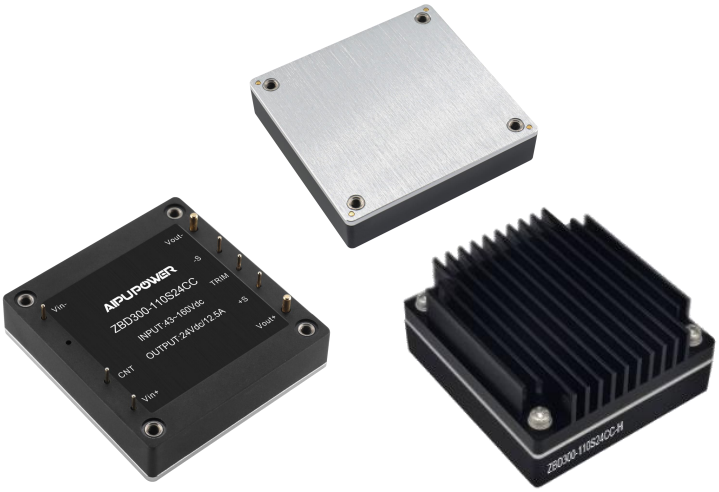


Typical Features

- Wide input voltage range 4:1
- Efficiency 91% (Typ.)
- Low standby power consumption
- Operating temperature from -40℃ to +105℃
- High isolation voltage 3000VDC (input-output) & 2100VDC (input-case)
- Input under voltage protection, output over current, over voltage, over temp. & short circuit protections
- Standard 1/2 brick size

The **ZBD300-110S24C** Series is a group of high-performance DC-DC converters designed for railway applications, with a rated input voltage of 110VDC and a wide input range from 43V to 160VDC. It provides a regulated single 24V/300W output with no minimum load requirement. Featuring high isolation voltage and a maximum operating temperature of 105°C, the series includes comprehensive protections against input undervoltage, output overcurrent, overvoltage, overtemperature, and short circuits. Additional functions include Remote Control (CNT), Remote Sense, and output voltage trimming. Complies with EN50155 railway standards, these converters are widely used in railway systems and associated equipment.

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
ZBD300-110S24CC	43-160	300	24	12.5	240	89/91	Positive Logic Standard
ZBD300-110S24CN							Negative Logic Standard
ZBD300-110S24CC-H							Positive logic With heat sink
ZBD300-110S24CN-H							Negative logic With heat sink

Note: For 43-66V input, the output power derates linearly; the maximum output power is 200W at 43V input.

Input Specifications

Item	Test conditions	Min.	Typ.	Max.	Unit
Max. Input Current	43VDC Input, full load	--	--	6	A
No-load Input Current	Nominal Input Voltage	--	--	10	mA
Input Surge Voltage (1sec. max.)	Exceeding this range causes permanent damage	-0.7	--	185	VDC
Start-up Voltage		--	--	43	
Input UVP	Measured at No Load (Note: OCP may trigger prematurely at Full Load)	--	--	42	
Remote ON/OFF (CNT)	Positive Logic: The module turns ON when CNT is open or connected to 3.5-15V; it turns OFF when connected to 0-1.2V.			Reference Voltage: -Vin	
	Negative Logic: The module turns OFF when CNT is open or connected to 3.5-15V; it turns ON when connected to 0-1.2V.				

Output Specifications

Item	Operating conditions	Min.	Typ.	Max.	Unit
Output Voltage Accuracy	Nominal input voltage, 0%-100% load	--	±0.2	±1.0	%
Line Regulation	Full load, input voltage from low to high	--	±0.1	±0.2	
Load Regulation	Nominal input voltage, 10%-100% load	--	±0.1	±0.2	
Transient Recovery Time	25% load step change (step rate 1A/50uS)	--	200	250	uS
Transient Response Deviation		-5	--	5	%
Temperature Coefficient	Full load	-0.02	--	+0.02	%/℃
Ripple & Noise	20MHz Bandwidth, with ext. cap. >220μF	--	150	240	mVp-p
Output Voltage Trim(TRIM)		-10	--	+10	%
Output Voltage Remote Sense(Sense)		--	--	105	%
Over Temperature Protection(OTP)	Max Baseplate Temperature	105	115	125	℃
Over Voltage Protection(OVP)		125	--	140	%
Over Current Protection(OCP)		13	--	17	A
Short Circuit Protection(SCP)		Hiccup mode, Continuous, Auto-recovery			

