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DC-DC CONVERTERS

200 WATTS

DCWF48xxQB-200 SERIES

FEATURES

- Ultra-wide 4:1 input voltage range
- High efficiency up to 91%
- I/O isolation test voltage 2.25k VDC
- Working temperature ange-40°C to +85°C
- Input under-voltage protection, output short-circuit, over-current, over-voltage, over-temperature protection
- Metal shielded package
- Industry standard ¼-Brick package and pin-out
- 3 Years warranty

MODEL NUMBERING

DCWF48xxQB-200W

- Series
- Input Voltage
- Output Voltage
- Output Power
- Packaging Form

SELECTION GUIDE

Product Model	**Input Voltage** Standard Value(range)	Output Voltage (Vdc)	Current (A) (Max.)	Efficiency % (Min./Typ.)	Maximum capacitive load (μF)
DCWF4805QB-200W	48VDC (18-75)	5	40	86/88	6000
DCWF4812QB-200W		12	16.7	89/91	2000
DCWF4815QB-200W		15	13.3	87/89	2000
DCWF4824QB-200W		24	8.4	89/91	1000
DCWF4836QB-200W		36	5.56	86/88	1000
DCWF4842QB-200W		42.5	5	88/90	2000
DCWF4848QB-200W		48	4.2	89/91	450

Note:
1. Use “F” suffix is for added aluminum baseplate and “H” suffix for heat sink mounting, use “ST” suffix for chassis mounting and “DR” suffix for DIN-Rail mounting, we recommend to choose modules with a heat sink for enhanced heat dissipation and applications with extreme temperature requirements;
2. Exceeding the maximum input voltage may cause permanent damage;
3. The minimum input voltage range and starting voltage of the ST /DR product model are 1VDC higher than the horizontal package model;
4. ST/DR package products are 2% less efficient than standard products.

INPUT CHARACTERISTICS

Parameter	Operating Conditions	Min.	Typ.	Max.	Units
Input Current (full load)	Nominal input voltage	--	4735	4845	mA
Input Current (no-load)	Nominal Input Voltage	--	100	200	mA
Reflected Ripple Current	Nominal Input Voltage	--	100	--	mA
Input Impulse voltage (1sec. max.)		-0.7	--	90	VDC
Starting Voltage		--	--	18	VDC
Input Under-voltage Protection		14	16	--	VDC
Input Filter		Pi filter			
Ctrl*	Module on	Ctrl pin open or pulled high TTL (3.5-12VDC)			
	Module off	Ctrl pin pulled lowto GND(0-1.2VDC)			
	Input current when off	--	2	10	mA

Remarks: This product does not support hot plug Note: *The Ctrl pin voltage is referenced to input GND

OUTPUT CHARACTERISTICS

Parameter	Operating Conditions		Min.	Typ.	Max.	Units
Output Voltage Accuracy	0% - 100% load		--	±1	±3	%
Line Regulation Rate	Input voltage variation from low to high at full load		--	±0.2	±0.5	%
Load Regulation Rate	5% - 100% load		--	±0.5	±0.75	%
Transient Recovery Time	25% load step change		--	300	500	μs
Dynamic Response Step Deviation	25% load step change, input	5V output	--	±3	±7.5	%
		Other output	--	±3	±5	%
Temperature Drift Coefficient	100% load		--	--	±0.03	%/°C
Ripple & Noise	20MHz bandwidth	36V, 42.5V output	--	150	300	mVp-p
		Other output	--	150	250	mVp-p

Parameter	Operating Conditions		Min.	Typ.	Max.	Units
Trim	36V output		110	--	110	%Vo
	Others		90	--	110	%Vo
Sense			--	--	105	%Vo
Over Temperature Protection	Max. Case Temperature	36V, 42.5V output	95	105	115	°C
		Other output	--	115	120	°C
Output Over Voltage Protection	Input voltage range		110	130	160	%Io
Output Over Current Protection			110	130	150	%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.

GENERAL CHARACTERISTIC

Parameter	Operating Conditions		Min.	Typ.	Max.	Units
Isolation Voltage	Electric Strength Test for 1 minute with a leakage current of 5mA max	Input - output	2250	--	--	VDC
		Input - case	1500	--	--	VDC
		Output - case	500	--	--	VDC
Insulation Resistance	Input-output insulation voltage 500VDC		100	--	--	MΩ
Isolation Capacitance	Input-output capacitance at 100KHz/0.1V		--	2200	--	pF
Working Temperature			-40	--	+85	°C
Storage Temperature			-55	--	+125	°C
Storage Humidity	Non-condensing		5	--	95	%RH
Soldering Temperature Resistance Of Pins	Soldering spot is 1.5mm away from case for 10 seconds		--	--	300	°C
	Wave soldering 10 seconds		255	260	265	°C
Thermal Resistance	Free air convection (20LFM)	DCWF48xxQB-200W	--	--	7.5	°C/W
		DCWF48xxQB-200WF	--	--	6.3	°C/W
		DCWF48xxQB-200WH	--	--	5.2	°C/W

Parameter	Operating Conditions	Min.	Typ.	Max.	Units
Shock And Vibration		IEC/EN61373 - Category 1, Grade B			
Switching Frequency	PWM mode	--	250	--	KHz
MTBF	MIL-HDBK-217F@25°C	500	--	--	Khours

Note: *The pin resistance temperature is not the actual set temperature of the soldering iron, but the temperature required for a good solder joint. The actual set temperature by the customer needs to be comprehensively set based on the thickness of the PCB, the size of the copper cladding, the power of the soldering iron and the selection of the soldering iron tip.

