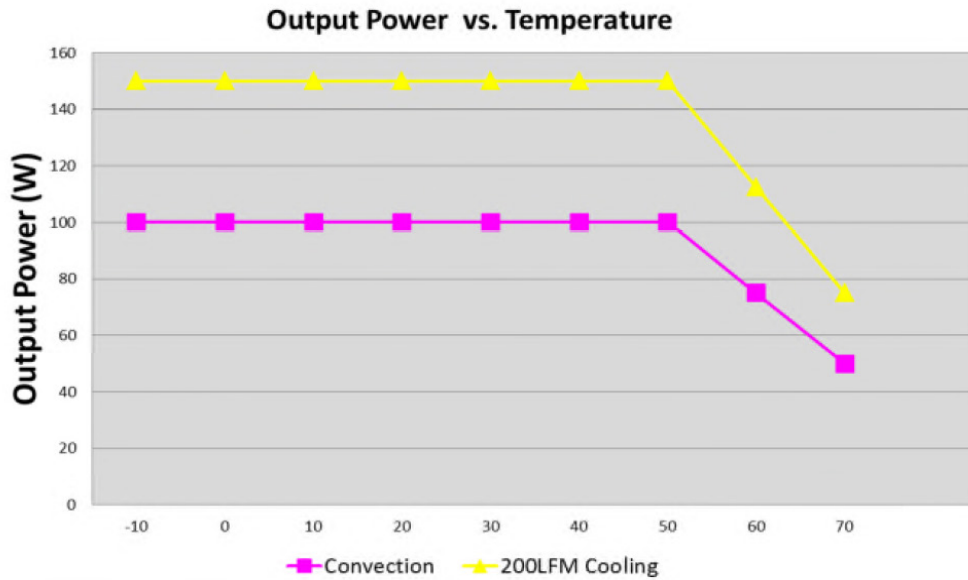
Notes:

1. All dimensions in inches (mm), tolerance is ±0.02".
2. Mounting holes should be grounded for EMI purpose.
3. Mounting J101 is safety ground connection.

CHARACTERISTIC CURVES

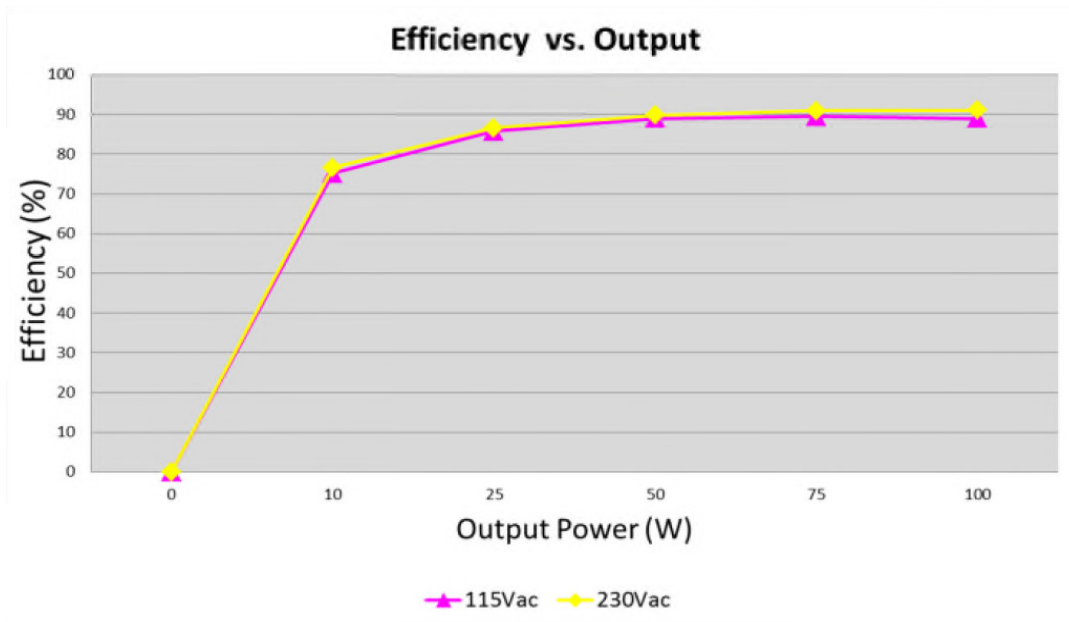
Output vs. Temperature:

100 W convection cooled and 150 W continuous with 200 LFM airflow. Derate output power to 50% at 70°C.



Efficiency vs. Loading:

The high efficiency is achieved by using LLC technology, PFC topology minimizing switching losses. Synchronous MOSFET or SCHOTTY diode is used as rectifier in MINT1150 series.

