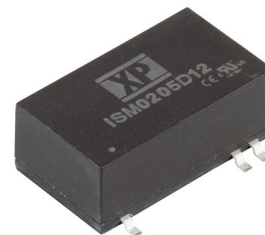


## 2 Watt

- International medical safety approvals
- Single & dual unregulated outputs
- Compact SMD package
- 4kV VAC reinforced isolation
- 1 x MOPP at 300 VAC
- 2  $\mu$ A patient leakage current
- Operating temperature -25 °C to +105 °C
- Full load to 60°C convection
- Tape & reel package available
- 3 year warranty

The ISM02 provides a compact cost effective SMD solution for healthcare applications providing 1 MOPP, 2 MOOP and IEC60601-1 compliance. Features include a high operating temperature, low leakage current, reinforced insulation and short circuit protection.



### Dimensions:

#### ISM02:

0.94 x 0.71 x 0.36" (24.0 x 18.1 x 9.3 mm)

## Models & Ratings

| Input voltage       | Output voltage | Output current |              | Input current <sup>(1)</sup> |           | Maximum capacitive load <sup>(2)</sup> | Efficiency <sup>(6)</sup> | Model number <sup>(3)</sup> |
|---------------------|----------------|----------------|--------------|------------------------------|-----------|----------------------------------------|---------------------------|-----------------------------|
|                     |                | Max            | Min          | No load                      | Full load |                                        |                           |                             |
| 5V<br>(4.5-5.5V)    | 5 V            | 400 mA         | 8.0 mA       | 90 mA                        | 605 mA    | 330 $\mu$ F                            | 72%                       | ISM0205S05                  |
|                     | 12 V           | 165 mA         | 3.0 mA       |                              | 600 mA    | 330 $\mu$ F                            | 72%                       | ISM0205S12                  |
|                     | 15 V           | 133 mA         | 2.5 mA       |                              | 605 mA    | 330 $\mu$ F                            | 72%                       | ISM0205S15                  |
|                     | $\pm 12$ V     | $\pm 83$ mA    | $\pm 1.5$ mA |                              | 555 mA    | $\pm 100$ $\mu$ F                      | 72%                       | ISM0205D12                  |
|                     | $\pm 15$ V     | $\pm 66$ mA    | $\pm 1.0$ mA |                              | 540 mA    | $\pm 100$ $\mu$ F                      | 73%                       | ISM0205D15                  |
| 12V<br>(10.8-13.2V) | 5 V            | 400 mA         | 8.0 mA       | 40 mA                        | 255 mA    | 330 $\mu$ F                            | 70%                       | ISM0212S05                  |
|                     | 12 V           | 165 mA         | 3.0 mA       |                              | 250 mA    | 330 $\mu$ F                            | 72%                       | ISM0212S12                  |
|                     | 15 V           | 133 mA         | 2.5 mA       |                              | 250 mA    | 330 $\mu$ F                            | 72%                       | ISM0212S15                  |
|                     | $\pm 12$ V     | $\pm 83$ mA    | $\pm 1.5$ mA |                              | 225 mA    | $\pm 100$ $\mu$ F                      | 74%                       | ISM0212D12                  |
|                     | $\pm 15$ V     | $\pm 66$ mA    | $\pm 1.0$ mA |                              | 220 mA    | $\pm 100$ $\mu$ F                      | 75%                       | ISM0212D15                  |
| 24V<br>(21.6-26.4V) | 5 V            | 400 mA         | 8.0 mA       | 30 mA                        | 125 mA    | 330 $\mu$ F                            | 68%                       | ISM0224S05                  |
|                     | 12 V           | 165 mA         | 3.0 mA       |                              | 125 mA    | 330 $\mu$ F                            | 68%                       | ISM0224S12                  |
|                     | 15 V           | 133 mA         | 2.5 mA       |                              | 125 mA    | 330 $\mu$ F                            | 68%                       | ISM0224S15                  |
|                     | $\pm 12$ V     | $\pm 83$ mA    | $\pm 1.5$ mA |                              | 110 mA    | $\pm 100$ $\mu$ F                      | 74%                       | ISM0224D12                  |
|                     | $\pm 15$ V     | $\pm 66$ mA    | $\pm 1.0$ mA |                              | 110 mA    | $\pm 100$ $\mu$ F                      | 75%                       | ISM0224D15                  |

## Notes

1. Input currents measured at nominal input voltage.
2. Maximum capacitive load is per output.
3. For optional water washable version add suffix '-P'.

