



## Features

- Compliance to BS EN/EN50155 and BS EN/EN45545-2 railway standard
- Ultra compact and 1U low profile(25mm)
- 4:1 wide input range
- No minimum load required
- Protections: Short circuit / Overload / Over voltage / Input reverse polarity
- 4000VDC I/O isolation (Reinforced isolation)
- Half encapsulated , cooling by free air convection
- -40~+70°C wide working temperature
- Built-in constant current limiting circuit
- LED indicator for power on
- 3 years warranty

## Description

RSD-60 is a 60W enclosed type DC-DC reliable railway converter. This series is compliant with BS EN/EN50155/ IEC60571 railway standard, constituting three types of models with 4:1 wide but different input ranges 9~36V/18~72V/40~160V, suitable for railway and all kinds of transportation systems exploiting the frequently used standard input voltages such as 12V, 24V, 36V, 48V, 72V, 96V and 110V. Various output voltages, 3.3V, 5V, 12V and 24V are available for selection.

This series has the capability of working under -40~+70°C, low ripple and noise, supreme EMC characteristics, 4KVDC I/P-OP, low enclosure profile 25mm and an interior with semi-potted silicone. It does not only well fits the in-car systems or the facilities by rails for railway, trams and buses but also can be used in the harsh environment with high vibration, high dust, extremely low or high temperature, etc.

## Model Encoding

RSD - 60G - 5

- Output voltage (3.3/5/12/24Vdc)
- Input voltage (G: 9~36Vdc, L: 18~72Vdc, H: 40~160Vdc)
- Rated wattage
- Series name

## Applications

- Bus, tram, metro or railway system
- Highly vibrating, highly dusty, extremely low or high temperature harsh environment
- Wireless network
- Telecom or datacom system
- Industry control system

