

AHM85 Series



- Medical & IT Safety Approvals
- Energy Star Level V
- CEC 2008 & EISA 2007 Compliant
- IP22 Environmental Rating
- Compact Format 5.90”x 2.52”x 1.45”
- <0.5 W Standby Power
- 85 W – Convection Cooled Ratings
- Class I & Class II Models
- 0 °C to +60 °C Operation
- Very Low Earth Leakage Current
- 3 Year Warranty

The AHM85 series of medical external power supplies is fully approved to international medical safety standards. It has been designed with very high efficiency and low standby power, enabling it to meet the latest environmental legislation. The unit has a fully sealed enclosure complying with IP22 and a smooth surface finish making it easier to wipe down in a clinical setting. With approvals for class I and II the product is suitable for hospital, home healthcare and portable medical device applications.

Models and Ratings - Convection-cooled

| Output Power | Output Voltage V1 | Max Output Current | Peak ⁽²⁾ | Model Number ⁽¹⁾ |
|--------------|-------------------|--------------------|---------------------|-----------------------------|
| 85 W | 12.0 VDC | 7.08 A | | AHM85PS12 |
| 85 W | 15.0 VDC | 5.67 A | | AHM85PS15 |
| 85 W | 19.0 VDC | 4.47 A | | AHM85PS19 |
| 85 W | 24.0 VDC | 3.54 A | | AHM85PS24 |
| 85 W | 12.0 VDC | 7.08 A | | AHM85PS12C2 |
| 85 W | 15.0 VDC | 5.67 A | | AHM85PS15C2 |
| 85 W | 19.0 VDC | 4.47 A | | AHM85PS19C2 |
| 85 W | 24.0 VDC | 3.54 A | | AHM85PS24C2 |

- Notes:**
1. Models with suffix 'C2' have a Class II equipment protection classification.
 2. For optional input connector retention clip, add suffix '-A' to the model number e.g. AHM85PS24C2-A.

Input Characteristics

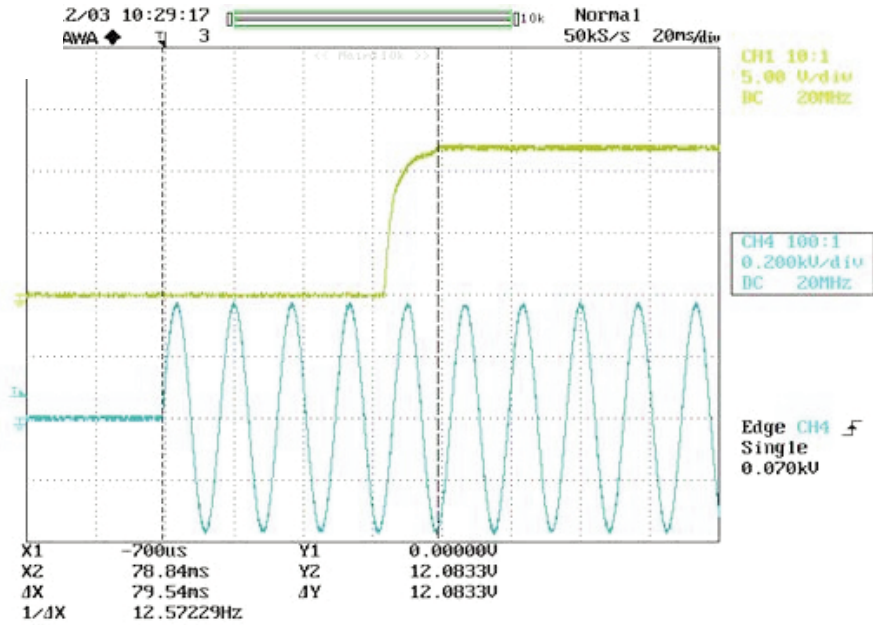
| Characteristic | Minimum | Typical | Maximum | Units | Notes & Conditions |
|---------------------------|-----------------------------------------|-----------|---------|-------|------------------------------------------------------------------------------------------|
| Input Voltage - Operating | 80 | 115/230 | 264 | VAC | Full power 90 VAC to 264 VAC. Derate output power linearly by 20% from 90 VAC to 80 VAC. |
| Input Frequency | 47 | 50/60 | 63 | Hz | |
| Power Factor | | >0.9 | | | EN61000-3-2 class A & D compliant & Energy Star Compliant |
| Input Current - No Load | | 0.05/0.09 | | A | 115/230 VAC |
| Input Current - Full Load | | 0.8/0.4 | | A | 115/230 VAC |
| Inrush Current | | 60-80 | 120 | A | 230 VAC cold start, 25 °C |
| No Load Input Power | | 0.3/0.4 | 0.5 | W | 115/230 VAC |
| Earth Leakage Current | | 50/85 | 180 | µA | 115 V 60 Hz/230 V 50 Hz (Typ.), 264 VAC/60 Hz (Max.) |
| | | 0.3/0.6 | | mA | 115/230 VAC/400 Hz |
| Input Protection | T2.5A/250 V internal fuse in both lines | | | | |

Output Characteristics

| Characteristic | Minimum | Typical | Maximum | Units | Notes & Conditions |
|----------------------------|---------|---------|----------------|---------|--------------------------------------------------------------------------|
| Output Voltage - V1 | 12 | | 48 | VDC | See Models and Ratings table |
| Output Voltage Adjustment | | | | % | No user adjustment |
| Minimum Load | 0 | | | A | |
| Start Up Delay | | 200/100 | | ms | 115/230 VAC full load (see fig.1) |
| Hold Up Time | | 15 | | ms | 115/230 VAC full load (see fig.2) |
| Drift | | | ±0.2 | % | After 20 min warm up |
| Line Regulation | | | ±0.5 | % | 90-264 VAC (50% load) |
| Load Regulation | | | ±3 | % | 0←50→100% load. |
| Transient Response - V1 | | | 5 | % | Recovery within 1% in less than 500 µs for a 50-75% and 75-50% load step |
| Over/Undershoot - V1 | | 3 | | % | |
| Ripple & Noise | | <1 | 1.5 | % pk-pk | 20 MHz bandwidth with external circuit (see fig.3-6) |
| Overvoltage Protection | | 125 | | % | Vnom, Recycle AC to reset |
| | 13.2 | | 18 | VDC | AHM85PS12 & C2 |
| | 16.5 | | 22 | | AHM85PS15 & C2 |
| | 21.0 | | 28 | | AHM85PS19 & C2 |
| 26.4 | | 33 | AHM85PS24 & C2 | | |
| Overload Protection | 115.0 | | 175 | % | I nom, Auto reset |
| | 8.5 | | 12.0 | A | AHM85PS12 & C2 |
| | 6.8 | | 9.6 | | AHM85PS15 & C2 |
| | 4.9 | | 7.6 | | AHM85PS19 & C2 |
| 4.2 | | 6.0 | AHM85PS24 & C2 | | |
| Short Circuit Protection | | | | | Continuous, trip & restart (hiccup mode) |
| Temperature Coefficient | | | 0.05 | %/°C | |
| Overtemperature Protection | | | | °C | Connected to transformer. Auto reset. |

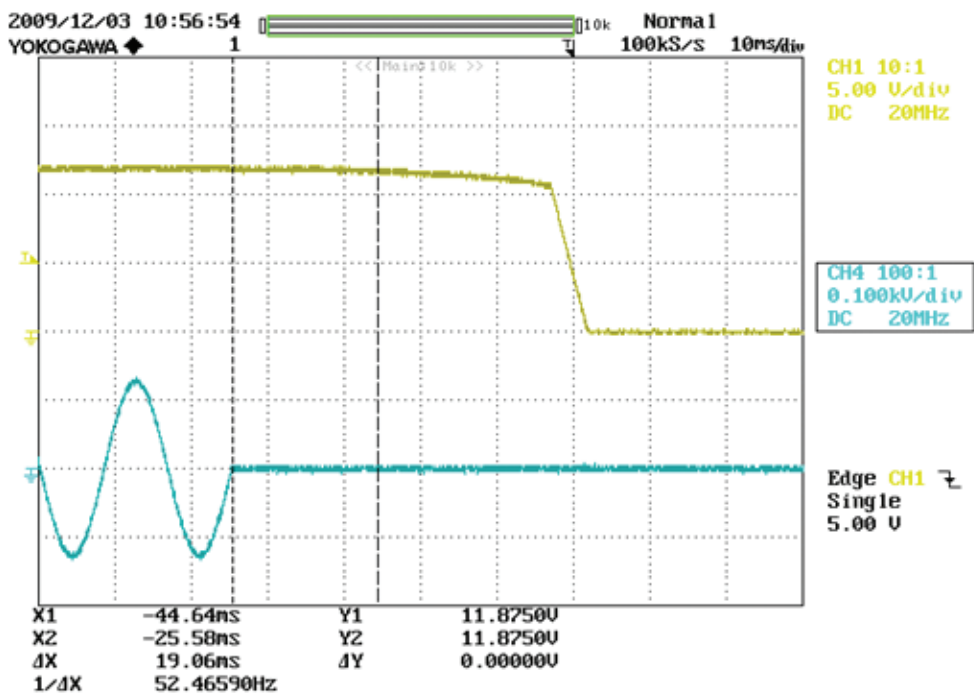
Start Up Delay From AC Turn On

Figure 1
Start up example from AC turn on
(230 VAC, 79 ms)



Hold Up Time From Loss of AC

Figure 2
Hold up example at 85 W load
with 230 VAC input (19 ms)



Ripple & Noise

Figure 3
AHM85PS12
Ripple & noise example at 85 W load
with 230 VAC input (75 mV)

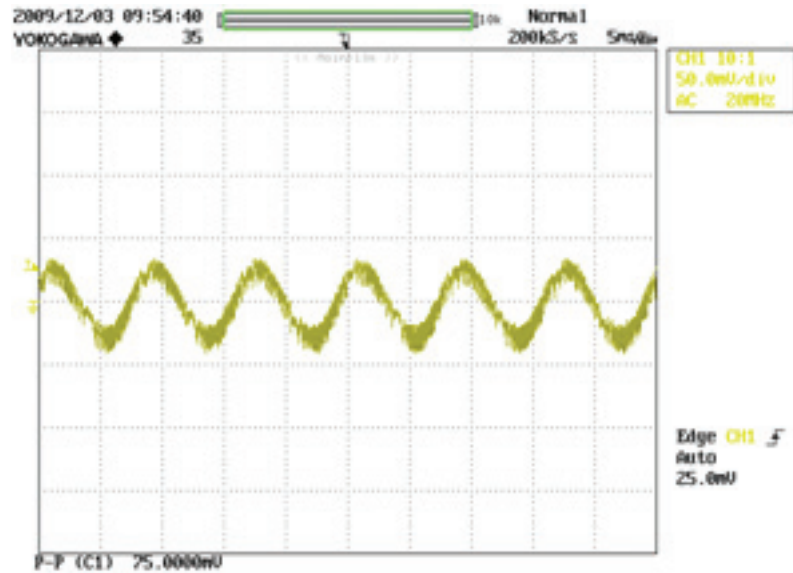


Figure 4
AHM85PS24
Ripple & noise example at 85 W load
with 230 VAC input (77 mV)

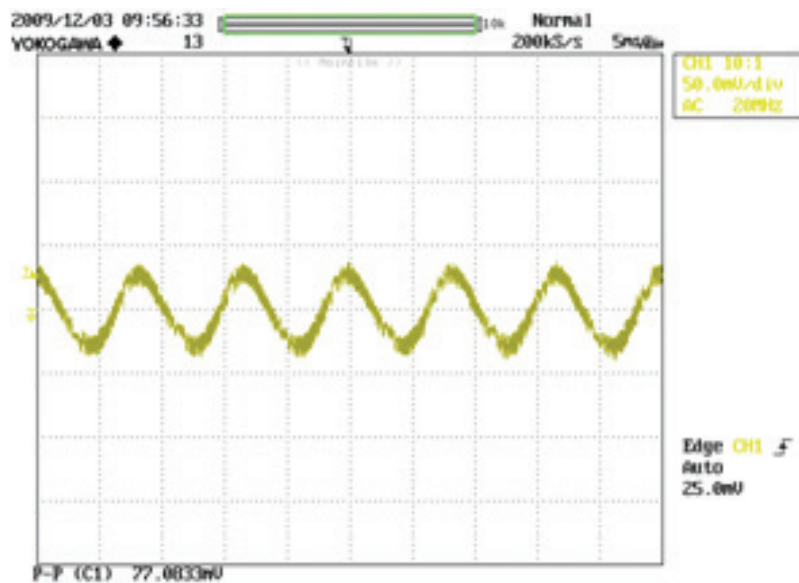
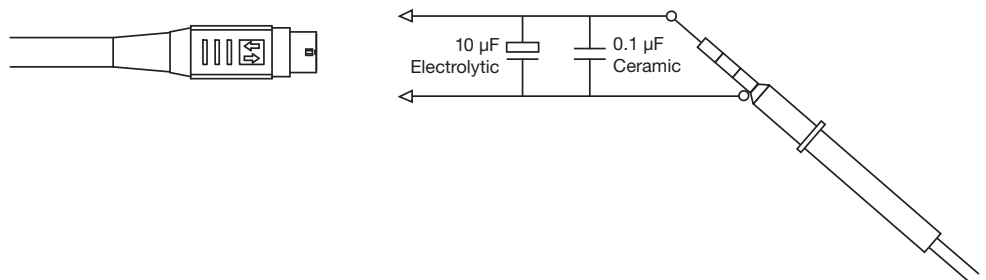


Figure 6
Ripple & noise measurement circuit



General Specifications

| Characteristic | Minimum | Typical | Maximum | Units | Notes & Conditions |
|-------------------------------------------------------------------|---------|-----------|---------|-------------------|-----------------------------------|
| Efficiency | | 92 | | % | Full load (see fig.7-8) |
| Isolation: Input to Output Input to Ground Output to Ground | 4000 | | | VAC | |
| | 1500 | | | VAC | Class I Models |
| | 500 | | | VAC | Class I Models |
| Switching Frequency | 45 | | 200 | kHz | PFC stage |
| | 90 | | 110 | | DC-DC stage |
| Power Density | | | 3.9 | W/in ³ | |
| Mean Time Between Failure | | 172 | | kHrs | MIL-HDBK-217F, Notice 2 +25 °C GB |
| Weight | | 0.9 (400) | | lb (g) | |

Average Active Efficiency



| Characteristic | Average Active Efficiency | | Units | Notes & Conditions |
|----------------|---------------------------|-----------------|-------|-------------------------------------------|
| | 115 V / 60 Hz | 230 VAC / 50 Hz | | |
| AHM85PS12 & C2 | 90.41 | 89.92 | % | As per Energy Star Level V test procedure |
| AHM85PS15 & C2 | 89.37 | 88.99 | | |
| AHM85PS19 & C2 | 90.36 | 89.93 | | |
| AHM85PS24 & C2 | 91.67 | 91.23 | | |

Efficiency Versus Load

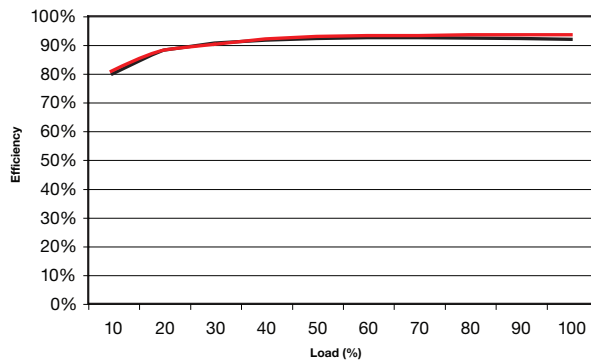


Figure 7 - AHM85PS12

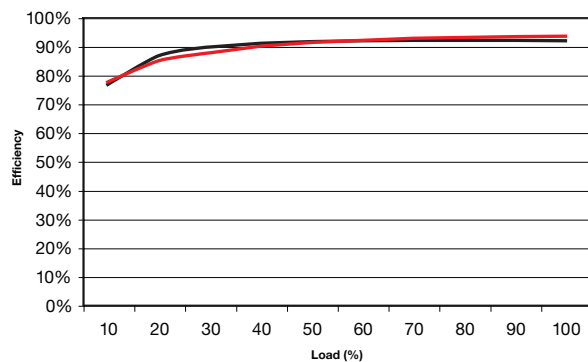
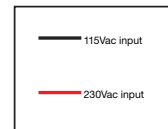