4. Add suffix '-TR' for tape and reel. MOQ 200 pcs.
5. Standard tube quantity 10 pcs.
6. Measured at maximum load.

## Input

| Characteristic      | Minimum                 | Typical | Maximum | Units       | Notes & Conditions |
|---------------------|-------------------------|---------|---------|-------------|--------------------|
| Input Voltage Range | 4.5                     |         | 5.5     | VDC         | 5 V nominal        |
|                     | 10.8                    |         | 13.2    |             | 12 V nominal       |
|                     | 21.6                    |         | 26.4    |             | 24 V nominal       |
| Input Filter        | Internal Pi type filter |         |         |             |                    |
| Input Surge         |                         |         | 9       | VDC for 1 s | 5 V nominal        |
|                     |                         |         | 18      |             | 12 V models        |
|                     |                         |         | 30      |             | 24 V models        |

## Output

| Characteristic           | Minimum | Typical | Maximum | Units       | Notes & Conditions                                                                            |
|--------------------------|---------|---------|---------|-------------|-----------------------------------------------------------------------------------------------|
| Output Voltage           | 5       |         | 30      | VDC         | See Models and Ratings table                                                                  |
| Initial Set Accuracy     |         | ±2.0    | ±4.0    | %           |                                                                                               |
| Output Voltage Balance   |         | ±0.1    | ±1.0    | %           | For dual output with balanced loads                                                           |
| Minimum Load             |         |         |         | A           | See Models and Ratings table                                                                  |
| Line Regulation          |         | ±1.2    | ±1.5    | %           |                                                                                               |
| Load Regulation          |         |         | 10      | %           | From 20% to 100% load. 5V output version is 12% max                                           |
| Cross Regulation         |         |         | ±5.0    | %           | On dual output models when one load is varied between 25% and 100% and other is fixed at 100% |
| Transient Response       |         | 3       | 5       | % deviation | Recovery within 1% in less than 250 µs for a 25% load change.                                 |
| Ripple & Noise           |         |         | 150     | mV pk-pk    | 20 MHz bandwidth. Measured using 0.47 µF ceramic capacitor.                                   |
| Short Circuit Protection |         |         | 0.5     | s           | With auto recovery                                                                            |
| Maximum Capacitive Load  |         |         |         |             | See Models and Ratings table                                                                  |
| Temperature Coefficient  |         |         | 0.02    | %/°C        |                                                                                               |

## General

| Characteristic                  | Minimum                                                                      | Typical     | Maximum | Units             | Notes & Conditions                                       |
|---------------------------------|------------------------------------------------------------------------------|-------------|---------|-------------------|----------------------------------------------------------|
| Efficiency                      |                                                                              | 72          |         | %                 | See Models and Ratings table                             |
| Isolation: Input to Output      | 4000                                                                         |             |         | VAC               | 60 s, reinforced isolation at 300 VAC, 1 x MOPP/2 x MOOP |
|                                 | 6000                                                                         |             |         | VDC               | 1 s                                                      |
| Leakage Current                 |                                                                              |             | 2       | µA                | 240 VAC, 60 Hz                                           |
| Isolation Resistance            | 10 <sup>9</sup>                                                              |             |         | Ω                 | At 500 VDC                                               |
| Isolation Capacitance           |                                                                              | 15          | 20      | pF                |                                                          |
| Switching Frequency             | 50                                                                           | 80          | 100     | kHz               |                                                          |
| Power Density                   |                                                                              |             | 12.2    | W/in <sup>3</sup> |                                                          |
| Mean Time Between Failure       |                                                                              | 2           |         | MHrs              | MIL-HDBK-217F, +25 °C GB                                 |
| Lead-Free Reflow Solder Process | IPC/JEDEC J-STD-020D.1                                                       |             |         |                   |                                                          |
| Case Material                   | Non conductive black plastic. UL94V-0 rated. Not suitable for water washing. |             |         |                   |                                                          |
| Pin Material                    | Solder-coated phosphor bronze                                                |             |         |                   |                                                          |
| Weight                          |                                                                              | 0.01 (3.75) |         | lb (g)            |                                                          |
| Moisture Sensitivity Level      | Level 2                                                                      |             |         |                   | IPC/JEDEC J-STD-020D.1                                   |

## Environmental

| Characteristic        | Minimum | Typical | Maximum | Units | Notes & Conditions |
|-----------------------|---------|---------|---------|-------|--------------------|
| Operating Temperature | -40     |         | +105    | °C    | See derating curve |
| Storage Temperature   | -50     |         | +125    | °C    |                    |
| Case Temperature      |         |         | +105    | °C    |                    |
| Humidity              |         |         | 95      | %RH   | Non-condensing     |
| Cooling               |         |         |         |       | Natural convection |

