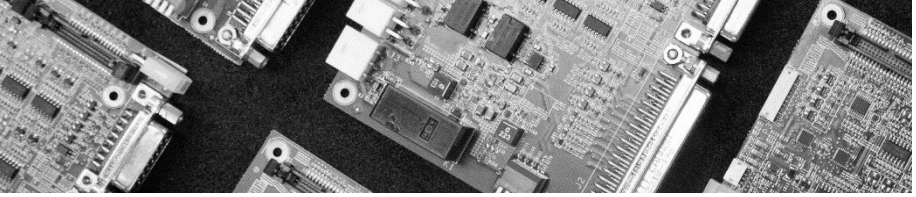


ASM400S / BSM400S

400W HIGH DENSITY MEDICAL / INDUSTRIAL GRADE OPEN FRAME POWER SUPPLIES

The Astrodyne ASM (Class I input) and BSM (Class II input) 400 Series open frame power supplies are designed for medical applications. They operate over an input voltage range of 90 to 264 VAC, produce 400 Watts of regulated DC output power, and have 2 MOPP isolation and BF leakage current (select models having CF leakage versions). These power supplies are certified to be compliant with the latest edition of the international medical safety standard, IEC 60601-1 3rd Edition using the CB reporting scheme, as well as to be compliant with the collateral standard 60601-1-2 for EMC. The product label has the UL Recognized component marks for North America and the EU and the CE mark.

HOW TO ORDER

A(B)SM400S-12-00C

- C = CF LEAKAGE
- BLANK = BOTH AUXILIARY BOARDS (5V AND 12V)
  A1 = ONLY 12V AUXILIARY BOARD
  00 = NO AUXILIARY BOARD
- DC OUTPUT (2 CHARACTERS)
  12 = 12V
  15 = 15V
  19 = 19.6V
  24 = 24V
  28 = 28V
  36 = 36V
  48 = 48V
  54 = 54V
- INPUT CLASS/PRODUCT FAMILY (A OR B)
  A: ASM CLASS I INPUT
  B: BSM CLASS II INPUT

FEATURES

UNIVERSAL AC INPUT
90-264 VAC INPUT, 50 / 60 Hz

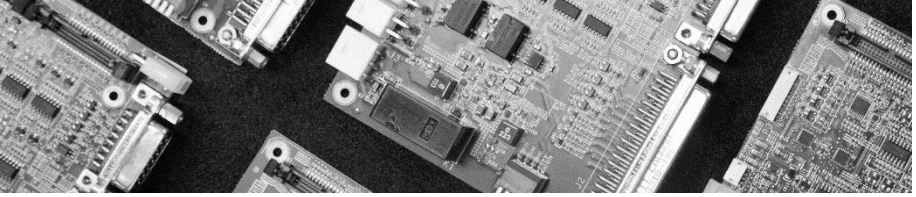
OUTPUT
400 Watts forced air / 200 Watts natural convection
Single output with 5V Auxiliary and 12V fan output
Voltages from 12V to 54V

HIGH EFFICIENCY
Up to 92% @ 230Vac

HIGH POWER DENSITY
Up to 19W / Inch^3

OPERATING TEMPERATURE
-20 to +40°C at Full Load with derating

AGENCY APPROVALS
AAMI ES60601-1: 2005 A1 2012
CSA 22.2 60601-1 2014
EN60601-1: 2006 3rd Edition A1 2013
CB Scheme IEC 60601-1: 2005 A1 2012
EN60601-1-2 Class B, EN55011 / A1 Class B
2 MOPP
Class 2 for home use medical applications (BSM400)



ASM400S / BSM400S

400W HIGH DENSITY MEDICAL / INDUSTRIAL GRADE OPEN FRAME POWER SUPPLIES

INPUT SPECIFICATIONS

All Specifications are typical at nominal input, full load, 25°C unless specified otherwise.