Figure 8 - AHM85PS24

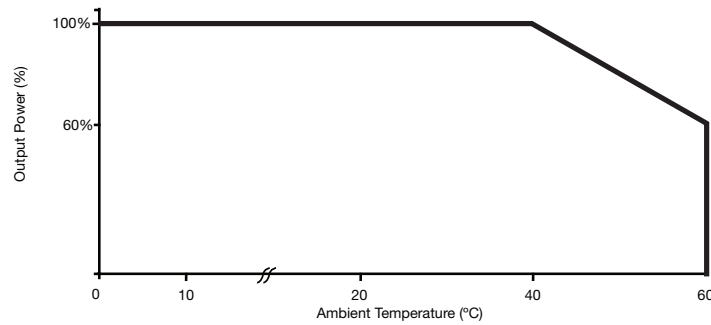


Environmental

| Characteristic | Minimum | Typical | Maximum | Units | Notes & Conditions |
|--------------------------------------------|---------|---------|---------|-------|--------------------------------------------------------------------------------------------------|
| Operating Temperature | 0 | | +60 | °C | Derate linearly to 60% load at 60 °C from +40 °C. (See fig.9) |
| Case Temperature (IEC60601 3rd Edition) | | | 71 | °C | 100% Load, with TAMB +40 °C |
| | | | 60 | | 90% Load Maximum, with TAMB +40 °C |
| | | | 48 | | 10% Load Maximum, with TAMB +40 °C |
| Storage Temperature | -40 | | +85 | °C | |
| Cooling | | | | | Convection cooled, see fig.9 |
| Humidity | 5 | | 95 | %RH | Non-condensing |
| Operating Altitude | | | 3000 | m | |
| Ingress Protection | IP22 | | | | |
| Shock | | | | | 3 x 30 g/11 ms shocks in both +ve & -ve directions along the 3 orthogonal axis, total 18 shocks. |
| Vibration | | | | | Three axis 5-500 Hz at 2 g x 10 sweeps |

Derating Curve

Figure 9



Electromagnetic Compatibility - Immunity

| Phenomenon | Standard | Test Level | Criteria | Notes & Conditions |
|------------------------|--------------|-------------------------|----------|-------------------------------------|
| Low Voltage PSU EMC | EN61204-3 | High severity level | as below | |
| Harmonic Current | EN61000-3-2 | Class A | | |
| ESD | EN61000-4-2 | 3 | A | |
| Radiated | EN61000-4-3 | 3 | A | |
| EFT | EN61000-4-4 | 3 | A | |
| Surges | EN61000-4-5 | Installation class 3 | A | |
| Conducted | EN61000-4-6 | 3 | A | |
| Magnetic Field | EN61000-4-8 | 3 | A | |
| Dips and Interruptions | EN61000-4-11 | Dip: 30% 500 ms | A | |
| | | Dip: 60% 200 ms | B | |
| | | Dip: 80% 5000 ms | A | |
| | | Dip: 100% 5000 ms | B | |
| | EN60601-1-2 | Dip: 30% 25 AC Cycles | A | 230 VAC 100% load, 100 VAC 80% load |
| | | Dip: 60% 5 AC Cycles | A | 230 VAC 100% load, 100 VAC 15% load |
| | | Dip: 100% 0.5 AC Cycles | A | |
| | | Int.: >95% 5000 ms | B | |

Electromagnetic Compatibility - Emissions

| Phenomenon | Standard | Test Level | Criteria | Notes & Conditions |
|----------------------|-------------|------------|----------|--------------------|
| Conducted | EN55011/22 | Class B | | |
| Radiated | EN55011/22 | Class B | | |
| Voltage Fluctuations | EN61000-3-3 | | | |

Safety Agency Approvals

| Safety Agency | Safety Standard | Category |
|---------------|--------------------------------------------------------------------------------|------------------------|
| CB Report | Certificate # US/15675/UL, IEC60950-1:2005 Ed 2 | Information Technology |
| UL | UL File # E139109-A57-UL-1, UL60950-1 Ed 2 (2007), CSA 22.2 No.60950-1-07 Ed 2 | Information Technology |
| TUV | TUV Certificate # Z1A 10 12 57396 085, EN60950-1:2006 | Information Technology |
| Denan Japan | PSE Certificate | |
| CE | LVD | |

| Safety Agency | Safety Standard | Category |
|---------------|-------------------------------------------------------------------------------|----------|
| CB Report | Certificate #US/16953/UL, IEC60601-1 Ed 3 Including Risk Management | Medical |
| UL | UL File # E146893-V1-S8, ANSI/AAMI ES 60601-1:2005 & CSA C22.2 No. 60601-1:08 | Medical |
| TUV | TUV Certificate # B11 06 57396 102, EN60601-1:2006 | Medical |

| Means of Protection | | Category |
|----------------------|----------------------------------------|-----------------|
| Primary to Secondary | 2 x MOPP (Means of Patient Protection) | IEC60601-1 Ed 3 |
| Primary to Earth | 1 x MOPP (Means of Patient Protection) | |
| Secondary to Earth | 1 x MOPP (Means of Patient Protection) | |

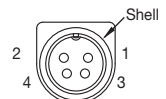
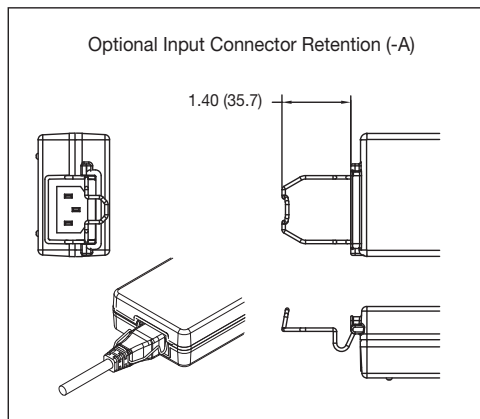
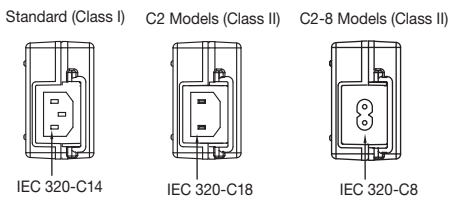
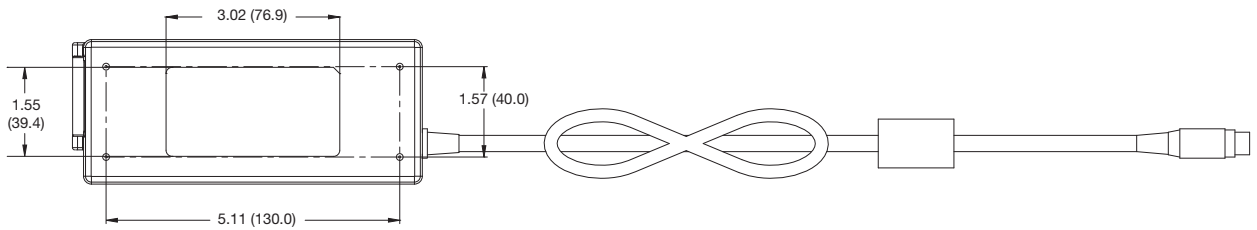
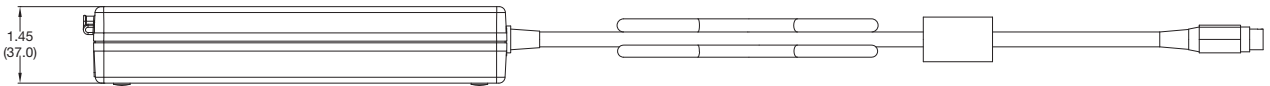
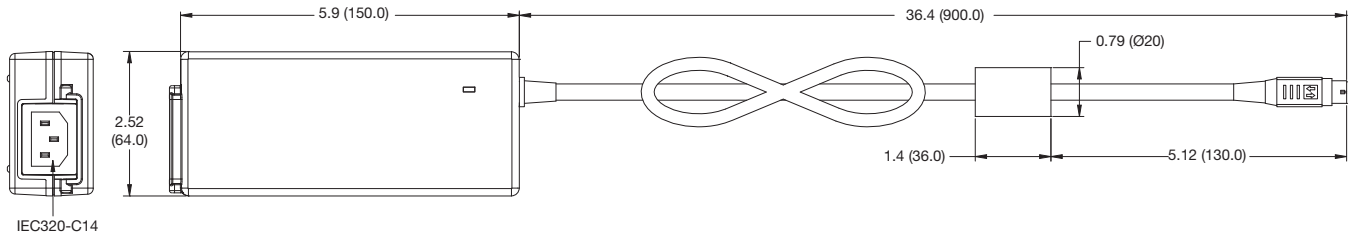
| Equipment Protection Class | Safety Standard | Notes & Conditions |
|----------------------------|----------------------------------------|-----------------------------------------------------------|
| Class I & Class II | IEC60950-1:2005 Ed 2 & IEC60601-1 Ed 3 | See safety agency conditions of acceptability for details |

Environmental Legislation

| Authority | Location | Date | Notes & Conditions |
|---------------|----------------|------|-------------------------|
| EISA | US | 2007 | |
| CEC | California, US | 2008 | |
| Energy Star | US | 2008 | Level V |
| ErP Directive | Europe | 2011 | Regulation No. 278/2009 |

Mechanical Details

Weight: 0.9 lbs (400 g)
 Dimensions shown in inches (mm).



| Output Connector equivalent to KPPX-4P (Non Locking) | |
|------------------------------------------------------|----------|
| Pin 1 | Output + |
| Pin 2 | Output + |
| Pin 3 | Return |
| Pin 4 | Return |
| Outer Shell | GND* |
| Outer Shell C2 Models | Floating |

* Functional earth.

AHM100 Series



- Medical & IT Safety Approvals
- Energy Star Level V
- CEC 2008 & EISA 2007 Compliant
- IP22 Environmental Rating
- Compact Format 6.50" x 2.52" x 1.46"
- <0.5 W Standby Power
- 100 W – Convection Cooled Ratings
- Class I & Class II Models
- 0 °C to +60 °C Operation
- Very Low Earth Leakage Current
- 3 Year Warranty

The AHM100 series of medical external power supplies is fully approved to international medical safety standards. It has been designed with very high efficiency and low standby power, enabling it to meet the latest environmental legislation. The unit has a fully sealed enclosure complying with IP22 and a smooth surface finish making it easier to wipe down in a clinical setting. With approvals for class I and II the product is suitable for hospital, home healthcare and portable medical device applications.

Models and Ratings - Convection-cooled

| Output Power | Output Voltage V1 | Max Output Current | Peak ⁽³⁾ | Model Number ⁽¹⁾ |
|--------------|-------------------|--------------------|---------------------|------------------------------|
| 100 W | 12.0 VDC | 8.33 A | | AHM100PS12 |
| 100 W | 15.0 VDC | 6.67 A | | AHM100PS15 |
| 100 W | 19.0 VDC | 5.26 A | | AHM100PS19 |
| 90 W | 24.0 VDC | 3.75 A | 7 A | AHM100PS24P ⁽³⁾ |
| 100 W | 24.0 VDC | 4.16 A | | AHM100PS24 |
| 100 W | 48.0 VDC | 2.08 A | | AHM100PS48 |
| 100 W | 12.0 VDC | 8.33 A | | AHM100PS12C2 |
| 100 W | 15.0 VDC | 6.67 A | | AHM100PS15C2 |
| 100 W | 19.0 VDC | 5.26 A | | AHM100PS19C2 |
| 90 W | 24.0 VDC | 3.75 A | 7 A | AHM100PS24C2P ⁽³⁾ |
| 100 W | 24.0 VDC | 4.16 A | | AHM100PS24C2 |
| 100 W | 48.0 VDC | 2.08 A | | AHM100PS48C2 |

- Notes:**
- Models with suffix 'C2' have a Class II equipment protection classification.
 - Maximum peak duration 300 ms, average power must not exceed 90 W.
 - Peak models are not standard product. Contact sales for details and availability.
 - For optional input connector retention clip, add suffix '-A' to the model number e.g. AHM100PS24C2-A.

Input Characteristics

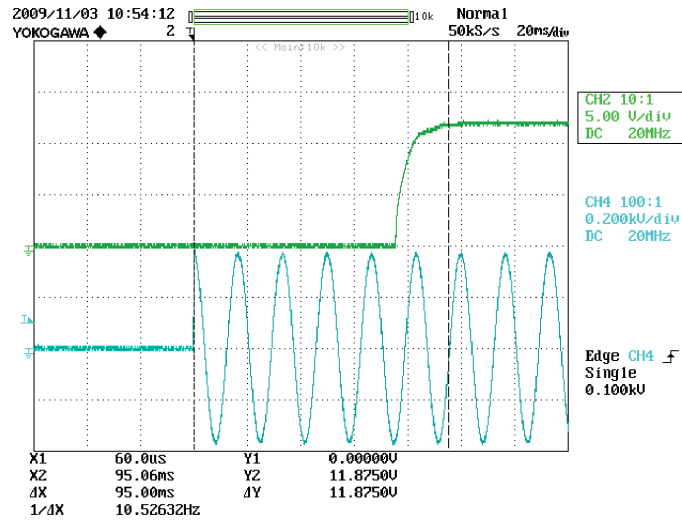
| Characteristic | Minimum | Typical | Maximum | Units | Notes & Conditions |
|---------------------------|-----------------------------------------|-----------|---------|-------|------------------------------------------------------------------------------------------|
| Input Voltage - Operating | 80 | 115/230 | 264 | VAC | Full power 90 VAC to 264 VAC. Derate output power linearly by 20% from 90 VAC to 80 VAC. |
| Input Frequency | 47 | 50/60 | 63 | Hz | |
| Power Factor | | >0.9 | | | EN61000-3-2 class A & D compliant & Energy Star Compliant |
| Input Current - No Load | | 0.05/0.09 | | A | 115/230 VAC |
| Input Current - Full Load | | 1.0/0.5 | | A | 115/230 VAC |
| Inrush Current | | 60-80 | 120 | A | 230 VAC cold start, 25 °C |
| No Load Input Power | | 0.3/0.4 | 0.5 | W | 115/230 VAC |
| Earth Leakage Current | | 50/85 | 180 | µA | 115 V 60 Hz/230 V 50 Hz (Typ.), 264 VAC/60 Hz (Max.) |
| | | 0.3/0.6 | | mA | 115/230 VAC/400 Hz |
| Input Protection | T2.5A/250 V internal fuse in both lines | | | | |

Output Characteristics

| Characteristic | Minimum | Typical | Maximum | Units | Notes & Conditions |
|----------------------------|---------|---------|-----------------|---------|--------------------------------------------------------------------------|
| Output Voltage - V1 | 12 | | 48 | VDC | See Models and Ratings table |
| Output Voltage Adjustment | | | | % | No user adjustment |
| Minimum Load | 0 | | | A | |
| Start Up Delay | | 200/100 | | ms | 115/230 VAC full load (see fig.1) |
| Hold Up Time | | 20 | | ms | 115/230 VAC full load (see fig.2) |
| Drift | | | ±0.2 | % | After 20 min warm up |
| Line Regulation | | | ±0.5 | % | 90-264 VAC (50% load) |
| Load Regulation | | | ±3 | % | 0←50→100% load. |
| Transient Response - V1 | | | 5 | % | Recovery within 1% in less than 500 µs for a 50-75% and 75-50% load step |
| Over/Undershoot - V1 | | 3 | | % | |
| Ripple & Noise | | <1 | 1.5 | % pk-pk | 20 MHz bandwidth with external circuit (see fig.3-6) |
| Overvoltage Protection | | 125 | | % | Vnom, Recycle AC to reset |
| | | 13.2 | 18 | VDC | AHM100PS12 & C2 |
| | | 16.5 | 22 | | AHM100PS15 & C2 |
| | | 21.0 | 28 | | AHM100PS19 & C2 |
| | | 26.4 | 33 | | AHM100PS24 & C2 |
| | 52.8 | 59 | AHM100PS48 & C2 | | |
| Overload Protection | | 115.0 | 175 | % | I nom, Auto reset |
| | | 10.0 | 14.0 | A | AHM100PS12 & C2 |
| | | 8.0 | 11.4 | | AHM100PS15 & C2 |
| | | 6.3 | 9.0 | | AHM100PS19 & C2 |
| | | 5.0 | 7.1 | | AHM100PS24 & C2 |
| | 2.5 | 3.6 | AHM100PS48 & C2 | | |
| Short Circuit Protection | | | | | Continuous, trip & restart (hiccup mode) |
| Temperature Coefficient | | | 0.05 | %/°C | |
| Overtemperature Protection | | | | °C | Connected to transformer. Auto reset. |