PHYSICAL CHARACTERISTICS

Parameter	Conditions		
Case Material	Aluminum alloy case, black plastic bottom, flame-retardant and heat-resistant (UL94 V-0)		
Dimensions	Without heatsink	DCWF48xxQB-200W	61.80 × 40.20 × 12.70 mm
		DCWF4805/12QB-200WST	135.00 × 70.00 × 20.45 mm
		DCWF4805/12QB-200WDR	137.00 × 70.00 × 25.95 mm
		DCWF4815/24/36/42/48QB-200WST	135.00 × 70.00 × 22.60 mm
		DCWF4815/24/36/42/48QB-200WDR	135.00 × 70.00 × 28.10 mm
	With heatsink	DCWF48xxQB-200WF	62.00 × 56.00 × 14.60 mm
		DCWF48xxQB-200WH	61.80 × 40.20 × 27.70 mm
		DCWF4805/12QB-200WHST	135.00 × 70.00 × 36.20 mm
		DCWF4805/12QB-200WHDR	137.00 × 70.00 × 37.20 mm
		DCWF4815/24/36/42/48QB-200WHST	135.00 × 70.00 × 36.20 mm
		DCWF4815/24/36/42/48QB-200WHDR	135.00 × 70.00 × 37.20 mm
Weight	Without heatsink	DCWF48xxQB-200W	89.0g (Typ.)
		DCWF4805/12QB-200WST	187.0g (Typ.)
		DCWF4805/12QB-200WDR	257.0g (Typ.)
		DCWF4815/24/36/42/48QB-200WST	165.0g (Typ.)
		DCWF4815/24/36/42/48QB-200WDR	235.0g (Typ.)
	With heatsink	DCWF48xxQB-200WF	109.0g (Typ.)
		DCWF48xxQB-200WH	120.0g (Typ.)
		DCWF4805/12QB-200WHST	165.0g (Typ.)
		DCWF4805/12QB-200WHDR	235.0g (Typ.)
		DCWF4815/24/36/42/48QB-200WHST	196.0g (Typ.)
		DCWF4815/24/36/42/48QB-200WHDR	266.0g (Typ.)
Cooling Method	Natural Air Cooling		

EMC CHARACTERISTICS

	Parameter	Category	Content	
EMI	CE	CISPR32/EN55032	CISPR32/EN55032 CLASS A (see Fig. 2 for recommended circuit)	
	RE	CISPR32/EN55032	CLASS A and CLASS B (see Fig. 2 for recommended circuit)	
EMS	ESD	IEC/EN61000-4-2 EN50121-3-2	Contact ±6KV, Air ±8KV	perf. Criteria B
	RS	IEC/EN61000-4-3 EN50121-3-2	10V/m	perf. Criteria A
	EFT	IEC/EN61000-4-4 EN50121-3-2	±2KV (see Fig. 2 for recommended circuit)	perf. Criteria A
	Surge	EN50121-3-2	Differential mode ±1KV, 1.2/50us, source impedance 42Ω (see Fig.2 for recommended circuit)	perf. Criteria B
	CS	IEC/EN61000-4-6 EN50121-3-2	10Vr.m.s	perf. Criteria A

CIRCUIT DESIGN AND APPLICATION

1. 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.

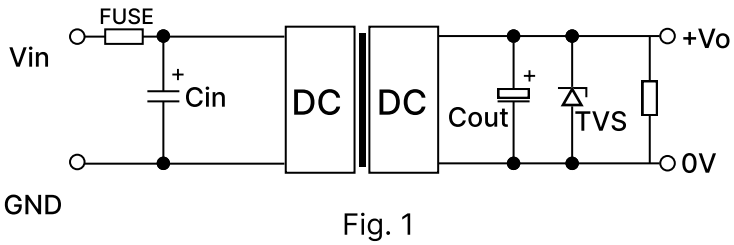


Fig. 1

Note:
① Please pay attention to the ambient temperature of the product when using an external capacitor, increase the electrolytic capacitor values to at least 1.5 times the original parameter if the ambient temperature is low such as-25°C) .

Table 1. Recommended Capacitive Load Values

Vout (VDC)	Cin①	Cout	TVS	FUSE
5	220μF	470μF	SMDJ6.0A	20A Slow blow
12		220μF	SMDJ14A	
15			SMDJ17A	
24		100μF	SMDJ28A	
36			SMDJ47A	
42.5			SMDJ54A	
48			SMDJ54A	

