



50DAW4_1.5R1 series

50W - Single Output DC-DC Converter - Isolated & Regulated

DC-DC Converter

50 Watt

- ⊕ Wide input voltage range 4:1,
- ⊕ Output power 50W
- ⊕ Ultra thin package: 9.5mm
- ⊕ Transfer efficiency up to 90%
- ⊕ Stand-by power consumption as low as 0.2W
- ⊕ Output super-fast start up as low as 20ms
- ⊕ Continuous short circuit protection, self-recovery
- ⊕ Protection: input under voltage, output over voltage, short circuit and over current
- ⊕ Switching frequency 350kHz
- ⊕ Isolation voltage 1500VDC
- ⊕ Operating temperature: -40°C~+85°C
- ⊕ Good EMI performance
- ⊕ International standard pin-out

Introducing our latest 50DAW4_1.5R1 series: a versatile converter designed to meet your needs. With a wide input voltage range of 4:1 and an output power of 50W, it ensures compatibility across various applications. Housed in an ultra-thin package of just 9.5mm, it offers space-saving benefits without compromising performance. Experience exceptional efficiency with transfer efficiency rates of up to 90%, while keeping standby power consumption as low as 0.2W. Benefit from super-fast start-up times as low as 20ms, ensuring quick and reliable operation when you need it most. Rest assured with continuous short circuit protection and self-recovery features, alongside comprehensive protection against input under voltage, output over voltage, short circuits, and overcurrent. Engineered to withstand temperatures ranging from -40°C to +85°C, this converter is built to thrive in diverse environments. Plus, enjoy good EMI performance and benefit from its international standard pin-out, simplifying integration into your projects.



Common specifications	
Short circuit protection	Hiccup, continuous, self-recovery
Over-voltage protection	110%~200%Vo
Over current protection	110%~200%Io (150%Io (Typ.))
Switching frequency	350kHz (Typ.)
Isolation capacitor	1000pF (Typ.)
Operating temperature	-40°C - +85°C
Storage temperature	-55°C - +125°C
Max case temperature	+105°C
Pin withstand soldering temp	Distance to case 1.5mm, 10S - 300°C MAX
Relative humidity	5~95% RH (No condensing)
Case material	Aluminum Metal Case
MTBF (MIL-HDBK-217F@25°C)	2X10 ⁵ Hours
Product weight	28g (Average)
MTBF (MIL-HDBK-217F@25°C)	>300,000 Hours

Input specifications					
Item	Operating condition	Min	Typ	Max	Units
Input surge voltage (1sec)	48VDC input			100	VDC
Under-voltage turn-off			14		VDC
Start-up time			20		ms
Input filter	Pi filter				
CTRL	<ul style="list-style-type: none"> • Module turn-on - Suspended or connect to High level(3.5V-12VDC) • Module turn-off - Connect to -Vin or connect to low level (0-0.7VDC) • Input current when switched off - 1mA typ.) 				
Reflected ripple current	Input full range, connect to test tools		150		mA

Note: *The voltage of CTRL pin is relative to -Vin pin.

Output specifications					
Item	Operating condition	Min	Typ	Max	Units
Voltage accuracy	Full voltage full load - Vo			±2.0	%
Line regulation	Nominal load, full voltage range - Vo			±1.0	%
Load regulation	10%~100% nominal load Vo			±2.0	%
Ripple & noise	10%~100% nominal load (20MHz bandwidth)			≤100	mVp-p
Output voltage adjustment	Trim-pin function		±10		%
Dynamic response	25% nominal load step change - ΔVo/Δt - ≤±5.0%/500μs; (Output 3V3,5.0V≤±8.0%/500μs)				

Isolation specifications					
Item	Operating Conditions	Min	Typ	Max	Units
Isolation voltage	Input to Output	1500VDC ≤ 0.5mA / 1min			
	Input Output to Case	1000VDC ≤ 0.5mA / 1min			
Insulation resistance	Input to Output, voltage 500VDC	≥1000			MΩ

1. The product should be used under the specification range, otherwise it will cause permanent damage to it.
2. If the product worked beyond the load range or below the minimum load, we cannot ensure that the performance of product is in accordance with all the indexes in this manual;
3. Unless otherwise specified, data in this datasheet should be tested under conditions of Ta = 25°C, humidity <75% when inputting nominal voltage and outputting rated load (pure resistance load);
4. All index testing methods in this datasheet are based on our company's corporate standards
5. The performance indexes of the product models listed in this manual are as above, but some indexes of non-standard model products will exceed the above-mentioned requirements, and please directly contact our technician for specific information;
6. We can provide customized product service; The product specification may be changed at any time without prior notice.

