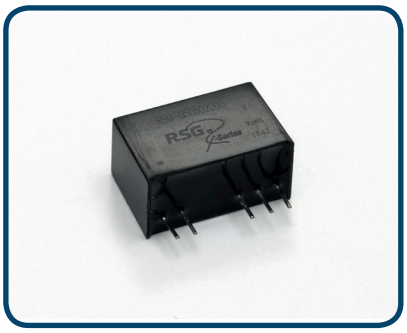
RSM-S / D20v2

2 W Unregulated Single & Dual Output DC / DC Converter

- **7 Pin SIL Package**
- **± 10 % Input Range**
- **Reinforced 4200 VAC / 6000 VDC Isolation**
- **EN60601-1, ANSI / AAMI ES60601-1 medical safety (1 x MOPP / 2 x MOOP)**
- **Efficiency up to 84 %**
- **Operating Temperature Range: – 40 °C ~ + 85 °C**
- **Leakage current max. 2 µA (@250 VAC, 50 / 60 Hz conditions)**
- **Low Ripple and Noise**
- **Non Conductive Black Plastic Case**

Picture similar



RoHS

Output Specifications	
Voltage Accuracy	See tolerance envelope graph
Maximum Output Current	See table
Line Regulation	± 1.2 ~ 1.5 % max.(per ± 1 % V_{in} Change)
Load Regulation	from 10 % to 100 % Load: 15 % to 20 % max. –
Cross Regulation (Dual Output)	–
Short Circuit Protection	3 s
Ripple & Noise (20 MHz Bandwidth)	100 mV typ., 150 mV pk-pk max.
Temperature Coefficient	± 0.02 % / °C

Input Specifications	
Voltage Range	See table
Start-up Time	–
No-Load / Full-Load Input Current	See table
Input Filter	C / L (see filter details on following pages)
Input Reflected Ripple Current	200 mA typ.
Surge Voltage (100 ms) [1]	
5 V Models 12 V Models 15 V Models 24 V Models	9 VDC max. 18 VDC max. 21 VDC max. 30 VDC max.

General Specifications	
I/O Isolation Voltage (60 sec)	4200 VAC; 6000 VDC
Out1/Out2 Isolation Voltage (Dual Separate)	–
I/O Isolation Capacitance	5 pF typ.
I/O Isolation Resistance	1000 MΩ, min.
Switching Frequency	100 kHz typ.
Humidity	95 % rel H
Reliability Calculated MTBF	> 3.5 MHrs (MIL-HDBK-217 f)
Safety Standard(s)	EN60601-1, ANSI / AAMI ES60601-1

Environmental Specifications	
Operating Temperature Range	– 40 °C ~ + 85 °C (see Derating Curve)
Maximum Case Temperature	–
Storage Temperature	– 55 °C ~ + 125 °C
Cooling	Natural Convection
Soldering Profile and Peak Temperature	Wave Flow: 300 °C (1.5 mm from case), 10 s, max.

Physical Specifications	
Case Material	Black flame-retardant, heat-resistant Plastic (UL94V-0 rated)
Pin Material SIP Case	–
Pin Material DIP Case	–
Potting Material	–
Weight SIP Case	4.2 g typ.
Weight DIP Case	–
Dimensions SIP Case	0.77" x 0.39" x 0.49"
Dimensions DIP Case	–

EMC Specifications	
Radiated / Conducted Emissions	EN60601-1-2 / CISPR 11 Group1 Class B see EMI Filter
ESD	IEC 61000-4-2 Contact ± 8 kV Perf. Criteria B
Rad. RF	–
EFT	–
Surge	–
Cond. RF	–
PFMF	–
VD/SI/VV	–

[1] These are stress ratings; exposure of devices to any of these conditions may adversely affect long-term reliability.
All specifications typical at T_a = 25 °C, nominal input voltage and full load, unless otherwise specified.
The information and specification contained in this data sheet are believed to be correct at time of publication. However, Acal BFi accepts no responsibility for consequences arising from printing errors or inaccuracies. Specifications are subject to change without notice.

