



Conform to CE

Typical Features

- ◆ Wide input voltage range 4:1
- ◆ Efficiency 86%(Typ)
- ◆ Low no-load power consumption
- ◆ Operating Temperature: -40°C to +105°C
- ◆ Isolation voltage: input-output 1500VDC, input-case 1500VDC
- ◆ Protection: Input under voltage, output over voltage, short circuit, over current, over temperature
- ◆ Standard 1/2 brick size

ZBD100-24S05A is a high efficiency DC-DC converter with rated input voltage 24VDC, output 5V/100W, no minimum load, wide input range 9-36VDC, regulated single output. More other advantages include high isolation voltage, operating temperature 105°C Max, input under-voltage, output over-current, over-voltage, over-temperature and short-circuit protections, remote control, 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) | Efficiency(%) @full load Min/Typ. | Remark |
| ZBD100-24S05AC | 9-36 | 100 | 5 | 20 | 100 | 85/86 | Standard positive logic |
| ZBD100-24S05AN | | | | | | | Standard negative logic |
| ZBD100-24S05AC-H | | | | | | | Heatsink positive logic |
| ZBD100-24S05AN-H | | | | | | | Heatsink negative logic |

| Input Specifications | | | | | | |
|-----------------------------------|--|------|------|------|------|-------------|
| Item | Operating conditions | Min. | Typ. | Max. | Unit | |
| Max input current | Input voltage 9V, full load | -- | -- | 16 | A | |
| No load input current | Rated input voltage | -- | -- | 15 | mA | |
| Input inrush voltage (1sec. max.) | A permanent damage risk when input over this range | -0.7 | -- | 50 | VDC | |
| Start-up voltage | | -- | -- | 9 | | |
| Input under voltage protection | No-load test, over current protection may start in advance at full load | -- | -- | 8.5 | | |
| Control (CNT) | Positive logic: CNT is no connection or connected to 3.5-15V to turn on, connected to 0-1.2V to shut off | | | | | Ref voltage |
| | Negative logic: CNT is no connection or connected to 3.5-15V to shut off, connected to 0-1.2V to turn on | | | | | -Vin |

Output Specifications

| Item | Operating conditions | Min. | Typ. | Max. | Unit |
|--|---|-----------------------------------|------|-------|-------|
| Output Voltage Accuracy | Rated 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 | Rated 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 Drift Coefficient | Full load | -0.02 | -- | +0.02 | %/°C |
| Ripple & Noise | 20MHz bandwidth, external capacitor above 220uF | -- | 80 | 100 | mVp-p |
| Output voltage adjustment (Trim) | | -10 | -- | +10 | % |
| Output voltage distal end compensation (Sense) | | -- | -- | 5 | % |
| Over temperature protection | Maximum temperature of metal case surface | 105 | 115 | 125 | °C |
| Output over voltage protection | | 125 | -- | 140 | % |
| Output over current protection | | 22 | -- | 28 | A |
| Output 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 | MIL-HDBK-217F@25°C | | 150 | -- | -- | K hours |

Environmental characteristics

| Item | Operating conditions | Min. | Typ. | Max. | Unit |
|---------------------------|--|--------------------------------------|------|------|------|
| Operating Temperature | Please refer to the temperature derating curve | -40 | -- | +105 | °C |
| Storage Humidity | No condensing | 5 | -- | 95 | %RH |
| Storage Temperature | | -40 | -- | +125 | °C |
| Pin Soldering Temperature | 1.5mm from the case, time< 1.5S | -- | -- | +350 | |
| Cooling requirements | | EN60068-2-1 | | | |
| Dry heat requirement | | EN60068-2-2 | | | |
| Damp heat requirement | | EN60068-2-30 | | | |
| Shock and vibration | | IEC/EN 61373 C1/Body Mounted Class B | | | |

EMC Performance (EN50155)

