## Typical Features

- Wide input voltage range 4:1
- Efficiency 92% (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

**ZBD300-48S48A-TSH** is a high-performance half brick size DC-DC modular converter with the rated input voltage 48VDC (full range from 18V to 75VDC), regulated single output 48V/300W 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 |
|---|---|---|---|---|---|---|---|
| ZBD300-48S48AC-TSH | 18-75 | 300 | 48 | 6.25 | 480 | 90/92 | Positive logic With chassis |
| ZBD300-48S48AN-TSH | | | | | | | Negative logic With chassis |

**Input Specifications**

| Item | Operating conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|
| Input current Max | Input 18VDC@ full load | -- | -- | 20 | A |
| No-load current | Rated input voltage | -- | -- | 50 | mA |
| Input inrush voltage (1sec. max.) | The unit could be permanently broken over this voltage | -0.7 | -- | 100 | VDC |
| Start-up voltage | | -- | -- | 18 | |
| Under-voltage protection | With No-load (Over current protection could work in advance at full load) | -- | -- | 16 | |
| 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 | -- | ±0.2 | ±0.5 | |
| Load regulation | Nominal input voltage, 10%-100% load | -- | ±0.2 | ±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 | -- | 240 | 480 | mVp-p |
| Output voltage TRIM | | -20 | -- | +10 | % |
| Distal end compensation (Sense) | | -- | -- | 5 | % |
| Over temperature protection | Maximum temperature of the Metal Base | 105 | 115 | 125 | ℃ |
| Over voltage protection | | 125 | -- | 140 | % |
| Over current protection | | 6.6 | -- | 8 | 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 | | | -- | 360 | -- | 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 | | | |

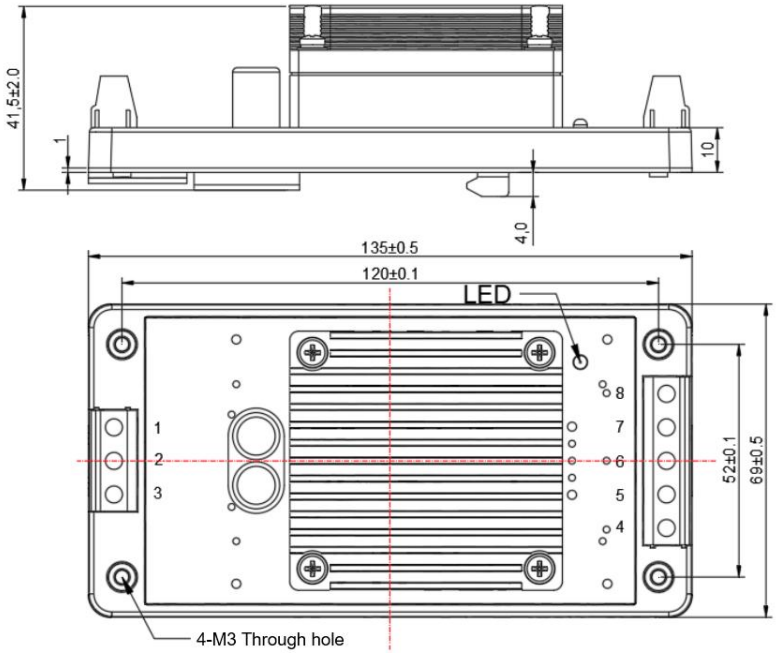
## EMC Performances (EN55032)

