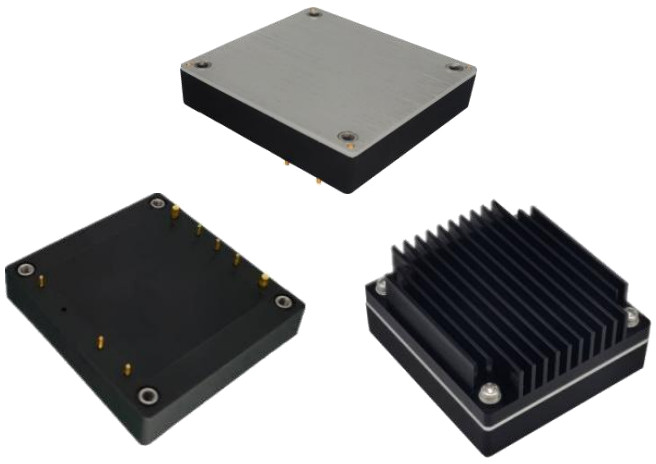


Typical Features

- Wide input voltage range 2:1
- Efficiency 90% (Typ.)
- Low standby power consumption
- Operating temperature from -40℃ to +105℃
- High isolation voltage 1500VDC(input-output) & 1500VDC(input-case)
- Input under voltage protection, output over current, over voltage, over temp. & short circuit protections
- Standard 1/2 brick size

ZBD350-48S24 is a high-performance DC-DC modular converter with the rated input voltage 48VDC (full range from 36V to 75VDC), regulated single output 24V/350W without minimum load limit. It has the advantage of high isolation voltage, Max operating temperature up to 105°C, with input under-voltage protection, output over-current, over-voltage, over-temperature and short circuit protections, input ON/OFF control, output voltage distal end compensation and output voltage Trim, etc.

Typical Product List

Part No.	Input Voltage Range (VDC)	Output Power (W)	Output Voltage (VDC)	Output Current (A)	Ripple & Noise (mVp-p)	Full load Efficiency (%) Min/Typ.	Remark
ZBD350-48S24C	36-75	350	24	14.5	240	88/90	Positive logic Standard
ZBD350-48S24N							Negative logic Standard
ZBD350-48S24C-H							Positive logic With heat sink
ZBD350-48S24N-H							Negative logic With heat sink

Input Specifications

Item	Operating conditions	Min.	Typ.	Max.	Unit
Input current Max	Input 36VDC@ full load	--	--	12	A
No-load current	Rated input voltage	--	--	30	mA
Input inrush voltage (1sec. max.)	The unit could be permanently broken over this voltage	-0.7	--	100	VDC
Start-up voltage		--	--	36	
Under-voltage protection	With No-load (over current protection should start in advance at full load)	--	--	34	
ON/OFF Control (CNT)	Positive logic: CNT no connection or connected to 3.5-15V to turn ON, connected to 0-1.2V to turn OFF the converter.			Reference voltage -Vin	
	Negative logic: CNT no connection or connected to 3.5-15V to turn OFF, connected to 0-1.2V voltage to turn ON the converter.				

Output Specifications

Item	Operating conditions	Min.	Typ.	Max.	Unit
Output voltage accuracy	Nominal input voltage, 0%-100% load	--	±0.5	±1.0	%
Line regulation	Full load, input voltage from low to high	--	±0.1	±0.5	
Load regulation	Nominal input voltage, 10%-100% load	--	±0.1	±0.5	
Transient recovery time	25% load step change (step rate 1A/50uS)	--	200	250	uS
Transient response deviation		-5	--	+5	%
Temperature drift coefficient	Full load	-0.02	--	+0.02	%/℃
Ripple & Noise	20M bandwidth, with external capacitor ≥220uF	--	200	240	mVp-p
Output voltage TRIM		-10	--	+10	%
Distal end compensation (Sense)		--	--	+5	%
Over temperature protection	Maximum temperature of the Metal Base	105	115	125	℃
Over voltage protection		125	--	150	%
Over current protection		16	--	20	A
Short circuit protection		Hiccup, continuous, self-recovery			