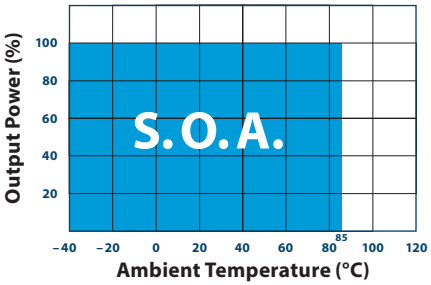
Acal BFi Germany GmbH • Assar-Gabrielsson-Straße 1 • D-63128 Dietzenbach, Germany
Tel. +49 6074 4098-0 • Fax +49 6074 4098-110 • sales-de@acalbfi.de • www.acalbfi.de

© Acal BFi. 05 / 2021
Subject to change without notice.

Number structure RSM Series

RSM	–	12	15	S	10	D	6	(v2)
Name / package		**V-input nom.**	**V-output**	**Output type**	**Power**	**Int. Code**	**Isolation (VDC)**	
RSM = SIL7 Medical		03 = 3.3 V 05 = 5 V … 24 = 24 V	03 = 3.3 V 05 = 5 V … 15 = 15 V	S = Single D = Dual	10 = 1 W 20 = 2 W	Logistics Code	6 = 6.0 k	

Temperature Derating Curve

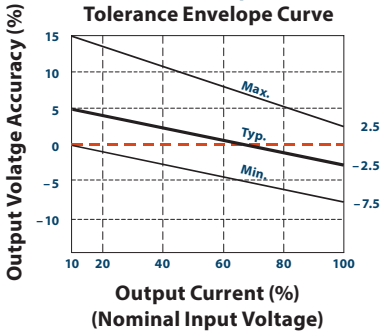


Model Selection Guide

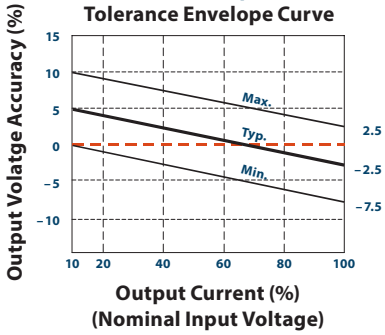
Model Number	Input		Output		Efficiency	Capacitor Load
	Voltage (VDC) Nom. (Range)	max. Current (mA) full / no load	Voltage (VDC)	Current (mA) max. / min.	@ Full Load (%, Min. / Typ.)	@ Full Load (µF, max.)
RSM-0505S20D6v2	5 (4.5 ~ 5.5)	520 / 35	5	400 / 40	73 / 77	1000
RSM-0512S20D6v2	5 (4.5 ~ 5.5)	520 / 35	12	167 / 17	75 / 79	470
RSM-0515S20D6v2	5 (4.5 ~ 5.5)	520 / 35	15	133 / 14	75 / 79	470
RSM-1205S20D6v2	12 (10.8 ~ 13.2)	217 / 15	5	400 / 40	72 / 76	1000
RSM-1212S20D6v2	12 (10.8 ~ 13.2)	217 / 15	12	167 / 17	75 / 79	470
RSM-1215S20D6v2	12 (10.8 ~ 13.2)	217 / 15	15	133 / 14	77 / 81	470
RSM-1505S20D6v2	15 (13.5 ~ 16.5)	171 / 18	5	400 / 40	73 / 77	1000
RSM-1515S20D6v2	15 (13.5 ~ 16.5)	171 / 18	15	133 / 14	78 / 82	470
RSM-2405S20D6v2	24 (21.6 ~ 26.4)	106 / 10	5	400 / 40	75 / 79	1000
RSM-2412S20D6v2	24 (21.6 ~ 26.4)	106 / 10	12	167 / 17	78 / 82	470
RSM-2415S20D6v2	24 (21.6 ~ 26.4)	106 / 10	15	133 / 14	80 / 84	470
RSM-0505D20D6v2	5 (4.5 ~ 5.5)	520 / 35	±5	±200 / ±20	74 / 78	470
RSM-0509D20D6v2	5 (4.5 ~ 5.5)	520 / 35	±9	±111 / ±12	74 / 78	470
RSM-0512D20D6v2	5 (4.5 ~ 5.5)	520 / 35	±12	±83 / ±9	74 / 78	220
RSM-0515D20D6v2	5 (4.5 ~ 5.5)	520 / 35	±15	±67 / ±7	76 / 80	220
RSM-1205D20D6v2	12 (10.8 ~ 13.2)	217 / 15	±5	±200 / ±20	70 / 74	470
RSM-1209D20D6v2	12 (10.8 ~ 13.2)	217 / 15	±9	±111 / ±12	76 / 80	470
RSM-1212D20D6v2	12 (10.8 ~ 13.2)	217 / 15	±12	±83 / ±9	76 / 80	220
RSM-1215D20D6v2	12 (10.8 ~ 13.2)	217 / 15	±15	±67 / ±7	73 / 77	220
RSM-1505D20D6v2	15 (13.5 ~ 16.5)	171 / 18	±5	±200 / ±20	73 / 77	470
RSM-1509D20D6v2	15 (13.5 ~ 16.5)	171 / 18	±9	±111 / ±12	76 / 80	470
RSM-1515D20D6v2	15 (13.5 ~ 16.5)	171 / 18	±15	±67 / ±7	69 / 73	220
RSM-2405D20D6v2	24 (21.6 ~ 26.4)	106 / 10	±5	±200 / ±20	75 / 79	470
RSM-2409D20D6v2	24 (21.6 ~ 26.4)	106 / 10	±9	±111 / ±12	77 / 81	470
RSM-2412D20D6v2	24 (21.6 ~ 26.4)	106 / 10	±12	±83 / ±9	78 / 82	220
RSM-2415D20D6v2	24 (21.6 ~ 26.4)	106 / 10	±15	±67 / ±7	77 / 81	220

