


**DESCRIPTION: 20W Wide Input Voltage DC/DC Converters**

The rated output power of TP20DD converters is 20W, the outline dimensions is "50.8\*40.6\*11.2", 2:1 and 4:1 wide input voltage range, the voltage range is 9V-18V, 18V-36V, 36V-72V, 9V-36V and 18V-72VDC. The accuracy of the converter can reach  $\pm 1\%$ , it can be widely used in telecommunications, railway transportation, instrument and etc.

**FEATURES**

|                                         |                                    |                                       |
|-----------------------------------------|------------------------------------|---------------------------------------|
| 20W output power                        | 2:1 and 4:1 input voltage range    | Input under voltage protection        |
| 50.8mm *40.6mm *11.2mm standard package | Metal shielding package            | Over output voltage protection        |
| Fixed switching frequency               | Long term short-circuit protection | Super capability with capacitive load |
| RoHs compliance                         | Operating temperature:-40℃ to 85℃  | /                                     |

**SELECTION GUIDE**

| Part Number  | Input Voltage |              | Output        |             | Efficiency(Typ)<br>% |
|--------------|---------------|--------------|---------------|-------------|----------------------|
|              | voltage (VDC) |              | Voltage (VDC) | Current (A) |                      |
|              | Rated         | Range values |               |             |                      |
| TP20DD12S03  | 12(2:1)       | 9-18         | 3.3           | 5.4         | 80                   |
| TP20DD12S05  | 12(2:1)       | 9-18         | 5             | 4           | 82                   |
| TP20DD12S12  | 12(2:1)       | 9-18         | 12            | 1.67        | 83                   |
| TP20DD12S15  | 12(2:1)       | 9-18         | 15            | 1.33        | 84                   |
| TP20DD12S24  | 12(2:1)       | 9-18         | 24            | 0.83        | 84                   |
| TP20DD12D05  | 12(2:1)       | 9-18         | ±5            | ±2          | 80                   |
| TP20DD12D12  | 12(2:1)       | 9-18         | ±12           | ±0.83       | 83                   |
| TP20DD12D15  | 12(2:1)       | 9-18         | ±15           | ±0.67       | 84                   |
| TP20DD24S03  | 24(2:1)       | 18-36        | 3.3           | 5.4         | 80                   |
| TP20DD24S05  | 24(2:1)       | 18-36        | 5             | 4           | 83                   |
| TP20DD24S12  | 24(2:1)       | 18-36        | 12            | 1.67        | 85                   |
| TP20DD24S15  | 24(2:1)       | 18-36        | 15            | 1.33        | 85                   |
| TP20DD24S19  | 24(2:1)       | 18-36        | 19            | 1.05        | 83                   |
| TP20DD24S24  | 24(2:1)       | 18-36        | 24            | 0.83        | 86                   |
| TP20DD24D05  | 24(2:1)       | 18-36        | ±5            | ±2          | 83                   |
| TP20DD24D12  | 24(2:1)       | 18-36        | ±12           | ±0.83       | 85                   |
| TP20DD24D15  | 24(2:1)       | 18-36        | ±15           | ±0.67       | 86                   |
| TP20DD48S03  | 48(2:1)       | 36-72        | 3.3           | 5.4         | 82                   |
| TP20DD48S05  | 48(2:1)       | 36-72        | 5             | 4           | 84                   |
| TP20DD48S12  | 48(2:1)       | 36-72        | 12            | 1.67        | 86                   |
| TP20DD48S15  | 48(2:1)       | 36-72        | 15            | 1.33        | 87                   |
| TP20DD48S24  | 48(2:1)       | 36-72        | 24            | 0.83        | 87                   |
| TP20DD48D05  | 48(2:1)       | 36-72        | ±5            | ±2          | 84                   |
| TP20DD48D12  | 48(2:1)       | 36-72        | ±12           | ±0.83       | 86                   |
| TP20DD48D15  | 48(2:1)       | 36-72        | ±15           | ±0.67       | 86                   |
| TP20DD24S05W | 24(4:1)       | 9-36         | 5             | 4           | 82                   |
| TP20DD24S12W | 24(4:1)       | 9-36         | 12            | 1.67        | 86                   |
| TP20DD24S15W | 24(4:1)       | 9-36         | 15            | 1.33        | 86                   |
| TP20DD24S24W | 24(4:1)       | 9-36         | 24            | 0.83        | 86                   |
| TP20DD24D05W | 24(4:1)       | 9-36         | ±5            | ±2          | 82                   |
| TP20DD24D12W | 24(4:1)       | 9-36         | ±12           | ±0.83       | 85                   |
| TP20DD24D15W | 24(4:1)       | 9-36         | ±15           | ±0.67       | 85                   |
| TP20DD48S05W | 48(4:1)       | 18-72        | 5             | 4           | 82                   |
| TP20DD48S12W | 48(4:1)       | 18-72        | 12            | 1.67        | 86                   |
| TP20DD48S15W | 48(4:1)       | 18-72        | 15            | 1.33        | 86                   |
| TP20DD48S24W | 48(4:1)       | 18-72        | 24            | 0.83        | 86                   |
| TP20DD48D05W | 48(4:1)       | 18-72        | ±5            | ±2          | 82                   |
| TP20DD48D12W | 48(4:1)       | 18-72        | ±12           | ±0.83       | 85                   |
| TP20DD48D15W | 48(4:1)       | 18-72        | ±15           | ±0.67       | 85                   |

All specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified.

**GENERAL CHARACTERISTICS**

| parameter                    | Test conditions     | Min                      | Typ               | Max  | Units |
|------------------------------|---------------------|--------------------------|-------------------|------|-------|
| Isolation voltage            | Input to output     |                          | 500               | 1500 | VDC   |
| Insulation resistance        | Input to output     | 100M                     |                   |      | Ohm   |
| Seismic                      | 10~55Hz             |                          | 5                 |      | G     |
| MTBF                         | MIL-HDBK-217F2      |                          | 5*10 <sup>5</sup> |      | hrs   |
| Over-current protection mode | All input range     | Burp, Automatic recovery |                   |      |       |
| Cooling                      | Free air convection |                          |                   |      |       |
| Case material                | Metal case          |                          |                   |      |       |

**INPUT CHARACTERISTICS**

| parameter                      | Test conditions                          | Min      | Typ | Max | Units |
|--------------------------------|------------------------------------------|----------|-----|-----|-------|
| Startup voltage                | The12V input module(9V-18V)              | 9.2      | 9.5 | 9.8 | VDC   |
| Startup voltage                | The24V input module(18V-36V)             |          |     | 18  | VDC   |
| Startup voltage                | The48Vinput module(36V-72V)              |          |     | 36  | VDC   |
| Startup voltage                | The24V input module(9V-36V)              | 8.8      | 9   | 9.3 | VDC   |
| Startup voltage                | The48Vinput module(18V-72V)              |          |     | 18  | VDC   |
| Input under voltage protection | The12V input module(9V-18V)              |          |     | 8.5 | VDC   |
| Input under voltage protection | The24V input module(18V-36V)             |          |     | 17  | VDC   |
| Input under voltage protection | The48Vinput module(36V-72vV)             |          |     | 35  | VDC   |
| Startup time                   | Output rise time from 5% to 100%         | 20       |     |     | ms    |
| Remote control CTL             | Remote CTL-Vin                           | Turn off |     |     |       |
| Remote control CTL             | Remote CTL NC(The control level 12V-40V) | Turn on  |     |     |       |