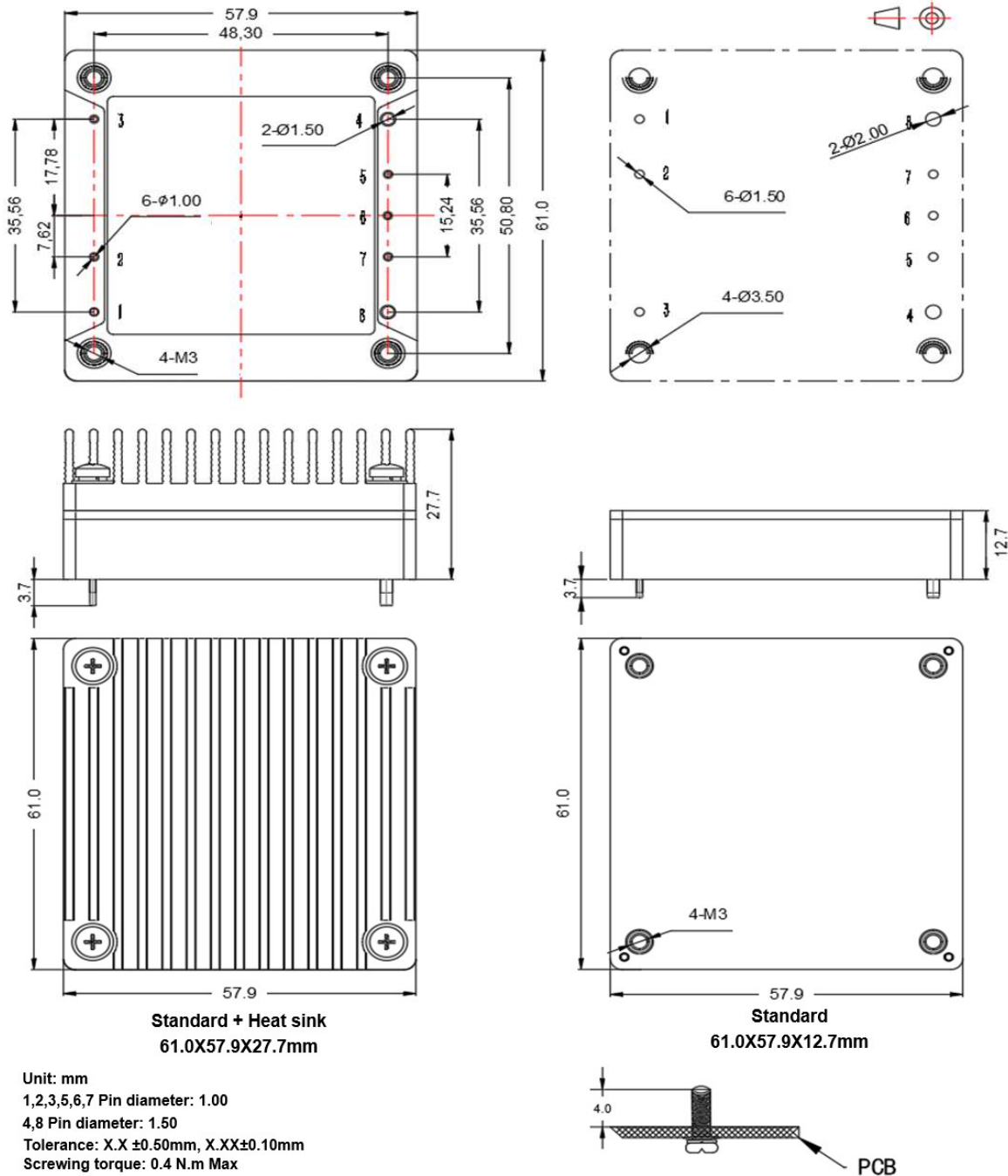
| | | | | |
|-----|-----|-------------|------------------------------|------------------|
| EMI | CE | EN50121-3-2 | 150kHz-500kHz 79dBuV | |
| | | EN55016-2-1 | 500kHz-30MHz 73dBuV | |
| | RE | EN50121-3-2 | 30MHz-230MHz 40dBuV/m at 10m | |
| | | EN55016-2-1 | 230MHz-1GHz 47dBuV/m at 10m | |
| EMS | ESD | EN50121-3-2 | Contact ±6KV / Air ±8KV | perf. Criteria A |
| | RS | EN50121-3-2 | 10V/m | perf. Criteria A |
| | EFT | EN50121-3-2 | ±2kV 5/50ns 5kHz | perf. Criteria A |

| | | | |
|-------|-------------|---------------------------------|------------------|
| Surge | EN50121-3-2 | Line to line ± 1KV (42Ω, 0.5μF) | perf. Criteria A |
| CE | EN50121-3-2 | 0.15MHz-80MHz 10 Vr.m.s | perf. Criteria A |

Physical Characteristics

| | |
|------------------|---|
| Case Materials | Metal bottom shell + Plastic Case in black with flame class UL94 V-0 |
| Heat sink | Dimension 61.0x57.9x15.0 mm, weight 65g, aluminum alloy, anodized black |
| Cooling method H | Conduction cooling or forced air cooling |
| Product Weight | Standard 120g, with heatsink 188g |

