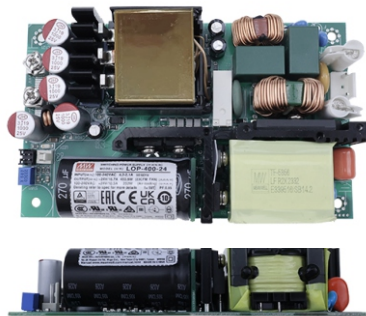




User's Manual



UL62368-1  
ANSI/AAMI ES60601-1



BS EN/EN62368-1  
BS EN/EN60335-1  
BS EN/EN61558-1/-2-16  
BS EN/EN60601-1



IEC62368-1  
IEC60335-1  
IEC61558-1/-2-16  
IEC60601-1



AS/NZS 61558-1/-2-16



GB4943.1 TPTC004



## Features

- MEAN WELL Patent Number: ZL 202223277512.1
- 5"×3" compact size with **low profile (27.5mm)**
- 80~264Vac input with PFC, No load power consumption<0.5W
- **Global certificates in multi-fields**  
(ITE 62368-1, Medical 60601-1, Household 60335-1, Industrial 61558-1/-2-16)
- **150%peak** load @ 3s
- **250W** convection, **400W** with FAN **23CFM** forced-cooled
- Suitable for **Class I** or **Class II** installations
- Over voltage category **III (OVC III)**
- **-40 ~ +80°C** wide range operation temperature
- High efficiency up to 95%
- Protections: Short circuit / Overload / Over voltage / Over temperature
- Extremely low leakage current
- Operating altitude up to **5000 meters**
- Built-in 12V/0.5A for external FAN
- Built-in Remote sense
- 3 years warranty

## Description

LOP-400 is a 400W highly reliable green PCB type low profile power supply with a high power density (24.6W/in<sup>3</sup>) on the 5" by 3" footprint. It accepts 80~264VAC input and offers various output voltages between 12V and 54V. The working efficiency is up to 95% and the extremely low no load power consumption is down below 0.5W.

LOP-400 is able to be used for both Class I (with FG) and Class II (no FG) system design. LOP-400 is equipped with complete protection functions; It is complied with the international safety regulations such as IEC/BS EN/EN/UL62368-1, IEC/BS EN/EN60335-1, IEC/BS EN/EN61558-1/-2-16, IEC/BS EN/EN60601-1. LOP-400 serves as a high price-to-performance power supply solution for various industrial applications. The extremely low leakage current is less than 500 μA. In addition, it conforms to the international medical regulations (2\*MOPP) and EMC BS EN/EN55011, perfectly fitting all kinds of BF rated "patient contact" medical system equipment.

## Model Encoding

**LOP - 400 - 12**

Output voltage (12V/15V/18V/24V/27V/36V/48V/54V)

Rated wattage

Series name

## Applications

- Industrial automation machinery
- Industrial control system
- Mechanical and electrical equipment
- Electronic instruments, equipments or apparatus
- Power sourcing equipment of PoE
- Medical devices

