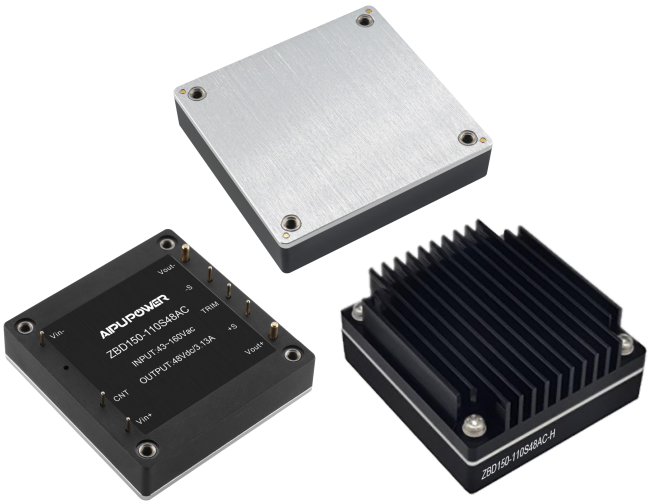


Typical Features

- Wide input voltage range 4:1
- Efficiency 94%(Typ.)
- Low standby power consumption
- Operating Temperature from -40℃ to +105℃
- Isolation voltage 3000Vac(input-output) & 2100Vac(input-case)
- Input under-voltage protection, output OVP, SCP, OCP, OTP
- Standard 1/2 brick size

ZBD150-110S48A series are high-performance power modules designed for railway applications, featuring a 110VDC nominal input (43-160VDC range) and a regulated 48V/150W single output. These modules require no minimum load and offer high isolation with an operating temperature up to 105°C. The series integrates comprehensive protections—including input UVP, output OCP, OVP, OTP, and short-circuit—alongside Remote Control (On/Off), Remote Sense, and Output Trim functions. Compliant with EN50155 railway standards, this series is widely used in railway systems and associated equipment.

Selection Guide

Part No.	Input voltage range (VAC)	Output Power (W)	Output Voltage (VDC)	Output Current (A)	Ripple & Noise (mVp-p)	Full load Efficiency (%) Min/Typ.	Remark
ZBD150-110S48AC	43–160	150	48	3.13	480	92/94	Positive logic Standard
ZBD150-110S48AN							Negative logic Standard
ZBD150-110S48AC-H							Positive logic With heat sink
ZBD150-110S48AN-H							Negative logic With heat sink

Input Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Max. Input Current	43V input voltage, full-load output	--	--	4	A
No-load Input Current	Rated input voltage	--	--	20	mA
Input Inrush voltage (1sec. max.)	Over-rating causes permanent damage	-0.7	--	185	VDC
Start-up voltage		--	--	43	
Input Undervoltage Protection (UVP)	No-load test; full-load test will trigger overcurrent protection early	--	--	42	
Start-up Delay		200		300	mS
Remote control pin (CNT)	Positive Logic: ON: Open or 3.5-15V; OFF: 0-1.2V				Reference Voltage - VIN
	Negative Logic: ON: 0-1.2V; OFF: Open or 3.5-15V				

Output Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Line Regulation	Full load, input voltage from low to high	--	±0.2	±1.0	%
Load Regulation	Rated input voltage, 10%-100% load	--	±0.1	±0.2	
Load regulation	Rated input voltage, 10%-100% load	--	±0.1	±0.5	
Transient Recovery Time	25% load step change (step rate 1 A/50 μs)	--	200	250	μs
Transient Response Deviation		-5	--	5	%
Temperature Coefficient	Full load	-0.02	--	+0.02	%/°C
Ripple & Noise	20M bandwidth, test with ≥220μF capacitor	--	250	480	mVp-p
Output voltage trim (TRIM)		-10	--	+10	%
Remote Sense (Sense)		--	--	5	%
Over temp protection(OTP)	Temperature of the metal base surface	105	115	125	°C
Output over voltage protection(OVP)		125	--	140	%
Output over current protection(OCP)		3.5	--	5	A
Output short circuit protection(SCP)		Hiccup, Continuous, Self-recovery			

