



## 75QBW4\_2.25 series

75W - Single Output DC-DC Converter - Wide Input - Isolated & Regulated

## DC-DC Converter

## 75W

- ⊕ 4:1 wide input voltage range
- ⊕ High efficiency up to 93%
- ⊕ I/O isolation test voltage: 2.25kVDC
- ⊕ Operating temperature range: -40°C ~ +85°C
- ⊕ Five-sided metal shielded package
- ⊕ Input under-voltage protection, output short circuit, over-current, over-voltage, over-temperature protection
- ⊕ Industry standard ¼-Brick package and pin-out
- ⊕ EN62368 approved
- ⊕ Meet UL62368, IEC62368, EN50155 standards

The 75QBW4\_2.25 series are isolated 75W DC-DC products with a 4:1 input voltage. They feature efficiency up to 93%, 2250VDC input to output isolation, operating ambient temperature of -40°C to +85°C, input under-voltage, output short circuit, over-current, over-voltage, over-temperature protection.

The products meet CLASS B of CISPR32/EN55032 EMI standards by adding the recommended external components, and they are widely used in applications such as battery powered systems, industrial controls, electricity, instrumentation, railway, communication and intelligent robotic.



Common specifications	
Short circuit protection:	Hiccup, continuous, self-recovery
Operation temperature:	-40°C ~ +85°C
Storage temperature:	-55°C ~ +125°C
Storage humidity:	Non-condensing 5 ~ 95%RH
Pin welding resistance temperature:	260°C MAX, wave soldering for 10 sec. 300°C MAX, 1.5mm from case for 10 sec.
Shock And Vibration:	IEC/EN61373 - Category 1, Grade B
Switching frequency:	PWM mode, 250KHz typ.
Cooling:	Free air convection (20LFM)
Casing material:	Aluminum alloy case, black plastic bottom, flame-retardant and heat-resistant (UL94 V-0)
MTBF:	500 Khours min. (MIL-HDBK-217F @25°C)
Dimension:	61.8 x 40.2 x 12.7mm (no heatsink) 62.0 x 56.0 x 14.6mm (with aluminium bottom case) 61.8 x 40.2 x 27.7mm (with heatsink) 135.00 x 70.00 x 22.6mm (75QBW4_xxyyS2.25CM) 137.00 x 70.00 x 28.10 (75QBW4_xxyyS2.25DR) 135.00 x 70.00 x 36.2mm (75QBW4_xxyySH2.25CM) 137.00 x 70.00 x 37.2mm (75QBW4_xxyySH2.25DR)
Weight:	90g (no heatsink) 110g (with aluminium bottom case) 121g (with heatsink) 166g (Typ.) (75QBW4_xxyyS2.25CM) 236g (Typ.) (75QBW4_xxyyS2.25DR) 197g (Typ.) (75QBW4_xxyySH2.25CM) 267g (Typ.) (75QBW4_xxyySH2.25DR)

Input specifications					
Item	Test condition	Min	Typ	Max	Units
Input current (Full load/no load)	Nominal input		1698 /50	1756 /80	mA
Reflected ripple current	Nominal input		30		mA
Surge voltage	(1sec max)	-0.7		90	VDC
Start-up Threshold Voltage				18	VDC
Under-voltage protection	• 5/15VDC output • Others	16 15	16.5 15.5		VDC
Filter	PI filter				
Ctrl*	• Module switch on • Module switch off • Input current when switched off		Ctrl suspended or connected to TTL high level (3.5-12VDC) Ctrl connected to -Vin or low level (0-1.2VDC) 2mA typ., 10mA max.		
Hot-plug	Unavailable				

Output specifications					
Item	Operating condition	Min	Typ	Max	Units
Output voltage accuracy			±1	±3	%
Line regulation	Full load, input voltage low to high		±0.2	±0.5	%
Load regulation	Nominal input, 10%-100% load		±0.5	±0.75	%
Transient Recovery Time	25% load step change		200	500	µs
Transient Response Deviation	25% load step change • 5VDC output • Others		±3 ±3	±7.5 ±5	%
Temperature drift	100% full load			±0.03	%/°C
Ripple & Noise*	20MHz Bandwidth • 12/15VDC output • Others		100 150	200 250	mVp-p mVp-p
Trim		95		110	%Vo
Sense				105	%Vo
Over-temperature Protection	Max. Case Temperature		115	120	°C
Over-voltage Protection	Input voltage range	110	130	160	%Vo
Over-current Protection	Input voltage range	110	140	190	%Io

\* Ripple and noise are measured by "parallel cable" method.

