DWQB100-F24xx(F/H)(E5/D6) Series

Descriptions

100W isolated，DC-DC Converter






RoHS

CE Report EN 62368-1

UKCA Report BS EN 62368-1

Features

- Ultra-wide 4:1 input voltage range
- High efficiency up to 90%
- I/O isolation test voltage: 2.25k VDC
- Input under-voltage protection, output short-circuit, over-current, over-voltage, over-temperature protection
- Operating ambient temperature range: -40℃ to +85℃
- Five-sided metal shielded package
- Industry standard ¼-Brick package and pin-out

Applications

- Industrial control
- Electricity Power
- Instrumentation
- Communication
- Railway
- Battery powered system
- Intelligent robotic

Selection Guide

Certification	Part No.①	Input Voltage (VDC)		Output		Full Load Efficiency (%) Min./Typ.	Capacitive Load (μF) Max.
		Nominal (Range)	Max.②	Voltage (VDC)	Current (A) Max.		
EN/BS EN	DWQB100-F2405(F/H)	24 (9 - 36)	40	5	20	87/89	6000
	DWQB100-F2412(F/H)			12	8.3	88/90	2000
--	DWQB100-F2415F			15	6.7	88/90	2000
EN/BS EN	DWQB100-F2415H			15	6.7	88/90	2000
	DWQB100-F2424(F/H)			24	4.2	88/90	1000
--	DWQB100-F2428F			28	3.6	88/90	1000
EN/BS EN	DWQB100-F2428H			28	3.6	88/90	1000
--	DWQB100-F2448F			48	2.1	88/90	470
EN/BS EN	DWQB100-F2448H			48	2.1	88/90	470
--	DWQB100-F2405(H)(E5/D6)			5	20	87/89	6000
EN/BS EN	DWQB100-F2412(H)E5			12	8.3	88/90	2000
--	DWQB100-F2412(H)(E5/D6)			12	8.3	88/90	2000
EN/BS EN	DWQB100-F2415HE5			15	6.7	88/90	2000

--	DWQB100-F2415(H)(E5/D6)			15	6.7	88/90	2000
EN/BS EN	DWQB100-F2424HD6			24	4.2	88/90	1000
--	DWQB100-F2424(H)(E5/D6)			24	4.2	88/90	1000
	DWQB100-F2428(H)(E5/D6)			28	3.6	88/90	1000
	DWQB100-F2448(H)(E5/D6)			48	2.1	88/90	470

Note:

①Use "F" suffix is for added aluminum baseplate and "H" suffix for heat sink mounting, Use " E5" suffix for chassis mounting and "D6" suffix for DIN-Rail mounting, we recommend to choose modules with a heat sink for enhanced heat dissipation and applications with extreme temperature requirements;

②Exceeding the maximum input voltage may cause permanent damage;

③The minimum input voltage range and start -up voltage of the E5 /D6 product model are 1VDC higher than the horizontal package model;

④E5/D6 package products are 2% less efficient than standard products.

Specifications

Product Specifications	Item	Operating Conditions		Min.	Typ.	Max.	Unit
Input Specifications	Input Current (full load/no-load)	Nominal input voltage		--	4682/120	4789/160	mA
	Reflected Ripple Current	Nominal input voltage		--	30	--	
	Surge Voltage (1sec. max.)			-0.7	--	50	VDC
	Start-up Voltage			--	--	9	
	Input Under-voltage Protection			7.0	7.5	--	
	Input Filter			Pi filter			
	Ctrl①	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		--	2	10	mA
	Hot Plug			Unavailable			
Output Specifications	Output Voltage Accuracy	0% -100% load		--	±1	±3	%
	Linear Regulation	Input voltage variation from low to high at full load		--	±0.2	±0.5	--
	Load Regulation	5% -100% load		--	±0.5	±0.75	%
	Transient Recovery Time	25% load step change		--	200	500	μs
	Transient Response Deviation	25% load step change	5V output	--	±3	±7.5	%
			Others	--	±3	±5	
	Temperature Coefficient	Full load		--	--	±0.03	%/℃
	Ripple & Noise②	20MHz bandwidth	12V/15V output	--	100	200	mVp-p
			Others	--	130	250	
	Output Over - voltage Protection	Input voltage range		110	125	160	%Vo
	Output Over - current Protection			110	125	150	%Io
	Short-circuit Protection			Hiccup, continuous, self-recovery			
General Specifications	Insulation voltage	Input - output	Electric Strength Test for 1 minute with a leakage current of 1mA max.	2250	--	--	VDC
		Input - case		1600	--	--	
		Output-case		500	--	--	
	Insulation Resistance	Input - output insulation voltage 500VDC		100	--	--	MΩ

	Isolation Capacitance	Input - output capacitance at 100kHz/0.1V		--	2200	--	pF
	Trim	5V, 15V output		91	--	110	%Vo
		Others		90	--	110	
	Sense	See remote sense application		--	--	110	
	Thermal Resistance	Natural convection	DWQB100-F24xx	--	--	8	℃/W
			DWQB100-F24xxF	--	--	6.8	
			DWQB100-F24xxH	--	--	5.7	
	Operating Temperature			-40	--	+85	℃
	Storage Temperature			-55	--	+125	
	Over-temperature Protection	Max. case temperature		--	115	120	
	Pin Soldering Resistance Temperature	Wave-soldering, 10 seconds		--	--	260	
		Soldering spot is 1.5mm away from case for 10 seconds		--	--	300	
	Storage Humidity	Non-condensing		5	--	95	%RH
	Vibration			IEC/EN61373 - Category 1, Grade B			
	Switching Frequency	PWM mode		--	250	--	kHz
	MTBF	MIL-HDBK-217F@25℃		500	--	--	k hours
Mechanical Specifications	Case Material	Aluminum alloy case; Black plastic bottom, flame-retardant and heat-resistant (UL94 V-0)					
	Dimensions	DWQB100-F24xx		61.8 × 40.2 × 12.7 mm			
		DWQB100-F24xxF		62.0 × 56.0 × 14.6 mm			
		DWQB100-F24xxH		61.8 × 40.2 × 27.7 mm			
		DWQB100-F2405E5		135.00 x 70.00 x 20.45 mm			
		DWQB100-F2405D6		137.00 x 70.00 x 21.45 mm			
		DWQB100-F2412/15/24/28/48E5		135.00 x 70.00 x 22.60 mm			
		DWQB100-F2412/15/24/28/48D6		137.00 x 70.00 x 23.60 mm			
		DWQB100-F24xxHE5		135.00 x 70.00 x 36.20 mm			
		DWQB100-F24xxHD6		137.00 x 70.00 x 37.20 mm			
	Weight	DWQB100-F24xx		86.0g (Typ.)			
		DWQB100-F24xxF		106.0g (Typ.)			
		DWQB100-F24xxH		117.0 (Typ.)			
		DWQB100-F2405E5		184.0g (Typ.)			
		DWQB100-F2405D6		254.0g (Typ.)			
		DWQB100-F2405HE5		215.0g (Typ.)			
		DWQB100-F2405HD6		285.0g (Typ.)			
		DWQB100-F2412/15/24/28/48E5		162.0g (Typ.)			
		DWQB100-F2412/15/24/28/48D6		232.0g (Typ.)			
		DWQB100-F2412/15/24/28/48HE5		193.0g (Typ.)			
		DWQB100-F2412/15/24/28/48HD6		263.0g (Typ.)			
	Cooling Method	Free air convection or forced convection					