## GTIN CODE

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



## SPECIFICATION

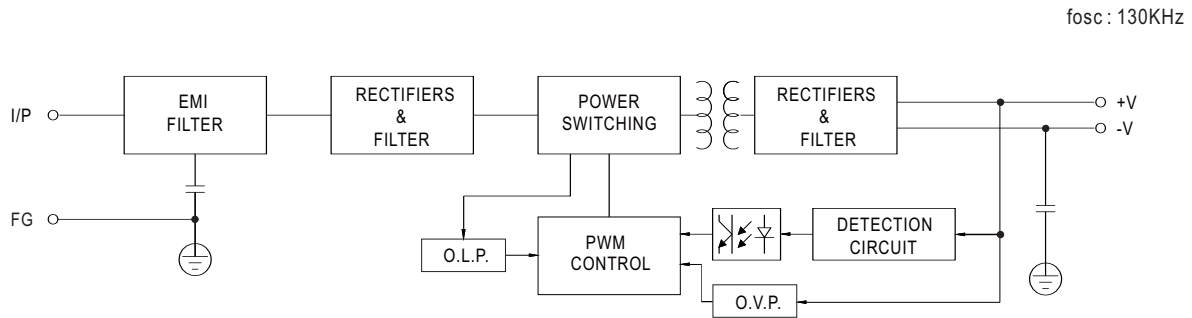
| MODEL                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | RSD-60G-3.3                                                                                                                           | RSD-60G-5                                                                                                                                        | RSD-60G-12   | RSD-60G-24   | RSD-60L-3.3                                    | RSD-60L-5 | RSD-60L-12   | RSD-60L-24   |
|--------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|--------------|--------------|------------------------------------------------|-----------|--------------|--------------|
| OUTPUT                   | DC VOLTAGE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 3.3V                                                                                                                                  | 5V                                                                                                                                               | 12V          | 24V          | 3.3V                                           | 5V        | 12V          | 24V          |
|                          | RATED CURRENT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 12A                                                                                                                                   | 12A                                                                                                                                              | 5A           | 2.5A         | 12A                                            | 12A       | 5A           | 2.5A         |
|                          | CURRENT RANGE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 0 ~ 12A                                                                                                                               | 0 ~ 12A                                                                                                                                          | 0 ~ 5A       | 0 ~ 2.5A     | 0 ~ 12A                                        | 0 ~ 12A   | 0 ~ 5A       | 0 ~ 2.5A     |
|                          | RATED POWER                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 39.6W                                                                                                                                 | 60W                                                                                                                                              | 60W          | 60W          | 39.6W                                          | 60W       | 60W          | 60W          |
|                          | RIPPLE & NOISE (max.) <small>Note.2</small>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 60mVp-p                                                                                                                               | 100mVp-p                                                                                                                                         | 50mVp-p      | 50mVp-p      | 60mVp-p                                        | 60mVp-p   | 50mVp-p      | 50mVp-p      |
|                          | VOLTAGE TOLERANCE <small>Note.3</small>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | ± 2.0%                                                                                                                                | ± 2.0%                                                                                                                                           | ± 2.0%       | ± 2.0%       | ± 2.0%                                         | ± 2.0%    | ± 2.0%       | ± 2.0%       |
|                          | LINE REGULATION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | ± 0.5%                                                                                                                                | ± 0.5%                                                                                                                                           | ± 0.3%       | ± 0.2%       | ± 0.5%                                         | ± 0.5%    | ± 0.3%       | ± 0.2%       |
|                          | LOAD REGULATION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | ± 0.5%                                                                                                                                | ± 0.5%                                                                                                                                           | ± 0.3%       | ± 0.2%       | ± 0.5%                                         | ± 0.5%    | ± 0.3%       | ± 0.2%       |
|                          | SETUP, RISE TIME                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 100ms, 60ms at full load                                                                                                              |                                                                                                                                                  |              |              |                                                |           |              |              |
|                          | HOLD UP TIME (Typ.)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Please refer to page 5 Hold up Time( Load de-rating curve )                                                                           |                                                                                                                                                  |              |              |                                                |           |              |              |
| INPUT                    | VOLTAGE RANGE CONTINUOUS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 9 ~ 36VDC                                                                                                                             |                                                                                                                                                  |              |              | 18 ~ 72VDC                                     |           |              |              |
|                          | EFFICIENCY (Typ.)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 86.5%                                                                                                                                 | 88%                                                                                                                                              | 92%          | 90%          | 88.5%                                          | 89%       | 93%          | 91.5%        |
|                          | DC CURRENT (Typ.)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 2.1A/24VDC 3A/24VDC                                                                                                                   |                                                                                                                                                  |              |              | 0.95A/48VDC 1.5A/48VDC                         |           |              |              |
|                          | INRUSH CURRENT (Typ.)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 20A/24VDC                                                                                                                             |                                                                                                                                                  |              |              | 20A/48VDC                                      |           |              |              |
|                          | INTERRUPTION OF VOLTAGE SUPPLY                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | EN50155:2021-Comply with S1 level                                                                                                     |                                                                                                                                                  |              |              |                                                |           |              |              |
| PROTECTION               | OVERLOAD                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 105 ~ 135% rated output power<br>Protection type : Constant current limiting, recovers automatically after fault condition is removed |                                                                                                                                                  |              |              |                                                |           |              |              |
|                          | OVER VOLTAGE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 4.3 ~ 5.3V                                                                                                                            | 5.75 ~ 7V                                                                                                                                        | 13.8 ~ 16.2V | 27.6 ~ 32.4V | 4.3 ~ 4.95V                                    | 5.75 ~ 7V | 13.8 ~ 16.2V | 27.6 ~ 32.4V |
| ENVIRONMENT              | WORKING TEMP.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | -40 ~ +55°C (no derating) ; +70°C @ 60% load by free air convection ; +70°C (no derating with external base plate)                    |                                                                                                                                                  |              |              |                                                |           |              |              |
|                          | WORKING HUMIDITY                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 5 ~ 95% RH non-condensing                                                                                                             |                                                                                                                                                  |              |              |                                                |           |              |              |
|                          | STORAGE TEMP.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | -40 ~ +85°C                                                                                                                           |                                                                                                                                                  |              |              |                                                |           |              |              |
|                          | TEMP. COEFFICIENT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | ± 0.03%/°C (0 ~ 50°C)                                                                                                                 |                                                                                                                                                  |              |              |                                                |           |              |              |
|                          | VIBRATION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 10 ~ 500Hz, 5G 10min./1cycle, 60min. each along X, Y, Z axes ; Mounting : compliance to IEC61373                                      |                                                                                                                                                  |              |              |                                                |           |              |              |
|                          | OPERATING ALTITUDE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 5000 meters                                                                                                                           |                                                                                                                                                  |              |              |                                                |           |              |              |
| SAFETY & EMC<br>(Note 4) | SAFETY STANDARDS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | IEC 62368-1, UL 62368-1, AS/NZS 62368-1, EAC TP TC 004 approved, Design refer to BS EN/EN62368-1                                      |                                                                                                                                                  |              |              |                                                |           |              |              |
|                          | WITHSTAND VOLTAGE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | I/P-O/P:4KVDC I/P-FG:2.5KVDC O/P-FG:2.5KVDC                                                                                           |                                                                                                                                                  |              |              |                                                |           |              |              |
|                          | 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                                                                                                                             | BS EN/EN55032                                                                                                                                    |              |              | Class A                                        |           |              |              |
|                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Radiated                                                                                                                              | BS EN/EN55032                                                                                                                                    |              |              | Class B                                        |           |              |              |
|                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Harmonic Current                                                                                                                      | BS EN/EN61000-3-2                                                                                                                                |              |              | -----                                          |           |              |              |
|                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Voltage Flicker                                                                                                                       | BS EN/EN61000-3-3                                                                                                                                |              |              | -----                                          |           |              |              |
|                          | EMC IMMUNITY                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | BS EN/EN55035                                                                                                                         |                                                                                                                                                  |              |              |                                                |           |              |              |
|                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Parameter                                                                                                                             | Standard                                                                                                                                         |              |              | Test Level / Note                              |           |              |              |
|                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | ESD                                                                                                                                   | BS EN/EN61000-4-2                                                                                                                                |              |              | Level 3, ±8KV air ; Level 3, ±6KV contact      |           |              |              |
|                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Radiated Field                                                                                                                        | BS EN/EN61000-4-3                                                                                                                                |              |              | Level X, 20V/m                                 |           |              |              |
|                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | EFT / Burst                                                                                                                           | BS EN/EN61000-4-4                                                                                                                                |              |              | Level 3, 2KV at power                          |           |              |              |
|                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Surge                                                                                                                                 | BS EN/EN61000-4-5                                                                                                                                |              |              | Level 3,1KV Line-Line, Level 3, 2KV Line-Earth |           |              |              |
|                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Conducted                                                                                                                             | BS EN/EN61000-4-6                                                                                                                                |              |              | Level 3                                        |           |              |              |
|                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | RAILWAY STANDARD                                                                                                                      | Compliance to BS EN/EN45545-2 for fire protection ; BS EN/EN50155 / IEC60571 including IEC61373 for shock & vibration, BS EN/EN50121-3-2 for EMC |              |              |                                                |           |              |              |
| OTHERS                   | MTBF                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 2738.8K hrs min. Telcordia SR-332 (Bellcore) ; 593.9K hrs min. MIL-HDBK-217F (25°C)                                                   |                                                                                                                                                  |              |              |                                                |           |              |              |
|                          | DIMENSION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 128*60*25mm (L*W*H)                                                                                                                   |                                                                                                                                                  |              |              |                                                |           |              |              |
|                          | PACKING                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 0.29Kg; 48pcs/14.9Kg/0.75CUFT                                                                                                         |                                                                                                                                                  |              |              |                                                |           |              |              |
| NOTE                     | <p>1. All parameters NOT specially mentioned are measured at 24,48VDC input, rated load and 25°C of ambient temperature.</p> <p>2. Ripple &amp; noise are measured at 20MHz of bandwidth by using a 12" twisted pair-wire terminated with a 0.1 <math>\mu</math> F &amp; 47 <math>\mu</math> F parallel capacitor.</p> <p>3. Tolerance : includes set up tolerance, line regulation and load regulation.</p> <p>4. 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."<br/>(as available on <a href="https://www.meanwell.com/Upload/PDF/EMI_statement_en.pdf">https://www.meanwell.com/Upload/PDF/EMI_statement_en.pdf</a> )</p> <p>5. Strongly recommended that external output capacitance should not exceed 5000uF.</p> <p>6. The ambient temperature derating of 3.5°C/1000m with fanless models and of 5°C/1000m with fan models for operating altitude higher than 2000m(6500ft).</p> <p>※ Product Liability Disclaimer : For detailed information, please refer to <a href="https://www.meanwell.com/serviceDisclaimer.aspx">https://www.meanwell.com/serviceDisclaimer.aspx</a></p> |                                                                                                                                       |                                                                                                                                                  |              |              |                                                |           |              |              |