## GTIN CODE

MW Search: <https://www.meanwell.com/serviceGTIN.aspx>



400W 5"×3" Low Profile Open Frame Power Supply

# LOP-400 series

## SPECIFICATION

| MODEL       |                                    |                                                                 | LOP-400-12                                                                                                                                                                                | LOP-400-15   | LOP-400-18   | LOP-400-24   | LOP-400-27   | LOP-400-36   | LOP-400-48   | LOP-400-54 |  |
|-------------|------------------------------------|-----------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|--------------|--------------|--------------|--------------|--------------|------------|--|
| OUTPUT      | DC VOLTAGE                         |                                                                 | 12V                                                                                                                                                                                       | 15V          | 18V          | 24V          | 27V          | 36V          | 48V          | 54V        |  |
|             | CURRENT                            | Peak(3sec.)                                                     | 50A                                                                                                                                                                                       | 40A          | 33.3A        | 25A          | 22.2A        | 16.7A        | 12.5A        | 11.1A      |  |
|             |                                    | 23CFM                                                           | 33.3A                                                                                                                                                                                     | 26.7A        | 22.2A        | 16.7A        | 14.9A        | 11.2A        | 8.4A         | 7.5A       |  |
|             |                                    | Convection                                                      | 20.8A                                                                                                                                                                                     | 16.7A        | 13.9A        | 10.5A        | 9.3A         | 7.1A         | 5.3A         | 4.75A      |  |
|             | RATED POWER                        | Peak(3sec.)                                                     | 600W                                                                                                                                                                                      | 600W         | 599.4W       | 600W         | 599.4W       | 601.2W       | 600W         | 599.4W     |  |
|             |                                    | 23CFM                                                           | 399.6W                                                                                                                                                                                    | 400.5W       | 399.6W       | 400.8W       | 402.3W       | 403.2W       | 403.2W       | 405W       |  |
|             |                                    | Convection                                                      | 249.6W                                                                                                                                                                                    | 250.5W       | 250.2W       | 252W         | 251.1W       | 255.6W       | 254.4W       | 256.5W     |  |
|             | RIPPLE & NOISE (max.) Note.2       |                                                                 | 120mVp-p                                                                                                                                                                                  | 150mVp-p     | 180mVp-p     | 200mVp-p     | 200mVp-p     | 250mVp-p     | 250mVp-p     | 250mVp-p   |  |
|             | VOLTAGE ADJ. RANGE (MAIN OUTPUT)   |                                                                 | 11.4~12.6V                                                                                                                                                                                | 14.3~15.8V   | 17.1~18.9V   | 22.8~25.2V   | 25.6 ~ 28.4V | 34.2 ~37.8V  | 45.6 ~50.4V  | 52 ~58V    |  |
|             | VOLTAGE TOLERANCE Note.3           |                                                                 | ±3.0%                                                                                                                                                                                     | ±3.0%        | ±3.0%        | ±2.0%        | ±1.0%        | ±1.0%        | ±1.0%        | ±1.0%      |  |
|             | LINE REGULATION                    |                                                                 | ±0.5%                                                                                                                                                                                     | ±0.5%        | ±0.5%        | ±0.5%        | ±0.5%        | ±0.5%        | ±0.5%        | ±0.5%      |  |
|             | LOAD REGULATION                    |                                                                 | ±1.0%                                                                                                                                                                                     | ±1.0%        | ±1.0%        | ±1.0%        | ±1.0%        | ±1.0%        | ±1.0%        | ±1.0%      |  |
|             | SETUP, RISE TIME                   |                                                                 | 1000ms, 30ms/230VAC      1500ms, 30ms/115VAC at full load                                                                                                                                 |              |              |              |              |              |              |            |  |
|             | HOLD UP TIME (Typ.)                |                                                                 | 30ms@250W load , 16ms@400W load                                                                                                                                                           |              |              |              |              |              |              |            |  |
| INPUT       | VOLTAGE RANGE Note.4               |                                                                 | 80 ~ 264VAC      113 ~ 370VDC                                                                                                                                                             |              |              |              |              |              |              |            |  |
|             | FREQUENCY RANGE                    |                                                                 | 47 ~ 63Hz                                                                                                                                                                                 |              |              |              |              |              |              |            |  |