Note:
①The Ctrl pin voltage is referenced to input GND.
② The "parallel cable" method is used for ripple and noise test.

Electromagnetic Compatibility (EMC)

Emissions	CE	CISPR32/EN55032	CLASS A and CLASS B (see Fig. 3 for recommended circuit)	
	RE	CISPR32/EN55032	CLASS A and CLASS B (see Fig. 3 for recommended circuit)	
Immunity	ESD	IEC/EN61000-4-2	Contact ±6kV Air ±8kV	perf.Criteria B
	RS	IEC/EN61000-4-3	20V/m	perf.Criteria A
	EFT	IEC/EN61000-4-4	±2kV (see Fig. 2 for recommended circuit)	perf.Criteria A
	CS	IEC/EN61000-4-6	10Vr.m.s	perf.Criteria A

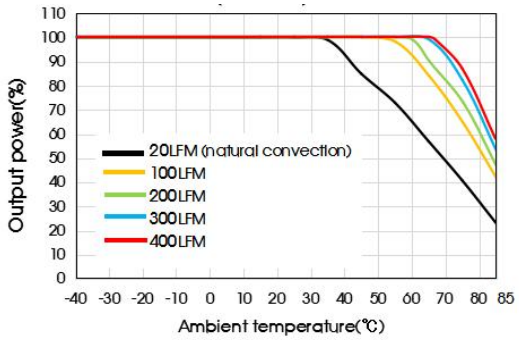
Electromagnetic Compatibility (EMC) (EN50155)

Emissions	CE	EN50121-3-2	150kHz-500kHz 99dBuV (see Fig.3 for recommended circuit)	
		EN55016-2-1	500kHz-30MHz 93dBuV	
	RE	EN50121-3-2	30MHz-230MHz 40dBuV/m at 10m (see Fig.3 for recommended circuit)	
		EN55016-2-1	230MHz-1GHz 47dBuV/m at 10m	
Immunity	ESD	EN50121-3-2	Contact ±6kV/Air ±8kV	perf.Criteria A
	RS	EN50121-3-2	80MHz-800MHz 20V/m (rms)	perf.Criteria A
	EFT	EN50121-3-2	±2kV 5/50ns 5kHz (see Fig.2 for recommended circuit)	perf.Criteria A
	Surge	EN50121-3-2	line to line ±1kV (42Ω 0.5uF see Fig.2 for recommended circuit)	perf.Criteria A
	CS	EN50121-3-2	0.15MHz-80MHz 10V (rms)	perf.Criteria A

Characteristic Curve

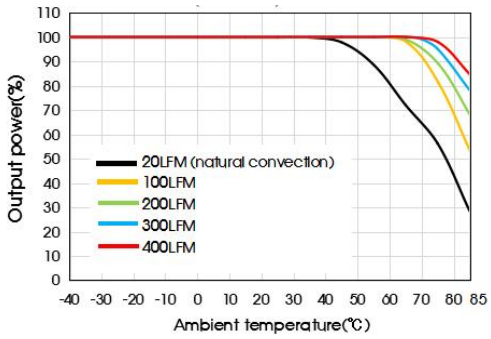
DWQB100-F2424 Temperature Derating Curves

(Vin=24V)



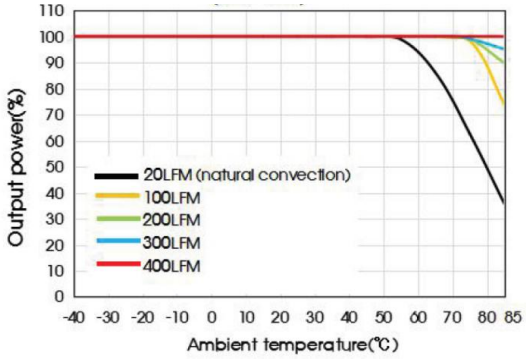
DWQB100-F2424F Temperature Derating Curves

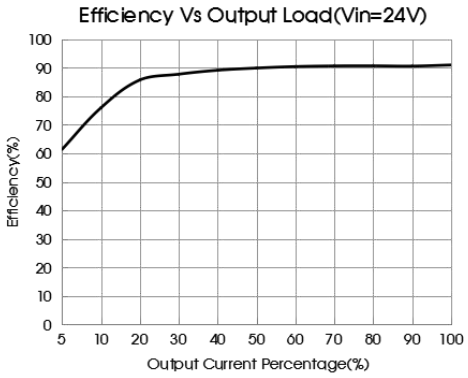
(Vin=24V)



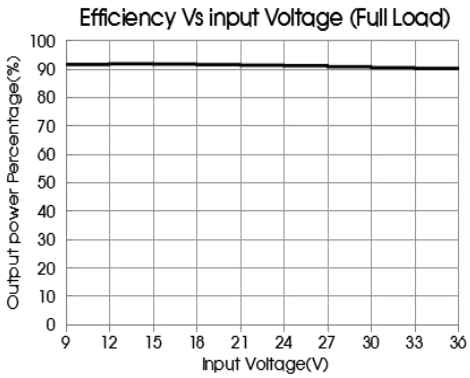
DWQB100-F2424H Temperature Derating Curves

(Vin=24V)





DWQB100-F2412

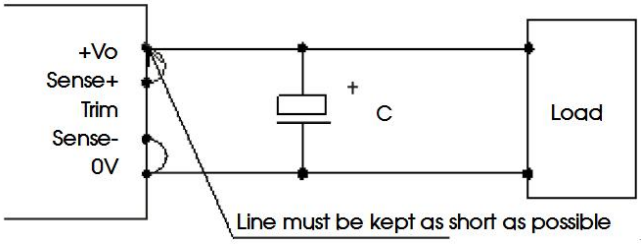


DWQB100-F2412

Note: Product application thermal design should be referred to the recommended PCB layout and recommended heat dissipation structure,n.