## SPECIFICATION

| MODEL                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | RSD-60H-3.3                                                                                                                                      | RSD-60H-5         | RSD-60H-12   | RSD-60H-24                                     |  |
|-----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|--------------|------------------------------------------------|--|
| OUTPUT                                  | DC VOLTAGE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 3.3V                                                                                                                                             | 5V                | 12V          | 24V                                            |  |
|                                         | RATED CURRENT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 12A                                                                                                                                              | 12A               | 5A           | 2.5A                                           |  |
|                                         | CURRENT RANGE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 0 ~ 12A                                                                                                                                          | 0 ~ 12A           | 0 ~ 5A       | 0 ~ 2.5A                                       |  |
|                                         | RATED POWER                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 39.6W                                                                                                                                            | 60W               | 60W          | 60W                                            |  |
|                                         | RIPPLE & NOISE (max.) <small>Note.2</small>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 80mVp-p                                                                                                                                          | 60mVp-p           | 50mVp-p      | 50mVp-p                                        |  |
|                                         | VOLTAGE TOLERANCE <small>Note.3</small>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | ± 2.0%                                                                                                                                           | ± 2.0%            | ± 2.0%       | ± 2.0%                                         |  |
|                                         | LINE REGULATION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | ± 0.5%                                                                                                                                           | ± 0.5%            | ± 0.3%       | ± 0.2%                                         |  |
|                                         | LOAD REGULATION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | ± 0.5%                                                                                                                                           | ± 0.5%            | ± 0.3%       | ± 0.2%                                         |  |
|                                         | SETUP, RISE TIME                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 100ms, 60ms at full load                                                                                                                         |                   |              |                                                |  |
|                                         | HOLD UP TIME (Typ.)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Please refer to page 5 Hold up Time( Load de-rating curve )                                                                                      |                   |              |                                                |  |
| INPUT                                   | VOLTAGE RANGE CONTINUOUS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 40 ~ 160VDC                                                                                                                                      |                   |              |                                                |  |
|                                         | EFFICIENCY (Typ.)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 87.5%                                                                                                                                            | 89%               | 92.5%        | 91.5%                                          |  |
|                                         | DC CURRENT (Typ.)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 0.415A/110VDC                                                                                                                                    | 0.62A/110V        |              |                                                |  |
|                                         | INRUSH CURRENT (Typ.)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 20A/110VDC                                                                                                                                       |                   |              |                                                |  |
|                                         | INTERRUPTION OF VOLTAGE SUPPLY                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | EN50155:2021-Comply with S1 level                                                                                                                |                   |              |                                                |  |
| PROTECTION                              | OVERLOAD                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 105 ~ 135% rated output power<br>Protection type : Constant current limiting, recovers automatically after fault condition is removed            |                   |              |                                                |  |
|                                         | OVER VOLTAGE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 4.3 ~ 4.95V                                                                                                                                      | 5.75 ~ 7V         | 13.8 ~ 16.2V | 27.6 ~ 32.4V                                   |  |
| ENVIRONMENT                             | WORKING TEMP.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | -40 ~ +55℃ (no derating) ; +70℃ @ 60% load by free air convection ; +70℃ (no derating with external base plate)                                  |                   |              |                                                |  |
|                                         | WORKING HUMIDITY                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 5 ~ 95% RH non-condensing                                                                                                                        |                   |              |                                                |  |
|                                         | STORAGE TEMP.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | -40 ~ +85℃                                                                                                                                       |                   |              |                                                |  |
|                                         | TEMP. COEFFICIENT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | ± 0.03%/℃ (0 ~ 50℃)                                                                                                                              |                   |              |                                                |  |
|                                         | VIBRATION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 10 ~ 500Hz, 5G 10min./1cycle, 60min. each along X, Y, Z axes ; Mounting : compliance to IEC61373                                                 |                   |              |                                                |  |
|                                         | OPERATING ALTITUDE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 5000 meters                                                                                                                                      |                   |              |                                                |  |
| SAFETY & EMC<br><small>(Note 4)</small> | SAFETY STANDARDS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | IEC 62368-1, UL 62368-1, AS/NZS 62368-1, EAC TP TC 004 approved, Design refer to BS EN/EN62368-1                                                 |                   |              |                                                |  |
|                                         | WITHSTAND VOLTAGE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | I/P-O/P:4KVDC I/P-FG:2.5KVDC O/P-FG:2.5KVDC                                                                                                      |                   |              |                                                |  |
|                                         | ISOLATION RESISTANCE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | I/P-O/P, I/P-FG, O/P-FG:100M Ohms / 500VDC / 25℃ / 70% RH                                                                                        |                   |              |                                                |  |
|                                         | EMC EMISSION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Parameter                                                                                                                                        | Standard          |              | Test Level / Note                              |  |
|                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Conducted                                                                                                                                        | BS EN/EN55032     |              | Class A                                        |  |
|                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Radiated                                                                                                                                         | BS EN/EN55032     |              | Class B                                        |  |
|                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Harmonic Current                                                                                                                                 | BS EN/EN61000-3-2 |              | -----                                          |  |
|                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Voltage Flicker                                                                                                                                  | BS EN/EN61000-3-3 |              | -----                                          |  |
|                                         | EMC IMMUNITY                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | BS EN/EN55035                                                                                                                                    |                   |              |                                                |  |
|                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Parameter                                                                                                                                        | Standard          |              | Test Level / Note                              |  |
|                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | ESD                                                                                                                                              | BS EN/EN61000-4-2 |              | Level 3, ±8KV air ; Level 3, ±6KV contact      |  |
|                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Radiated Field                                                                                                                                   | BS EN/EN61000-4-3 |              | Level X, 20V/m                                 |  |
|                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | EFT / Burst                                                                                                                                      | BS EN/EN61000-4-4 |              | Level 3, 2KV at power                          |  |
|                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Surge                                                                                                                                            | BS EN/EN61000-4-5 |              | Level 3,1KV Line-Line, Level 3, 2KV Line-Earth |  |
| Conducted                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | BS EN/EN61000-4-6                                                                                                                                |                   | Level 3      |                                                |  |
| RAILWAY STANDARD                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Compliance to BS EN/EN45545-2 for fire protection ; BS EN/EN50155 / IEC60571 including IEC61373 for shock & vibration, BS EN/EN50121-3-2 for EMC |                   |              |                                                |  |
| OTHERS                                  | MTBF                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 2738.8K hrs min. Telcordia SR-332 (Bellcore) ; 593.9K hrs min. MIL-HDBK-217F (25℃)                                                               |                   |              |                                                |  |
|                                         | DIMENSION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 128*60*25mm (L*W*H)                                                                                                                              |                   |              |                                                |  |
|                                         | PACKING                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 0.29Kg; 48pcs/14.9Kg/0.75CUFT                                                                                                                    |                   |              |                                                |  |
| NOTE                                    | 1. All parameters NOT specially mentioned are measured at 110VDC 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 0.1 μ F & 47 μ F parallel capacitor.<br>3. Tolerance : includes set up tolerance, line regulation and load regulation.<br>4. 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."<br>(as available on <a href="https://www.meanwell.com/Upload/PDF/EMI_statement_en.pdf">https://www.meanwell.com/Upload/PDF/EMI_statement_en.pdf</a> )<br>5. Strongly recommended that external output capacitance should not exceed 5000uF.<br>6. The ambient temperature derating of 3.5℃/1000m with fanless models and of 5℃/1000m with fan models for operating altitude higher than 2000m(6500ft).<br>※ Product Liability Disclaimer : For detailed information, please refer to <a href="https://www.meanwell.com/serviceDisclaimer.aspx">https://www.meanwell.com/serviceDisclaimer.aspx</a> |                                                                                                                                                  |                   |              |                                                |  |