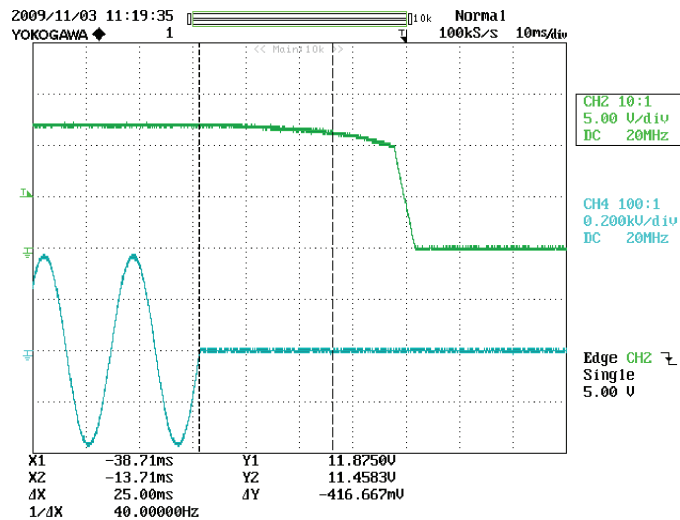
Start Up Delay From AC Turn On

Figure 1
Start up example from AC turn on
(230 VAC, 95 ms)



Hold Up Time From Loss of AC

Figure 2
Hold up example at 100 W load
with 230 VAC input (25 ms)



Ripple & Noise

Figure 3
AHM100PS12
Ripple & noise example at 100 W load
with 230 VAC input (58 mV)

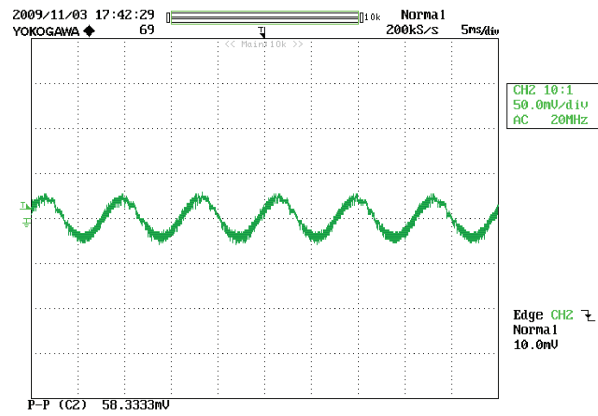


Figure 4
AHM100PS24
Ripple & noise example at 100 W load
with 230 VAC input (258 mV)

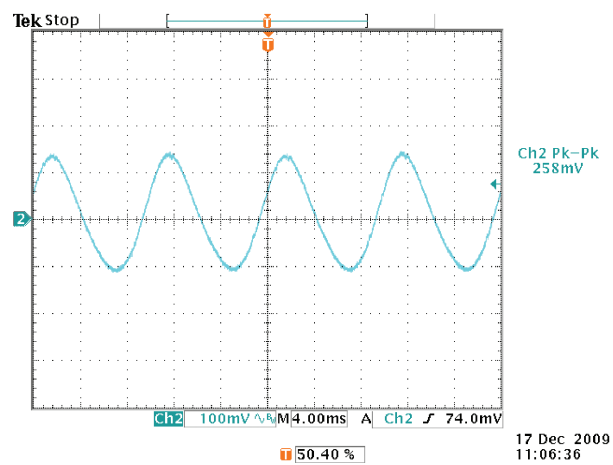


Figure 5
AHM100PS48
Ripple & noise example at 100 W load
with 230 VAC input (318 mV)

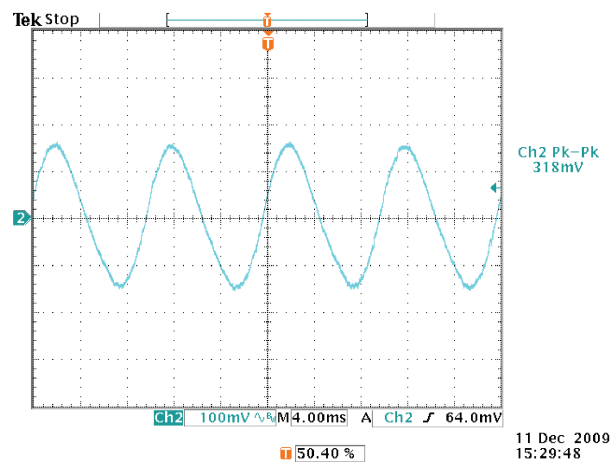
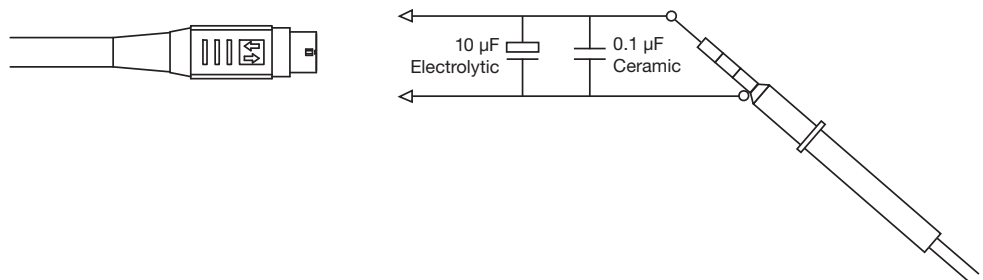


Figure 6
Ripple & noise measurement circuit



General Specifications

| Characteristic | Minimum | Typical | Maximum | Units | Notes & Conditions |
|-------------------------------------------------------------------|---------|-----------|---------|-------------------|-----------------------------------|
| Efficiency | | 92 | | % | Full load (see fig.7-9) |
| Isolation: Input to Output Input to Ground Output to Ground | 4000 | | | VAC | |
| | 1500 | | | VAC | Class I Models |
| | 500 | | | VAC | Class I Models |
| Switching Frequency | 45 | | 200 | kHz | PFC stage |
| | 90 | | 110 | | DC-DC stage |
| Power Density | | | 4.4 | W/in ³ | |
| Mean Time Between Failure | | 153 | | kHrs | MIL-HDBK-217F, Notice 2 +25 °C GB |
| Weight | | 1.1 (500) | | lb (g) | |

Average Active Efficiency

| Characteristic | Average Active Efficiency | | Units | Notes & Conditions |
|-----------------|---------------------------|-----------------|-------|-------------------------------------------|
| | 115 V / 60 Hz | 230 VAC / 50 Hz | | |
| AHM100PS12 & C2 | 90.52 | 90.32 | % | As per Energy Star Level V test procedure |
| AHM100PS15 & C2 | 89.88 | 89.64 | | |
| AHM100PS19 & C2 | 89.99 | 89.74 | | |
| AHM100PS24 & C2 | 91.67 | 91.43 | | |
| AHM100PS48 & C2 | 91.80 | 91.63 | | |

Efficiency Versus Load

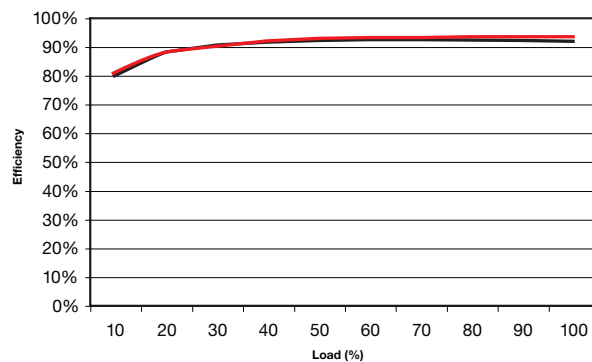


Figure 7 - AHM100PS12

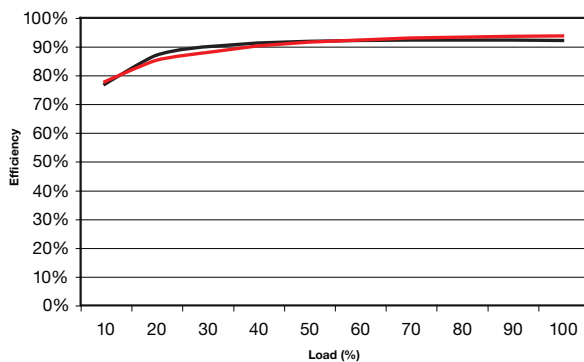


Figure 8 - AHM100PS24

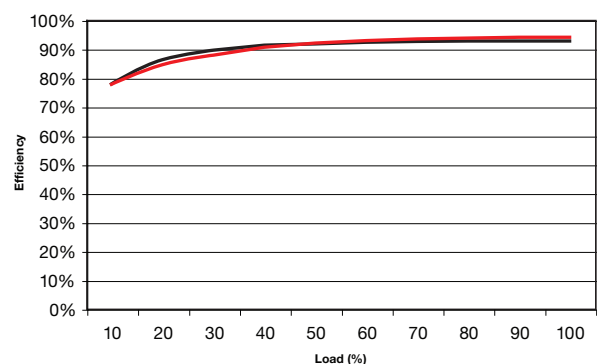
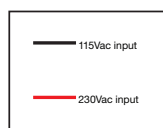


Figure 9 - AHM100PS48

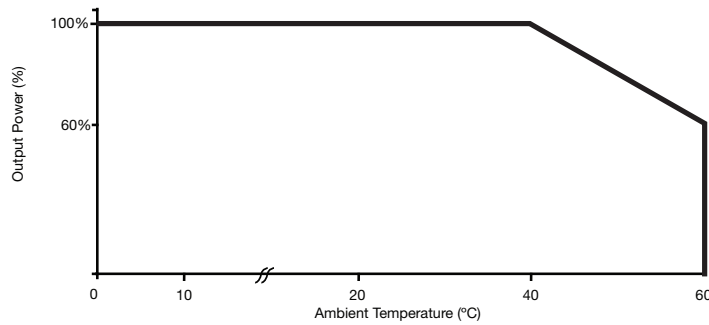


Environmental

| Characteristic | Minimum | Typical | Maximum | Units | Notes & Conditions |
|--------------------------------------------|---------|---------|---------|-------|--------------------------------------------------------------------------------------------------|
| Operating Temperature | 0 | | +60 | °C | Derate linearly to 60% load at 60 °C from +40 °C. (See fig.10) |
| Case Temperature (IEC60601 3rd Edition) | | | 71 | °C | 100% Load, with TAMB +40 °C |
| | | | 60 | | 80% Load Maximum, with TAMB +40 °C |
| | | | 48 | | 10% Load Maximum, with TAMB +40 °C |
| Storage Temperature | -40 | | +85 | °C | |
| Cooling | | | | | Convection cooled, see fig.10 |
| Humidity | 5 | | 95 | %RH | Non-condensing |
| Operating Altitude | | | 3000 | m | |
| Ingress Protection | IP22 | | | | |
| Shock | | | | | 3 x 30 g/11 ms shocks in both +ve & -ve directions along the 3 orthogonal axis, total 18 shocks. |
| Vibration | | | | | Three axis 5-500 Hz at 2 g x 10 sweeps |

Derating Curve

Figure 10



Electromagnetic Compatibility - Immunity

| Phenomenon | Standard | Test Level | Criteria | Notes & Conditions |
|------------------------|--------------|-------------------------|----------|-------------------------------------|
| Low Voltage PSU EMC | EN61204-3 | High severity level | as below | |
| Harmonic Current | EN61000-3-2 | Class A | | |
| ESD | EN61000-4-2 | 3 | A | |
| Radiated | EN61000-4-3 | 3 | A | |
| EFT | EN61000-4-4 | 3 | A | |
| Surges | EN61000-4-5 | Installation class 3 | A | |
| Conducted | EN61000-4-6 | 3 | A | |
| Magnetic Field | EN61000-4-8 | 3 | A | |
| Dips and Interruptions | EN61000-4-11 | Dip: 30% 500 ms | A | |
| | | Dip: 60% 200 ms | B | |
| | | Dip: 80% 5000 ms | A | |
| | | Dip: 100% 5000 ms | B | |
| | EN60601-1-2 | Dip: 30% 25 AC Cycles | A | 230 VAC 100% load, 100 VAC 80% load |
| | | Dip: 60% 5 AC Cycles | A | 230 VAC 100% load, 100 VAC 15% load |
| | | Dip: 100% 0.5 AC Cycles | A | |
| | | Int.: >95% 5000 ms | B | |

Electromagnetic Compatibility - Emissions

| Phenomenon | Standard | Test Level | Criteria | Notes & Conditions |
|----------------------|-------------|------------|----------|--------------------|
| Conducted | EN55011/22 | Class B | | |
| Radiated | EN55011/22 | Class B | | |
| Voltage Fluctuations | EN61000-3-3 | | | |

Safety Agency Approvals

| Safety Agency | Safety Standard | Category |
|---------------|--------------------------------------------------------------------------------|------------------------|
| CB Report | Certificate # US/15053A/UL, IEC60950-1:2005 Ed 2 | Information Technology |
| UL | UL File # E139109-A45-UL-1, UL60950-1 Ed 2 (2007), CSA 22.2 No.60950-1-07 Ed 2 | Information Technology |
| TUV | TUV Certificate # Z1A 10 07 57396 078, EN60950-1:2006 | Information Technology |
| Denan Japan | PSE Certificate | |
| CE | LVD | |

| Safety Agency | Safety Standard | Category |
|---------------|-------------------------------------------------------------------------|----------|
| CB Report | Certificate #US/18097/UL, IEC60601-1 Ed 3 Including Risk Management | Medical |
| UL | UL File # E146893, ANSI/AAMI ES 60601-1:2005 & CSA C22.2 No. 60601-1:08 | Medical |
| TUV | TUV Certificate # Z11 12 57396 122, EN60601-1:2006 | Medical |

| Means of Protection | | Category |
|----------------------|----------------------------------------|-----------------|
| Primary to Secondary | 2 x MOPP (Means of Patient Protection) | IEC60601-1 Ed 3 |
| Primary to Earth | 1 x MOPP (Means of Patient Protection) | |
| Secondary to Earth | 1 x MOPP (Means of Patient Protection) | |

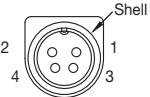
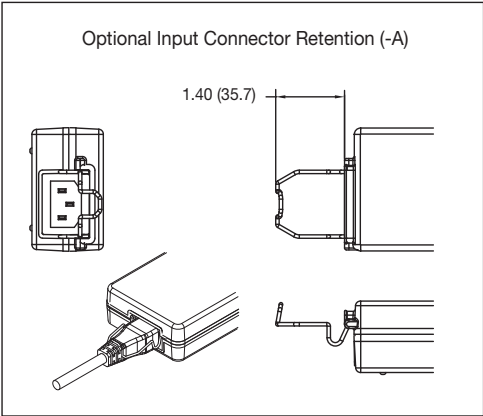
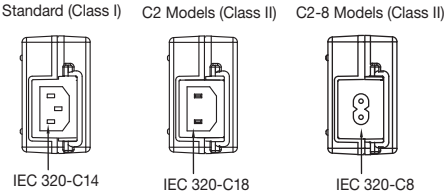
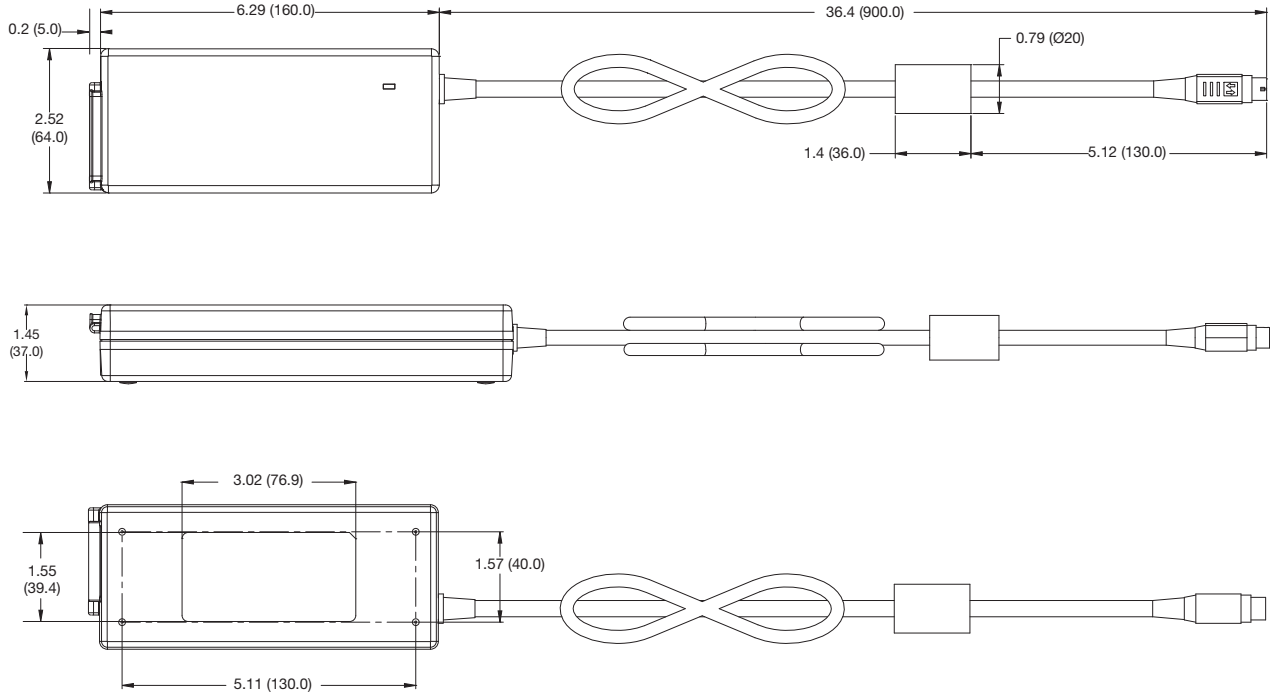
| Equipment Protection Class | Safety Standard | Notes & Conditions |
|----------------------------|----------------------------------------|-----------------------------------------------------------|
| Class I & Class II | IEC60950-1:2005 Ed 2 & IEC60601-1 Ed 3 | See safety agency conditions of acceptability for details |