Remote Sense Application

1. Remote Sense Connection if not used

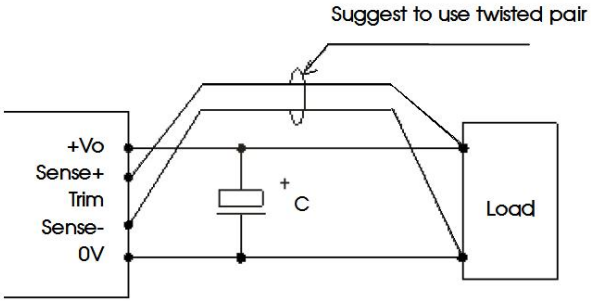


Note:

(1) If the sense function is not used for remote regulation the user must connect the +Sense to + Vo and -Sense to 0V.

(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. Remote Sense Connection used for Compensation



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.

Design Reference

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 stablity of input terminal and avoid repeatedly start-up problems due to input voltage lower than undervoltage protection point.

(3) We recommended increasing the output capacitance with limited to the capactive 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.

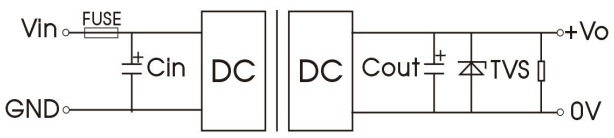


Fig.1

Vout (VDC)	Fuse	Cin①	Cout	TVS
5	20A, slow blow	220μF/63V	470μF/25V	SMDJ7.0A
12			220μF/35V	SMDJ15A
15				SMDJ18A
24			100μF/63V	SMDJ30A
28				SMDJ36A
48				SMDJ64A

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℃).

2. EMC compliance circuit

We recommended using the recommended circuit shown in Fig.2 during product EMC testing and application.

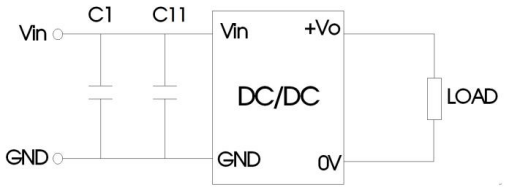


Fig. 2

Components	Recommended value	Function
C1	150μF/63V	Meets EFT and surge
C11	47μF/63V	

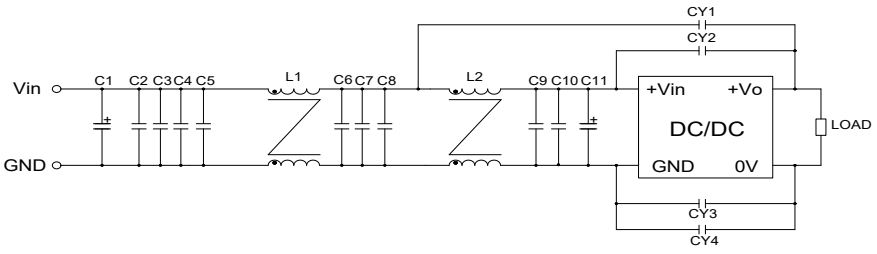
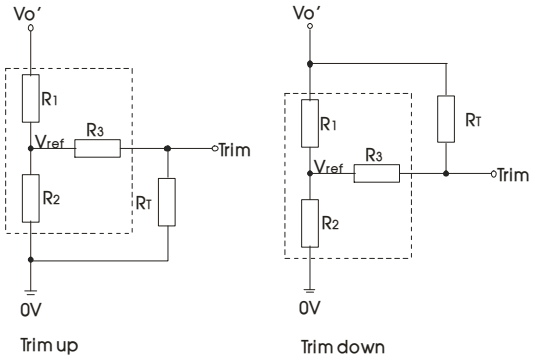


Fig. 3

CLASS A components	CLASS B components	Recommended component value	Function
C1		150μF/63V	Meets conducted emission and radiated emission
C11		47μF/63v	
C2/ C3/ C4/ C5/ C6/C7/ C8/ C9/ C10		10μF/100V	
L1/L2		2mH	
CY3	CY1/ CY2	2.2nF Y1 safety capacitor	
	CY3/ CY4	1nF Y1 safety capacitor	

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



TRIM resistor connection (dashed line shows internal resistor network)

Calculation formula of Trim resistance:

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

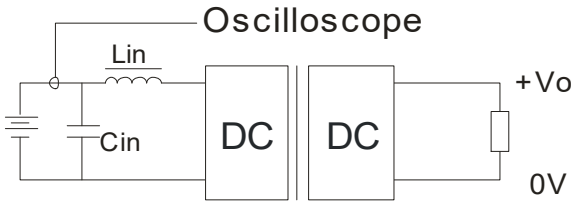
$$down:\ R_T=\frac{aR_1}{R_1-a}-R_3 \qquad a=\frac{Vo'-Vref}{Vref}\cdot R_2$$

Note:
Value for R1, R2, R3, and Vref refer to the above table
RT: Resistance of Trim
a: User-defined parameter, no actual meanings
Vo'= desired output voltage (±10% max.)

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
28	29.201	2.851	15	2.5
48	53.017	2.894	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.

