

Medical

### FEATURES AND BENEFITS

2" x 4" x 1.3" Package	Approved to CSA/EN/IEC/UL60601-1, 3 <sup>rd</sup> Edition
For 1U Applications	2 x MOPP Isolation
Class I and Class II Versions	12V Fan Output
175W w/air, 120W Convection Cooled	Efficiency 90% Typical at Full Load
Universal Input 90VAC–264VAC	3 Year Warranty
Average Efficiency meets Level V Requirements	RoHS Compliant



### MODEL SELECTION

Model Number	Volts	Output Current		Fan Output	Ripple & Noise <sup>1</sup>	Total Regulation	OVP Threshold
		w/200LFM air	Convection				
MINT1175A1206K01	12V	14.6A	10.0A	12Vdc/0.4A	0.5%RMS, 1.2% pk-pk	±3%	14.0 ± 1.1V
MINT1175A1506K01	15V	11.7A	8.0A	12Vdc/0.4A	0.5%RMS, 1.0% pk-pk	±3%	19.5 ± 1.5V
MINT1175A2406K01	24V	7.3A	5.0A	12Vdc/0.4A	0.5%RMS, 1.2% pk-pk	±3%	28.0 ± 2.5V
MINT1175A4806K01	48V	3.6A	2.5 A	12Vdc/0.4A	0.5%RMS, 1.0% pk-pk	±3%	55.0 ± 4.0V
MINT1175A5606K01	56V	3.1A	2.1A	12Vdc/0.4A	0.5%RMS, 1.0% pk-pk	±3%	59.0 ± 1.0V

#### Notes:

- \* Total convection power is 120 Watts.
- \*\* Measured with noise probe directly across output terminals, and load terminated with 0.1µF ceramic and 10µF low ESR capacitors.
- \*\*\* Output adjustment on 56V model will not exceed 56.2 volts



### INPUT

AC Input	100VAC–240VAC, ±10%, 47Hz–63Hz, 1 $\phi$ , 120Vdc–370Vdc
Input Current	115VAC: 2A, 230VAC: 1A
Inrush Current	264VAC, cold start: will not exceed 50A
Input Fuses	F1, F2: 4A, 250VAC fuses provided on all models
Earth Leakage Current	<200 $\mu$ A@264VAC, 60Hz, NC; <400 $\mu$ A SFC
Efficiency	90% typical at 115VAC

### PROTECTION

Overvoltage Protection	OVP firing reduces output voltage to <50% of nominal in <50mS. See chart for trip range.
Short Circuit Protection	Provided - no damage will occur if the output is shorted.
Overload Protection	Hiccup Mode

### ISOLATION

Isolation	Input-Output: 4000VAC, 2 x MOPP Input-Ground: 1800VAC, 1 x MOPP Output-Ground: 1500VAC
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### RELIABILITY

MTBF	331,000 hours, 25°C Ambient, 110VAC input
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### SAFETY

Safety Standards	EN/CSA/UL/IEC 60601-1, 3 <sup>rd</sup> Edition
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### OUTPUT

Output Voltage	See chart
Output Power	175W continuous, with 200 lfm airflow, 120W convection cooled – See chart for specific voltage model ratings.
Turn On Time	Less than 2sec. @115VAC (inversely proportional to input voltage and thermistor temperature)
Hold-up Time	16mS, typical (120W output load)
Ripple and Noise	See chart
Total Regulation	± 3%. See chart
Switching Frequency	PFC: Fixed, 65kHz. Main Converter: Variable 35kHz–200kHz, 65Hz–70kHz at full load.
Minimum Load	Not required
Transient Response	50% load step. $\Delta i/\Delta t$ : <0.2A/ $\mu$ S Max Volt Deviation = 3%
Voltage Adjustability	±5% from nominal

### AUXILIARY SIGNALS

DC OK	Open collector logic signal goes and stays HIGH 100mS to 500mS after main output reaches regulation
AC Power Fail	During normal operation, stays HIGH. Signal goes LOW with 5mS warning before loss of DC output from AC failure
Inhibit	Connect to inhibit pin to output common to inhibit the DC output



