Descriptions

10A non-isolated ultra-wide input and buck single output DC-DC converter



RoHS

3 Years Warranty

CE Report EN62368-1

UKCA Report BS EN62368-1

Features

- Ultra-wide input voltage range: 18 - 85VDC
- High efficiency up to 98%
- Input under-voltage protection, output short-circuit, over-current protection, over-temperature protection
- Operating ambient temperature range: -40℃ to +105℃
- Industry standard 1/8-Brick package and pin-out
- Maximum 360W output power

Applications

- Industrial control
- Electricity
- Instrumentation

Selection Guide

Certification	Part No①	Input Voltage (VDC)		Output		Full Load Efficiency④(%) Min./Typ.	Capacitive Load(μF) Max.
		Nominal② (Range)	Max.③ (VDC)	Voltage(VDC)	Current (A) Max.		
EN/BS EN	DNJEB10-B4805(F)	48, 72 (18-85)	90	5	10	90/92	8500
	DNJEB10-B4812(F)			12	10	93/95	5500
	DNJEB10-B4815(F)	48, 72 (21-85)		15	10	93/95	4400
	DNJEB10-B4824(F)	48, 72 (30-85)		24	10	94/96	3300
	DNJEB10-B4836(F)	48, 72 (43-85)		36	10	96/98	1800

Notes:
① "F" means heat sink package; We recommend to choose modules with a heat sink for enhanced heat dissipation and applications with extreme temperature requirements;
②For input voltage exceeding 48VDC, an input capacitor of 330μF/100V is required;
③The input voltage should not exceed this value, otherwise permanent and unrecoverable damage may be caused;
④The above efficiency values are measured at nominal 48VDC input voltage;
⑤Product images are for reference only; the actual product shall prevail.

Specifications

Product Specifications	Item	Operating Conditions		Min.	Typ.	Max.	Unit
Input Specifications	Input Current (full load / no-load)	Nominal 48VDC input	DNJEB10-B4805(F)	--	1133/2	1158/--	mA
			DNJEB10-B4812(F)	--	2632/2	2689/--	
			DNJEB10-B4815(F)	--	3290/2	3361/--	
			DNJEB10-B4824(F)	--	5209/2	5320/--	
			DNJEB10-B4836(F)	--	7654/2	7813/--	
	Reverse Polarity at Input	Nominal 48VDC input		--	200	--	
	Surge Voltage (1sec. max.)			-0.7	--	90	VDC
	Start-up Voltage	DNJEB10-B4805(F), DNJEB10-B4812(F)		--	--	18	
		DNJEB10-B4815(F)		--	--	21	
		DNJEB10-B4824(F)		--	--	30	
		DNJEB10-B4836(F)		--	--	43	
	Under-voltage Protection	DNJEB10-B4805(F), DNJEB10-B4812(F)		13	--	--	
		DNJEB10-B4815(F)		16	--	--	
		DNJEB10-B4824(F)		24	--	--	
		DNJEB10-B4836(F)		36	--	--	
	Input Filter			Capacitance filter			
	Hot Plug			Unavailable			
	Input Reverse Polarity Protection			Unavailable			
	Ctrl①	Module on		Ctrl pin open or pulled high (TTL 3 - 20VDC)			
		Module off		Ctrl pin pulled low to -Vin(0 - 1VDC)			
		Input current when off		--	1	5	mA
Output Specifications	Voltage Accuracy	Input voltage range, 10% - 100%Io		--	±2	±3	%
	Linear Regulation	Full load, input voltage range		--	±0.3	±1	
	Load Regulation	Nominal 48VDC input, 10% - 100%Io		--	±0.5	±2	
	Transient Recovery Time	Nominal 48VDC input, 25% load step change		--	300	500	us
	Transient Response Deviation	Nominal 48VDC input, 25% load step change	5VDC output	--	--	±8	%
			Others	--	--	±5	
	Temperature Coefficient	Operating temperature -40℃ to +105℃, full load		--	±0.02	±0.03	%/℃
	Ripple & Noise②	20MHz bandwidth, nominal 48VDC input, full load	5/ 12/ 15VDC output	--	200	300	mVp-p
			24/36VDC output	--	250	350	
	Over-temperature Protection③	Maximum surface temperature of the product		--	125	--	℃
	Over-current Protection	Normal temperature, input voltage range		110	130	230	%Io
	Short-circuit Protection	Input voltage range		Hiccup, continuous, self-recovery			
General Specifications	Isolation	Input/Output - Shell, Electric Strength Test for 1 minute with a leakage current of 1mA max.		1500	--	--	VDC
	Trim④			90	--	110	%Vo
	Sense④	See part of Remote Sense Application		--	--	105	
	Operating Temperature			-40	--	+105	℃
	Storage Temperature			-55	--	+125	