Product Characteristic Curve

5 VDC output
Tolerance Envelope Curve

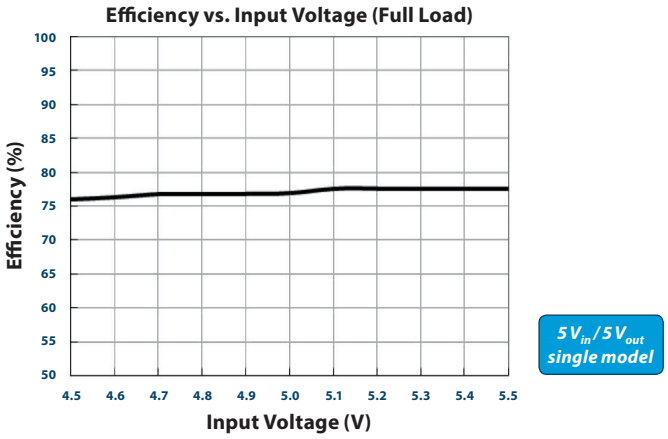


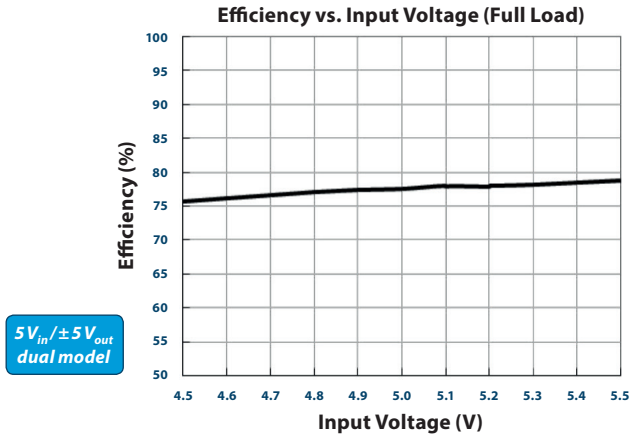
Other output
Tolerance Envelope Curve

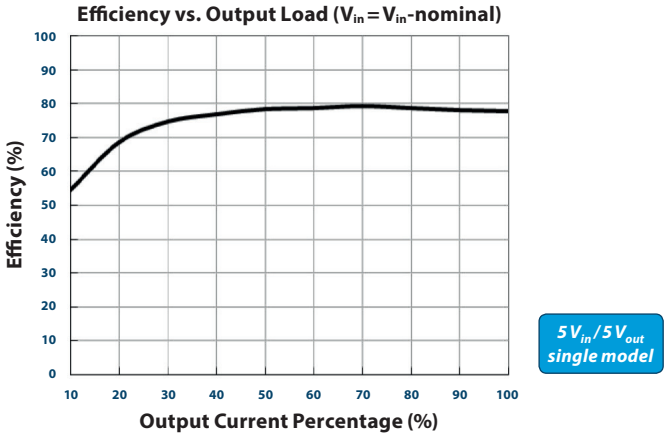


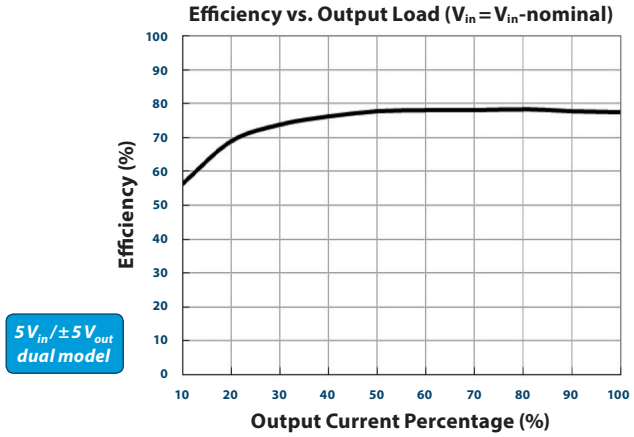
The models listed above are standard types. If you need special specifications or have questions regarding packing or need application support, please contact our specialists:
sales-de@acalbfi.de or +49 6074 4098-0

Electrical Characteristic Curves









Design Reference

1. Typical application

Input and / or output ripple can be further reduced, by connecting a filter capacitor from the input and / or output terminals to ground as shown in Fig.3. Choosing suitable filter capacitor values is very important