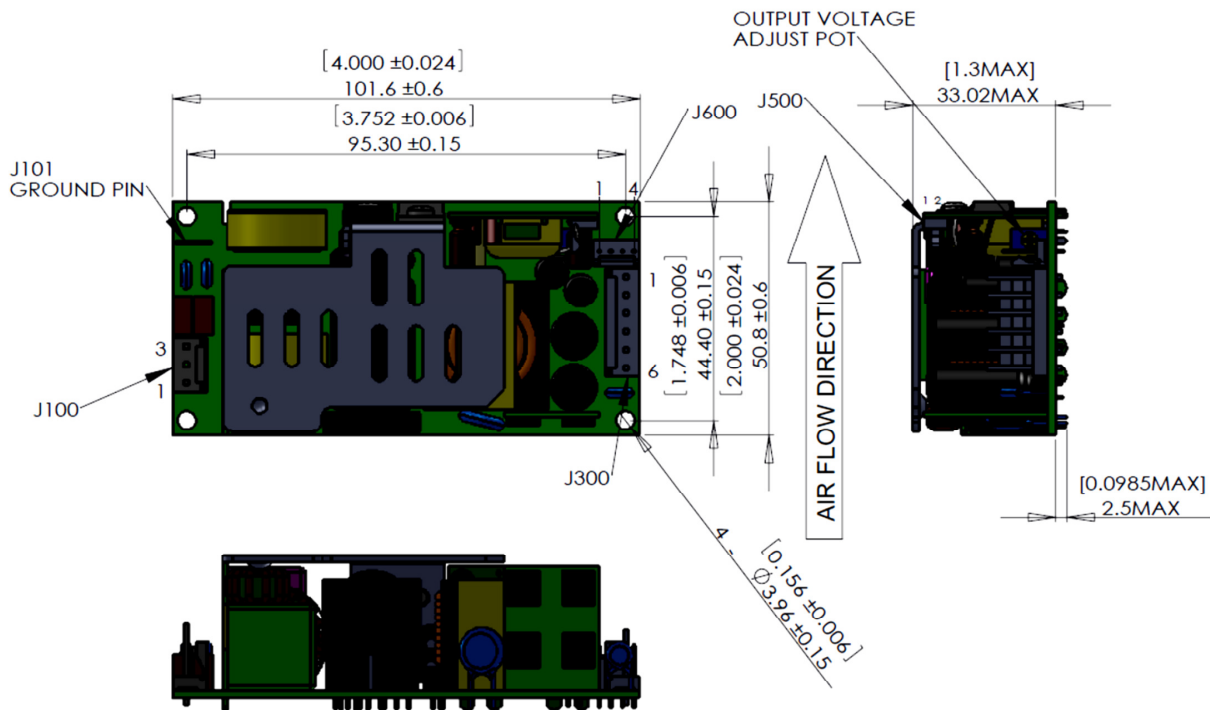
### ENVIRONMENT

Operating Temperature	-10°C to +70°C, Start Up at -40°C, full load
Relative Humidity	5% to 95%, non-condensing
Weight	210 grams
Dimensions	W: 2.0" x L: 4.0" x H: 1.3"
Altitude	Operating: -500 ft to 10,000 ft. Non-operating: -500 ft to 40,000 ft.
Storage Temperature	-40°C to +85°C
Vibration	Operating: 0.003g <sup>2</sup> /Hz, 1.5grms overall, 3 axes, 10 min/axis Non-Operating: 0.026g <sup>2</sup> /Hz, 5.0grms overall, 3 axes, 1 hr/axis
Shock	Operating: Half-sine, 20gpk, 10ms, 3 axes, 6 shocks total Non-Operating: Half-sine, 40gpk, 10ms, 3 axes, 6 shocks total
Temperature Derating	Derate output power linearly above 50°C to 50% at 70°C

### 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 A, Class A w/6db margin
Static Discharge Immunity	EN61000-4-2, Criteria A, 6kV Contact Discharge, 8kV air discharge
Radiated RF Immunity	EN61000-4-3, 3V/m, Criteria A
EFT/Burst Immunity	EN61000-4-4, 2kV/5kHz, Criteria A
Line Surge Immunity	EN61000-4-5, 1kV differential, 2kV common-mode, Criteria A
Conducted RF Immunity	EN61000-4-6, 3Vrms, Criteria A
Power Frequency Magnetic Field Immunity	EN61000-4-8, 3A/m, Criteria A
Voltage Dip Immunity	EN61000-4-11, 0% Vin, 0.5cycle; 40% Vin, 5 cycles; 70% Vin, 25 cycles, Criteria A
Line Harmonic Emissions	EN61000-3-2, Class A, B, C, & D
Flicker Test	EN61000-3-3, Complies (dmax<6%)

### MECHANICAL DRAWINGS



When installing the power supply into the end-product, a non-conductive Insulator should be placed between the unit and any conductive metal chassis or mounting platform.