### Block Diagram



### Input Fuse

There is one fuse connected in series to the positive input line, which is used to protect against abnormal surge. Fuse specifications of each model are shown as below.

| Type | Fuse Type | Reference and Rating   |
|------|-----------|------------------------|
| G    | Time-Lag  | CONQUE MST, 10A, 250V  |
| L    | Time-Lag  | CONQUE MST, 5A, 250V   |
| H    | Time-Lag  | CONQUE MST, 2.5A, 250V |

### Input Reverse Polarity Protection

There is a MOSFET connected in series to the negative input line. If the input polarity is connected reversely, the MOSFET opens and there will be no output to protect the unit.

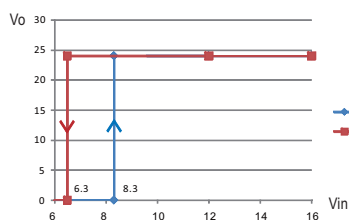
### Input Range and Transient Ability

The series has a wide range input capability. With  $\pm 40\%$  of rated input voltage, it can withstand that for 1 second.

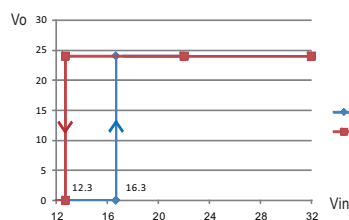
### Input Under-Voltage Protection

If input voltage drops below  $V_{min}$ , the internal control IC shuts down and there is no output voltage. It recovers automatically when input voltage reaches above  $V_{min}$ , please refer to the curve below.