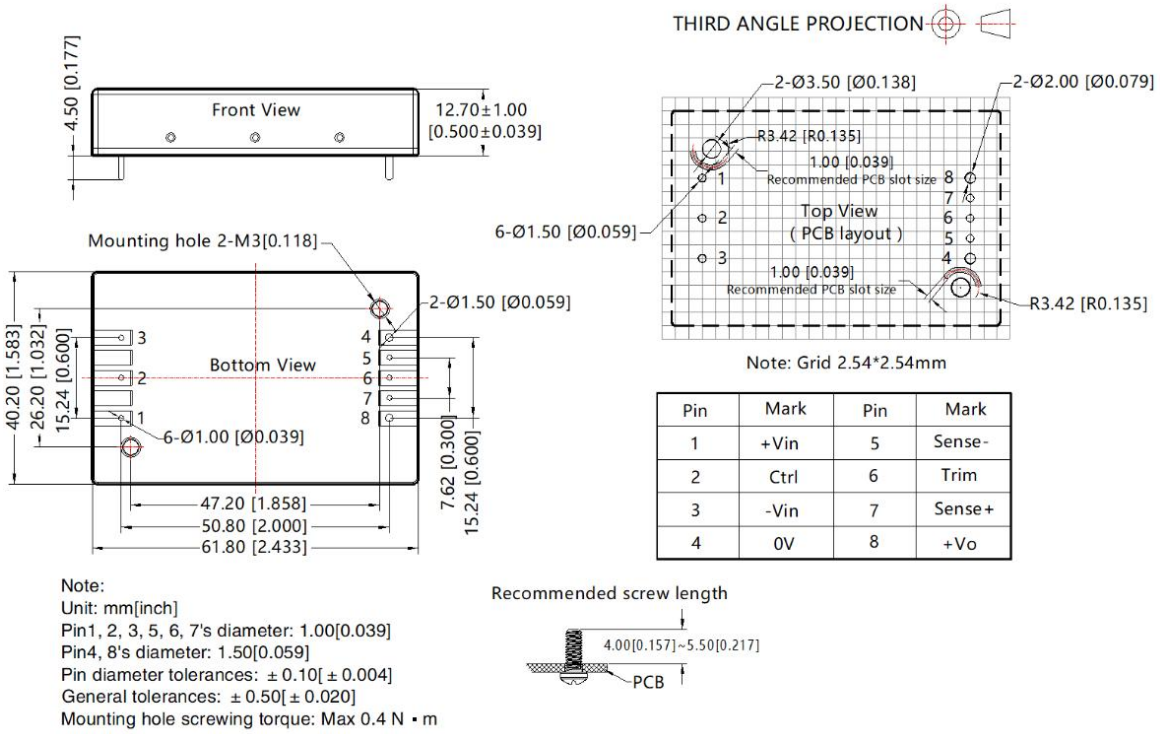
4. Reflected ripple current--test circuit



Note: Lin (4.7μH), Cin(220μF, ESR<1.0Ω at 100kHz)

5. The products do not support parallel connection of their output.

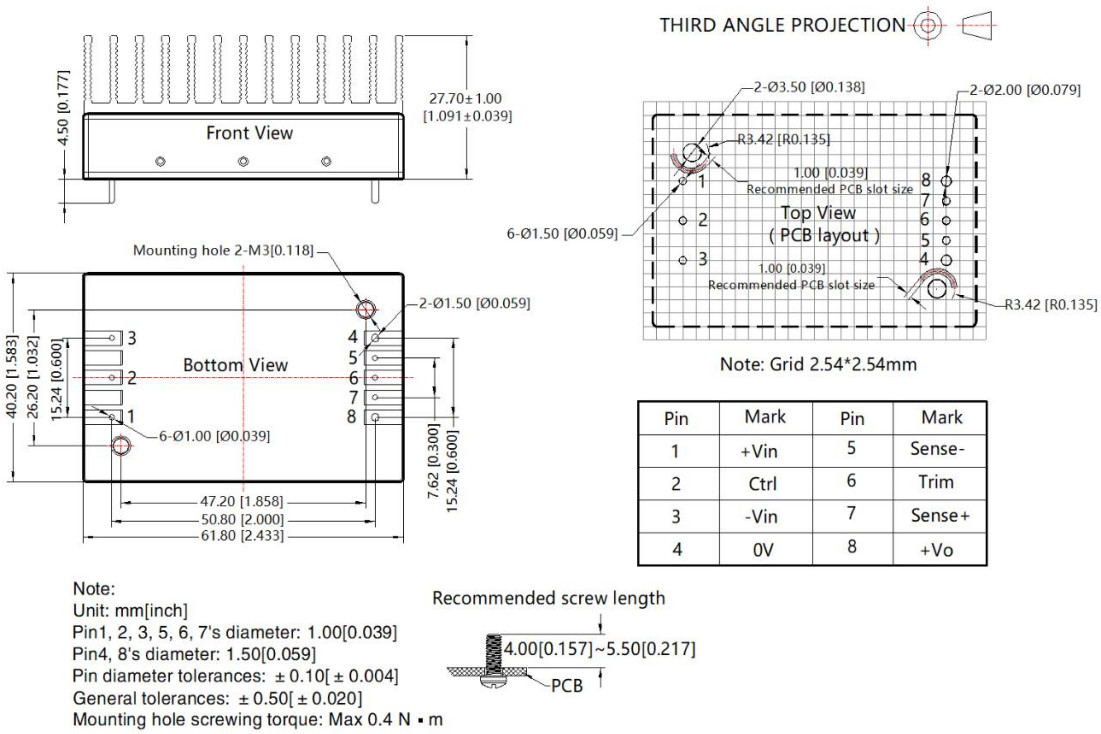
Dimensions and Recommended Layout (DWQB100-F24xx)



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

Note:
Unit: mm[inch]
Pin1, 2, 3, 5, 6, 7's diameter: 1.00[0.039]
Pin4, 8's diameter: 1.50[0.059]
Pin diameter tolerances: ± 0.10[± 0.004]
General tolerances: ± 0.50[± 0.020]
Mounting hole screwing torque: Max 0.4 N • m