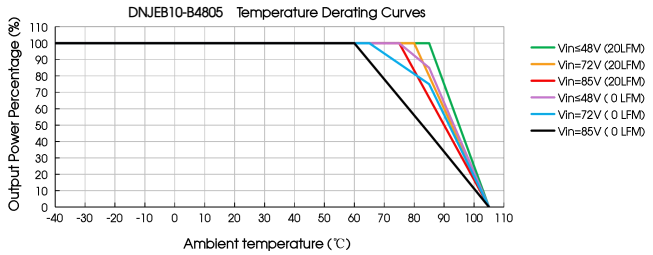
General Specifications	Pin Soldering Resistance Temperature⑤	Soldering spot is 1.5mm away from the case, 10 seconds max.		--	--	+300	℃
		Wave soldering, maximum 10 seconds		255	260	265	
	Storage Humidity	Non-condensing		5	--	95	%RH
	Vibration			10-150Hz, 5g, 0.75mm, 90 Min. along X, Y and Z			
	Switching Frequency⑥	Nominal 48VDC input, Full load	DNJEB10-B4805(F)	--	190	--	kHz
			DNJEB10-B4812(F)	--	330	--	
			DNJEB10-B4815(F)	--	390	--	
			DNJEB10-B4824(F)	--	270	--	
Mechanical Specifications	Case Material	Aluminum alloy					
	Dimensions	DNJEB10-B48xx		60.80 × 25.00 × 12.70 mm			
		DNJEB10-B48xxF		60.80 × 36.83 × 12.70 mm			
	Weight	DNJEB10-B48xx		53.0g(Typ.)			
		DNJEB10-B48xxF		58.2g(Typ.)			
	Cooling Method	Free air convection or forced convection					

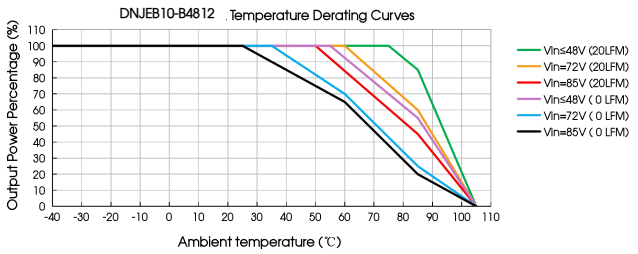
Note:
①The ctrl pin voltage is referenced to input -Vin;
②The method is used for ripple and noise test, please refer to Fig.2;
③Over-temperature protection for product is output off;
④When using Trim and Sense, the 24VDC output needs to meet Vin≥34VDC, the 36VDC output needs to meet Vin≥48VDC;
⑤The pin soldering temperature tolerance is not the actual temperature set by the soldering iron but the temperature required for proper solder joints. The actual temperature set by the customer should be determined comprehensively based on factors such as PCB thickness, copper coverage, soldering iron power, and soldering iron tip selection;
⑥Switching frequency varies with input voltage and load, ranging from 110-750 kHz.

