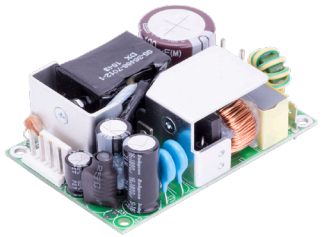
MB60 Family

60W Single Output
Medical Grade

Medical



FEATURES AND BENEFITS

- Ultra Small Size of 2" x 3" x 1.063"
- For 1U Applications
- 60W Convection Cooled
- Universal Input 90-264Vac
- Approved to IEC60601-1, 3rd Edition with 2 MOPP
- Class II Input Versions Available
- Less than 0.5W no-load Power Consumption
- 3 Year Warranty
- Optional LED Indicator for power-on
- RoHS Compliant
- Level V Efficiency Compliant Models

MODEL SELECTION

Model Number***	Volts	Output Current Convection Cooled	Output Power Convection Cooled	Ripple & Noise*	Total Regulation	OVP Threshold
MB60S12K	12V	4.58A	55W	120mV pk-pk	±2%	14.4-18Vdc
MB60S15K	15V	4.00A	60W	150mV pk-pk	±2%	18-22.5Vdc
MB60S18K	18V	3.33A	60W	180mV pk-pk	±2%	21-25.5Vdc
MB60S24K	24V	2.50A	60W	240mV pk-pk	±2%	28.8-36Vdc
MB60S36K**	36V	1.67A	60W	360mV pk-pk	±2%	42-47Vdc
MB60S48K	48V	1.25A	60W	480mV pk-pk	±2%	57.6-72Vdc

Notes:
1. * At -20 ° C, the noise and ripple is 2% of the output.
2. ** For product availability, please contact the factory.
3. ***Replace "K" in model number with "C" for class II input versions

INPUT

Input Voltage	90-264Vac, single phase
Input Current	120Vac: 1.4A, 240Vac: 0.75A
Inrush Current	40A maximum @ 0°C
Input Fuses	F1, F2: 2.5A, 250Vac
Earth Leakage Current	<275µA@264Vac, 60 Hz input, NC / <90µA@264Vdc, 60 Hz input, NC
Efficiency	83% to 88%
Input Frequency	47-63Hz
No Load Input Power	<0.5W
Turn-on Input Voltage	70V
Turn-off Input Voltage	65V

OUTPUT

Output Power	60W continuous for operation from -10°C to 50°C 55 Watts for 12V output.
Turn On Time	<2 Seconds at 120Vac
Hold Up Time	16mS minimum from loss of ac input at 120 Vac, full load
Ripple and Noise	0.5% RMS, 1% pk-pk for all models
Total Regulation	±2% for all models
Transient Response	500µs typ. response time for return to within 0.5% of final value for a 50% load change, Δi/Δt< 0.2A/µs. Max. voltage deviation is 3.5%
Minimum Load	No minimum load is required

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RELIABILITY

MTBF	700,000 hours, 25°C ambient, full load
Warranty	3 Years
HALT Data	Per SL Power Halt procedure

ISOLATION

Isolation Safety Rating	Input to Ground: 1 MOPP, Class I input models Input to Output: 2 MOPP Output to Ground: Functional, Class I input models
Electric Strength Test Voltage	Input to Ground: 1800Vac, Class I input models Input to Output: 4000Vac Output to Ground: 500Vac, Class I input models

SAFETY

Safety Standards	UL - ANSI/AAMI ES60101:2005, 3rd Edition CSA - CAN/CSA-C22.2 No. 60601-1 (2008) Demko - EN 60601-1:2006 CB Report - IEC 60601-1 (3rd Edition) Isolation Type - B rated

ENVIRONMENT

Operating Temperature	-10°C to +80°C
Relative Humidity	5% to 95%, non-condensing
Shock	Non-Operating: Half-sine, 40 gpk, 10mS, 3 axes, 6 shocks total
Temperature Derating	For 24V output and up, derate output power to 50 Watts@ 60C, 40 Watt @ 70C, and 20 Watts for 80C
Altitude	Operating: -500 to 3,000 meter Non-operating: -500 to 40,000 ft.
Storage Temperature	-40°C to +85°C
Vibration	Random vibration per MIL-STD-810E, Method 514.4, Cat. 1, Figure 514.4-1, 1 hr in each of three axes
Cooling	Convection

