JMR10 series

10W

DC-DC converters

The JMR10 series is a range of ultra-compact, regulated PCB-mount medical DC-DC converters which offers single and dual output voltages ranging from 5V to 15V. Housed in a ultra-compact DIP24 package, the JMR10 series features a 4:1 input voltage range and offers a ±10% output trim on single output versions. Its low no load power increases efficiency and extends runtime in battery powered applications. The JMR10 series features worldwide medical approvals, 2 x MOPP 5kVAC reinforced isolation and extremely low leakage currents benefitting system designers with easy integration into a wide range of BF and CF rated medical applications including imaging, patient monitoring, surgical equipment, patient treatment and dentistry.

Features

- Regulated single & dual outputs from 5 to 30VDC
- 4:1 input range
- Ultra-compact DIP24 PCB mount package
- Low no-load power
- 10% trim in single output versions
- IEC60601-1 medical safety agency approvals
- 5kVAC reinforced isolation
- 2 x MOPP at 250VAC
- 2µA patient leakage current
- Remote On/Off
- Short circuit, overload & overvoltage protection
- -40°C to +100°C operating temperature
- 3 year warranty

Applications

Healthcare

Home healthcare

Medical Diagnostics

Dimensions

31.8 x 20.3 x 10.2 mm (1.25" x 0.8" x 0.4")

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Models & ratings

Model number	Input voltage	Output voltage[1]	Output current	Efficiency[3]	Input current[4]		Maximum capacitive load
					No load	Full load	
JMR1012S05	12V (4.5-18V)	5V	2000mA	84.5%	20mA	987mA	3300µF
JMR1012S12		12V	833mA	86.5%	20mA	964mA	470µF
JMR1012S15		15V	666mA	87%	20mA	957mA	330µF
JMR1012D05		±5V	±1000mA	84.5%	20mA	987mA	±1470µF
JMR1012D12		±12V	±416mA	86.5%	20mA	962mA	±680µF
JMR1012D15		±15V	±333mA	87%	20mA	957mA	±390µF

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Notes:

1. Dual output models can be used to provide a single output of 10V, 24V or 30V.
2. Specifications noted using nominal input voltage and full load at 25°C unless otherwise stated.
3. Measured at full load and nominal input voltage.
4. No load input current reduces to <3mA when module is inhibited.

JMR10 series

Models & ratings

Model number	Input voltage	Output voltage[1]	Output current	Efficiency[3]	Input current		Maximum capacitive load
					No load[4,5]	Full load	
JMR1024S05	24V (9.0-36.0V)	5V	2000mA	85%	6mA	491mA	3300µF
JMR1024S12		12V	833mA	88%	6mA	474mA	470µF
JMR1024S15		15V	666mA	89%	6mA	469mA	330µF
JMR1024D05		±5V	±1000mA	85%	6mA	491mA	±1470µF
JMR1024D12		±12V	±416mA	88%	6mA	473mA	±680µF
JMR1024D15		±15V	±333mA	89%	6mA	468mA	±390µF
JMR1048S05	48V (18.0-75.0V)	5V	2000mA	85%	4mA	246mA	3300µF
JMR1048S12		12V	833mA	88%	4mA	237mA	470µF
JMR1048S15		15V	666mA	88%	4mA	237mA	330µF
JMR1048D05		±5V	±1000mA	85%	4mA	246mA	±1470µF
JMR1048D12		±12V	±416mA	88%	4mA	237mA	±680µF
JMR1048D15		±15V	±333mA	88%	4mA	237mA	±390µF

Notes:

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Input

Characteristic	Minimum	Typical	Maximum	Units	Notes & conditions
Input voltage range	4.5		18	VDC	12V nominal
	9		36		24V nominal
	18		75		48V nominal
Inrush current			80	A	At nominal input voltage
Input reflected ripple		20		mA pk-pk	Through 12µH inductor and 47µF capacitor
Input surge			25	VDC for 100ms	12V nominal
			50		24V nominal
			100		48V nominal
Input current remote On/Off		2.5	8.0	mA	Idle current using remote “Off”. See models and ratings table for no load input current with module “On”
Recommended input fuse (Slow blow)		5.0		A	12V nominal
		2.0			24V nominal
		1.0			48V nominal

Output

Characteristic	Minimum	Typical	Maximum	Units	Notes & conditions
Output voltage	5		30	VDC	See Models & ratings table
Output voltage adjustment	-10		+10	%	See application note
Initial set accuracy			±1	%	At full load
Minimum load	0			%	No minimum load required
Line regulation			±0.5	%	From min to max input voltage
Load regulation			±1.0	%	From 0-100% load
Cross regulation			±5	%	Dual output, when one output at 25% load other is varied from 10% to full load
Transient response deviation	3		5	%	Deviation recovering to within 1% in 250µs for 25% load change at 0.1A/µs
Ripple & noise			75/100	mV pk-pk	5V/12-15V outputs, 20MHz bandwidth, measured using 10µF ceramic capacitor at nominal Vin
Short circuit protection	Continuous, hiccup mode with auto recovery				
Maximum capacitive load	See Models & Ratings table				
Temperature coefficient			0.02	%/ °C	
Overload protection		160		%	At nominal input voltage
Remote On/Off	Output is on if pin 1 is shorted to pin 2 or with a voltage less than 1.2V is applied WRT pin 2. Output is off if pin 1 is open circuit or with a voltage of 3-12V applied WRT pin 2. See application note.				