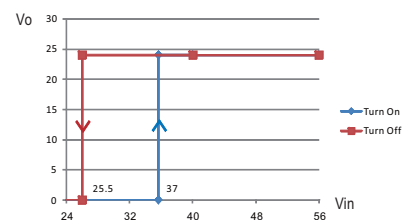
RSD-60G-24



RSD-60L-24



RSD-60H-24

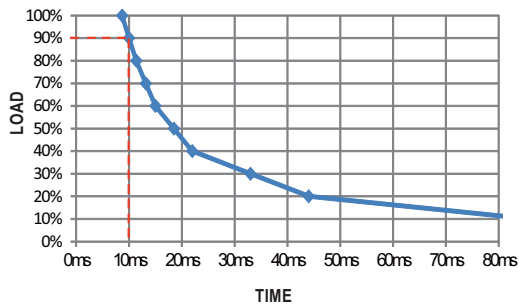


### Inrush Current

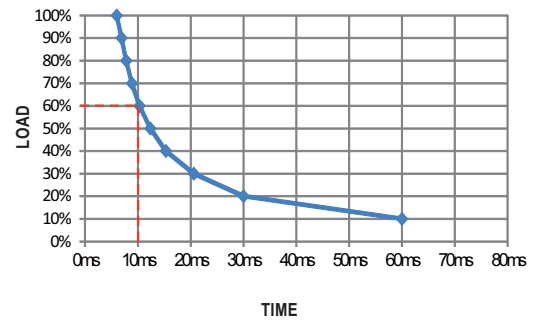
Inrush current is suppressed by a resistor during the initial start-up, and then the resistor is bypassed by a MOSFET to reduce power consumption after accomplishing the start-up.

## Hold-up Time

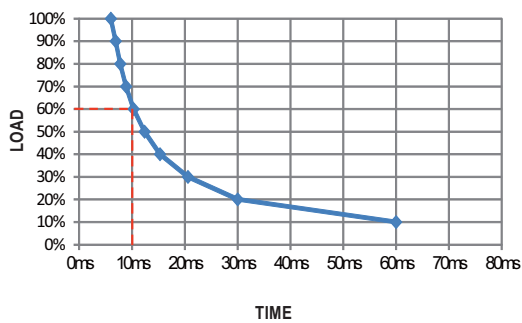
RSD-60G-3.3



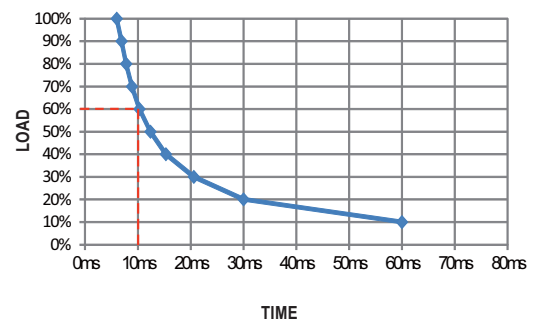
RSD-60G-5



RSD-60G-12



RSD-60G-24



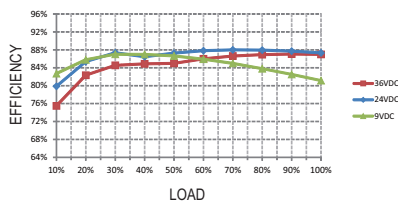
## Output Voltage Adjustment

This function is optional, which the standard product does not have it. If you do need the function, please contact MW for details.

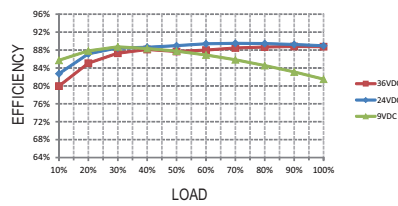
## Efficiency vs Load & Vin Curve

The efficiency vs load & Vin curves of each model are shown as below.