Environmental Legislation

| Authority | Location | Date | Notes & Conditions |
|---------------|----------------|------|-------------------------|
| EISA | US | 2007 | |
| CEC | California, US | 2008 | |
| Energy Star | US | 2008 | Level V |
| ErP Directive | Europe | 2011 | Regulation No. 278/2009 |

Mechanical Details

Weight: 1.1 lbs (500 g)
 Dimensions shown in inches (mm).



| Output Connector equivalent to KPPX-4P (Non Locking) | |
|------------------------------------------------------|----------|
| Pin 1 | Output + |
| Pin 2 | Output + |
| Pin 3 | Return |
| Pin 4 | Return |
| Outer Shell | GND* |
| Outer Shell C2 Models | Floating |

* Functional earth.

AHM150 Series



- Medical & IT Safety Approvals
- Energy Star Level V
- CEC 2008 & EISA 2007 Compliant
- IP22 Environmental Rating
- Compact Format 7.80" x 3.15" x 1.45"
- <0.5 W Standby Power
- 150 W – Convection Cooled Ratings
- Class I & Class II Models
- 0 °C to +60 °C Operation
- Very Low Earth Leakage Current
- 3 Year Warranty

The AHM150 series of medical external power supplies is fully approved to international medical safety standards. It has been designed with very high efficiency and low standby power, enabling it to meet the latest environmental legislation. The unit has a fully sealed enclosure complying with IP22 and a smooth surface finish making it easier to wipe down in a clinical setting. With both medical & IT approvals in class I and class II formats the product is suitable for hospital, home healthcare, portable medical device applications and a wide range of IT applications.

Models and Ratings - Convection-cooled

| Output Power | Output Voltage V1 | Max Output Current | Model Number ⁽¹⁾ |
|--------------|-------------------|--------------------|-----------------------------|
| 150 W | 12.0 VDC | 12.50 A | AHM150PS12 |
| 150 W | 15.0 VDC | 10.00 A | AHM150PS15 |
| 150 W | 19.0 VDC | 7.89 A | AHM150PS19 |
| 150 W | 24.0 VDC | 6.25 A | AHM150PS24 |
| 150 W | 48.0 VDC | 3.13 A | AHM150PS48 |
| 150 W | 12.0 VDC | 12.50 A | AHM150PS12C2 |
| 150 W | 15.0 VDC | 10.00 A | AHM150PS15C2 |
| 150 W | 19.0 VDC | 7.89 A | AHM150PS19C2 |
| 150 W | 24.0 VDC | 6.25 A | AHM150PS24C2 |
| 150 W | 48.0 VDC | 3.13 A | AHM150PS48C2 |

Notes:
 1. For optional input connector retention clip, add suffix 'A' to the model number e.g. AHM150PS24-A. Models with suffix 'C2' have a class II equipment protection classification. For IEC320-C8 input connector with class II models, add suffix '8' to the model number, e.g. AHM150PS24C2-8.

Input Characteristics

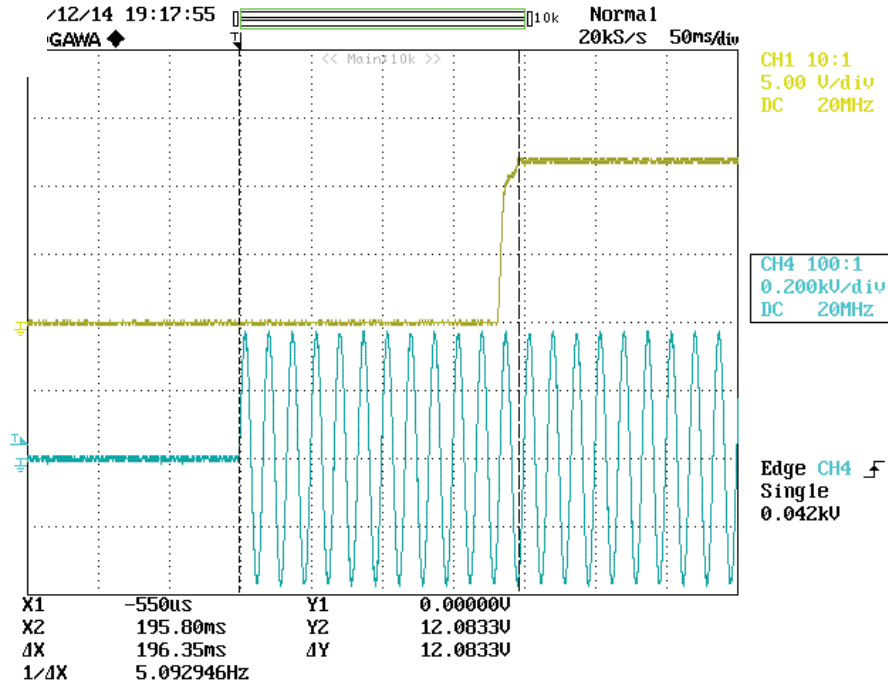
| Characteristic | Minimum | Typical | Maximum | Units | Notes & Conditions |
|---------------------------|-----------------------------------------|-----------|---------|-------|------------------------------------------------------------------------------------------|
| Input Voltage - Operating | 80 | 115/230 | 264 | VAC | Full power 90 VAC to 264 VAC. Derate output power linearly by 20% from 90 VAC to 80 VAC. |
| Input Frequency | 47 | 50/60 | 63 | Hz | |
| Power Factor | | >0.9 | | | EN61000-3-2 class A & D compliant & Energy Star Compliant |
| Input Current - No Load | | 0.06/0.04 | | A | 115/230 VAC |
| Input Current - Full Load | | 1.4/0.7 | | A | 115/230 VAC |
| Inrush Current | | 60-80 | 120 | A | 230 VAC cold start, 25 °C |
| No Load Input Power | | 0.3/0.4 | 0.5 | W | 115/230 VAC |
| Earth Leakage Current | | 50/100 | 200 | µA | 115 V 60 Hz/230 V 50 Hz (Typ.), 264 VAC/60 Hz (Max.) |
| | | 0.3/0.6 | | mA | 115/230 VAC/400 Hz |
| Input Protection | T4.0A/250 V internal fuse in both lines | | | | |

Output Characteristics

| Characteristic | Minimum | Typical | Maximum | Units | Notes & Conditions |
|----------------------------|---------|---------|-----------------|---------|--------------------------------------------------------------------------|
| Output Voltage - V1 | 12 | | 48 | VDC | See Models and Ratings table |
| Output Voltage Adjustment | | | | % | No user adjustment |
| Minimum Load | 0 | | | A | |
| Start Up Delay | | 200/100 | | ms | 115/230 VAC full load (see fig.1) |
| Hold Up Time | | 10 | | ms | 115/230 VAC full load (see fig.2) |
| Drift | | | ±0.2 | % | After 20 min warm up |
| Line Regulation | | | ±0.5 | % | 90-264 VAC (50% load) |
| Load Regulation | | | ±4 | % | 0←50→100% load. |
| Transient Response - V1 | | | 5 | % | Recovery within 1% in less than 500 µs for a 50-75% and 75-50% load step |
| Over/Undershoot - V1 | | 3 | | % | |
| Ripple & Noise | | <1 | 1.5 | % pk-pk | 20 MHz bandwidth with external circuit (see fig.3-6) |
| Overvoltage Protection | | 125 | | % | Vnom, Recycle AC to reset |
| | | 13.2 | 18 | VDC | AHM150PS12 & C2 |
| | | 16.5 | 22 | | AHM150PS15 & C2 |
| | | 20.9 | 28 | | AHM150PS19 & C2 |
| | | 26.4 | 33 | | AHM150PS24 & C2 |
| | 52.8 | 59 | AHM150PS48 & C2 | | |
| Overload Protection | | 115.0 | 175 | % | I nom, Auto reset |
| | | 15.0 | 21.3 | A | AHM150PS12 & C2 |
| | | 12.0 | 17.0 | | AHM150PS15 & C2 |
| | | 8.7 | 13.4 | | AHM150PS19 & C2 |
| | | 6.8 | 10.6 | | AHM150PS24 & C2 |
| | 3.7 | 5.3 | AHM150PS48 & C2 | | |
| Short Circuit Protection | | | | | Continuous, trip & restart (hiccup mode) |
| Temperature Coefficient | | | 0.05 | %/°C | |
| Overtemperature Protection | | | | °C | Connected to transformer. Auto reset. |

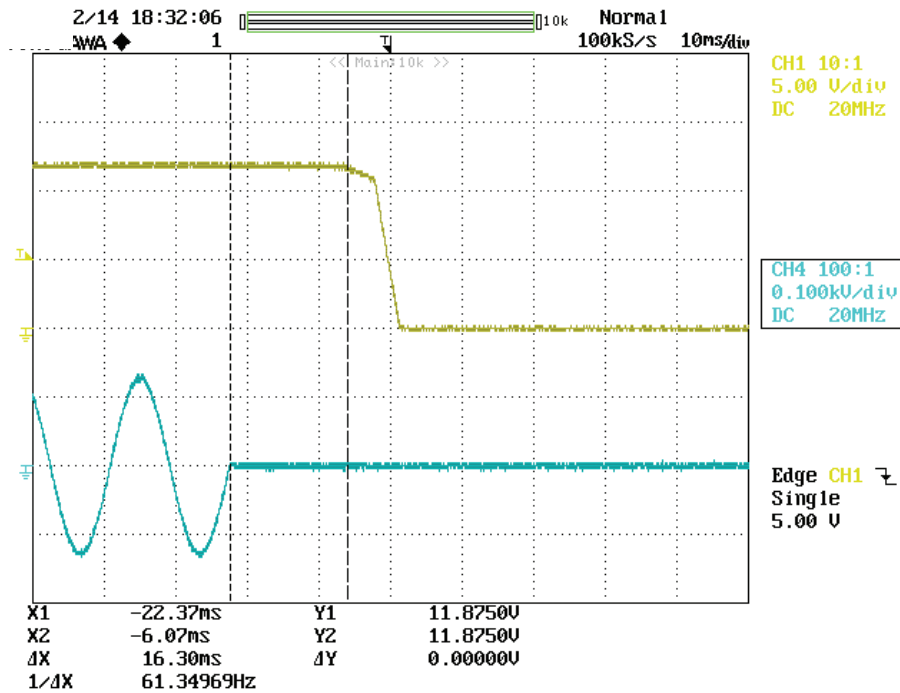
Start Up Delay From AC Turn On

Figure 1
Start up example from AC turn on
(230 VAC, 196 ms)



Hold Up Time From Loss of AC

Figure 2
Hold up example at 150 W load
with 230 VAC input (16 ms)



Ripple & Noise

Figure 3
AHM150PS12
Ripple & noise example at 150 W load
with 230 VAC input (60 mV)

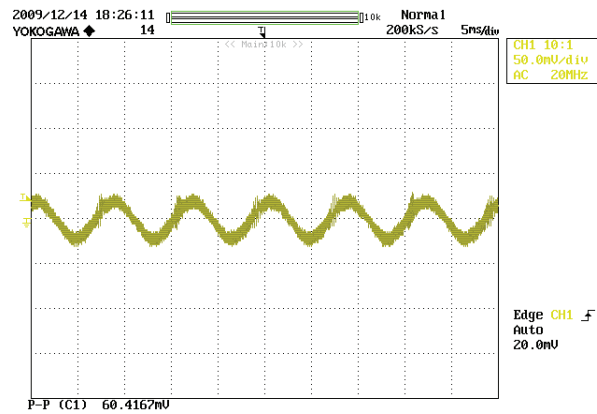


Figure 4
AHM150PS24
Ripple & noise example at 150 W load
with 230 VAC input (137 mV)

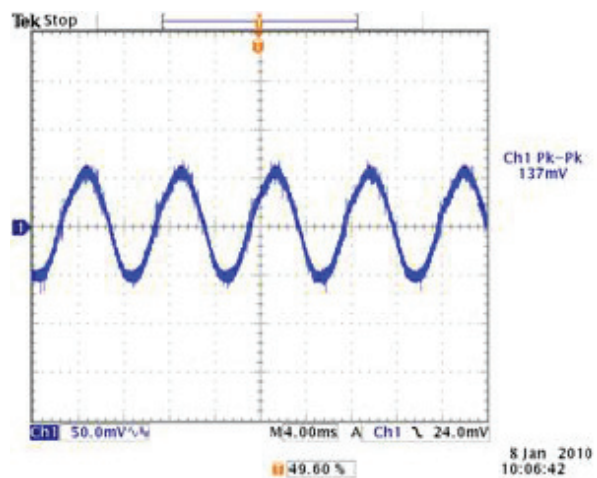


Figure 5
AHM150PS48
Ripple & noise example at 150 W load
with 230 VAC input (296 mV)

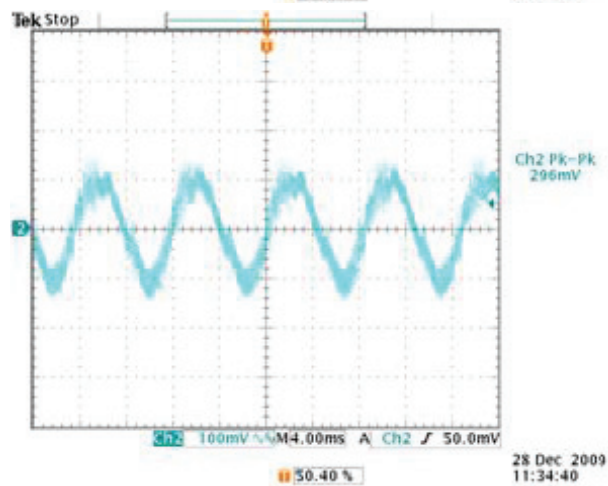
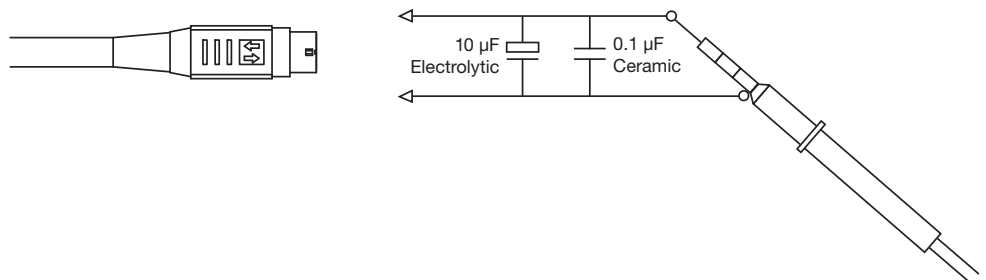


