



20W 2"x1" Package Reliable Railway DC-DC Converter **RSDW20 & RDDW20** series



■ Features

- Compliance with EN50155 railway standard
- DIP 2"x1" package with standard pinout
- 4:1 wide input range
- Wide operating temperature range -40 ~ +85°C
- No minimum load required
- Full encapsulated
- Protections: Short circuit (Continuous) / Overload / Over voltage / Input under voltage
- 1.5KVDC, 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

■ GTIN CODE

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

■ Description

RSDW20 and RDDW20 series are 20W module type DC-DC reliable railway converter with 2"x1" package. It features international standard pins, a high efficiency up to 90%, wide working temperature range -40~+85°C, 1.5KVDC(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 43~160V 4:1 wide input range, and various output voltage, 3.3V/5V/12V/15V for single output and $\pm 5V/\pm 12V/\pm 15V$ 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

RSDW20H-12

Output voltage (3.3/5/12/15Vdc, $\pm 5/\pm 12/\pm 15Vdc$)

Input voltage (F: 9~36Vdc, G: 18~75Vdc, H: 43~160Vdc)

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				
RSDW20F-03	Normal 24V (9 ~ 36V)	55mA	869mA	3.3V	5500mA	87%	5500μF
RSDW20F-05		55mA	935mA	5V	4000mA	90%	4000μF
RSDW20F-12		55mA	928mA	12V	1670mA	90%	1800μF
RSDW20F-15		55mA	935mA	15V	1330mA	90%	1500μF
RDDW20F-05		70mA	945mA	±5V	±0 ~ 2000mA	89%	*2000μF
RDDW20F-12		35mA	947mA	±12V	±0 ~ 835mA	88%	*1000μF
RDDW20F-15		35mA	935mA	±15V	±0 ~ 666mA	88%	*800μF
RSDW20G-03	Normal 48V (18 ~ 75V)	25mA	430mA	3.3V	5500mA	88%	5500μF
RSDW20G-05		25mA	465mA	5V	4000mA	89%	4000μF
RSDW20G-12		25mA	465mA	12V	1670mA	90%	1800μF
RSDW20G-15		25mA	465mA	15V	1330mA	90%	1500μF
RDDW20G-05		45mA	468mA	±5V	±0 ~ 2000mA	89%	*2000μF
RDDW20G-12		25mA	470mA	±12V	±0 ~ 835mA	88%	*1000μF
RDDW20G-15		25mA	470mA	±15V	±0 ~ 666mA	88%	*800μF
RSDW20H-05	Normal 110V (43 ~ 160V)	3mA	205mA	5V	4000mA	88.5%	5600μF
RSDW20H-12		3mA	202mA	12V	1670mA	90%	1000μF
RSDW20H-15		3mA	203mA	15V	1330mA	89.5%	1000μF
RDDW20H-12		3mA	206mA	±12V	±0 ~ 833mA	89%	*680μF
RDDW20H-15		3mA	206mA	±15V	±0 ~ 667mA	88.5%	*350μF

