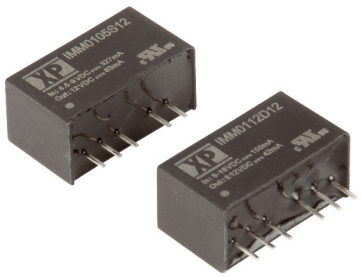
# IMM01 Series

DC-DC Converter

XP Power

## 1 Watt

- World Wide Medical Approvals
- Single and Dual Outputs
- 2 µA Patient Leakage Current
- SIP7 Package
- -20 °C to +100 °C Operation
- Full Load at 60 °C Ambient
- 1500 VAC Isolation, 1 MOPP
- MTBF 1 MHrs
- 3 Year Warranty



**Dimensions:**

**IMM01:**
0.76 x 0.36 x 0.44" (19.5 x 9.2 x 11.1 mm)

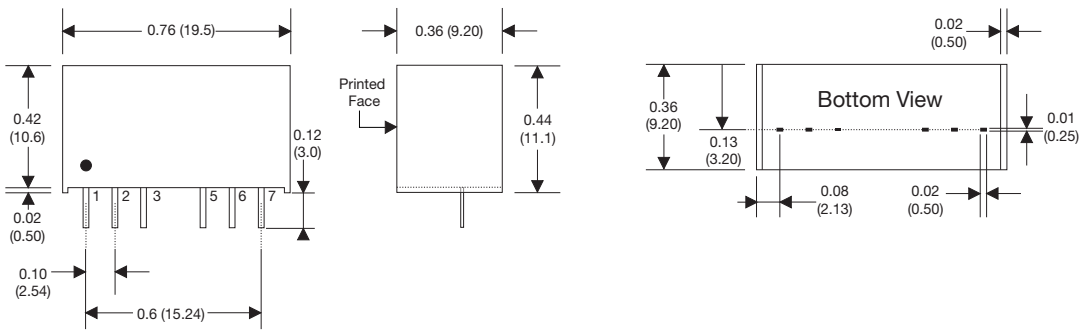
## Models & Ratings

| Input Voltage | Output Voltage | Output Current | Input current | | Maximum capacitive load | Model Number |
|---|---|---|---|---|---|---|
| | | | No Load | Full Load | | |
| 4.5-9.0 V | 3V3 | 303 mA | 75 mA | 337 mA | 2200 µF | IMM0105S3V3 |
| | 5 V | 200 mA | 75 mA | 337 mA | 2200 µF | IMM0105S05 |
| | 12 V | 83 mA | 75 mA | 327 mA | 470 µF | IMM0105S12 |
| | 15 V | 67 mA | 75 mA | 327 mA | 470 µF | IMM0105S15 |
| | ±3.3 V | ±150 mA | 55 mA | 337 mA | ±1000 µF | IMM0105D03 |
| | ±5 V | ±100 mA | 55 mA | 337 mA | ±1000 µF | IMM0105D05 |
| | ±12 V | ±42 mA | 75 mA | 327 mA | ±220 µF | IMM0105D12 |
| | ±15 V | ±33 mA | 75 mA | 327 mA | ±220 µF | IMM0105D15 |
| 9.0-18.0 V | 3V3 | 303 mA | 25 mA | 163 mA | 2200 µF | IMM0112S3V3 |
| | 5 V | 200 mA | 25 mA | 163 mA | 2200 µF | IMM0112S05 |
| | 12 V | 83 mA | 25 mA | 150 mA | 470 µF | IMM0112S12 |
| | 15 V | 67 mA | 25 mA | 150 mA | 470 µF | IMM0112S15 |
| | ±3.3 V | ±150 mA | 55 mA | 163 mA | ±1000 µF | IMM0112D03 |
| | ±5 V | ±100 mA | 55 mA | 163 mA | ±1000 µF | IMM0112D05 |
| | ±12 V | ±42 mA | 30 mA | 150 mA | ±220 µF | IMM0112D12 |
| | ±15 V | ±33 mA | 30 mA | 150 mA | ±220 µF | IMM0112D15 |