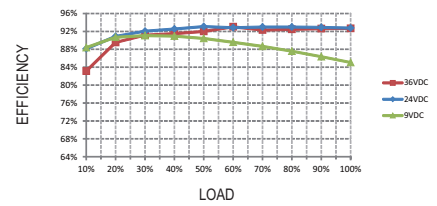
RSD-60G-3.3



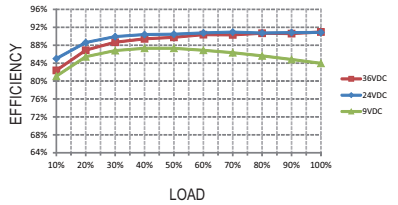
RSD-60G-5



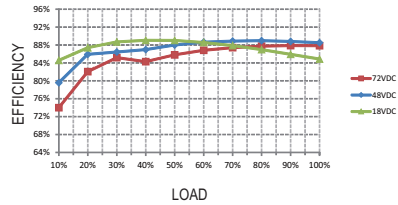
RSD-60G-12



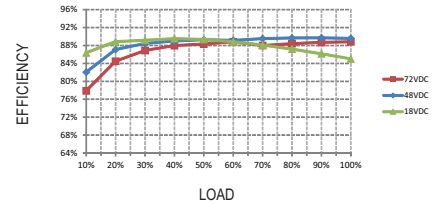
RSD-60G-24



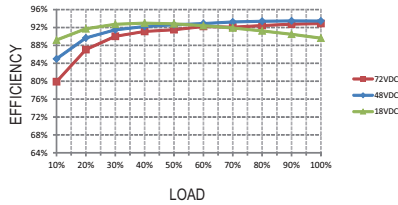
RSD-60L-3.3



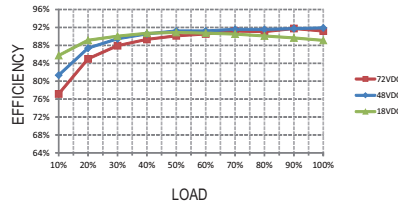
RSD-60L-5



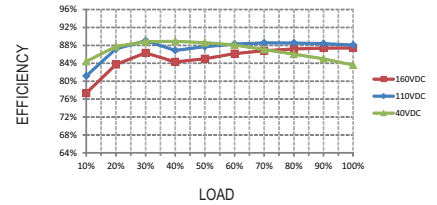
RSD-60L-12



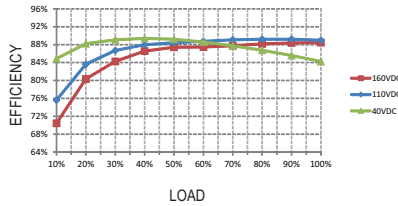
RSD-60L-24



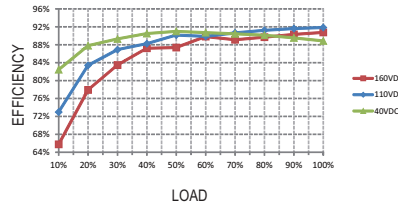
RSD-60H-3.3



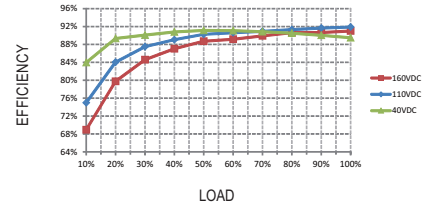
RSD-60H-5



RSD-60H-12



RSD-60H-24

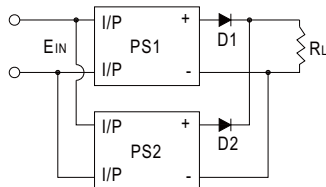


## Parallel and Series Connection

### A. Operation in Parallel

Since RSD-60 series don't have built-in parallel circuit, it can only use external circuits to achieve the redundant operation but not increase the current rating.

1. Add a diode at the positive-output of each power supply (as shown as below), the current rating of the diode should be larger than the maximum output current rating and attached to a suitable heat sink. This is only for redundant use (increase the reliability of the system) and users have to check suitability of the circuit by themselves.

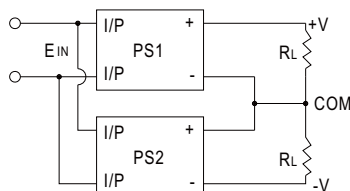


2. When using S.P.S. in parallel connection, the leakage current will increase at the same time. This could pose as a shock hazard for the user. So please contact the supplier if you have this kind of application.

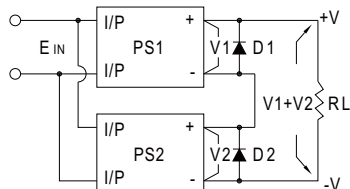
### B. Operation in Series

RSD-60 can be operated in series. Here are the methods of doing it:

1. Positive and negative terminals are connected as shown as below. According to the connection, you can get the positive and negative output voltages for your loads.

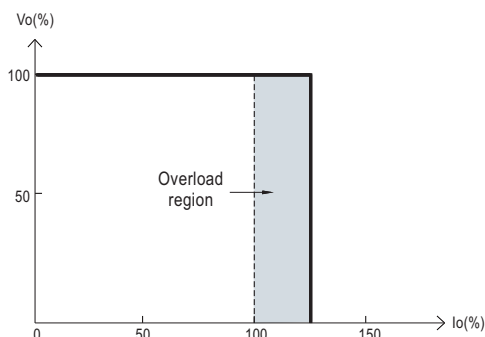


2. Increase the output voltage (current does not change). Because RSD-60 series have no reverse blocking diode in the unit, you should add an external blocking diode to prevent the damage of every unit while starting up. The voltage rating of the external diode should be larger than  $V1+V2$  (as shown as below).



## Overload Protection

If the output draw up to 105~135% of its output power rating, the converter will go into overload protection which is constant current mode. After the faulty condition is removed, it will recover automatically. Please refer to the diagram below for the detail operation characteristic. Please note that it's not suitable to operate within the overload region continuously, or it may cause to over temperature and reduce the life of the power supply unit or even damage it.



## Over Voltage Protection

The converter shuts off to protect itself when the output voltage drawn exceeds 115~140% of its output rating. It must be repowered on to recover.

## LED Indicator

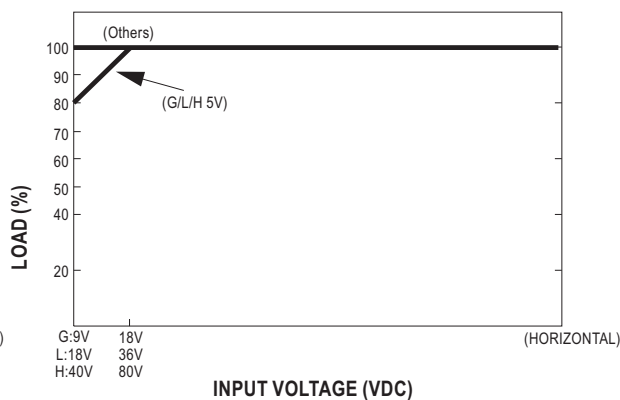
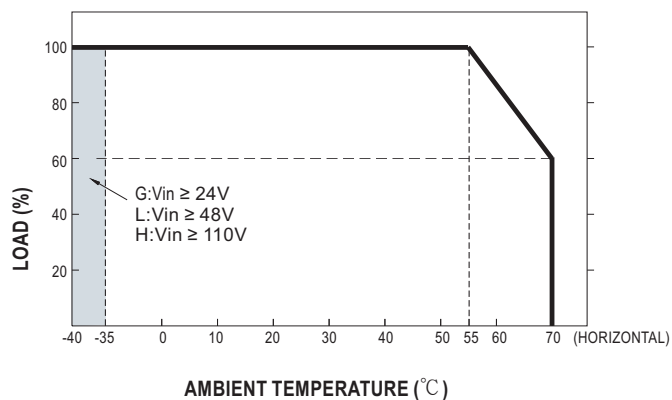
Equipped with a built-in LED indicator, the converter provides an easy way for users to check its condition through the LED indicator.