Input Voltage Range	90-264 VAC
Range of Nominal Input Voltages	100-240 VAC
Input Frequency	47-63 Hz (50 / 60 Hz Nom.)
Input Current	4.5 A Max at 115VAC 2.5A Max at 230VAC
Inrush Current	30A Max at 115VAC, 60 Hz 60A Max at 230VAC, 50 Hz
Earth Leakage Current ASM400S	300uA Max at 264VAC, 50Hz
Patient Leakage BF ****CF Leakage options***	100uA Max at 264VAC, 50Hz **Designated voltages will meet CF Class B EMC, Class I or II input* *48V and 54V models will meet CF Class A EMC, Class I or II input*
Input Fusing	8A fuse in both L and N lines
Power Factor	0.95 min., 230VAC 50Hz

OUTPUT SPECIFICATIONS

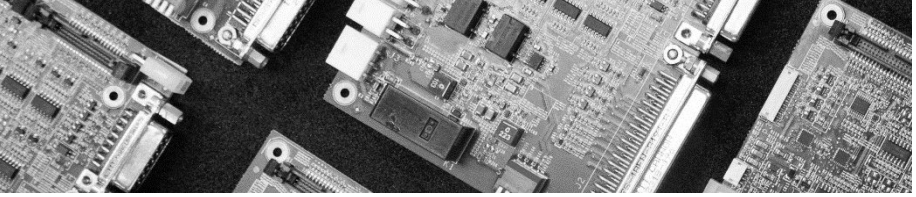
Output Voltage	12*V, 15*V, 19.6*, 24*V, 28*V, 36*V, 48V or 54V nominal
Output Power	400 W Continuous – See temp. & Airflow derating curves
Minimum Load	No minimum load required
Set Point Accuracy	± 1%
Load Regulation	± 1% Max, 0 to Full Load
Line Regulation	± 0.5% Max, 90 to 264 VAC
Temp. Drift	± 0.025 % / °C
Transient Response Excursion	Less than ± 5% 50 to 100% Load Step 1A / us Slew Rate
Transient Response Recovery Time	2ms Max 50 to 100% Load Step 1A / us Slew Rate
Ripple and Noise	1% pk-pk Max. 20MHz BW Measured with 47uF Alum and 0.1uF Ceramic at output

GENERAL SPECIFICATIONS

Efficiency	Refer to Ordering Information table
Standby Power	<1W 230 VAC
Start-up Delay	2s maximum
Start-up Rise Time	50ms maximum
Hold-up Time	16ms typ. Full Load, 115VAC
Power Density	19 W / in^3
Switching Frequency	200 KHz typ.
MTBF	100K hrs. (typ.) per MIL-HDBK-217F

ISOLATION

Input to Output	4000VAC, 2 MOPP
Input to Earth	1500VAC, 1 MOPP
Output to Earth	500VAC



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400W HIGH DENSITY MEDICAL / INDUSTRIAL GRADE OPEN FRAME POWER SUPPLIES

PROTECTION

Over Current Inception	105 to 135% Rated Current
Short Circuit	Hiccup Mode, Automatic recovery
Over Voltage Protection	130% Vo max. Latching, Recycle Input to Reset
Over Temperature Protection	Automatic recovery

MECHANICAL

Size	See Outline Drawings for mechanical options
Weight	1lbs. (453.6g)
Input Connector	Molex 41791
Input Mating Connector	Housing Molex 2139 Contact 2478
Output Connector	See Outline Drawings for mechanical options
Output Mating Connector	See Outline Drawings for mechanical options

ENVIRONMENTAL

Operating Temp. Range	-20 to +40°C at Full Load, to 50°C with derating (see graphs)
Storage Temp. Range	-40 to +85°C
Humidity	0 to 95%, non-condensing
Altitude	0 to 10,000 ft. 0 to 3048 m
Shock	30G pk. Half sine, 6 axis
Vibration	2 G RMS, 5 Hz to 500 Hz 3 axis, 30 min

