



40W 2"x1" Package Reliable Railway DC-DC Converter RSDW40 & RDDW40 series



■ Features

- Compliance with EN50155 railway standard
- 2"x1" compact size with low profile(10.5mm)
- 4:1 wide input range
- Wide operating temperature range -40 ~ +90°C
- No minimum load required
- Full encapsulated
- Protections: Short circuit (Continuous) / Overload / Over voltage / Over temperature / Input under voltage lock-out
- 1.6KVDC,3KVDC I/O isolation by models
- Remote ON/OFF control
- 3 years warranty

■ Applications

- Bus, tram, metro or railway system
- Telecom/datacom system
- Wireless network
- Industrial control facility
- Instrument
- Analyzer
- Highly vibrating, heavily dusty, extremely low or high temperature harsh environment

■ Description

RSDW40 and RDDW40 series are 40W module type DC-DC reliable railway converter with 2"x1" package. It features international standard pins, a high efficiency up to 92%, wide working temperature range -40~+90°C, 1.6KVDC(F/G models)/3KVDC(H models) I/P-O/P isolation voltage, compliance with EN50155 railway standard, continuous-mode short circuit protection, etc. The models account for different input voltage 9~36V, 18~75V and 40~160V 4:1 wide input range, and various output voltage, 3.3V/5V/12V/15V/24V/48V for single output and ±12V/±15V for dual outputs, which are suitable for railway, trams, buses and also can be used in the harsh environment with high vibration, high dust, extremely low or high temperature, etc.

■ Model Encoding

RSDW40H-12

- Output voltage (3.3/5/12/15/24/48Vdc, ±12/±15Vdc)
- Input voltage (F: 9~36Vdc, G: 18~75Vdc, H: 40~160Vdc)
- Rated wattage
- Series name { S:Single output, D:Dual output



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| MODEL SELECTION TABLE | | | | | | | |
|-----------------------|-------------------------|---------------|-----------|----------------|----------------|-------------------|-----------------------|
| ORDER NO. | INPUT | | | OUTPUT | | EFFICIENCY (Typ.) | CAPACITOR LOAD (MAX.) |
| | INPUT VOLTAGE (RANGE) | INPUT CURRENT | | OUTPUT VOLTAGE | OUTPUT CURRENT | | |
| | | NO LOAD | FULL LOAD | | | | |
| RSDW40F-03 | Normal 24V (9 ~ 36V) | 15mA | 1.6A | 3.3V | 10A | 89% | 26600μF |
| RSDW40F-05 | | 15mA | 1.9A | 5V | 8A | 89% | 20000μF |
| RSDW40F-12 | | 15mA | 1.9A | 12V | 3.333A | 92% | 3900μF |
| RSDW40F-15 | | 15mA | 1.9A | 15V | 2.666A | 92% | 2600μF |
| RDDW40F-12 | | 15mA | 1.95A | ±12V | 0 ~ ±1.666A | 89% | *2600μF |
| RDDW40F-15 | | 15mA | 1.95A | ±15V | 0 ~ ±1.333A | 90% | *1600μF |
| RSDW40G-03 | Normal 48V (18 ~ 75V) | 15mA | 0.85A | 3.3V | 10A | 88% | 26600μF |
| RSDW40G-05 | | 15mA | 1A | 5V | 8A | 90% | 20000μF |
| RSDW40G-12 | | 15mA | 1A | 12V | 3.333A | 92% | 3900μF |
| RSDW40G-15 | | 15mA | 1A | 15V | 2.666A | 92% | 2600μF |
| RDDW40G-12 | | 15mA | 1A | ±12V | 0 ~ ±1.666A | 90% | *2600μF |
| RDDW40G-15 | | 15mA | 1A | ±15V | 0 ~ ±1.333A | 90% | *1600μF |
| RSDW40H-05 | Normal 110V (40 ~ 160V) | 10mA | 0.5A | 5V | 8A | 88.5% | 20000μF |
| RSDW40H-12 | | 10mA | 0.5A | 12V | 3.333A | 89% | 3900μF |
| RSDW40H-24 | | 10mA | 0.5A | 24V | 1.667A | 89% | 1300μF |
| RSDW40H-48 | | 10mA | 0.5A | 48V | 0.833A | 89% | 220μF |