2. EMC compliance circuit

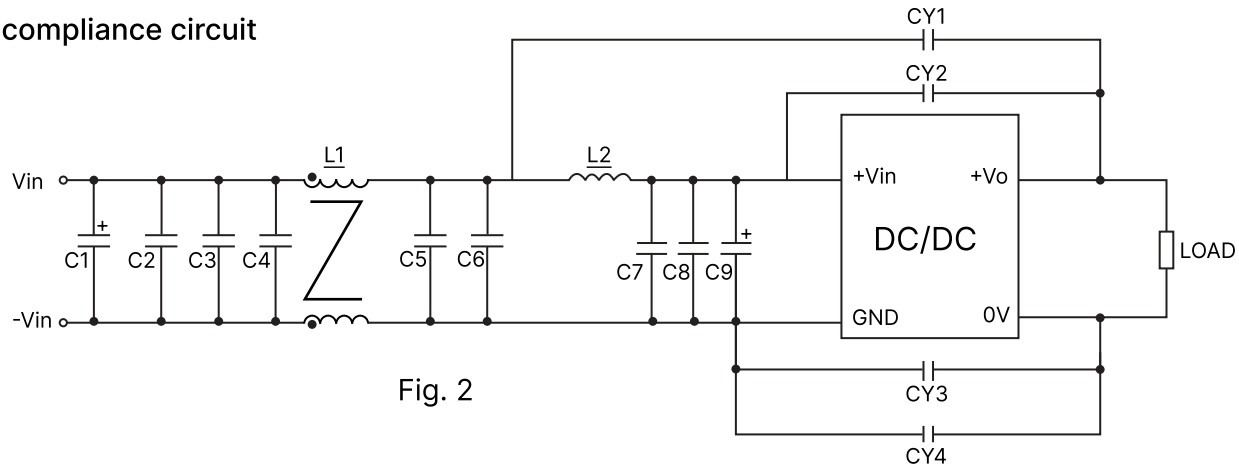


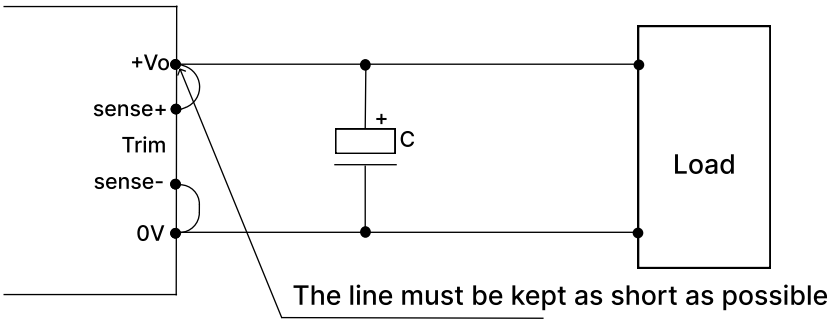
Fig. 2

Table 2：recommended component parameters

Components	Recommended Component Value
C1	150μF/100V electrolytic capacitor
C9	47μF/100V electrolytic capacitor
C2/ C3/ C4/ C5/ C6/C7/ C8	2.2μF/100V ceramic capacitor
L1	2.0mH
L2	1.5μH/15A inductance
CY1/ CY2/ CY3/ CY4	1nF Y1 safety capacitor

3. Remote Sense Application

Remote Sense Connection if not used

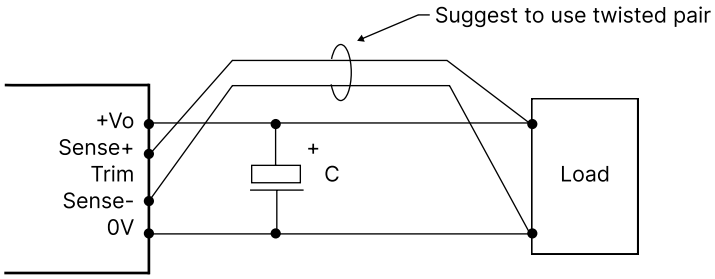


Notes：

(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.

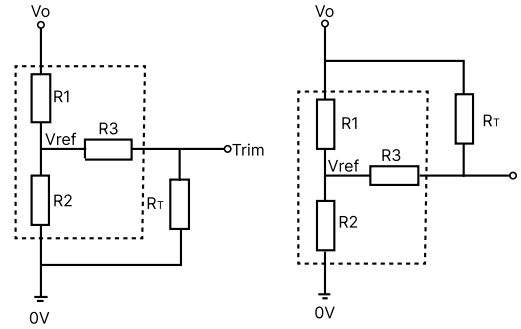
(2)The connections between Sense lines and their respective power lines must be kept as short as possible, otherwise they may be picking up noise, interference and/or causing unstable operation of the power module.

Remote Sense Connection used for Compensation



Notes:
(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.

4. Trim Function for Output Voltage Adjustment (open if unused)



Trim up Trim Down

Trim resistor connections (dashed line shows internal resistor network)

Calculating Trim resistor values:

Trim up: $R_T = \frac{aR_2}{R_2-a} - R_3$ $a = \frac{Vref}{Vo'-Vref} R_1$

Trim down: $R_T = \frac{aR_1}{R_1-a} - R_3$ $a = \frac{Vo'-Vref}{Vref} R_2$

R_T is Trim resistance
a is a self-defined parameter, with no real meaning.
Vo' = desired output 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
36	38.73	2.85	15	2.5
42.5	46.789	2.913	15	2.5
48	53.017	2.913	15	2.5

Note: When using the Trim down function, if RT resistor value is too low, or the Trim pin is shorted with +Vo, then the output voltage Vo' would be lower than 0.9Vo, which may cause permanent damage to the product.

4. Reflected ripple current test circuit

All DC-DC converters of this series are tested using the recommended circuit shown in Fig. 5. Test point,

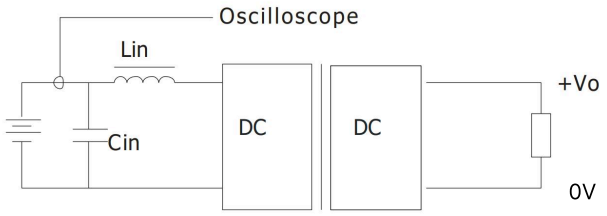
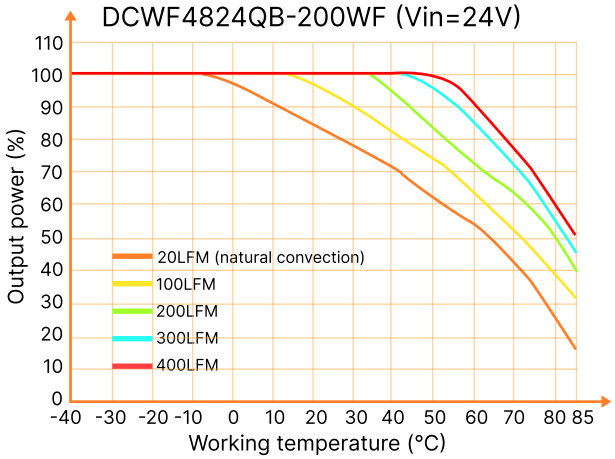
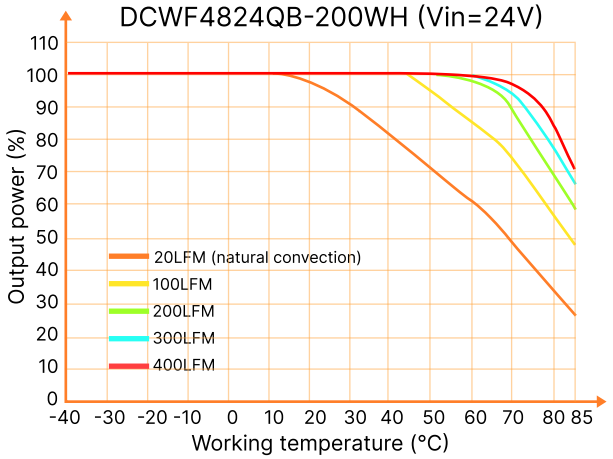


