

Embedded Switch Mode Power Supplies (SMPS)

FEATURES

- Ultra-wide DIN rail mount DC-DC 9...36Vdc
- Efficiency up to 90%
- I/O isolation test voltage 1.5k VDC
- Inhibit and Trim
- Operating temperature range - 40°C to +80°C
- Input under-voltage protection, output short circuit, over-current, over-voltage protection.
- EMI performance meets CISPR32 / EN55032
- Six-sided metal shielded package

RS PRO PCB mount wide Input DC-DC

- 2351368
- 2351371
- 2351376
- 2351380



RS Professionally Approved Products bring to you professional quality parts across all product categories. Our product range has been tested by engineers and provides a comparable quality to the leading brands without paying a premium price.

Embedded Switch Mode Power Supplies (SMPS)

Product Description

PCB mount DC-DC converters feature an ultra-wide 4:1 input voltage with efficiencies of up to 90%, 1500VDC input to output isolation, an operating ambient temperature range of -40°C to +80°C, input undervoltage protection, output overvoltage, overcurrent, short circuit protection, CISPR32/EN55032 CLASS A EMI compliant without external components, which makes them suitable for a wide range of industrial, instrumentation and communications applications.

General Specifications

Model	DC-DC 30W Industrial PCB mount power supply
Mounting Type	PCB
MTBF	MIL-HDBK-217F@25°C > 1,000,000 hrs
Applications	Industrial control systems, instrumentation and communications equipment

RS Stock#	Input (Vdc)		Output Voltage	Output Current	Max. Capacitive Load(µF)	Efficiency (Typ)
	Input range	Max				
2351368	9 to 36Vdc	40	3.3V	6A	10000	85%
2351371			5V	6A	10000	86%
2351376			12V	2.5A	2700	90%
2351380			15V	2A	1680	90%

Input Specifications

Input Specification						
Item	Operating Conditions	Min.	Typ.	Max.	Unit	
Input Current (full load / no-load)	24VDC nominal input series, nominal input voltage	3.3V output	-	970/60	993/100	mA
		5V output	-	1454/60	1488/100	
		Others	-	1388/6	1488/16	
Surge Voltage (1sec. max.)	24VDC nominal input series	-0.7	-	50	VDC	
Start-up Voltage	24VDC nominal input series	-	-	9		
Input under-voltage protection	24VDC nominal input series	5.5	6.5	-		
Start-up Time	Nominal input voltage & constant resistance load	-	10	-	ms	
Input Filter		Pi filter				
Hot Plug		Unavailable				
Ctrl*	Module on	Ctrl pin open or pulled high (TTL 3.5-12VDC)				
	Module off	Ctrl pin pulled low to GND (0-1.2VDC)				
	Input current when off	-	5	8	mA	