### CONNECTOR INFORMATION

Input Connector J100	Ground J101	DC Output Connector J300	Fan Output Connector J500	Signal Connector J600
PIN 1) AC LINE PIN 2) EMPTY PIN 3) AC NEUTRAL	0.187 x 0.032 FASTON TAB	PIN 1) +Vout PIN 2) +Vout PIN 3) +Vout PIN 4) -Vout PIN 5) -Vout PIN 6) -Vout	PIN 1) +12Vfan PIN 2) RTN	PIN 1) Inhibit PIN 2) PF/DC OK PIN 3, 4) Common
Mating Connector: Molex 09-50-3031 Pins= 08-52-0072	Mating Connector: Molex 01-90020009	Mating Connector: AMP 640250-6 Pins = 640252-1	Mating Connector: Molex 1375820-2 Pins = 1375819	Mating Connector: Molex 1375820-4 Pins = 1375819

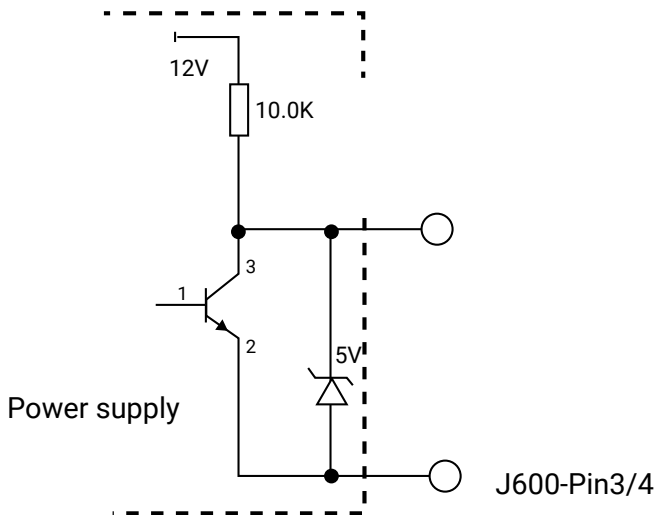
### FAN OUTPUT - J500

J500 provides a 12V@0.4mA output to support a system cooling fan. The fan output is always available when AC input is present, so it also can be used for a 12V standby output is so desired.

### AC POWER FAILURE/DC OK AND INHIBIT SIGNALS - J600

HIGH: 4V - 5.2V  
LOW: 0V - 0.8V

PF/DC OK: During normal operation stays HIGH  
-goes HIGH 100mS-500mS after main output  
-goes LOW with 5mS warning before loss of output from AC failure



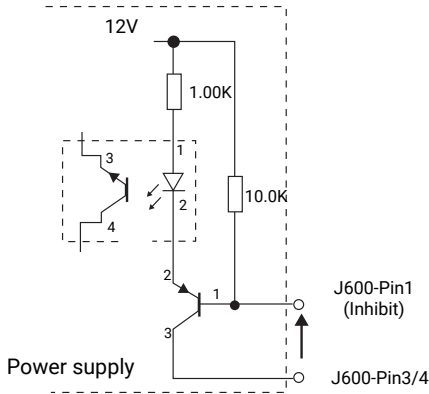
AC Power failure and DC OK signals use the same pin, so the signals can be as follows:  
DC OK: Pin2 = HIGH & Pin1 = HIGH  
AC Power Failure: Pin2= LOW & Pin1 = LOW