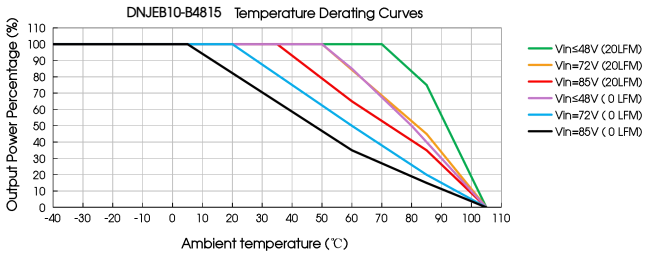
Electromagnetic Compatibility (EMC)

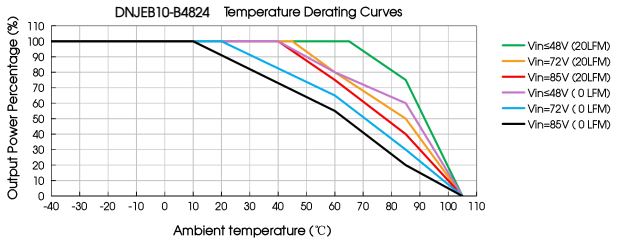
Emissions	CE	CISPR32/EN55032 CLASS A (see Fig. 3 for recommended circuit)	
	RE	CISPR32/EN55032 CLASS A (see Fig. 3 for recommended circuit)	
Immunity	ESD	IEC/EN61000-4-2 Contact ±6kV, Air ±8kV	perf. Criteria B
	RS	IEC/EN61000-4-3 10V/m	perf. Criteria A
	EFT	IEC/EN61000-4-4 ±2kV (see Fig. 3 for recommended circuit)	perf. Criteria A
	Surge	IEC/EN61000-4-5 line to line ±2kV (see Fig. 3 for recommended circuit)	perf. Criteria B
	CS	IEC/EN61000-4-6 10Vr.m.s	perf. Criteria A

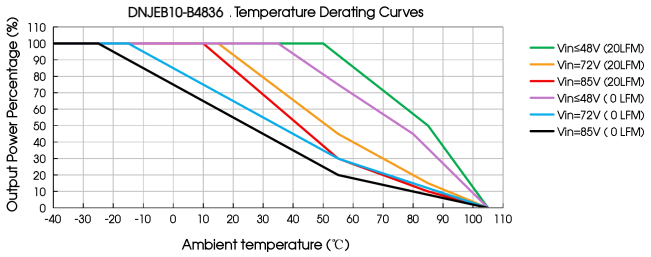
Characteristic Curve

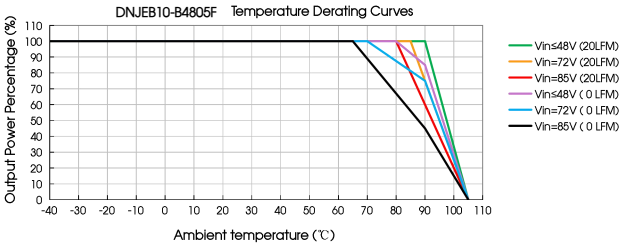


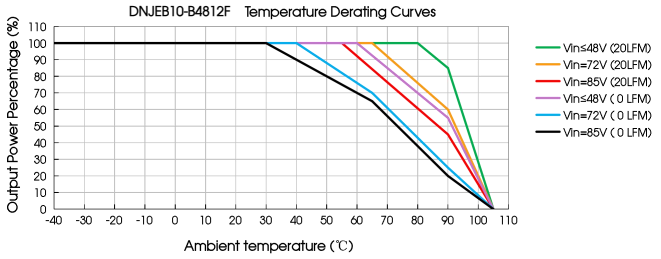


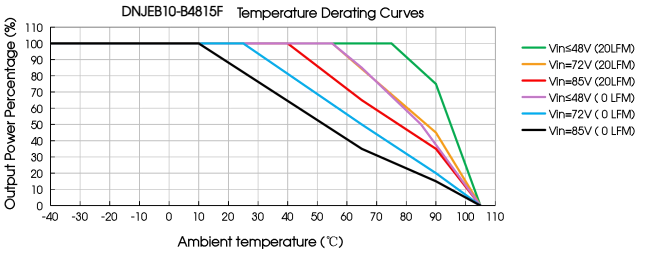

DNJEB10-B4815 Temperature Derating Curves
Output Power Percentage (%)
Ambient temperature (℃)
Vin≤48V (20LFM)
Vin=72V (20LFM)
Vin=85V (20LFM)
Vin≤48V (0 LFM)
Vin=72V (0 LFM)
Vin=85V (0 LFM)