* For each output

| SPECIFICATION | | | | |
|--------------------------------------|--|---|----------------------|---|
| INPUT | VOLTAGE RANGE | F: 9~36Vdc, G: 18~75Vdc, H: 40~160Vdc | | |
| | SURGE VOLTAGE (100ms max.) | 24Vin models : 50Vdc, 48Vin models : 100Vdc, 110Vin models : 200Vdc | | |
| | FILTER | Pi type | | |
| | PROTECTION | Fuse recommended. 24Vin models: 8A delay time Type, 48Vin models: 4A delay time Type, 110Vin models: 2A delay time Type | | |
| OUTPUT | VOLTAGE ACCURACY | ±1% | | |
| | RATED POWER | 40W | | |
| | RIPPLE & NOISE <small>Note.2</small> | Single output models: 3.3Vo~15Vo: 100mVp-p, 24Vo~48Vo: 150mVp-p Dual output models: 125mVp-p | | |
| | LINE REGULATION <small>Note.3</small> | Single output models: ±0.2%, Dual output models: ±0.5% | | |
| | LOAD REGULATION <small>Note.4</small> | Single output models: ±0.5%, Dual output models: ±1% | | |
| | CROSS REGULATION | ±5% @ 25%~100% load for 24Vin/48Vin models | | |
| | SWITCHING FREQUENCY (Typ.) | 250KHz | | |
| | EXTERNAL TRIM ADJ. RANGE (Typ.) | ±10% (Single output model only) | | |
| PROTECTION | SHORT CIRCUIT | Protection type : Continuous, automatic recovery | | |
| | OVERLOAD | 125 ~ 210% rated output power | | |
| | | Protection type : Recovers automatically after fault condition is removed | | |
| | OVER VOLTAGE | Protection type : Clamp by diode | | |
| | OVER TEMPERATURE | Tcase temperature 110°C max. | | |
| UNDER VOLTAGE LOCKOUT | 24Vin: 8Vdc, 48Vin: 16Vdc, 110Vin: 34Vdc | | | |
| FUNCTION | REMOTE CONTROL | Power ON: R.C~-Vin >3~12Vdc or open circuit Power OFF: R.C~-Vin <1.2Vdc or short | | |
| ENVIRONMENT | COOLING | Free-air convection | | |
| | WORKING TEMP. | -40 ~ +90°C (Refer to "Derating Curve") | | |
| | CASE TEMPERATURE | +110°C max. | | |
| | WORKING HUMIDITY | 20% ~ 90% RH non-condensing | | |
| | STORAGE TEMP., HUMIDITY | -55 ~ +125°C, 10 ~ 95% RH non-condensing | | |
| | TEMP. COEFFICIENT | 0.05% / °C (0 ~ 55°C) | | |
| | SOLDERING TEMPERATURE | 1.5mm from case of 1 ~ 3sec./260°C max. | | |
| | VIBRATION | 10 ~ 500Hz, 2G 10min./1cycle, period for 60min. each along X, Y, Z axes | | |
| SAFETY & EMC <small>(Note.5)</small> | SAFETY STANDARDS | EAC TP TC 004 approved | | |
| | WITHSTAND VOLTAGE | 24Vin / 48Vin models: I/P-O/P 1.6KVDC, 110Vin models: 3KVDC | | |
| | ISOLATION RESISTANCE | I/P-O/P:1000M Ohms / 500VDC / 25°C / 70% RH | | |
| | ISOLATION CAPACITANCE (Typ.) | 1500pF | | |
| | EMC EMISSION | Parameter | Standard | Test Level / Note |
| | | Conducted | EN55032 | Class A/B with external components (see page 6~7) |
| | | Radiated | EN55032 | |
| | EMC IMMUNITY | Parameter | Standard | Test Level / Note |
| | | ESD | EN61000-4-2 | Level 2, ±8KV air, ±6KV contact |
| | | EFT/Burest | EN61000-4-4 | Level 1, ±2KV |
| | | Surge | EN61000-4-5 | Level 1, ±2KV Line-Line |
| Conducted | | EN61000-4-6 | Level 2, 10V(e.m.f.) | |
| Magnetic field | | EN61000-4-8 | 10A/m | |
| RAILWAY STANDARD | EN50155 / IEC60571 including EN61373 for shock & vibration, EN50121-3-2 for EMC | | | |
| OTHERS | MTBF | 779Khrs MIL-HDBK-217F(25°C) | | |
| | DIMENSION (L*W*H) | 50.8*25.4*10.5mm (2*1*0.413 inch) | | |
| | CASE MATERIAL | Metal Case | | |
| | PACKING | F/G models: 37.6g, H models: 45g ; 18pcs/per tube, 288pcs/16 tube max./carton | | |
| NOTE | <p>1.All parameters are specified at normal input(F:24Vdc, G:48Vdc, H:110Vdc), rated load, 25°C 70% RH ambient.</p> <p>2.Ripple & noise are measured at 20MHz by using a 12" twisted pair terminated with a 0.1µf & 47µf capacitor.</p> <p>3.Line regulation is measured from low line to high line at rated load.</p> <p>4.Load regulation is measured from 0% to 100% rated load.</p> <p>5.The final equipment must be re-confirm that it still meet EMC directives. For guidance on how to perform these EMC tests, please refer to "EMI testing of component power supplies."(as available on http://www.meanwell.com)</p> | | | |