## AC POWER FAILURE/DC OK AND INHIBIT SIGNALS - J600

Inhibit

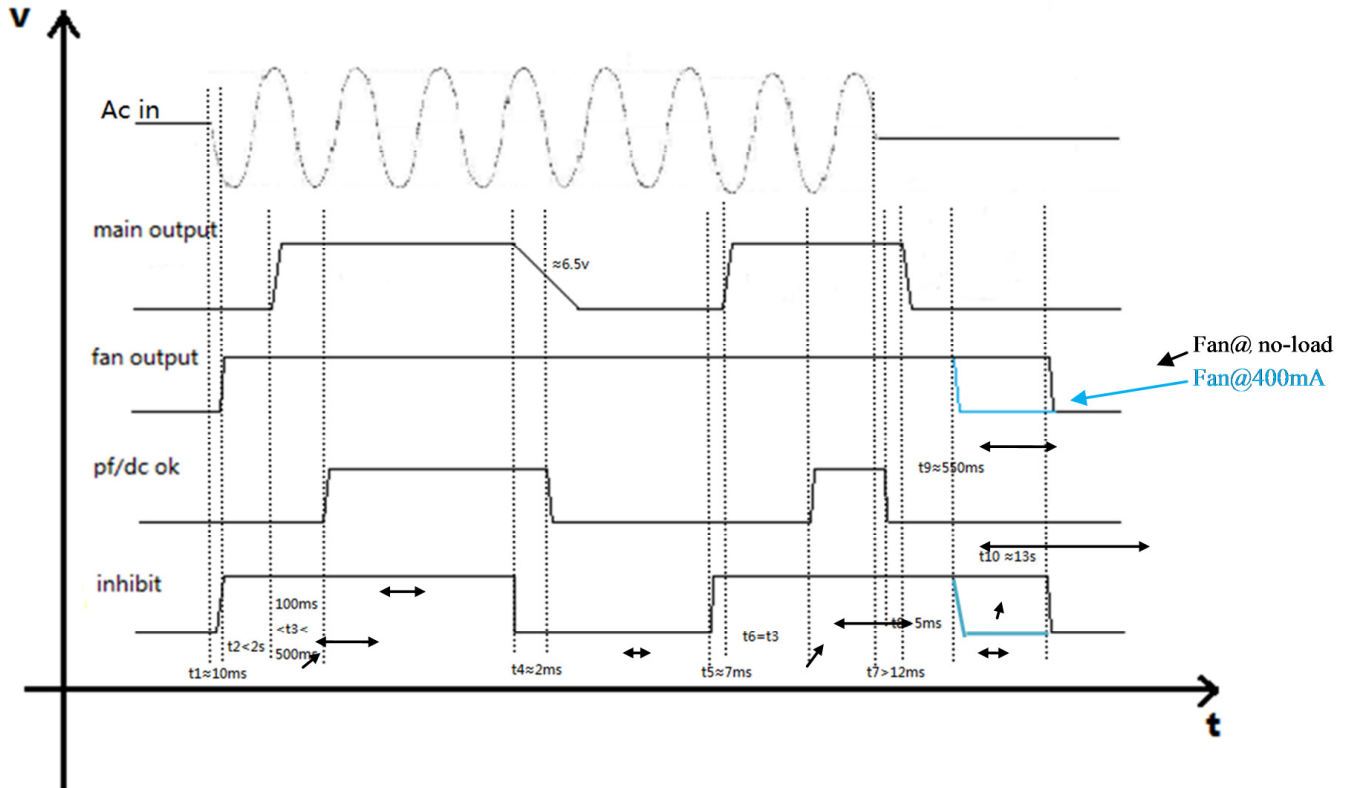
HIGH: 10.5V - 12.6V



Disable: Connect to output Common or pull down this pin below 10V

Enable: Floating or HIGH

## TIMING SEQUENCE





## ISOLATION SPECIFICATIONS

Parameter	Conditions/Description	Min	Nom	Max	Units
Insulation Safety Rating	Input/Ground Input/Output Output/Ground		B1 MOPP 2 MOPP Operational		
Electric Strength Test Voltage	Input/Ground Input/Output Output/Ground	1800 4000 1500	-	-	VAC VAC VAC

## INPUT SPECIFICATIONS

Parameter	Conditions/Description	Min	Nom	Max	Units
Input Voltage		90	115/230	264	VAC
Turn-On Input Voltage	Ramping up		82.7		VAC
Turn-Off Input Voltage	Ramping down		67.0		VAC
Input Frequency		47	50/60	63	Hz
Inrush Current Limitation	264VAC, cold start	-	-	50	A
Power Factor	$V_i / I_o$ <sub>nom'</sub> / <sub>nom</sub>	0.9	-	-	
Efficiency	$V_i / I_o$ <sub>nom'</sub> / <sub>nom</sub> MINT1175A1206K01 MINT1175A1506K01 MINT1175A2406K01 MINT1175A4806K01 MINT1175A5606K01	-	90%	-	%

All specifications apply over specified input voltage, output load, and temperature range, unless otherwise noted.