Example:

50DAW4_3605S1.5R1

50 = 50Watt; D = DIP; A = Series; W = Wide input; 36 = 36Vin; 05 = 5Vout; S = Single Output; 1.5 = 1500VDC isolation; R1 = Regulated output

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EMC specifications				
EMC	EMI	CE	CISPR22/EN55032 CLASSB (external circuit is needed)	
EMC	EMI	RE	CISPR22/EN55032 CLASSB (external circuit is needed)	
EMC	EMS	ESD	IEC/EN61000-4-2 Contact $\pm 4\text{KV}$	perf.Criteria B
EMC	EMS	RS	IEC/EN61000-4-3 10V/m	perf.Criteria A
EMC	EMS	EFT	IEC/EN61000-4-4 $\pm 2\text{KV}$	perf.Criteria B (external circuit is needed)
EMC	EMS	Surge	IEC/EN61000-4-5 $\pm 2\text{KV}$	perf.Criteria B (external circuit is needed)
EMC	EMS	Voltage dips, short interruptions and voltage variations immunity	IEC/EN61000-4-6 3V/r.m.s	perf.Criteria A

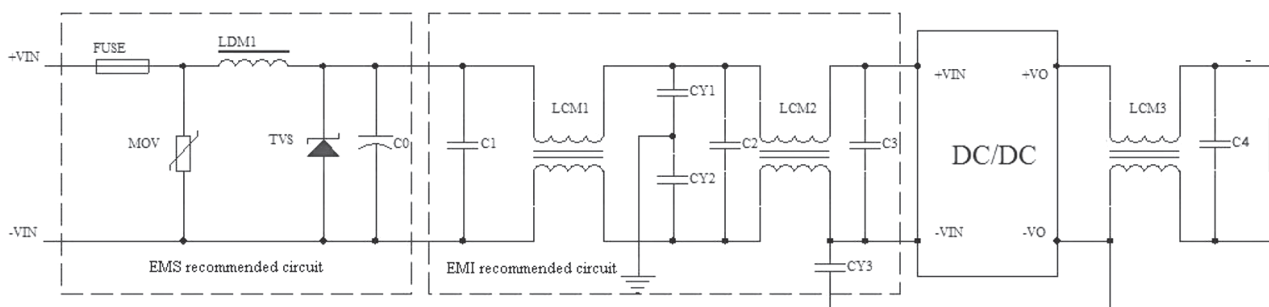
Product Selection Guide

Approval	Model	Input Voltage Nominal (VDC)	Input Voltage Range (VDC)	Output Voltage Vo/lo (V)	Output Current Vo/lo (A)	Input Current (mA) (Nominal Voltage) Full load	Input Current (mA) (Nominal Voltage) No load	Max. Capacitive Load (μF)	Ripple & Noise 20MHz (MAX) mVp-p (mV)	Efficiency (%)Min.	Efficiency (%)Typ.
	50DAW4_4805S1.5R1	48	18-75	5.0	10	1157	50	8000	100	88	90
	50DAW4_4812S1.5R1	48	18-75	12	4.16	1155	2	2000	100	88	90
	50DAW4_4815S1.5R1	48	18-75	15	3.33	1156	2	1000	100	88	90
	50DAW4_4824S1.5R1	48	18-75	24	2.08	1155	2	500	100	88	90

Note:

- Suffix /R is with control and adjustment pin, suffix /C is with control pin, suffix /N is without control and adjustment pin; 50DAW4_48xxS1.5R1/R/C/N
- With heatsink please add „H“: 50DAW4_48xxSH1.5R1, suffix /CM for chassis mounting, suffix /DR for DIN-Rail mounting, rail width 35mm. 50DAW4_48xxS1.5R1/CM/DR
- Max capacitive load is, when the power supply is fully loaded, the max capacity could be connected to output, if exceed, the power supply cannot start-up;
- To reduce no load power consumption and improve efficiency of light-load, IC will be flitter frequency under no-load and light-load operating.
- Output cannot be no load, at least with 10% load or above 470 μF high frequency low resistance electrolytic capacitor, otherwise the output ripple will rise.