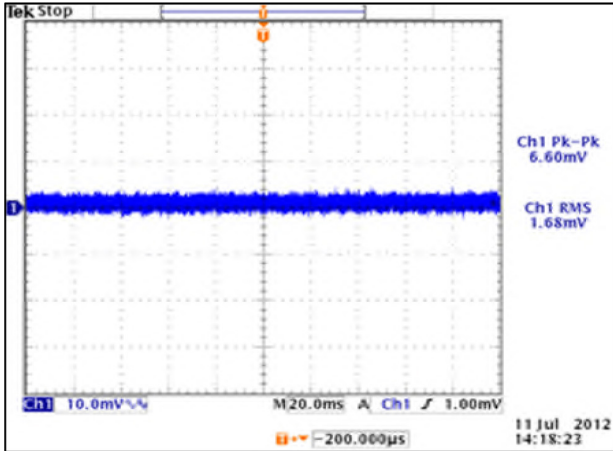


## CHARACTERISTIC CURVES

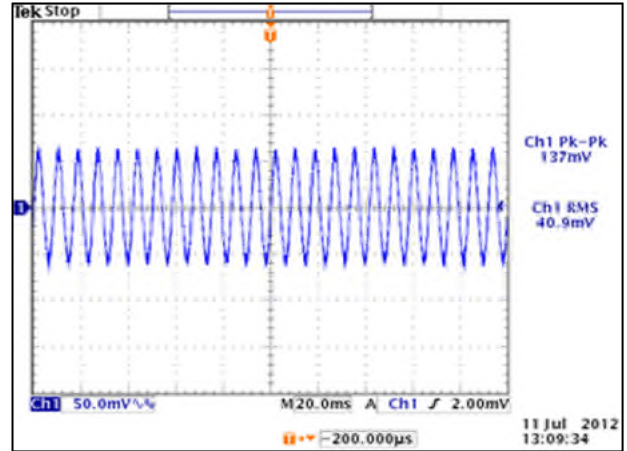
### Ripple vs. Noise:

To verify that the output ripple and noise does not exceed the level specified in the product specification. Measured using a scope probe socket with 0.1 $\mu$ F ceramic and a 10 $\mu$ F electrolytic capacitor connected in parallel across it, BW limit with 20MHz.