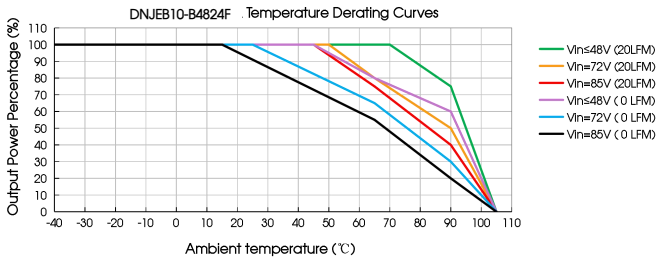

DNJEB10-B4824 Temperature Derating Curves
Output Power Percentage (%)
Ambient temperature (℃)
Vin≤48V (20LFM)
Vin=72V (20LFM)
Vin=85V (20LFM)
Vin≤48V (0 LFM)
Vin=72V (0 LFM)
Vin=85V (0 LFM)


DNJEB10-B4836 Temperature Derating Curves
Output Power Percentage (%)
Ambient temperature (℃)
Vin≤48V (20LFM)
Vin=72V (20LFM)
Vin=85V (20LFM)
Vin≤48V (0 LFM)
Vin=72V (0 LFM)
Vin=85V (0 LFM)


DNJEB10-B4805F Temperature Derating Curves
Output Power Percentage (%)
Ambient temperature (℃)
Vin≤48V (20LFM)
Vin=72V (20LFM)
Vin=85V (20LFM)
Vin≤48V (0 LFM)
Vin=72V (0 LFM)
Vin=85V (0 LFM)


DNJEB10-B4812F Temperature Derating Curves
Output Power Percentage (%)
Ambient temperature (℃)
Vin≤48V (20LFM)
Vin=72V (20LFM)
Vin=85V (20LFM)
Vin≤48V (0 LFM)
Vin=72V (0 LFM)
Vin=85V (0 LFM)


DNJEB10-B4815F Temperature Derating Curves
Output Power Percentage (%)
Ambient temperature (℃)
Vin≤48V (20LFM)
Vin=72V (20LFM)
Vin=85V (20LFM)
Vin≤48V (0 LFM)
Vin=72V (0 LFM)
Vin=85V (0 LFM)


DNJEB10-B4824F Temperature Derating Curves
Output Power Percentage (%)
Ambient temperature (℃)
Vin≤48V (20LFM)
Vin=72V (20LFM)
Vin=85V (20LFM)
Vin≤48V (0 LFM)
Vin=72V (0 LFM)
Vin=85V (0 LFM)