Figure 6
Ripple & noise measurement circuit



General Specifications

| Characteristic | Minimum | Typical | Maximum | Units | Notes & Conditions |
|-------------------------------------------------------------------|---------|-----------|---------|-------------------|-----------------------------------|
| Efficiency | | 92 | | % | Full load (see fig.7-9) |
| Isolation: Input to Output Input to Ground Output to Ground | 4000 | | | VAC | |
| | 1500 | | | VAC | |
| | 500 | | | VAC | |
| Switching Frequency | 30 | | 200 | kHz | PFC stage |
| | 90 | | 110 | | DC-DC stage |
| Power Density | | | 4.2 | W/in ³ | |
| Mean Time Between Failure | | 163 | | kHrs | MIL-HDBK-217F, Notice 2 +25 °C GB |
| Weight | | 1.3 (600) | | lb (g) | |

Average Active Efficiency



| Characteristic | Average Active Efficiency | | Units | Notes & Conditions |
|----------------|---------------------------|-----------------|-------|-------------------------------------------|
| | 115 V / 60 Hz | 230 VAC / 50 Hz | | |
| AHM150PS12 | 90.31 | 91.74 | % | As per Energy Star Level V test procedure |
| AHM150PS15 | 91.44 | 91.78 | | |
| AHM150PS19 | 92.00 | 92.52 | | |
| AHM150PS24 | 91.46 | 92.99 | | |
| AHM150PS48 | 92.38 | 92.85 | | |

Efficiency Versus Load

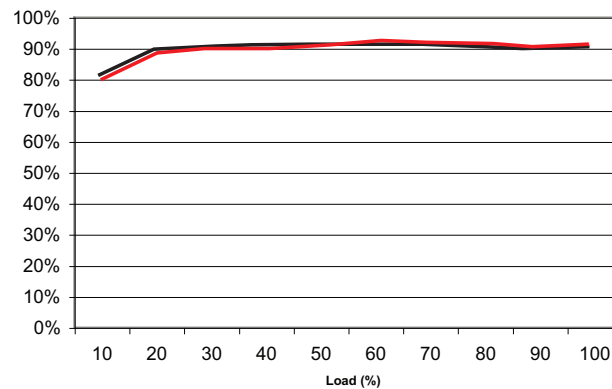


Figure 7 - AHM150PS12

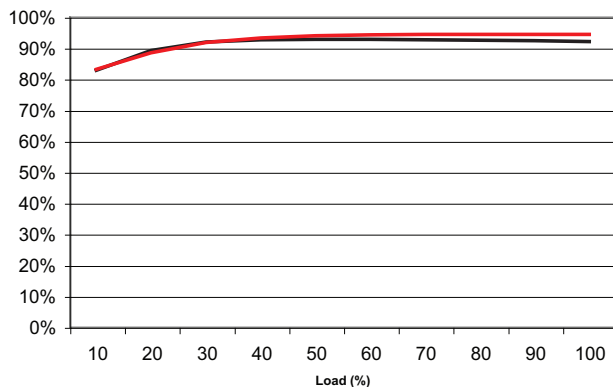


Figure 8 - AHM150PS24

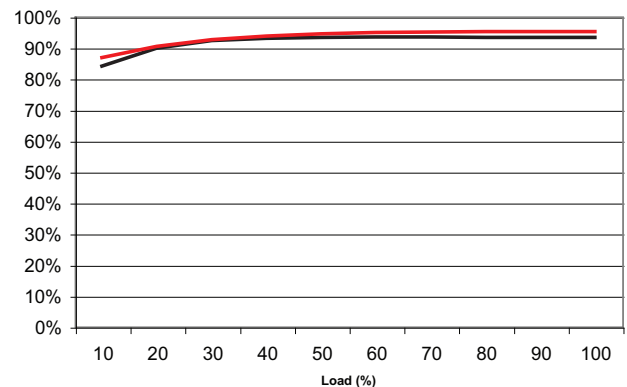
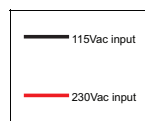


Figure 9 - AHM150PS48

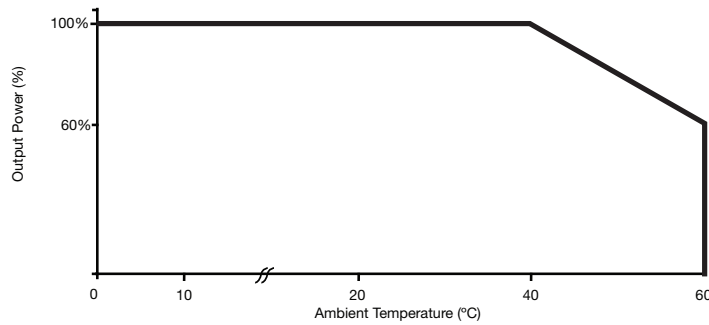


Environmental

| Characteristic | Minimum | Typical | Maximum | Units | Notes & Conditions |
|--------------------------------------------|---------|---------|---------|-------|--------------------------------------------------------------------------------------------------|
| Operating Temperature | 0 | | +60 | °C | Derate linearly to 60% load at 60 °C from +40 °C. (See fig.10) |
| Case Temperature (IEC60601 3rd Edition) | | | 71 | °C | 100% Load, with TAMB +40 °C |
| | | | 60 | | 70% Load Maximum, with TAMB +40 °C |
| | | | 48 | | 10% Load Maximum, with TAMB +40 °C |
| Storage Temperature | -40 | | +85 | °C | |
| Cooling | | | | | Convection cooled, see fig.10 |
| Humidity | 5 | | 95 | %RH | Non-condensing |
| Operating Altitude | | | 3000 | m | |
| Ingress Protection | IP22 | | | | |
| Shock | | | | | 3 x 30 g/11 ms shocks in both +ve & -ve directions along the 3 orthogonal axis, total 18 shocks. |
| Vibration | | | | | Three axis 5-500 Hz at 2 g x 10 sweeps |

Derating Curve

Figure 10



Electromagnetic Compatibility - Immunity

| Phenomenon | Standard | Test Level | Criteria | Notes & Conditions |
|------------------------|--------------|-------------------------|----------|-------------------------------------|
| Low Voltage PSU EMC | EN61204-3 | High severity level | as below | |
| Harmonic Current | EN61000-3-2 | Class A | | |
| ESD | EN61000-4-2 | 3 | A | |
| Radiated | EN61000-4-3 | 3 | A | |
| EFT | EN61000-4-4 | 3 | A | |
| Surges | EN61000-4-5 | Installation class 3 | A | |
| Conducted | EN61000-4-6 | 3 | A | |
| Magnetic Field | EN61000-4-8 | 3 | A | |
| Dips and Interruptions | EN61000-4-11 | Dip: 30% 500 ms | A | |
| | | Dip: 60% 200 ms | B | |
| | | Dip: 80% 5000 ms | A | |
| | | Dip: 100% 5000 ms | B | |
| | EN60601-1-2 | Dip: 30% 25 AC Cycles | A | 230 VAC 100% load, 100 VAC 80% load |
| | | Dip: 60% 5 AC Cycles | A | 230 VAC 100% load, 100 VAC 15% load |
| | | Dip: 100% 0.5 AC Cycles | A | |
| | | Int.: >95% 5000 ms | B | |

Electromagnetic Compatibility - Emissions

| Phenomenon | Standard | Test Level | Criteria | Notes & Conditions |
|----------------------|-------------|------------|----------|--------------------|
| Conducted | EN55011/22 | Class B | | |
| Radiated | EN55011/22 | Class B | | |
| Voltage Fluctuations | EN61000-3-3 | | | |

Safety Agency Approvals

| Safety Agency | Safety Standard | Category |
|---------------|-----------------------------------------------------------------------|------------------------|
| CB Report | Certificate # US/16498/UL IEC60950-1:2005 Ed 2 | Information Technology |
| UL | UL File #E139109-A62-UL UL60950-1 (2007), CSA 22.2 No.60950-1-07 Ed 2 | Information Technology |
| TUV | TUV Certificate # Z1A 11 02 57396 093, EN60950-1:2006 | Information Technology |
| Denan Japan | PSE Certificate | |
| CE | LVD | |

| Safety Agency | Safety Standard | Category |
|---------------|-------------------------------------------------------------------------------|----------|
| CB Report | Certificate #US/17207/UL, IEC60601-1 Ed 3 Including Risk Management | Medical |
| UL | UL File # E146893-V1-S9, ANSI/AAMI ES 60601-1:2005 & CSA C22.2 No. 60601-1:08 | Medical |
| TUV | TUV Certificate # B11 07 57396 105, EN60601-1:2006 | Medical |

| Means of Protection | | Category |
|----------------------|----------------------------------------|-----------------|
| Primary to Secondary | 2 x MOPP (Means of Patient Protection) | IEC60601-1 Ed 3 |
| Primary to Earth | 1 x MOPP (Means of Patient Protection) | |
| Secondary to Earth | 1 x MOPP (Means of Patient Protection) | |

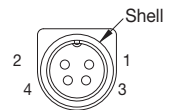
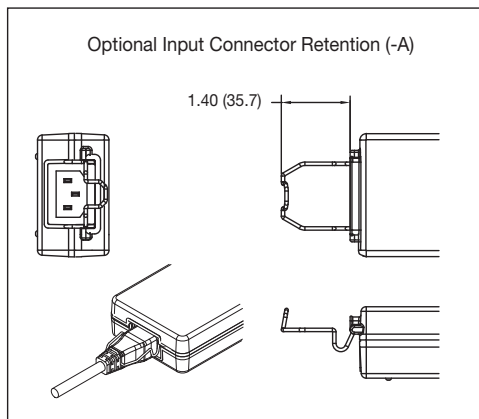
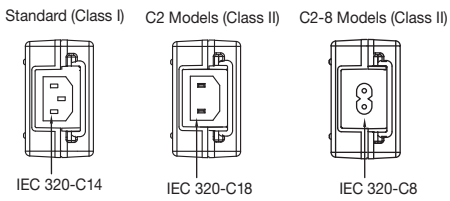
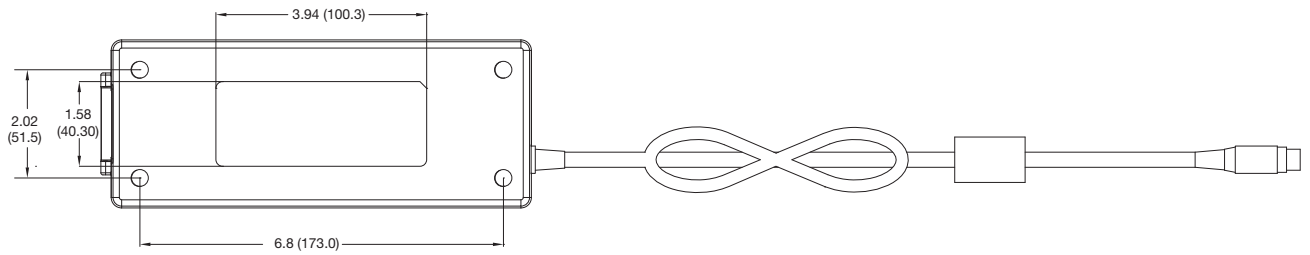
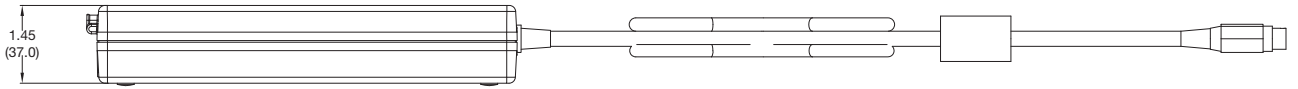
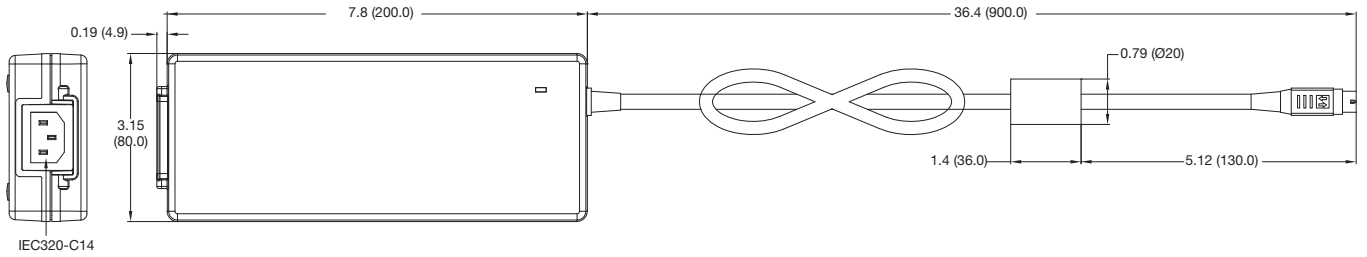
| Equipment Protection Class | Safety Standard | Notes & Conditions |
|----------------------------|----------------------------------------|-----------------------------------------------------------|
| Class I & Class II | IEC60950-1:2005 Ed 2 & IEC60601-1 Ed 3 | See safety agency conditions of acceptability for details |

Environmental Legislation

| Authority | Location | Date | Notes & Conditions |
|---------------|----------------|------|-------------------------|
| EISA | US | 2007 | |
| CEC | California, US | 2008 | |
| Energy Star | US | 2008 | Level V |
| ErP Directive | Europe | 2011 | Regulation No. 278/2009 |

Mechanical Details

Weight: 1.3 lbs (600 g)
 Dimensions shown in inches (mm).



| Output Connector equivalent to KPPX-4P (Non Locking) | |
|------------------------------------------------------|----------|
| Pin 1 | Output + |
| Pin 2 | Output + |
| Pin 3 | Return |
| Pin 4 | Return |
| Outer Shell | GND* |
| Outer Shell C2 Models | Floating |

* Functional earth.

AHM180 Series



- Medical & IT Safety Approvals
- Energy Star Level V
- CEC 2008 & EISA 2007 Compliant
- IP22 Environmental Rating
- Compact Format 7.90" x 3.15" x 1.61"
- <0.5 W Standby Power
- 180 W – Convection Cooled Ratings
- Class I & Class II Models
- 0 °C to +60 °C Operation
- Very Low Earth Leakage Current
- 3 Year Warranty

The AHM180 series of medical external power supplies is fully approved to international medical safety standards. It has been designed with very high efficiency and low standby power, enabling it to meet the latest environmental legislation. The unit has a fully sealed enclosure complying with IP22 and a smooth surface finish making it easier to wipe down in a clinical setting. With both medical & IT approvals the product is suitable for hospital, home healthcare, portable medical device applications and a wide range of IT applications.

Models and Ratings - Convection-cooled

| Output Power | Output Voltage V1 | Max Output Current | Model Number ⁽¹⁾ |
|--------------|-------------------|--------------------|-----------------------------|
| 165 W | 12.0 VDC | 13.75 A | AHM180PS12 |
| 180 W | 15.0 VDC | 12.00 A | AHM180PS15 |
| 180 W | 19.0 VDC | 9.47 A | AHM180PS19 |
| 180 W | 24.0 VDC | 7.50 A | AHM180PS24 |
| 180 W | 48.0 VDC | 3.75 A | AHM180PS48 |
| 165 W | 12.0 VDC | 13.50 A | AHM180PS12C2 |
| 180 W | 15.0 VDC | 12.00 A | AHM180PS15C2 |
| 180 W | 19.0 VDC | 9.47 A | AHM180PS19C2 |
| 180 W | 24.0 VDC | 7.50 A | AHM180PS24C2 |
| 180 W | 48.0 VDC | 3.75 A | AHM180PS48C2 |

Notes:
 1. For optional input connector retention clip, add suffix 'A' to the model number e.g. AHM180PS24-A. Models with suffix C2' have a class II equipment protection classification. For IEC320-C8 input connector with class II models, add suffix '8' to the model number, e.g. AHM180PS24C2-8.