General

Characteristic	Minimum	Typical	Maximum	Units	Notes & conditions
Efficiency		87		%	See Models & ratings table
Isolation: Input to output	5000			VAC	Reinforced insulation, 2 x MOPP, 60s, production test to 5kVAC
Working voltage			250	VAC	
Creepage and clearance	8			mm	
Isolation resistance	10^9			Ω	Input to output
Isolation capacitance		17		pF	Input to output
Leakage current		2		µA	264VAC, 60Hz
Power density			1.5	Wcm^3	
Mean time between failure	650			khrs	MIL-HDBK-217F, +25°C GB
Switching frequency		300		kHz	
Weight		14.0 (0.003)		g (lb)	
Solder profile			260	°C	Waveflow. 1.5mm (0.05”) from case, 10 seconds max.
Case material	Non conductive black plastic UL94V-0 rated				
Potting material	Silicone, UL94V-0 rated				
Pin material	Solder coated brass dia. 0.5mm				
Water wash	Use deionized water. Dry thoroughly				

Environmental

Characteristic	Minimum	Typical	Maximum	Units	Notes & conditions
Operating temperature	-40		+100	°C	See derating curve
Storage temperature	-55		+125	°C	
Case temperature			+110	°C	At nominal input voltage
Humidity operating & storage	5		95	%RH	Non-condensing
Cooling	Natural convection				
Operating altitude			5000	m	Transport altitude 10km

Safety approvals

Safety agency	Standard	Notes & conditions
UL	ANSI/AAMI ES60601-1, UL62368-1	
CSA	CSA C22.2 No. 60601-1	
TUV	EN60601-1	
CB	IEC/EN60601-1	
CE	Meets all applicable directives	
UKCA	Meets all applicable legislation	

EMC: emissions

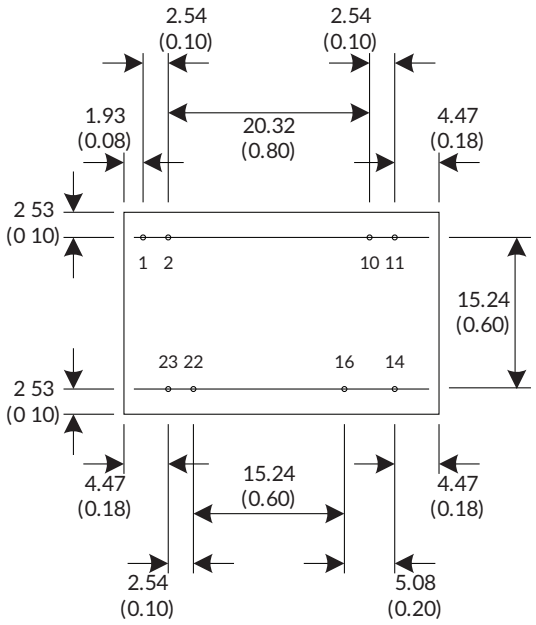
Phenomenon	Standard	Test level	Notes & conditions
Conducted	EN55011	Class B	See Application notes
Radiated	EN55011	Class B	

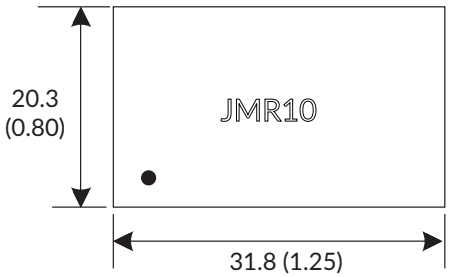
EMC: immunity

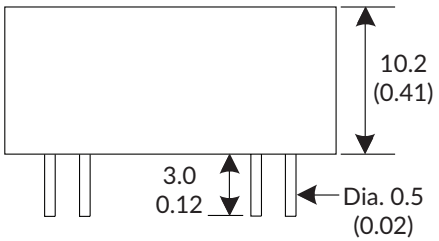
Phenomenon	Standard	Test Level	Criteria	Notes & conditions
Medical device EMC	EN60601-1-2: 2015			IEC60601-1-2:2014 Ed4.0
ESD immunity	EN61000-4-2	±8kV	A	Contact
		±15kV		Air
Radiated immunity	EN61000-4-3	10V/m	A	
EFT/Burst	EN61000-4-4	±2kV	A	External component required, see application notes
Surge	EN61000-4-5	±2kV	A	External component required, see application notes
Conducted immunity	EN61000-4-6	10Vrms	A	
Magnetic fields	EN61000-4-8	100A/m	A	