Isolation specifications					
Item	Test condition	Min	Typ	Max	Units
Insulation voltage*	• Input-output • Input-case • Output-case	2250 1500 500			VDC VDC VDC
Insulation resistance	Test at 500VDC	100			MΩ
Isolation capacitance	Input/output, 100KHz/0.1V		2200		pF

\* Input-output, with the test time of 1 minute and the leak current less than 1mA

### Example:

#### 75QBW4\_4812S2.25

75 = 75 Watt; QB = Quarter Brick; W4 = Wide input (4:1); 48 = 18-75Vin; 12 = 12Vout; S = Single Output; 2.25 = 2250 VDC Isolation

### Note:

- The maximum capacitive load offered were tested at input voltage range and full load;
- Unless otherwise specified, data in this datasheet should be tested under the conditions of Ta = 25°C, humidity<75%RH when inputting nominal voltage and outputting rated load;
- All index testing methods in this datasheet are based on our Company's corporate standards;
- We can provide product customization service and match filter module;
- Specifications of this product are subject to changes without prior notice.
- The products do not support parallel connection of their output.
- We recommended the use of a converter with higher output power capability to cover applications with higher power requirement

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EMC specifications			
Emissions	CE	CISPR22/EN55032	CLASS A and CLASS B (see Fig. 3 for recommended circuit)
Emissions	RE	CISPR22/EN55032	CLASS A and CLASS B (see Fig. 3 for recommended circuit)
Immunity	ESD	IEC/EN61000-4-2 EN50121-3-2	Contact $\pm 6\text{KV}$ ; Air $\pm 8\text{KV}$ perf. Criteria B
Immunity	RS	IEC/EN61000-4-3 GB/T17626.3	10V/m perf. Criteria A
Immunity	EFT	IEC/EN61000-4-4 EN50121-3-2	$\pm 2\text{KV}$ (5KHz, 100KHz) (see Fig. 2 for recommended circuit) perf. Criteria A
Immunity	Surge	EN50121-3-2	differential mode $\pm 1\text{KV}$ , 1.2/50 $\mu\text{s}$ , source impedance 42 $\Omega$ (see Fig. 2 for recommended circuit) perf. Criteria B
Immunity	CS	IEC/EN61000-4-6 EN50121-3-2	10 Vr.m.s perf. Criteria A

## Product Selection Guide

Part Number	Input Voltage [VDC]		Ctrl Logic*	Output Voltage [VDC]	Output Current [A, max]	Full Load Efficiency [%, Min/typ]	Capacitive load [ $\mu\text{F}$ , max]
	Nominal (range)	Max.**					
75QBW4_4805S2.25	48 (18-75)	80	P	5	15	87/91	6000
75QBW4_4812S2.25	48 (18-75)	80	P	12	6.25	88/92	2000
75QBW4_4815S2.25	48 (18-75)	80	P	15	5	89/93	2000
75QBW4_4824S2.25	48 (18-75)	80	P	24	3.13	88/92	1000
75QBW4_4848S2.25	48 (18-75)	80	P	48	1.56	88/92	470

Note:

For aluminium base-plate: add suffix: **BP** at the end, i.e.: 75QBW4\_4805S2.25BP