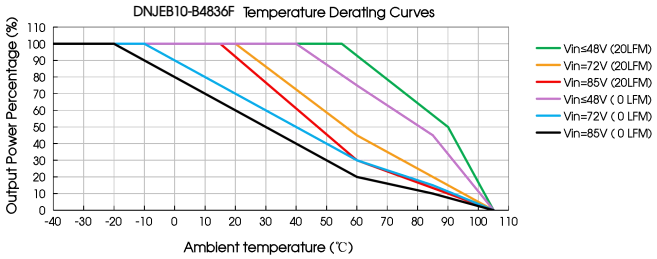
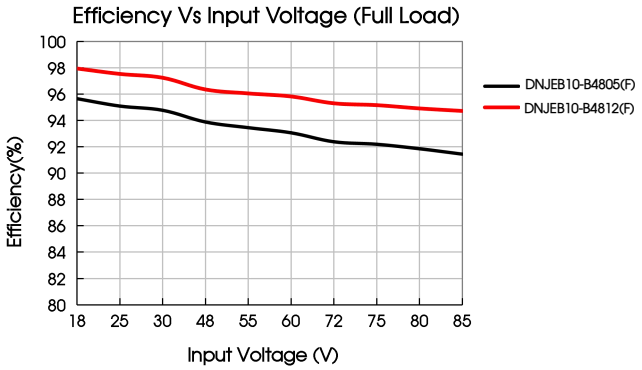
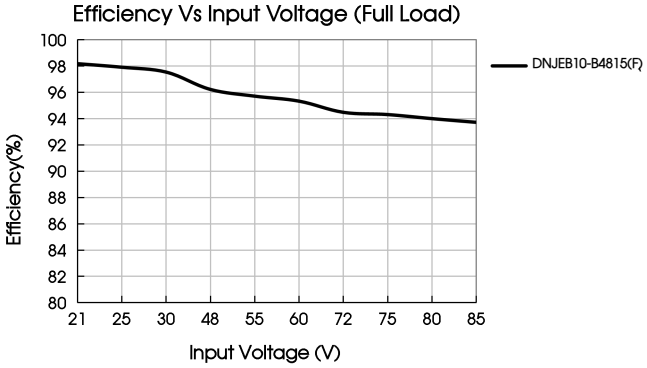
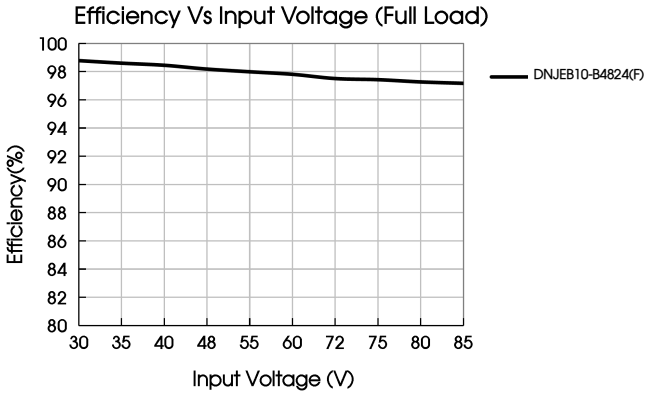
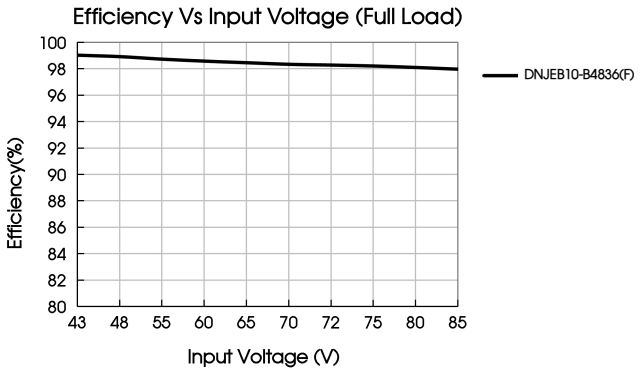

DNJEB10-B4836F Temperature Derating Curves
Output Power Percentage (%)
Ambient temperature (℃)
Vin≤48V (20LFM)
Vin=72V (20LFM)
Vin=85V (20LFM)
Vin≤48V (0 LFM)
Vin=72V (0 LFM)
Vin=85V (0 LFM)

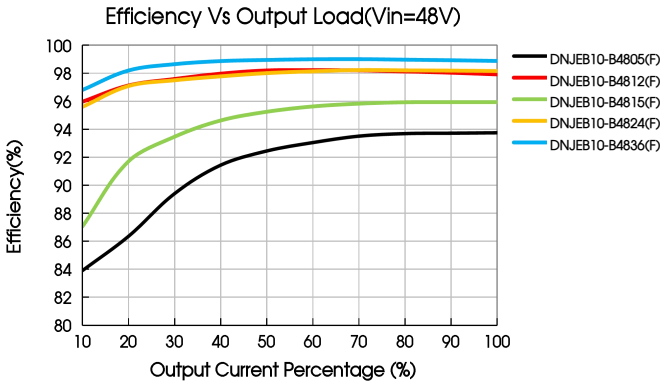
Fig. 1


Efficiency Vs Input Voltage (Full Load)
Efficiency(%)
Input Voltage (V)
DNJEB10-B4805(F)
DNJEB10-B4812(F)