Mechanical Dimensions & Pin definition



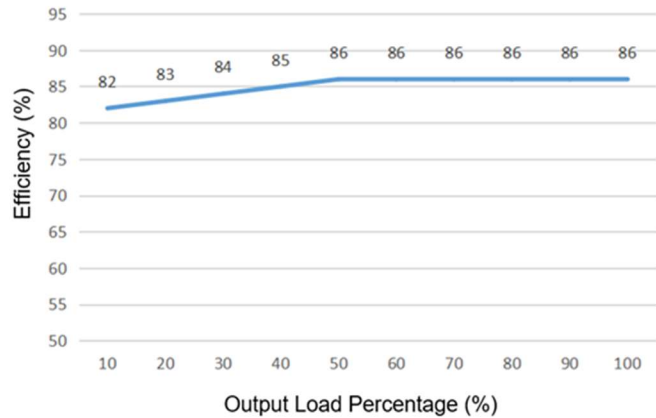
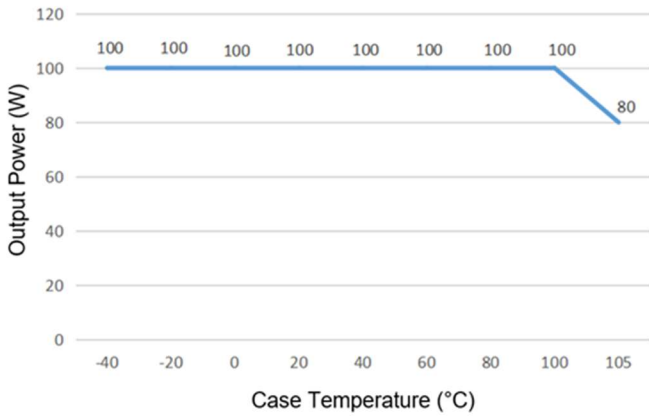
Standard + Heat sink
61.0X57.9X27.7mm

Standard
61.0X57.9X12.7mm

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

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

Product Performance Curve



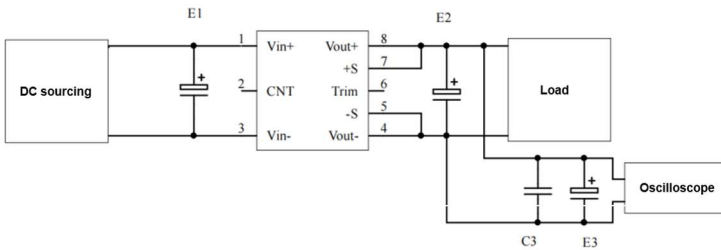
Note:

- Both the temperature derating curve and the efficiency curve are made by the tested typical values.
- The temperature derating is tested at Aipu laboratory test conditions. It is recommended to keep the temperature of the aluminum case not more than 100 °C while the converter operating at the rated load range for customer application.

Recommended Circuits for Application

1. Ripple & Noise test

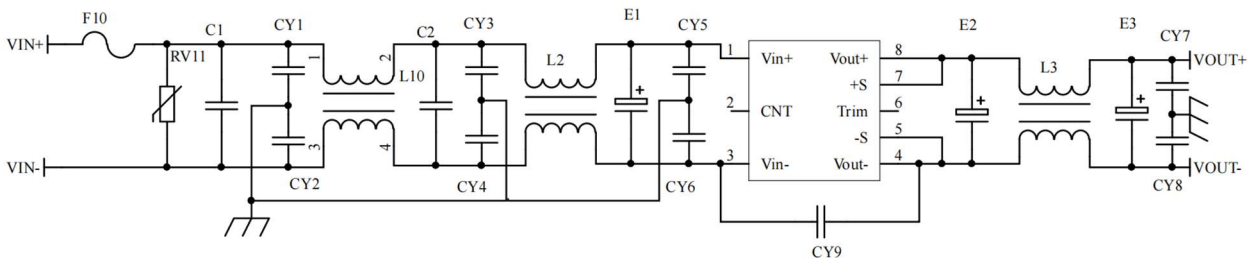
All this series converters will be tested according to this circuit recommended below before shipping.



| Output voltage | E1 (μF) | E2 (μF) | C1 (μF) | E3 (μF) |
|----------------|---------|---------|---------|---------|
| 3.3VDC | 100 | 1000 | 1 | 10 |
| 5VDC | | 680 | | |
| 12VDC | | 220 | | |
| | | | | |
| 48VDC | 68 | 68 | | |
| | | | | |
| 110VDC | | | | |