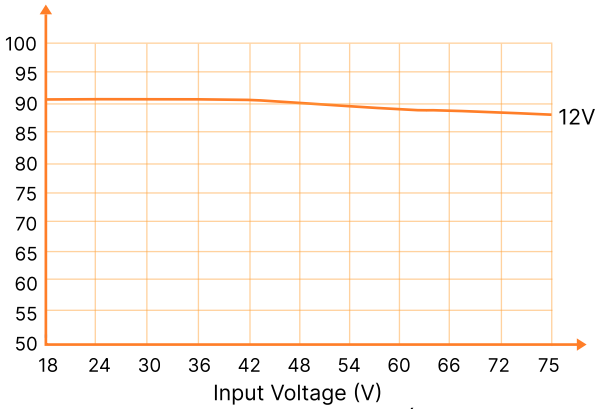
Fig. 3

Components	Recommended Component Value
Cin	220μF
Lin	4.7uH

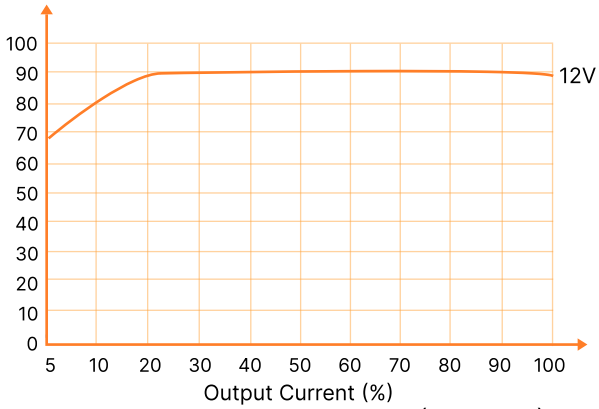
PRODUCT CHARACTERISTIC CURVE







Efficiency Vs Input Voltage (Full Load)



Efficiency Vs Output Voltage (Vin=48V)

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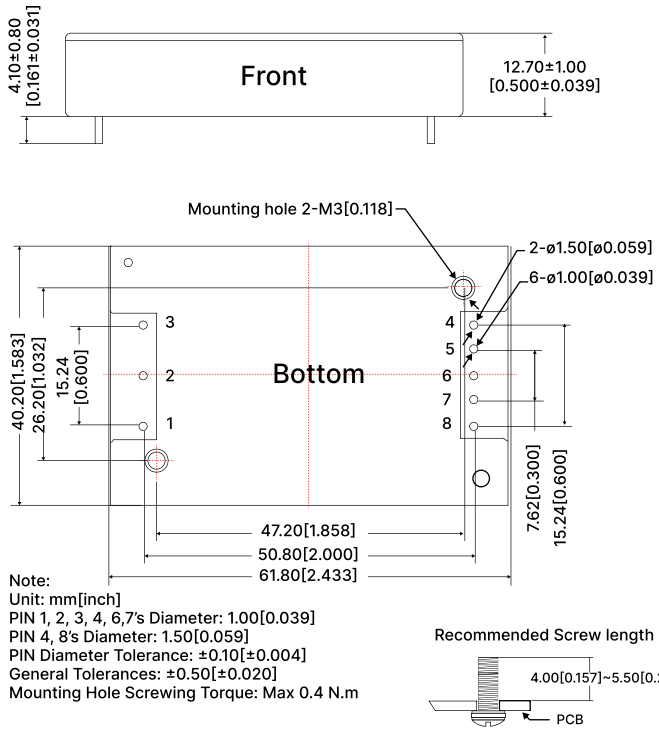
200 WATTS

DIMENSIONS AND INSTALLATION

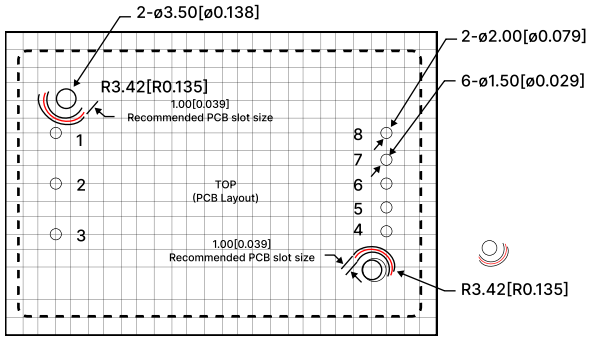
DCWF48_QB-200W



Note:
Unit: mm[inch]
PIN 1, 2, 3, 4, 6,7's Diameter: 1.00[0.039]
PIN 4, 8's Diameter: 1.50[0.059]
PIN Diameter Tolerance: ±0.10[±0.004]
General Tolerances: ±0.50[±0.020]
Mounting Hole Screwing Torque: Max 0.4 N.m

