

20W, DC/DC Power Converter

SDA20H

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Introduction

SDA20H series are 2"x1" package DC/DC converters specially designed for railway applications. The series meet EN50155 Europe railway standard and IEC/EN62368 industrial standards. They are input under voltage protected, output over voltage, over current, and short circuit protected, 1000Khrs minimum MTBF, highly reliable, and ideally suitable for the railway applications.

Features

- Rated power: 20W Max
- Input voltage 40...160VDC
- Regulated output with 10% trimming range
- High efficiency up to 88%
- Isolation voltage 2250VDC
- Low ripple and noise
- Remote On/Off control
- Operating temperature range: -40 ~ +85°C ambient
- RoHS compliant
- Standard 2"x1" package
- Six-sided metal shielding package
- Under voltage, over voltage, over current, and short circuit protection
- Meet IEC/EN 62368-1, EN50155 standards
- Designed for railway apps
- 3 year warranty

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Part numbers

Model Number	Input Voltage [VDC]			V _{OUT} [VDC]	Output Current [mA]		Efficiency [%] Typ.	Capacitive Load [uF] Max.
	Nom.	Range	*Max.		Max	Min.		
SDA20H033	110	40-160	170	3.3	5000	0	82	10000
SDA20H050	110	40-160	170	5	4000	0	85	10000
SDA20H120	110	40-160	170	12	1667	0	86	2700
SDA20H150	110	40-160	170	15	1333	0	86	1680
SDA20H240	110	40-160	170	24	833	0	87	680
SDA20H480	110	40-160	170	48	417	0	88	470

* Input voltage exceed the Max. value may cause permanent damage.

* Only typical models are listed. Other models may be available upon request.

* Check Mechanical Specifications for different types of pinouts. Model numbers listed here are for default options, add suffix for other pinout options, e.g. SDA20H050A.

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Electrical characteristics

Unless otherwise indicated, specifications are measured at $T_A=25^{\circ}\text{C}$, nominal input voltage, full load after warm up.

Parameter	Condition	Min.	Type	Max.	Unit	Note
Input current Full load	$V_{OUT}=3.3\text{V}$	-	183	-	mA	
	Others		214			
Input current No load	$V_{OUT}=3.3\text{V}$		10	-	mA	
	Others		3			
Reflected ripple current		-	25	-	mA	
Input voltage surge 1 second max		-0.7	-	180	VDC	
Startup input voltage	Full load	-	-	40	VDC	
Startup time	Resistive load	-	10	-	mS	
Input under voltage shutdown		28	33	-	VDC	
Remote On/Off control "Ctrl" pin open or logic high [ON] "Ctrl" pin grounded or logic low [OFF]	Logic high	3.5	-	12	VDC	Positive Logic
	Logic low	0	-	1.2	VDC	
	Ctrl pin current	-	2	7	mA	
Output voltage accuracy	$I_{OUT}=5\%$ to 100%	-	± 1	± 3	%	
Line regulation Full load, $V_{IN}=V_{IN, Min}$ to $V_{IN, Max}$		-	± 0.4	± 1.0	%	
Load regulation		-	± 0.5	± 1.0	%	

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$I_{OUT}=5\%$ to 100% of $I_{OUT, rated}$						
Output ripple and noise 20MHz bandwidth, peak to peak		-	50	100	mVp-p	
Temperature coefficient	Full load	-	-	0.03	%/°C	
Dynamic load response $I_{OUT}=25\%\sim 50\%\sim 75\%$ of $I_{OUT, rated}$	Peak deviation* Peak deviation Recovery time	-	± 3 ± 3 300	± 8 ± 5 500	% V_{OUT} % V_{OUT} uS	* $V_{OUT}=3.3, 5V$
Output voltage trim	Trim range	-	-	± 10	% V_{OUT}	
Output over voltage protection		110	-	-	% V_{OUT}	
Output over current protection		120	-	-	% I_{OUT}	
Output short circuit protection		Continuous, automatic recovery				
Input filter		PI filter				
Hot plug		None				

* Operating with less than 5% of rated load will not cause damage to the converters, but the performances data may not fall into the specifications, and stable operating is not assured.