For heat sink mounting: add suffix: **H**, i.e.: 75QBW4\_4805SH2.25

For chassis mounting: add suffix: **CM**, i.e.: 75QBW4\_4805S2.25CM

For Din-Rail mounting: add suffix: **DR**, i.e.: 75QBW4\_4805S2.25DR

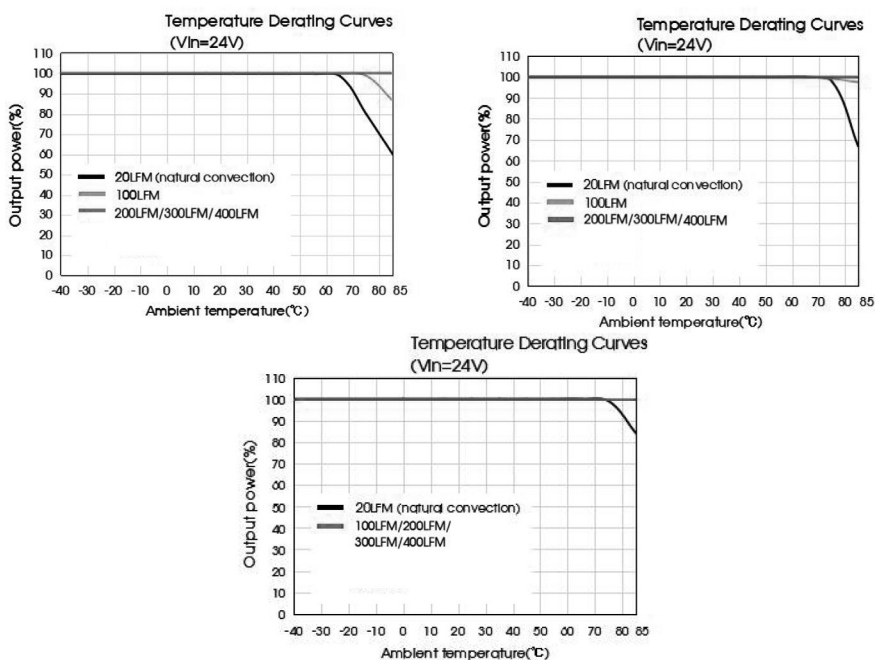
\* Suffix **P** = positive logic 75QBW4\_4805S2.25/P

Suffix **N** = negative logic 75QBW4\_4805S2.25/N

\*\* Exceeding the maximum input voltage may cause permanent damage;

\*\*\* The minimum input voltage range and the start-up voltage of the CM/DR product model are 1VDC higher than the horizontal package.

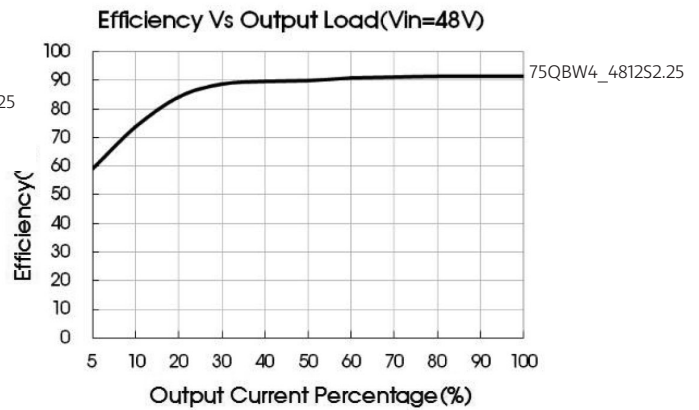
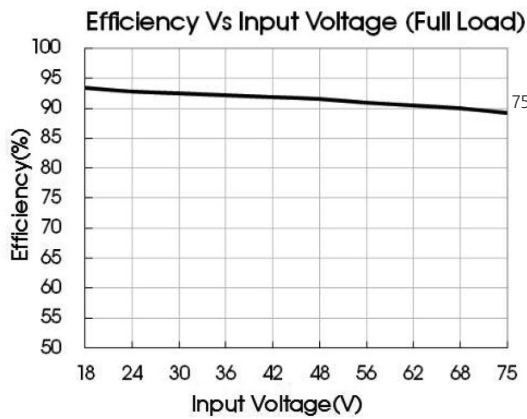
## Temperature derating curves



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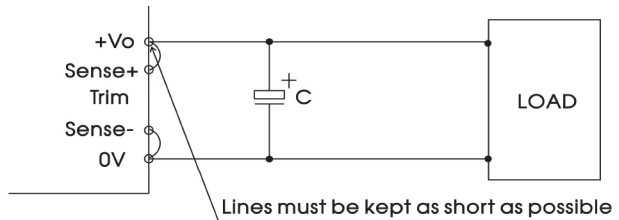
### Efficiency



