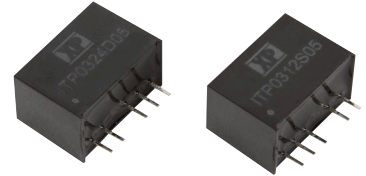


The ITP03 series is housed in a SIP6 plastic case. Featuring a 4:1 input voltage range of 4.5 to 18VDC, 9 to 36VDC or 18 to 75VDC with both single and dual outputs, singles have 3.3, 5, 12 or 15VDC with duals having  $\pm 5$ ,  $\pm 12$  &  $\pm 15$ VDC.

The 3W ITP03 provides 1.5kVDC isolation between input and output, the output has short circuit protection, remote On/Off is standard on the single output model only. The operating temperature range is from -40°C to +75°C, with derating above +70°C.



### Features

- ▶ Regulated single & dual outputs
- ▶ 4:1 input range
- ▶ Input ranges 4.5 to 18, 9 to 36, 18 to 75VDC
- ▶ Single outputs 3.3 to 15VDC
- ▶ Dual outputs  $\pm 3.3$  to  $\pm 15$ VDC
- ▶ SIP6 package
- ▶ 1.6kVDC isolation
- ▶ Complies with EN55032 (with minimal external components)
- ▶ Short-circuit protection
- ▶ Remote On/Off (single output versions only)
- ▶ -40°C to +75°C operating temperature
- ▶ Full power to +70°C
- ▶ 3 year warranty

### Applications



### Dimensions

17.0 x 10.1 x 11.7mm (0.67" x 0.40" x 0.46")

### Models & ratings

| Model number | Input voltage | Output voltage | Output current (full load) | Efficiency | Input current <sup>(1)</sup> |           | Maximum capacitive load <sup>(2)</sup> |
|--------------|---------------|----------------|----------------------------|------------|------------------------------|-----------|--|
|              |               |                |                            |            | No load                      | Full load |  |
| ITP0312S3V3  | 4.5-18VDC     | 3.3VDC         | 700mA                      | 75%        | 45mA                         | 257mA     | 3300 $\mu$ F                           |
| ITP0312S05   |               | 5.0VDC         | 600mA                      | 81%        | 45mA                         | 309mA     | 1680 $\mu$ F                           |
| ITP0312S12   |               | 12.0VDC        | 250mA                      | 83%        | 50mA                         | 301mA     | 820 $\mu$ F                            |
| ITP0312S15   |               | 15.0VDC        | 200mA                      | 83%        | 55mA                         | 301mA     | 680 $\mu$ F                            |
| ITP0312D05   |               | $\pm 5.0$ VDC  | $\pm 300$ mA               | 80%        | 40mA                         | 313mA     | $\pm 1000$ $\mu$ F                     |
| ITP0312D12   |               | $\pm 12.0$ VDC | $\pm 125$ mA               | 82%        | 50mA                         | 305mA     | $\pm 470$ $\mu$ F                      |
| ITP0312D15   |               | $\pm 15.0$ VDC | $\pm 100$ mA               | 83%        | 60mA                         | 301mA     | $\pm 330$ $\mu$ F                      |