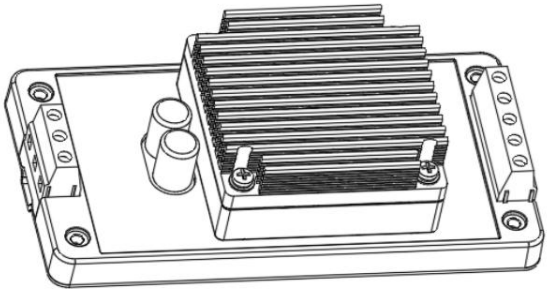
| | | | | |
|---|---|---|---|---|
| EMI | CE | EN55032-3-2 | 150kHz-500kHz 66dBuV | |
| | | EN55032-2-1 | 500kHz-30MHz 60dBuV | |
| | RE | EN55032-3-2 | 30MHz-230MHz 50dBuV/m at 3m | |
| | | EN55032-2-1 | 230MHz-1GHz 57dBuV/m at 3m | |
| EMS | ESD | IEC/EN61000-4-2 | Contact ±6KV/Air ±8KV | perf. Criteria 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 72g, Aluminum, anodized black |
| Cooling method | Conduction cooling or forced air cooling |
| Unit weight | With chassis 295g |
| Unit dimensions | 135x69x41.5 mm |

## Mechanical Dimensions and Pin-out Function Description

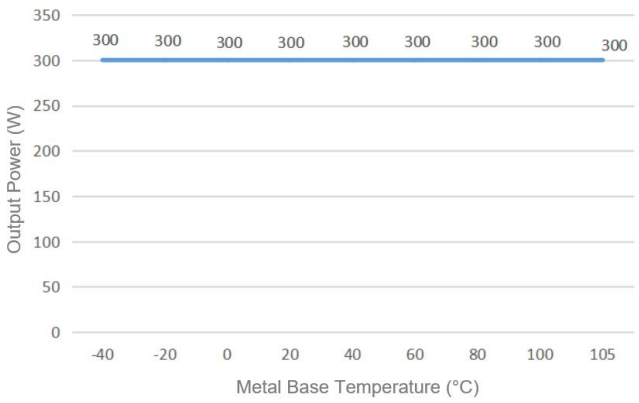


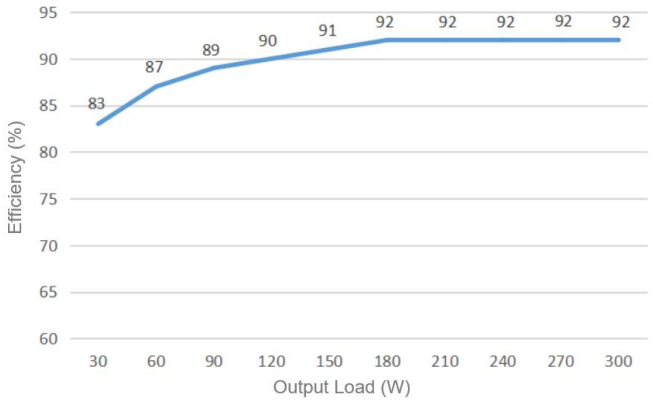



**Note:**
**Unit: mm**
**Lead wires gauge: 16 - 12 AWG**
**Screwing torque: 0.4 N.m Max**
**Mounting type: TS35 Rail**
**Tolerance: X.X ±0.5mm, X.XX ±0.10mm**

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

## Product Characteristics Graphs



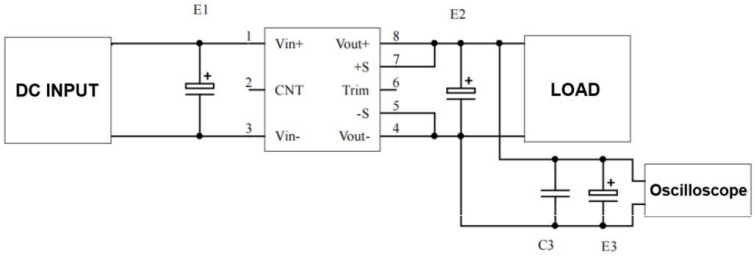

Note:

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 derated load for the application.