General Specifications

Item	Operating conditions		Min.	Typ.	Max.	Unit
Isolation voltage	I/P-O/P	Test 1min, leakage current <3mA	1500	--	--	VDC
	I/P-Case	Test 1min, leakage current <3mA	1500	--	--	VDC
	O/P-Case	Test 1min, leakage current <3mA	500	--	--	VDC
Insulation resistance	I/P-O/P	@ 500VDC	100	--	--	MΩ
Switching frequency			--	250	--	KHz
MTBF			150	--	--	K hours

Environmental characteristics

Item	Operating conditions	Min.	Typ.	Max.	Unit
Operating temperature	Refer to the temperature derating graph	-40	--	+105	℃
Storage humidity	No condensing	5	--	95	%RH
Storage temperature		-40	--	+125	℃
Pin soldering temperature	1.5mm from the case, soldering time <1.5S	--	--	+350	
Cooling requirement		EN60068-2-1			
Dry and heat requirements		EN60068-2-2			
Moisture and heat requirements		EN60068-2-30			
Shock and vibration		IEC/EN 61373 C1/Body Mounted Class B			

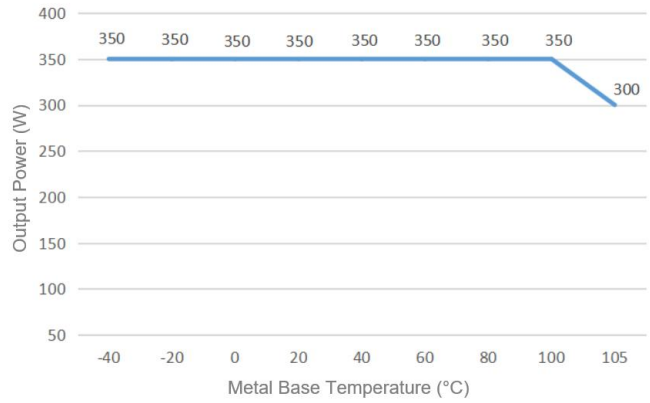
EMC Performances

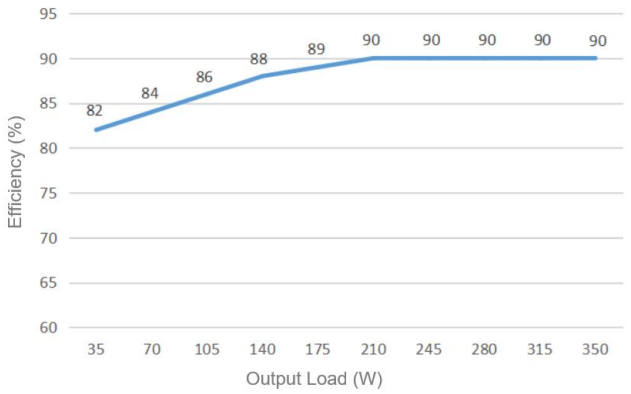
EMI	CE	EN55032-3-2	150kHz-500kHz 66dBuV	
		EN55032-2-1	500kHz-30MHz 60dBuV	
	RE	EN55032-3-2	30MHz-230MHz 50dBuV/m at 3m	
		EN55032-2-1	230MHz-1GHz 57dBuV/m at 3m	
EMS	ESD	IEC/EN61000-4-2	Contact ±6KV/Air ±8KV	perf. Criteria B
	RS	IEC/EN61000-4-3	10V/m	perf. Criteria A
	EFT	IEC/EN61000-4-4	±2kV 5/50ns 5kHz	perf. Criteria A
	Surge	IEC/EN61000-4-5	Line to line ± 2KV	perf. Criteria B
	CS	IEC/EN61000-4-6	10 Vr.m.s	perf. Criteria A

Physical Characteristics

Case materials	Metal base + Plastic case in black with flame class UL94-V0
Heat sink	Dimension 61.0x57.9x15.0mm, weight 74g, Aluminum, anodized black
Cooling method	Conduction cooling or forced air cooling with fan
Unit weight	Standard 125g, with heatsink 203g