Continued on page 2

#### Notes:

1. Input currents measured at nominal input voltage.

2. Maximum capacitive load is per output.

## Models & ratings

| Model number | Input voltage | Output voltage | Output current (full load) | Efficiency | Input current <sup>(1)</sup> |           | Maximum capacitive load <sup>(2)</sup> |
|--------------|---------------|----------------|----------------------------|------------|------------------------------|-----------|--|
|              |               |                |                            |            | No load                      | Full load |  |
| ITP0324S3V3  | 9-36VDC       | 3.3VDC         | 700mA                      | 76%        | 25mA                         | 127mA     | 3300μF                                 |
| ITP0324S05   |               | 5.0VDC         | 600mA                      | 82%        | 25mA                         | 152mA     | 1680μF                                 |
| ITP0324S12   |               | 12.0VDC        | 250mA                      | 84%        | 35mA                         | 149mA     | 820μF                                  |
| ITP0324S15   |               | 15.0VDC        | 200mA                      | 84%        | 35mA                         | 149mA     | 680μF                                  |
| ITP0324D05   |               | ±5.0VDC        | ±300mA                     | 81%        | 30mA                         | 154mA     | ±1000μF                                |
| ITP0324D12   |               | ±12.0VDC       | ±125mA                     | 83%        | 35mA                         | 151mA     | ±470μF                                 |
| ITP0324D15   |               | ±15.0VDC       | ±100mA                     | 84%        | 40mA                         | 149mA     | ±330μF                                 |
| ITP0348S3V3  | 18-75VDC      | 3.3VDC         | 700mA                      | 74%        | 15mA                         | 65mA      | 3300μF                                 |
| ITP0348S05   |               | 5.0VDC         | 600mA                      | 81%        | 15mA                         | 77mA      | 1680μF                                 |
| ITP0348S12   |               | 12.0VDC        | 250mA                      | 81%        | 15mA                         | 77mA      | 820μF                                  |
| ITP0348S15   |               | 15.0VDC        | 200mA                      | 82%        | 20mA                         | 76mA      | 680μF                                  |
| ITP0348D05   |               | ±5.0VDC        | ±300mA                     | 79%        | 15mA                         | 79mA      | ±1000μF                                |
| ITP0348D12   |               | ±12.0VDC       | ±125mA                     | 80%        | 20mA                         | 78mA      | ±470μF                                 |
| ITP0348D15   |               | ±15.0VDC       | ±100mA                     | 80%        | 30mA                         | 78mA      | ±330μF                                 |

### Notes:

1. Input currents measured at nominal input voltage.

2. Maximum capacitive load is per output.

## Input

| Characteristic             | Minimum   | Typical | Maximum | Units         | Notes & conditions                       |
|----------------------------|-----------|---------|---------|---------------|--|
| Input voltage range        | 4.5       | 12      | 18      | VDC           | ITP0312 series                           |
|                            | 9         | 24      | 36      |               | ITP0324 series                           |
|                            | 18        | 48      | 75      |               | ITP0348 series                           |
| Input filter               | Capacitor |         |         |               |  |
| Input reflected ripple     |           |         | 20      | mA pk-pk      | Through 27μH inductor and 47μF capacitor |
| Input surge                |           |         | 25      | VDC for 100ms | 12V models, ITP0312 series               |
|                            |           |         | 50      |               | 24V models, ITP0324 series               |
|                            |           |         | 100     |               | 48V models, ITP0348 series               |
| Inhibit mode Input Current |           | 2.5     |         | mA            | Vin nominal when inhibited               |

## Output

| Characteristic               | Minimum  | Typical | Maximum | Units       | Notes & conditions   |
|------------------------------|--|---------|---------|-------------|--|
| Output voltage               | 3.3  |         | 30      | VDC         | See models and ratings table   |
| Initial set accuracy         |  |         | ±1      | %           |  |
| Minimum load                 | 0  |         |         | A           | No minimum load required   |
| Line regulation              |  |         | ±0.2    | %           |  |
| Load regulation              |  |         | ±1      | %           | From 0 to 100% load  |
| Cross regulation             |  |         | ±5      | %           | On dual output models when one load is varied between 25% and 100% and other is fixed at 100%          |
| Transient response deviation |  |         | ±5      | % deviation | Recovery time 500μs, 25% load step change  |
| Ripple & noise               |  |         | 150     | mV pk-pk    | Single Output. 20MHz bandwidth. Measured using 0.1μF ceramic capacitor and 10μF electrolytic capacitor |
|                              |  |         | 100     |             | Dual Output. 20MHz bandwidth. Measured using 0.1μF ceramic capacitor and 10μF electrolytic capacitor   |
| Over current protection      |  | 150     |         | %           | Overcurrent threshold  |
| Short circuit protection     | Continuous, with auto recovery   |         |         |             |  |
| Maximum capacitive load      | See models and ratings table   |         |         |             |  |
| Temperature coefficient      |  |         | 0.02    | %/°C        |  |
| Remote on/off                | Output is on if Remote On/Off (pin 3) is open<br>Output turns off if 2-4mA is applied to Remote On/Off (pin 3). Via 1kΩ resistor. Applies to single output models. |         |         |             |  |