SAFETY CERTIFICATIONS

UL / cUL	AAMI ES60601-1: 2005 A1 2012 / CSA 22.2 60601-1 2014
UL EU	EN60601-1: 2006 3rd Edition A1 2013 CB Scheme IEC 60601-1: 2005 A1 2012

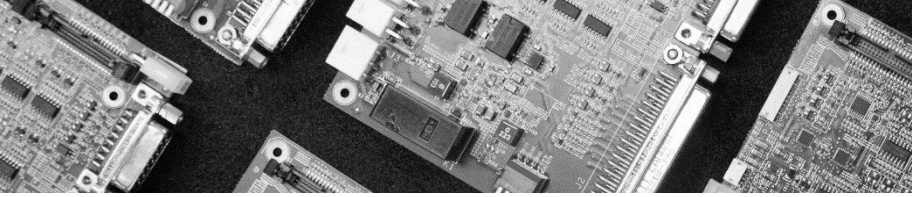
EMC CERTIFICATIONS

Conducted Emissions	EN60601-1-2 Class B EN55011 / A1 Class B
Radiated Emissions	EN60601-1-2 Class B EN55011 / A1 Class B
ESD Susceptibility Air Discharge	EN61000-4-2 Criteria A Level 3
ESD Susceptibility Contact Discharge	EN61000-4-2 Criteria A Level 2
Radiated Susceptibility	EN61000-4-3 Criteria A Level 2
EFT / Burst	EN61000-4-4 Criteria A Level 3
Surge	EN61000-4-5 Criteria A Level 2
Conducted Susceptibility	EN61000-4-6 Criteria A Level 2

All Specifications are typical at nominal input, full load, 25°C unless specified otherwise.

✓ *For EMC Compliance, electrically bond four mounting holes to a conductive surface.*

✓ **Designated models will meet Class B when set to CF leakage; all other models only meet Class A when set to CF*