### OUTPUT SPECIFICATIONS

Parameter	Conditions/Description	Min	Nom	Max	Units
Output Voltage Setpoint Accuracy MINT1175A1206K01	$V_{i\text{ nom}}$ , $I_{o1}$ @ ADC, TC = 25 °C	-3	-	3	% $V_{o\text{ nom}}$
Output Voltage Setpoint Accuracy MINT1175A1506K01	$V_{i\text{ nom}}$ , $I_{o1}$ @ ADC, TC = 25 °C	-3	-	3	% $V_{o\text{ nom}}$
Output Voltage Setpoint Accuracy MINT1175A2406K01	$V_{i\text{ nom}}$ , $I_{o1}$ @ ADC, TC = 25 °C	-3	-	3	% $V_{o\text{ nom}}$
Output Voltage Setpoint Accuracy MINT1175A4806K01	$V_{i\text{ nom}}$ , $I_{o1}$ @ ADC, TC = 25 °C	-3	-	3	% $V_{o\text{ nom}}$
Output Voltage Setpoint Accuracy MINT1175A5606K01	$V_{i\text{ nom}}$ , $I_{o1}$ @ ADC, TC = 25 °C	-3	-	3	% $V_{o\text{ nom}}$
Output Current V1 Output Current V2	MINT1175A1206K01	0 0	10.0 -	14.6 0.4	ADC ADC
Output Current V1 Output Current V2	MINT1175A1506K01	0 0	8.0 -	11.7 0.4	ADC ADC
Output Current V1 Output Current V2	MINT1175A2406K01	0 0	5.0 -	7.3 0.4	ADC ADC
Output Current V1 Output Current V2	MINT1175A4806K01	0 0	2.5 -	3.6 0.4	ADC ADC
Output Current V1 Output Current V2	MINT1175A5606K01	0 0	2.1 -	3.1 0.4	ADC ADC
Static Line Regulation V1	$V_{i\text{ min}}-V_{i\text{ max}}$ , $V_{i\text{ nom}}$ , 0%–100% $I_{o\text{ nom}}$	-1	-	1	% $V_{o\text{ nom}}$
Static Load Regulation V1 (Droop Characteristic)	$V_{i\text{ min}}-V_{i\text{ max}}$ , $V_{i\text{ nom}}$ , 0%–100% $I_{o\text{ nom}}$	-3	-	3	% $V_{o\text{ nom}}$
Hold-Up Time	Starting at $V_{i\text{ nom}}$ = 230VAC, $P_{o\text{ nom}}$	-	16	-	mS
Dynamic Load Regulation	Load change =50%, $di/dt = 0.2A/\mu S$ voltage deviation 3%	0	-	3	% $V_{o\text{ nom}}$
Start-Up Time	$V_{i\text{ nom}}$ , $I_{o\text{ nom}}$	0	-	2	s

### PROTECTION SPECIFICATIONS

Parameter	Conditions/Description	Min	Nom	Max	Units
Input Fuse	Not user accessible				
Input Transient Protection	2KV(CM) and 1KV(DM) surge			2	KV(CM)
Output	No-load and short circuit proof			Hiccup or Latch	
	Short circuit proof			Hiccup or Latch	
	Overload (latch style)			Hiccup	
Overvoltage Protection	Latch style			Latch	
Over temperature Protection	Automatic power shutdown at TC =155°C				

