



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



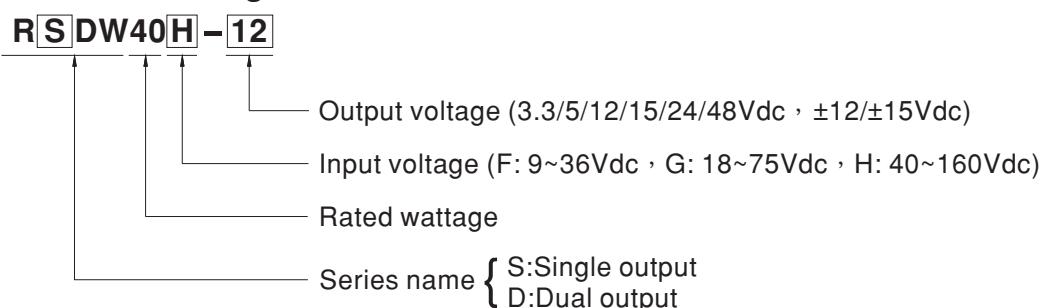
■ Features

- 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

■ 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



■ 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



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 Note.2	Single output models: 3.3Vo~15Vo: 100mVp-p, 24Vo~48Vo: 150mVp-p Dual output models: 125mVp-p	
	LINE REGULATION Note.3	Single output models: ±0.2%, Dual output models: ±0.5%	
	LOAD REGULATION Note.4	Single output models: ±0.5%, Dual output models: ±1%	
	CROSS REGULATION	±5% @ 25%~100% load for 24Vin/48Vin models	
	SWITCHING FREQUENCY (Typ.)	250KHz	
PROTECTION	EXTERNAL TRIM ADJ. RANGE (Typ.)	±10% (Single output model only)	
	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	
FUNCTION	OVER TEMPERATURE	Tcase temperature 110°C max.	
	UNDER VOLTAGE LOCKOUT	24Vin: 8Vdc, 48Vin: 16Vdc, 110Vin: 34Vdc	
	REMOTE CONTROL	Power ON: R.C~-Vin >3~12Vdc or open circuit Power OFF: R.C~-Vin <1.2Vdc or short	
	COOLING	Free-air convection	
	WORKING TEMP.	-40 ~ +90°C (Refer to "Derating Curve")	
ENVIRONMENT	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 STANDARDS	EAC TP TC 020/2011(EAC TP TC 004 for 48Vin/110Vin type only) approved	
SAFETY & EMC (Note.5)	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
		Conducted	BS EN/EN55032
		Radiated	BS EN/EN55032
	EMC IMMUNITY	Parameter	Standard
		ESD	BS EN/EN61000-4-2
		EFT/Burst	BS EN/EN61000-4-4
		Surge	BS EN/EN61000-4-5
		Conducted	BS EN/EN61000-4-6
		Magnetic field	BS EN/EN61000-4-8
	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	1. All parameters are specified at normal input(F:24Vdc, G:48Vdc, H:110Vdc), rated load, 25°C 70% RH ambient. 2. Ripple & noise are measured at 20MHz by using a 12" twisted pair terminated with a 0.1μf & 47μf capacitor. 3. Line regulation is measured from low line to high line at rated load. 4. Load regulation is measured from 0% to 100% rated load. 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) ※ Product Liability Disclaimer : For detailed information, please refer to https://www.meanwell.com/serviceDisclaimer.aspx		

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 $\pm 10\%$. This is shown in Figures 1 and 2:

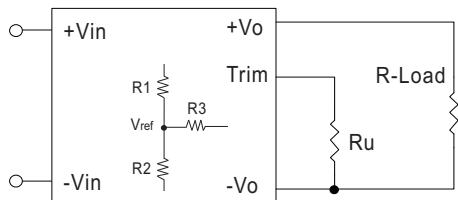


Figure 1. Trim-up Voltage Setup

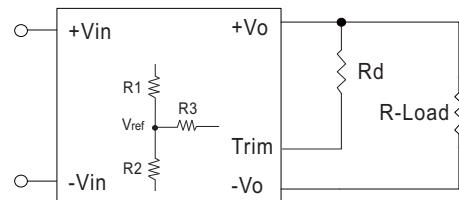


Figure 2. Trim-down Voltage Setup

1. The value of Rtrim-up defined as:

$$R_{\text{trim-up}} = \frac{aR2}{R2-a} - R3, a = \frac{V_{\text{ref}}}{V_{\text{o'}}-V_{\text{ref}}} \times R1$$