**OUTPUT CHARACTERISTICS**

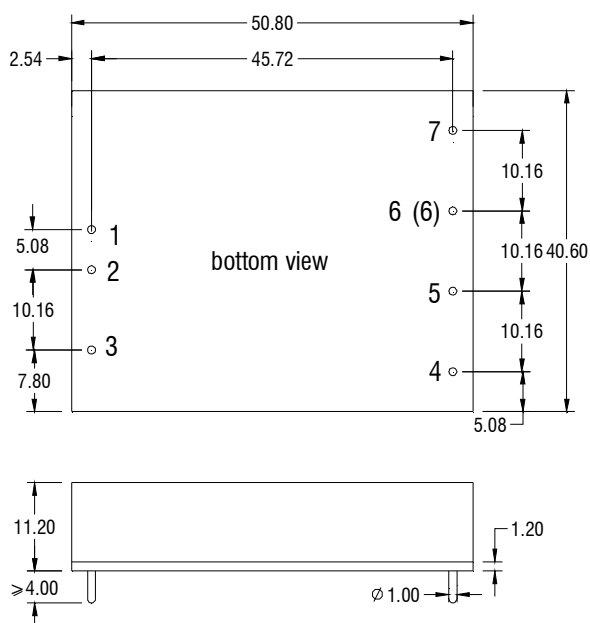
| parameter                   | Test conditions                                                                                                              | Min | Typ | Max       | Units |
|-----------------------------|------------------------------------------------------------------------------------------------------------------------------|-----|-----|-----------|-------|
| Voltage accuracy            | $I_o=0.1 \dots 1.0 \times I_{onom}$ $V_i=V_i$ rated                                                                          |     |     | $\pm 1$   | %     |
| Line regulation             | $V_{imin} \leq V_i \leq V_{imax}$                                                                                            |     |     | $\pm 0.2$ | %     |
| Load regulation             | $I_o=0.1 \dots 1.0 \times I_{onom}$<br>$V_{imin} \leq V_i \leq V_{imax}$                                                     |     |     | $\pm 0.5$ | %     |
| Auxiliary voltage accuracy  | Main Load and auxiliary load differ 25%,the auxiliary circuit of the load with at least 25%, the main circuit with full load |     |     | $\pm 3$   | %     |
| Ripple and noise            | 20MHz bandwidth                                                                                                              |     |     | $\pm 1$   | %     |
| Over current protection     | $V_{imin} \leq V_i \leq V_{imax}$                                                                                            | 120 |     |           | %     |
| output voltage change range | $V_{imin} \leq V_i \leq V_{imax}$                                                                                            |     |     | 10        | %     |
| Transient recovery time     | 25% load changes                                                                                                             |     |     | $\pm 5$   | %     |
| Transient overshoot time    | 25% load changes                                                                                                             |     |     | 400       | us    |
| Switch frequency            | $V_{imin} \leq V_i \leq V_{imax}$                                                                                            |     | 300 |           | KHz   |

**ENVIRONMENT CHARACTERISTICS**

| parameter                | Test conditions                       | Min | Typ        | Max  | Units |
|--------------------------|---------------------------------------|-----|------------|------|-------|
| Environment temperature  | industrial-class                      | -40 |            | +85  | ℃     |
| Maximum case temperature | industrial-class                      |     |            | +85  | ℃     |
| Storage temperature      | Industry-class/ Military J1&J11 class | -55 |            | +125 | ℃     |
| Relative humidity        | No condensation                       | 5   |            | 90   | RH(%) |
| Temperature coefficient  |                                       |     | $\pm 0.02$ |      | %/℃   |

- Module in every environment temperature rating, case temperature under shall not exceed the maximum case temperature level.