Notes:
1. <24V will derate to 40W at 60C, 30W at 70C, and 20 W at 80C

EMI/EMC COMPLIANCE

Conducted Emissions	EN55011/22 Class B; FCC Part 15
Radiated Emissions	EN55011/22 Class A; FCC Part 15
Voltage Fluctuations & Flicker	EN61000-3-3
Static Discharge Immunity	EN61000-4-2 6kV contact, 8kV air, Criteria A
RF Field Susceptibility	EN61000-4-3 (3V/m), Criteria A
Fast Transients/Bursts	EN61000-4-4 (PS: 2kV/40A, other lines 1kV/20A), Criteria B
Surge Susceptability	EN61000-4-5, Installation Class 3 (1kV diff. mode, 2kV common mode), Criteria A
Conducted RF Susceptability	EN61000-4-6 (3Vrms), Criteria A
Power Frequency Magnetic Field Immunity	EN61000-4-8 (3A/m), Criteria A
Voltage Sags and Surges	EN61000-4-11, 95% dip/0.5 cycle (Criteria A), 60%/5cycles (Criteria B), 30%/25 cycles (Criteria A)
Harmonic Current Emissions	EN61000-3-2, Class A

Notes:
1. Specifications subject to change without notice.
2. Specifications are for convection rating at factory settings with 115Vac input and 25 °C ambient unless otherwise stated.

PROTECTION

Overvoltage Protection	OVP firing reduces output voltage to <50% of nominal in <50mS. See chart for trip range
Short Circuit Protection	Short across the output terminals will not cause damage to the unit. Hiccup Mode
Overtemperature Protection	Automatic Power Shutdown at Tc = 155°C
Overload Protection	120% - 180% of rated output current value, Hiccup Mode
Overshoot	5% overshoot at turn-on, 5% overshoot at turn-off, under all conditions

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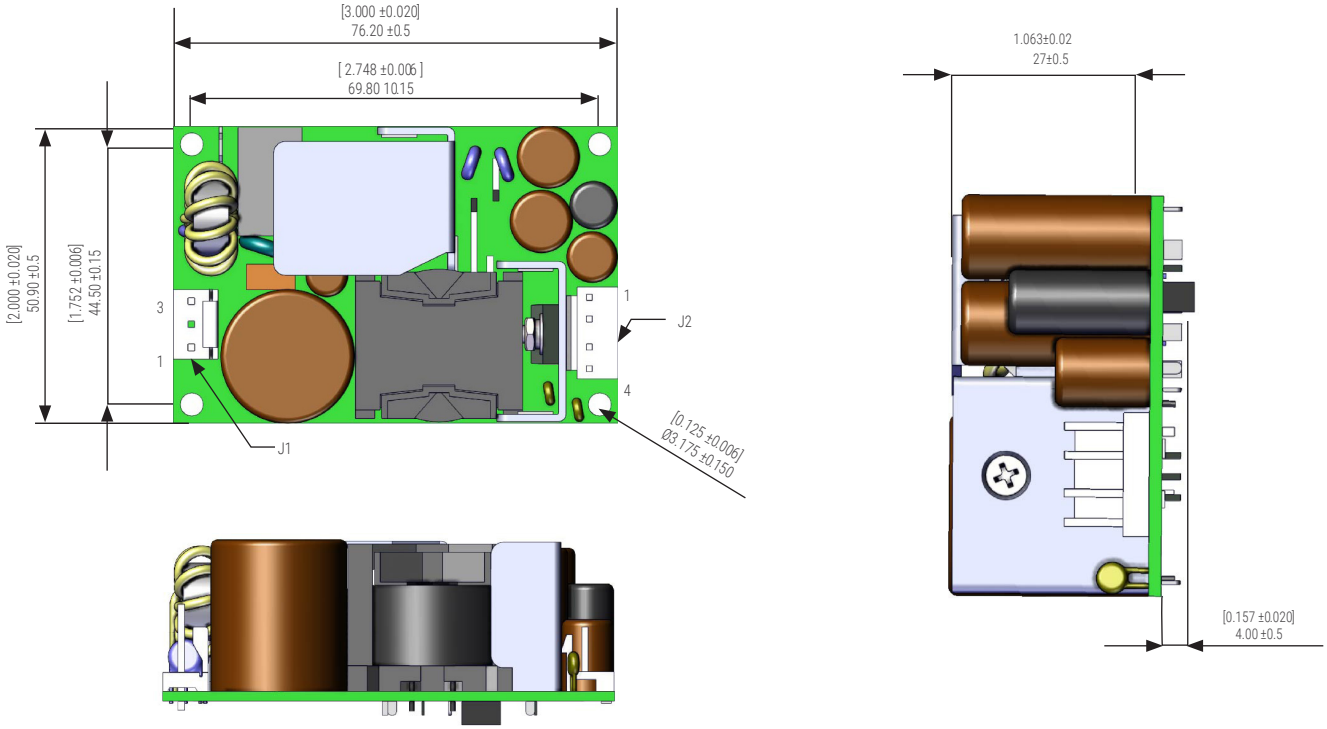
MECHANICAL DRAWING