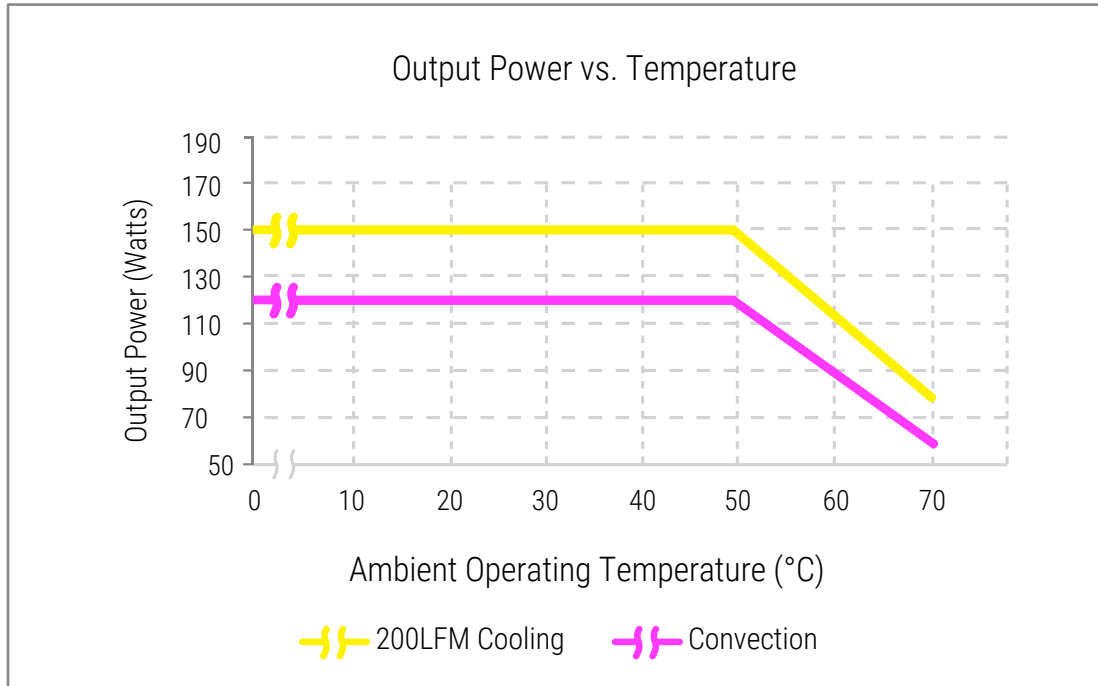
All specifications apply over specified input voltage, output load, and temperature range, unless otherwise noted.



## CHARACTERISTIC CURVES

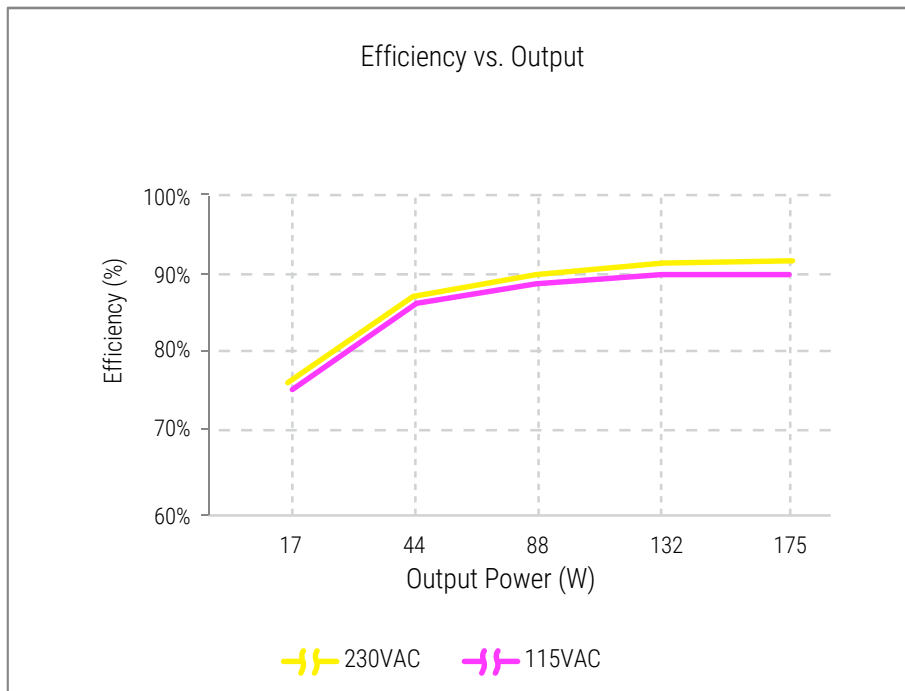
### OUTPUT VS. TEMPERATURE

120W convection cooled and 175W 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 SCHOTTKY or ultra-fast diode is used as rectifier in MINT1175 family because of high output voltage level.