General Specifications

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

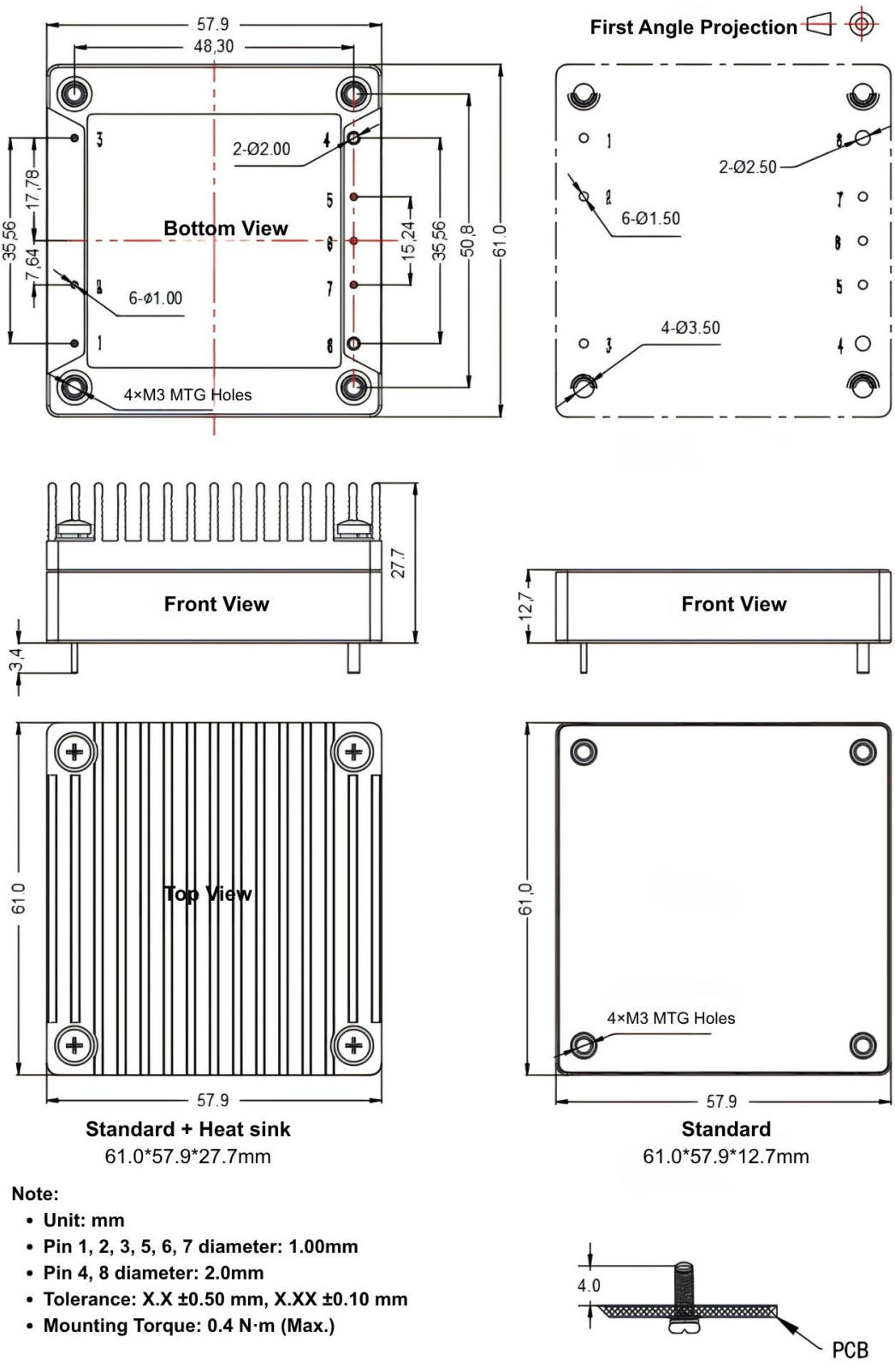
Environmental Specifications

Project	Operating Conditions	Min.	Typ.	Max.	Unit
Operating Temperature	Refer to the temperature derating curve	-40	--	+105	°C
Storage humidity	Non-condensing	5	--	95	%RH
Storage temperature		-40	--	+125	°C
Pin Soldering temperature	1.5mm from the case, < 1.5S	--	--	+350	
Cooling requirements		EN 60068-2-1			
Dry heat requirements		EN 60068-2-2			
Damp heat requirements		EN 60068-2-30			
Shock and Vibration		IEC/EN 61373, Category 1, Class B			