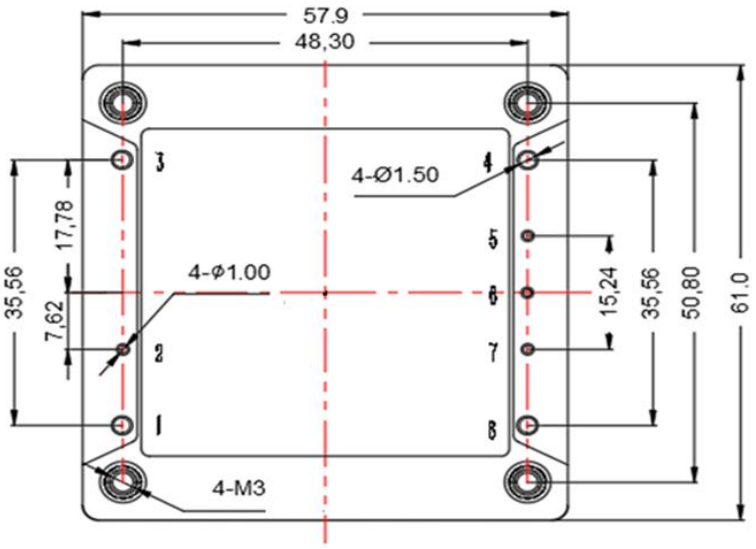
Product Characteristics Graphs

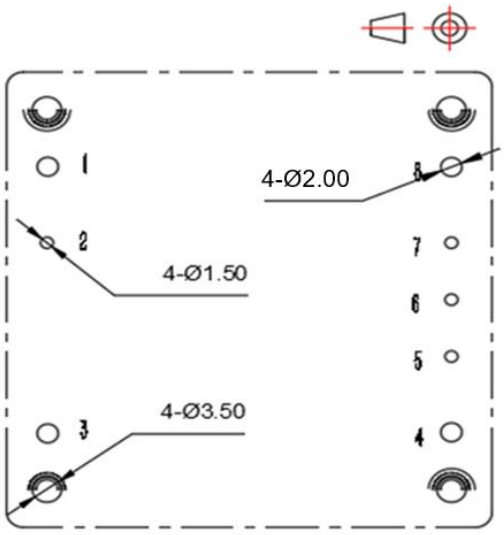




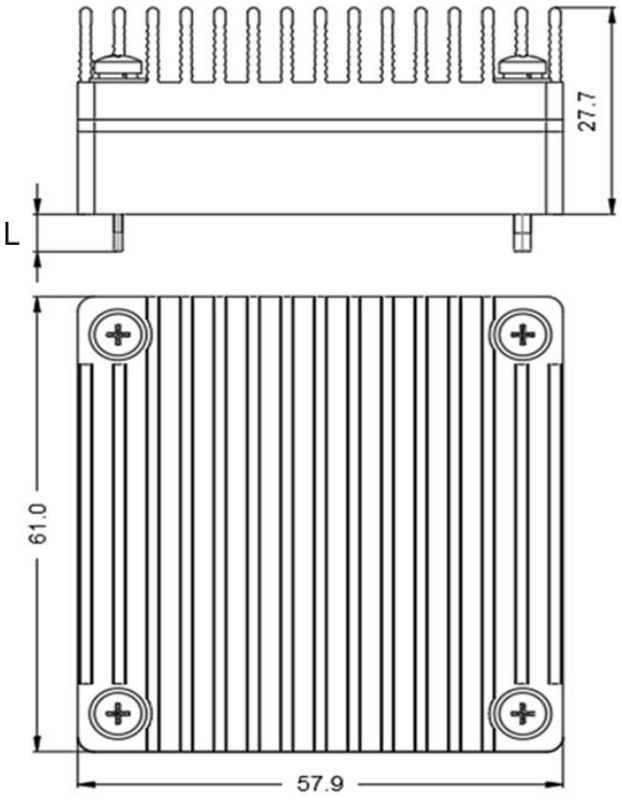
Note:
1. Both the output power and efficiency in the graphs have been tested with typical values.
2. The data in the temperature derating graph have been tested at Aipu laboratory test conditions. It is recommended to keep the temperature of the Metal base not more than 100 °C when the converter operates at the rated load for the application.