External Output Trimming

In order to trim the voltage up or down one needs to connect the trim resistor either between the trim pin and -Vo for trim-up and between trim pin and +Vo for trim-down. The output voltage trim range is ±10%. This is shown in Figures 1 and 2:

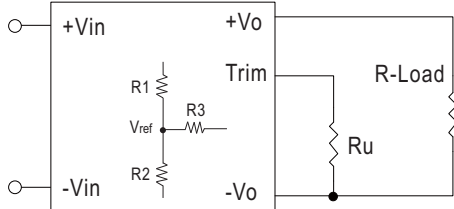


Figure 1. Trim-up Voltage Setup

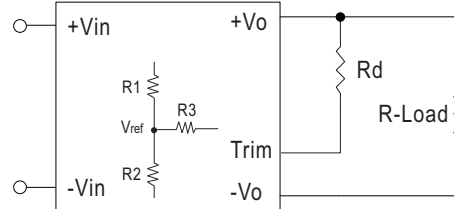


Figure 2. Trim-down Voltage Setup

Trim-up :

$$R_u = \frac{aR_2}{R_2-a} - R_3, a = \frac{V_{ref}}{V_o' - V_{ref}} * R_1$$

Trim-down :

$$R_d = \frac{bR_1}{R_1-b} - R_3, b = \frac{V_o' - V_{ref}}{V_{ref}} * R_2$$

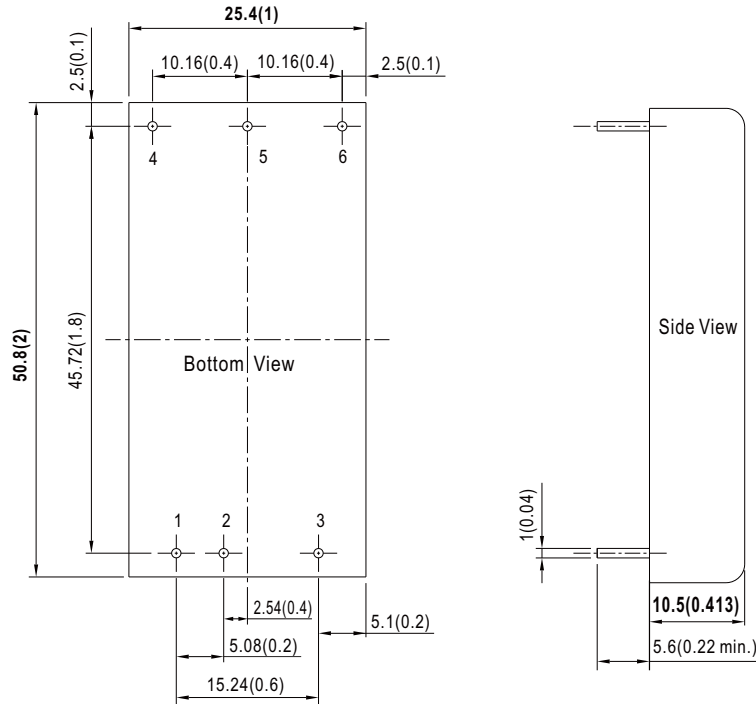
Note:

1. Ru, Rd is mean trim resistor, please check the formula.
2. a & b: user define parameter, no actual meanings.
3. Vo' is mean trim up/down voltage.
4. Value for R1, R2, R3 and Vref refer to below table.

| Model No. | Vout | Vref | R1 | R2 | R3 |
|--------------------|------|-------|---------|-------|--------|
| RSDW40F RDDW40F | 3.3V | 1.24V | 8.5KΩ | 5.1KΩ | 27KΩ |
| | 5V | 1.24V | 15.47KΩ | 5.1KΩ | 33KΩ |
| | 12V | 2.50V | 12.62KΩ | 3.3KΩ | 22KΩ |
| | 15V | 2.50V | 15.1KΩ | 3KΩ | 22KΩ |
| RSDW40G RDDW40G | 3.3V | 1.24V | 8.5KΩ | 5.1KΩ | 27KΩ |
| | 5V | 1.24V | 15.47KΩ | 5.1KΩ | 33KΩ |
| | 12V | 2.50V | 12.62KΩ | 3.3KΩ | 22KΩ |
| | 15V | 2.50V | 15.1KΩ | 3KΩ | 22KΩ |
| RSDW40H | 5V | 1.24V | 15.47KΩ | 5.1KΩ | 30KΩ |
| | 12V | 2.50V | 38KΩ | 10KΩ | 68KΩ |
| | 24V | 2.50V | 86KΩ | 10KΩ | 76.8KΩ |
| | 48V | 2.50V | 182KΩ | 10KΩ | 80.6KΩ |

■ Mechanical Specification

- All dimensions in mm(inch)
- Tolerance: $x.xx \pm 0.35\text{mm}$ ($x.xxx \pm 0.013"$)
- Pin size is: $1 \pm 0.1\text{mm}$ ($0.04" \pm 0.005"$)