Recommended Screw length

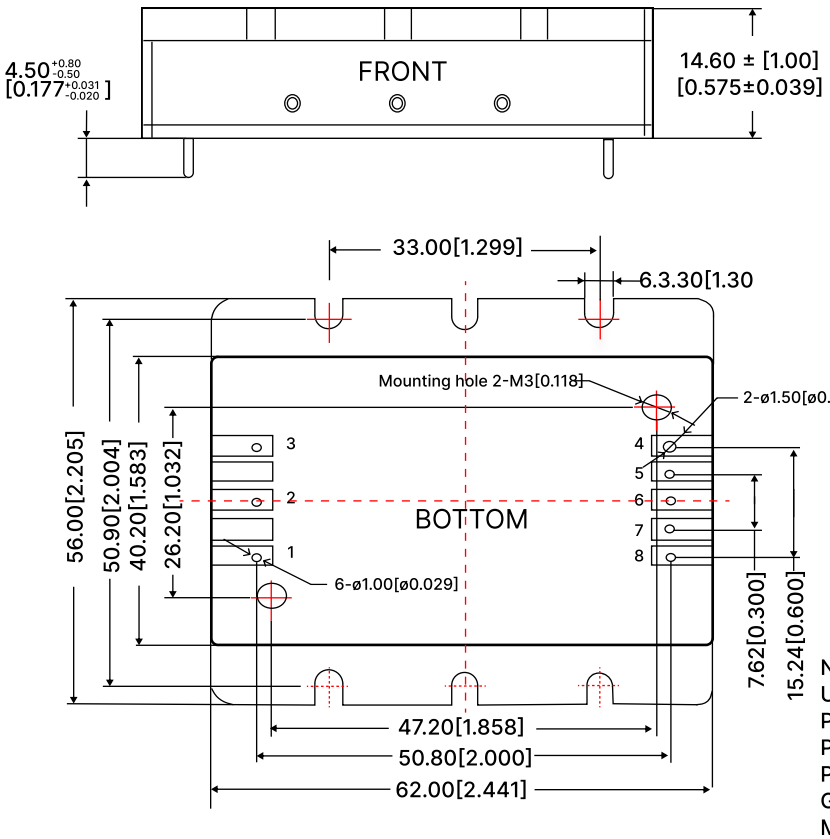
THIRD ANGLE PROJECTION



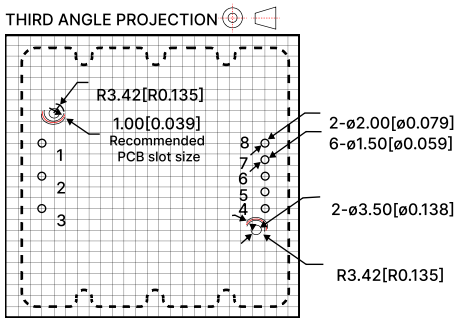
Note: Grid 2.54*2.54mm

Pin	Function	Pin	Function
1	+Vin	5	Sense-
2	Ctrl	6	Trim
3	GND	7	Sense+
4	0V	8	+V0

DCWF48_QB-200WF (with baseplate)

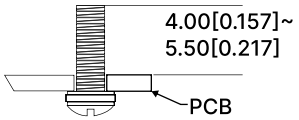


THIRD ANGLE PROJECTION



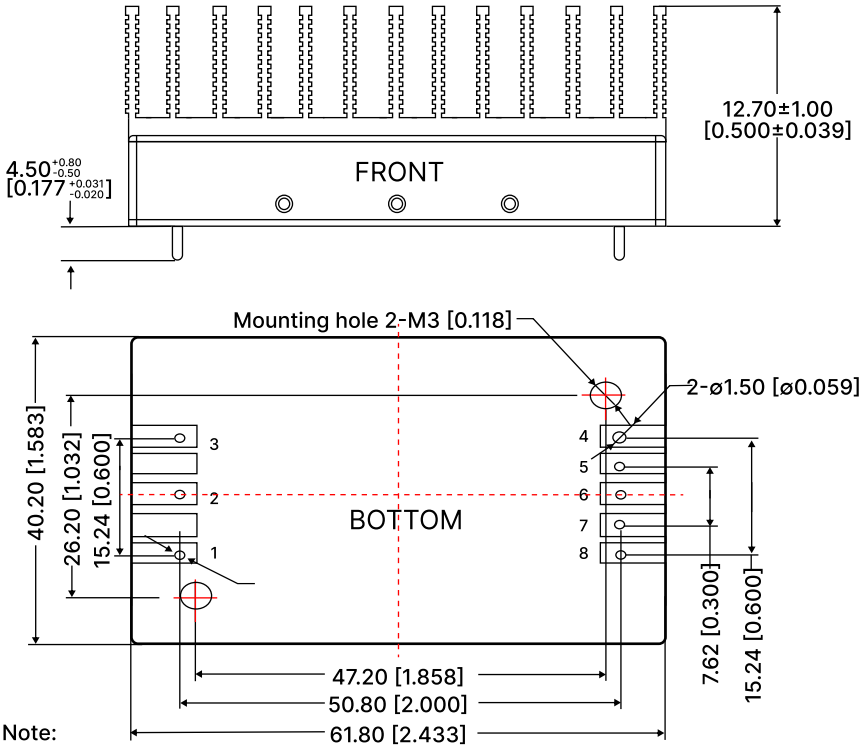
Note: Grid 2.54*2.54mm

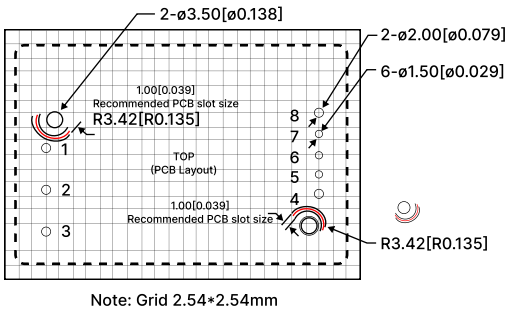
Pin	Function	Pin	Function
1	+Vin	5	Sense-
2	Ctrl	6	Trim
3	GND	7	Sense+
4	0V	8	+V0



Note:
Unit: mm[inch]
PIN 1, 2, 3, 4, 6,7s Diameter: 1.00[0.039]
PIN 4, 8's Diameter: 1.50[0.059]
PIN Diameter Tolerance: ±0.10[±0.004]
General Tolerances: ±0.50[±0.020]
Mounting Hole Screwing Torque: Max 0.4 N.m

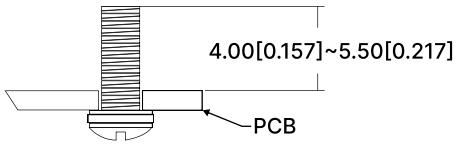
DCWF48_QB-200WH (with heatsink)