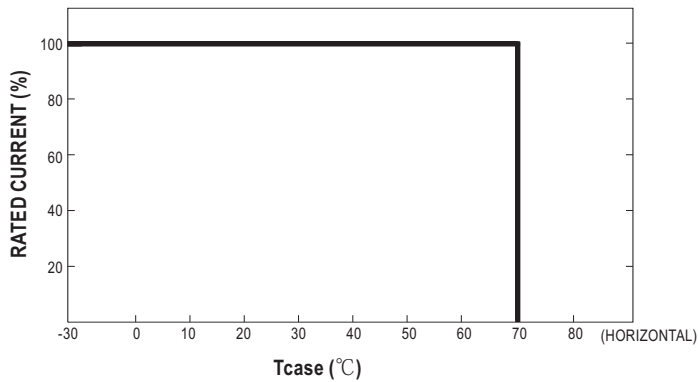
Green : normal operation; No signal: no power or failure.

## Derating Curve

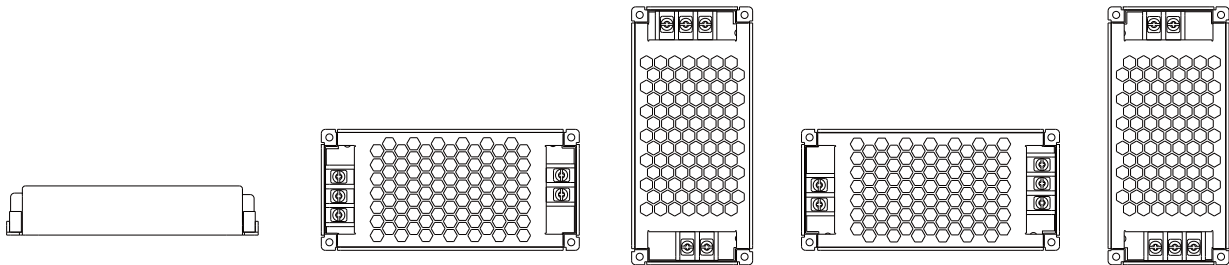
### a. Single unit operation

If the unit has no iron plate mounted on its bottom, the maximum ambient temperature for the unit will be 55°C as operating under full load condition. It requires de-rating output current when ambient temperature is between 55~70°C, please refer to the de-rating curve as below.



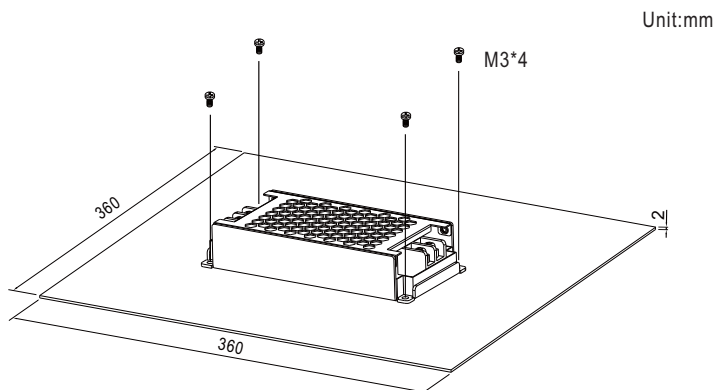


Suitable installation methods are shown as below. Since RSD-60 is a semi-potted model, its thermal performances for the following installation methods are similar and share the same derating curve.

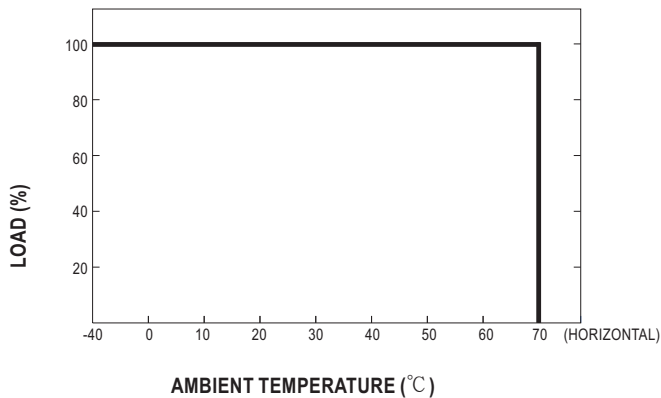


## b. Operate with additional iron plate

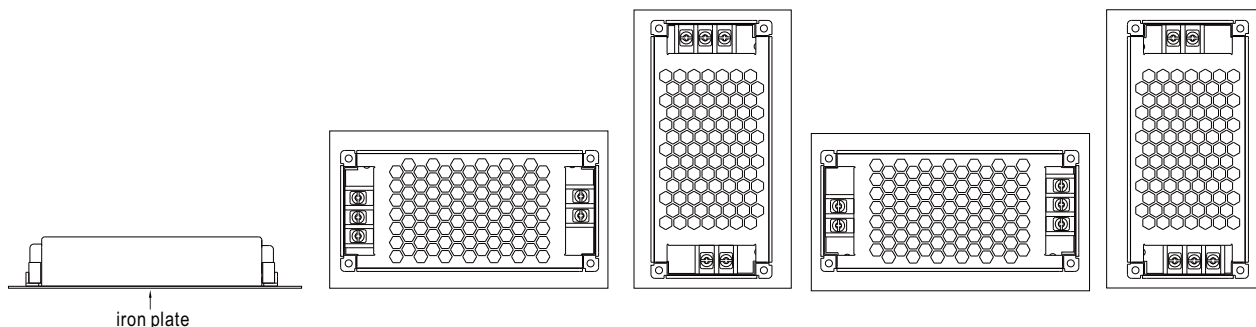
If it is necessary to fulfil the requirements of EN50155 TX level that operate the unit fully-loaded at 70°C, RSD-60 series must be installed onto an iron plate on the bottom. The size of the suggested iron plate is shown as below. In order for optimal thermal performance, the iron plate must have an even & smooth surface and RSD-60 series must be firmly mounted at the center of the iron plate.