## Recommended Circuits for Application

### 1. Ripple & Noise

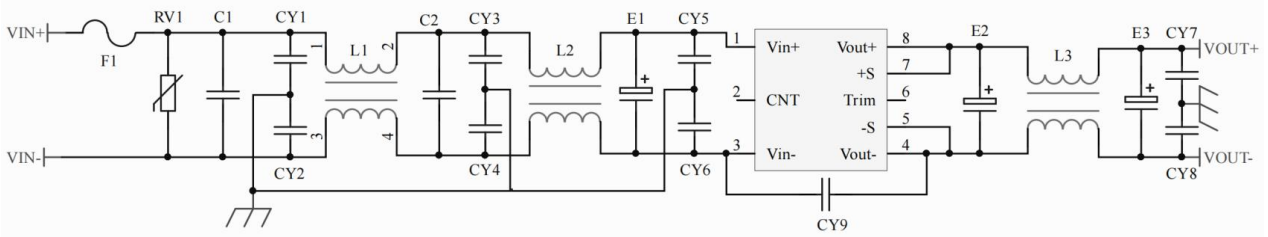
All this series of the products will be tested according to this circuit diagram below before shipping.




| 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 | | | | |

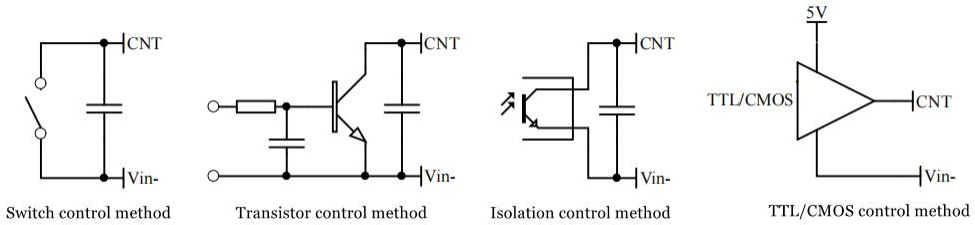
### 2. Recommended circuit for application

If this circuit diagram recommended below is not adopted, an electrolytic capacitor ≥100μF should be used at the input to suppress the possible surge voltage.



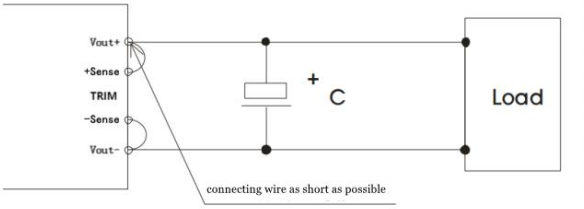

| | |
|---|---|
| F1 | T30A/250V FUSE |
| RV1 | 14D 100V Varistor |
| C1, C2 | 105/100V Polyester film capacitor |
| CY1, CY2, CY3, CY4, CY5, CY6 | 102/250Vac Y2 capacitor |
| CY7, CY8 | 103/2KV Ceramic capacitor |
| CY9 | 471/250Vac Y2 capacitor |
| E1 | 220μF/100V Electrolytic capacitor |
| E2，E3 | 220μF/63V Electrolytic capacitor |
| L1, L2 | >1mH, Temperature rise less than 25° @20A |
| L3 | >100uH, Temperature rise less than 25° @6.3A |

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



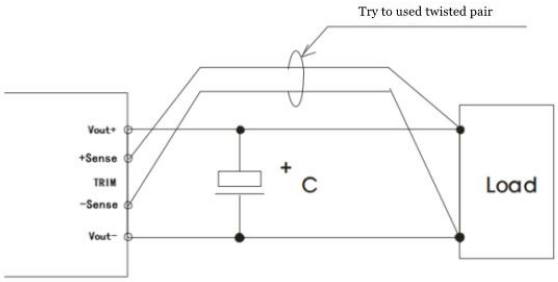

## 4. Application for Sense

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



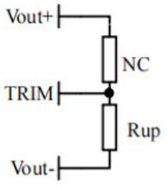

Notes:
1. The output voltage may be unstable if the compensation cables are too long.
2. The twisted pair or shielded cables are recommended, the cable length should be as short as possible.
3. Wide copper path on PCB or thick lead wires between the power supply and the load should be used to achieve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

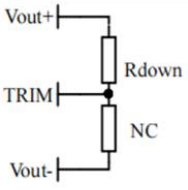
The calculation of △U and Rup & Rdown:

Rup=140/△U-5.1（KΩ）

Rdown=56*(48-2.5-△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 used 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 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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