Note: *The Ctrl pin voltage is referenced to input GND

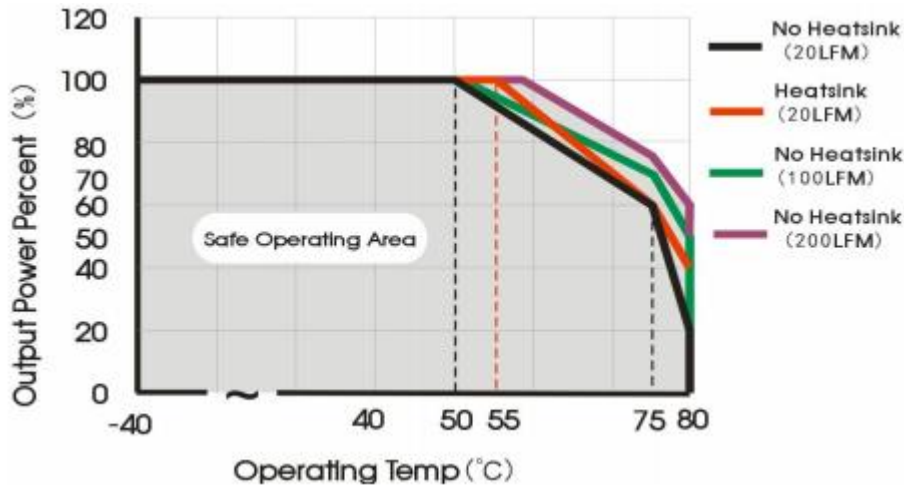
Output Specifications

Output Specification						
Item	Operating Conditions	Min	Typ.	Max	Unit	
Voltage Accuracy	5%-100% load	-	±1	±3	%	
	0%-5% load	-	±1	±5		
Linear Regulation	Input voltage variation from low to high at full load	-	±0.2	±0.5		
Load Regulation	5%-100% load	-	±0.5	±1		
Transient Recovery Time		-	300	500	µs	
Transient Response Deviation	25% load step change, nominal input voltage	3.3/5V output	-	±5	±8	%
Transient Response Deviation		Others	-	±3	±5	
Temperature Coefficient	Full load	-	-	±0.03	%/°C	
Ripple & Noise *	20MHz bandwidth, 100% load	-	50	100	mV p-p	
Trim	Input voltage range	-	±10	-	%Vo	
Over-voltage Protection		110	-	160		
Over-current Protection		110	-	190	%Io	
Short circuit Protection		Hiccup, continuous, self-recovery				
Note: The "parallel cable" method is used for Ripple and Noise test, please refer to DC-DC Converter Application Notes for specific information.						

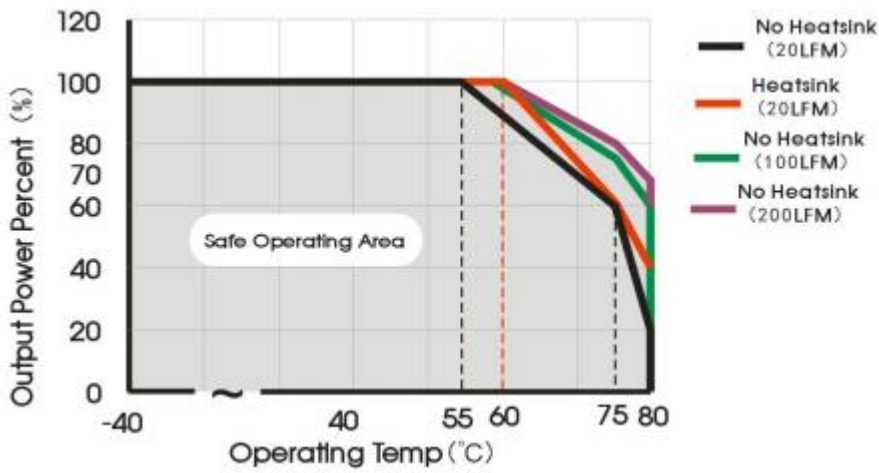
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Derating

Derating curve 3.3V and 5V



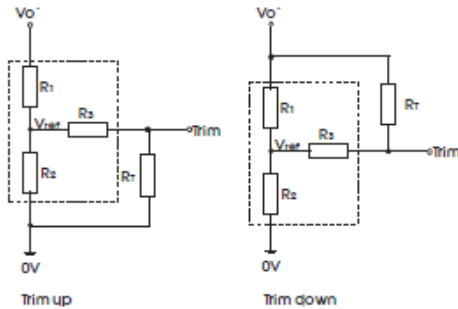
Derating curve 12V and 15V



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Trim Function

Trim Function for Output Voltage Adjustment (open if unused)



Calculating Trim resistor values:

$$\text{up: } R_T = \frac{\alpha R_2}{R_2 - \alpha} - R_3 \quad \alpha = \frac{V_{ref}}{V_o' - V_{ref}} \cdot R_1$$

$$\text{down: } R_T = \frac{\alpha R_1}{R_1 - \alpha} - R_3 \quad \alpha = \frac{V_o' - V_{ref}}{V_{ref}} \cdot R_2$$

R_T = Trim Resistor value
 α = self-defined parameter
 V_o' = desired output voltage

TRIM resistor connection (dashed line shows internal resistor network)

Vout(VDC)	R1(KΩ)	R2(KΩ)	R3(KΩ)	Vref(V)
3.3Vdc	4.801	2.87	12.4	1.24
5Vdc	2.883	2.87	10	2.5
12Vdc	11.000	2.87	15	2.5
15Vdc	14.494	2.87	15	2.5

