

2 Watts

- World Wide Medical Approvals
- Single and Dual Outputs
- SIP7 Package
- -40 °C to +85 °C Operation
- Full Load at 85 °C Ambient
- 4000 VAC Isolation, 1 x MOPP
- 2 µA Patient Leakage Current
- MTBF 2.5 Mhrs
- 3 Year Warranty



Dimensions:

IML02:

0.77 x 0.39 x 0.49" (19.5 x 9.8 x 12.5 mm)

Models & Ratings

| Input Voltage | Output Voltage | Output Current | Input current | | Max. capacitive load | Efficiency | Model Number |
|---------------|----------------|----------------|---------------|-----------|----------------------|------------|--------------|
| | | | No Load | Full Load | | | |
| 4.5-5.5 V | 3.3V | 600 mA | 50 mA | 533 mA | 1000 µF | 75% | IML0205S3V3 |
| | 5.0V | 400 mA | 60 mA | 533 mA | 470 µF | 78% | IML0205S05 |
| | 9.0V | 222 mA | 60 mA | 500 mA | 470 µF | 80% | IML0205S09 |
| | 12.0V | 167 mA | 60 mA | 482 mA | 220 µF | 83% | IML0205S12 |
| | 15.0V | 133 mA | 60 mA | 488 mA | 220 µF | 82% | IML0205S15 |
| | ±3.3V | ±303 mA | 50 mA | 519 mA | ±470 µF | 77% | IML0205D03 |
| | ±5.0V | ±200 mA | 60 mA | 513 mA | ±220 µF | 78% | IML0205D05 |
| | ±9.0V | ±111 mA | 60 mA | 500 mA | ±220 µF | 80% | IML0205D09 |
| | ±12.0V | ±83 mA | 60 mA | 482 mA | ±100 µF | 83% | IML0205D12 |
| 10.8-13.2 V | ±15.0V | ±67 mA | 60 mA | 488 mA | ±100 µF | 82% | IML0205D15 |
| | 3.3V | 600 mA | 25 mA | 217 mA | 1000 µF | 76% | IML0212S3V3 |
| | 5.0V | 400 mA | 30 mA | 208 mA | 470 µF | 80% | IML0212S05 |
| | 9.0V | 222 mA | 30 mA | 208 mA | 470 µF | 80% | IML0212S09 |
| | 12.0V | 167 mA | 30 mA | 200 mA | 220 µF | 83% | IML0212S12 |
| | 15.0V | 133 mA | 30 mA | 203 mA | 220 µF | 82% | IML0212S15 |
| | ±3.3V | ±303 mA | 25 mA | 214 mA | ±470 µF | 78% | IML0212D03 |
| | ±5.0V | ±200 mA | 30 mA | 208 mA | ±220 µF | 80% | IML0212D05 |
| | ±9.0V | ±111 mA | 30 mA | 208 mA | ±220 µF | 80% | IML0212D09 |
| 13.5-16.5V | ±12.0V | ±83 mA | 30 mA | 200 mA | ±100 µF | 83% | IML0212D12 |
| | ±15.0V | ±67 mA | 30 mA | 203 mA | ±100 µF | 82% | IML0212D15 |
| | 3.3V | 600 mA | 25 mA | 174 mA | 1000 µF | 76% | IML0215S3V3 |
| | 5.0V | 400 mA | 30 mA | 170 mA | 470 µF | 78% | IML0215S05 |
| | 9.0V | 222 mA | 30 mA | 167 mA | 470 µF | 80% | IML0215S09 |
| | 12.0V | 167 mA | 30 mA | 167 mA | 220 µF | 80% | IML0215S12 |
| | 15.0V | 133 mA | 30 mA | 167 mA | 220 µF | 80% | IML0215S15 |
| | ±3.3V | ±303 mA | 25 mA | 170 mA | ±470 µF | 78% | IML0215D03 |
| | ±5.0V | ±200 mA | 30 mA | 170 mA | ±220 µF | 78% | IML0215D05 |
| 21.6-26.4V | ±9.0V | ±111 mA | 30 mA | 167 mA | ±220 µF | 80% | IML0215D09 |
| | ±12.0V | ±83 mA | 30 mA | 167 mA | ±100 µF | 80% | IML0215D12 |
| | ±15.0V | ±67 mA | 30 mA | 167 mA | ±100 µF | 80% | IML0215D15 |
| | 3.3V | 600 mA | 20 mA | 111 mA | 1000 µF | 75% | IML0224S3V3 |
| | 5.0V | 400 mA | 20 mA | 106 mA | 470 µF | 78% | IML0224S05 |
| | 9.0V | 222 mA | 20 mA | 104 mA | 470 µF | 80% | IML0224S09 |
| | 12.0V | 167 mA | 20 mA | 104 mA | 220 µF | 80% | IML0224S12 |
| | 15.0V | 133 mA | 20 mA | 104 mA | 220 µF | 80% | IML0224S15 |
| | ±3.3V | ±303 mA | 20 mA | 107 mA | ±470 µF | 77% | IML0224D03 |
| 21.6-26.4V | ±5.0V | ±200 mA | 20 mA | 106 mA | ±220 µF | 78% | IML0224D05 |
| | ±9.0V | ±111 mA | 20 mA | 104 mA | ±220 µF | 80% | IML0224D09 |
| | ±12.0V | ±83 mA | 20 mA | 104 mA | ±100 µF | 80% | IML0224D12 |
| | ±15.0V | ±67 mA | 20 mA | 104 mA | ±100 µF | 80% | IML0224D15 |