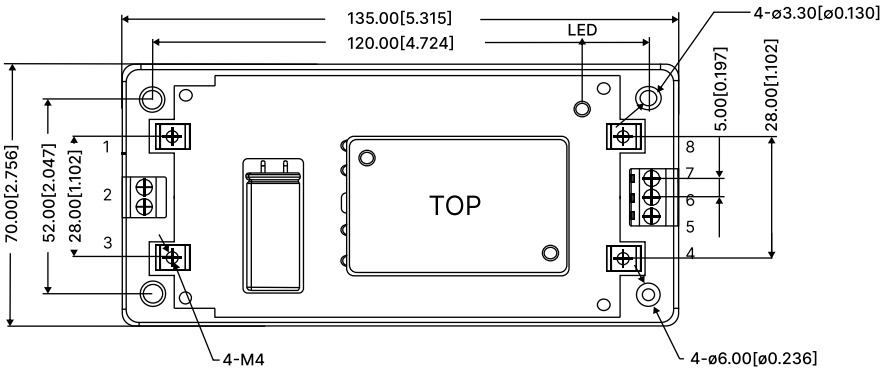
Note: Grid 2.54*2.54mm

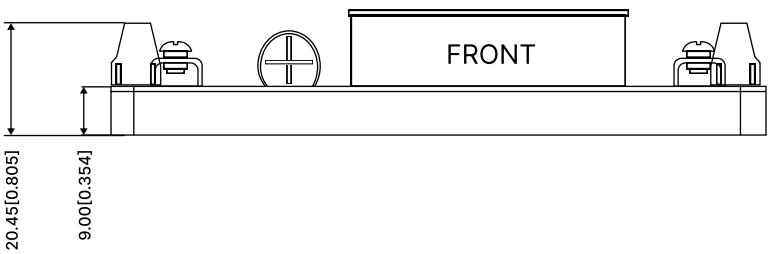
Pin	Function	Pin	Function
1	+Vin	5	Sense-
2	Ctrl	6	Trim
3	GND	7	Sense+
4	0V	8	+Vo



Note:
Unit: mm[inch]
PIN 1, 2, 3, 4, 6,7s Diameter: 1.00[0.039] PIN 4, 8's Diameter: 1.50[0.059] PIN Diameter Tolerance: ±0.10[±0.004]
General Tolerances: ±0.50[±0.020] Mounting Hole Screwing Torque: Max 0.4 N.m

DCWF4805/12QB-200WST (without heatsink)





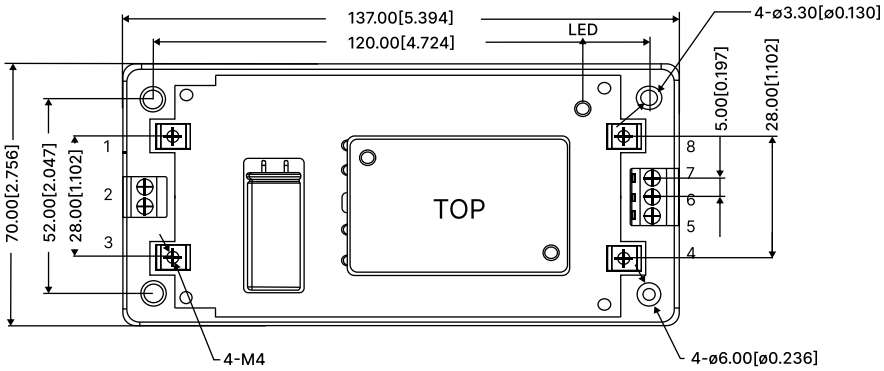
THIRD ANGLE PROJECTION

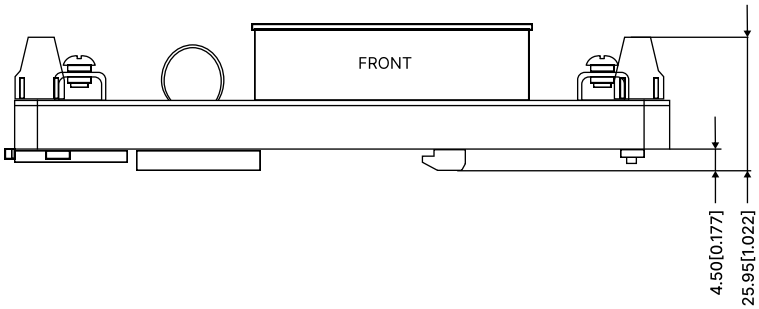
Pin	Function	Pin	Function
1	+Vin	5	Sense-
2	Ctrl	6	Trim
3	GND	7	Sense+
4	0V	8	+Vo

Position	Screw Spec	Function
①-④	M3	0.4N.m

Note:
Unit: mm[inch]
Wire range: PIN 1, 3, 4, 8, 8AWG
PIN 2, 5-7 24-12 AWG
Tightening torque: PIN 1, 3, 4, 8 M4, Max 0.9 N.m
PIN 2, 5-7 M3, Max 0.4 N.m
General tolerance: ± 1.00[±0.039]

DCWF4805/12QB-200WDR (without heatsink)



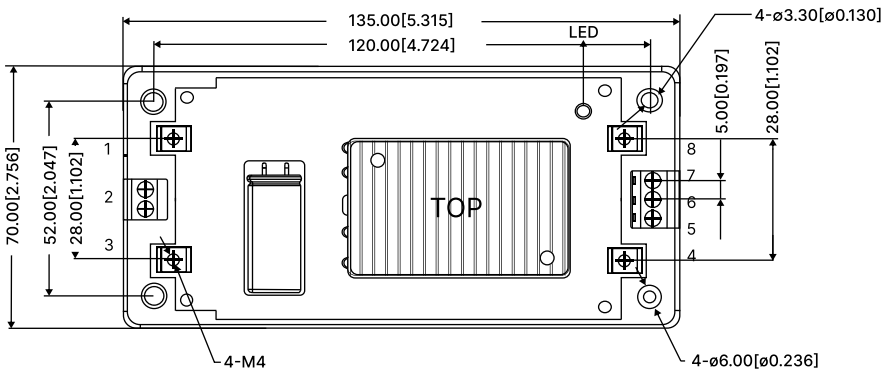


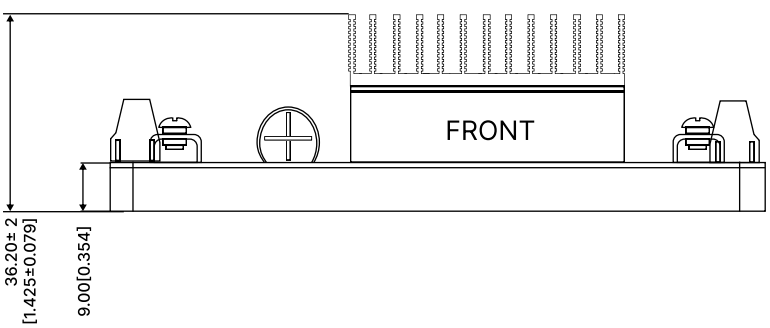
THIRD ANGLE PROJECTION

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

Note:
Unit: mm[inch]
Wire range: PIN 1, 3, 4, 8, 8AWG
PIN 2, 5-7 24-12 AWG
Tightening torque: PIN 1, 3, 4, 8 M4, Max 0.9 N.m
PIN 2, 5-7 M3, Max 0.4 N.m
Installed on DIN Rail TS35
General tolerance: ± 1.00[±0.039]