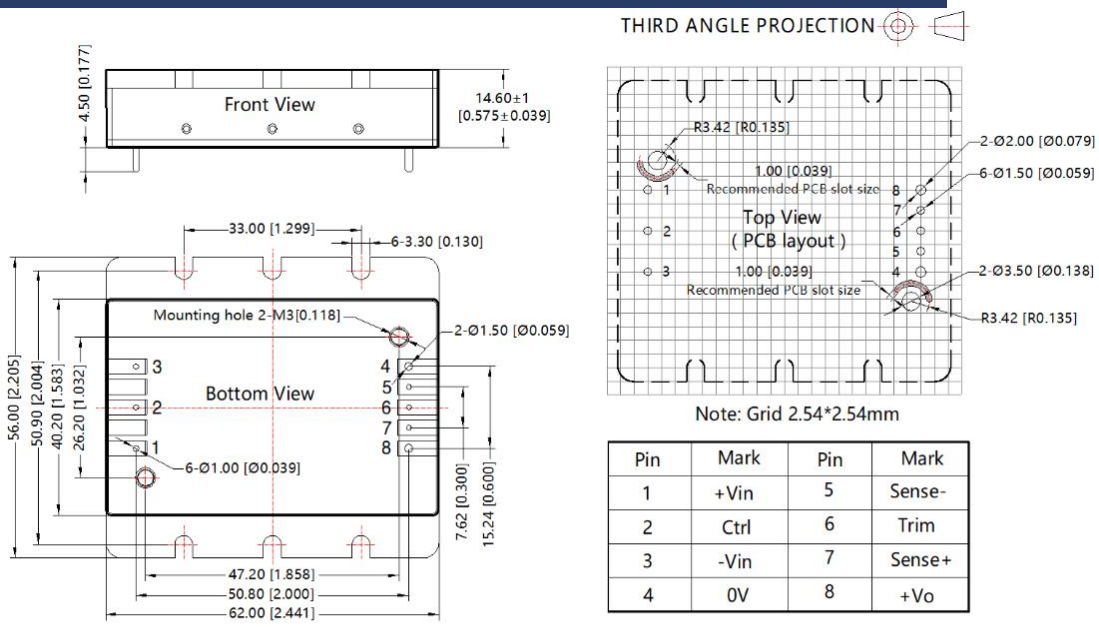
Dimensions and Recommended Layout (DWQB100-F24xxH)



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

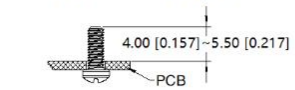
Note:
Unit: mm[inch]
Pin1, 2, 3, 5, 6, 7's diameter: 1.00[0.039]
Pin4, 8's diameter: 1.50[0.059]
Pin diameter tolerances: ± 0.10[± 0.004]
General tolerances: ± 0.50[± 0.020]
Mounting hole screwing torque: Max 0.4 N ▪ m

Dimensions and Recommended Layout (DWQB100-F24xxF)

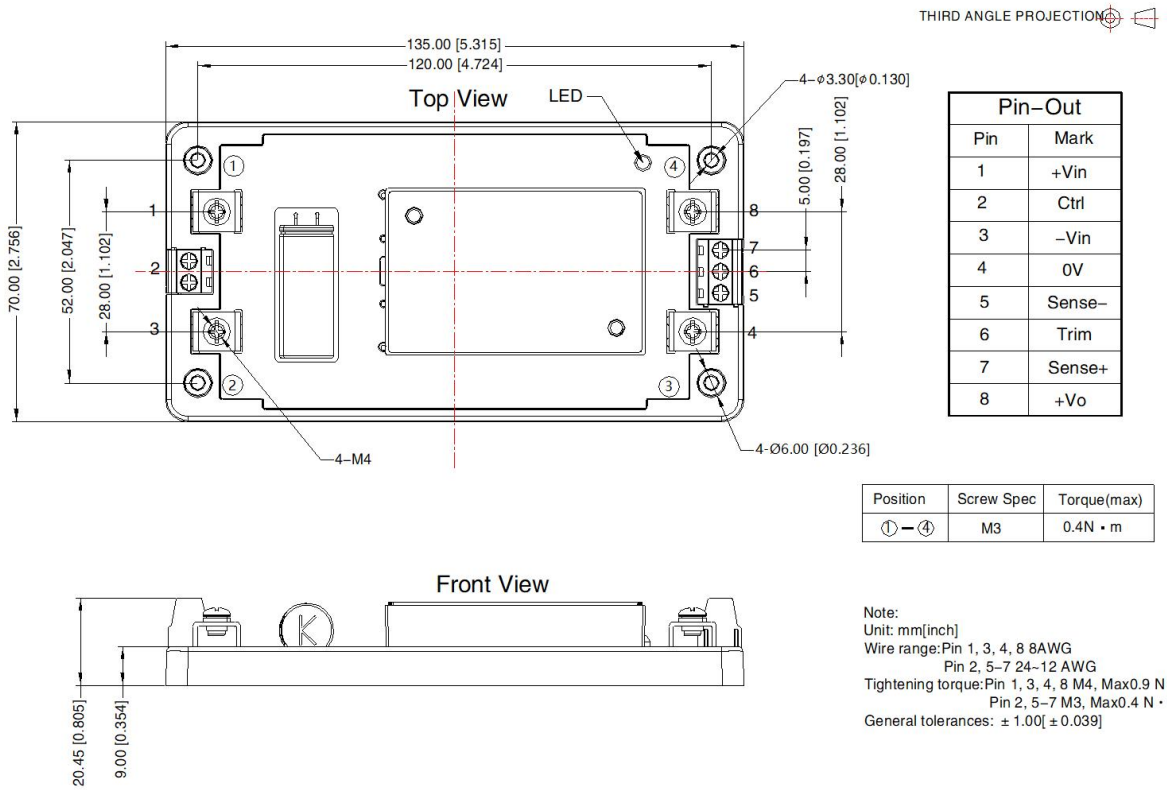


Pin	Mark	Pin	Mark
1	+Vin	5	Sense-
2	Ctrl	6	Trim
3	-Vin	7	Sense+
4	0V	8	+Vo

Note:
Unit: mm[inch]
Pin1, 2, 3, 5, 6, 7's diameter: 1.00[0.039]
Pin4, 8's diameter: 1.50[0.059]
Pin diameter tolerances: ± 0.10[± 0.004]
General tolerances: ± 0.50[± 0.020]
Mounting hole screwing torque: Max 0.4 N · m



Dimensions and Recommended Layout (DWQB100-F2405E5)