Mechanical Dimensions and Pin-out Function Description

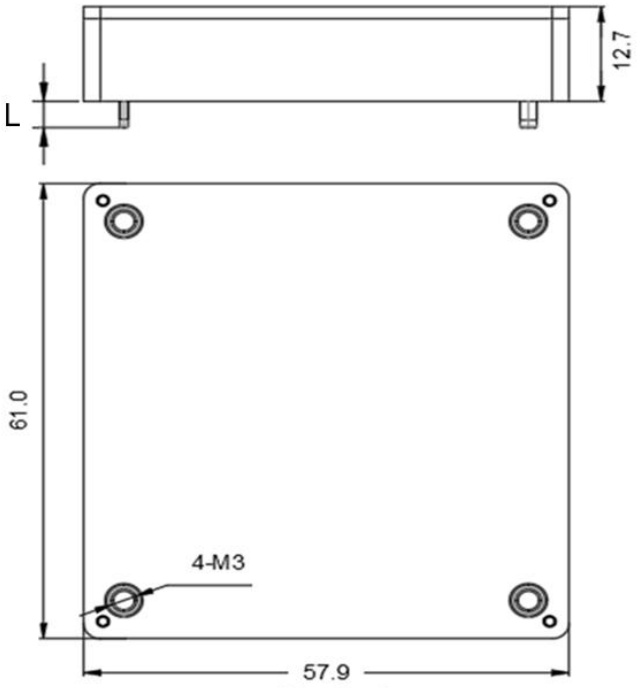




Recommended holes for PCB

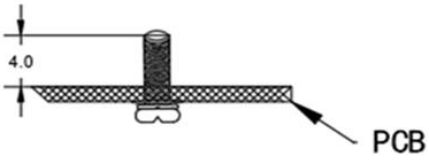


Standard + Heat sink
61.0X57.9X27.7mm



Standard
61.0X57.9X12.7mm

Unit: mm
2,5,6,7 Pin diameter: 1.00
1,3,4,8 Pin diameter: 1.50
Tolerance: X.X ±0.50mm, X.XX±0.10mm
Screwing torque: 0.4 N.m Max



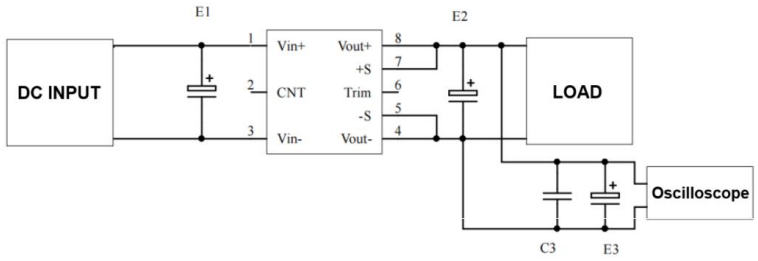
Pin Length L=3.7mm

Pin No.	1	2	3	4	5	6	7	8
Function	Vin+	CNT	Vin-	Vout-	-Sense	TRIM	+Sense	Vout+

Recommended Circuits for Application

1. Ripple & Noise

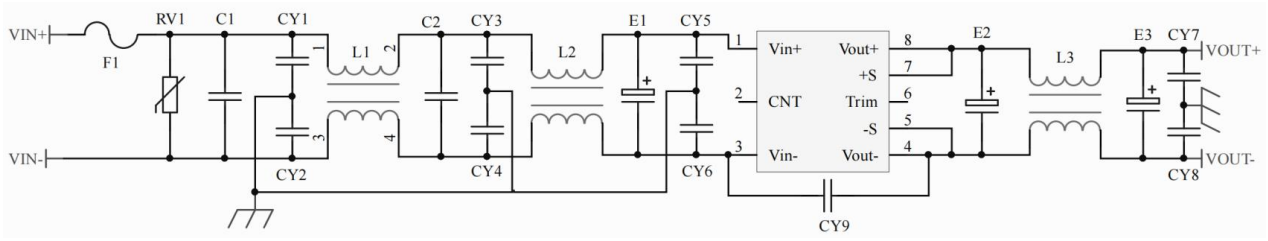
All this series of products will be tested according to this circuit diagram below before shipping.