for a smooth operation of the modules, particularly to avoid start-up problems caused by capacitor values that are too high. For recommended input and output capacitor values refer to Table 1.
For a tight output voltage regulation, including overvoltage, overcurrent and over temperature protection, we recommend the use of a linear regulator that is connected in series to the input and / or output terminals as shown in Fig. 4.

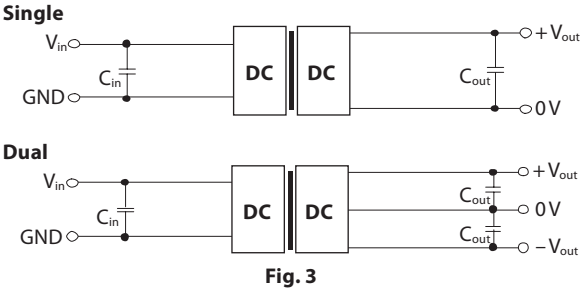


Fig. 3

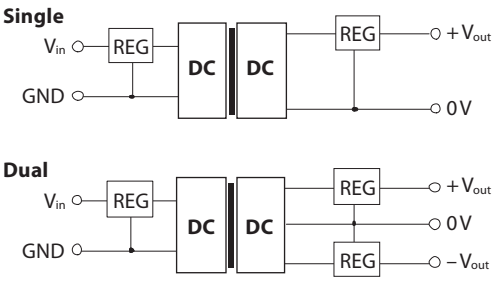
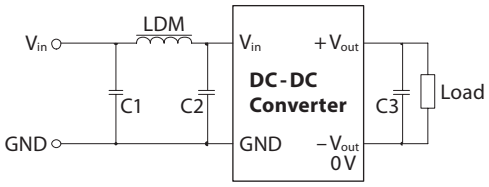


Fig. 4

Recommended input and output capacitor values (Table 1)					
V_{in} (VDC)	C_{in} (µF)	Single V_{out} (VDC)	C_{out} (µF)	Dual V_{out} (VDC)	C_{out} (µF)
5	10	5	10	±5	4.7
12 / 15	4.7	12	2.2	±9	2.2
24	2.2	15	1	±12 / ±15	1