* For each output

SPECIFICATION				
INPUT	VOLTAGE RANGE	F: 9~36Vdc , G: 18~75Vdc , H: 43~160Vdc		
	SURGE VOLTAGE (100ms max.)	24Vin models : 50Vdc, 48Vin models : 100Vdc, 110Vin models : 200Vdc		
	FILTER	Pi type		
	PROTECTION	Fuse recommended. 24Vin models: 4A delay time Type, 48Vin models: 2A delay time Type, 110Vin models: 0.8A delay time Type		
OUTPUT	VOLTAGE ACCURACY	± 1.5%		
	RATED POWER	20W		
	RIPPLE & NOISE Note.2	60mVp-p		
	LINE REGULATION Note.3	± 0.2%		
	LOAD REGULATION Note.4	Single output models: ± 0.5%, Dual output models: ± 1%		
	CROSS REGULATION	± 5% @ 25%~100% load		
	SWITCHING FREQUENCY (Typ.)	F/G: Single output 350KHz, Dual output 400KHz H: 250KHz		
	EXTERNAL TRIM ADJ. RANGE (Typ.)	± 10% (Single output model only)		
PROTECTION	SHORT CIRCUIT	Protection type : Continuous, automatic recovery		
	OVERLOAD	110 ~ 160% rated output power		
		Protection type : Recovers automatically after fault condition is removed		
	OVER VOLTAGE	Protection type : Clamp by diode		
	UNDER VOLTAGE LOCKOUT	Start-up voltage	24Vin: 8.8Vdc, 48Vin: 17Vdc, 110Vin: 40Vdc	
Shutdown voltage		24Vin: 8Vdc, 48Vin: 16Vdc, 110Vin: 38Vdc		
FUNCTION	REMOTE CONTROL	Power ON: >5.5~75Vdc or open circuit (F/G models) ; >3.5~75Vdc or open circuit (H models) Power OFF: <1.2Vdc or short (F/G/H models)		
ENVIRONMENT	COOLING	Free-air convection		
	WORKING TEMP.	-40 ~ +85℃ (Refer to "Derating Curve")		
	CASE TEMPERATURE	+105℃ max.		
	WORKING HUMIDITY	20% ~ 90% RH non-condensing		
	STORAGE TEMP., HUMIDITY	-55 ~ +125℃, 10 ~ 95% RH non-condensing		
	TEMP. COEFFICIENT	0.03% / °C (0 ~ 71℃)		
	SOLDERING TEMPERATURE	1.5mm from case of 1 ~ 3sec./260℃ max.		
	VIBRATION	10 ~ 500Hz, 2G 10min./1cycle, period for 60min. each along X, Y, Z axes		
SAFETY & EMC (Note.5)	SAFETY STANDARDS	EAC TP TC 020/2011(EAC TP TC 004 for 48Vin/110Vin type only) approved		
	WITHSTAND VOLTAGE	F/G: I/P-O/P 1.5KVDC, H: I/P-O/P 3KVDC		
	ISOLATION RESISTANCE	I/P-O/P:100M Ohms / 500VDC / 25℃ / 70% RH		
	ISOLATION CAPACITANCE (Typ.)	1000pF		
	EMC EMISSION	Parameter	Standard	Test Level / Note
		Conducted	BS EN/EN55032	Class B with external components
		Radiated	BS EN/EN55032	Class B with external components
	EMC IMMUNITY	Parameter	Standard	Test Level / Note
		ESD	BS EN/EN61000-4-2	Level 2, ±8KV air, ±4KV contact
		Radiated Susceptibility	BS EN/EN61000-4-3	Level 2, 3V/m
		EFT/Burest	BS EN/EN61000-4-4	Level 1, 0.5KV
		Surge	BS EN/EN61000-4-5	Level 1, 0.5KV Line-Line
		Conducted	BS EN/EN61000-4-6	Level 2, 3V(e.m.f.)
		RAILWAY STANDARD	EN50155 / IEC60571 including EN61373 for shock & vibration, EN50121-3-2 for EMC	
OTHERS	MTBF	F/G: 720Khrs ; H: 880Khrs MIL-HDBK-217F(25℃)		
	DIMENSION (L*W*H)	50.8*25.4*10.2mm (2*1*0.4 inch)		
	CASE MATERIAL	Black coated copper with Non-Conductive Base		
	PACKING	35g ; 12pcs/per tube, 300pcs/25 tube/per carton		
NOTE	1.All parameters are specified at normal input(F:24Vdc, G:48Vdc, H:110Vdc), rated load, 25℃ 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:

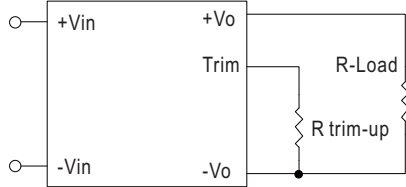


Figure 1. Trim-up Voltage Setup

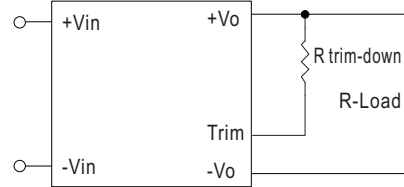


Figure 2. Trim-down Voltage Setup

1. The value of Rtrim-up defined as:

$$R_{\text{trim-up}} = \left(\frac{V_r \times R_1 \times (R_2 + R_3)}{(V_o - V_{o, \text{nom}}) \times R_2} \right) - R_t \text{ (K}\Omega\text{)}$$

Where

$R_{\text{trim-up}}$ is the external resistor in Kohm.

$V_{o, \text{nom}}$ is the nominal output voltage.

V_o is the desired output voltage.

R_1 , R_t , R_2 , R_3 and V_r are internal to the unit and are defined in Table 1.