### Remote sense application

#### 1. When Remote Sense is not used

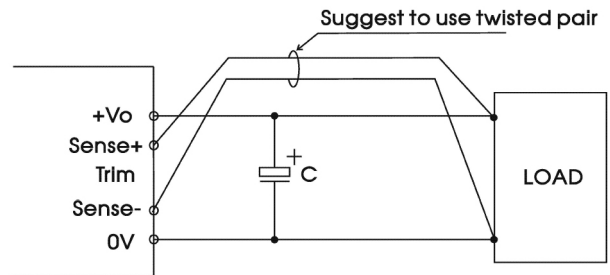
- (1) If the sense function is not used for remote regulation the user must connect the +Sense to +Vo and -Sense to 0V at the DC-DC converter pins and will compensate for voltage drop across pins only.
- (2) The connections between Sense lines and their respective power lines must be kept as short as possible, otherwise they may be picking up noise, interference and/or causing unstable operation of the power module.



#### 2. When Remote Sense is used

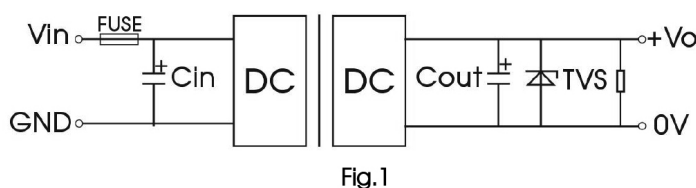
Note:

- (1) Using remote sense with long wires may cause unstable output, please contact technical support if long wires must be used.
- (2) PCB-tracks or cables/wires for Remote Sense must be kept as short as possible. Twisted pair or shielded wires are suggested for remote compensation and must be kept as short as possible.
- (3) We recommend using adequate cross section for PCB-track layout and/or cables to connect the power supply module to the load in order to keep the voltage drop below 0.3V and to make sure the power supply's output voltage remains within the specified range.
- (4) Note that large wire impedance may cause oscillation of the output voltage and/or increased ripple. Consult technical support or factory for further advice of sense operation.



### Typical application

- (1) We recommended using the recommended circuit shown in Fig.1 during product testing and application, otherwise please ensure that at least a 220µF electrolytic capacitors is connected at the input in order to ensure adequate voltage surge suppression and protection.
- (2) We recommended increasing the value of Cin and pay attention to the unstable input voltage if the product input side is paralleled with motor drive circuit and/or larger energy transient circuits, to ensure the stability of input terminal and avoid repeatedly start-up problems due to input voltage lower than under-voltage protection point.
- (3) We recommended increasing the output capacitance with limited to the capacitive load specification and/or increasing the voltage clamping circuit (such as TVS) if the output terminal is inductive device such as relay or a motor, to ensure adequate voltage surge suppression and protection.
- (4) Input and/or output ripple can be further reduced by appropriately increasing the input & output capacitor values Cin and Cout and/or by selecting capacitors with a low ESR (equivalent series resistance). Also make sure that the capacitance is not exceeding the specified max. capacitive load value of the product.



Vout (VDC)	Fuse	Cin (µF)	Cout (µF)	TVS
5	10A, slow blow	220	470	SMDJ6.0A
12	10A, slow blow	220	220	SMDJ14A
15	10A, slow blow	220	220	SMDJ17A
24	10A, slow blow	220	100	SMDJ28A
48	10A, slow blow	220	100	SMDJ54A

**EMC solution-module recommended**

Note: We suggest to use the recommended circuit shown in Fig.2 or Fig.3 during product EMC testing and application.

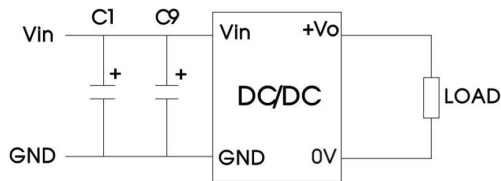


Fig. 2

Capacitor	Recommended Value	Function
C1	150μF electrolytic	Meets EFT and surge
C9	47μF electrolytic	