General Specifications

Item	Operating conditions		Min.	Typ.	Max.	Unit
Isolation Voltage	I/P-O/P	Test 1min, leakage current <3mA	3000	--	--	VDC
	I/P-Case	Test 1min, leakage current <3mA	2100	--	--	VDC
	O/P-Case	Test 1min, leakage current <3mA	500	--	--	VDC
Insulation Resistance	I/P-O/P	@ 500VDC	100	--	--	MΩ
Switching Frequency			--	500	--	kHz
MTBF			150	--	--	khrs

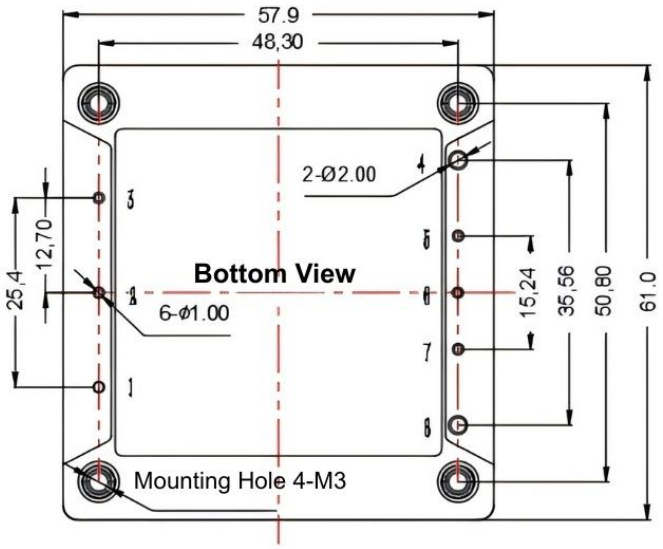
Environmental characteristics

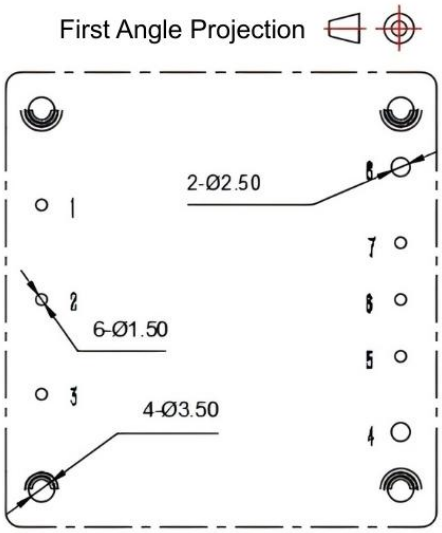
Item	Operating conditions	Min.	Typ.	Max.	Unit
Operating Temperature	Refer to the temperature derating curve	-40	--	+105	℃
Storage Humidity	No-condensing	5	--	95	%RH
Storage Temperature		-40	--	+125	℃
Lead Soldering Temperature	≥ 1.5mm from case, < 1.5s	--	--	+350	
Cooling Requirement		EN60068-2-1			
Dry Heat		EN60068-2-2			
Damp Heat		EN60068-2-30			
Vibration & Shock		IEC/EN 61373 Category 1, Class B			

EMC Performances				
EMI	CE	EN50121-3-2	150kHz-500kHz 79dBuV	
		EN55016-2-1	500kHz-30MHz 73dBuV	
	RE	EN50121-3-2	30MHz-230MHz 40dBuV/m at 10m	
		EN55016-2-1	230MHz-1GHz 47dBuV/m at 10m	
EMS	ESD	IEC/EN61000-4-2/GB/T 17626.2-2006	Contact ±6KV/Air ±8KV	Performance Criteria A
	RS	IEC/EN61000-4-3/GB/T 17626.3-2006	10V/m	Performance Criteria A
	EFT	IEC/EN61000-4-4/GB/T 17626.4-2008	±2kV 5/50ns 5kHz	Performance Criteria A
	Surge	IEC/EN61000-4-5/GB/T 17626.5-2008	Line to line ± 1KV（42Ω, 0.5μF）	Performance Criteria A
	CS	IEC/EN61000-4-6/GB/T 17626.6-2008	0.15MHz-80MHz 10 Vr.m.s	Performance Criteria A