EMC External Recommended Circuit



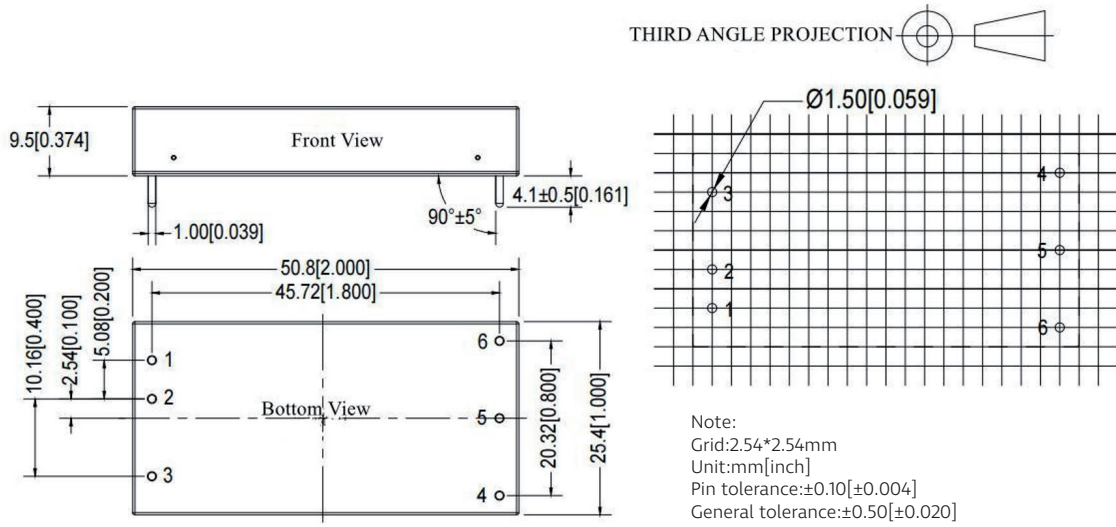
Recommended Parameter:

Component	48V Input
FUSE	According to customer's request
MOV	14D101K
LDM1	56 μH
TVS	SMCJ80A
C0	560 $\mu\text{F}/100\text{V}$
C1,C2,C3	4.7 $\mu\text{F}/100\text{V}$
LCM1	15mH
LCM2	56 μH
LCM3	20 μH ~30 μH
C4	47 $\mu\text{F}/50\text{V}$
CY1, CY2, CY3	1nF/2KV

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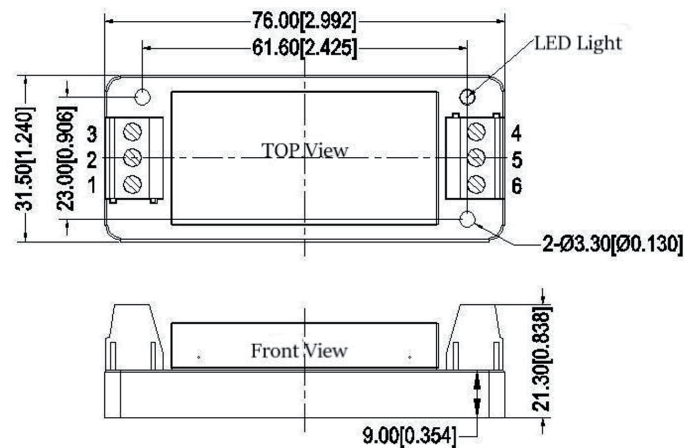
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Standard package dimensions and pin function