|             | POWER FACTOR                       |                                                                 | PF>0.95/230VAC PF>0.98/115VAC at full load                                                                                                                                                |              |              |              |              |              |              |            |  |
|             | EFFICIENCY (Typ.)                  |                                                                 | 94%                                                                                                                                                                                       | 94.5%        | 95%          | 94.5%        | 95%          | 95%          | 95%          | 95%        |  |
|             | AC CURRENT (Typ.)                  |                                                                 | 4.2A/115VAC      2.1A/230VAC                                                                                                                                                              |              |              |              |              |              |              |            |  |
|             | INRUSH CURRENT (Typ.)              |                                                                 | COLD START 40A/115VAC      80A/230VAC                                                                                                                                                     |              |              |              |              |              |              |            |  |
|             | LEAKAGE CURRENT                    |                                                                 | Earth leakage current < 500μA(rms) @ 264VAC , touch current < 70μA(rms) @ 264VAC                                                                                                          |              |              |              |              |              |              |            |  |
| PROTECTION  | OVERLOAD                           |                                                                 | 105 ~ 150% rated output power, Protection type : Hiccup after 3 sec, recovers automatically after fault condition is removed                                                              |              |              |              |              |              |              |            |  |
|             | OVER VOLTAGE                       | 13.2 ~ 15.6V                                                    | 16.5 ~ 19.5V                                                                                                                                                                              | 19.8 ~ 23.4V | 26.4 ~ 31.2V | 29.7 ~ 35.1V | 39.6 ~ 46.8V | 52.8 ~ 62.4V | 59.4 ~ 67.5V |            |  |
|             |                                    | Protection type : Shut down o/p voltage, re-power on to recover |                                                                                                                                                                                           |              |              |              |              |              |              |            |  |
|             | OVER TEMPERATURE                   |                                                                 | Protection type : Shut down o/p voltage, recovers automatically after temperature goes down                                                                                               |              |              |              |              |              |              |            |  |
| FUNCTION    | EXTERNAL FAN SUPPLY                |                                                                 | 12V@0.5A for driving a fan / 12V@0.2A for without fan ; <u>(23CFM)</u><br>tolerance -15% ~+15% at main output 20% rated current                                                           |              |              |              |              |              |              |            |  |
|             | REMOTE SENSE                       |                                                                 | The remote sensing compensates voltage drop on the load wiring up to 0.5V                                                                                                                 |              |              |              |              |              |              |            |  |
|             | POWER GOOD / POWER FAIL (optional) |                                                                 | 500ms>PG>10ms ; The TTL signal goes high with 10ms to 500ms delay after power set up ; The TTL signal goes low at least 1ms before Vo below 90% of rated value ; TTL(0 ~ 1V), TTH(2 ~ 5V) |              |              |              |              |              |              |            |  |
| ENVIRONMENT | WORKING TEMP.                      |                                                                 | -40 ~ +80°C (Refer to "Derating Curve")                                                                                                                                                   |              |              |              |              |              |              |            |  |
|             | WORKING HUMIDITY                   |                                                                 | 20 ~ 90% RH non-condensing                                                                                                                                                                |              |              |              |              |              |              |            |  |
|             | STORAGE TEMP., HUMIDITY            |                                                                 | -40 ~ +85°C, 10 ~ 95% RH non-condensing                                                                                                                                                   |              |              |              |              |              |              |            |  |
|             | TEMP. COEFFICIENT                  |                                                                 | ±0.03%/°C (0 ~ 50°C)                                                                                                                                                                      |              |              |              |              |              |              |            |  |
|             | VIBRATION                          |                                                                 | 10 ~ 500Hz, 2G 10min./1cycle, 60min. each along X, Y, Z axes                                                                                                                              |              |              |              |              |              |              |            |  |