Notes:
1. For class I model, the unit shall be mounted on a metal plate with metal stand offs and screws to ensure proper emissions attenuation.
2. For class II model, the unit should be mounted using platic or other non-conductive hardware.

CONNECTOR INFORMATION

Input Connector J100	DC Output Connector J2	Ground (FG)
PIN 1) AC LINE PIN 2) EMPTY PIN 3) AC NEUTRAL	PIN 1) +Vout PIN 3) -Vout PIN 2) +Vout PIN 4) -Vout	19-30258-0187 (Keystone 1285) (Zierick 895)(.187*0.020)
Mating Connector: Tyco/AMP 640250-3 Pins = 770461-1	Mating Connector: AMP 640250-4 Pins = 770461-1	Mating Connector Molex 19002-0005

Notes:
1. Mounting holes should be connected together for EMI purpose.
2. FG is safety ground connection (class I version).
3. This power supply requires mounting on metal standoffs 0.20" (5mm) in height.

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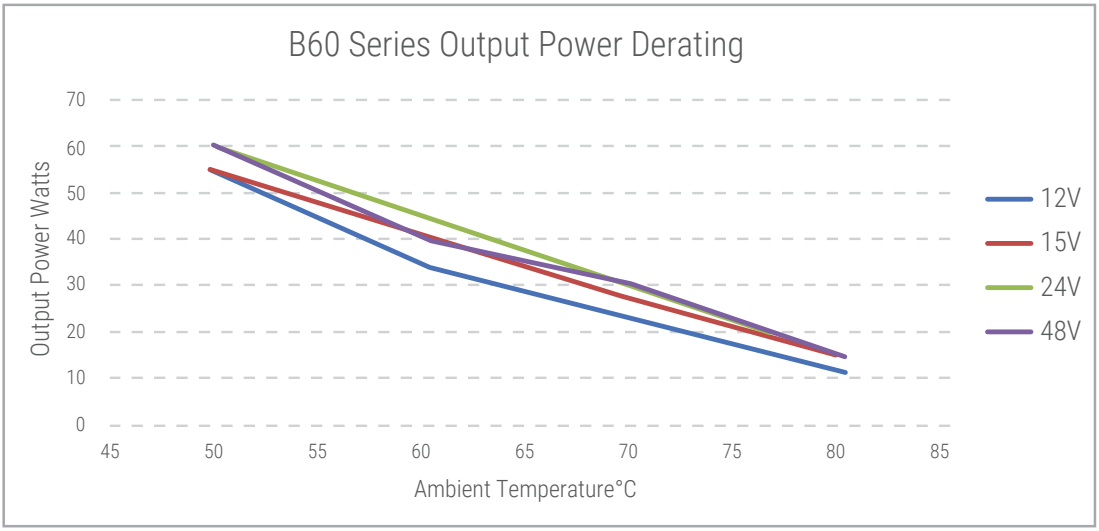
CHARACTERISTIC CURVES