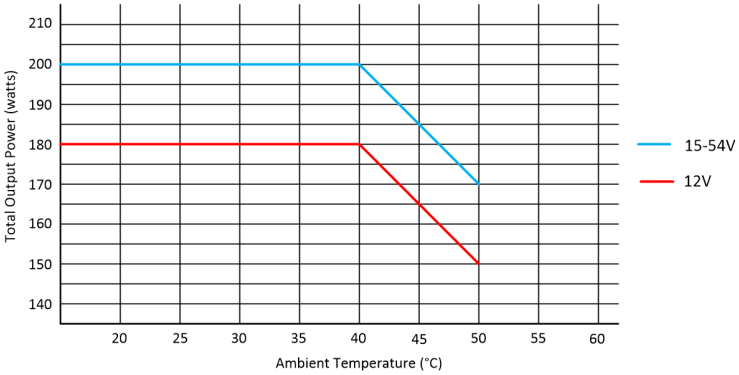


ASM400S / BSM400S

400W HIGH DENSITY MEDICAL / INDUSTRIAL GRADE OPEN FRAME POWER SUPPLIES

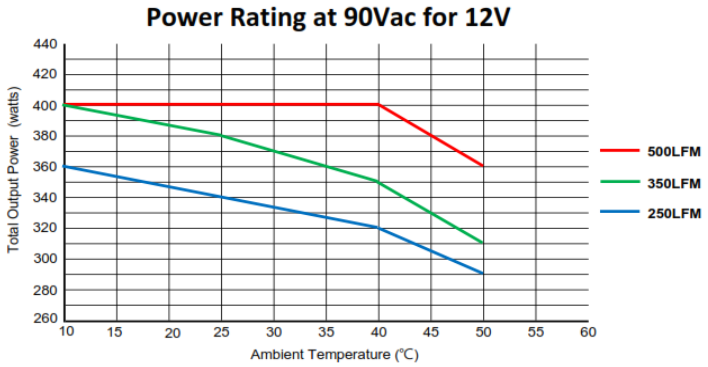
OUTPUT POWER DERATING

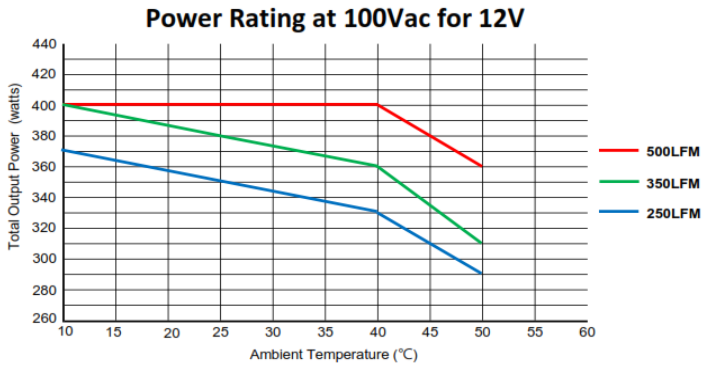
Natural Convection - Output Power vs. Ambient Temperature and Output Voltage
(Combined output power rating)



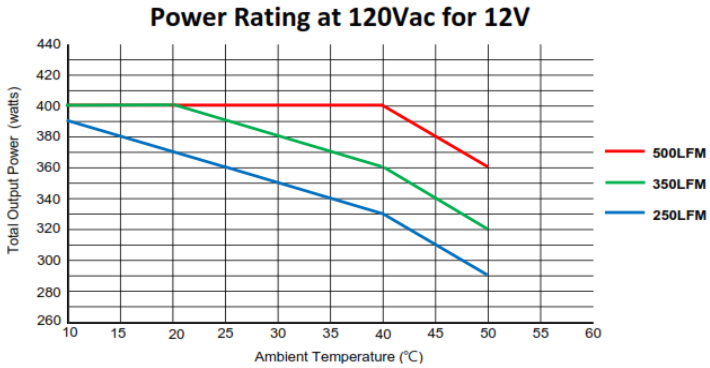
For proper airflow with natural convection cooling, 8mm min length spacers must be used to support the PCBA. A 50mm free air zone must be allowed around the other 5 surfaces of the power supply to allow free natural convection air circulation.

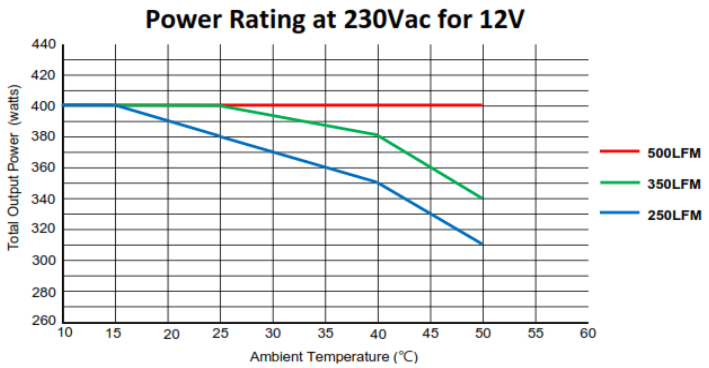
Forced Convection - Output Power vs. Ambient Temperature, Airflow and Input Voltage:

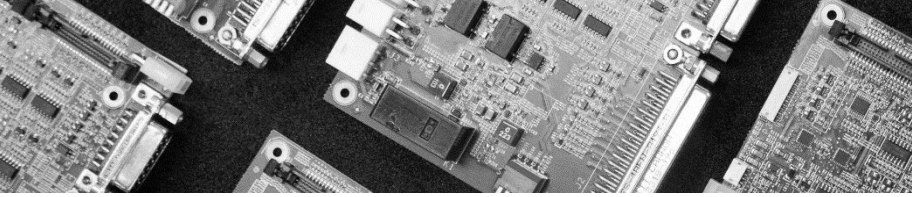




For proper airflow with forced convection cooling, 6mm min length spacers must be used to support the PCBA.