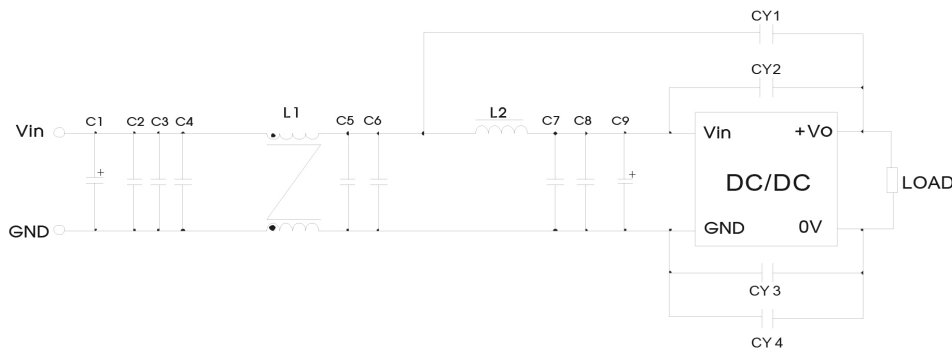
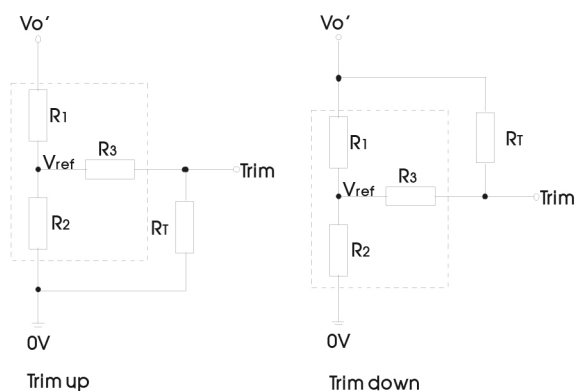


Fig. 3

Class A Components	Class B Components	Recommended Component Value	Function
	C1	50μF electrolytic caoacitor	Meets conducted emission and radiated emission
	C9	47μF electrolytic caoacitor	
	C1	50μF electrolytic caoacitor	
	C9	47μF electrolytic caoacitor	
	C2, C3, C4, C5, C6, C7, C8	2.2μF ceramic capacitor	
	L1	1.0mH common mode inductor	
	L2	1.5μH inductance	
CY3	CY1, CY2, CY3, CY4	1nF Y1safety caoacitor	

**Trim Function for Output Voltage Adjustment (open if unused)**



TRIM resistor connection (dashed line shows internal resistor network)

Calculation formula of Trim resistance:

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

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

Note:

Value for R1, R2, R3, and Vref refer to the above table .

RT: Resistance of Trim.

α: User-defined parameter, no actual meanings.

Vo': The trim up/down voltage.

Vout (VDC)	R1 (KΩ)	R2 (KΩ)	R3 (KΩ)	Vref (V)
5	3.036	3	10	2.5
12	11.00	2.87	15	2.5
15	14.03	2.8	15	2.5
24	24.872	2.87	15	2.5
48	53.017	2.913	15	2.5

Note: If the Trim pin is shorted with "+Vo", or its value is too low, then the output voltage Vo' would be lower than 0.95Vo, which may cause permanent damage.

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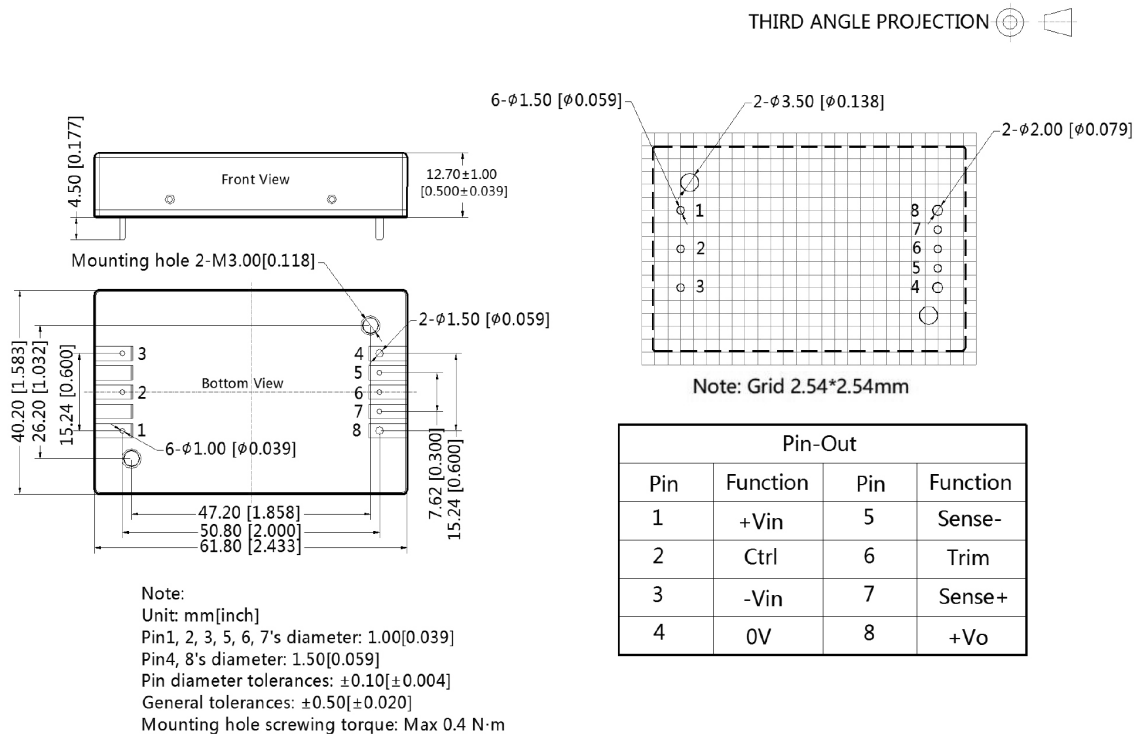
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### Reflected ripple current-test circuit