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General Specifications

Parameters	Condition	Min.	Typ.	Max.	Unit	Notes
Isolation voltage 1 minute, leakage current 1mA max.	I/P to O/P I/P & O/P to Case	2250 1600	-	-	VDC	
Isolation resistance Tested at 500VDC	I/P to O/P	1000	-	-	M ohm	
Isolation capacitance 100KHz, 0.1V	I/P to O/P	-	2200	-	pF	
Switching frequency*	Full load	-	300	-	KHz	PWM mode
Operating temperature	See "Derating Curve"	-40	-	85	°C	
Storage temperature		-55	-	125	°C	
Storage humidity	None condensing	5	-	95	%RH	
Pin soldering temperature 1.5mm away from case for 10 sec		-	-	300	°C	
Vibration		IEC/EN61373 – Category 1, Grade B				
Cooling method		Free air convection				
Case material		Aluminum alloy				
MTBF	MIL-HDBK-217F	>1,000,000 Hours, T _A =25°C				
Design based on standards		EN/IEC 62368-1, EN50155				

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Safety certifications		EN/IEC 62368-1
EMC		CISPR32, EN55032 Class B, IEC/EN61000-4-2, 3, 4, 5, 6 EN50155, IEC/EN50121-3-2, EN55016-2-1
Size, and Weight		50.8 x 25.4 x 12 mm, 41g

* Switching frequency is measured at full load. The converter reduces the switching frequency at low load (less than 50% load) for better efficiency.

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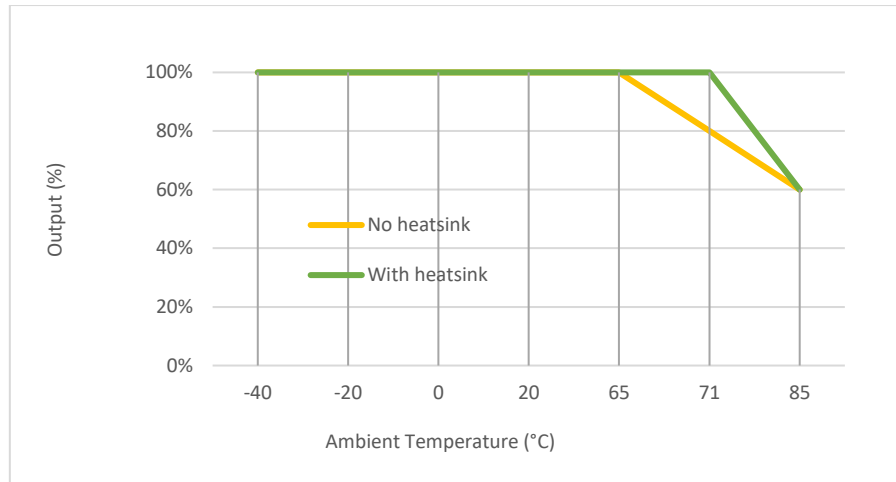
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Characteristics Curves