For example, to trim-up the output voltage of 5.0V module (RSDW20F-05) by 10% to 5.5V, $R_{\text{trim-up}}$ is calculated as follows:

$$V_o - V_{o, \text{nom}} = 5.5 - 5.0 = 0.5V$$

$$R_1 = 2.32 \text{ K}\Omega$$

$$R_2 = 2.32 \text{ K}\Omega$$

$$R_3 = 0 \text{ K}\Omega$$

$$R_t = 8.2 \text{ K}\Omega$$

$$V_r = 2.5V$$

$$R_{\text{trim-up}} = \left(\frac{2.5 \times 2.32 \times (2.32+0)}{0.5 \times 2.32} \right) - 8.2 = 3.4(\text{K}\Omega)$$

2. The value of Rtrim-down defined as:

$$R_{\text{trim-down}} = R_1 \times \left(\frac{V_r \times R_1}{(V_{o, \text{nom}} - V_o) \times R_2} - 1 \right) - R_t \text{ (K}\Omega\text{)}$$

Where

$R_{\text{trim-down}}$ is the external resistor in Kohm.

$V_{o, \text{nom}}$ is the nominal output voltage.

V_o is the desired output voltage.

R_1 , R_t , R_2 , R_3 and V_r are internal to the unit and are defined in Table 1.

For example, to trim-down the output voltage of 5.0V module (RSDW20F-05) by 10% to 4.5V, $R_{\text{trim-down}}$ is calculated as follows:

$$V_{o, \text{nom}} - V_o = 5.0 - 4.5 = 0.5V$$

$$R_1 = 2.32 \text{ K}\Omega$$

$$R_2 = 2.32 \text{ K}\Omega$$

$$R_3 = 0 \text{ K}\Omega$$

$$R_t = 8.2 \text{ K}\Omega$$

$$V_r = 2.5V$$

$$R_{\text{trim-down}} = 2.32 \times \left(\frac{2.5 \times 2.32}{0.5 \times 2.32} - 1 \right) - 8.2 = 1.08 \text{ (K}\Omega\text{)}$$

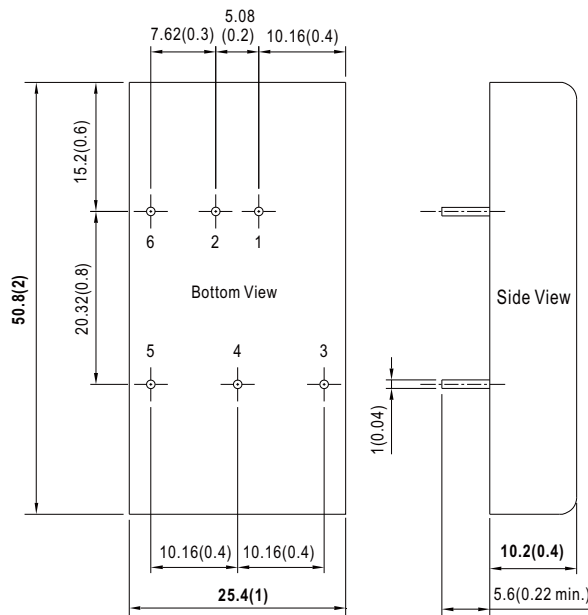
Table 1 – Trim up and Trim down Resistor Values

Model Number	Output Voltage(V)	R1 (KΩ)	R2 (KΩ)	R3 (KΩ)	Rt (KΩ)	Vr (V)
RSDW20F-03 RSDW20G-03	3.3	2.74	1.8	0.27	9.1	1.24
RSDW20F-05 RSDW20G-05 RSDW20H-05	5.0	2.32	2.32	0	8.2	2.5
RSDW20F-12 RSDW20G-12 RSDW20H-12	12.0	6.8	2.4	2.32	22	2.5
RSDW20F-15 RSDW20G-15 RSDW20H-15	15.0	8.06	2.4	3.9	27	2.5

■ Mechanical Specification

- All dimensions in mm(inch)
- Tolerance: $x.xx \pm 0.5\text{mm}$ ($x.xx \pm 0.02"$)
 $x.xx \pm 0.25\text{mm}$ ($x.xxx \pm 0.010"$)
- Pin size is: $0.5 \pm 0.05\text{mm}$ ($0.02" \pm 0.002"$)