EMC Specifications				
EMI	CE	EN50121-3-2	150 kHz–500 kHz 79 dBuV	
		EN55016-2-1	500 kHz–30 MHz 73 dBuV	
	RE	EN50121-3-2	30 MHz–230 MHz 40 dBuV/m at 10 m	
		EN55016-2-1	230 MHz–1 GHz 47 dBuV/m at 10 m	
EMS	ESD	IEC/EN61000-4-2/GB/T 17626.2-2006	Contact ±6 kV/Air ±8 kV	Perf. Criteria A
	Radiated Immunity	IEC/EN 61000-4-3/GB/T 17626.3-2006	10 V/m	Perf. Criteria A
	EFT	IEC/EN 61000-4-4/GB/T 17626.4-2008	±2 kV 5/50 ns 5 kHz	Perf. Criteria A
	Surge Immunity	IEC/EN 61000-4-5/GB/T 17626.5-2008	Line-to-line ±1 kV (42 Ω, 0.5 μF)	Perf. Criteria A
	CS	IEC/EN 61000-4-6/GB/T 17626.6-2008	0.15 MHz–80 MHz, 10 V rms	Perf. Criteria A

Physical Specifications	
Case Materials	Metal base + Plastic case in black with flame class UL94 V-0
Heat sink	Dimension 61x57.9x15.0mm, weight 72g, Aluminium, anodized black
Cooling method	Conduction cooling or forced fan cooling
Weight	Standard 115g, with heatsink 192g

Mechanical Dimensions and Pin Definition



Standard + Heat sink
61.0*57.9*27.7mm

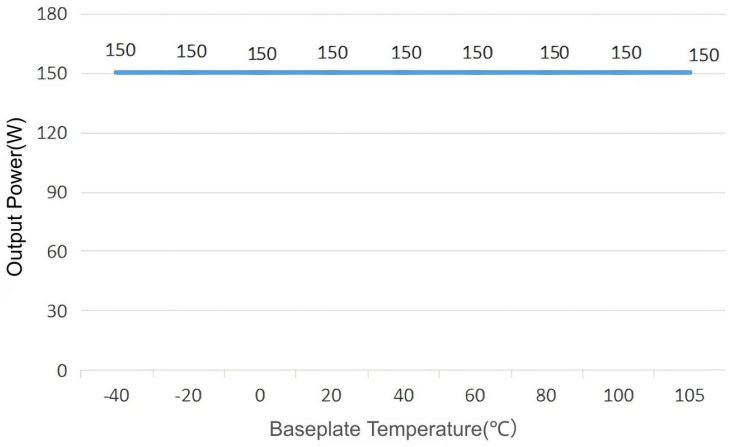
Standard
61.0*57.9*12.7mm

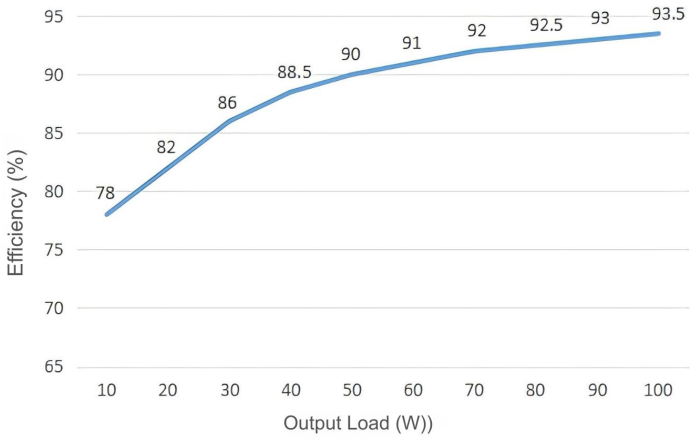
Note:

- **Unit: mm**
- **Pin 1, 2, 3, 5, 6, 7 diameter: 1.00mm**
- **Pin 4, 8 diameter: 2.0mm**
- **Tolerance: X.X ±0.50 mm, X.XX ±0.10 mm**
- **Mounting Torque: 0.4 N·m (Max.)**

No.	1	2	3	4	5	6	7	8
Pin Definitions	**Vin+**	**CNT**	**Vin-**	**Vout-**	**-S**	**TRIM**	**+S**	**Vout+**
Function	Positive Input	Remote Control (CNT)	Negative Input	Negative Output	Remote Sense Negative	Output Voltage Trim	Remote Sense Positive	Positive Output

Product Performance Curves





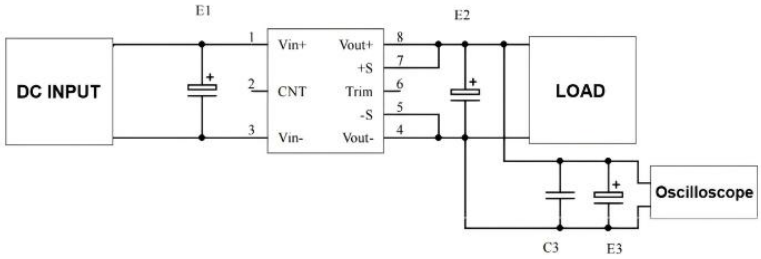
Notes:

1. Both temperature derating and efficiency curves are based on typical values.
2. Derating curves are measured under our laboratory conditions. If the actual application environment differs, ensure the case temperature does not e 100° C. The module can be used at any load within its rated range provided this temperature limit is maintained.

Recommended Circuits for Application

1.Ripple & Noise

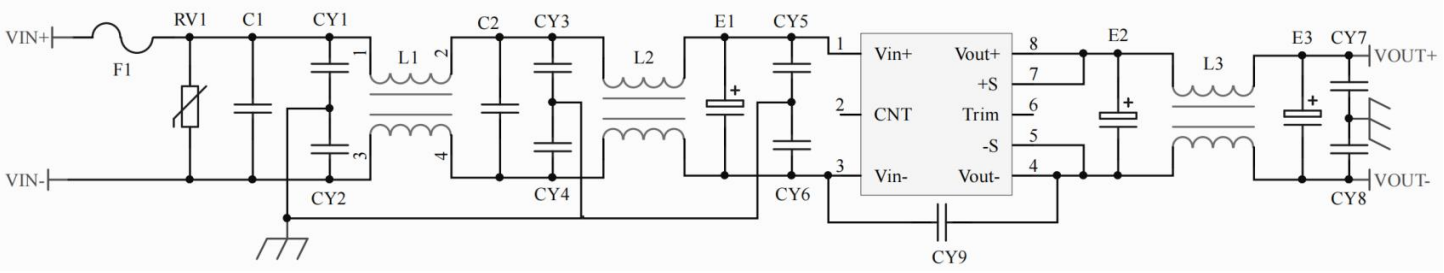
All DC/DC converters in this series are tested according to the recommended circuit diagram below prior to shipment.



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

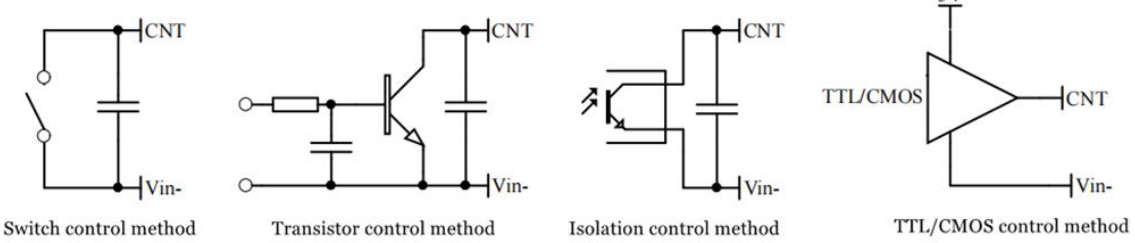
2. Recommended circuit for application

If this circuit recommended is not adopted, please connect an electrolytic capacitor ≥100 μF in parallel at the input to suppress the possible surge voltage.