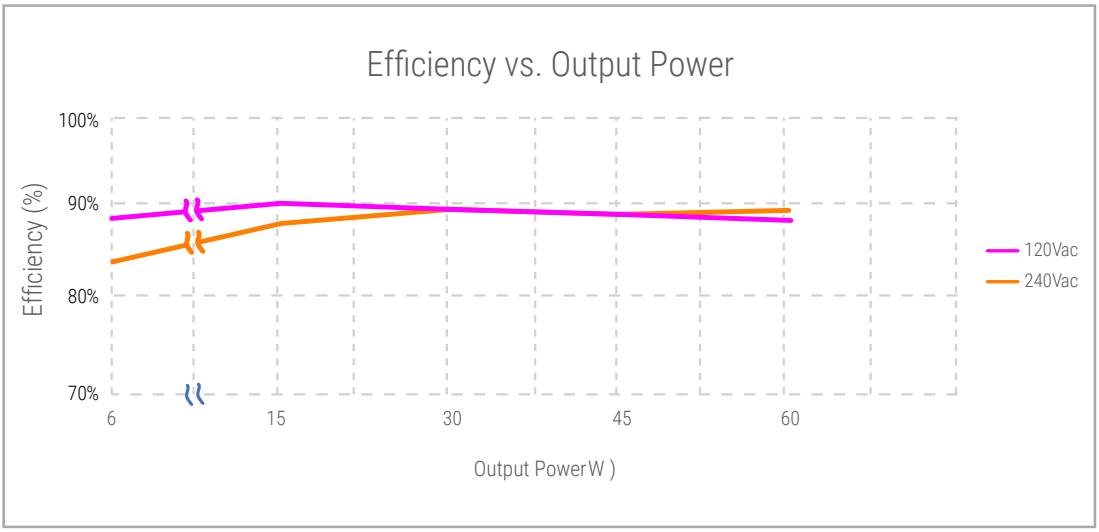
Output vs. Temperature

1. -40°C start up: At -20°C, the supply meet its full spec except ripple & noise might be increased from 1% to 2% of the output voltage.
2. See chart below for output power available at higher ambient.



Output Voltage				
Temp °C	12V	15V	24V	48V
50	55	55	60	60
60	35	41	45	40
70	22	27	30	30
80	12	15	15	15

Efficiency vs. Loading



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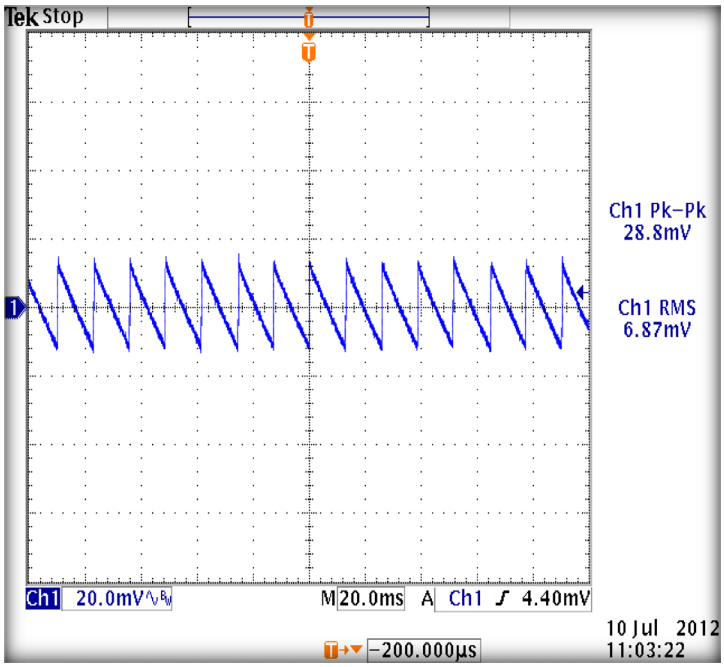
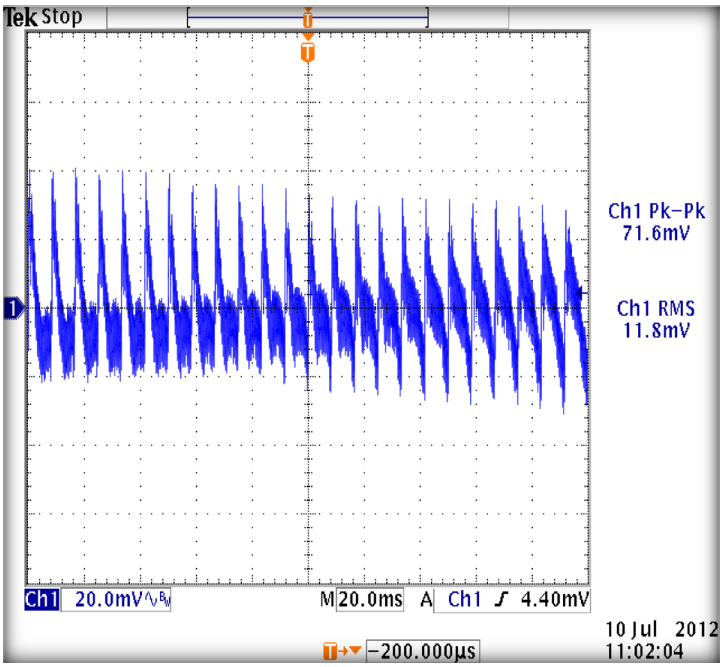
Ripple & Noise

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 0.1uF ceramic and a 10uF electrolytic capacitor connected in parallel across it, 20MHz BW.

