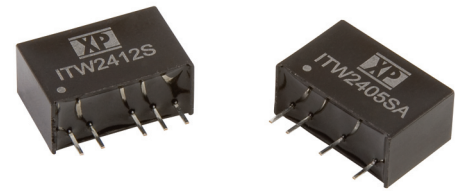


## 1 Watt

- 2:1 Input Range
- Operating Temperature -40 °C to +105 °C
- ITE safety approval
- Single & Dual Outputs
- 1500 VDC Isolation
- Fully Regulated Output
- No Minimum Load Required
- 3 Year Warranty



### Dimensions:

ITW:

0.67 x 0.43 x 0.30" (17.0 x 11.0 x 7.6 mm)

### Models & Ratings

| Input Voltage | Output Voltage | Output Current | Input Current <sup>(1)</sup> |           | Maximum Capacitive Load | Efficiency | Model Number |
|---------------|----------------|----------------|------------------------------|-----------|-------------------------|------------|--------------|
|               |                |                | No Load                      | Full Load |                         |            |              |
| 4.5-9 V       | 5.0 V          | 200 mA         | 35 mA                        | 263 mA    | 1680 µF                 | 76%        | ITW0505SA    |
|               | 12.0 V         | 83 mA          | 35 mA                        | 259 mA    | 820 µF                  | 79%        | ITW0512SA    |
|               | 15.0 V         | 67 mA          | 35 mA                        | 254 mA    | 680 µF                  | 80%        | ITW0515SA    |
|               | 24.0 V         | 42 mA          | 35 mA                        | 265 mA    | 470 µF                  | 80%        | ITW0524SA    |
|               | ±12.0 V        | ±42 mA         | 35 mA                        | 259 mA    | ±470 µF                 | 77%        | ITW0512S     |
|               | ±15.0 V        | ±33 mA         | 35 mA                        | 254 mA    | ±330 µF                 | 79%        | ITW0515S     |
| 9-18 V        | 5.0 V          | 200 mA         | 20 mA                        | 108 mA    | 1680 µF                 | 78%        | ITW1205SA    |
|               | 12.0 V         | 83 mA          | 20 mA                        | 108 mA    | 820 µF                  | 80%        | ITW1212SA    |
|               | 15.0 V         | 67 mA          | 20 mA                        | 105 mA    | 680 µF                  | 81%        | ITW1215SA    |
|               | 24.0 V         | 42 mA          | 20 mA                        | 109 mA    | 470 µF                  | 80%        | ITW1224SA    |
|               | ±12.0 V        | ±42 mA         | 20 mA                        | 108 mA    | ±470 µF                 | 79%        | ITW1212S     |
|               | ±15.0 V        | ±33 mA         | 20 mA                        | 105 mA    | ±330 µF                 | 80%        | ITW1215S     |
| 18-36 V       | 5.0 V          | 200 mA         | 10 mA                        | 54 mA     | 1680 µF                 | 78%        | ITW2405SA    |
|               | 12.0 V         | 83 mA          | 10 mA                        | 52 mA     | 820 µF                  | 80%        | ITW2412SA    |
|               | 15.0 V         | 67 mA          | 10 mA                        | 52 mA     | 680 µF                  | 80%        | ITW2415SA    |
|               | 24.0 V         | 42 mA          | 10 mA                        | 55 mA     | 470 µF                  | 81%        | ITW2424SA    |
|               | ±12.0 V        | ±42 mA         | 10 mA                        | 52 mA     | ±470 µF                 | 80%        | ITW2412S     |
|               | ±15.0 V        | ±33 mA         | 10 mA                        | 52 mA     | ±330 µF                 | 79%        | ITW2415S     |
| 36-75 V       | 5.0 V          | 200 mA         | 7 mA                         | 27 mA     | 1680 µF                 | 76%        | ITW4805SA    |
|               | 12.0 V         | 83 mA          | 7 mA                         | 27 mA     | 820 µF                  | 78%        | ITW4812SA    |
|               | 15.0 V         | 67 mA          | 7 mA                         | 27 mA     | 680 µF                  | 78%        | ITW4815SA    |
|               | 24.0 V         | 42 mA          | 7 mA                         | 28 mA     | 470 µF                  | 77%        | ITW4824SA    |
|               | ±12.0 V        | ±42 mA         | 7 mA                         | 27 mA     | ±470 µF                 | 77%        | ITW4812S     |
|               | ±15.0 V        | ±33 mA         | 7 mA                         | 27 mA     | ±330 µF                 | 77%        | ITW4815S     |