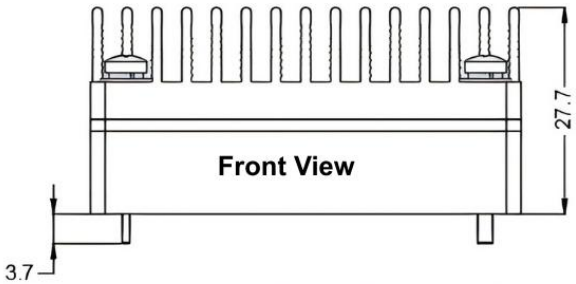
Physical Characteristics	
Case Material	Metal base + black flame-retardant plastic (UL94-V0)
Heat Sink	Dimensions: 61.0 × 57.9 × 15.0 mm; Weight: 72 g; Black anodized aluminum alloy
Cooling Method	Conduction cooling or forced air cooling
Unit Weight	Standard: 120g; With heat sink: 188g

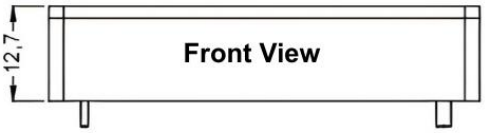
Mechanical Dimensions and Pin Definition

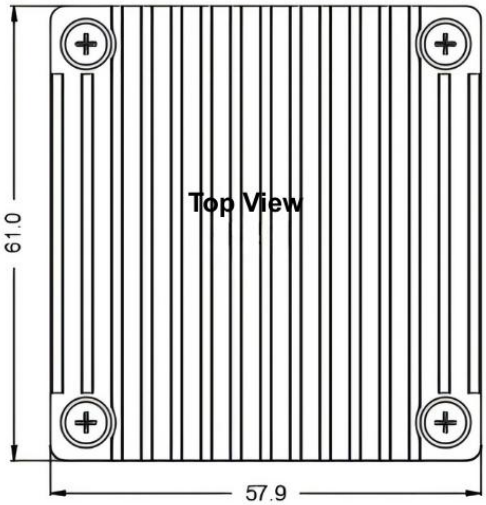




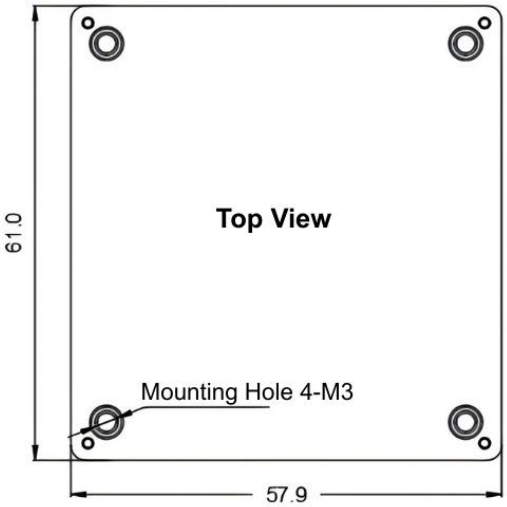
Recommended PCB Slot Dimensions







Standard + Heat sink
61.0*57.9*27.7mm



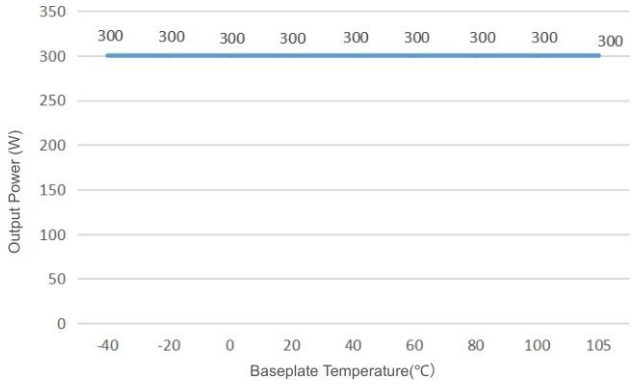
Standard