Input Characteristics

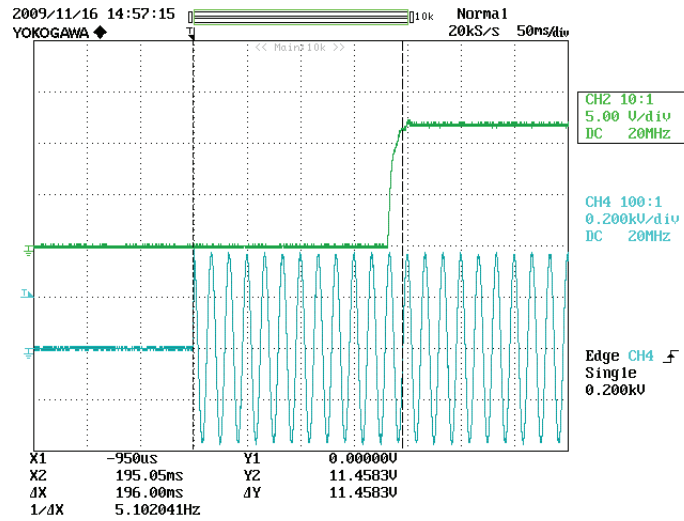
| Characteristic | Minimum | Typical | Maximum | Units | Notes & Conditions |
|---------------------------|-----------------------------------------|-----------|---------|-------|------------------------------------------------------------------------------------------|
| Input Voltage - Operating | 80 | 115/230 | 264 | VAC | Full power 90 VAC to 264 VAC. Derate output power linearly by 20% from 90 VAC to 80 VAC. |
| Input Frequency | 47 | 50/60 | 63 | Hz | |
| Power Factor | | >0.9 | | | EN61000-3-2 class A & D compliant & Energy Star Compliant |
| Input Current - No Load | | 0.08/0.05 | | A | 115/230 VAC |
| Input Current - Full Load | | 1.7/0.9 | | A | 115/230 VAC |
| Inrush Current | | 60-80 | 120 | A | 230 VAC cold start, 25 °C |
| No Load Input Power | | 0.3/0.4 | 0.5 | W | 115/230 VAC |
| Earth Leakage Current | | 50/100 | 200 | µA | 115 V 60 Hz/230 V 50 Hz (Typ.), 264 VAC/60 Hz (Max.) |
| | | 0.3/0.6 | | mA | 115/230 VAC/400 Hz |
| Input Protection | T4.0A/250 V internal fuse in both lines | | | | |

Output Characteristics

| Characteristic | Minimum | Typical | Maximum | Units | Notes & Conditions |
|----------------------------|---------|---------|-----------------|---------|--------------------------------------------------------------------------|
| Output Voltage - V1 | 12 | | 48 | VDC | See Models and Ratings table |
| Output Voltage Adjustment | | | | % | No user adjustment |
| Minimum Load | 0 | | | A | |
| Start Up Delay | | 200/100 | | ms | 115/230 VAC full load (see fig.1) |
| Hold Up Time | | 15 | | ms | 115/230 VAC full load (see fig.2) |
| Drift | | | ±0.2 | % | After 20 min warm up |
| Line Regulation | | | ±0.5 | % | 90-264 VAC (50% load) |
| Load Regulation | | | ±4 | % | 0←50→100% load. |
| Transient Response - V1 | | | 5 | % | Recovery within 1% in less than 500 µs for a 50-75% and 75-50% load step |
| Over/Undershoot - V1 | | 3 | | % | |
| Ripple & Noise | | <1 | 1.5 | % pk-pk | 20 MHz bandwidth with external circuit (see fig.3-6) |
| Overvoltage Protection | | 125 | | % | Vnom, Recycle AC to reset |
| | | 13.2 | 18 | VDC | AHM180PS12 & C2 |
| | | 16.5 | 22 | | AHM180PS15 & C2 |
| | | 20.9 | 28 | | AHM180PS19 & C2 |
| | | 26.4 | 33 | | AHM180PS24 & C2 |
| | 52.8 | 59 | AHM180PS48 & C2 | | |
| Overload Protection | | 115.0 | 175 | % | I nom, Auto reset |
| | | 16.5 | 23.4 | A | AHM180PS12 & C2 |
| | | 14.4 | 20.4 | | AHM180PS15 & C2 |
| | | 10.4 | 16.1 | | AHM180PS19 & C2 |
| | | 8.3 | 12.8 | | AHM180PS24 & C2 |
| | 4.5 | 6.4 | AHM180PS48 & C2 | | |
| Short Circuit Protection | | | | | Continuous, trip & restart (hiccup mode) |
| Temperature Coefficient | | | 0.05 | %/°C | |
| Overtemperature Protection | | | | °C | Connected to transformer. Auto reset. |

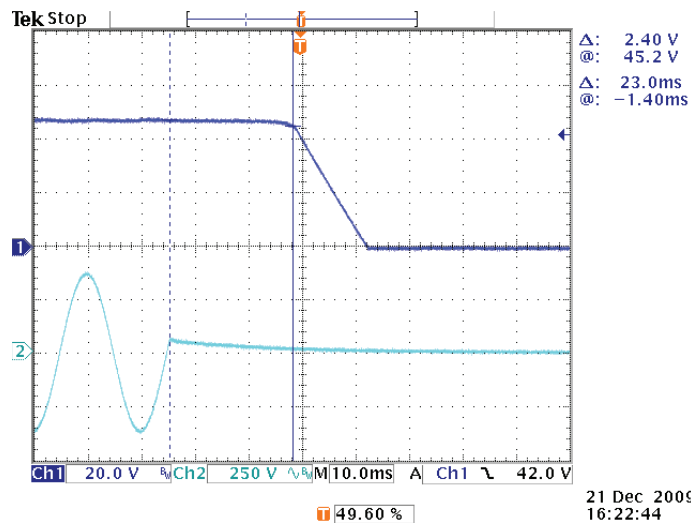
Start Up Delay From AC Turn On

Figure 1
Start up example from AC turn on
(230 VAC, 196 ms)



Hold Up Time From Loss of AC

Figure 2
Hold up example at 180 W load
with 230 VAC input (23 ms)



Ripple & Noise

Figure 3
AHM180PS12
Ripple & noise example at 165 W load
with 230 VAC input (50 mV)

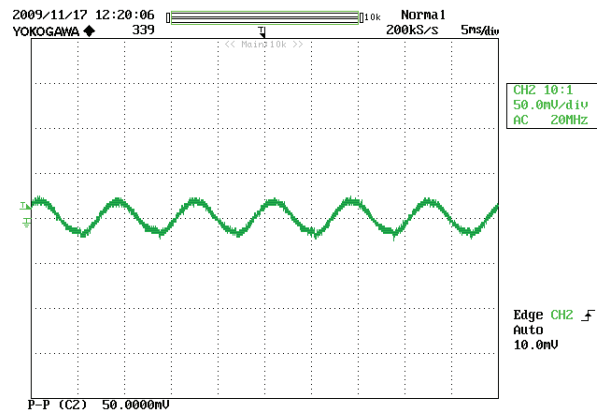


Figure 4
AHM180PS24
Ripple & noise example at 180 W load
with 230 VAC input (228 mV)

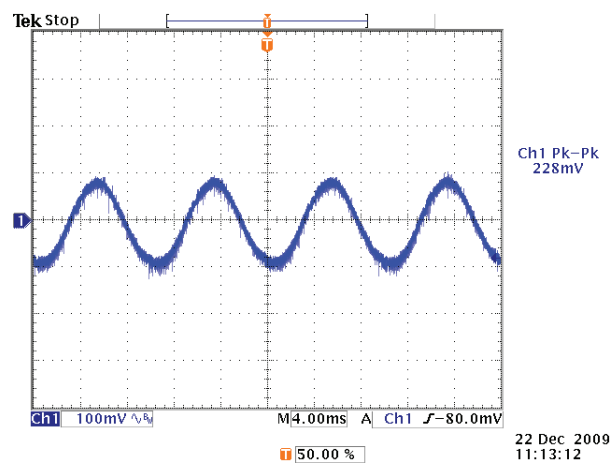


Figure 5
AHM180PS48
Ripple & noise example at 180 W load
with 230 VAC input (360 mV)

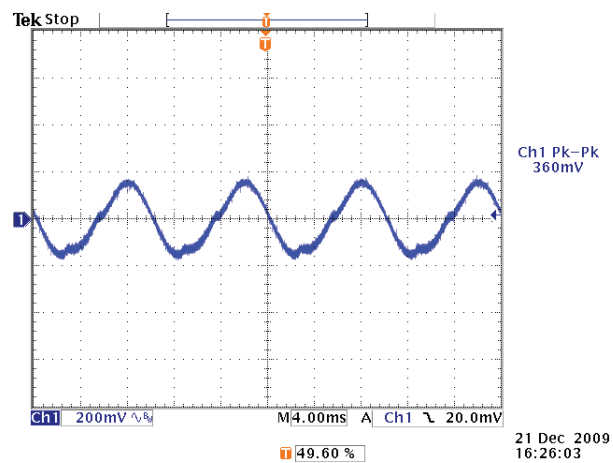
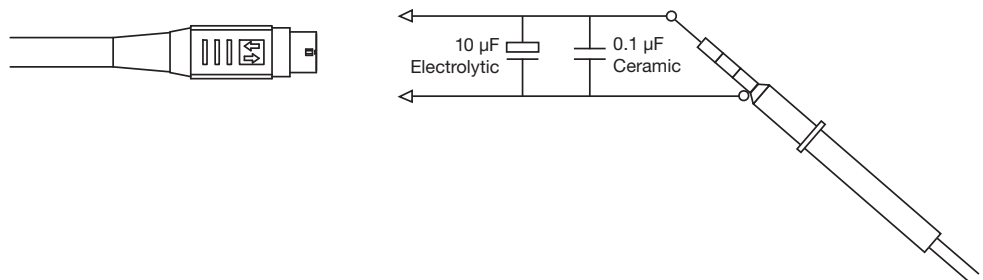


Figure 6
Ripple & noise measurement circuit



General Specifications

| Characteristic | Minimum | Typical | Maximum | Units | Notes & Conditions |
|-------------------------------------------------------------------|---------|-----------|---------|-------------------|-----------------------------------|
| Efficiency | | 92 | | % | Full load (see fig.7-9) |
| Isolation: Input to Output Input to Ground Output to Ground | 4000 | | | VAC | |
| | 1500 | | | VAC | |
| | 500 | | | VAC | |
| Switching Frequency | 30 | | 200 | kHz | PFC stage |
| | 90 | | 110 | | DC-DC stage |
| Power Density | | | 4.4 | W/in ³ | |
| Mean Time Between Failure | | 156 | | kHrs | MIL-HDBK-217F, Notice 2 +25 °C GB |
| Weight | | 1.4 (620) | | lb (g) | |

Average Active Efficiency



| Characteristic | Average Active Efficiency | | Units | Notes & Conditions |
|----------------|---------------------------|-----------------|-------|-------------------------------------------|
| | 115 V / 60 Hz | 230 VAC / 50 Hz | | |
| AHM180PS12 | 90.19 | 91.25 | % | As per Energy Star Level V test procedure |
| AHM180PS15 | 91.13 | 92.26 | | |
| AHM180PS19 | 91.28 | 92.44 | | |
| AHM180PS24 | 91.67 | 92.83 | | |
| AHM180PS48 | 92.11 | 93.12 | | |

Efficiency Versus Load

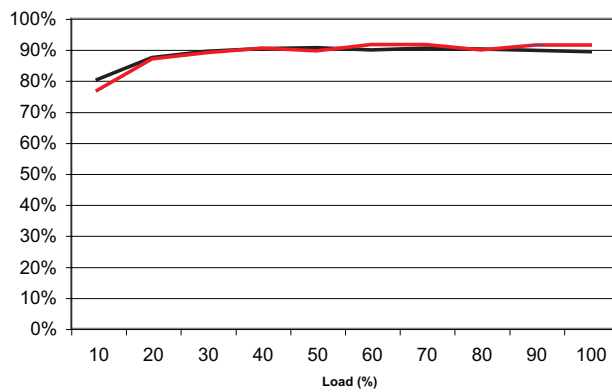


Figure 7 - AHM180PS12

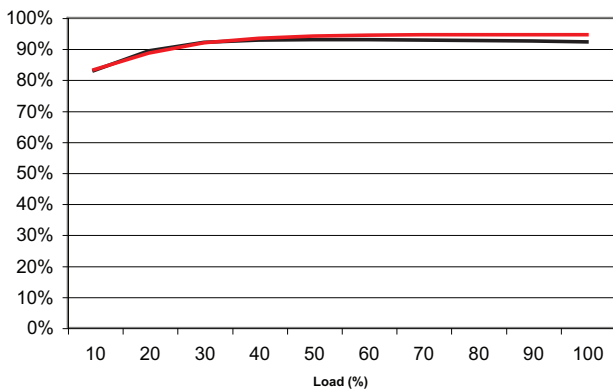


Figure 8 - AHM180PS24

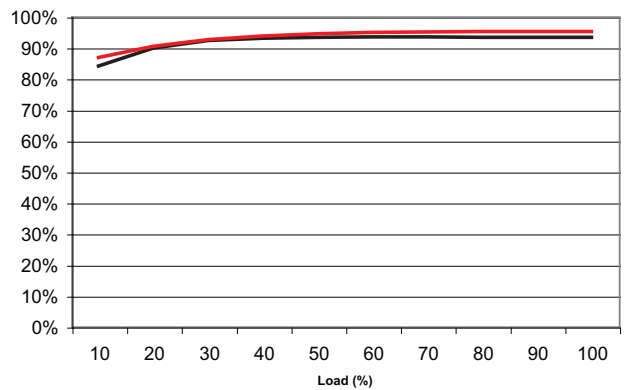
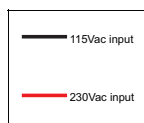


Figure 9 - AHM180PS48

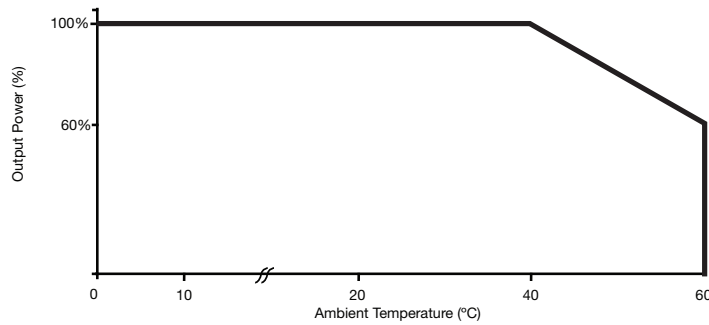


Environmental

| Characteristic | Minimum | Typical | Maximum | Units | Notes & Conditions |
|--------------------------------------------|---------|---------|---------|-------|--------------------------------------------------------------------------------------------------|
| Operating Temperature | 0 | | +60 | °C | Derate linearly to 60% load at 60 °C from +40 °C. (See fig.10) |
| Case Temperature (IEC60601 3rd Edition) | | | 71 | °C | 100% Load, with TAMB +40 °C |
| | | | 60 | | 60% Load Maximum, with TAMB +40 °C |
| | | | 48 | | 5% Load Maximum, with TAMB +40 °C |
| Storage Temperature | -40 | | +85 | °C | |
| Cooling | | | | | Convection cooled, see fig.10 |
| Humidity | 5 | | 95 | %RH | Non-condensing |
| Operating Altitude | | | 3000 | m | |
| Ingress Protection | IP22 | | | | |
| Shock | | | | | 3 x 30 g/11 ms shocks in both +ve & -ve directions along the 3 orthogonal axis, total 18 shocks. |
| Vibration | | | | | Three axis 5-500 Hz at 2 g x 10 sweeps |

Derating Curve

Figure 10



Electromagnetic Compatibility - Immunity

| Phenomenon | Standard | Test Level | Criteria | Notes & Conditions |
|------------------------|--------------|-------------------------|----------|-------------------------------------|
| Low Voltage PSU EMC | EN61204-3 | High severity level | as below | |
| Harmonic Current | EN61000-3-2 | Class A | | |
| ESD | EN61000-4-2 | 3 | A | |
| Radiated | EN61000-4-3 | 3 | A | |
| EFT | EN61000-4-4 | 3 | A | |
| Surges | EN61000-4-5 | Installation class 3 | A | |
| Conducted | EN61000-4-6 | 3 | A | |
| Magnetic Field | EN61000-4-8 | 3 | A | |
| Dips and Interruptions | EN61000-4-11 | Dip: 30% 500 ms | A | |
| | | Dip: 60% 200 ms | B | |
| | | Dip: 80% 5000 ms | A | |
| | | Dip: 100% 5000 ms | B | |
| | EN60601-1-2 | Dip: 30% 25 AC Cycles | A | 230 VAC 100% load, 100 VAC 80% load |
| | | Dip: 60% 5 AC Cycles | A | 230 VAC 100% load, 100 VAC 80% load |
| | | Dip: 100% 0.5 AC Cycles | A | |
| | | Int.: >95% 5000 ms | B | |