F1	T10A/250V fuse
RV1	14D 200V MOV
C1, C2	105/450V Polyester Film Capacitors
CY1, CY2, CY3, CY4, CY5, CY6	102/250Vac Safety-rated Y2 capacitors
CY7, CY8	103/2 kV Ceramic Capacitors
CY9	471/250 VAC Safety-rated Y1 capacitors
E1	220μF/ 200V Electrolytic Capacitors
E2, E3	220μF/63V Electrolytic Capacitor
L1, L2	>3mH, the temperature rise <25℃@4A
L3	>220μH, the temperature rise <25℃@4A

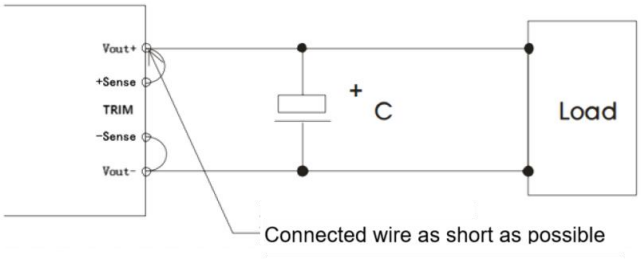
3.ON/OFF control (CNT) application



Switch control method | Transistor control method | Isolation control method | TTL/CMOS control method

4.Remote Sense: Usage & Precautions

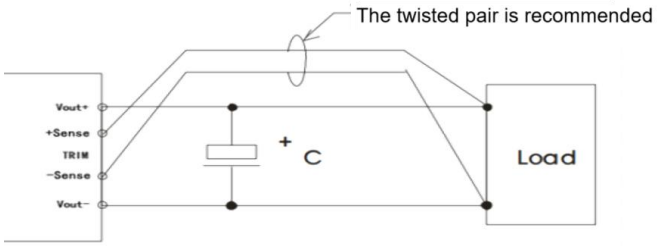
1)**Without Remote Sense**



Precautions:

1. If the remote sense function is not used, ensure +S is shorted to +Vout and -S is shorted to -Vout.
2. The connections between +Vout / +S and -Vout / -S must be as short as possible and placed close to the pins; otherwise, the module's stability may be compromised.

2)**With Remote Sense**

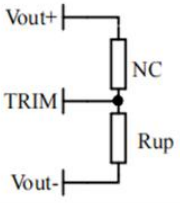


Precautions:

1. With remote sense, excessively long sense leads may cause output voltage instability.
2. With remote sense, use shielded twisted pair wires and keep them as short as possible.
3. Use wide PCB traces or heavy-gauge wires between the module and the load. Ensure the total voltage drop is below 0.3V to maintain the output voltage within specified limits.
4. Lead impedance may cause output voltage oscillation or increased ripple; please verify performance prior to use.

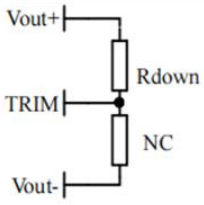
5.TRIM & TRIM resistance calculation

Output Voltage Trim Range vs. Resistor Value:



Voltage-up: Add Rup between Trim and Vout-

Rup=107.5/△U-5.1 (KΩ)



Voltage-down: Add Rdown between Trim and Vout+

Rdown=43* (45.5-△U) /△U -5.1 (KΩ)

6.Direct parallel connection for higher power is not supported. For parallel applications, please contact our technical support team.

Others

1.This product is covered by a two-year warranty. Any failure or damage that occurs under normal use will be repaired free of charge. In the event of damage caused by improper use, incorrect application, or manufacturing process errors not attributable to our product, paid repair services can be provided.

2.AIPUPOWER offers custom product design services as well as matching filter modules. For details, please contact our technical support team directly.

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