The load vs ambient temperature curve is shown as below.



Suitable installation methods are shown as below. Since RSD-60 is a semi-potted model, its thermal performances for the following installation methods are similar and share the same derating curve.



### Immunity to Environmental Conditions

| Test method                  | Standard                 | Test conditions                                                     | Status |
|------------------------------|--------------------------|---------------------------------------------------------------------|--------|
| Dry Heat Test                | EN 50155 section 13.4.5  | Temperature: 70°C / 85°C<br>Duration: 6 hrs / 10min                 | PASS   |
| Damp Heat Test, Cyclic       | EN 50155 section 13.4.8  | Temperature: 25°C~55°C<br>Humidity: 90%~100% RH<br>Duration: 48 hrs | PASS   |
| Vibration Test               | EN 50155 section 13.4.10 | Temperature: 19°C<br>Humidity: 65%<br>Duration: 10 mins             | PASS   |
| Shock Test                   | EN 50155 section 13.4.10 | Temperature: 21± 3°C<br>Humidity: 65 ± 5%<br>Duration: 30ms*18      | PASS   |
| Low Temperature Storage Test | EN 50155 section 13.4.6  | Temperature: -40°C<br>Dwell Time: 16 hrs                            | PASS   |
| Salt Mist Test               | EN 50155 section 13.4.13 | Temperature: 35°C ±2°C<br>Duration: 96 hrs                          | PASS   |

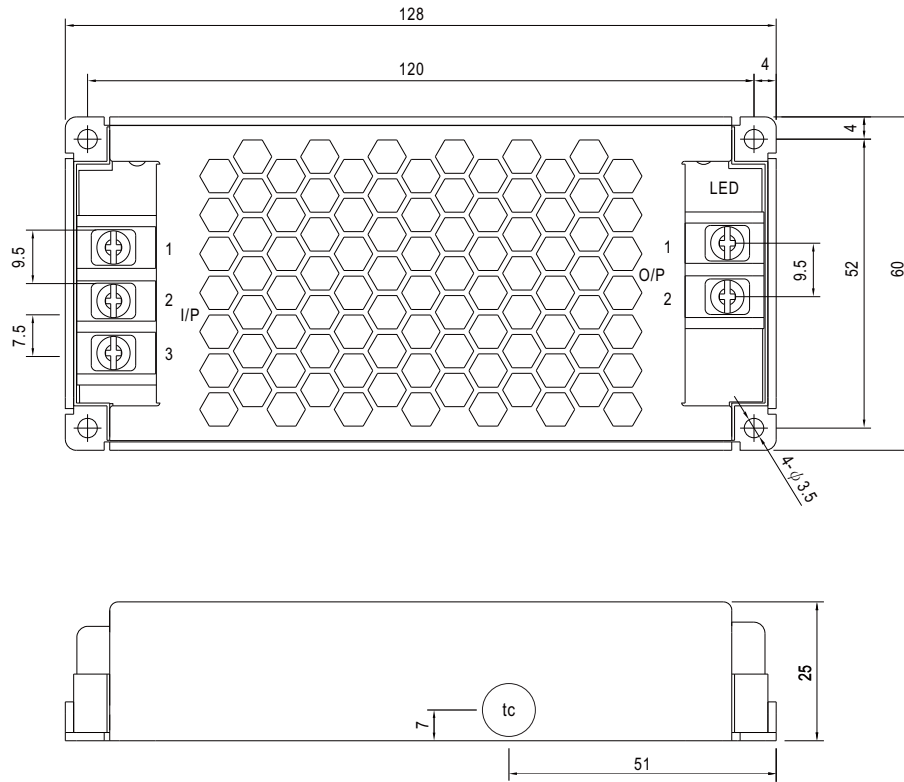
### EN45545-2 Fire Test Conditions

| Test Items      |     |                     |                                        | Hazard Level |      |      |
|-----------------|-----|---------------------|----------------------------------------|--------------|------|------|
| Items           |     | Standard            |                                        | HL1          | HL2  | HL3  |
| PCB             | R22 | Oxygen index test   | EN 45545-2:2020<br>EN ISO 4589-2:2017  | PASS         | PASS | PASS |
|                 |     | Smoke density test  | EN 45545-2:2020<br>EN ISO 5659-2:2017  | PASS         | PASS | PASS |
|                 |     | Smoke toxicity test | EN 45545-2:2020<br>EN 17084:2018       | PASS         | PASS | PASS |
|                 | R24 | Oxygen index test   | EN 45545-2:2020<br>EN ISO 4589-2:2017  | PASS         | PASS | PASS |
|                 | R25 | Glow-wire test      | EN 45545-2:2020<br>EN 60695-2-11:2014  | PASS         | PASS | PASS |
| Potting         | R24 | Oxygen index test   | EN 45545-2:2020<br>EN ISO 4589-2:2017  | PASS         | PASS | PASS |
| Terminal; block | R26 | Vertical flame test | EN 45545-2:2020<br>EN 60695-11-10:2013 | PASS         | PASS | PASS |

## Mechanical Specification

(Unit: mm , tolerance  $\pm 1$  mm)

Case No.255



•  $t_c$  : Max. Case Temperature

Input Terminal Pin No. Assignment :

| Pin No. | Assignment  |
|---------|-------------|
| 1       | DC INPUT V+ |
| 2       | DC INPUT V- |
| 3       | FG $\perp$  |

Output Terminal Pin No. Assignment :

| Pin No. | Assignment   |
|---------|--------------|
| 1       | DC OUTPUT -V |
| 2       | DC OUTPUT +V |

## Installation Manual

Please refer to : <http://www.meanwell.com/manual.html>