2. EMC compliance circuit (CLASS B)



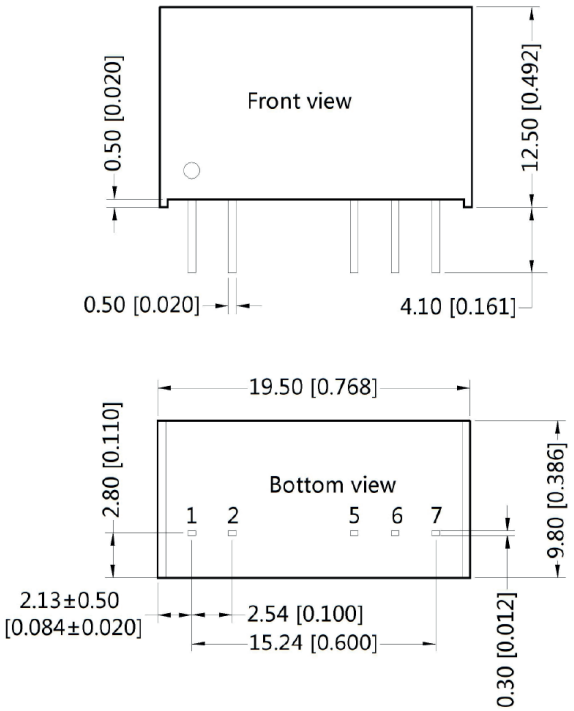
Recommended EMC filter values (Table 2)			
V_{in} (VDC)		5 / 12 / 15	24
EMI	C1, C2	4.7 µF / 50 V	
	C3	Refer to the C_{out} in Fig. 3	
	LDM	6.8 µH	15 µH

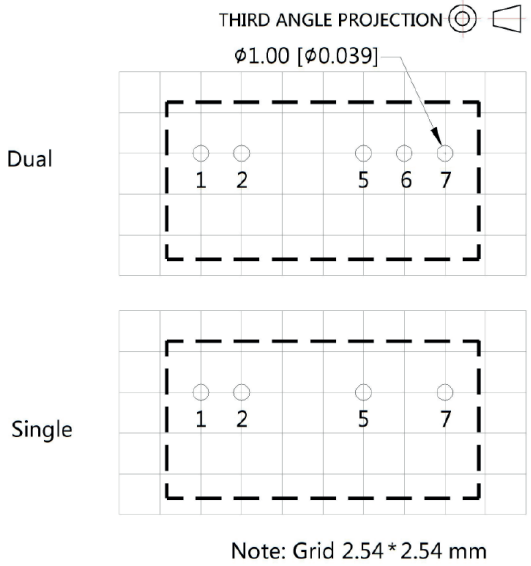
Note:
For 15 V_{in} / ± 15 V_{out} Dual model C1 / C2 is 10 µF / 25 V and LDM is 22 µH.

3. Output load requirements

In order to ensure the converter can work reliably with high efficiency, the minimum load should not less than 10 % rated load when it is used. If the needed power is indeed small, please parallel a resistor on the output side. (The sum of the efficient power and resistor consumption power is not less than 10 %).

Mechanical Specifications





Note: Grid 2.54 * 2.54 mm

Pin	Single	Dual
1	V_{in}	V_{in}
2	GND	GND
5	0 V	$-V_{out}$
6	No Pin	0 V
7	$+V_{out}$	$+V_{out}$

Notes:
Unit: mm [inch]
Pin diameter tolerances: ± 0.10 [± 0.004]
General tolerances: ± 0.25 [± 0.010]

Notes

- If the product is not operated within the required load range, the product performance cannot be guaranteed to comply with all parameters in the datasheet.
- The maximum capacitive load was tested at nominal input voltage and full load.
- Unless otherwise specified, parameters in this datasheet were measured under the conditions of T_a = 25 °C, humidity < 75 % RH with nominal input voltage and rated output load.

© Acal BFi. 05 / 2021
Subject to change without notice.