Efficiency Vs Input Voltage (Full Load)
Efficiency(%)
Input Voltage (V)
DNJEB10-B4815(F)

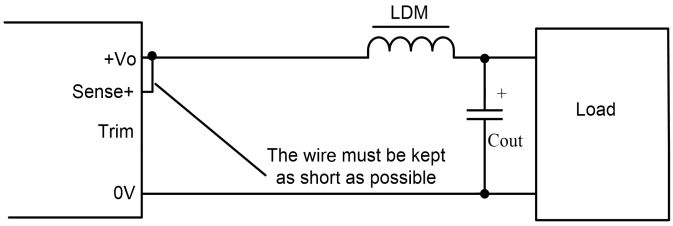






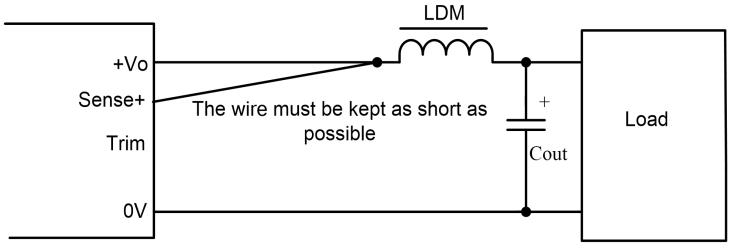
Design Reference

1. Remote Sense Application



Notes:
①If the sense function is not used for remote regulation the user must connect the Sense+ to +Vo at the DC-DC converter pins and will compensate for voltage drop across pins only.
②The 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



Notes:

①Using remote sense with long wires may cause unstable output, please contact technical support if long wires must be used;

②We 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;

③Note 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. Application circuit

① During product testing and application, please follow the recommended test circuit (Fig. 2); At least one electrolytic capacitor Cin is guaranteed to be connected externally to suppress the possible input surge voltage; An external inductor and electrolytic capacitor are connected to output for output filtering;

②If the input terminal of the product is connected in parallel with a circuit with large transient energy (such as a parallel motor drive circuit), the input voltage of the product may be pulled down. At this time, pay attention to the fluctuation of the input voltage of the product, and it is recommended to appropriately increase the capacitance of the electrolytic capacitor Cin at the input terminal to ensure the stability of the input terminal voltage and avoid the situation where the input voltage is lower than the under-voltage protection point and cause the product to restart repeatedly;

③If the input and output ripple needs to be further reduced, Cin and Cout capacity of external capacitors can be appropriately increased or external capacitors with small series equivalent impedance can be selected.

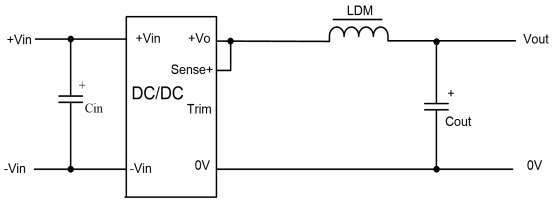


Fig. 2

Cin	LDM	Cout
330μF/100V(ESR<45mΩ)	0.47μH/27A	330μF/50V

2. EMC compliance circuit

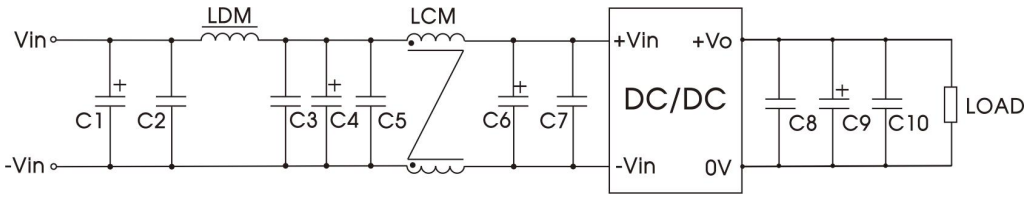
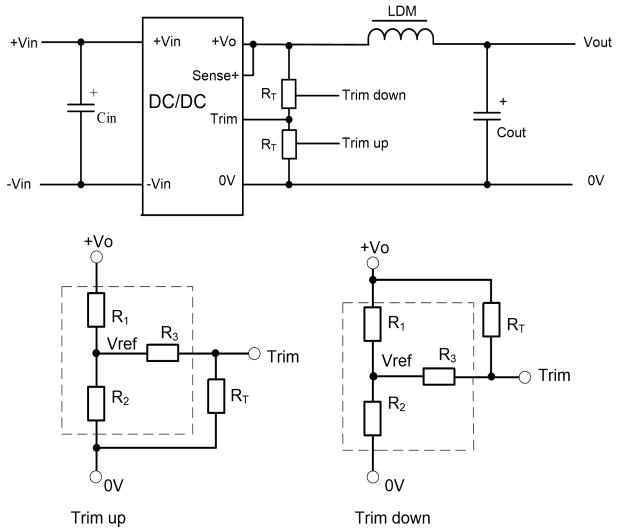