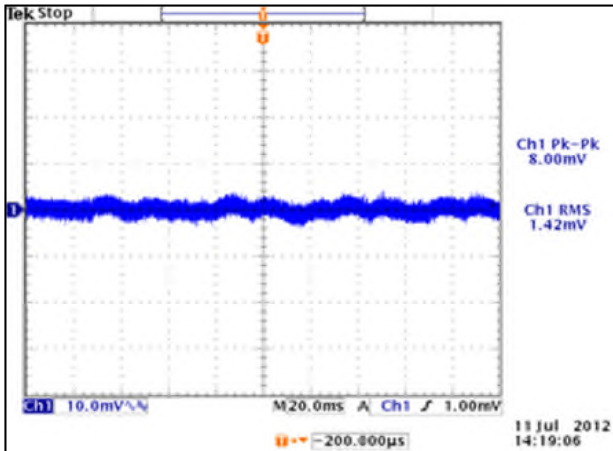
90Vac 60Hz Input, 24V Output, No Load



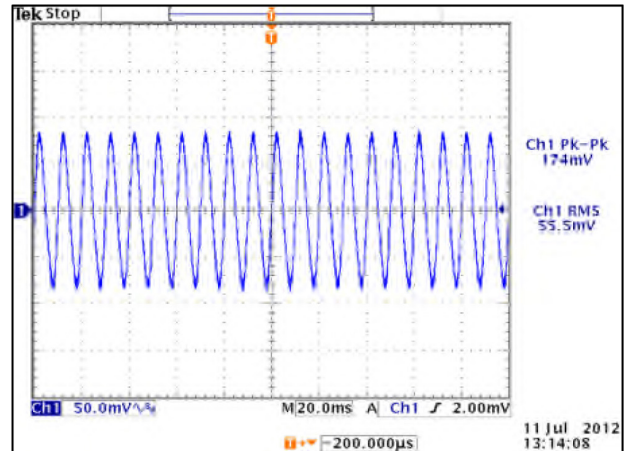
90Vac 60Hz Input, 24V Output, Full Load



264Vac 50Hz Input, 24V Output, No Load



264Vac 50Hz Input, 24V Output, Full Load

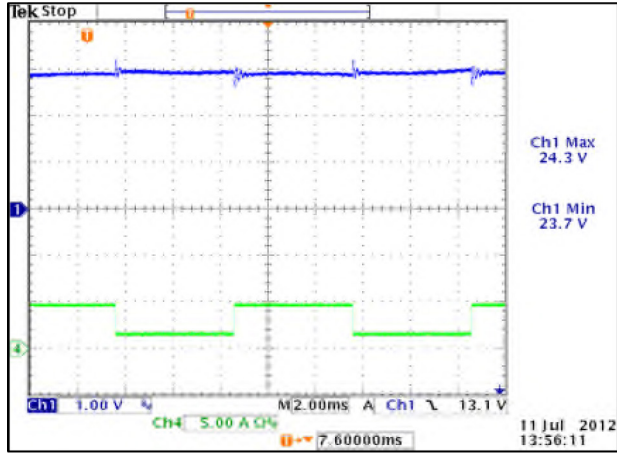


CHARACTERISTIC CURVES

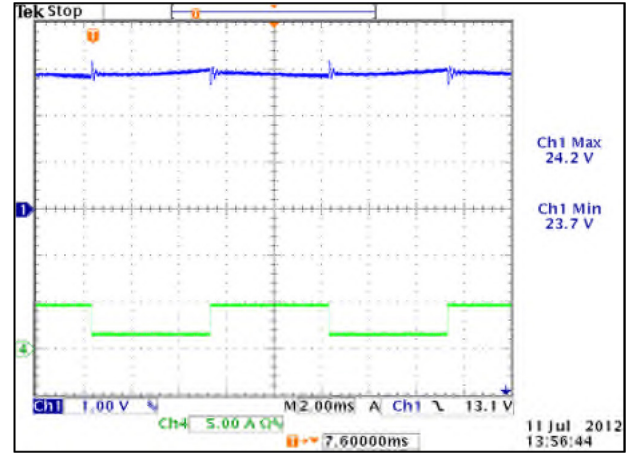
Output Transient Response:

50% load step within the regulation limits of minimum and maximum load,  $di/dt < 0.2 \text{ A}/\mu\text{S}$ . Recovery time not specified as there is no laps in regulation with a 50% Load Step. Maximum voltage deviation is 3%.

120Vac Input, 24V Output, 25% to 75% Load Step



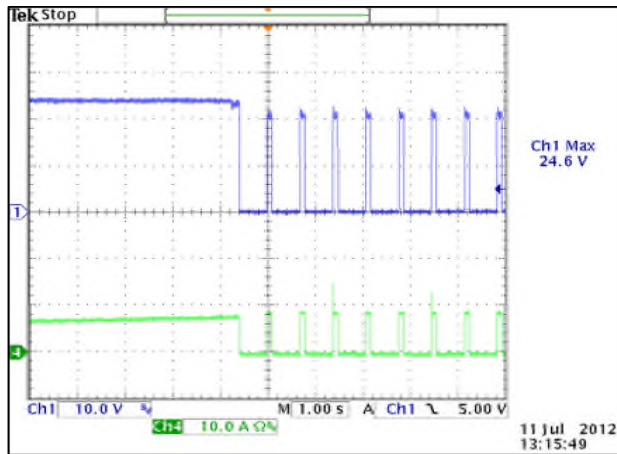
240Vac Input, 24V Output, 25% to 75% Load Step



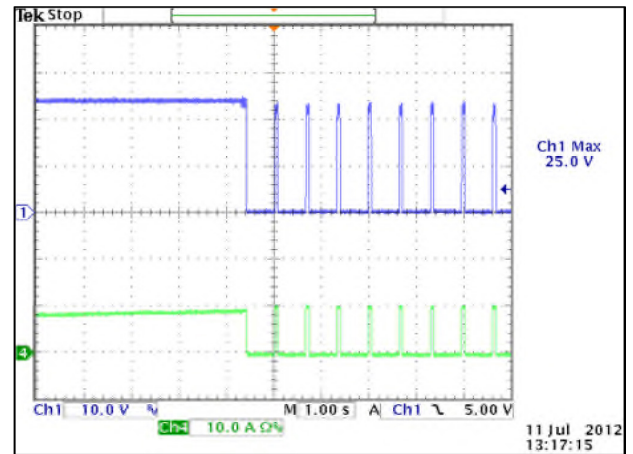
Output Overload Characteristic:

Supply shall protect itself against overload condition. The power supply shall recover from overload conditions without operator intervention.