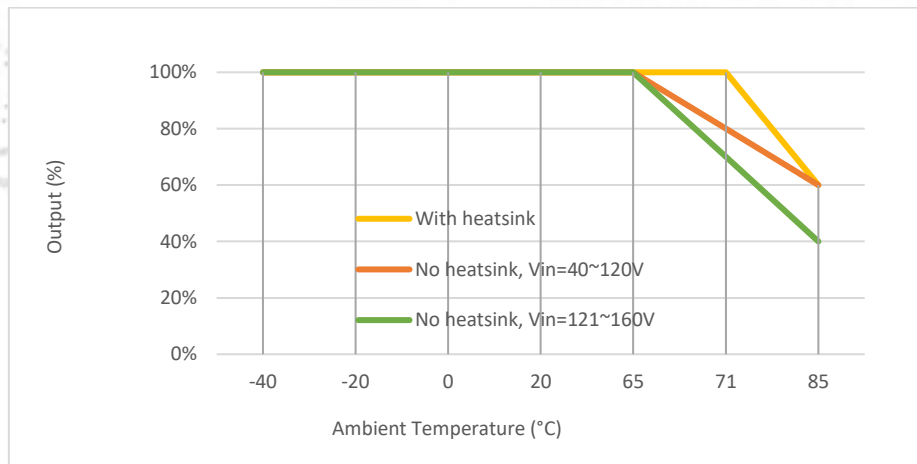
Derating Curve

Output vs Ambient Temperature



$V_{IN}=40\sim 160V$, $V_{OUT}=12, 15, 24, 48V$

Output vs Input Voltage

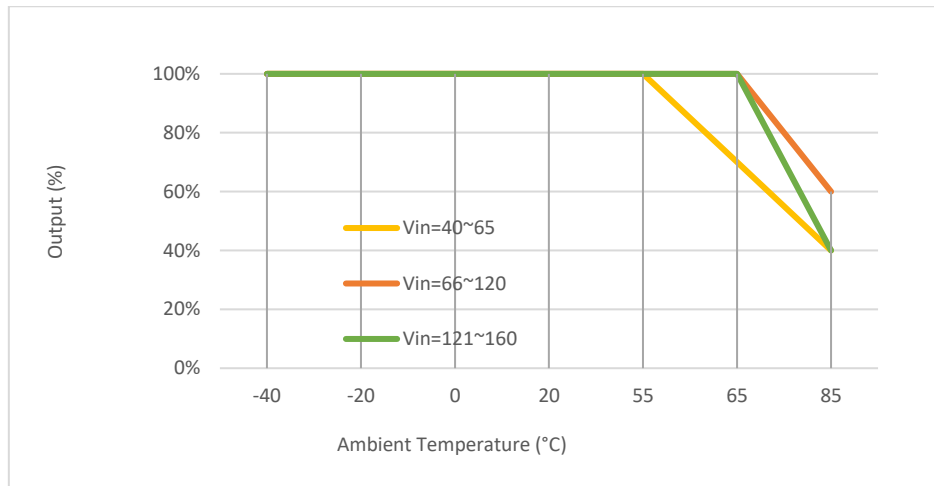


$V_{OUT}=3.3V$

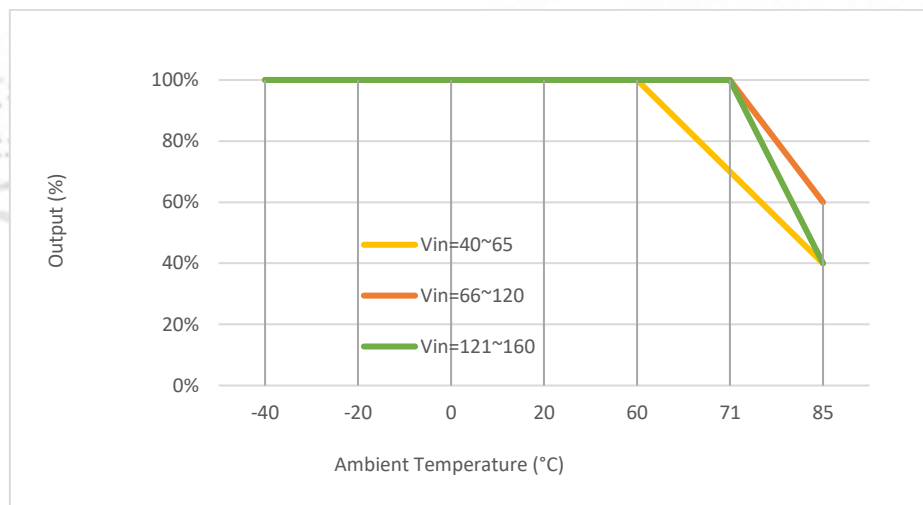
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$V_{OUT}=5V$, no heatsink