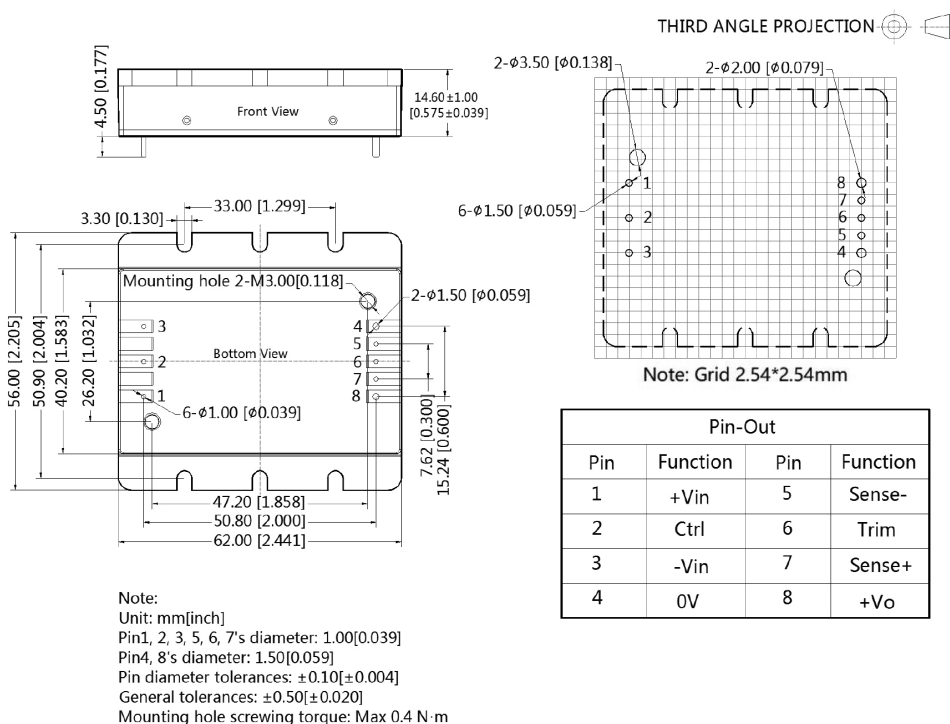


Note:  $L_{in}(4.7 \mu H)$ ,  $C_{in}(220 \mu F, ESR < 1.0 \Omega \text{ at } 100 \text{ KHz})$