JMR10 series

Mechanical details

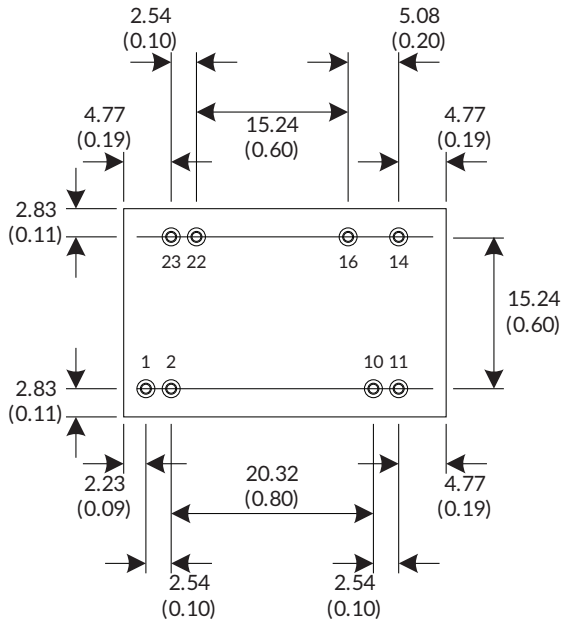






Pin Connections		
Pin	**Single**	**Dual**
1	CTRL	CTRL
2	-Vin	-Vin
10	Trim	Trim
11	NC	-Vout
14	+Vout	+Vout
16	-Vout	COM
22	+Vin	+Vin
23	+Vin	+Vin

Recommended PCB footprint



There should be at least 8mm distance between primary and secondary circuit.

Through hole diameter 0.8mm (0.031")
Pad diameter top side 1.0mm (0.039")
Pad diameter bottom side 2.0mm (0.079")

Notes:

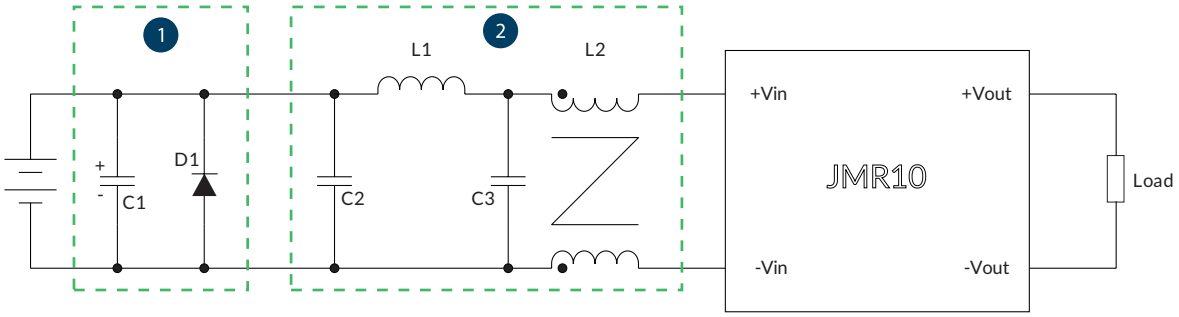
1. All dimensions are in mm (inches)
2. Weight: 14.0 (0.03) g (lbs) approx.
3. Pin diameter: 0.5 ±0.05 (0.02 ±0.002)
4. Pin pitch tolerance: ±0.35 (±0.014)
5. Case tolerance: ±0.5 (±0.02)

Application notes

EMC Filter

Circuit 1 for Surge & EFT, 2 for EMC class B.

Single output

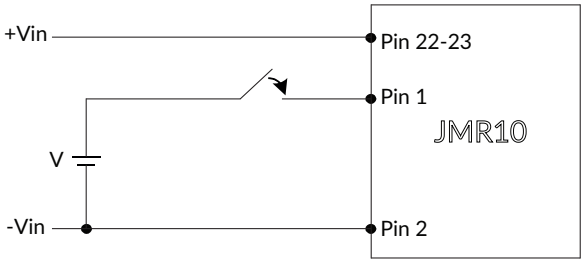


Model Number	D1	C1[1]	C2, C3	L1	L2
JMR1012XXX	SMDJ26A	470µF/100V	MLCC, 22µF, 35V	2.2µH	52µH
JMR1024XXX	SMDJ58A	330µF/100V	MLCC, 4.7µF, 50V	4.7µH	175µH
JMR1048XXX	SMDJ120A	330µF/100V	MLCC, 2.2µF, 100V	6.8µH	419µH