Notes

Input currents measured at nominal input voltage.

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 |
| | 13.5 | | 16.5 | | 15 V nominal |
| | 21.6 | | 26.4 | | 24 V nominal |
| Input Reflected Ripple Current | | 20 | | mA pk-pk | Through 12 μ H inductor and 47 μ F capacitor |
| Input Surge | | | 5.5 | VDC for 100 ms | 5 V models |
| | | | 13.2 | | 12 V models |
| | | | 16.5 | | 15 V nominal |
| | | | 26.4 | | 24 V nominal |

Output

| Characteristic | Minimum | Typical | Maximum | Units | Notes & Conditions |
|--------------------------|---------|---------|-----------|----------|---|
| Output Voltage | 3.3 | | 30 | VDC | See Models and Ratings table |
| Initial Set Accuracy | | | ± 5 | % | At full load |
| Minimum Load | 10 | | | % | Minimum load required to meet specified regulation |
| Line Regulation | | | ± 1.2 | %/1% | Output changes by max of 1.2% for each 1% change in input voltage |
| Load Regulation | | | 10 | % | From 10% to full load, see application note |
| Cross Regulation | | ± 4 | | % | On dual output models, when one output is at 25% load and other is varied from 10% load to full load |
| Ripple & Noise | | | 150 | mV pk-pk | 20 MHz bandwidth. Measured using 10 μ F electrolytic in parallel with 0.1 μ F ceramic capacitor |
| Short Circuit Protection | | | | | Continuous |
| Maximum Capacitive Load | | | | | See Models and Ratings table |
| Temperature Coefficient | | | 0.03 | %/°C | |

General

| Characteristic | Minimum | Typical | Maximum | Units | Notes & Conditions |
|----------------------------|-----------------|-------------|---------|-------------------|--|
| Efficiency | | 80 | | % | |
| Isolation: Input to Output | 4000 | | | VAC | 1 x MOPP at 250 VAC rms working voltage, 2 x MOPP at 125 VAC working voltage |
| Patient Leakage Current | | | 2 | μ A | |
| Isolation Resistance | 10 ⁹ | | | Ω | |
| Isolation Capacitance | | 10 | 20 | pF | |
| Switching Frequency | 50 | | 100 | kHz | |
| Power Density | | | 13.6 | W/in ³ | |
| Mean Time Between Failure | 2.5 | | | MHrs | MIL-HDBK-217F, +25 °C GB |
| Weight | | 0.009 (4.2) | | lb (g) | |

Environmental

| Characteristic | Minimum | Typical | Maximum | Units | Notes & Conditions |
|-----------------------|---------|---------|---------|-------|--------------------|
| Operating Temperature | -40 | | +85 | °C | No derating |
| Storage Temperature | -40 | | +125 | °C | |
| Case Temperature | | | +105 | °C | |
| Humidity | 2.5 | | 95 | %RH | Non-condensing |
| Cooling | | | | | Natural convection |
| Altitude | | | 5000 | m | |

