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IML02 Series

DC-DC Converter

XP Power

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 at 250 VAC
- 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	3V3	600 mA	50 mA	533 mA	1000 µF	75%	IML0205S3V3
	5 V	400 mA	60 mA	533 mA	470 µF	78%	IML0205S05
	9 V	222 mA	60 mA	500 mA	470 µF	80%	IML0205S09
	12 V	167 mA	60 mA	482 mA	220 µF	83%	IML0205S12
	15 V	133 mA	60 mA	488 mA	220 µF	82%	IML0205S15
	±3V3	±300 mA	50 mA	519 mA	±470 µF	77%	IML0205D03
	±5 V	±200 mA	60 mA	513 mA	±220 µF	78%	IML0205D05
	±9 V	±111 mA	60 mA	500 mA	±220 µF	80%	IML0205D09
	±12 V	±83 mA	60 mA	482 mA	±100 µF	83%	IML0205D12
	±15 V	±66 mA	60 mA	488 mA	±100 µF	82%	IML0205D15
10.8-13.2 V	3V3	600 mA	25 mA	217 mA	1000 µF	76%	IML0212S3V3
	5 V	400 mA	30 mA	208 mA	470 µF	80%	IML0212S05
	9 V	222 mA	30 mA	208 mA	470 µF	80%	IML0212S09
	12 V	167 mA	30 mA	200 mA	220 µF	83%	IML0212S12
	15 V	133 mA	30 mA	203 mA	220 µF	82%	IML0212S15
	±3V3	±300 mA	25 mA	214 mA	±470 µF	78%	IML0212D03
	±5 V	±200 mA	30 mA	208 mA	±220 µF	80%	IML0212D05
	±9 V	±111 mA	30 mA	208 mA	±220 µF	80%	IML0212D09
	±12 V	±83 mA	30 mA	200 mA	±100 µF	83%	IML0212D12
	±15 V	±66 mA	30 mA	203 mA	±100 µF	82%	IML0212D15
13.5-16.5V	3V3	600 mA	25 mA	174 mA	1000 µF	76%	IML0215S3V3
	5 V	400 mA	30 mA	170 mA	470 µF	78%	IML0215S05
	9 V	222 mA	30 mA	167 mA	470 µF	80%	IML0215S09
	12 V	167 mA	30 mA	167 mA	220 µF	80%	IML0215S12
	15 V	133 mA	30 mA	167 mA	220 µF	80%	IML0215S15
	±3V3	±300 mA	25 mA	170 mA	±470 µF	78%	IML0215D03
	±5 V	±200 mA	30 mA	170 mA	±220 µF	78%	IML0215D05
	±9 V	±111 mA	30 mA	167 mA	±220 µF	80%	IML0215D09
	±12 V	±83 mA	30 mA	167 mA	±100 µF	80%	IML0215D12
	±15 V	±66 mA	30 mA	167 mA	±100 µF	80%	IML0215D15
21.6-26.4V	3V3	600 mA	20 mA	111 mA	1000 µF	75%	IML0224S3V3
	5 V	400 mA	20 mA	106 mA	470 µF	78%	IML0224S05
	9 V	222 mA	20 mA	104 mA	470 µF	80%	IML0224S09
	12 V	167 mA	20 mA	104 mA	220 µF	80%	IML0224S12
	15 V	133 mA	20 mA	104 mA	220 µF	80%	IML0224S15
	±3V3	±300 mA	20 mA	107 mA	±470 µF	77%	IML0224D03
	±5 V	±200 mA	20 mA	106 mA	±220 µF	78%	IML0224D05
	±9 V	±111 mA	20 mA	104 mA	±220 µF	80%	IML0224D09
	±12 V	±83 mA	20 mA	104 mA	±100 µF	80%	IML0224D12
	±15 V	±66 mA	20 mA	104 mA	±100 µF	80%	IML0224D15

Notes

Input currents measured at nominal input voltage.