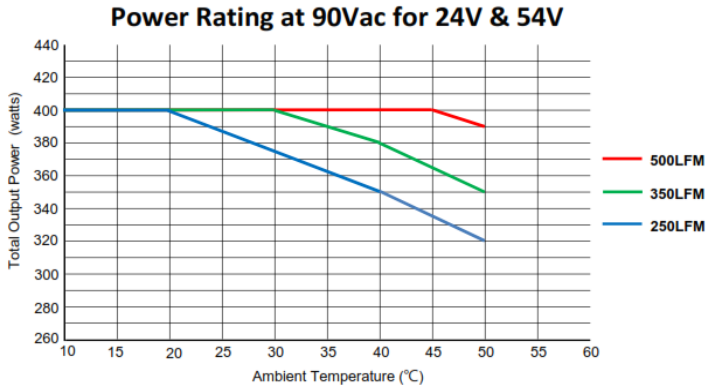


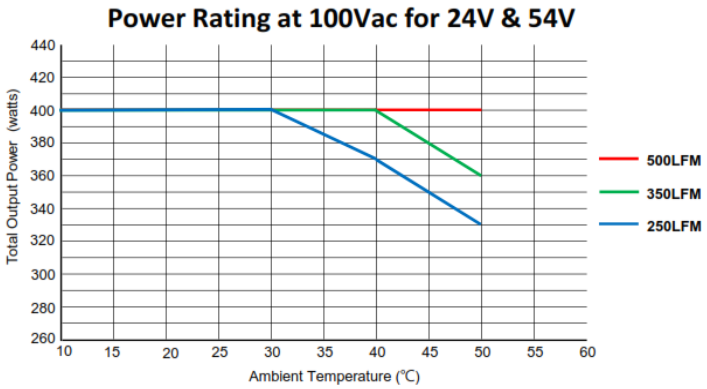


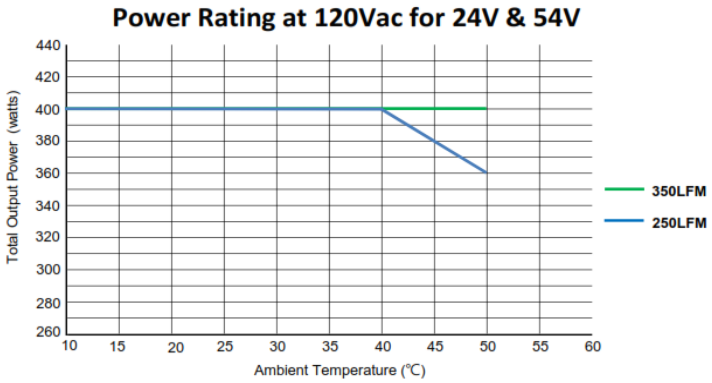
ASM400S / BSM400S

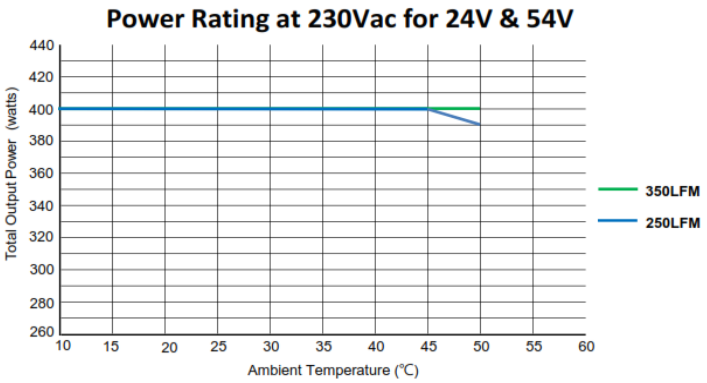
400W HIGH DENSITY MEDICAL / INDUSTRIAL GRADE OPEN FRAME POWER SUPPLIES

OUTPUT DERATING

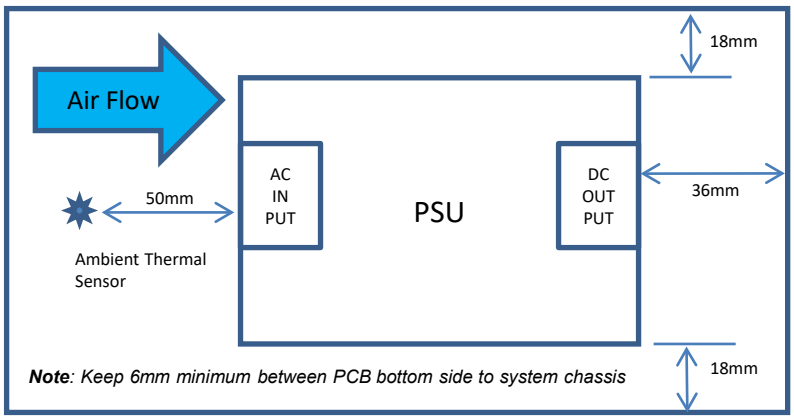






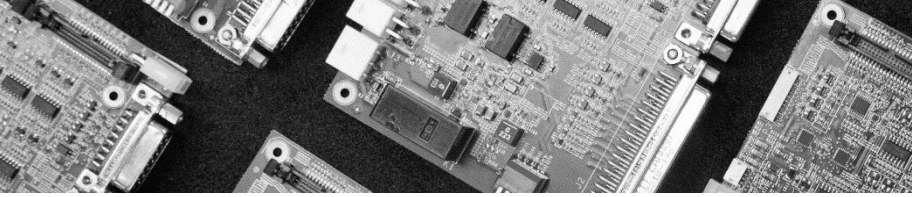


AIRFLOW GUIDELINES



Notes:

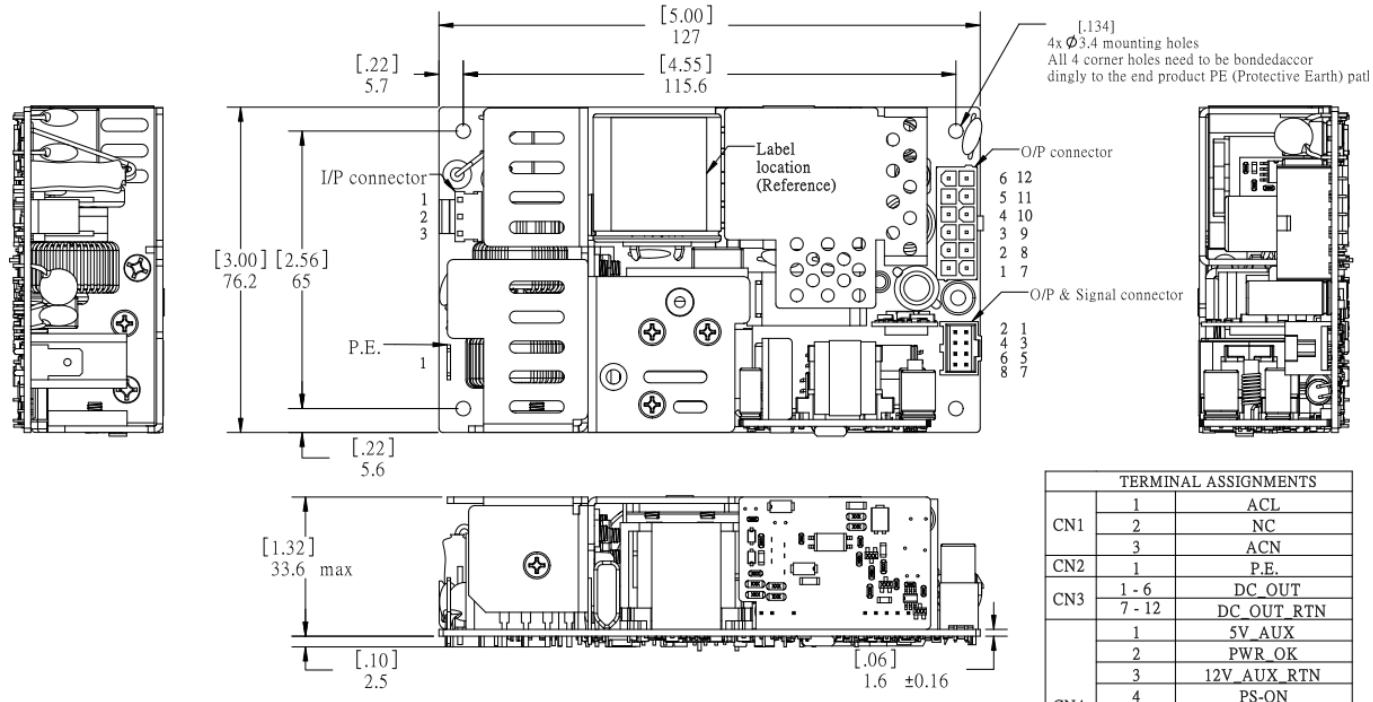
1. PS-ON: Connect this signal to DC_OUT_RTN to enable the main and FAN outputs. The 5V_AUX output is on when AC is applied. (Place a jumper across pins 3 and 4 on connector CN4)
2. PWR_OK: Open collector logic goes to high 160ms (typ.) after the main output is regulated.
3. Contact the factory for a low-cost single-output PN option, without the auxiliary outputs.