Notes:

1. Nippon CHEMI-CON KY series

Remote On/Off

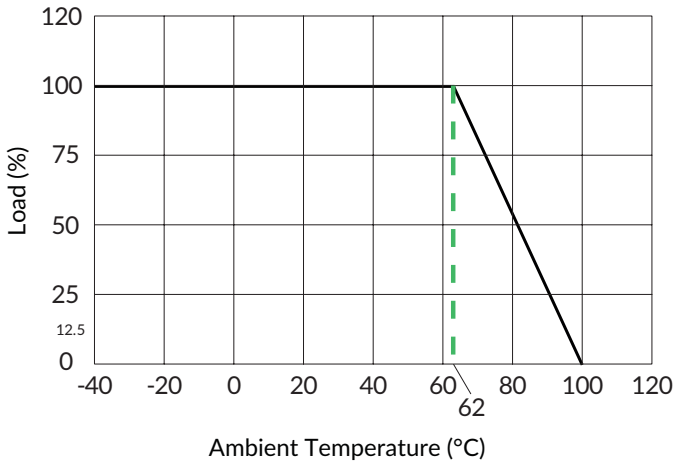


Module “On” if pin 1 is shorted to pin 2 or with a voltage (V) less than 1.2V WRT to pin 2.
Module “Off” if pin 1 is open or with a voltage (V) of 3V to 12V WRT to pin 2.

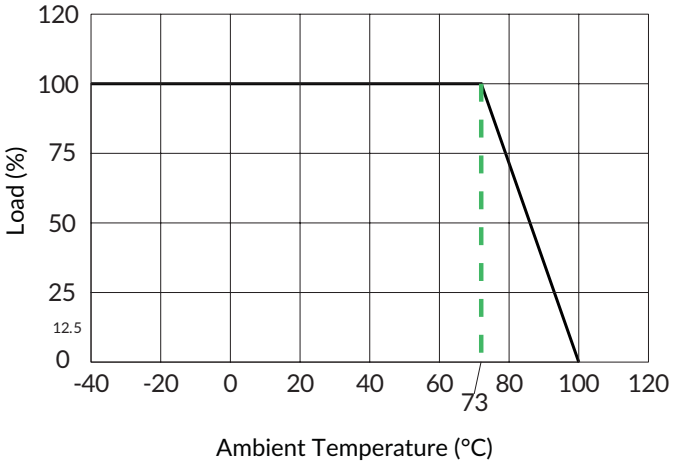
Application notes

Derating curves

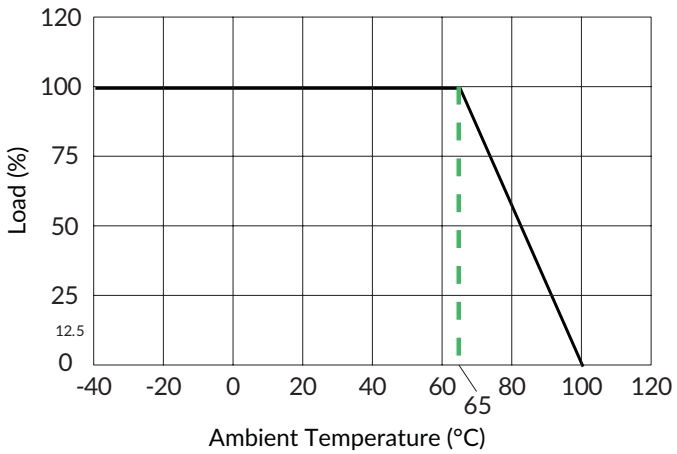
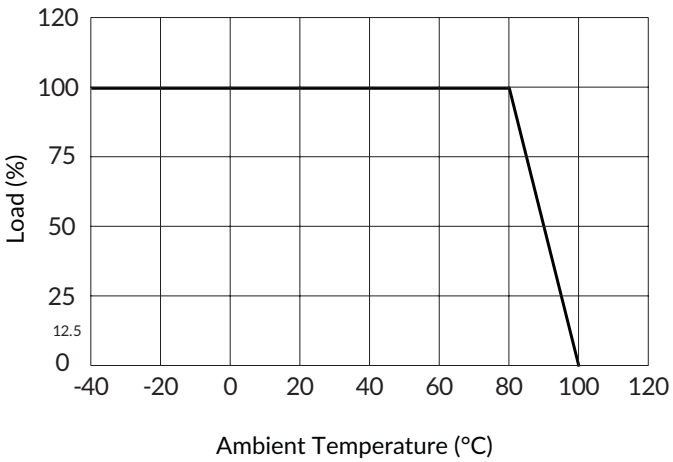
JMR1012S05, JMR1012D05, JMR1024S05, JMR1024D05



JMR1012S12, JMR1012D12, JMR12S15, JMR12D15



JMR1048S05, JMR1048D05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