90Vac Input, 24V Output



264Vac Input, 24V Output



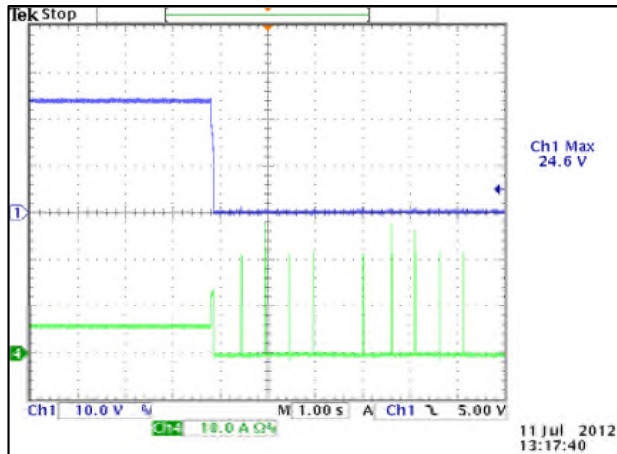


## CHARACTERISTIC CURVES

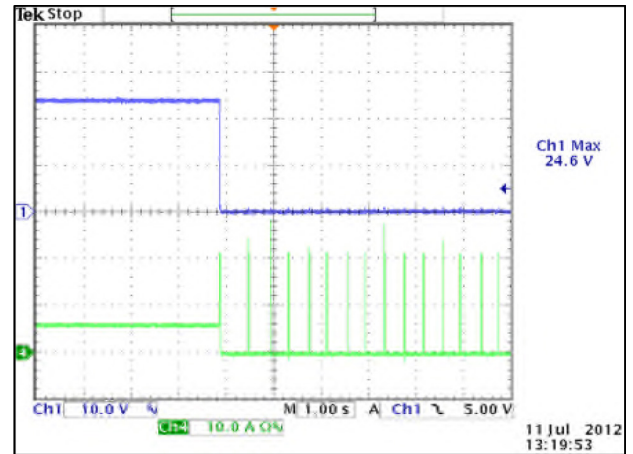
### Short Circuit Protection:

Power supply shall protect itself against short circuit conditions. No damage will occur if the output is shorted.

90Vac Input, 24V Output



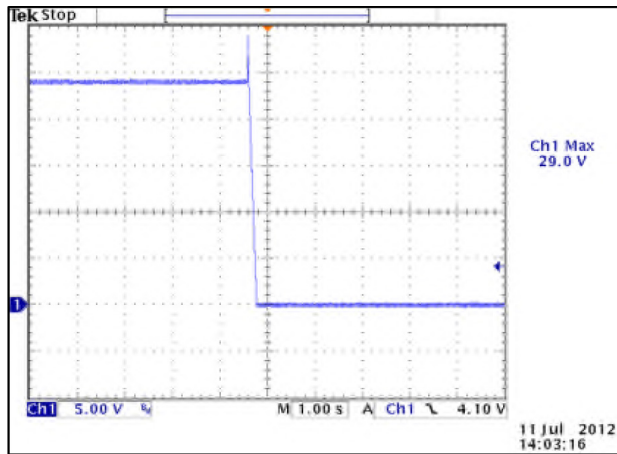
264Vac Input, 24V Output



### Overvoltage Protection:

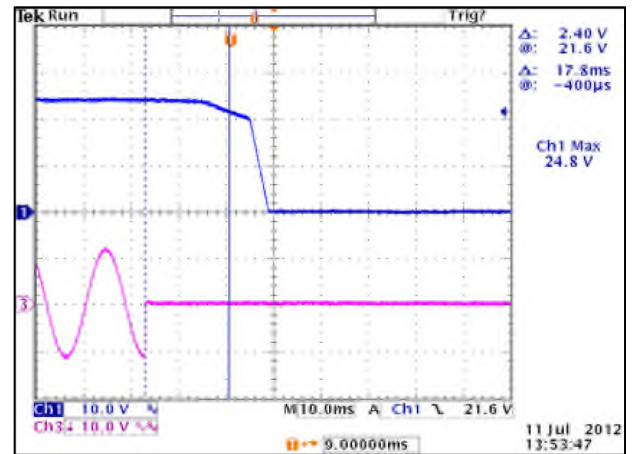
OVP firing reduces output voltage to <50% of nominal in <50ms. See models chart for trip ranges.