Electromagnetic Compatibility - Emissions

| Phenomenon | Standard | Test Level | Criteria | Notes & Conditions |
|----------------------|-------------|------------|----------|--------------------|
| Conducted | EN55011/22 | Class B | | |
| Radiated | EN55011/22 | Class B | | |
| Voltage Fluctuations | EN61000-3-3 | | | |

Safety Agency Approvals

| Safety Agency | Safety Standard | Category |
|---------------|------------------------------------------------------------------------|------------------------|
| CB Report | Certificate # US/16502/UL EC60950-1:2005 Ed 2 | Information Technology |
| UL | UL File # E139109-A48-UL UL60950-1 (2007), CSA 22.2 No.60950-1-07 Ed 2 | Information Technology |
| TUV | TUV Certificate # Z1A 11 02 57396 094, EN60950-1:2006 | Information Technology |
| Denan Japan | PSE Certificate | |
| CE | LVD | |

| Safety Agency | Safety Standard | Category |
|---------------|--------------------------------------------------------------------------------|----------|
| CB Report | Certificate #US/17220/UL, IEC60601-1 Ed 3 Including Risk Management | Medical |
| UL | UL File # E146893-V1-S10, ANSI/AAMI ES 60601-1:2005 & CSA C22.2 No. 60601-1:08 | Medical |
| TUV | TUV Certificate # B11 07 57396 104, EN60601-1:2006 | Medical |

| Means of Protection | | Category |
|----------------------|----------------------------------------|-----------------|
| Primary to Secondary | 2 x MOPP (Means of Patient Protection) | IEC60601-1 Ed 3 |
| Primary to Earth | 1 x MOPP (Means of Patient Protection) | |
| Secondary to Earth | 1 x MOPP (Means of Patient Protection) | |

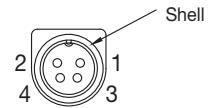
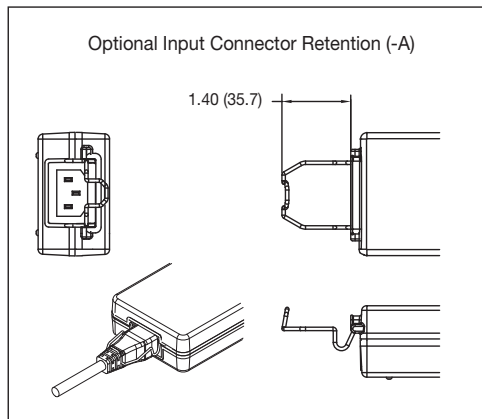
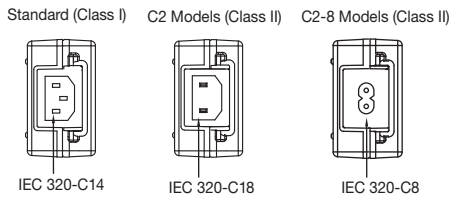
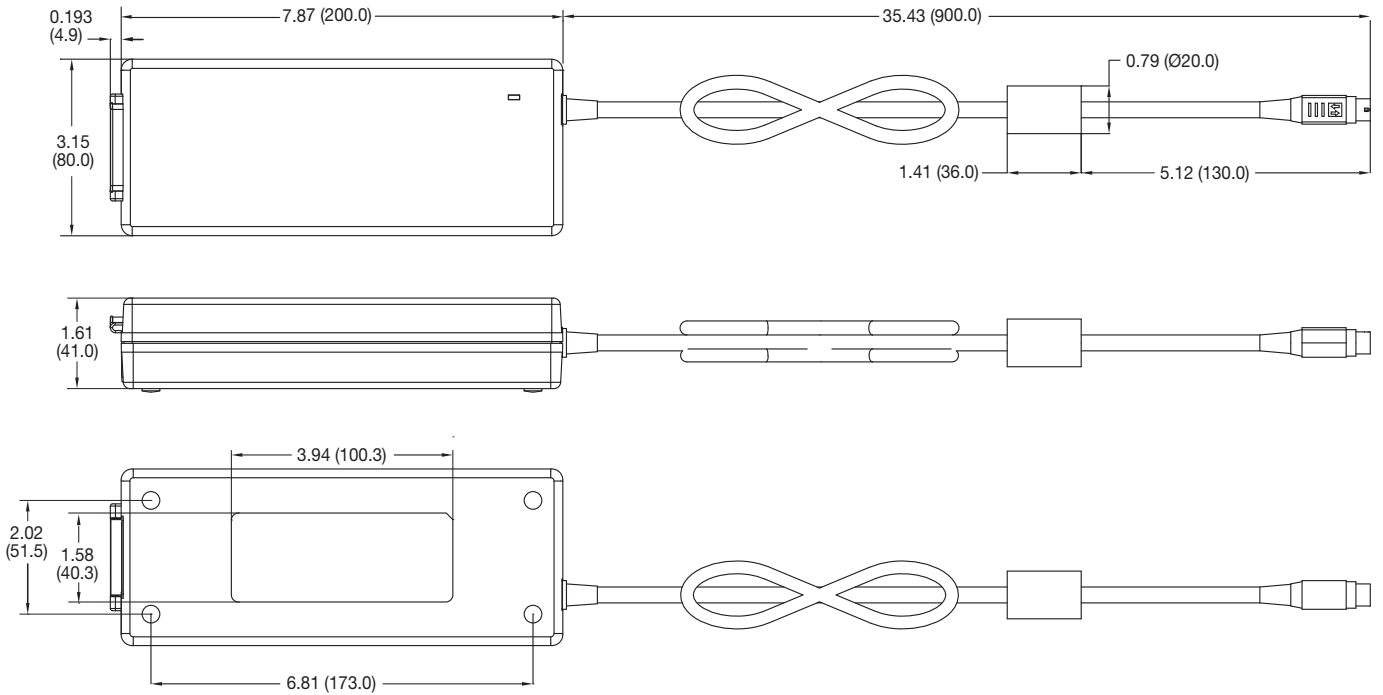
| Equipment Protection Class | Safety Standard | Notes & Conditions |
|----------------------------|----------------------------------------|-----------------------------------------------------------|
| Class I & Class II | IEC60950-1:2005 Ed 2 & IEC60601-1 Ed 2 | See safety agency conditions of acceptability for details |

Environmental Legislation

| Authority | Location | Date | Notes & Conditions |
|---------------|----------------|------|-------------------------|
| EISA | US | 2007 | |
| CEC | California, US | 2008 | |
| Energy Star | US | 2008 | Level V |
| ErP Directive | Europe | 2011 | Regulation No. 278/2009 |

Mechanical Details

Weight: 1.1 lbs (500 g)
 Dimensions shown in inches (mm).



| Output Connector equivalent to KPPX-4P (Non Locking) | |
|------------------------------------------------------|----------|
| Pin 1 | Output + |
| Pin 2 | Output + |
| Pin 3 | Return |
| Pin 4 | Return |
| Outer Shell | GND* |
| Outer Shell C2 Models | Floating |

* Functional earth.

AHM250 Series



- Medical & IT Safety Approvals
- Energy Star Level V
- CEC 2008 & EISA 2007 Compliant
- IP22 Environmental Rating
- Compact Format 8.60" x 3.50" x 1.46"
- <0.5 W Standby Power
- 250 W – Convection Cooled Ratings
- IEC Input Cable Retention (Optional)
- 0 °C to +60 °C Operation
- Very Low Earth Leakage Current
- 3 Year Warranty

The AHM250 series of medical external power supplies is fully approved to international medical safety standards. It has been designed with very high efficiency and low standby power, enabling it to meet the latest environmental legislation. The unit has a fully sealed enclosure complying with IP22 and a smooth surface finish making it easier to wipe down in a clinical setting. With both medical & IT approvals the product is suitable for hospital, home healthcare, portable medical device applications and a wide range of IT applications.

Models and Ratings - Convection-cooled

| Output Power | Output Voltage V1 | Max Output Current | Model Number |
|--------------|-------------------|--------------------|--------------|
| 210 W | 12.0 VDC | 17.50 A | AHM250PS12T |
| 220 W | 15.0 VDC | 14.66 A | AHM250PS15T |
| 240 W | 19.0 VDC | 12.63 A | AHM250PS19T |
| 250 W | 24.0 VDC | 10.41 A | AHM250PS24T |
| 250 W | 48.0 VDC | 5.21 A | AHM250PS48T |

Notes:

1. For optional input connector retention clip, add suffix '-A' to the model number e.g. AHM250PS24T-A.
2. For 6 pin DIN connector, remove 'T' from the end of the model number e.g. AHM250PS24 (DIN connector for medical applications only).

Input Characteristics

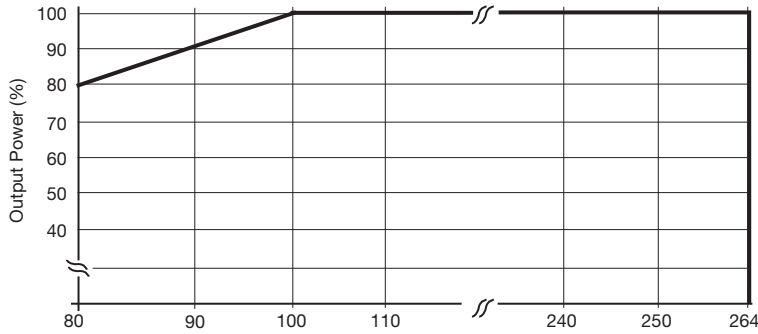
| Characteristic | Minimum | Typical | Maximum | Units | Notes & Conditions |
|---------------------------|-----------------------------------------|-----------|---------|---------|-----------------------------------------------------------|
| Input Voltage - Operating | 80 | 115/230 | 264 | VAC | Derate <100 VAC (see fig. 1) |
| Input Frequency | 47 | 50/60 | 63 | Hz | |
| Power Factor | | >0.9 | | | EN61000-3-2 class A & D compliant & Energy Star Compliant |
| Input Current - No Load | | 0.09/0.10 | | A | 115/230 VAC |
| Input Current - Full Load | | 2.3/1.2 | | A | 115/230 VAC |
| Inrush Current | | 60-80 | 120 | A | 230 VAC cold start, 25 μ C |
| No Load Input Power | | 0.3/0.35 | 0.5 | W | 115/230 VAC |
| Earth Leakage Current | | 60/120 | 200 | μ A | 115 V 60 Hz/230 V 50 Hz (Typ.), 264 VAC/60 Hz (Max.) |
| | | 0.4/0.8 | | mA | 115/230 VAC/400 Hz |
| Input Protection | T6.3A/250 V internal fuse in both lines | | | | |

Output Characteristics

| Characteristic | Minimum | Typical | Maximum | Units | Notes & Conditions |
|----------------------------|---------|---------|-----------|-----------------|-------------------------------------------------------------------------------|
| Output Voltage - V1 | 12 | | 48 | VDC | See Models and Ratings table |
| Output Voltage Adjustment | | | | % | No user adjustment |
| Minimum Load | 0 | | | A | |
| Start Up Delay | | 300/200 | | ms | 115/230 VAC full load (see fig.2) |
| Hold Up Time | | 15 | | ms | 115/230 VAC full load (see fig.3) |
| Drift | | | \pm 0.2 | % | After 20 min warm up |
| Line Regulation | | | \pm 0.5 | % | 90-264 VAC (50% load) |
| Load Regulation | | | \pm 4 | % | 0 \leftarrow 50 \rightarrow 100% load. |
| Transient Response - V1 | | | 5 | % | Recovery within 1% in less than 500 μ s for a 50-75% and 75-50% load step |
| Over/Undershoot - V1 | | 3 | | % | |
| Ripple & Noise | | <1 | 1.5 | % pk-pk | 20 MHz bandwidth with external circuit (see fig.4-7) |
| Overvoltage Protection | | 125 | | % | Vnom, Recycle AC to reset |
| | | 13.2 | 18 | VDC | AHM250PS12 |
| | | 16.5 | 22 | | AHM250PS15 |
| | | 21.0 | 28 | | AHM250PS19 |
| | | 26.4 | 33 | | AHM250PS24 |
| | | 52.8 | 59 | | AHM250PS48 |
| Overload Protection | | 115.0 | 175 | | % |
| | | 21.0 | 29.8 | A | AHM250PS12 |
| | | 17.6 | 26.3 | | AHM250PS15 |
| | | 15.2 | 21.5 | | AHM250PS19 |
| | | 11.5 | 17.7 | | AHM250PS24 |
| | | 5.7 | 8.9 | | AHM250PS48 |
| Short Circuit Protection | | | | | |
| Temperature Coefficient | | | 0.05 | %/ $^{\circ}$ C | |
| Overtemperature Protection | | | | $^{\circ}$ C | Connected to transformer. Auto reset. |

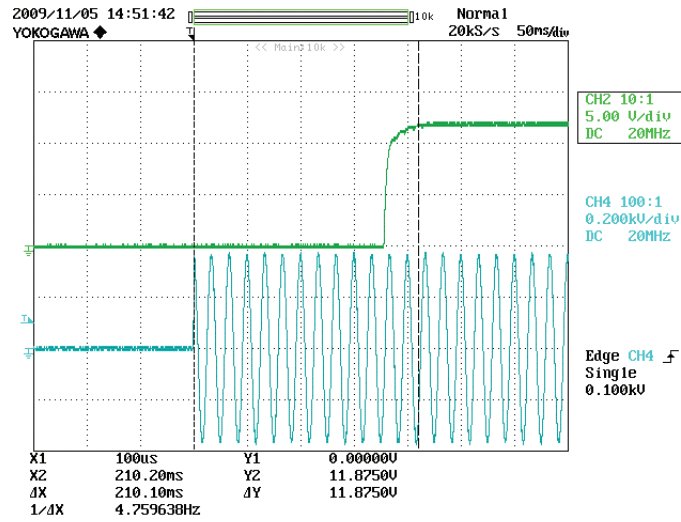
Derating Curve

Figure 1



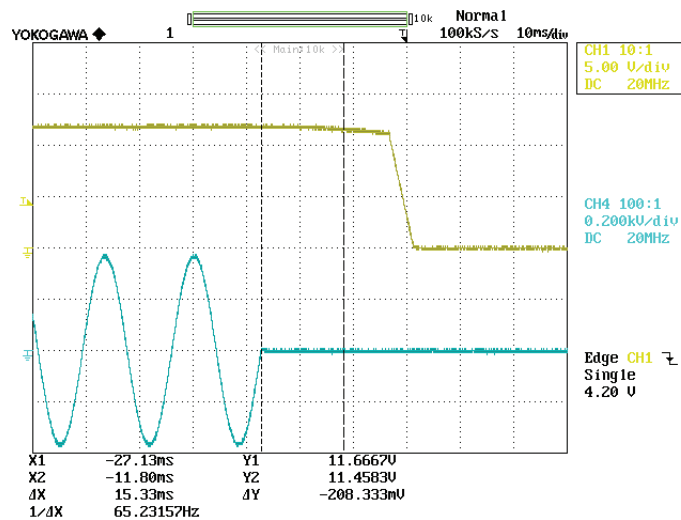
Start Up Delay From AC Turn On

Figure 2
Start up example from AC turn on
(230 VAC, 210 ms)



Hold Up Time From Loss of AC

Figure 3
Hold up example at 250 W load
with 230 VAC input (15 ms)



Ripple & Noise

Figure 4
AHM250PS12
Ripple & noise example at 210 W load
with 230 VAC input (50 mV)

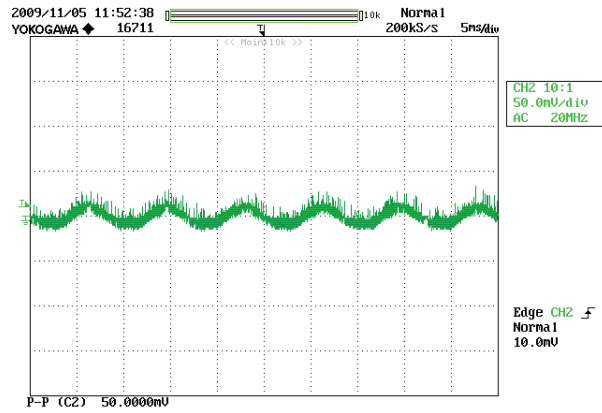


Figure 5
AHM250PS24
Ripple & noise example at 250 W load
with 230 VAC input (100 mV)