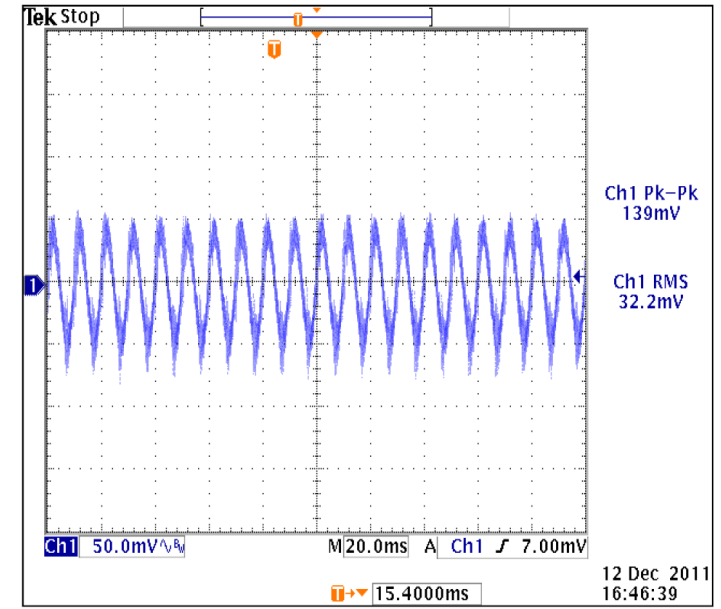
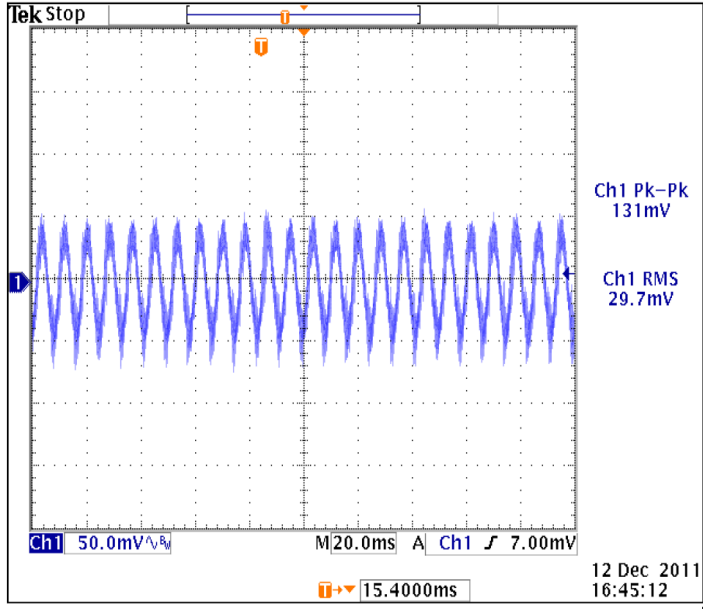






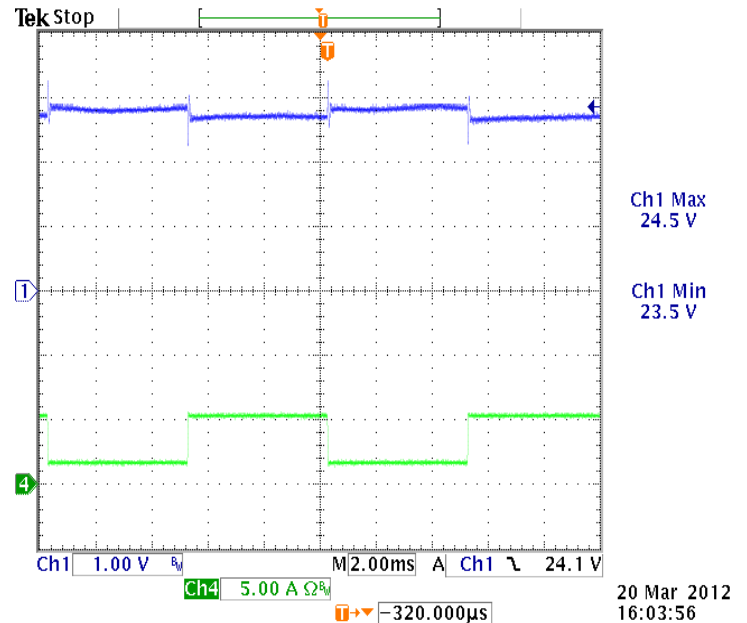
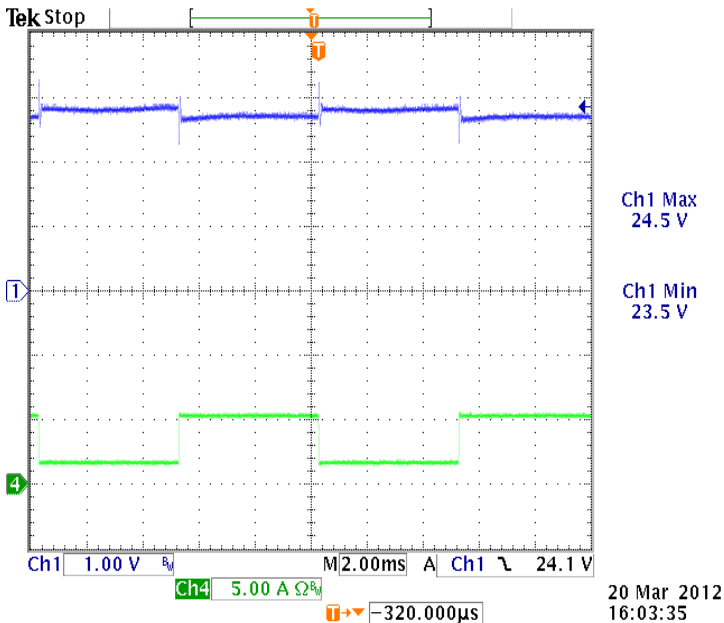
## Ripple & Noise