24V Output, No load



### Hold Up Time:

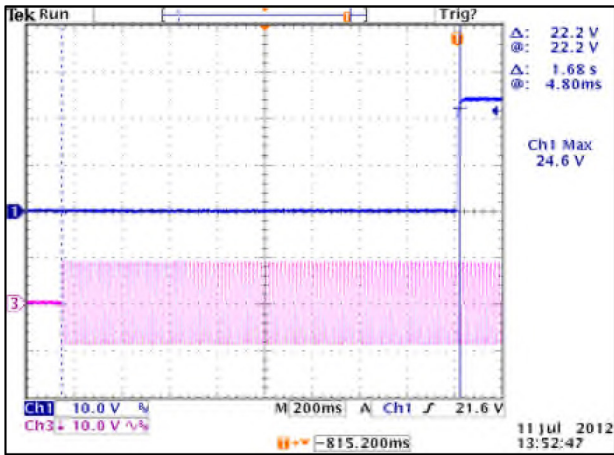
120Vac Input, Full Load



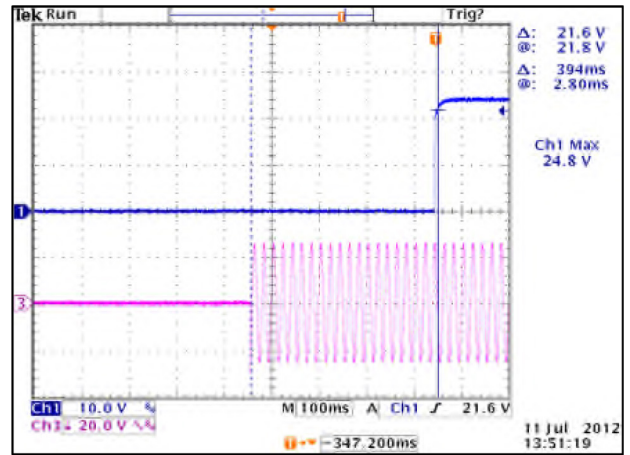
CHARACTERISTIC CURVES

Turn On Delay:

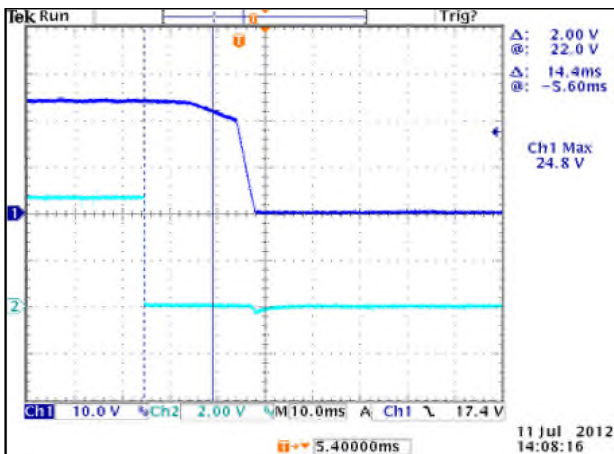
90Vac Input, Full Load



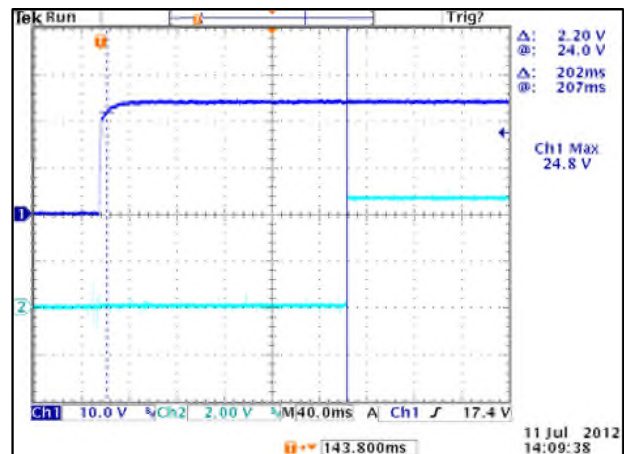
264Vac Input, Full Load



AC Power Fail Signal:



DC OK Signal:





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## ABOUT ADVANCED ENERGY

Advanced Energy (AE) has devoted more than three decades to perfecting power for its global customers. AE designs and manufactures highly engineered, precision power conversion, measurement and control solutions for mission-critical applications and processes.

Our products enable customer innovation in complex applications for a wide range of industries including semiconductor equipment, industrial, manufacturing, telecommunications, data center computing, and medical. With deep applications know-how and responsive service and support across the globe, we build collaborative partnerships to meet rapid technological developments, propel growth for our customers, and innovate the future of power.

**PRECISION | POWER | PERFORMANCE | TRUST**

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