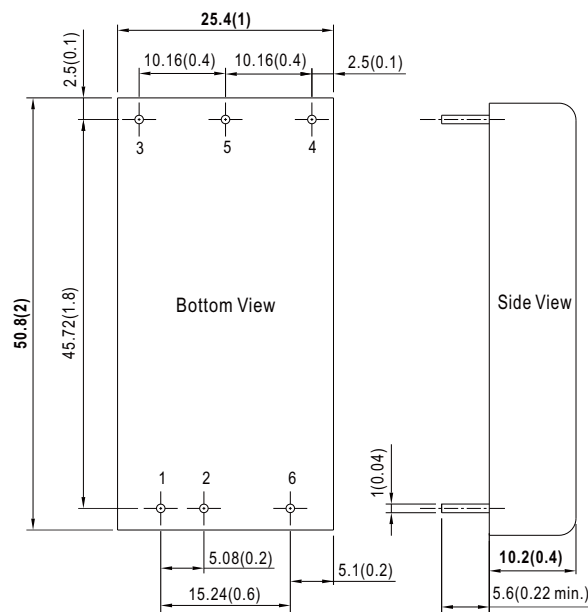
※ **F models(9~36Vin)** and **G models(18~75Vin)**:



■ Plug Assignment

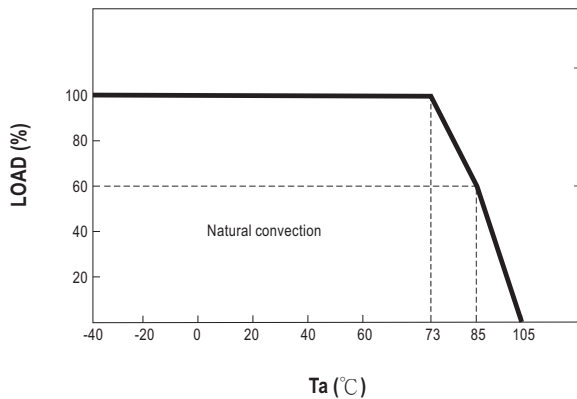
Pin-Out		
Pin No.	RSDW20F/G (Single output)	RDDW20F/G (Dual output)
1	+Vin	+Vin
2	-Vin	-Vin
3	+Vout	+Vout
4	Trim	Common
5	-Vout	-Vout
6	Remote ON/OFF	Remote ON/OFF

※ **H models(43~160Vin)**:



Pin-Out		
Pin No.	RSDW20H (Single output)	RDDW20H (Dual output)
1	+Vin	+Vin
2	-Vin	-Vin
3	+Vout	+Vout
4	Trim	-Vout
5	-Vout	Common
6	Remote ON/OFF	Remote ON/OFF

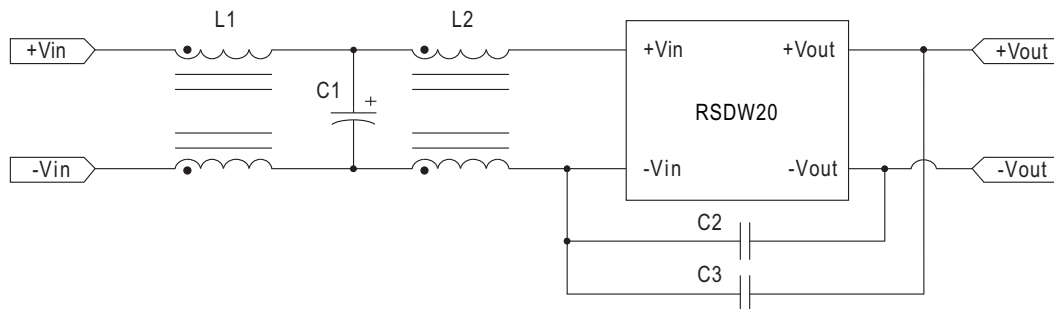
Derating Curve



EMC Suggestion Circuit

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

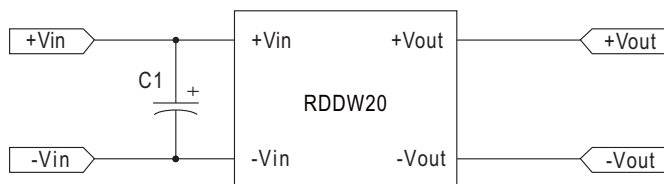
※Comply to BS EN/EN55032 conducted Class A without additional componets, required external componets to meet BS EN/EN55032 conducted Class B emission are as below:



Model No.	BS EN/EN55032 Class B				
	C1	C2	C3	L1	L2
RSDW20F-03	220μF/50V KY	1000pF/2KV	1000pF/2KV	SHORT	1.2mH
RSDW20F-05	220μF/50V KY	1000pF/2KV	1000pF/2KV	SHORT	1.2mH
RSDW20F-12	220μF/50V KY	1000pF/2KV	1000pF/2KV	SHORT	1.2mH
RSDW20F-15	220μF/50V KY	1000pF/2KV	1000pF/2KV	SHORT	1.2mH
RSDW20G-03	220μF/100V PW	1000pF/2KV	1000pF/2KV	0.15mH	1.2mH
RSDW20G-05	220μF/100V PW	1000pF/2KV	1000pF/2KV	0.15mH	1.2mH
RSDW20G-12	220μF/100V PW	1000pF/2KV	1000pF/2KV	0.15mH	1.2mH
RSDW20G-15	220μF/100V PW	1000pF/2KV	1000pF/2KV	0.15mH	1.2mH