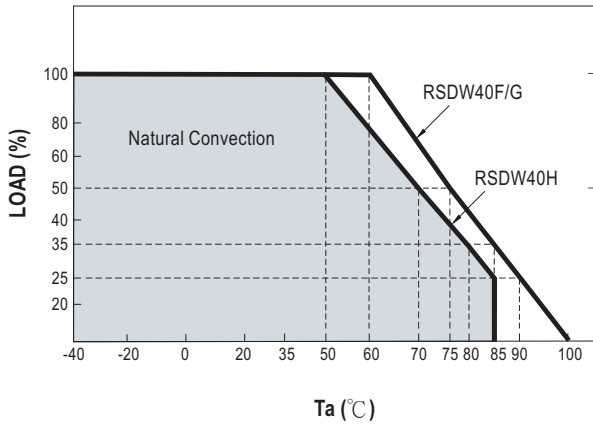


■ Plug Assignment

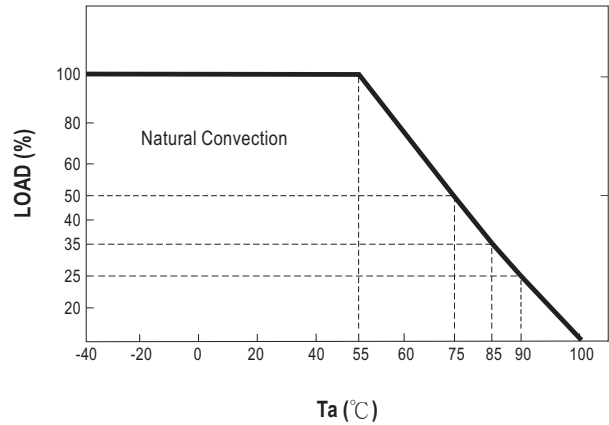
| Pin-Out | | |
|---------|---------------------------|-------------------------|
| Pin No. | RSDW40 (Single output) | RDDW40 (Dual output) |
| 1 | +Vin | +Vin |
| 2 | -Vin | -Vin |
| 3 | Remote ON/OFF | Remote ON/OFF |
| 4 | +Vout | +Vout |
| 5 | -Vout | Common |
| 6 | Trim | -Vout |

Derating Curve

RSDW40F/G/H (Single output models):



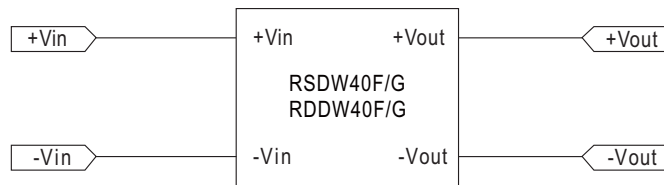
RDDW40F/G (Dual output models):



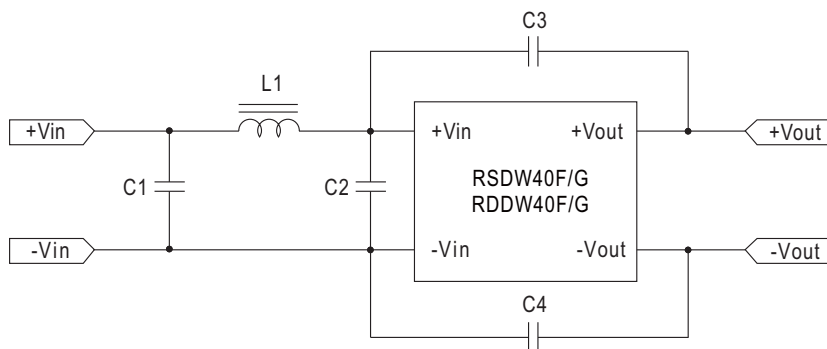
EMC Suggestion Circuit

F models(9~36Vin) and G models(18~75Vin):

※Comply to EN55032 Class A emission without additional componets are as below:



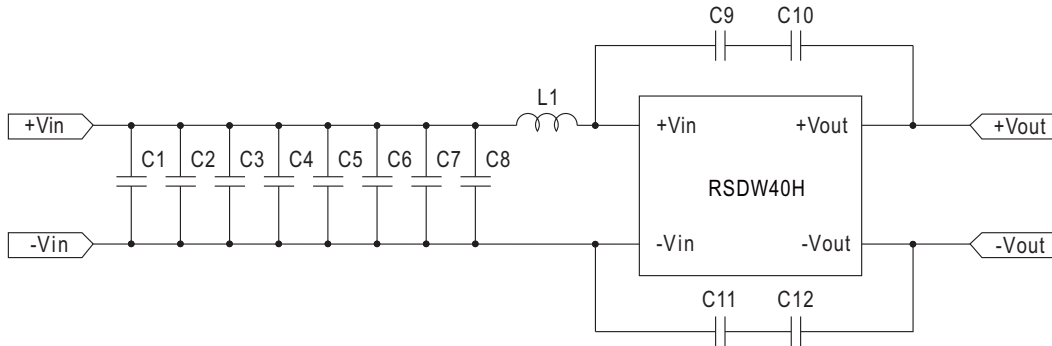
※Required external componets to meet EN55032 Class B emission are as below:



| Model No. | C1 | L1 | C2 | C3 | C4 |
|--------------------------------------|-------------|-------------|-------------|--------|--------|
| RSDW40F-03/05/12/15 RDDW40F-12/15 | 10 μ F | 1.5 μ H | 10 μ F | 2200pF | 2200pF |
| RSDW40G-03/05/12/15 RDDW40G-12/15 | 4.7 μ F | 3.3 μ H | 4.7 μ F | 2200pF | 2200pF |