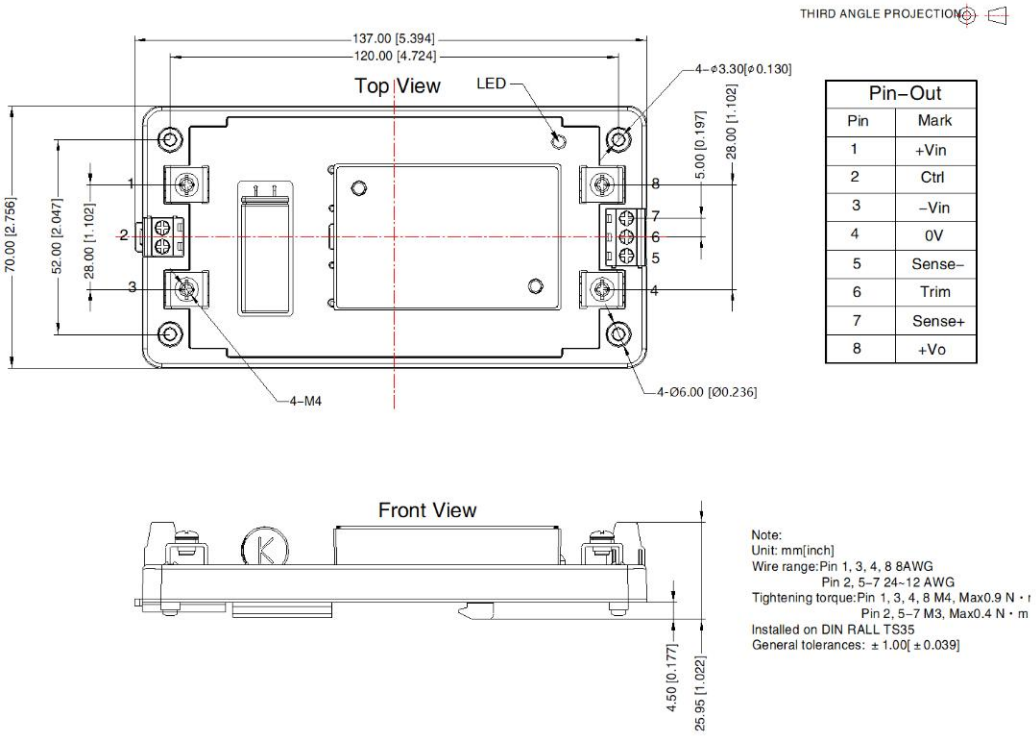


Pin-Out	
Pin	Mark
1	+Vin
2	Ctrl
3	-Vin
4	0V
5	Sense-
6	Trim
7	Sense+
8	+Vo

Position	Screw Spec	Torque(max)
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, Max0.9 N • m
Pin 2, 5-7 M3, Max0.4 N • m
General tolerances: ± 1.00[± 0.039]

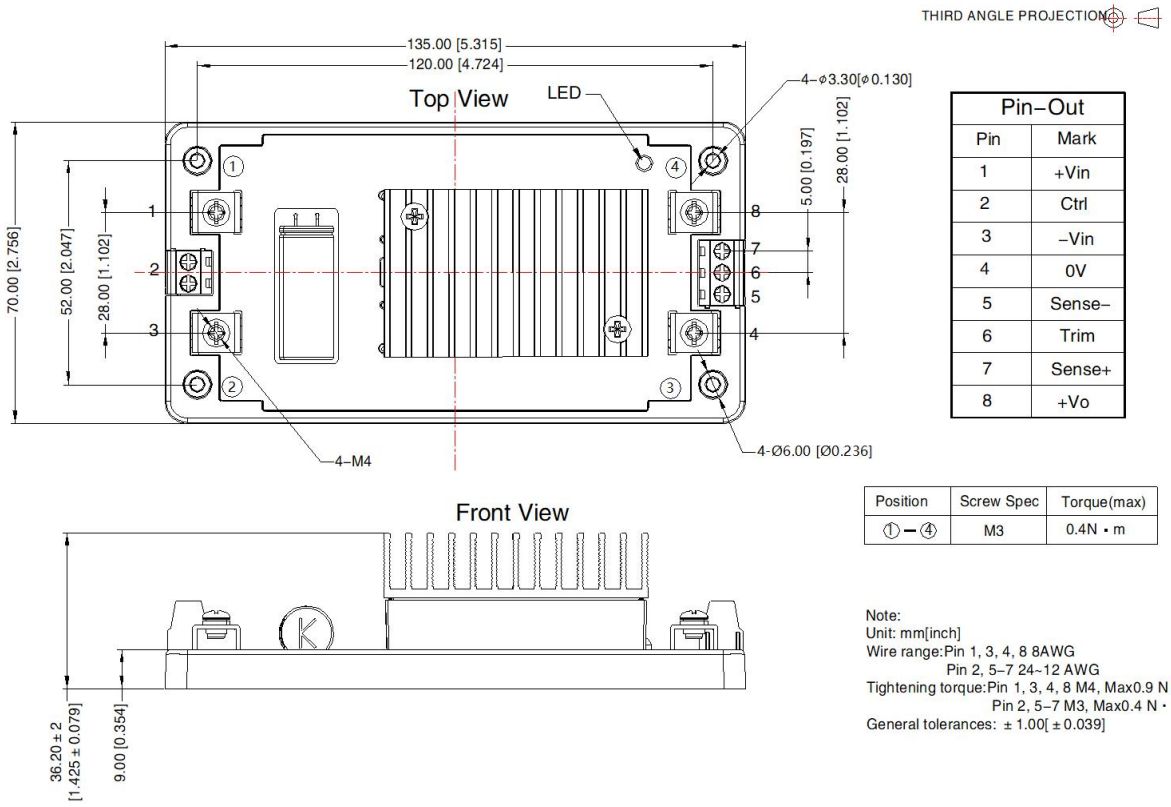
Dimensions and Recommended Layout (DWQB100-F2405D6)



Pin-Out	
Pin	Mark
1	+Vin
2	Ctrl
3	-Vin
4	0V
5	Sense-
6	Trim
7	Sense+
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, Max0.9 N • r
Pin 2, 5-7 M3, Max0.4 N • m
Installed on DIN RALL TS35
General tolerances: ± 1.00[± 0.039]

Dimensions and Recommended Layout (DWQB100-F2405HE5)