Note: C1 is NIPPON-CHEMICON KY series or NICHICON PW series aluminum capacitor
C2, C3 are ceramic capacitors

※Required external componets to meet BS EN/EN55032 conducted Class A emission are as below:



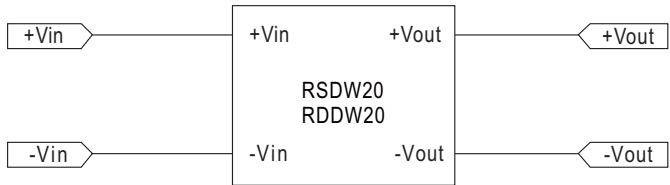
Model No.	BS EN/EN55032 Class A
	C1
RDDW20F-05	10μF/50V/MLCC 1210
RDDW20F-12	10μF/50V/MLCC 1210
RDDW20F-15	10μF/50V/MLCC 1210
RDDW20G-05	NC
RDDW20G-12	NC
RDDW20G-15	NC



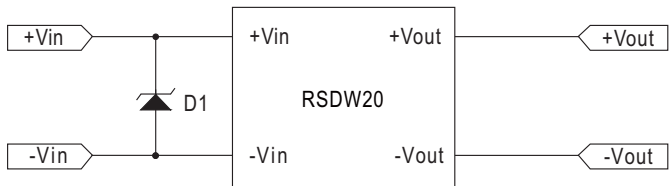
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H models(43~160Vin):

※Comply to BS EN/EN55032 conducted Class A without additional componets are as below:



※Required external componets to meet BS EN/EN50121-3-2(BS EN/EN55011 Class A conducted & Radiated Emission) are as below:



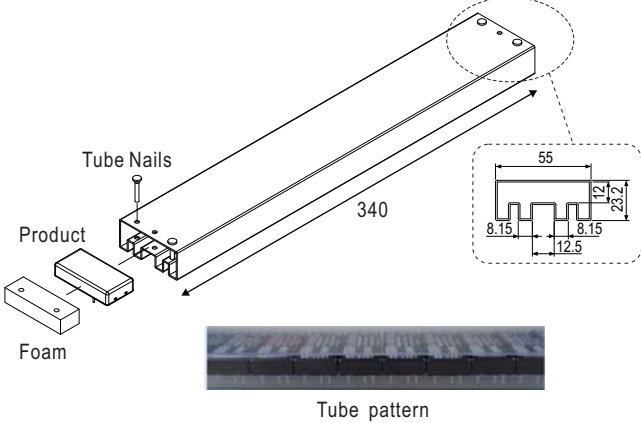
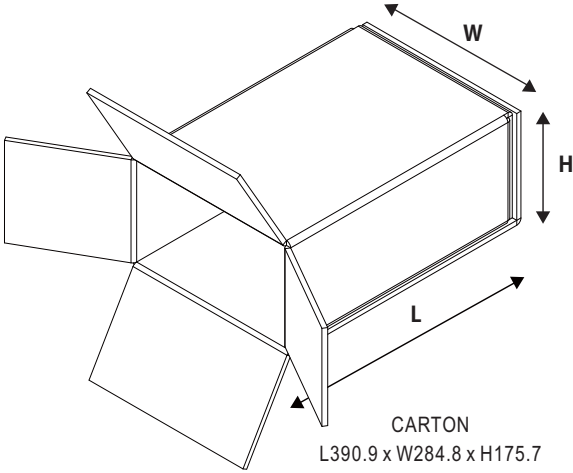
Model No.	D1
RSDW20H-05	P6KE180A Littelfuse
RSDW20H-12	P6KE180A Littelfuse
RSDW20H-15	P6KE180A Littelfuse



20W 2"x1" Package Reliable Railway DC-DC Converter

RSDW20 & RDDW20 series

Packing

Standard Tube Packing	MPQ Per Tube (PCS)	One Tube G.W.	Max. Q'TY/ Carton(PCS)	One Carton G.W.
Unit : mm   CARTON L390.9 x W284.8 x H175.7	12	498g	300	14.45Kg

Installation Manual

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