### Notes

*Input currents measured at low input voltage.*

## Mechanical Details




| Pin Connections | | |
|---|---|---|
| Pin | Single | Dual |
| 1 | -Vin | -Vin |
| 2 | +Vin | +Vin |
| 3 | Remote On/Off | Remote On/Off |
| 5 | +Vout | +Vout |
| 6 | -Vout | Common |
| 7 | No Pin | -Vout |

### Notes

1. All dimensions are in inches (mm)
2. Weight: 0.008 lbs (3.6 g) approx.
3. Pin diameter: 0.02±0.002 (0.5±0.05)
4. Pin pitch tolerance: ±0.014 (±0.35)
5. Case tolerance: ±0.02 (±0.5)

## Input

| Characteristic | Minimum | Typical | Maximum | Units | Notes & Conditions |
|---|---|---|---|---|---|
| Input Voltage Range | 4.5 | | 9 | VDC | 5 V nominal |
| | 9 | | 18 | VDC | 12 V nominal |
| Inrush Current | | | 0.05 | $A^2s$ | |
| Input Reflected Ripple Current | | 30 | | mA pk-pk | Through 12 µH inductor and 47 µF capacitor |
| Input Surge | | | 16 | VDC for 100 ms | 5 V models |
| | | | 25 | VDC for 100 ms | 12 V models |

## Output

| Characteristic | Minimum | Typical | Maximum | Units | Notes & Conditions |
|---|---|---|---|---|---|
| Output Voltage | 3.3 | | 30 | VDC | See Models and Ratings table |
| Patient Leakage Current | | | 2 | µA | |
| Initial Set Accuracy | | | ±2 | % | 3.3 V & 5.0 V at full load |
| | | | ±1 | | 12.0 V & 15.0 V at full load |
| Minimum Load | 0 | | | % | No minimum load required |
| Line Regulation | | | ±0.5 | % | From minimum to maximum input |
| Load Regulation | | | 2.0 | % | From 10% to full load (2% from 0% to 10% load) |
| Cross Regulation | | | ±5 | % | On dual output models, when one output is at 25% load and other is varied from 10% load to full load |
| Ripple & Noise | | | 1/2 | % pk-pk | For 12 V & 15 V/ 3.3 V & 5 V models. 20 MHz bandwidth. Measured using 0.1 µF ceramic capacitor |
| Short Circuit Protection | | | | | Continuous fold-back mode, with auto recovery |
| Maximum Capacitive Load | | | | | See Models and Ratings table |
| Temperature Coefficient | | | 0.03 | %/°C | |
| Overload Protection | 190 | 250 | 310 | % | Of nominal output current at nominal input voltage |
| Remote On/Off | Output is on if remote on/off (pin 3) is open<br>Output turns off if 2-4 mA is applied to remote on/off (pin 3) | | | | |

## General

| Characteristic | Minimum | Typical | Maximum | Units | Notes & Conditions |
|---|---|---|---|---|---|
| Efficiency | 64 | 78 | 81 | % | Typical value is for IMM0112S12 |
| Isolation: Input to Output | 1500 | | | VAC | At 250 VAC working voltage, 1 MOPP |
| Switching Frequency | 175 | | 1000 | kHz | May enter burst mode frequency of 12-28 kHz at light load |
| Isolation Resistance | $10^9$ | | | Ω | |
| Isolation Capacitance | | | 27 | pF | |
| Power Density | | | 8.31 | $W/in^3$ | |
| Mean Time Between Failure | 1 | | | MHrs | MIL-HDBK-217F, +25 °C GB |
| Weight | | 0.008 (3.6) | | lb (g) | |

## Environmental

| Characteristic | Minimum | Typical | Maximum | Units | Notes & Conditions |
|---|---|---|---|---|---|
| Operating Altitude | | | 3048 | M | |
| Transport Altitude | | | 10,000 | | |
| Operating Temperature | -20 | | +100 | °C | Derate linearly from 100% load at +60 °C to 0% at +100 °C |
| Storage Temperature | -40 | | +125 | °C | |
| Case Temperature | | | +105 | °C | |
| Humidity | | | 95 | %RH | Non-condensing |
| Cooling | | | | | Natural convection |