DCWF4805/12QB-200WHST (with heatsink)





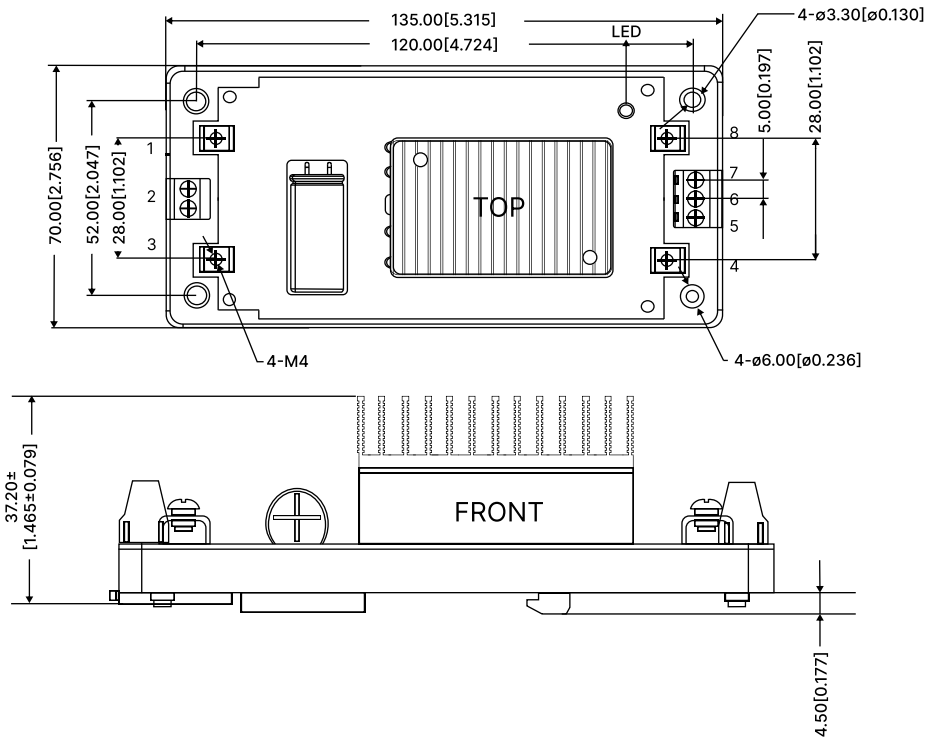
THIRD ANGLE PROJECTION

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

Position	Screw Spec	Function
①-④	M3	0.4N.m

Note:
Unit: mm[inch]
Wire range: PIN 1, 3, 4, 8, 8AWG
PIN 2, 5-7 24-12 AWG
Tightening torque: PIN 1, 3, 4, 8 M4, Max 0.9 N.m
PIN 2, 5-7 M3, Max 0.4 N.m
General tolerance: ± 1.00[±0.039]

DCWF4805/12QB-200WHDR (with heatsink)

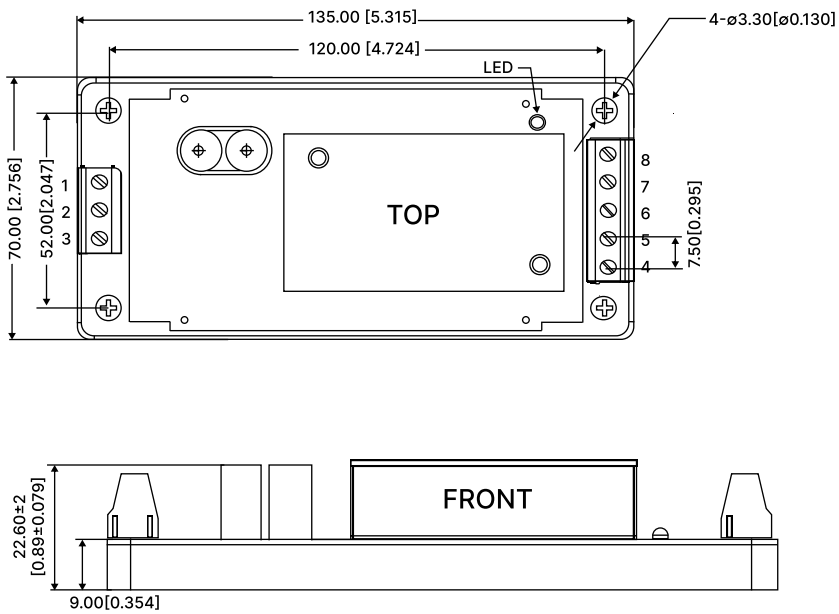


THIRD ANGLE PROJECTION

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

Note:
Unit: mm[inch]
Wire range: PIN 1, 3, 4, 8, 8AWG
PIN 2, 5-7 24-12 AWG
Tightening torque: PIN 1, 3, 4, 8 M4, Max 0.9 N.m
PIN 2, 5-7 M3, Max 0.4 N.m
Installed on DIN Rail TS35
General Tolerances ± 1.00[±0.039]

DCWF4815/24/36/42/48QB-200WST (without heatsink)