### Notes

1. Input currents measured at nominal input voltage.

## Input

| Characteristic         | Minimum   | Typical | Maximum | Units           | Notes & Conditions                                   |
|------------------------|-----------|---------|---------|-----------------|------------------------------------------------------|
| Input Voltage Range    | 4.5       |         | 9       | VDC             | 5 V nominal                                          |
|                        | 9         |         | 18      | VDC             | 12 V nominal                                         |
|                        | 18        |         | 36      | VDC             | 24 V nominal                                         |
|                        | 36        |         | 75      | VDC             | 48 V nominal                                         |
| Input Filter           | Capacitor |         |         |                 |                                                      |
| Input Reflected Ripple |           |         | 35      | mA pk-pk        | Through 12 $\mu$ H inductor and 47 $\mu$ F capacitor |
| Input Surge            |           |         | 15      | VDC for 1000 ms | 5 V models                                           |
|                        |           |         | 25      | VDC for 1000 ms | 12 V models                                          |
|                        |           |         | 50      | VDC for 1000 ms | 24 V models                                          |
|                        |           |         | 100     | VDC for 1000 ms | 48 V models                                          |

## Output

| Characteristic           | Minimum | Typical | Maximum             | Units           | Notes & Conditions                                                                            |
|--------------------------|---------|---------|---------------------|-----------------|-----------------------------------------------------------------------------------------------|
| Output Voltage           |         |         |                     |                 | See Models and Ratings table                                                                  |
| Initial Set Accuracy     |         |         | $\pm 2$             | %               |                                                                                               |
| Minimum Load             | 0       |         |                     | A               | No minimum load required                                                                      |
| Line Regulation          |         |         | $\pm 0.2$           | %               |                                                                                               |
| Load Regulation          |         |         | $\pm 1$             | %               | Single output                                                                                 |
|                          |         |         | $\pm 1$ ( $\pm 2$ ) | %               | Dual output 5%-100% (0%-100%)                                                                 |
| Cross Regulation         |         |         | $\pm 5$             | %               | On dual output models when one load is varied between 25% and 100% and other is fixed at 100% |
| Transient Response       |         |         | 3                   | % deviation     | Recovery within 2% in less than 2 ms for a 25% load change                                    |
| Ripple & Noise           |         |         | 50                  | mV pk-pk        | 20 MHz bandwidth. Measured using 1 $\mu$ F ceramic capacitor                                  |
| Short Circuit Protection |         |         |                     |                 | Continuous, with auto recovery                                                                |
| Maximum Capacitive Load  |         |         |                     |                 | See Models and Ratings table                                                                  |
| Temperature Coefficient  |         |         | 0.02                | %/ $^{\circ}$ C |                                                                                               |

## General

| Characteristic             | Minimum | Typical      | Maximum | Units            | Notes & Conditions                 |
|----------------------------|---------|--------------|---------|------------------|------------------------------------|
| Efficiency                 |         |              |         |                  | See Models and Ratings table       |
| Isolation: Input to Output |         |              | 1500    | VDC              |                                    |
| Switching Frequency        | 150     |              | 550     | kHz              | Variable                           |
| Isolation Resistance       | $10^9$  |              |         | $\Omega$         |                                    |
| Isolation Capacitance      |         | 70           |         | pF               |                                    |
| Power Density              |         |              | 11.5    | Win <sup>3</sup> |                                    |
| Mean Time Between Failure  | 2.8     |              |         | MHrs             | MIL-HDBK-217F, +25 $^{\circ}$ C GB |
| Weight                     |         | 0.0067 (3.0) |         | lb (g)           |                                    |

## Environmental

| Characteristic        | Minimum | Typical | Maximum | Units        | Notes & Conditions                                                        |
|-----------------------|---------|---------|---------|--------------|---------------------------------------------------------------------------|
| Operating Temperature | -40     |         | +105    | $^{\circ}$ C | Derate from 100% load at +85 $^{\circ}$ C to no load at +105 $^{\circ}$ C |
| Storage Temperature   | -55     |         | +125    | $^{\circ}$ C |                                                                           |
| Case Temperature      |         |         | +105    | $^{\circ}$ C |                                                                           |
| Humidity              |         |         | 95      | %RH          | Non-condensing                                                            |
| Cooling               |         |         |         |              | Natural convection                                                        |

## EMC: Emissions

| Phenomenon | Standard | Test Level | Notes & Conditions   |
|------------|----------|------------|----------------------|
| Conducted  | EN55022  | Class A    | See Application Note |
| Radiated   | EN55022  | Class A    | See Application Note |