Capacitance / Output Volt.	E1(μF)	E2(μF)	C3(μF)	E3(μF)
3.3VDC	100	1000	1	10
5VDC		680		
12VDC		470		
……				
48VDC				
……	68	68		
110VDC				

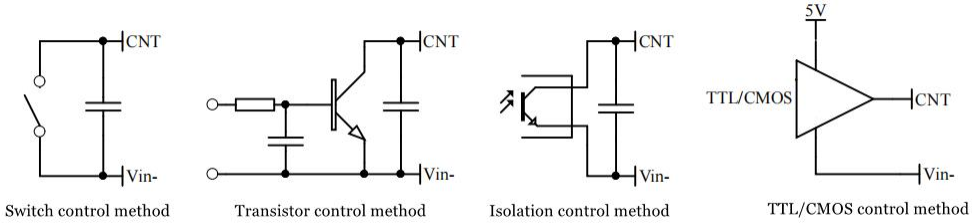
2. Recommended circuit for application

If this circuit diagram recommended below is not adopted, an electrolytic capacitor ≥220μF should be connected at the input to suppress the possible surge voltage.



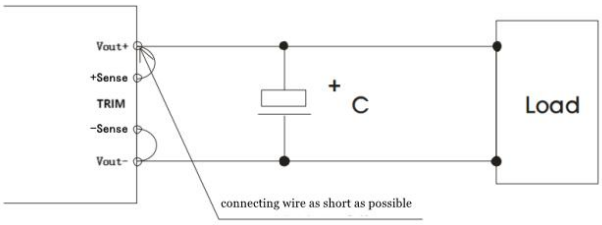
F1	T20A/250V FUSE
RV1	14D 100V Varistor
C1, C2	105/250V Polyester film capacitor
CY1, CY2, CY3, CY4, CY5, CY6	102/250Vac Y2 capacitor
CY7, CY8	103/2KV Ceramic capacitor
CY9	471/250Vac Y2 capacitor
E1	220μF/100V Electrolytic capacitor
E2，E3	470μF/35V Electrolytic capacitor
L1, L2	>3mH, Temperature rise less than 25° @12A
L3	>220uH, Temperature rise less than 25° @15A

3. Recommended circuits for the ON/OFF Control (CNT)



4. Application for Sense

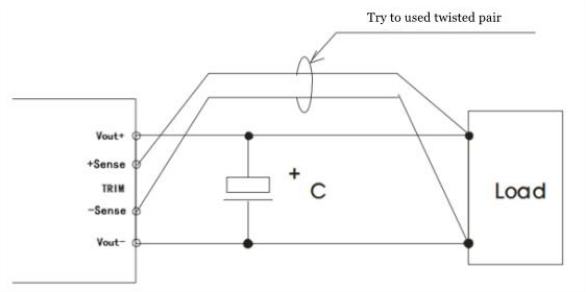
1) With NO distal end compensation



Note:

1. Vout+ & Sense+, Vout- & Sense- should be shorted when distal end compensation is not needed
2. The lead wire between Vout+ and Sense+, Vout- and Sense- should be as short as possible, and close to the pins, or else the output may be unstable.

2) With distal end compensation



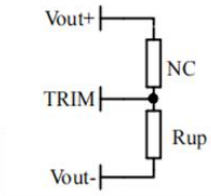
Notes:
1. The output voltage may be unstable if the compensation cables are too long.
2. The twisted pair or shielded cables are recommended, the cable length should be as short as possible.
3. Wide copper path on PCB or thick lead wires between the power supply and the load should be used to achieve the line voltage drop <0.3V. The target is to keep output voltage within the specified range.
4. The leads wire resistance may create the output voltage oscillation or larger ripples. Please verify it before to use.

5. TRIM and calculation of TRIM resistance

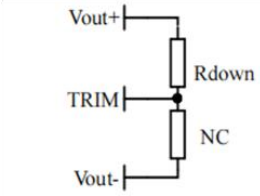
The calculation of △U and Rup & Rdown:

Rup=70/△U-5.1（KΩ）

Rdown=28*(24-2.5-△U)/△U -5.1（KΩ）



Voltage-up: Add Rup between Trim and Vout-



Voltage-down: Add Rdown between Trim and Vout+

6. This product is not available to be connected in parallel for the output power increasing. Please contact Aipu technician for this kind of requirement.

Others

1. The product warranty period is two years. The failed product can be repaired/replaced free of charge if it operates at normal condition. A paid service shall be also provided if the product fails after operating under wrong or unreasonable conditions.
2. Aipupower can provide customization design and filter modules for matching, please contact our technician for details.

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