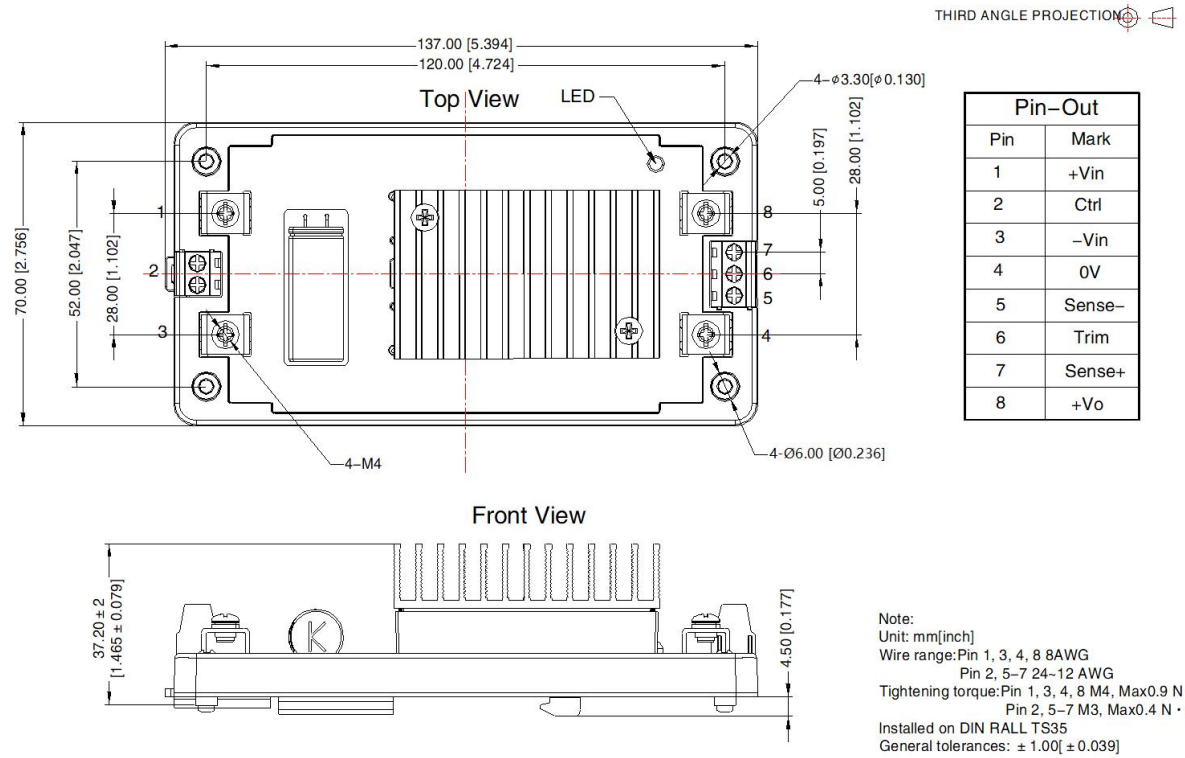


Pin-Out	
Pin	Mark
1	+Vin
2	Ctrl
3	-Vin
4	0V
5	Sense-
6	Trim
7	Sense+
8	+Vo

Position	Screw Spec	Torque(max)
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, Max0.9 N・m
Pin 2, 5-7 M3, Max0.4 N・m
General tolerances: ±1.00[±0.039]

Dimensions and Recommended Layout (DWQB100-F2405HD6)

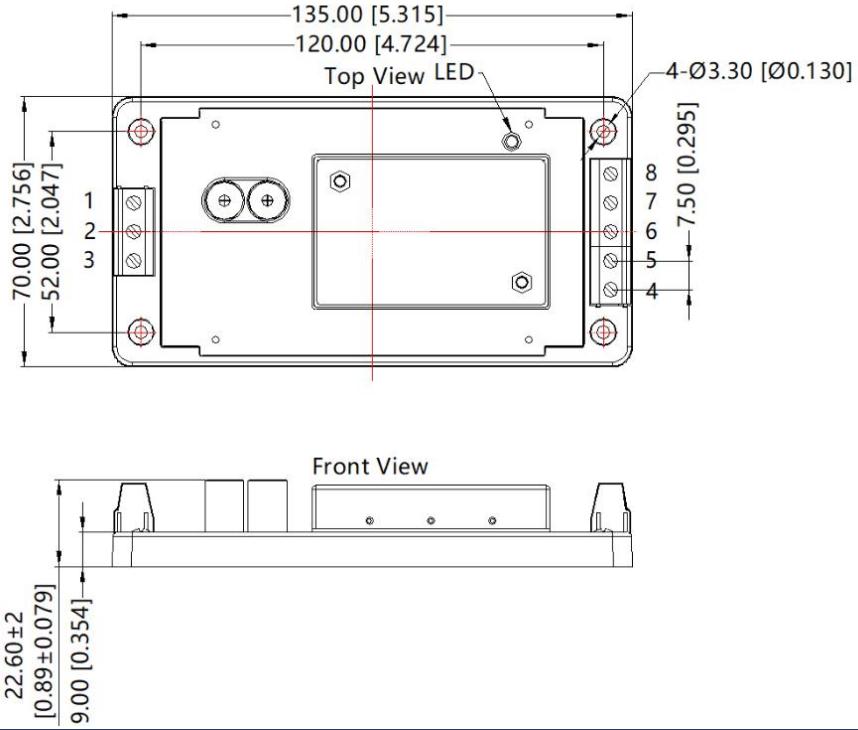


Pin-Out	
Pin	Mark
1	+Vin
2	Ctrl
3	-Vin
4	0V
5	Sense-
6	Trim
7	Sense+
8	+Vo

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, Max0.9 N・m
Pin 2, 5-7 M3, Max0.4 N・m
Installed on DIN RALL TS35
General tolerances: ±1.00[±0.039]

Dimensions and Recommended Layout (DWQB100-F2412/15/24/48E5)