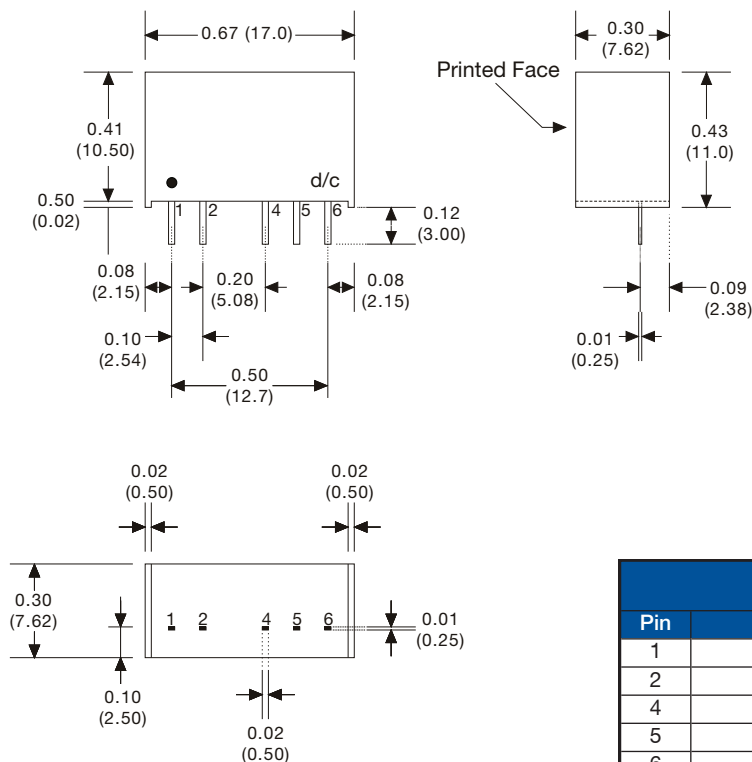
## EMC: Immunity

| Phenomenon         | Standard    | Test Level           | Criteria | Notes & Conditions                                  |
|--------------------|-------------|----------------------|----------|-----------------------------------------------------|
| ESD Immunity       | EN61000-4-2 | 3                    | A        |                                                     |
| Radiated Immunity  | EN61000-4-3 | 20 Vrms              | A        |                                                     |
| EFT/Burst          | EN61000-4-4 | 3                    | A        | External input capacitor required 330 $\mu$ F/100 V |
| Surges             | EN61000-4-5 | Installation class 2 | A        | External input capacitor required 330 $\mu$ F/100 V |
| Conducted Immunity | EN61000-4-6 | 3 V rms              | A        |                                                     |
| Magnetic Fields    | EN61000-4-8 | 1 A/m                | A        |                                                     |

## Safety Approvals

| Safety Agency | Safety Standard                  | Notes & Conditions     |
|---------------|----------------------------------|------------------------|
| UL            | UL60950-1, UL62368-1             | Information Technology |
| CE            | Meets all applicable directives  |                        |
| UKCA          | Meets all applicable legislation |                        |

## Mechanical Details



## Pin Connections

| Pin | Single | Dual   |
|-----|--------|--------|
| 1   | -Vin   | -Vin   |
| 2   | +Vin   | +Vin   |
| 4   | +Vout  | +Vout  |
| 5   | N.P.   | Common |
| 6   | -Vout  | -Vout  |

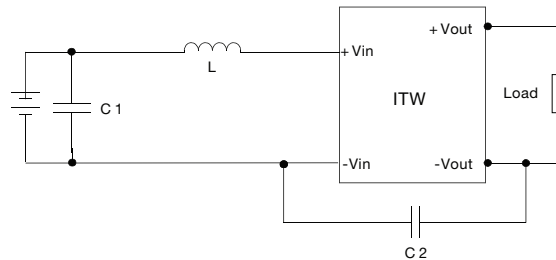
## Notes

- All dimensions are in inches (mm)
- Weight: 0.0067 lbs (3.0 g) approx.
- Pin diameter: 0.02 $\pm$ 0.002 (0.5 $\pm$ 0.05)
- Pin pitch tolerance:  $\pm$ 0.014 ( $\pm$ 0.35)
- Case tolerance:  $\pm$ 0.02 ( $\pm$ 0.5)

## Application Note

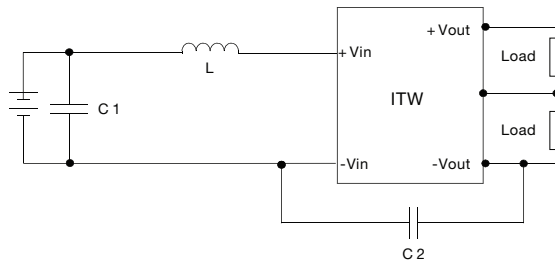
## EMI Filter

Input filter components (C1, C2, L) are used to help meet conducted emissions requirement for the module. These components should be mounted as close as possible to the module; and all leads should be minimized to decrease radiated noise.



|           | C1*              | C2*         | L           |
|-----------|------------------|-------------|-------------|
| ITWxx05SA | 4.7 $\mu$ F/50 V | 220 pF/3 kV | 4.7 $\mu$ H |
| ITWxx12SA | 4.7 $\mu$ F/50 V | 220 pF/3 kV | 4.7 $\mu$ H |
| ITWxx15SA | 4.7 $\mu$ F/50 V | 220 pF/3 kV | 18 $\mu$ H  |
| ITWxx24SA | 4.7 $\mu$ F/50 V | 220 pF/3 kV | 18 $\mu$ H  |

\* C1 & C2 are multilayer ceramic capacitors.



|          | C1*              | C2*         | L           |
|----------|------------------|-------------|-------------|
| ITWxx12S | 4.7 $\mu$ F/50 V | 220 pF/3 kV | 4.7 $\mu$ H |
| ITWxx15S | 4.7 $\mu$ F/50 V | 220 pF/3 kV | 4.7 $\mu$ H |

\* C1 & C2 are multilayer ceramic capacitors.