Fig. 3

Components	Recommended Component Value	Components Function
C1, C6	1000μF/100V electrolytic capacitor	Meet EFT and Surge
	330μF/100V electrolytic capacitor	Meet CE and RE
C4	330μF/100V electrolytic capacitor	Universal
C2, C3, C5, C7	4.7μF/100V ceramic capacitor	
LDM	8.2μH/17A	
LCM	EFL2D-4-040	
C8, C10	4.7μF/50V ceramic capacitor	
C9	330μF/50V electrolytic capacitor	

3. Trim Function for Output Voltage Adjustment



Trim resistance calculation formula:

$$up:\ R_T=\frac{\alpha R_2}{R_2-\alpha}-R_3 \qquad \alpha=\frac{Vref}{+Vo-Vref}-R_1$$

$$down:\ R_T=\frac{\alpha R_1}{R_1-\alpha}-R_3 \qquad \alpha=\frac{+Vo-Vref}{Vref}-R_2$$

R_T:the Trim resistor

α :user-defined parameter and has no actual meaning

+Vo:the actual up or down voltage required

Trim resistor connection (dashed line shows internal resistor network)

Part No.	R1(kΩ)	R2(kΩ)	R3(kΩ)	Vref(V)
DNJEB10-B4805(F)	6.8	2.87	12.4	1.5
DNJEB10-B4812(F)	20	2.87	14.7	1.5
DNJEB10-B4815(F)	25.80	2.87	17.5	1.5
DNJEB10-B4824(F)	43.13	2.87	17	1.5
DNJEB10-B4836(F)	83.08	3.6	20.8	1.5

When trimming is used, if the RT resistor is too small or the Trim and +Vo pins are directly short-circuited, resulting in the output voltage after trimming, the product may be irreparably damaged.

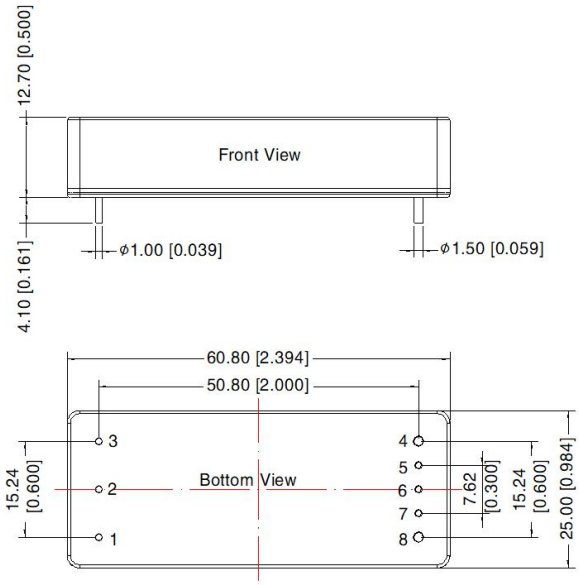
4. The products do not support parallel connection of their output

5. Recommended solution for thermal test

In the application process, the product temperature derating curve can be combined to evaluate the product thermal design; The temperature of point A is used to determine the stable operating range of the product, when it is lower than 110℃, it is the stable operating range.