## EMC: Emissions

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

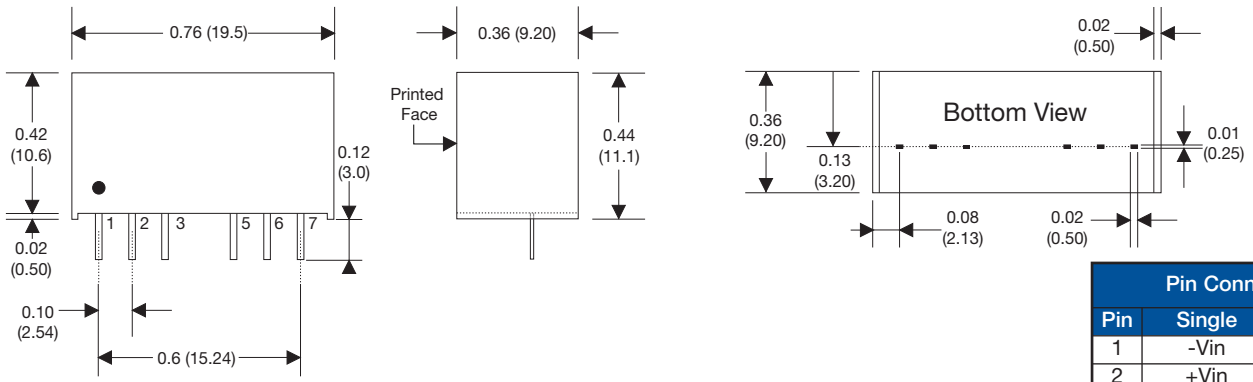
## EMC: Immunity

| Phenomenon | Standard | Test Level | Criteria | Notes & Conditions |
|---|---|---|---|---|
| Medical Device EMC | IEC60601-1-2 | Ed 4.0:2014 | As below | |
| ESD Immunity | EN61000-4-2 | ±15 kV | A | Air Discharge |
| Radiated Immunity | EN61000-4-3 | 10 V/m | A | 80% mod, 80 MHz - 2.7 GHz plus discrete communcation proximity field frequencies |
| EFT/Burst | EN61000-4-4 | 2 kV | A | External input filter required, see applications note |
| Surge | EN61000-4-5 | 2 kV | A | External input filter required, see applications note |
| Conducted Immunity | EN61000-4-6 | 10 V rms | A | |
| Magnetic Fields | EN61000-4-8 | 30 A/m | A | |

## Safety Approvals

| Safety Agency | Safety Standard | Notes & Conditions |
|---|---|---|
| UL | ANSI/AMMI ES60601-1 | |
| CSA | CSA C22.2 No. 60601-1 | |
| TUV | EN60601-1 | |
| CB | IEC60601-1 | |

## Mechanical Details



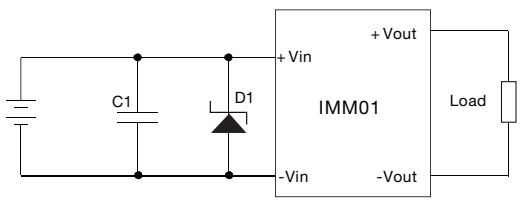

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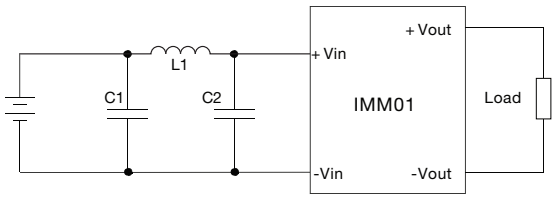
## Application Note

### External Filter for Surge and EFT




C1 is 220 µF, 100 V electrolytic capacitor
D1 is 18 V, 3 kW TVS for 5 V input or 28 V, 3 kW TVS for 12 V input

### EMI Filter Conducted Emissions




C1 & C2 are 10 µF, 35 V multilayer ceramic chip capacitors, placed as close as possible to the input pins
L1 is 12 µH inductor