General Specifications

Item	Operating Conditions	Min	Typ	Max.	Unit
Isolation	Input-output Electric Strength test for 1 minute with a leakage current of 1mA max	1500	-	-	VDC
Insulation Resistance	Input-output resistance at 500VDC/60sec	1000	-	-	MΩ
Isolation Capacitance	Input-output capacitance at 100KHz/0.1V		2000		pF
Operating Temperature	See derating curves	-40	-	+80	°C
Storage Temperature		-55	-	+125	
Storage Humidity	Non-condensing	5	-	95	%RH
MTBF	MIL-HDBK-217F@25°C	1000			K hours

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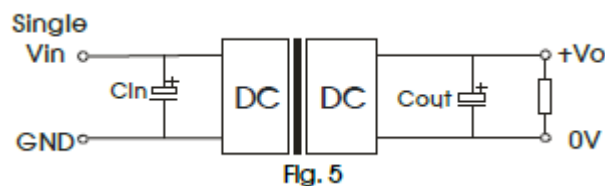
EMC Specifications

Emissions	CE	CISPR32/EN55032 CLASS A CLASS B (see Fig.6 for recommended circuit)	
	RE	CISPR32/EN55032 CLASS A CLASS B (see Fig.6 for recommended circuit)	
Immunity	ESD	IEC/EN61000-4-2 Contact ± 4 KV	Perf. Criteria B
	RS	IEC/EN61000-4-3 10V/m	Perf. Criteria A
	EFT	IEC/EN61000-4-4 ± 2 KV (see Fig.6 for recommended circuit)	Perf. Criteria B
	Surge	IEC/EN61000-4-5 line to line ± 2 KV (see Fig.6 for recommended circuit)	Perf. Criteria B
	CS	IEC/EN61000-4-6 3 Vr.m.s	Perf. Criteria A
	CE	EN50121-3-2 150kHz-500kHz 99dB μ V (see Fig.6 for recommended circuit) EN55016-2-1 500kHz-30MHz 93dB μ V (see Fig.6 for recommended circuit)	
	RE	EN50121-3-2 30MHz-230MHz 40dB μ V/m at 10m (see Fig.6 for recommended circuit) EN55016-2-1 230MHz-1GHz 47dB μ V/m at 10m (see Fig.6 for recommended circuit)	

Typical application

All the DC/DC converters of this series are tested before delivery using the recommended circuit shown in Fig. 5. Input and/or output ripple can be further reduced by appropriately increasing the input & output capacitor values C_{in} and C_{out} and/or by selecting capacitors with a low ESR. Also make sure that the capacitance is not exceeding the specified max. capacitive load value of the product.

Output voltage	C_{out} (μ F)	C_{in} (μ F)
3.3/5V	220	10
12/15V	100	



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EMC Circuit

FUSE	Choose according to actual input current
MOV	S20K30
C0	680 μ F/50V
C1	330 μ F/50V
C2	4.7 μ F/50V
C3	Refer to the <u>Cout</u> in Fig.5
LCM	1mH, recommended to use MORNSUN's FL2D-30-102
CY1/CY2	1nF/2KV