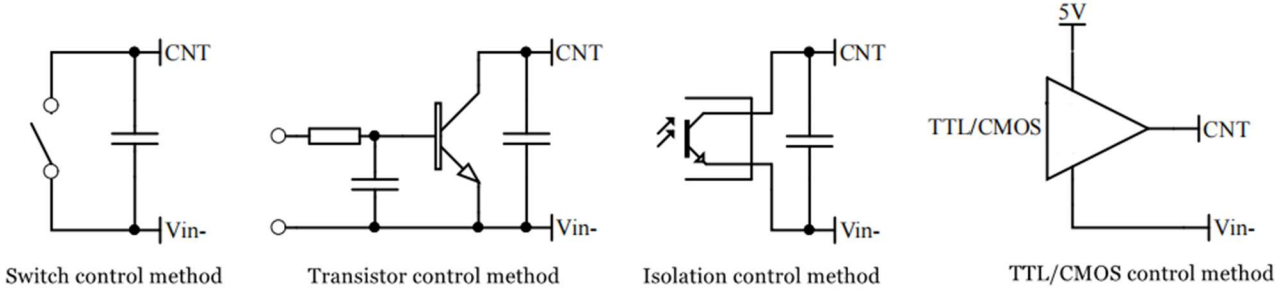
2. Recommended EMC Circuit

If this circuit recommended is not adopted, please connect an electrolytic capacitor $\geq 220 \mu\text{F}$ in parallel at the input to suppress the possible surge voltage at the input.



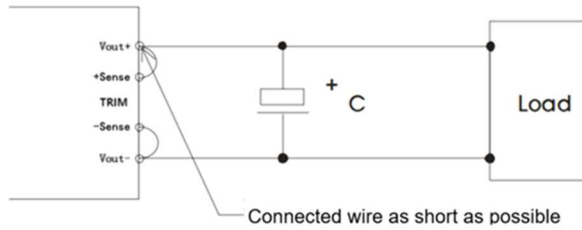
| | |
|-------------------------|--|
| F1 | T25A/250Vac fuse |
| RV1 | 14D 63V Varistor |
| C1,C2 | 105/63V Polyester Film Capacitor |
| CY1,CY2,CY3,CY4,CY5,CY6 | 102/250Vac, Y2 capacitor |
| CY7,CY8 | 103/2KV Ceramic Capacitor |
| CY9 | 471/250Vac, Y2 capacitor |
| E1 | 220μF/63V Electrolytic Capacitor |
| E2, E3 | 470μF/50V Electrolytic Capacitor |
| L1,L2 | > 3mH, the temperature rise less than 25°K@16A |
| L3 | > 100uH, the temperature rise less than 25°K@20A |

3. Recommended application for Remote control terminal (CNT)



4. Application for Sense

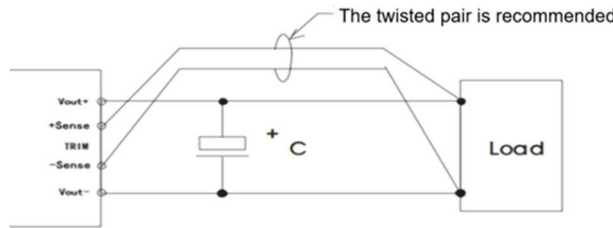
1) With NO distal end compensation



Notes:

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:

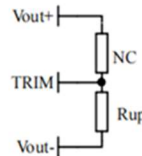
1. The output voltage may be unstable if the compensation cables are too long.
2. Twisted pair or shielded cables are recommended, the cable length should be as short as possible.
3. Wide copper path on PCB or thick lead wires between the power supply and the load should be used to achieve the line voltage 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

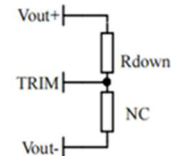
The calculation of ΔU and R_{up} & R_{down} :

$R_{up} = 25 / \Delta U - 5.1 \text{ (K}\Omega\text{)}$

$R_{down} = 10 * (5 - 2.5 - \Delta U) / \Delta U - 5.1 \text{ (K}\Omega\text{)}$



Voltage-up: Add R_{up} between Trim and Vout-



Voltage-down: Add R_{down} between Trim and Vout+

6. This product is not available for connection in parallel to increase the output power. 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 failed after operating under wrong or unreasonable conditions.
2. Aipupower can provide customization design and filter modules for matching, please contact our technician for details.

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: www.aipupower.com