**MECHANICAL DIMENSIONS**

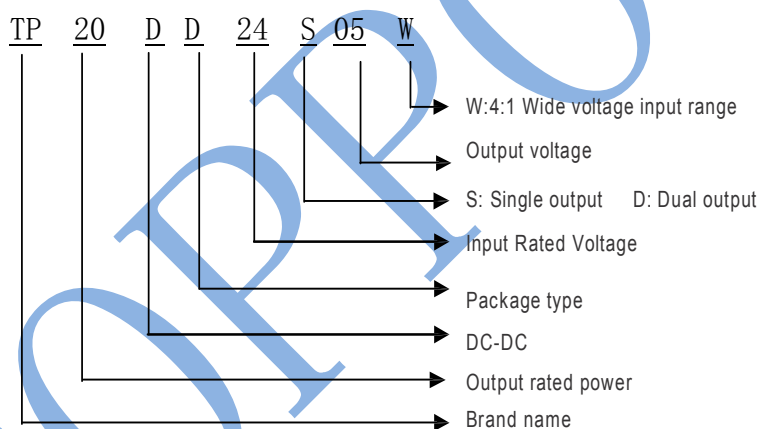


Units: mm

Tolerance:  $\pm 0.2$ mm

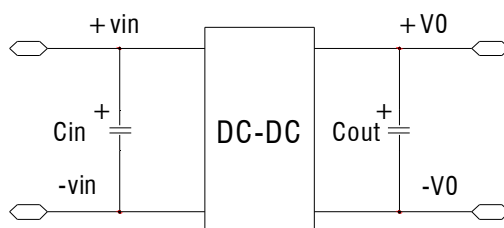
| PIN CONNECTION |               |             |
|----------------|---------------|-------------|
| Pin            | Single output | Dual output |
| 1              | +Vin          | +Vin        |
| 2              | -Vin          | -Vin        |
| 3              | CTL           | CTL         |
| 4              | TRM           | TRM         |
| 5              | -Vout         | -Vout       |
| 6              | +Vout         | /           |
| (6)            | /             | COM         |
| 7              | /             | +Vout       |

**MODEL SELECTION**



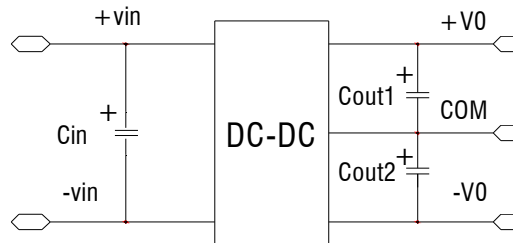
**RECOMMEND CIRCUIT**

Single Output:



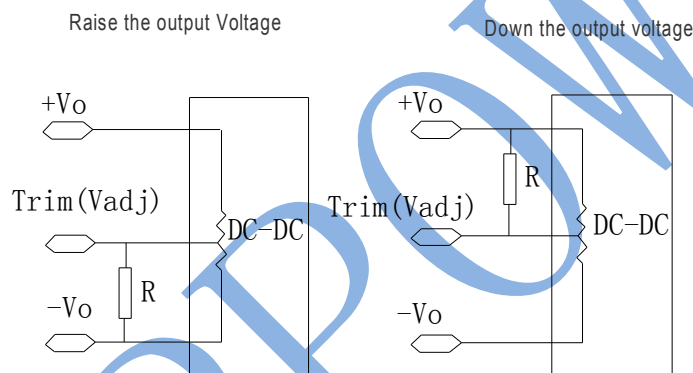
## RECOMMEND CIRCUIT

Dual Output :



- Add input capacitance  $C_{in}$  is helpful to improve the electromagnetic compatibility, recommend  $C_{in}$  use 47  $\mu F$ -100 $\mu F$  of the electrolytic capacitors.
- If the module connect to the digital circuits, please add the  $C_{out}$ ,  $C_{out1}$ ,  $C_{out2}$ .
- If  $C_{out}$ ,  $C_{out1}$ ,  $C_{out2}$  value is too high or lower ESR, it will cause the module instable,
- The recommended value of  $C_{out}$ ,  $C_{out1}$ ,  $C_{out2}$  should be 100  $\mu F/A$ , the current here means the output current.

## Trim application & Trim Resistance



- In dual and triple output modules, this application can just used in the main load(auxiliary load change together with the main load)

## USING ATTENTIONS

- Module will cause irreversible damage when in the state of the input reverse polarity.
- Module will cause irreversible damage when in the long-term overload conditions.
- Module will cause irreversible damage when out of the maximum input voltage range.

TEMPERATURE RATING: 0~50℃