ASM400S / BSM400S

400W HIGH DENSITY MEDICAL / INDUSTRIAL GRADE OPEN FRAME POWER SUPPLIES

MECHANICAL DRAWING



Connector P/N info. for reference.	
I / P :Molex 41791 series or equivalent	Mating Connector :Molex 41695 series
O / P :Molex 5566 series or equivalent	Mating Connector :Molex 5557 series
O / P& Signal :Molex 90130 series or equivalent	Mating Connector :Molex 90142 series

TERMINAL ASSIGNMENTS		
CN1	1	ACL
	2	NC
	3	ACN
CN2	1	P.E.
CN3	1 - 6	DC_OUT
	7 - 12	DC_OUT_RTN
CN4	1	5V_AUX
	2	PWR_OK
	3	12V_AUX_RTN
	4	PS-ON
	5	+REMOTE_SENSE
	6	-REMOTE_SENSE
	7	12V_AUX
	8	5V_AUX_RTN

Notes:
1. All dimensions in mm (in.)
2. Maximum Dimensions:
   Length and Width Tolerance is ± 0.2 (0.008)
   Maximum Height: 36.1 (1.42)

MODEL	OUTPUT VOLTAGE	OUTPUT CURRENT, A FORCED / NATURAL CONVECTION	5V AUX, A FORCED / NATURAL CONVECTION	12V FAN, A FORCED / NATURAL CONVECTION	EFFICIENCY, TYP. 230 / 115VAC
A(B)SM400S-12*	12 VDC	33.3/15.0	2A/1A	1A/0.5A	90/86
A(B)SM400S-15*	15 VDC	26.7/13.3	2A/1A	1A/0.5A	90/86
A(B)SM400S-19*	19.6VDC	21.1/10.2	2A/1A	1A/0.5A	91/86
A(B)SM400S-24*	24 VDC	16.7/8.3	2A/1A	1A/0.5A	91/88
A(B)SM400S-28*	28 VDC	14.3/7.15	2A/1A	1A/0.5A	91/88
A(B)SM400S-36*	36 VDC	11.1/5.6	2A/1A	1A/0.5A	91/88
A(B)SM400S-48	48 VDC	8.3/4.2	2A/1A	1A/0.5A	91/88
A(B)SM400S-54	54 VDC	7.4/3.7	2A/1A	1A/0.5A	91/88