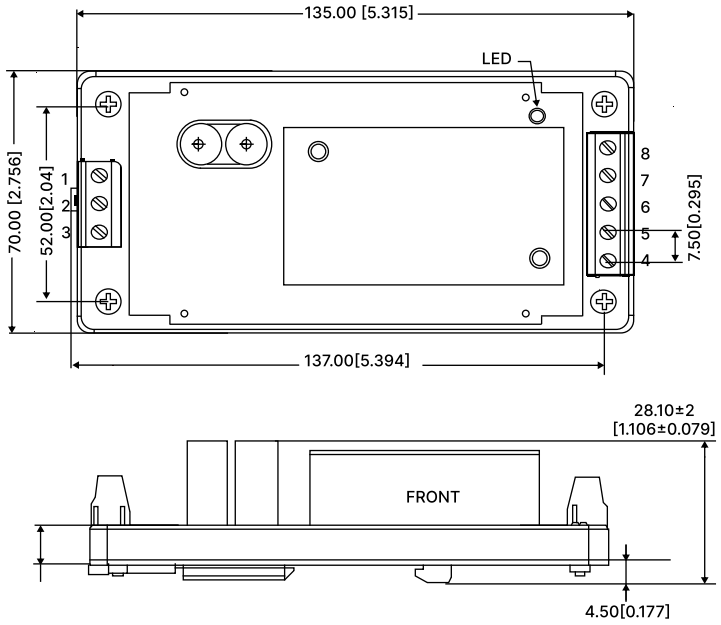


THIRD ANGLE PROJECTION

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

Note:
Unit: mm[inch]
Wire range: PIN 1, 3, 4, 8, 8AWG
PIN 2, 5-7 24-12 AWG
Tightening torque: PIN 1, 3, 4, 8 M4, Max 0.9 N.m
PIN 2, 5-7 M3, Max 0.4 N.m
General tolerance: ± 1.00[±0.039]

DCWF4815/24/36/42/48QB-200WDR (without heatsink)

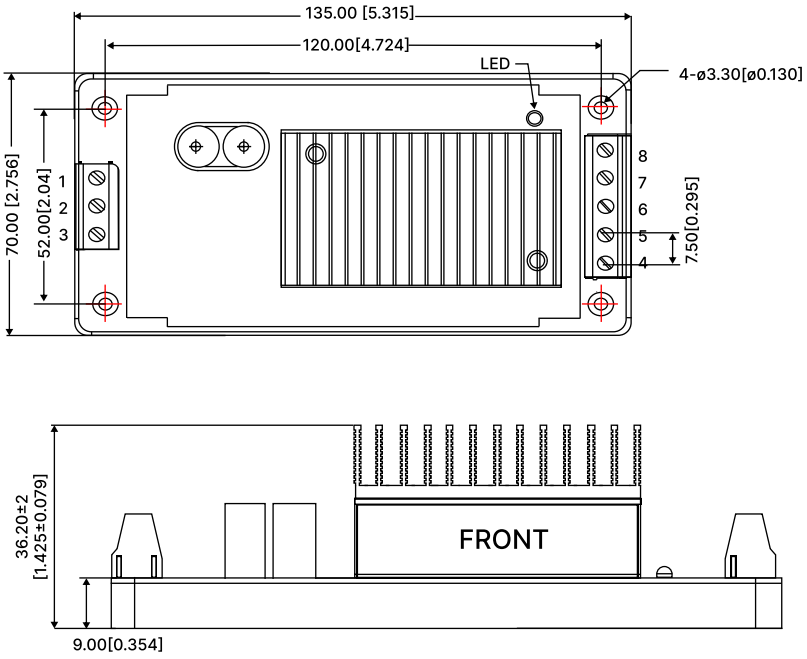


THIRD ANGLE PROJECTION

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

Note:
Unit: mm[inch]
Wire range: 24-12, 8AWG
Tightening torque: Max 0.4 N.m
Installed on DIN Rail TS35
General Tolerances ± 1.00[±0.040]

DCWF4815/24/36/42/48QB-200WHST (with heatsink)

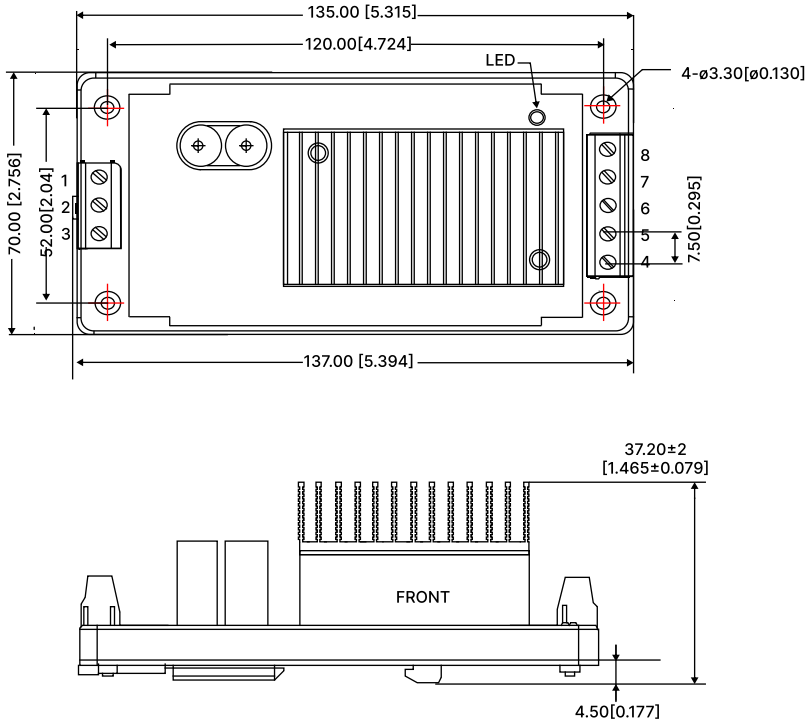


THIRD ANGLE PROJECTION

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

Note:
Unit: mm[inch]
Wire range: 24-12, 8AWG
Tightening torque: Max 0.4 N.m
Installed on DIN Rail TS35
General Tolerances ± 1.00[±0.040]

DCWF4815/24/36/42/48QB-200WHDR (with heatsink)



THIRD ANGLE PROJECTION

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

Note:
Unit: mm[inch]
Wire range: 24-12, 8AWG
Tightening torque: Max 0.4 N.m
Installed on DIN Rail TS35
General Tolerances ± 1.00[±0.040]

NOTES

1. Recommended used in more than 10% load, if the load is lower than 10%, then the ripple index of the product may exceed the specification, but does not affect the reliability of the product;

2. 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;

3. The maximum capacitive load offered were tested at input voltage range and full load;

4. 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;

5. All index testing methods in this datasheet are based on company corporate standards;

6. We can provide product customization service, please contact our technicians directly for specific information;

7. The product test process shall ensure that the current of the input terminal meets the requirements of the starting current to ensure that the power supply of the product does not suffer from under-power.