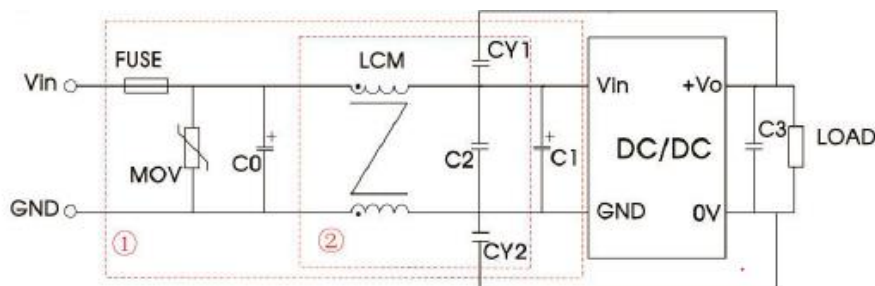


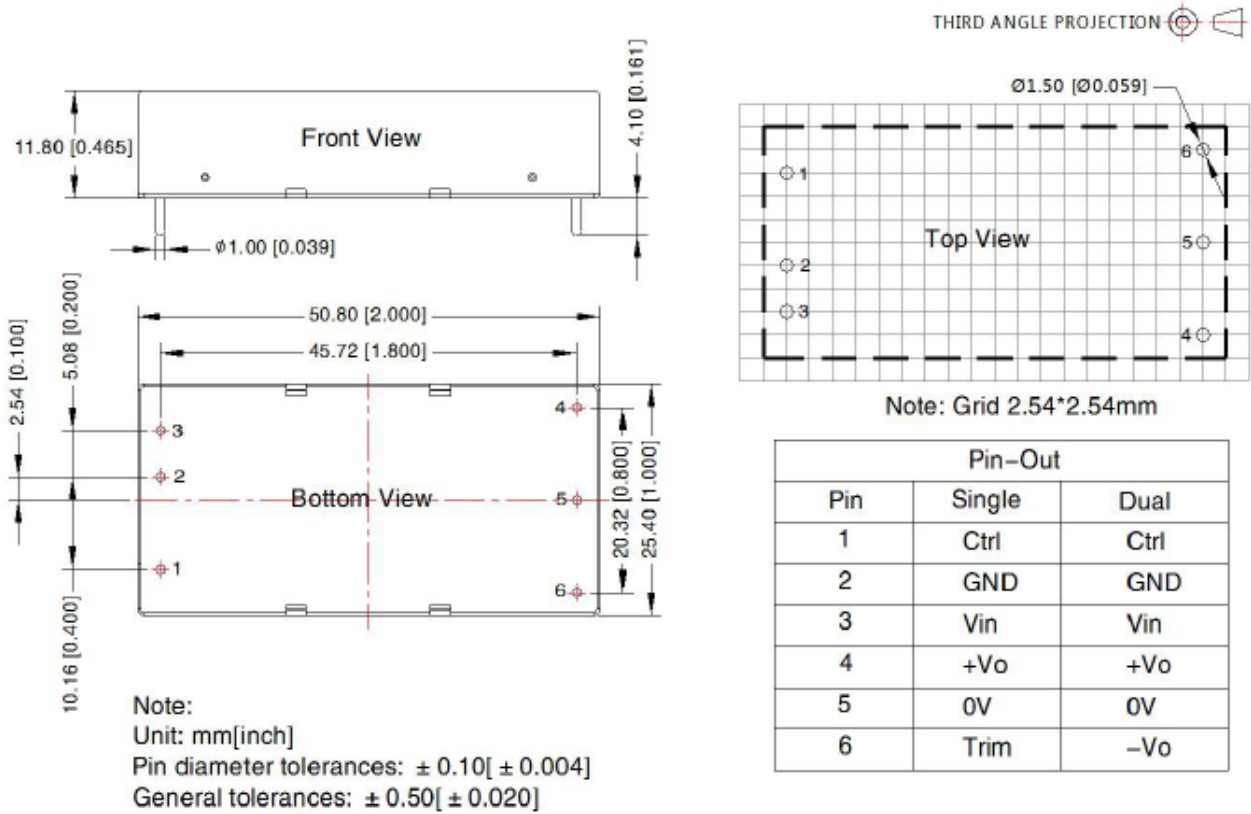
Fig. 6

Notes: We use Part ① in Fig. 6 for immunity and part ② for emissions test.
Selecting based on needs.

Mechanical Specifications

Case material	Aluminium alloy
Dimensions	50.80 × 25.40 × 11.80 mm
Weight	27.8g (Typ.)
Cooling Method	Free air convection

Dimensions and recommended layout



Approvals

Safety Certification	IEC62368, UL60950, EN62368
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1. The maximum capacitive load offered were tested at input voltage range and full load
2. Unless otherwise specified, parameters in this datasheet were measured under the conditions of Ta=25°C, humidity <75%RH with nominal input voltage and rated output load
3. All index testing methods in this datasheet are based on company corporate standards
4. Products are related to laws and regulations: see "Features" and "EMC"