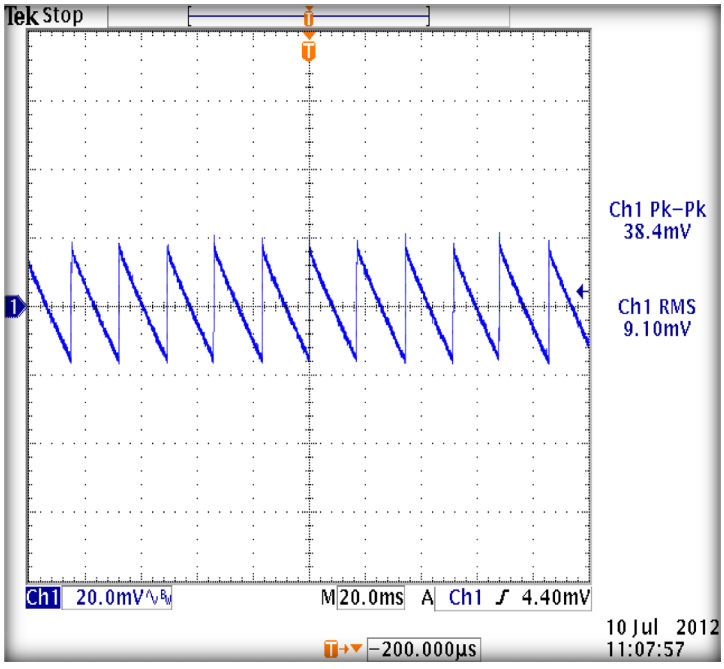
24V OUT, NO LOAD, 90VAC, 60HZ



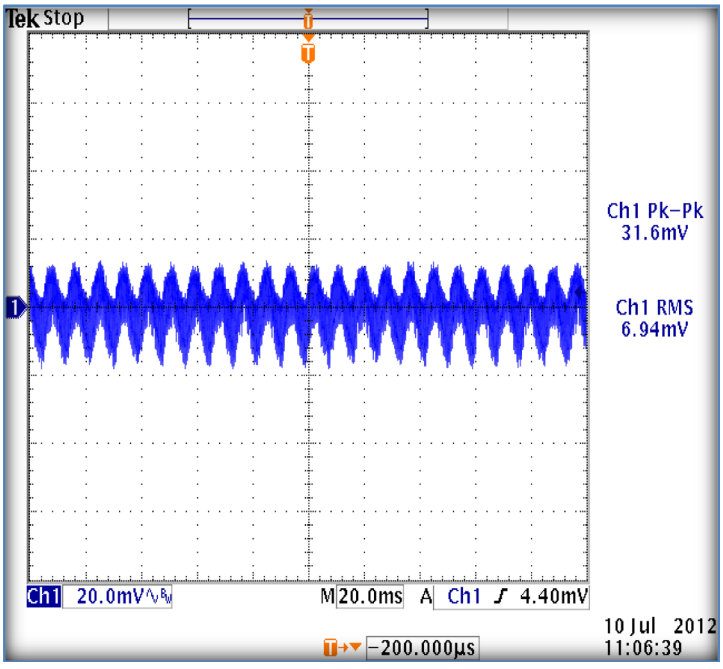
24V OUT, FULL LOAD, 90VAC, 60HZ



24V OUT, NO LOAD, 264VAC, 50HZ



24V OUT, FULL LOAD, 264VAC, 50HZ



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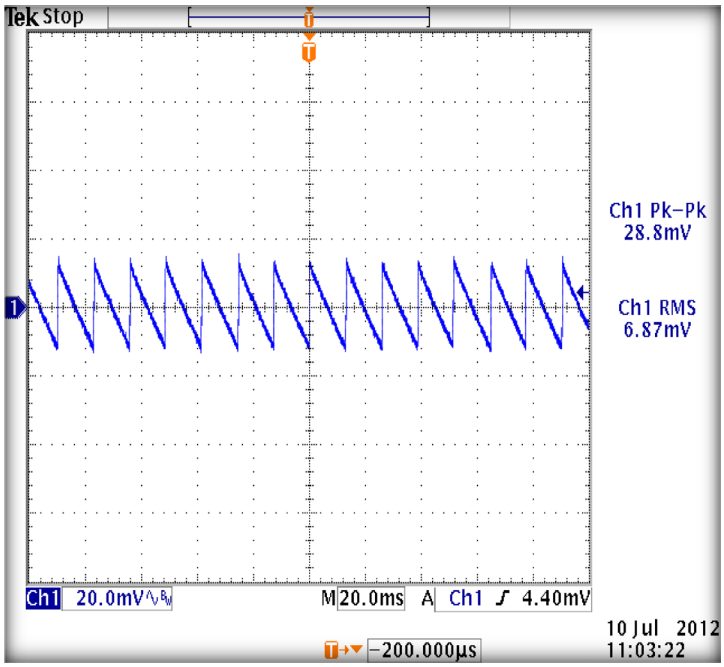