## 400W 5"×3" Low Profile Open Frame Power Supply

## LOP-400 series

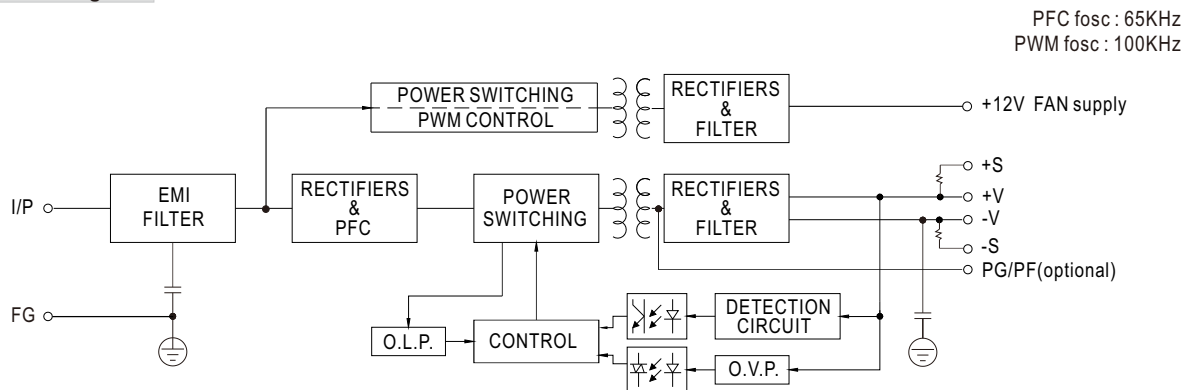
|                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                 |                                                                                                  |                                                                      |
|--------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|----------------------------------------------------------------------|
| SAFETY & EMC<br>(Note 5)       | SAFETY STANDARDS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | CB IEC62368-1, IEC60335-1, IEC61558-1/-2-16, IEC60601-1;<br>TUV BS EN/EN62368-1, BS EN/EN60335-1, BS EN/EN61558-1/-2-16, BS EN/EN60601-1(3.2 Version);<br>UL UL62368-1, ANSI / AAMI ES60601-1(3.2 Version) ;<br>CCC GB4943.1 ; RCM AS/NZS 61558-1/-2-16; EAC TPTC 004 approved. |                                                                                                  |                                                                      |
|                                | ISOLATION LEVEL                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Primary-Secondary: 2xMOPP, Primary-Earth:1xMOPP, Secondary-Earth:1xMOPP                                                                                                                                                                                                         |                                                                                                  |                                                                      |
|                                | OVER VOLTAGE CATEGORY                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | IEC/EN 61558-1/-2-16(OVC III, altitude up to 2000M )<br>IEC/EN/UL 62368-1 (OVC II, altitude up to 5000M )<br>IEC/EN 60335-1 (OVC II, altitude up to 5000M )<br>IEC/EN 60601-1 (OVC II, altitude up to 4000M )                                                                   |                                                                                                  |                                                                      |
|                                | PROTECTIVE EXTRA-LOW VOLTAGE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | IEC/EN61558-2-16 (SELV )<br>IEC/EN/UL 62368-1 (SELV / ES1 )                                                                                                                                                                                                                     |                                                                                                  |                                                                      |
|                                | WITHSTAND VOLTAGE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | I/P-O/P:4KVAC I/P-FG:2KVAC O/P-FG:1.5KVAC                                                                                                                                                                                                                                       |                                                                                                  |                                                                      |
|                                | ISOLATION RESISTANCE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | I/P-O/P, I/P-FG, O/P-FG:100M Ohms / 500VDC / 25°C/ 70% RH                                                                                                                                                                                                                       |                                                                                                  |                                                                      |
|                                | EMC EMISSION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Parameter                                                                                                                                                                                                                                                                       | Standard                                                                                         | Test Level / Note                                                    |
|                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Conducted & Radiated                                                                                                                                                                                                                                                            | BS EN/EN55032(CISPR32)<br>BS EN/EN55011(CISPR11)                                                 | Class I : Class B , Class II : Class A                               |
|                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                 | BS EN/EN55014(CISPR32)                                                                           | Class I : Class B                                                    |
|                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Harmonic Current                                                                                                                                                                                                                                                                | BS EN/EN61000-3-2                                                                                | Class A                                                              |
|                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Voltage Flicker                                                                                                                                                                                                                                                                 | BS EN/EN61000-3-3                                                                                | -----                                                                |
|                                | EMC IMMUNITY                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | BS EN/EN55035,BS EN/EN61000-6-2                                                                                                                                                                                                                                                 |                                                                                                  |                                                                      |
|                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Parameter                                                                                                                                                                                                                                                                       | Standard                                                                                         | Test Level /Note                                                     |