### Mechanical dimensions



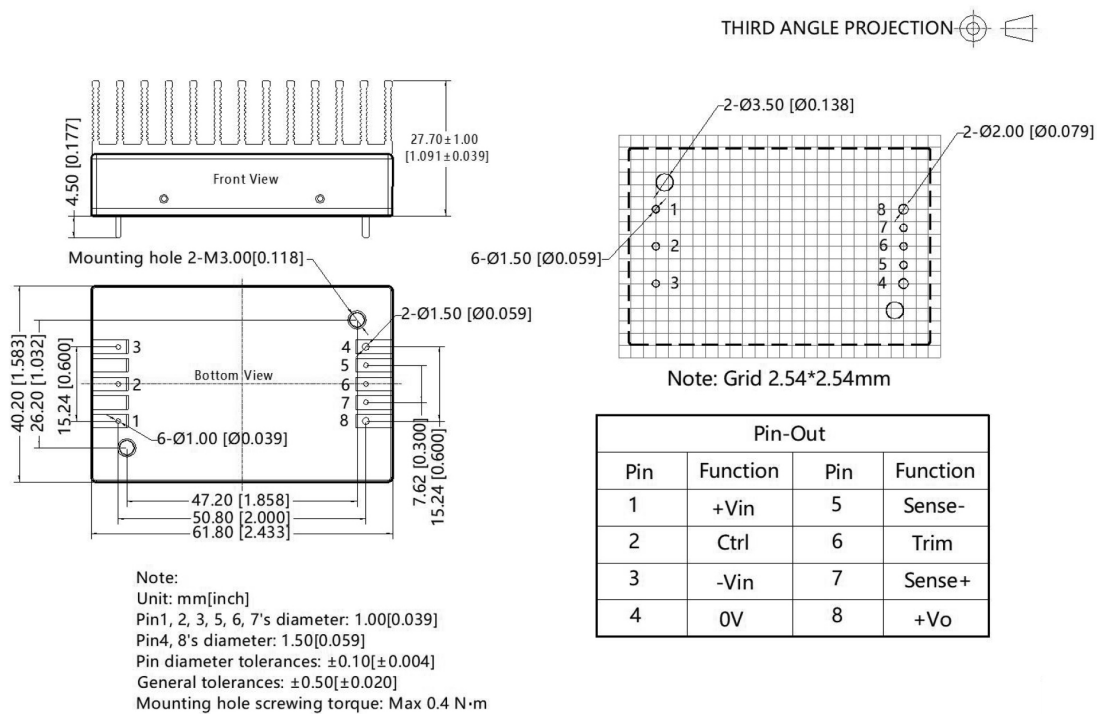
### Mechanical dimensions (aluminium base-plate)



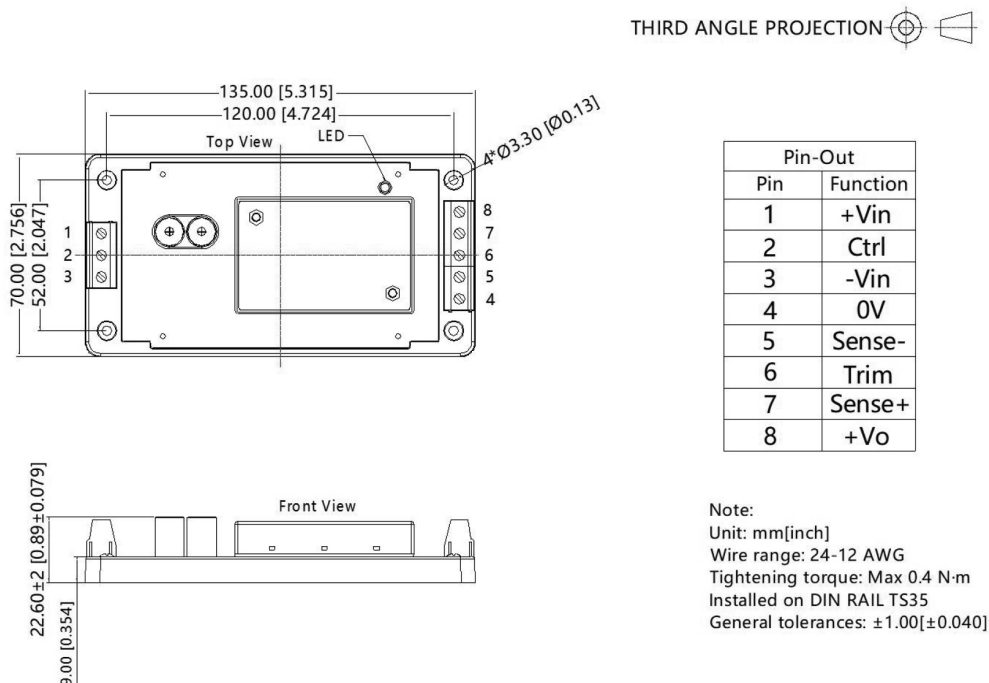
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### Mechanical dimensions (heat sink mounting)