For example, to trim-up the output voltage of 5.0V module (RSDW40F-05) by 10% to 5.5V, $R_{\text{trim-up}}$ is calculated as follows:

$$V_{\text{o'}} = 5.5\text{V}$$

$$V_{\text{ref}} = 1.24\text{V}$$

$$R1 = 15.47\text{ k}\Omega$$

$$R2 = 5.1\text{ k}\Omega$$

$$R3 = 33\text{ k}\Omega$$

$$a = \frac{V_{\text{ref}}}{V_{\text{o'}}-V_{\text{ref}}} \times R1$$

$$= \frac{1.24}{5.5 - 1.24} \times 15.47 = 4.503$$

$$R_{\text{trim-up}} = \frac{aR2}{R2-a} - R3$$

$$= \frac{4.503 \times 5.1}{5.1 - 4.503} - 33$$

$$= \frac{22.9653}{0.597} - 33$$

$$= 5.476\text{ k}\Omega$$

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

Note:

1. $R_{\text{trim-up}}$, $R_{\text{trim-down}}$ is mean trim resistor, please check the formula.

2. a & b: user define parameter, no actual meanings.

3. $V_{\text{o'}}$ is target trim voltage.

4. Value for R1, R2, R3 and Vref refer to below table.

2. The value of Rtrim-down defined as:

$$R_{\text{trim-down}} = \frac{bR1}{R1-b} - R3, b = \frac{V_{\text{o'}}-V_{\text{ref}}}{V_{\text{ref}}} \times R2$$

For example, to trim-down the output voltage of 5.0V module (RSDW40F-05) by 10% to 4.5V, $R_{\text{trim-down}}$ is calculated as follows:

$$V_{\text{o'}} = 4.5\text{V}$$

$$V_{\text{ref}} = 1.24\text{V}$$

$$R1 = 15.47\text{ k}\Omega$$

$$R2 = 5.1\text{ k}\Omega$$

$$R3 = 33\text{ k}\Omega$$

$$b = \frac{V_{\text{o'}}-V_{\text{ref}}}{V_{\text{ref}}} \times R2$$

$$= \frac{4.5 - 1.24}{1.24} \times 5.1 = 2.629 \times 5.1 = 13.408$$

$$R_{\text{trim-down}} = \frac{bR1}{R1-b} - R3$$

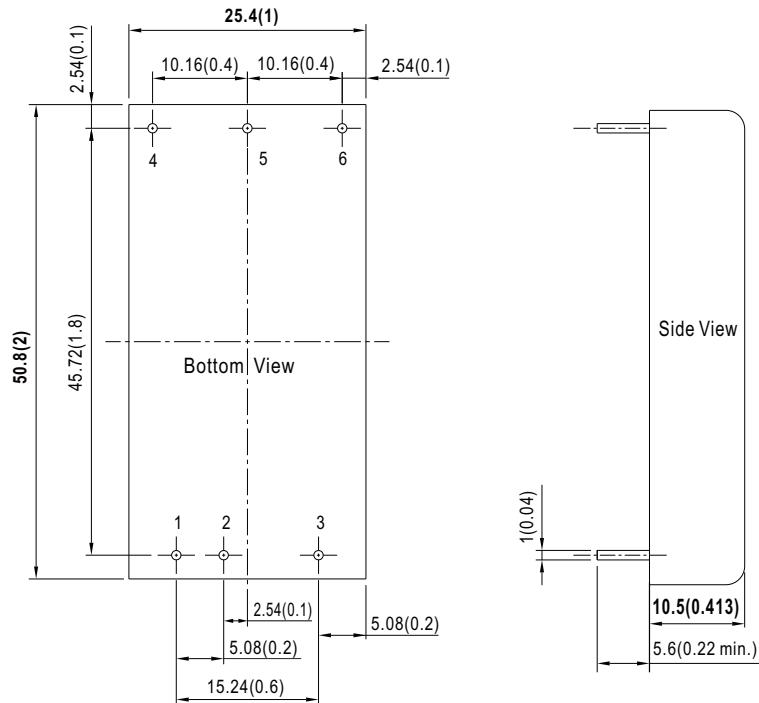
$$= \frac{13.408 \times 15.47}{15.47 - 13.408} - 33$$

$$= \frac{207.4217}{2.062} - 33$$

$$= 67.592\text{k}\Omega$$

40W 2"x1" Package Reliable Railway DC-DC Converter **RSDW40 & RDDW40** series**■ Mechanical Specification**