## General

| Characteristic             | Minimum  | Typical      | Maximum   | Units                                  | Notes & conditions           |
|----------------------------|--|--------------|-----------|--|------------------------------|
| Efficiency                 | 74   |              | 84        | %                                      | See models and ratings table |
| Isolation: input to output |  | 1600         |           | VDC                                    | Functional                   |
| Switching frequency        |  | 100          |           | kHz                                    |                              |
| Isolation resistance       | 10 <sup>9</sup>  |              |           | Ω                                      |                              |
| Isolation capacitance      |  |              | 40        | pF                                     |                              |
| Power density              |  |              | 1.46 (24) | W/cm <sup>3</sup> (W/in <sup>3</sup> ) |                              |
| Mean time between failure  | 0.95   |              |           | Mhrs                                   | MIL-HDBK-217F, +25°C GB      |
| Case material              | Non conductive black plastic                               |              |           |  |                              |
| Potting material           | Epoxy (UL94V-0 rated)                                      |              |           |  |                              |
| Pin material               | C5191R-H Solder-coated                                     |              |           |  |                              |
| Solder process             | 260°C max. 1.5mm from case 10s max. See application notes. |              |           |  |                              |
| Water washing              | Wash with de-ionised water and dry thoroughly              |              |           |  |                              |
| Weight                     |  | 3.85 (0.008) |           | g (lb)                                 |                              |

## Environmental

| Characteristic        | Minimum            | Typical | Maximum | Units | Notes & conditions                                 |
|-----------------------|--------------------|---------|---------|-------|--|
| Operating temperature | -40                |         | 75      | °C    | Derate from 100% load at +70°C to no load at +75°C |
| Storage temperature   | -55                |         | +125    | °C    |  |
| Case temperature      |                    |         | +100    | °C    |  |
| Cooling               | Natural convection |         |         |       |  |
| Operating humidity    |                    |         | 95      | %     | RH, non condensing                                 |

## Safety approvals

| Certification | Standard                         | Notes & conditions |
|---------------|----------------------------------|--------------------|
| UL            | UL62368-1                        |                    |
| CE            | Meets all applicable directives  |                    |
| UKCA          | Meets all applicable legislation |                    |

## Emissions - EMC

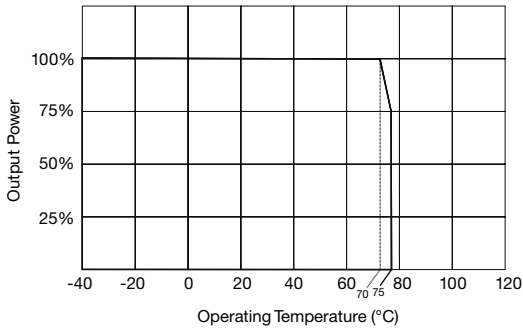
| Phenomenon | Standard | Test level | Notes & conditions                                   |
|------------|----------|------------|--|
| Conducted  | EN55032  | Class A    | External components required. See application notes. |
| Radiated   | EN55032  | Class A    |  |

## Immunity - EMC

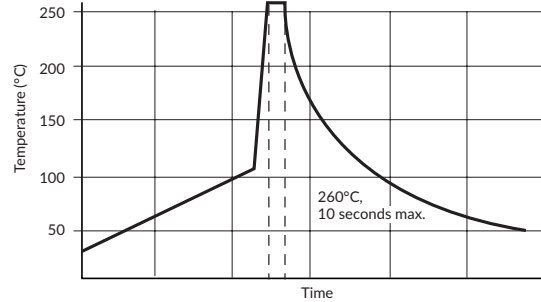
| Phenomenon         | Standard    | Test level | Criteria | Notes & conditions                           |
|--------------------|-------------|------------|----------|--|
| ESD Immunity       | EN61000-4-2 | ±8kV       | A        | Air discharge                                |
| Radiated Immunity  | EN61000-4-3 | 10Vrms     | A        |  |
| EFT/Burst          | EN61000-4-4 | ±2kV       | A        | External input capacitor required 220µF/100V |
| Surges             | EN61000-4-5 | ±2kV       | A        | External input capacitor required 220µF/100V |
| Conducted Immunity | EN61000-4-6 | 10Vrms     | A        |  |
| Magnetic Fields    | EN61000-4-8 | 100A/m     | A        |  |