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



## Output Transient Response

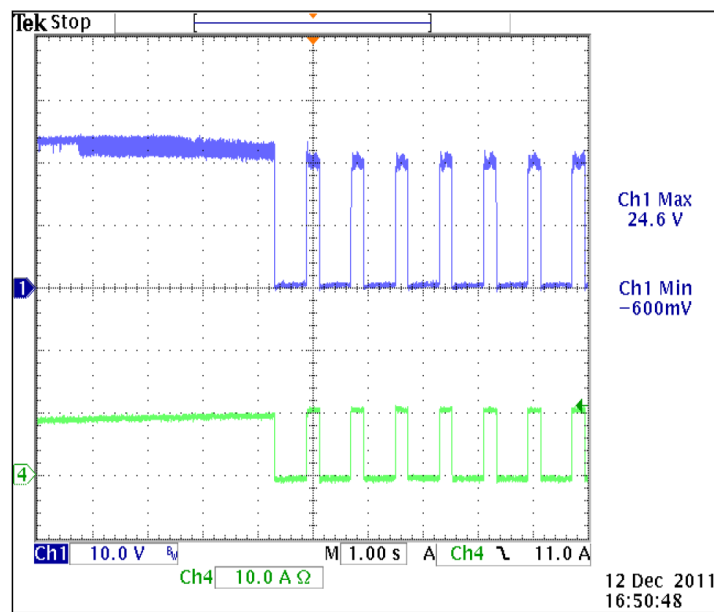
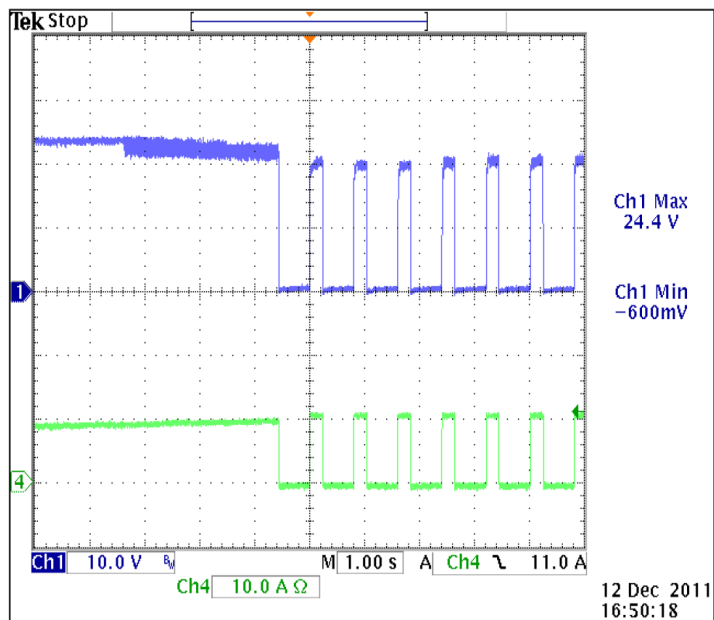
50% load step within the regulation limits of minimum and maximum load,  $di/dt < 0.2A/\mu\text{Sec}$ . Recovery time not specified as there is no laps in regulation with a 50% Load Step. Maximum voltage deviation is 3%, This test is performed on the MAIN OUTPUT ONLY.





## Output Overload Characteristic

Supply shall protect itself against Overload conditions. The Power Supply shall recover from Overload Conditions without operator intervention.



## Output Overshoot

When supply is turned on, off or when the load is stepped 100%, the Power Supply Overshoot/Undershoot shall not exceed minimum or maximum of output voltage regulation.