## Safety Approvals

| Safety Agency | Safety Standard                  | Notes & Conditions |
|---------------|----------------------------------|--------------------|
| CB Medical    | IEC60601-1                       |                    |
| UL Medical    | ANSI AMMI ES60601-1              |                    |
| EN Medical    | EN60601-1                        |                    |
| UL ITE        | UL/cUL60950-1, UL/cUL62368-1     |                    |
| CE            | Meets all applicable directives  |                    |
| UKCA          | Meets all applicable legislation |                    |

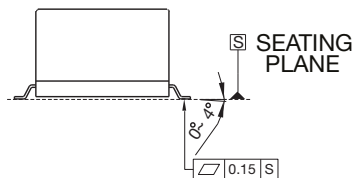
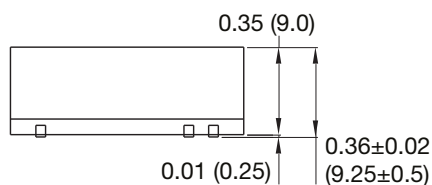
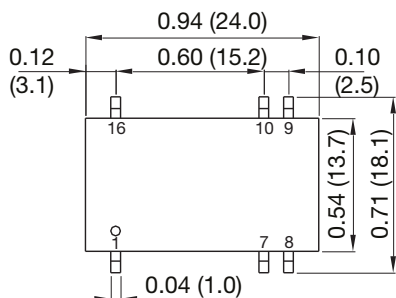
### EMC: Emissions

| Phenomenon | Standard | Test Level | Notes & Conditions    |
|------------|----------|------------|-----------------------|
| Conducted  | EN55011  | Class A    | See Application Notes |

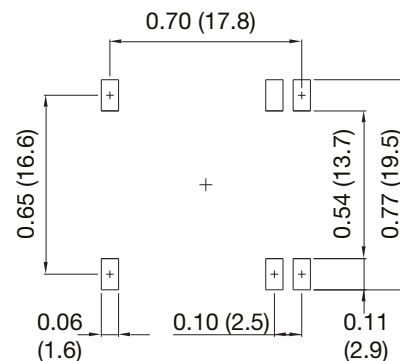
### EMC: Immunity

| Phenomenon      | Standard    | Test Level                          | Criteria | Notes & Conditions |
|-----------------|-------------|-------------------------------------|----------|--------------------|
| ESD             | EN61000-4-2 | ±15 kV air discharge, ±8 kV contact | A        |                    |
| Radiated        | EN61000-4-3 | 10 V/m                              | A        |                    |
| EFT/Burst       | EN61000-4-4 | ±2 kV                               | A        |                    |
| Surge           | EN61000-4-5 | ±1 kV                               | A        |                    |
| Conducted       | EN61000-4-6 | 6kV rms                             | A        |                    |
| Magnetic Fields | EN61000-4-8 | 30 A/m                              | A        |                    |

### Mechanical Details



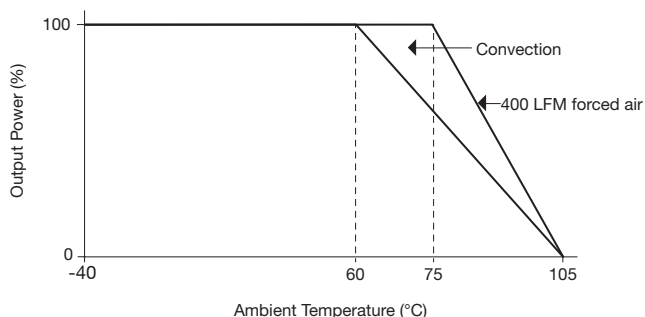
### Connecting Pin Pattern



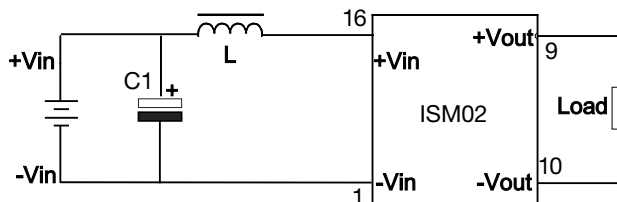
| Pin Connections |               |               |
|-----------------|---------------|---------------|
| Pin             | Single        | Dual          |
| 1               | -Vin          | -Vin          |
| 7               | No Connection | No Connection |
| 8               | No Connection | Common        |
| 9               | +Vout         | +Vout         |
| 10              | -Vout         | -Vout         |
| 16              | +Vin          | +Vin          |

### Application Notes

#### Derating Curve



#### EMC Circuit for Class A



| C1         | L    |
|------------|------|
| 2.2μF/150V | 88μH |

#### Notes

1. All dimensions are in inches (mm)
2. Weight: 0.01 lbs (3.75 g) approx.

3. Tolerance: X.XX±0.01 (X.X±0.25)  
X.XXX±0.005 (X.XX±0.13)
4. Pin Tolerance: ±0.002 (±0.05)

Specifications subject to change without notice.