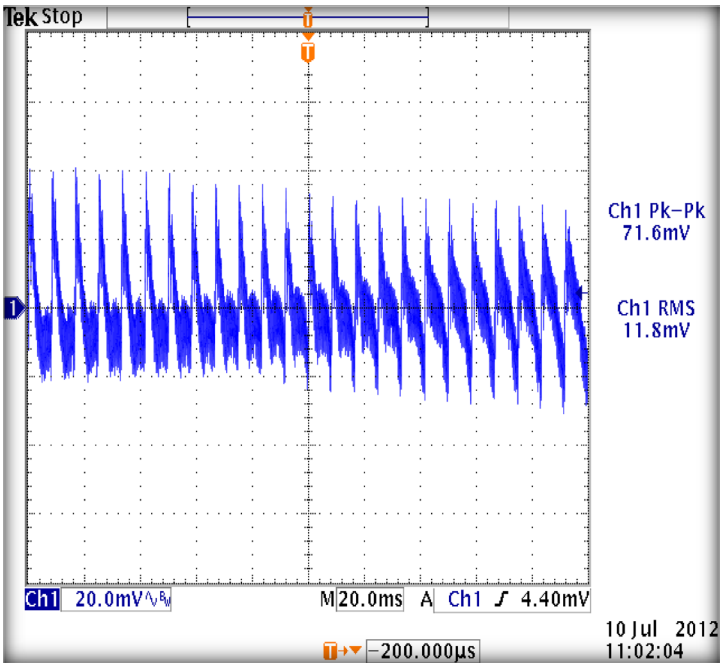
Output Transient Response

50% load step within the regulation limits of minimum and maximum load, dI/dt< 0.2A/µSec. Recovery time not specified as there is no laps in regulation with a 50% Load Step. Maximum voltage deviation is 3.5%