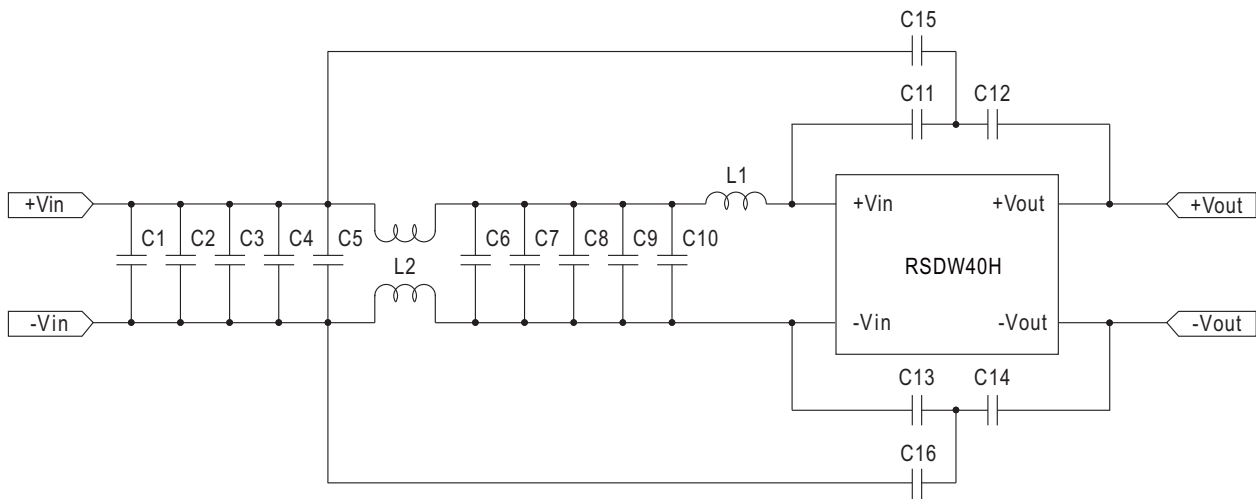
H models(40~160Vin):

※Required external componets to meet EN55032 Class A emission are as below:



| Model No. | L1 | C1 | C2 | C3 | C4 | C5 | C6 | C7 | C8 | C9 | C10 | C11 | C12 |
|--------------------|------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| RSDW40H-5/12/24/48 | 68μH | 0.68μH | 0.68μH | 0.68μH | 0.68μH | 0.68μH | 0.68μH | 0.68μH | 0.68μH | 4700pF | 4700pF | 4700pF | 4700pF |

※Required external componets to meet EN55032 Class B emission are as below:



| Model No. | L1 | L2 | C1 | C2 | C3 | C4 | C5 | C6 | C7 | C8 | C9 | C10 | C11 | C12 | C13 | C14 | C15 | C16 |
|---------------|------|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|------|------|
| RSDW40H-05/12 | 68μH | 2.2mH | 0.68μF | 0.68μF | 0.68μF | 0.68μF | 0.68μF | 0.68μF | 0.68μF | 0.68μF | 0.68μF | 0.68μF | 4700pF | 4700pF | 4700pF | 4700pF | 47pF | 47pF |
| RSDW40H-24/48 | 68μH | 2.2mH | 0.68μF | 0.68μF | 0.68μF | 0.68μF | 0.68μF | 0.68μF | 0.68μF | 0.68μF | 0.68μF | 0.68μF | 4700pF | 4700pF | 4700pF | 4700pF | 33pF | 33pF |

■ Installation Manual

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