THIRD ANGLE PROJECTION

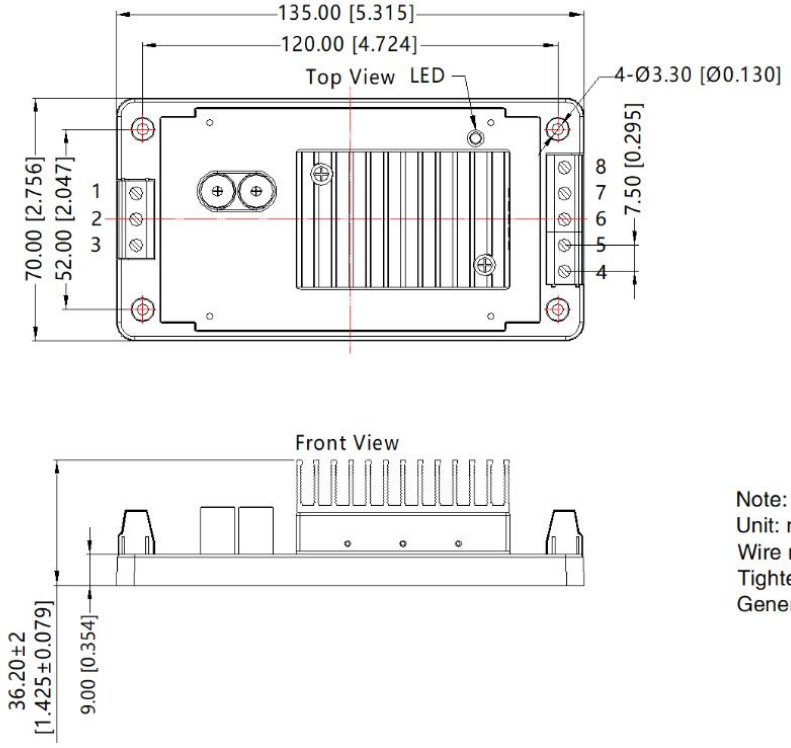


Pin	Mark
1	+Vin
2	Ctrl
3	-Vin
4	0V
5	Sense-
6	Trim
7	Sense+
8	+Vo

Note:
Unit: mm[inch]
Wire range: 24~12 AWG
Tightening torque: Max 0.4 N・m
General tolerances: ±1.00[±0.040]

Dimensions and Recommended Layout (DWQB100-F2412/15/24/48HE5)

THIRD ANGLE PROJECTION

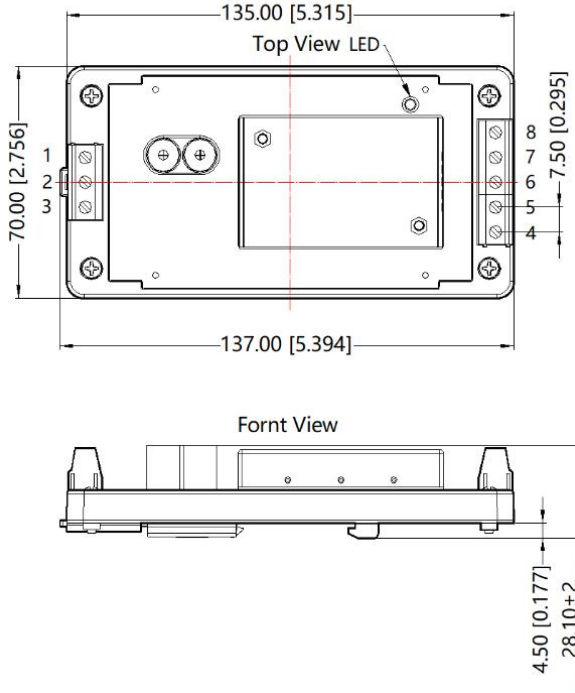


Pin	Mark
1	+Vin
2	Ctrl
3	-Vin
4	0V
5	Sense-
6	Trim
7	Sense+
8	+Vo

Note:
Unit: mm[inch]
Wire range: 24~12 AWG
Tightening torque: Max 0.4 N・m
General tolerances: ±1.00[±0.040]

Dimensions and Recommended Layout (DWQB100-F2412/15/24/48D6)

THIRD ANGLE PROJECTION

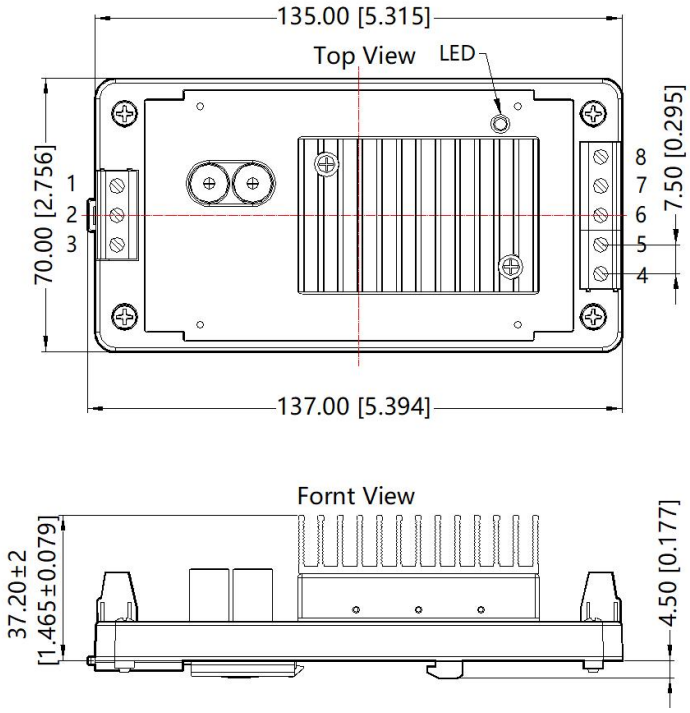


Pin	Mark
1	+Vin
2	Ctrl
3	-Vin
4	0V
5	Sense-
6	Trim
7	Sense+
8	+Vo

Note:
Unit: mm[inch]
Wire range: 24~12 AWG
Tightening torque: Max 0.4 N・m
Installed on DIN RAIL TS35
General tolerances: ±1.00[±0.040]

Dimensions and Recommended Layout (DWQB100-F2412/15/24/48HD6)

THIRD ANGLE PROJECTION



Pin	Mark
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: ±1.00[±0.040]

Note:

1. The maximum capacitive load offered were tested at input voltage range and full load;
2. Unless otherwise specified, data in this datasheet should be tested under the conditions of Ta=25℃, humidity<75%RH with nominal input voltage and rated load;
3. All index testing methods in this datasheet are based on our company corporate standards;
4. We can provide product customization service, please contact our technicians directly for specific information;
5. Products are related to laws and regulations: see "Features" and "EMC";
6. Our products shall be classified according to ISO14001 and related environmental laws and regulations, and shall be handled by qualified units.