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IML02 Series

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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 µH inductor and 47 µF 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 µF electrolytic in parallel with 0.1 µF 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 working voltage, 2 x MOPP at 125 VAC working voltage
Patient Leakage Current			2	µA	
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			+100	°C	
Humidity	2.5		95	%RH	Non-condensing
Cooling					Natural convection

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EMC: Emissions

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

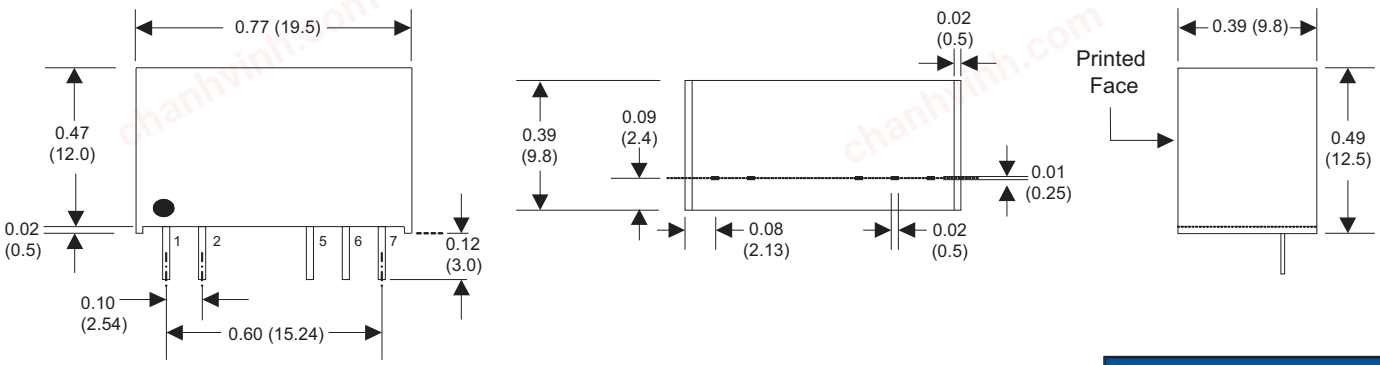
EMC: Immunity

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



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

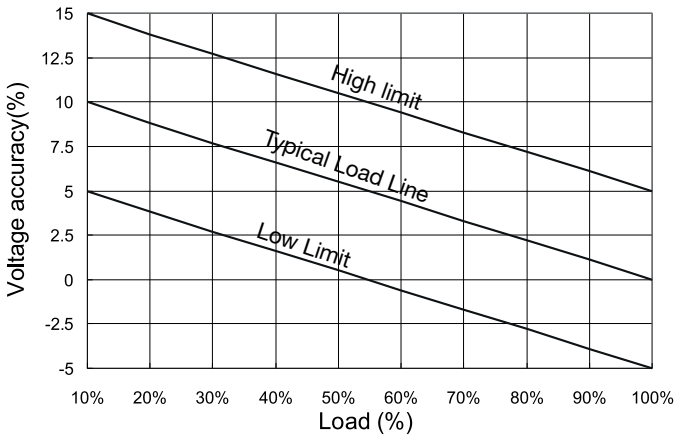
Notes

1. All dimensions are in inches (mm)
2. Weight: 0.009 lbs (4.2 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)

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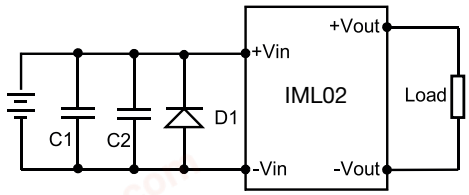
Application Note

Regulation



EFT and Surge Filter

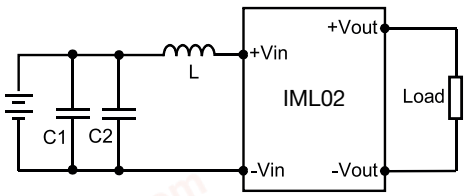
Input components (C1, C2, D1) are used to help meet EFT and surge test requirements for the module.



	C1	C2	D1
IML0205XXXX	1000 µF/35 V	330 µF/50 V	SMDJ9.0A
IML0212XXXX	1000 µF/35 V	330 µF/50 V	SMDJ13A
IML0215XXXX	1000 µF/35 V	330 µF/50 V	SMDJ18A
IML0224XXXX	1000 µF/35 V	330 µF/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 µF/ 50 V		6.8 µH
IML0212XXXX	1206, 4.7 µF/ 50 V	1206, 4.7 µF/ 50 V	6.8 µH
IML0215XXXX	1206, 4.7 µF/ 50 V	1206, 4.7 µF/ 50 V	6.8 µH
IML0224XXXX	1206, 4.7 µF/ 50 V	1206, 4.7 µF/ 50 V	6.8 µH