$V_{OUT}=5V$, with heatsink

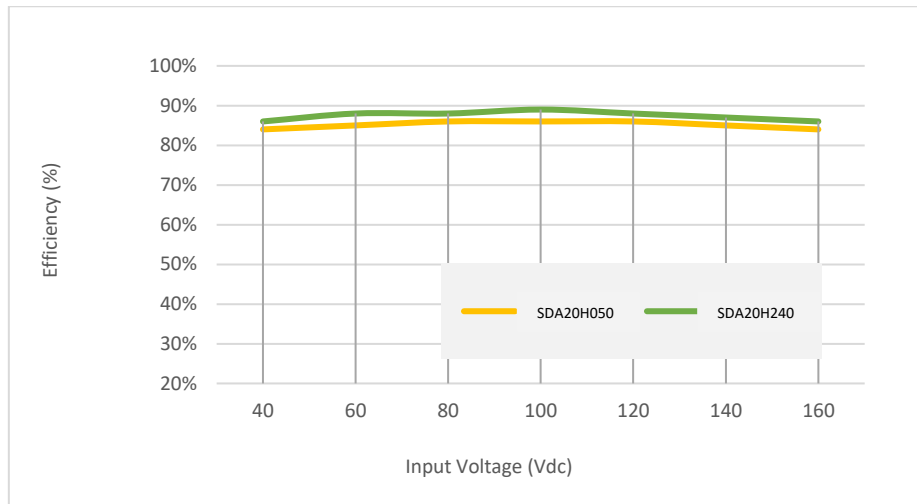
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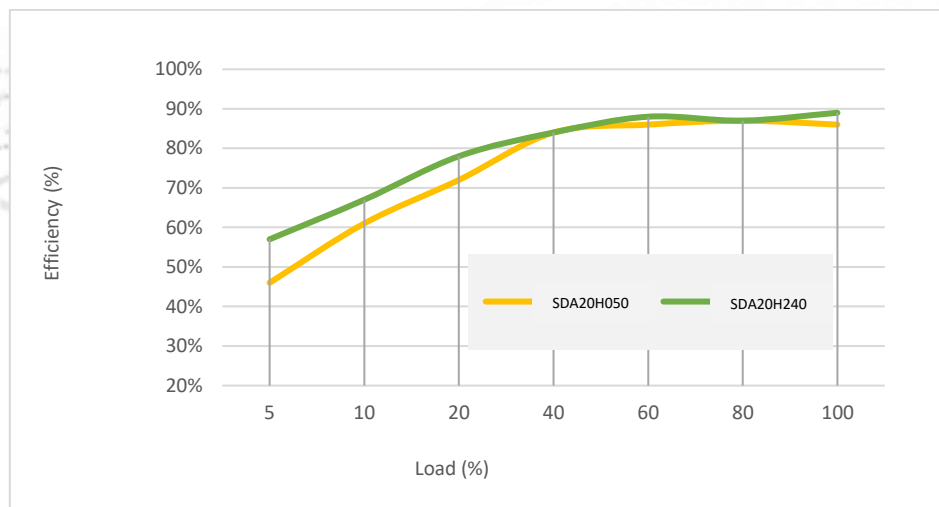
Efficiency Curve

Efficiency vs Input Voltage



Full Load

Efficiency vs Load



$V_{IN}=110Vdc$

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Recommended External Circuit

Typical external Circuit

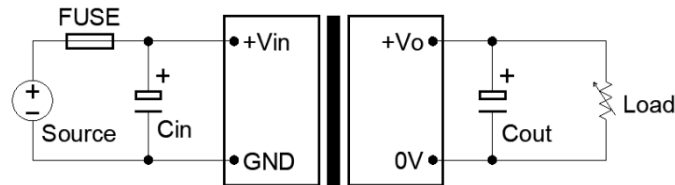


Figure 1: Typical external circuit

Note:

1. *Typical application circuit is to further lower the input and output ripple. It is not required for general use.
2. *Recommended component specifications are typical values. Excessive external capacitive load may cause startup problem.

Recommend component spec

V _{OUT}	3.3, 5V	12, 15V	24, 48V
C _{OUT}	470uF	220uF	100uF

*Recommended FUSE to be 2A slow blow, and C_{IN} to be 10...47uF

Circuit for EMC Enhancement

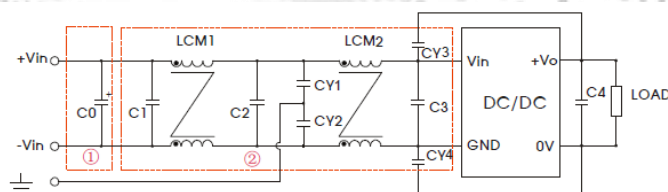


Figure 2: Circuit for EMC Enhancement

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Recommended component specifications

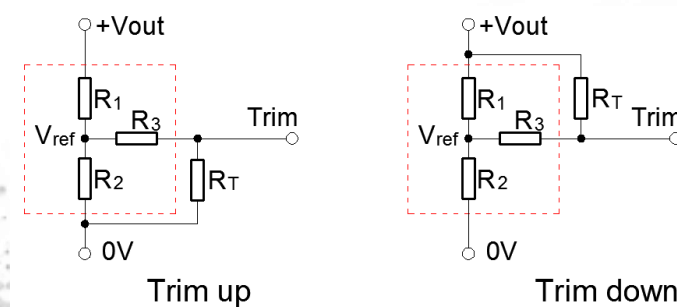
Symbol	Condition	Recommended value
Fuse		2A, slow blow
LCM1		2.2mH
LCM2		0.53mH
C0		100uF, 200V
C1, C2		0.22uF, 250V
C3		10~47uF
C4		Refer to C _{OUT} in Table 1
CY1 ... CY4		1000pF, 400Vac

* Do not use two converters in parallel to supply higher power.