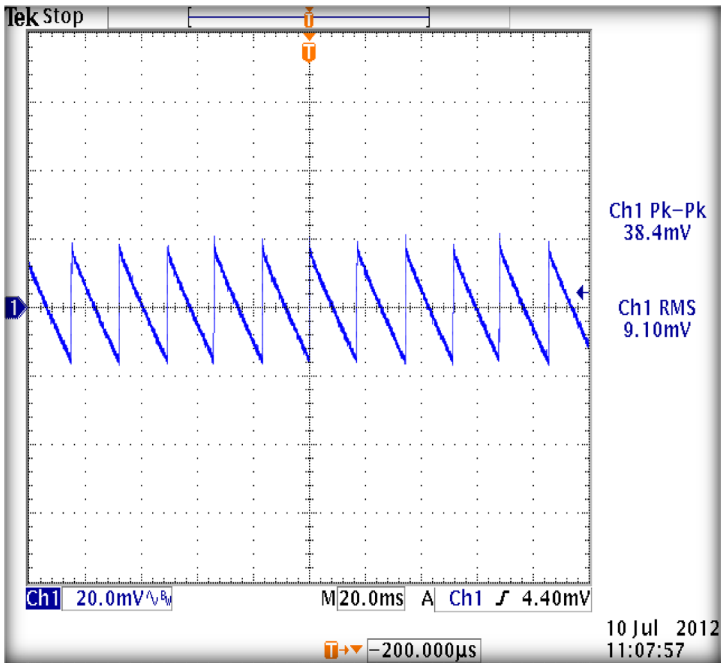
24V OUT, 120VAC, 25% TO 75% LOAD STEP



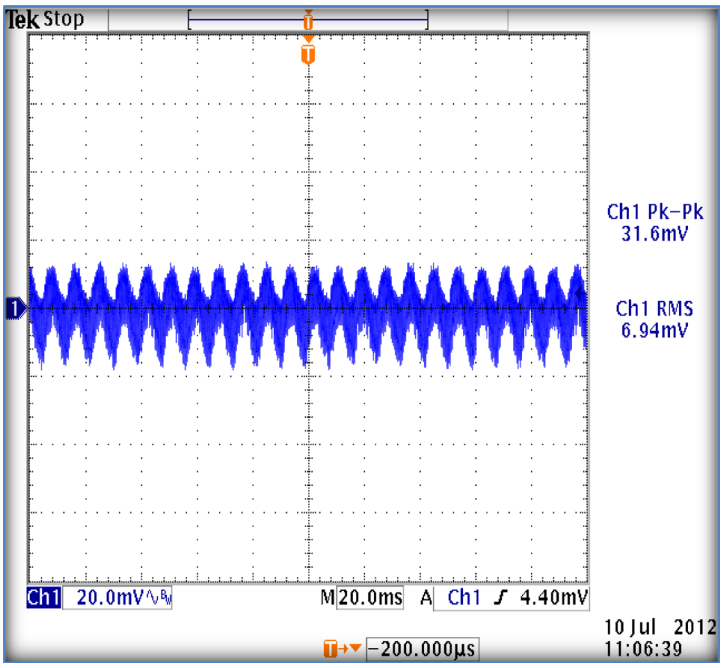
24V OUT, 240VAC, 25%TO 75% LOAD STEP



24V OUT, 90VAC



24V OUT, 264VAC



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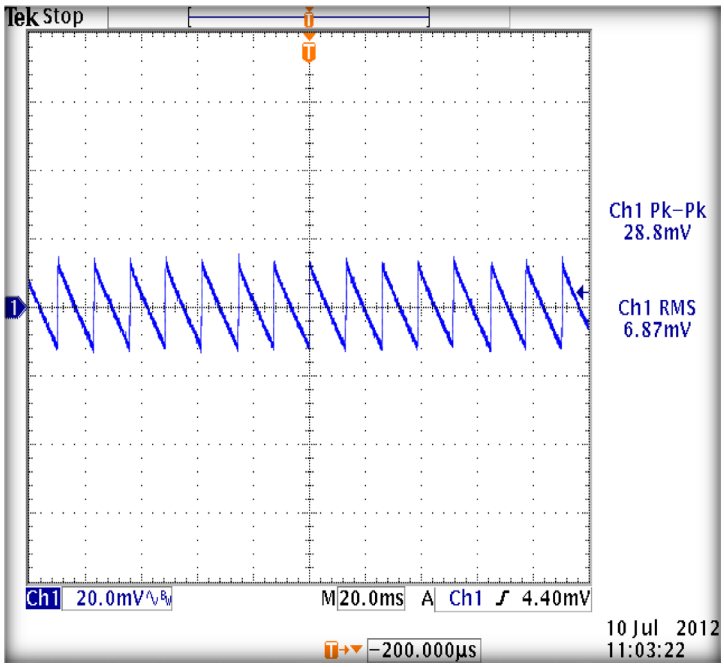
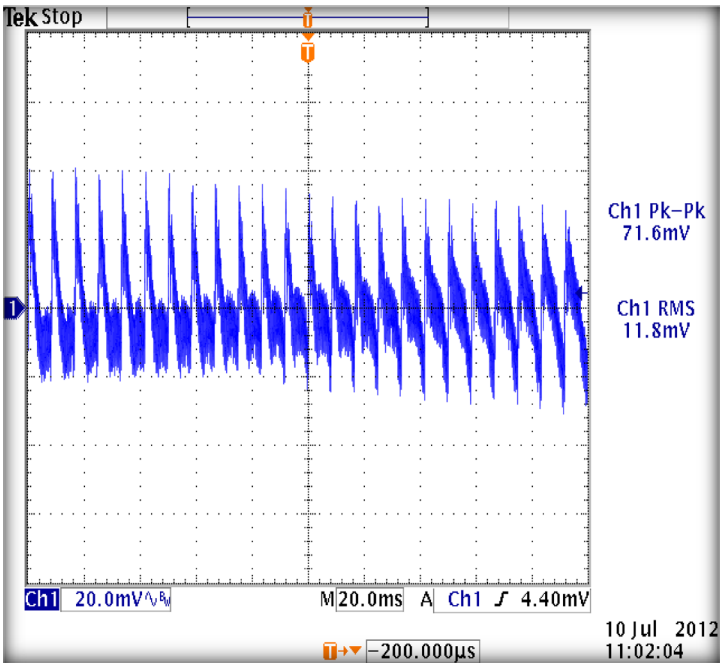
Overvoltage Protection