### Mechanical dimensions (chassis mounting)

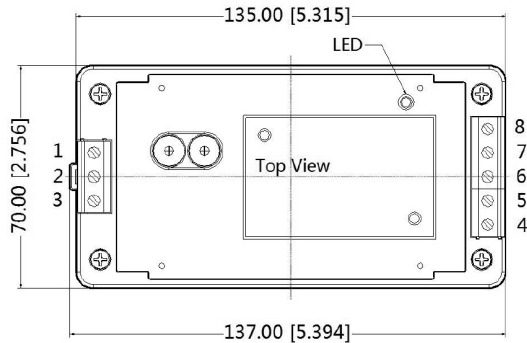


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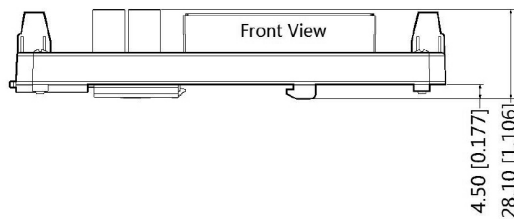
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### Mechanical dimensions (DIN-Rail mounting)

THIRD ANGLE PROJECTION 



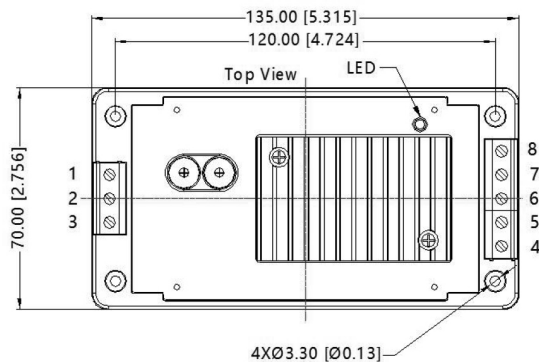
Pin-Out	
Pin	Function
1	+Vin
2	Ctrl
3	-Vin
4	0V
5	Sense-
6	Trim
7	Sense+
8	+Vo



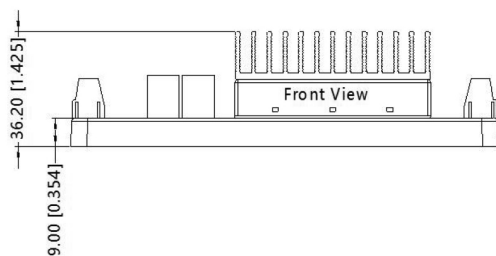
Note:  
 Unit: mm[inch]  
 Wire range: 24-12 AWG  
 Tightening torque: Max 0.4 N·m  
 Installed on DIN RAIL TS35  
 General tolerances:  $\pm 1.00[\pm 0.040]$

### Mechanical dimensions (heat sink, chassis mounting)

THIRD ANGLE PROJECTION 



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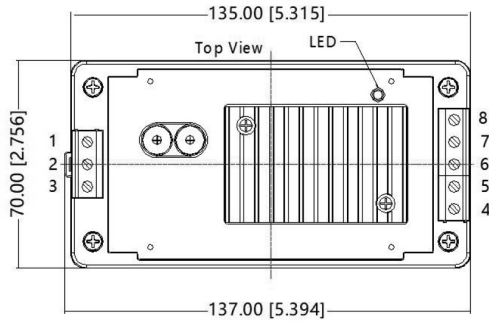
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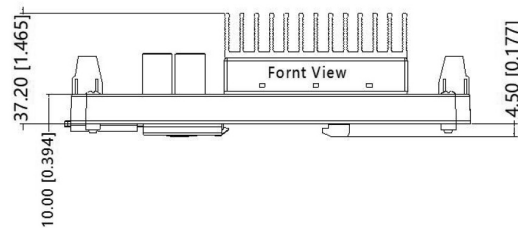
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### Mechanical dimensions (heat sink, DIN-Rail mounting)

THIRD ANGLE PROJECTION 



Pin-Out	
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