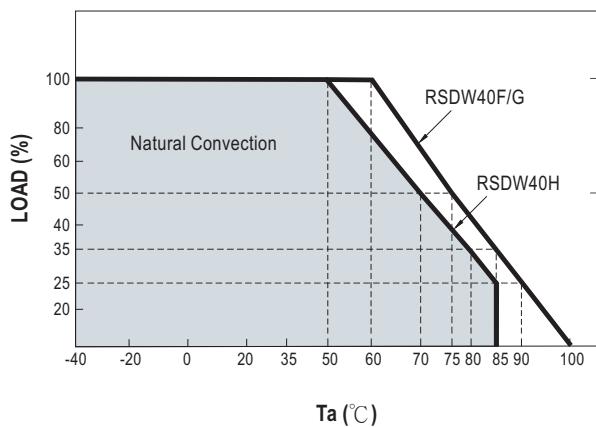
- All dimensions in mm(inch)
- Tolerance: $x.xx \pm 0.35\text{mm}(x.xxx \pm 0.013\text{"})$
- Pin size is: $1 \pm 0.1\text{mm}$ ($0.04\text{"} \pm 0.005\text{"}$)

**■ Plug Assignment**

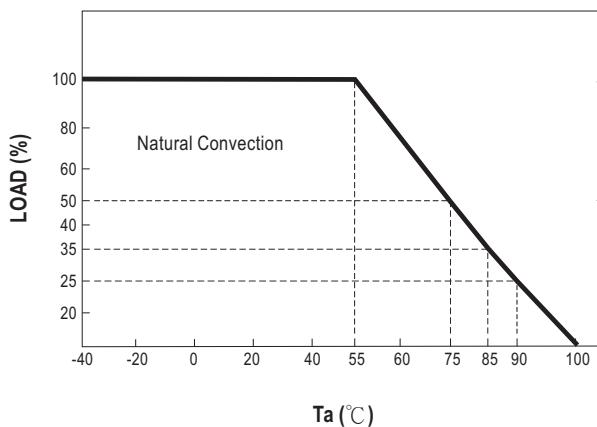
Pin-Out		
Pin No.	RSDW40 (Single output)	RDDW40 (Dual output)
1	+Vin	+Vin
2	-Vin	-Vin
3	Remote ON/OFF	Remote ON/OFF
4	+Vout	+Vout
5	-Vout	Common
6	Trim	-Vout

■ Derating Curve

RSDW40F/G/H (Single output models):



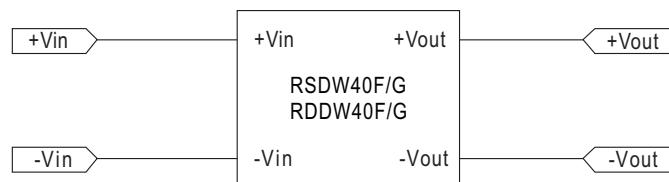
RDDW40F/G (Dual output models):



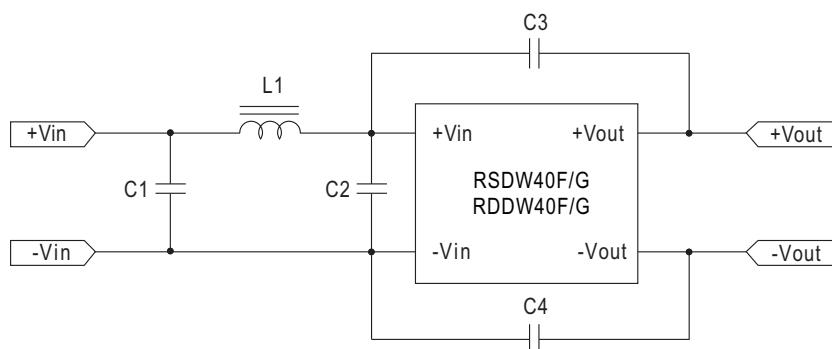
■ EMC Suggestion Circuit

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

※Comply to BS EN/EN55032 Class A emission without additional components are as below:



※Required external components to meet BS EN/EN55032 Class B emission are as below:



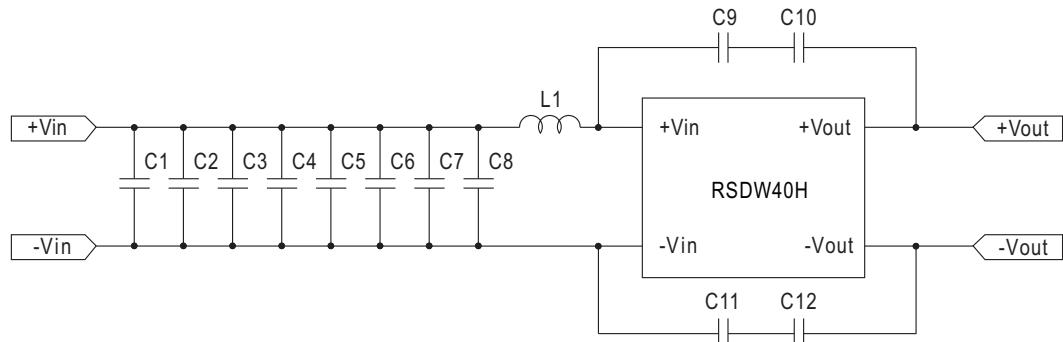
Model No.	C1	L1	C2	C3	C4
RSDW40F-03/05/12/15 RDDW40F-12/15	10μF	1.5μH	10μF	2200pF	2200pF
RSDW40G-03/05/12/15 RDDW40G-12/15	4.7μF	3.3μH	4.7μF	2200pF	2200pF



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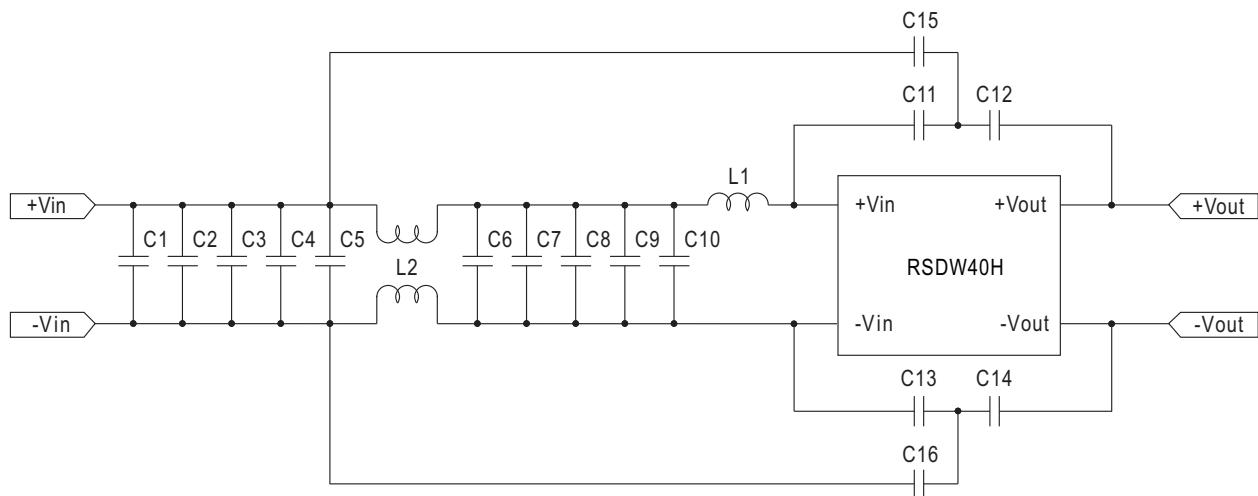
H models(40~160Vin):

※Required external components to meet BS EN/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	4700pF	4700pF	4700pF	4700pF							

※Required external components to meet BS EN/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	4700pF	4700pF	4700pF	4700pF	47pF	47pF									
RSDW40H-24/48	68μH	2.2mH	0.68μF	4700pF	4700pF	4700pF	4700pF	33pF	33pF									

■ Installation Manual

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