61.0*57.9*12.7mm

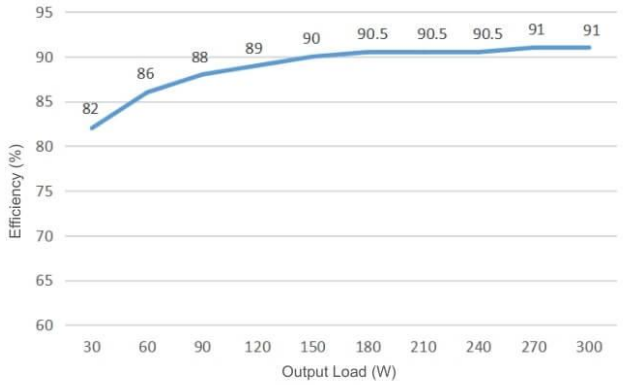
Note:

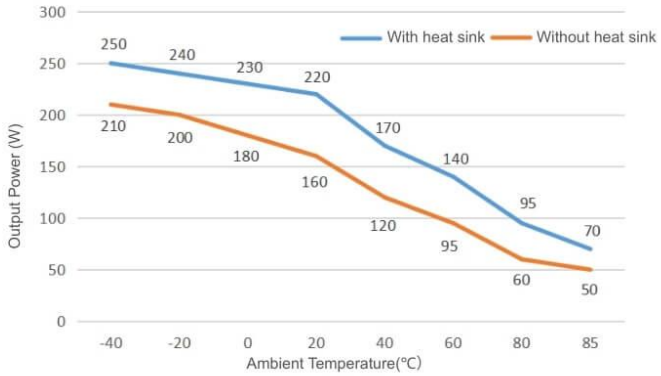
- **Unit: mm**
- **Pin 1, 2, 3, 5, 6, 7 diameter: 1.00mm**
- **Pin 4, 8 diameter: 2.00mm**
- **Tolerance: X.X ±0.50 mm, X.XX ±0.10 mm**
- **Mounting Torque: 0.4 N·m (Max.)**

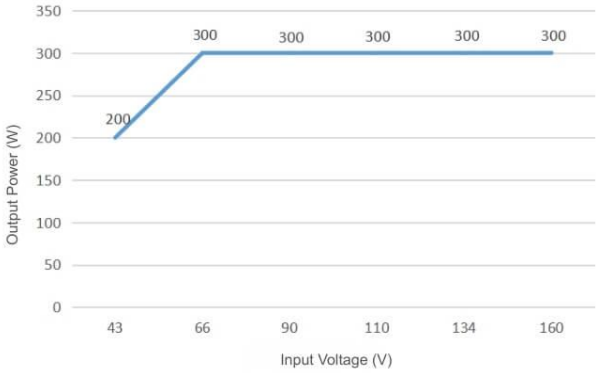
Pin No.	1	2	3	4	5	6	7	8
Function	**Vin+**	**Remote Control (CNT)**	**Vin-**	**Vout-**	**-Sense (-S)**	**TRIM**	**+Sense (+S)**	**Vout+**

Typical Characteristic Curves









Notes:

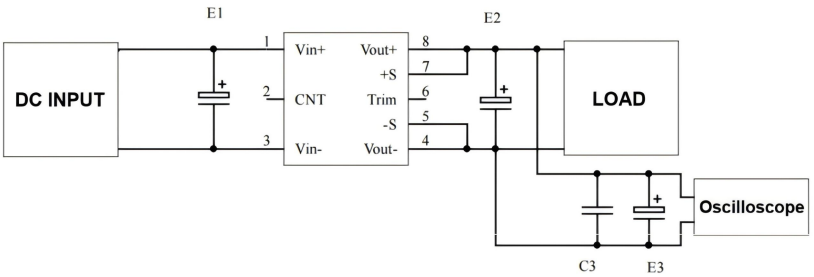
1. The derating and efficiency curves are based on typical test values.