|                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | ESD                                                                                                                                                                                                                                                                             | BS EN/EN61000-4-2                                                                                | Level 4, 15KV air ; Level 4, 8KV contact                             |
|                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Radiated Susceptibility                                                                                                                                                                                                                                                         | BS EN/EN61000-4-3                                                                                | Level 3, 10V/m( 80MHz~2.7GHz )<br>Table 9, 9~28V/m( 385MHz~5.78GHz ) |
|                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | EFT/Burest                                                                                                                                                                                                                                                                      | BS EN/EN61000-4-4                                                                                | Level 3, 2KV                                                         |
|                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Surge                                                                                                                                                                                                                                                                           | BS EN/EN61000-4-5                                                                                | Level 4, 4KV/Line-FG ; 2KV/Line-Line                                 |
| Conducted                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | BS EN/EN61000-4-6                                                                                                                                                                                                                                                               | Level 3, 10V                                                                                     |                                                                      |
| Magnetic Field                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | BS EN/EN61000-4-8                                                                                                                                                                                                                                                               | Level 4, 30A/m                                                                                   |                                                                      |
| Voltage Dips and interruptions |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | BS EN/EN61000-4-11                                                                                                                                                                                                                                                              | >95% dip 0. 5 periods, 100% dip 1 periods, 30% dip 25 periods,<br>>95% interruptions 250 periods |                                                                      |
| OTHERS                         | MTBF                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 1696.4K hrs min. Telcordia SR-332 (Bellcore) ; 231.2K hrs min. MIL-HDBK-217F (25°C)                                                                                                                                                                                             |                                                                                                  |                                                                      |
|                                | DIMENSION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 127*76.2*27.5mm (L*W*H)                                                                                                                                                                                                                                                         |                                                                                                  |                                                                      |
|                                | PACKING                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 0.39Kg; 36pcs/15Kg/0.96CUFT                                                                                                                                                                                                                                                     |                                                                                                  |                                                                      |
| NOTE                           | 1. All parameters NOT specially mentioned are measured at 230VAC input, rated load and 25 of ambient temperature.<br>2. Ripple & noise are measured at 20MHz of bandwidth by using a 12" twisted pair-wire terminated with a 0.1μf & 47μf parallel capacitor.<br>3. Tolerance : includes set up tolerance, line regulation and load regulation.<br>4. Derating may be needed under low input voltages. Please check the derating curve for more details.<br>5. The power supply is considered a component which will be installed into a final equipment. All the EMC tests are been executed by mounting the unit on a 360mm*360mm metal plate with 1mm of thickness. The final equipment must be re-confirmed that it still meets EMC directives. For guidance on how to perform these EMC tests, please refer to “EMI testing of component power supplies.” (as available on http://www.meanwell.com)<br>※ Product Liability Disclaimer : For detailed information, please refer to https://www.meanwell.com/serviceDisclaimer.aspx |                                                                                                                                                                                                                                                                                 |                                                                                                  |                                                                      |