EMC: Emissions

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

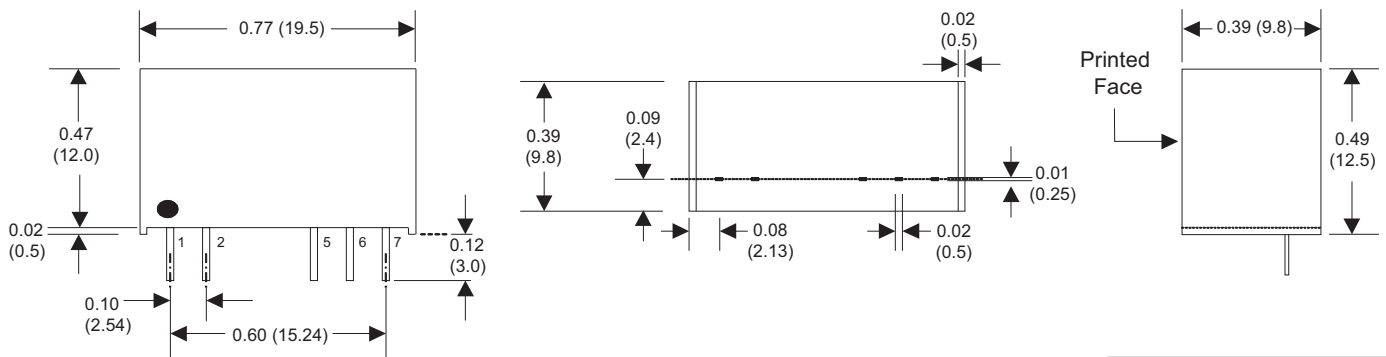
EMC: Immunity

| Phenomenon | Standard | Test Level | Criteria | Notes & Conditions |
|--------------------|-------------|------------|----------|---|
| ESD Immunity | EN61000-4-2 | ±15 kV | A | Air Discharge |
| Radiated Immunity | EN61000-4-3 | 10 Vrms | A | |
| EFT/Burst | EN61000-4-4 | 2 kV | A | External components required, see application notes |
| Surge | EN61000-4-5 | 2 kV | A | External components 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



Notes

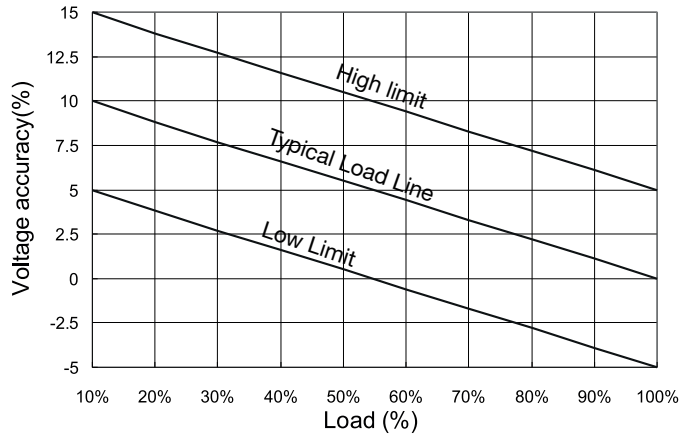
- All dimensions are in inches (mm)
- Weight: 0.009 lbs (4.2 g) approx.
- Pin diameter: 0.02±0.002 (0.5±0.05)

- Pin pitch tolerance: ±0.014 (±0.35)
- Case tolerance: ±0.02 (±0.5)

| Pin Connections | | |
|-----------------|--------|--------|
| Pin | Single | Dual |
| 1 | +Vin | +Vin |
| 2 | -Vin | -Vin |
| 5 | -Vout | -Vout |
| 6 | No Pin | Common |
| 7 | +Vout | +Vout |

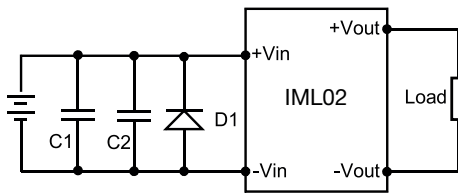
Application Note

Regulation



EFT and Surge Filter

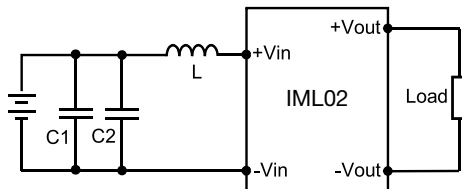
Input components (C1, C2, D1) are used to help meet EFT and surge test requirements for the module.



| | C1 | C2 | D1 |
|-------------|-------------------|------------------|----------|
| IML0205XXXX | 1000 μ F/35 V | 330 μ F/50 V | SMDJ9.0A |
| IML0212XXXX | 1000 μ F/35 V | 330 μ F/50 V | SMDJ13A |
| IML0215XXXX | 1000 μ F/35 V | 330 μ F/50 V | SMDJ18A |
| IML0224XXXX | 1000 μ F/35 V | 330 μ F/50 V | SMDJ28A |

EMI Filter

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



| | C1 | C2 | L |
|-------------|-------------------------|-------------------------|-------------|
| IML0205XXXX | 1206, 4.7 μ F/ 50 V | | 6.8 μ H |
| IML0212XXXX | 1206, 4.7 μ F/ 50 V | 1206, 4.7 μ F/ 50 V | 6.8 μ H |
| IML0215XXXX | 1206, 4.7 μ F/ 50 V | 1206, 4.7 μ F/ 50 V | 6.8 μ H |
| IML0224XXXX | 1206, 4.7 μ F/ 50 V | 1206, 4.7 μ F/ 50 V | 6.8 μ H |

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