2. Temperature derating curves are obtained under Aipu's laboratory test conditions. If the actual application environment differs, the product can be used within any rated load range provided the case temperature (metal base) is maintained below 100°C.

Recommended circuits for application

1. Ripple & Noise

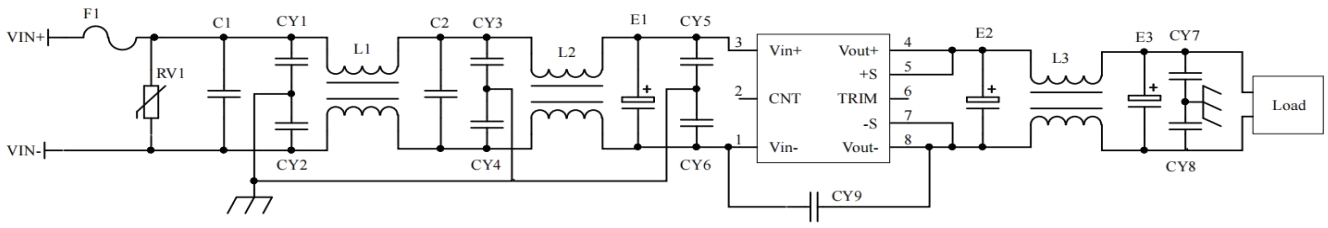
All DC-DC converters in this series are tested according to the recommended test circuit diagram shown below prior to shipment.



Capacitance / Output Volt.	E1(μF)	E2(μF)	C3(μF)	E3(μF)
3.3VDC	100	1000	1	10
5VDC		680		
12VDC		220		
……				
48VDC				
……	68	68		
110VDC				

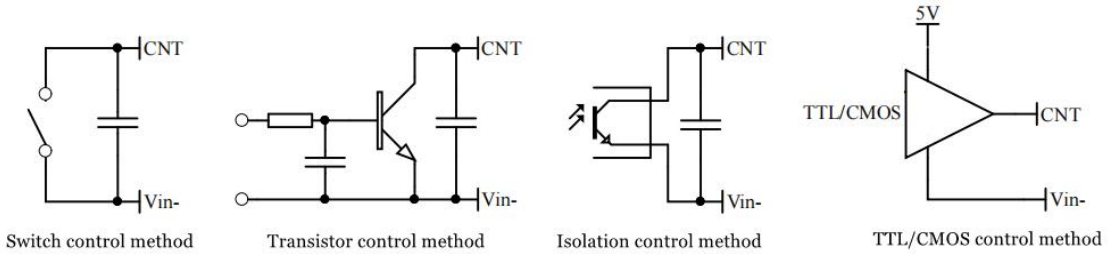
2. Recommended circuit for application

If the recommended circuit is not used, an electrolytic capacitor of at least 100μF must be connected in parallel at the input side to suppress potential surge voltage.



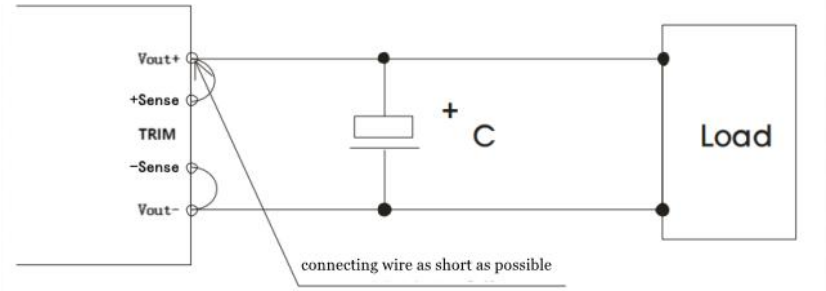
F1	T10A/250V FUSE
RV1	14D 200V Varistor(MOV)
C1, C2	105/450V Polyester film capacitor
CY1, CY2, CY3, CY4, CY5, CY6	102/250Vac Safety Y2 capacitor
CY7, CY8	103/2KV Ceramic capacitor
CY9	471/250Vac Safety Y1 capacitor
E1	220μF/200V Electrolytic capacitor
E2，E3	220μF/35V Electrolytic capacitor
L1, L2	Inductance > 5mH, Rated Current 6A, Temperature Rise < 25℃
L3	Inductance > 0.2mH, Rated Current 13A, Temperature Rise < 25℃