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

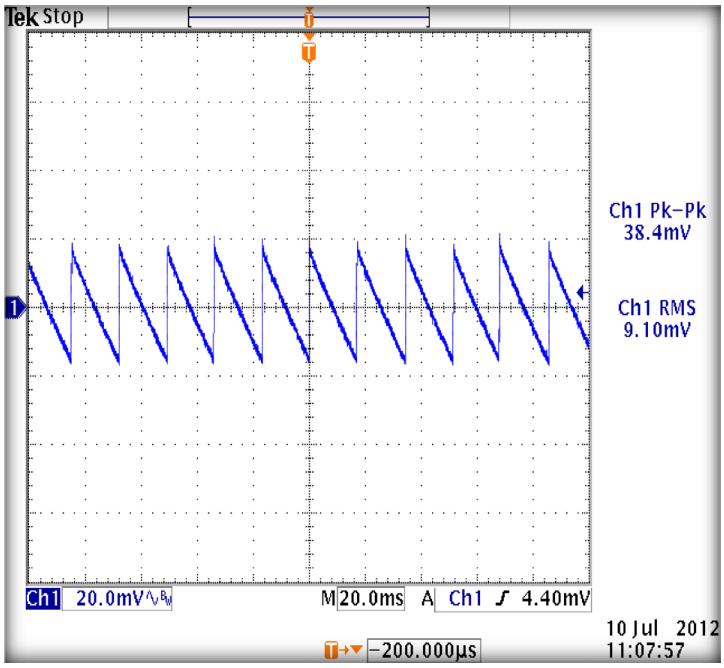
24V OUT, FULL LOAD, 90VAC, 60HZ



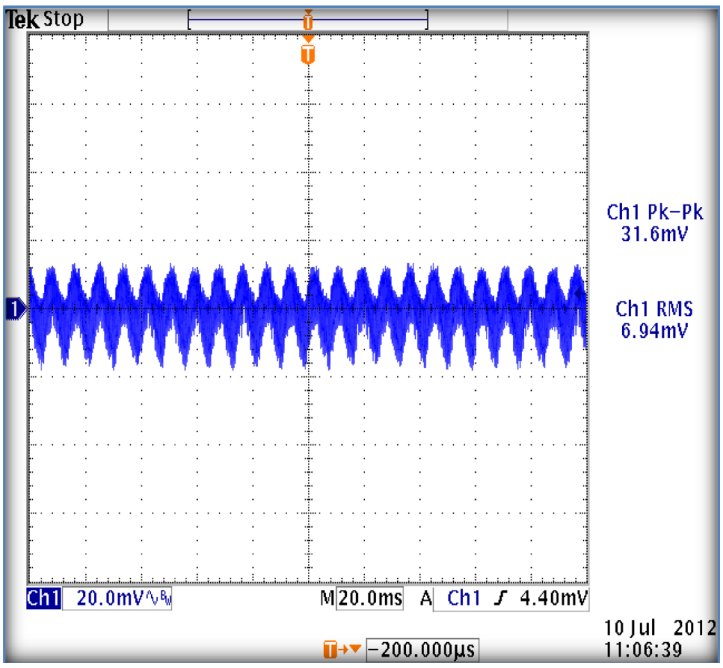
24V OUT, FULL LOAD, 264VAC, 50HZ



24V OUT, FULL LOAD, 90VAC, 60HZ



24V OUT, FULL LOAD, 264VAC, 50HZ



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