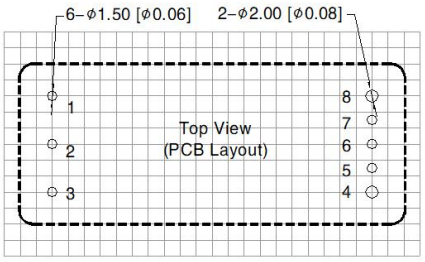


DNJEB10-B48xx Dimensions and Recommended Layout



Note:
Unit: mm[inch]
Pin1,2,3,6,7 diameter: 1.00[0.039]
Pin4,8 diameter: 1.50[0.059]
Pin diameter tolerances: ± 0.10[± 0.004]
General tolerances: ± 0.50[± 0.020]

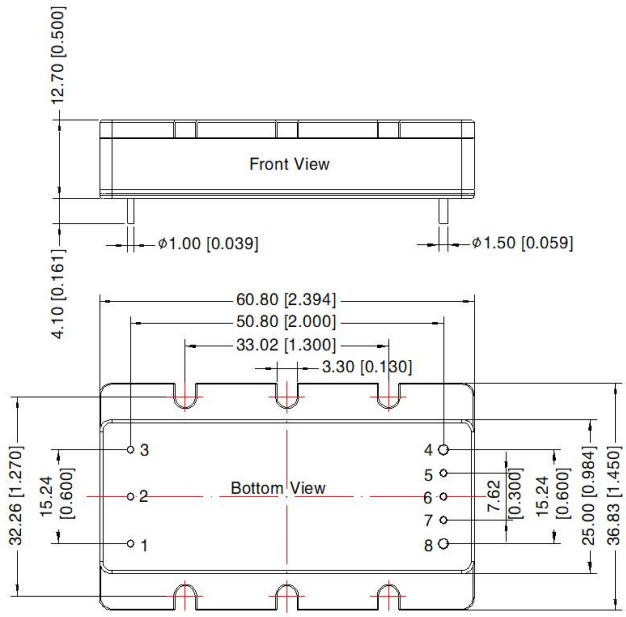
THIRD ANGLE PROJECTION



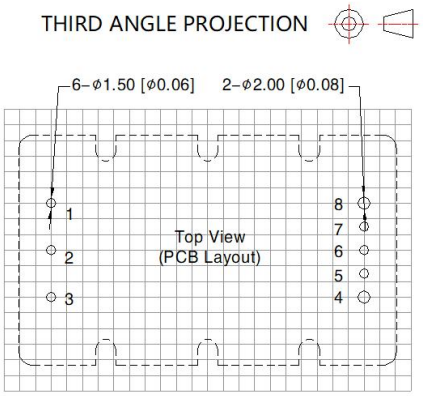
Note: Grid 2.54*2.54mm

Pin–Out			
Pin	Mark	Pin	Mark
1	+Vin	5	No pin
2	Ctrl	6	Trim
3	–Vin	7	Sense+
4	0V	8	+Vo

DNJEB10-B48xxF Dimensions and Recommended Layout



Note:
Unit: mm[inch]
Pin1,2,3,6,7 diameter: 1.00[0.039]
Pin4,8 diameter: 1.50[0.059]
Pin diameter tolerances: ± 0.10[± 0.004]
General tolerances: ± 0.50[± 0.020]



Note: Grid 2.54*2.54mm

Pin–Out			
Pin	Mark	Pin	Mark
1	+Vin	5	No pin
2	Ctrl	6	Trim
3	–Vin	7	Sense+
4	0V	8	+Vo

Notes:

1. The maximum capacitive load offered were tested at nominal input voltage and full load;
2. Unless otherwise specified, parameters in this datasheet were measured under the conditions of Ta=25℃, humidity<75%RH with nominal 48VDC input voltage and rated output load;
3. Products are related to laws and regulations: see "Features" and "EMC";
4. Our products shall be classified according to ISO14001 and related environmental laws and regulations, and shall be handled by qualified units;
5. The image certification marks are for reference only; please refer to the selection table for actual specifications. Certification is based on the physical mark or packaging label.