## Application notes

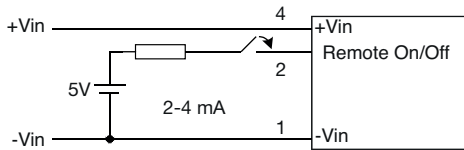
### Derating curve



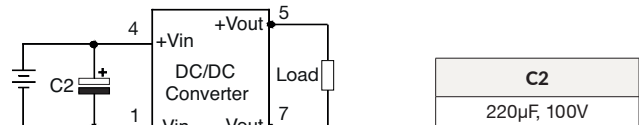
### Solder profile



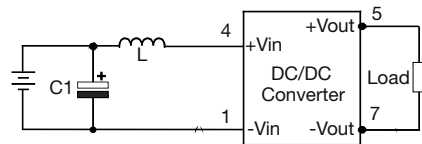
### Remote on/off



### EFT & surge



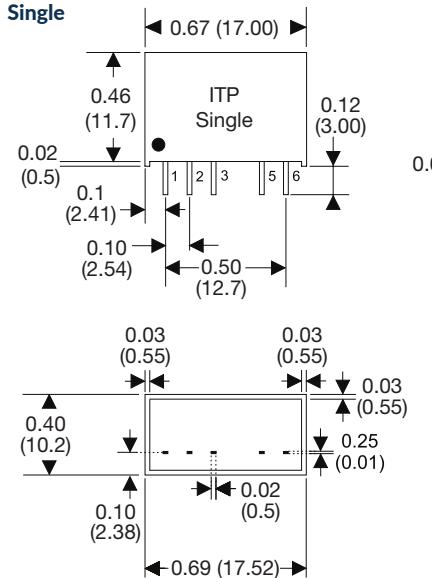
### EMI Filter



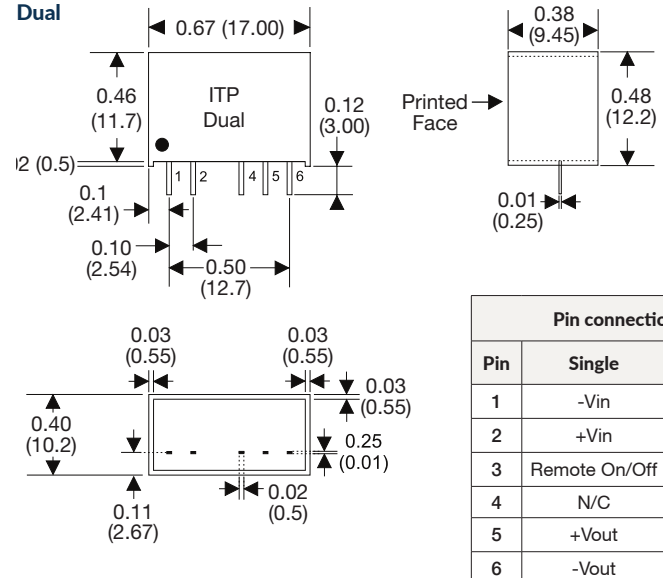
| Model   | C1                 | L      | C3                |
|---------|--------------------|--------|-------------------|
| ITP0312 | 1210, 10 µF, 35 V  | 2.2 µH | 1206, 100 PF, 1kV |
| ITP0324 | 1210, 2.2 µF, 35 V | 10 µH  | 1206, 100 PF, 1kV |
| ITP0348 | 1210, 4.7 µF, 35 V | 18 µH  | 1206, 100 PF, 1kV |

## Mechanical details

### Single



### Dual



| Pin connections |               |        |
|-----------------|---------------|--------|
| Pin             | Single        | Dual   |
| 1               | -Vin          | -Vin   |
| 2               | +Vin          | +Vin   |
| 3               | Remote On/Off | N/C    |
| 4               | N/C           | +Vout  |
| 5               | +Vout         | Common |
| 6               | -Vout         | -Vout  |

### Notes:

- All dimensions are in mm (inches)
- Weight: 3.85 (0.008) g (lb) approx.
- Pin pitch tolerance:  $\pm 0.35$  ( $\pm 0.014$ )
- Pin diameter:  $0.5 \pm 0.05$  ( $0.02 \pm 0.002$ )
- Case tolerance:  $\pm 0.5$  ( $\pm 0.02$ )

Specifications subject to change without notice.