3. Recommended Applications for Remote Control (CNT)



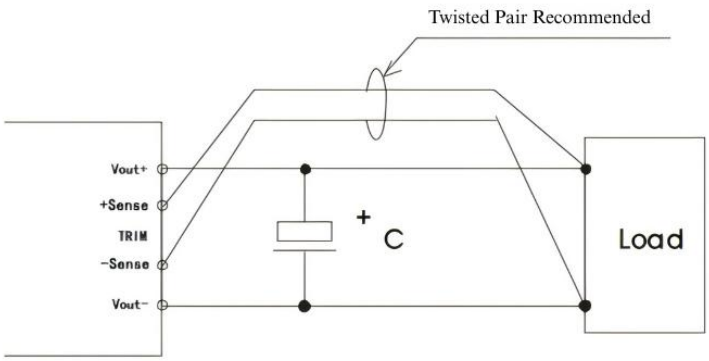
4. Remote Sense Application and Precautions

1) Without Remote Sense



Note:
1. When remote sense is not in use, ensure +Vout is shorted to +Sense, and -Vout to -Sense.
2. The connections between +Vout to +Sense and -Vout to -Sense must be as short as possible and located close to the pins; otherwise, it may cause module instability.

2) With Remote Sense

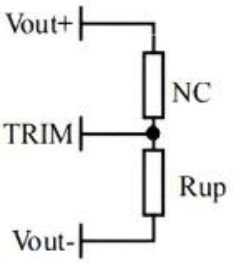


Notes:

1. Long lead wires for remote sense may result in output voltage instability.
2. With remote sense, twisted pair or shielded wires are recommended; keep the lead length as short as possible.
3. Use wide PCB traces or thick wires between the power module and the load to ensure the line voltage drop is below 0.3V. This maintains the output voltage within the specified range.
4. Lead impedance may cause output voltage oscillation or excessive ripple; please verify performance thoroughly before use.

5. TRIM Function and Resistance Calculation

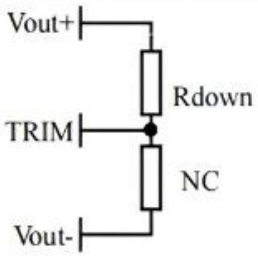
The relationship between the output voltage change ($\triangle U$) and the Trim resistors(R_{up}/R_{down}) is as follows:



Voltage Increase (Trim Up)

Add resistor R_{up} between **TRIM** and **Vout-**
(to increase output voltage)

$$R_{up} = \frac{50}{\Delta U} - 5.1\ (\text{k}\Omega)$$



Voltage Decrease (Trim Down)

Add resistor R_{down} between **TRIM** and **Vout+**
(to decrease output voltage)

$$R_{down} = \frac{20 \times (21.5 - \Delta U)}{\Delta U} - 5.1\ (\text{k}\Omega)$$

6. This series of products does not support direct parallel connection to increase output power. Please contact Aipu technical support for specific requirements.

Others

1. The product warranty period is two years. Defective products will be repaired or replaced free of charge under normal operating conditions. Paid services are available for damages resulting from improper use or technical operating errors.
2. AIPUPOWER provides customized designs and matching filter modules. Please contact our technical support team for detailed information.
3. Revised: Jan. 14, 2026

Guangzhou Aipu Electron Technology Co., Ltd
Address: Building 4, HEDY Park, No.63, Punan Road, Huangpu Dist, Guangzhou, China.
Tel: 86-20-84206763 Fax: 86-20-84206762 HOTLINE: 400-889-8821
E-mail: sales@aipu-elec.com Website: https://www.aipupower.com