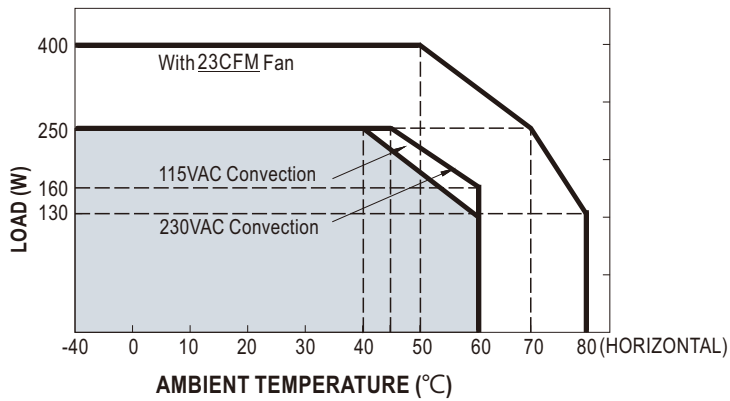
## 400W 5"×3" Low Profile Open Frame Power Supply

# LOP-400 series

### ■ Block Diagram

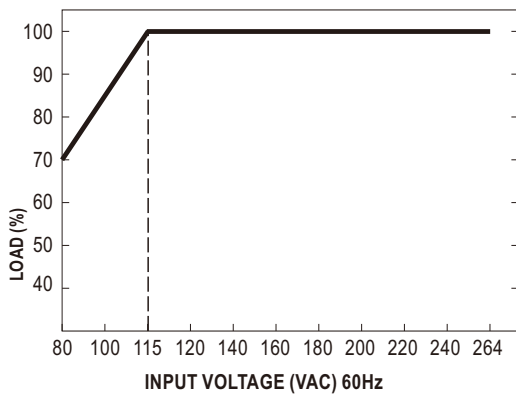


### ■ Derating Curve



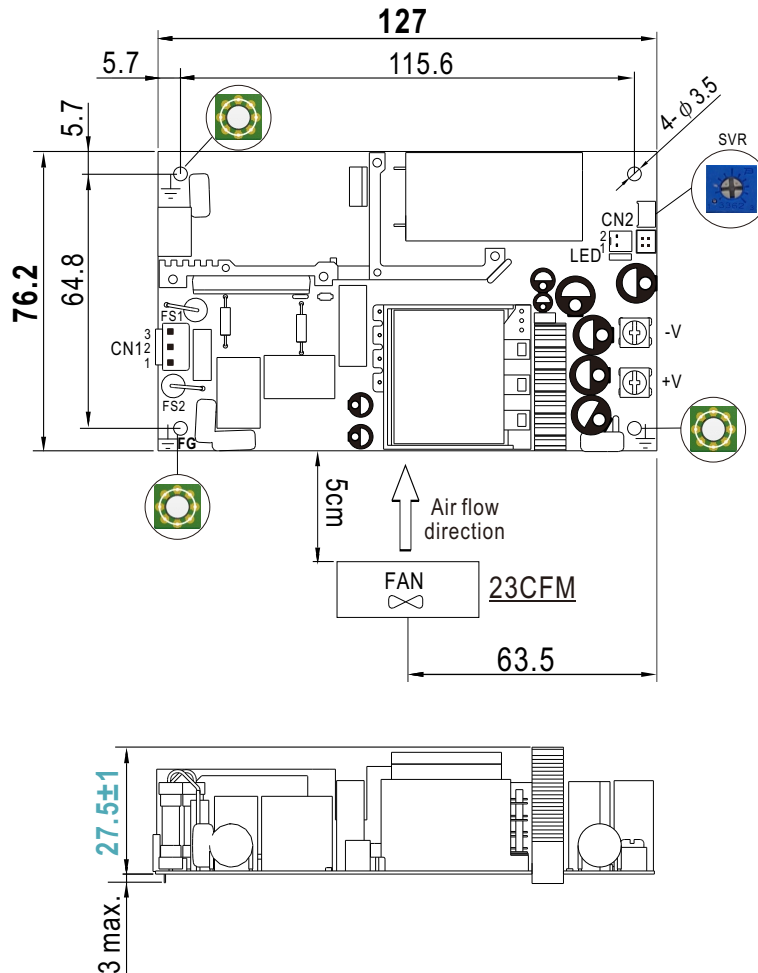
| Cooling                        | Max. Output Power |
|--------------------------------|-------------------|
| Free air convection            | 250W              |
| Force-cooled with external Fan | 400W              |

### ■ Output Derating VS Input Voltage



## Mechanical Specification

Unit:mm



AC Input Connector (CN1) : JST B3P-VH or equivalent

| Pin No. | Assignment | Mating Housing        | Terminal                       |
|---------|------------|-----------------------|--------------------------------|
| 1       | AC/L       | JST VHR or equivalent | JST SVH-21T-P1.1 or equivalent |
| 2       | No Pin     |                       |                                |
| 3       | AC/N       |                       |                                |

FAN Connector(CN2) : TKP 8812-2 or equivalent

| Pin No. | Assignment | Mating Housing         | Terminal               |
|---------|------------|------------------------|------------------------|
| 1       | DC COM     | TKP 2502 or equivalent | TKP 8811 or equivalent |
| 2       | +12V       |                        |                        |

Note:

Class I System: Mounting holes marked with  $\perp$  have to be connected to safety earth.

Class II System: Unnecessary to connect with safety earth.

⚠ HS1,HS2,HS3,HS4 can not be shorted

DC Output Connector

| Assignment | Output Terminals                                                  |
|------------|-------------------------------------------------------------------|
| -V         | M3.5 Pan HD screw in 2 positions<br>Torque to 8 lbs-in(90cNm)max. |
| +V         |                                                                   |

## Installation Manual

Please refer to : <http://www.meanwell.com/webnet/search/InstallationSearch.html>