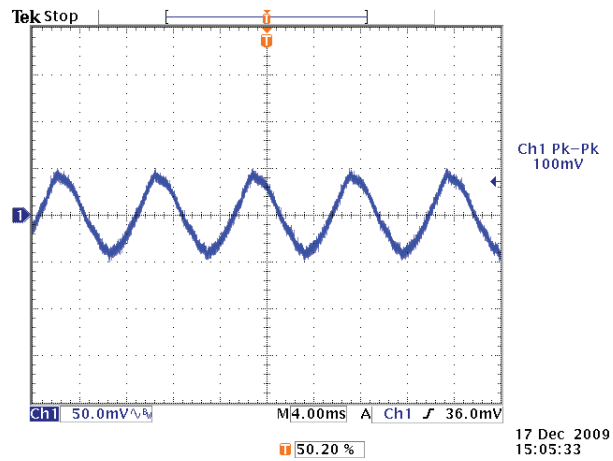


Figure 6
AHM250PS48
Ripple & noise example at 250 W load
with 230 VAC input (180 mV)

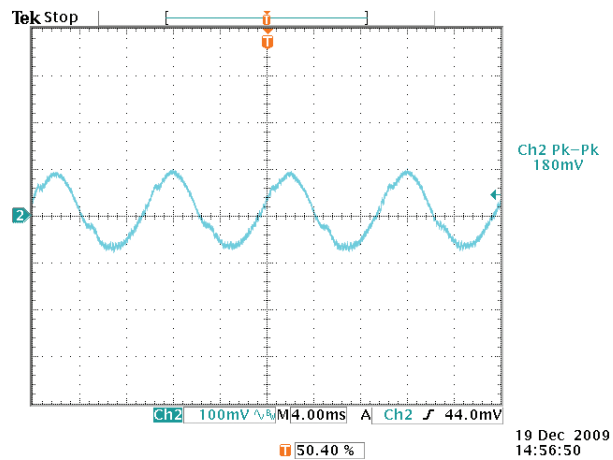
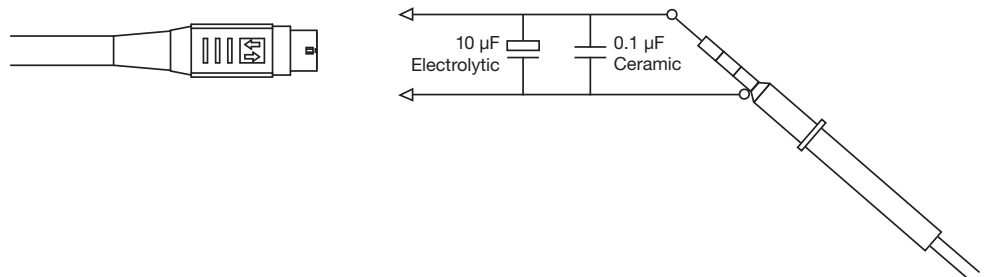


Figure 7
Ripple & noise measurement circuit



General Specifications

| Characteristic | Minimum | Typical | Maximum | Units | Notes & Conditions |
|-------------------------------------------------------------------|---------|------------|---------|-------------------|-----------------------------------|
| Efficiency | | 92 | | % | Full load (see fig.8-10) |
| Isolation: Input to Output Input to Ground Output to Ground | 4000 | | | VAC | |
| | 1500 | | | VAC | |
| | 500 | | | VAC | |
| Switching Frequency | 40 | | 220 | kHz | PFC stage |
| | 80 | | 150 | | DC-DC stage |
| Power Density | | | 5.7 | W/in ³ | |
| Mean Time Between Failure | | 151 | | kHrs | MIL-HDBK-217F, Notice 2 +25 °C GB |
| Weight | | 2.1 (1000) | | lb (g) | |

Average Active Efficiency



| Characteristic | Average Active Efficiency | | Units | Notes & Conditions |
|----------------|---------------------------|-----------------|-------|-------------------------------------------|
| | 115 V / 60 Hz | 230 VAC / 50 Hz | | |
| AHM250PS12 | 89.16 | 89.67 | % | As per Energy Star Level V test procedure |
| AHM250PS15 | 90.05 | 90.71 | | |
| AHM250PS19 | 89.65 | 90.76 | | |
| AHM250PS24 | 91.85 | 92.20 | | |
| AHM250PS48 | 91.32 | 92.46 | | |

Efficiency Versus Load

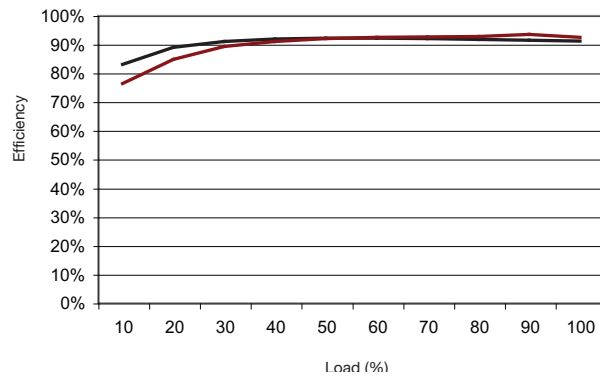


Figure 8 - AHM250PS12

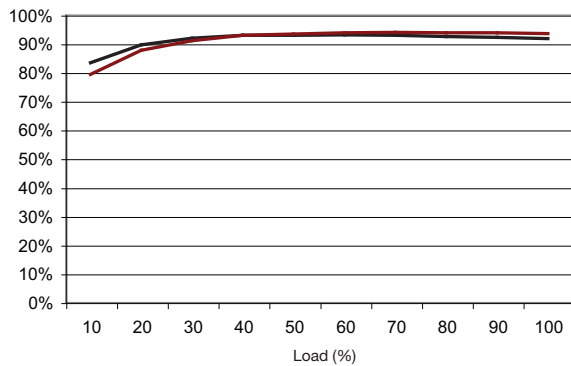


Figure 9 - AHM250PS24

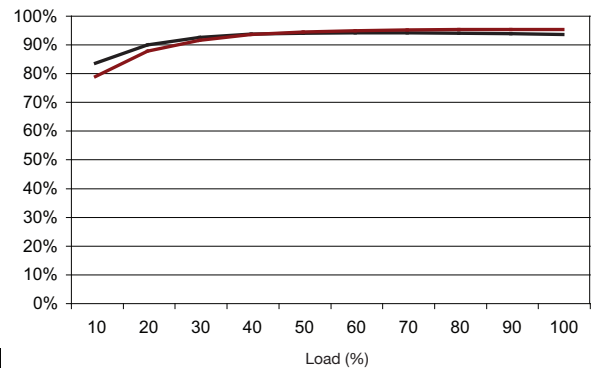
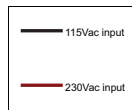


Figure 10 - AHM250PS48

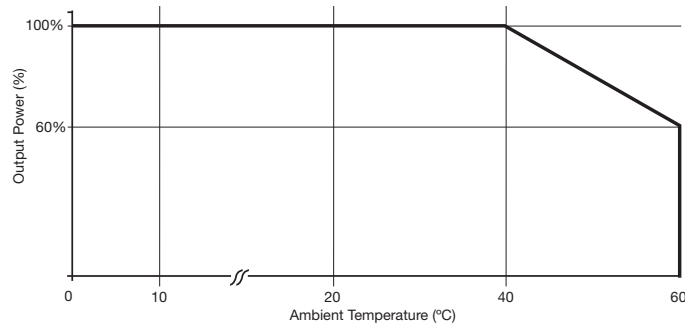


Environmental

| Characteristic | Minimum | Typical | Maximum | Units | Notes & Conditions |
|--------------------------------------------|---------|---------|---------|-------|--------------------------------------------------------------------------------------------------|
| Operating Temperature | 0 | | +60 | °C | Derate linearly to 60% load at 60 °C from +40 °C. (See fig.11) |
| Case Temperature (IEC60601 3rd Edition) | | | 86 | °C | 100% load with TAMB +40 °C |
| | | | 71 | | 80% Load, with TAMB +40 °C |
| | | | 60 | °C | 60% Load Maximum, with TAMB +40 °C |
| | | | 48 | | 5% Load Maximum, with TAMB +40 °C |
| Storage Temperature | -40 | | +85 | °C | |
| Cooling | | | | | Convection cooled, see fig.11 |
| Humidity | 5 | | 95 | %RH | Non-condensing |
| Operating Altitude | | | 3000 | m | |
| Ingress Protection | IP22 | | | | |
| Shock | | | | | 3 x 30 g/11 ms shocks in both +ve & -ve directions along the 3 orthogonal axis, total 18 shocks. |
| Vibration | | | | | Three axis 5-500 Hz at 2 g x 10 sweeps |

Derating Curve

Figure 11



Electromagnetic Compatibility - Immunity

| Phenomenon | Standard | Test Level | Criteria | Notes & Conditions |
|------------------------|---------------------------|----------------------|----------|-------------------------------------|
| Low Voltage PSU EMC | EN61204-3 | High severity level | as below | |
| Harmonic Current | EN61000-3-2 | Class A | | |
| ESD | EN61000-4-2 | 3 | A | |
| Radiated | EN61000-4-3 | 3 | A | |
| EFT | EN61000-4-4 | 3 | A | |
| Surges | EN61000-4-5 | Installation class 3 | A | |
| Conducted | EN61000-4-6 | 3 | A | |
| Magnetic Field | EN61000-4-8 | 3 | A | |
| Dips and Interruptions | EN55024 (EN61000-4-11) | Dip: 30% 500 ms | A | |
| | | Dip: >95% 10 ms | A | |
| | | Int: >95% 5000 ms | B | |
| | EN60601-1-2 | Dip: 30% 500 ms | A | 230 VAC 100% load, 100 VAC 60% load |
| | | Dip: 60% 100 ms | A | 230 VAC 100% load, 100 VAC 15% load |
| | | Dip: >95% 10 ms | A | |
| | | Int.: >95% 5000 ms | B | |

Electromagnetic Compatibility - Emissions

| Phenomenon | Standard | Test Level | Criteria | Notes & Conditions |
|----------------------|-------------|------------|----------|--------------------|
| Conducted | EN55011/22 | Class B | | |
| Radiated | EN55011/22 | Class B | | |
| Voltage Fluctuations | EN61000-3-3 | | | |

Safety Agency Approvals

| Safety Agency | Safety Standard | Category |
|---------------|-----------------------------------------------------------|------------------------|
| CB Report | UL TBA IEC60950-1:2005 Ed 2 | Information Technology |
| UL | UL File TBA UL60950-1 (2007), CSA 22.2 No.60950-1-07 Ed 2 | Information Technology |
| TUV | TUV Certificate # TBA, EN60950-1:2006 | Information Technology |
| Denan Japan | PSE Certificate | |
| CE | LVD | |

| Safety Agency | Safety Standard | Category |
|---------------|-------------------------------------------------------------------------|----------|
| CB Report | Certificate #US/18020/UL, IEC60601-1 Ed 3 Including Risk Management | Medical |
| UL | UL File # E146893, ANSI/AAMI ES 60601-1:2005 & CSA C22.2 No. 60601-1:08 | Medical |
| TUV | TUV Certificate # Z11 11 57396 116, EN60601-1:2006 | Medical |

| Means of Protection | | Category |
|----------------------|----------------------------------------|-----------------|
| Primary to Secondary | 2 x MOPP (Means of Patient Protection) | IEC60601-1 Ed 3 |
| Primary to Earth | 1 x MOPP (Means of Patient Protection) | |
| Secondary to Earth | 1 x MOPP (Means of Patient Protection) | |

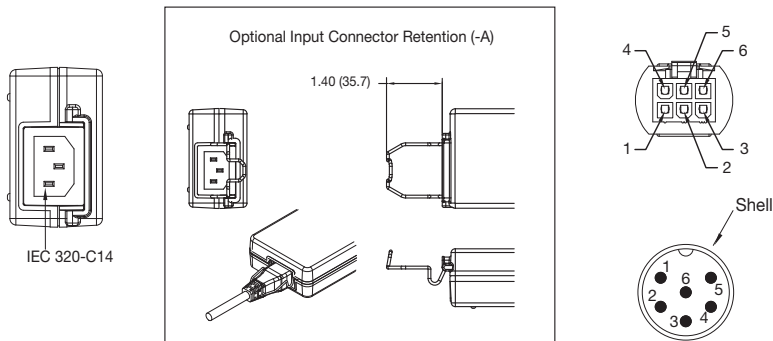
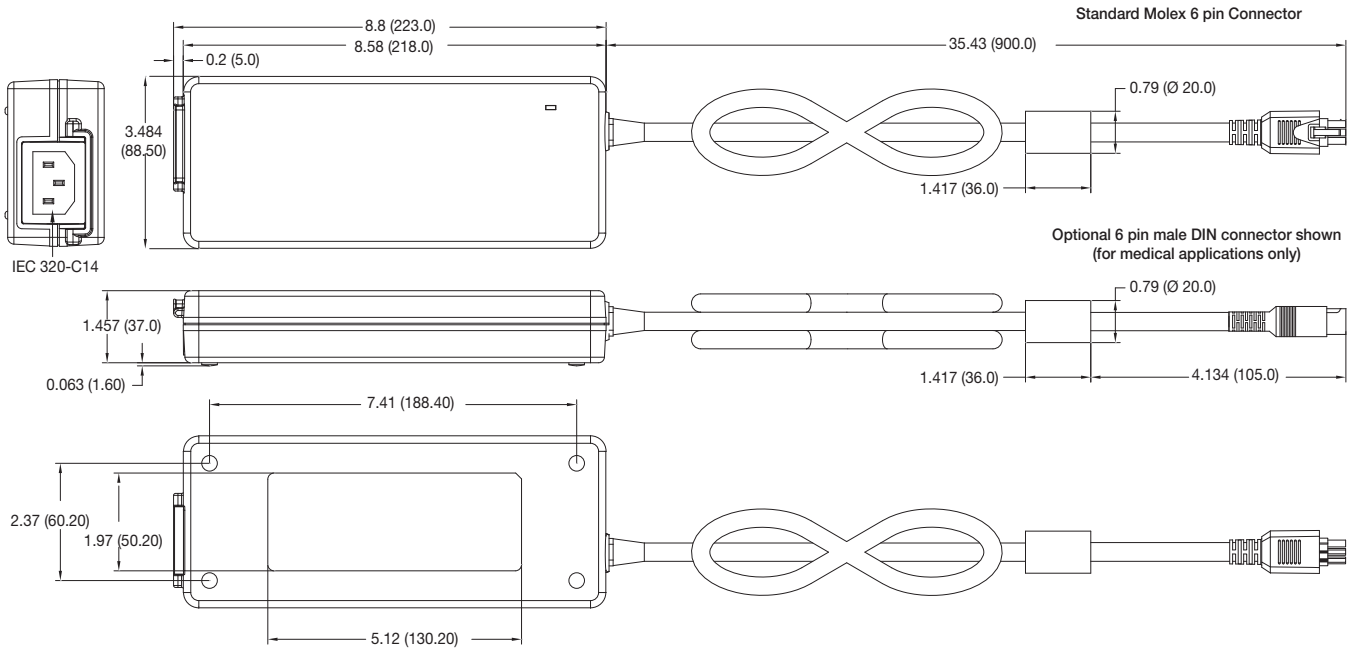
| Equipment Protection Class | Safety Standard | Notes & Conditions |
|----------------------------|----------------------------------------|-----------------------------------------------------------|
| Class I | IEC60950-1:2005 Ed 2 & IEC60601-1 Ed 3 | See safety agency conditions of acceptability for details |

Environmental Legislation

| Authority | Location | Date | Notes & Conditions |
|---------------|----------------|------|-------------------------|
| EISA | US | 2007 | |
| CEC | California, US | 2008 | |
| Energy Star | US | 2008 | Level V |
| ErP Directive | Europe | 2011 | Regulation No. 278/2009 |

Mechanical Details

Weight: 2.2 lbs (1000 g)
 Dimensions shown in inches (mm).



| OUTPUT CONNECTOR | | |
|------------------|---------------------------|-------------------------|
| Pin No. | Molex Type ⁽³⁾ | DIN Type ⁽⁴⁾ |
| Pin 1 | Return | Output + |
| Pin 2 | Return | Return |
| Pin 3 | Return | Return |
| Pin 4 | Output + | Return |
| Pin 5 | Output + | Output + |
| Pin 6 | Output + | Output + |
| Outer Shell | | GND* |

Notes

- Dimensions shown in inches (mm). Tolerance is 0.02 (0.5) maximum, except output cable length.
 - Weight 2.2 lbs (1000 g).
 - Molex part no. 39-03-9062 mates with Molex part no. 39-30-1062 or equivalent.
 - Equivalent to DIN45322 (6 pin at 60°) Male.
- * Functional earth.