* Consult our technical staff for more information about application.

Circuits for Output Trim

* Components within the red block are internal components of the converter.



* The formulas to calculate the desired resistance of Trim resistor "R_T".

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Trim up: $R_T = \frac{a R_2}{R_2 - a} - R_3$ $a = \frac{V_{ref}}{V_{OUT} - V_{ref}} R_1$

Trim down: $R_T = \frac{a R_1}{R_1 - a} - R_3$ $a = \frac{V_{OUT} - V_{ref}}{V_{ref}} R_2$

Internal Component Spec

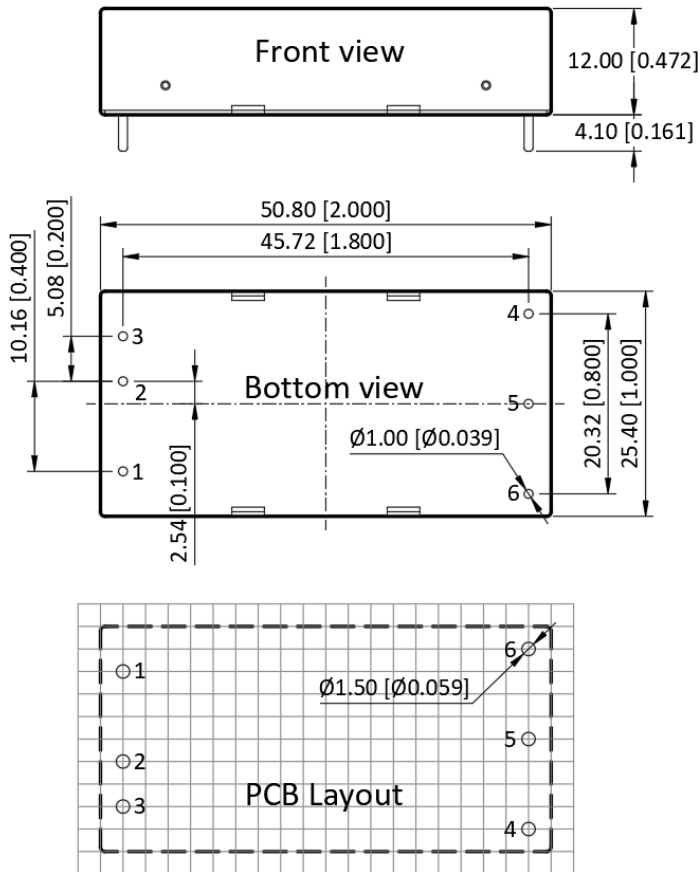
V _{OUT} [V]	R1 [K Ohm]	R2 [K Ohm]	R3 [K Ohm]	V _{ref} [V]
3.3	4.801	2.87	10	1.24
5	2.883	2.87	10	2.5
12	11.000	2.87	15	2.5
15	14.384	2.87	15	2.5
24	24.872	2.87	17.8	2.5
48	55.28	3.0	20	2.5

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Mechanical Specifications



Pin Definition

Pin #	Single Out	
1	Ctrl	
2	GND	
3	V _{IN}	
4	+V _{OUT}	
5	0V	
6	Trim	

* Unless otherwise specified unit:
mm [inch]

* General tolerance: ± 0.50 [± 0.020]

* Pin thickness: ± 0.10 [± 0.004]

* Footprint grid 2.54 x 2.54 mm

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Ordering information

Ordering can be done via www.summit-electronics.com or via info@summit-electronics.com. Please contact us for more information. Customisation of the product is available on request.

Technical support

For all product questions please contact us via info@summit-electronics.com

Document revision

Rev	Date	Changes
2025v0.1	29-08-2025	First issue of document