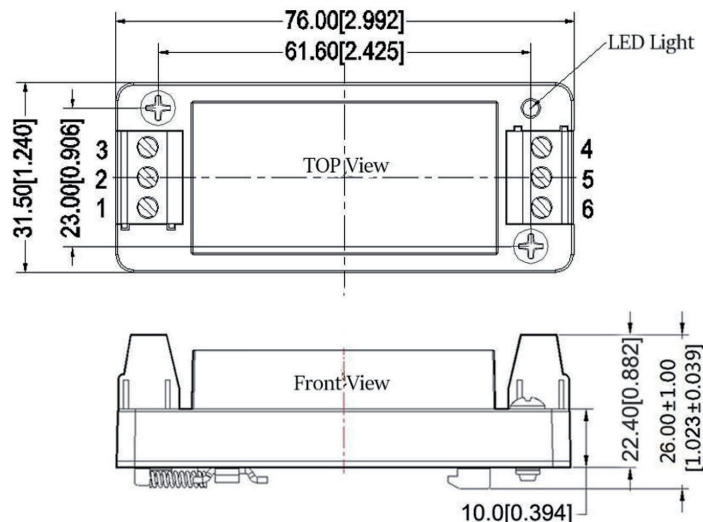


Pin	1	2	3	4	5	6
Single	+Vin	-Vin	CTRL	Trim	-Vo	+Vo

Chassis mounting dimensions



DIN rail mounting dimensions



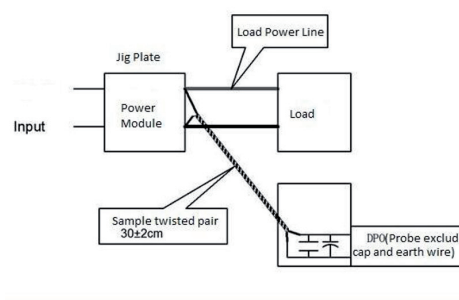
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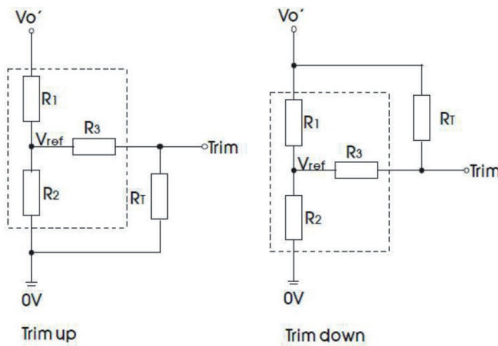
Ripple & noise test (twisted pair method 20MHz bandwidth)

Test Method:

1. 12# twisted pair to connect, Oscilloscope bandwidth set as 20MHz, 100M bandwidth probe, terminated with 0.1uF polypropylene capacitor and 47uF high frequency low resistance electrolytic capacitor in parallel, oscilloscope set as Sample pattern.
2. Output Ripple& Noise Test Method: Input terminal connect to power supply, output terminal connect to electronic load through jig plate, Use 30cm±2 cm sampling line, Power line selected from corresponding diameter wire with insulation according to the flow of output current.



The usage of trim and calculating trim resistor values



Calculating Trim resistor values:

$$\text{up: } R_T = \frac{\alpha R_2}{R_2 - \alpha} - R_3$$

$$\alpha = \frac{V_{ref}}{V_o' - V_{ref}} \cdot R_1$$

$$\text{down: } R_T = \frac{\alpha R_1}{R_1 - \alpha} - R_3$$

$$\alpha = \frac{V_o' - V_{ref}}{V_{ref}} \cdot R_2$$

R_T = Trim Resistor value;

α = self-defined parameter, no actual meaning;

V_o' is the actual voltage to increase or decrease;

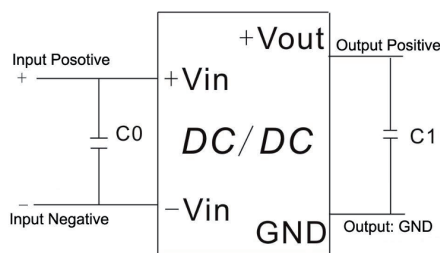
The usage circuit of the Trim circuit (dashed line shows inside of product)

Vout(VDC)	R1(KΩ)	R2(KΩ)	R3(KΩ)	Vref(V)
5	24	24	68	2.5
12	18	4.7	30	2.5
15	24	4.78	30	2.5
24	25.5	2.955	18	2.5

Recommended circuit

DC-DC test circuit:

Normal recommended capacitors:
C0:47-100uF; C1:100uF.



Input reflecting ripple current test circuit:

Capacitor C choose low ESR ones, withstand voltage value should be bigger than max input voltage;

