

## 20 Watts

- International Medical Safety Approvals
- Regulated Single & Dual Output
- 2:1 Input Range
- 2" x 1" Package
- 4200 VAC Isolation
- 5  $\mu$ A Patient Leakage Current
- 2 x MOPP at 300 VAC
- Operating Temperature -40 °C to +95 °C
- High Power Density
- Six-sided Metal Case
- 3 Year Warranty



### Dimensions:

#### JMM20:

2.00 x 1.00 x 0.47" (50.8 x 25.4 x 12.0 mm)

## Models & Ratings

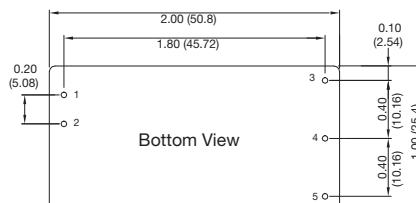
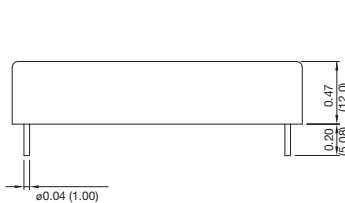
Input voltage	Output voltage	Output current	Input current <sup>(1)</sup>		Overvoltage Protection	Maximum capacitive load <sup>(2)</sup>	Efficiency	Model number
			No load	Full load				
9-18V	5.0V	4.00 A	20 mA	1.94 A	6.2 V	6800 $\mu$ F	86%	JMM2012S05
	5.1V	4.00 A		1.98 A	6.2 V	6800 $\mu$ F	86%	JMM2012S5V1
	12.0V	1.67 A		1.88 A	15.0 V	1160 $\mu$ F	89%	JMM2012S12
	15.0V	1.33 A		1.95 A	18.0 V	750 $\mu$ F	88%	JMM2012S15
	24.0V	0.84 A		1.89 A	27.0 V	295 $\mu$ F	89%	JMM2012S24
	$\pm 12.0V$	$\pm 0.84$ A		1.89 A	$\pm 15.0$ V	$\pm 590$ $\mu$ F	89%	JMM2012D12
	$\pm 15.0V$	$\pm 0.67$ A		1.88 A	$\pm 18.0$ V	$\pm 380$ $\mu$ F	89%	JMM2012D15
18-36V	5.0V	4.00 A	15 mA	0.96 A	6.2 V	6800 $\mu$ F	87%	JMM2024S05
	5.1V	4.00 A		0.98 A	6.2 V	6800 $\mu$ F	87%	JMM2024S5V1
	12.0V	1.67 A		0.94 A	15.0 V	1160 $\mu$ F	89%	JMM2024S12
	15.0V	1.33 A		0.94 A	18.0 V	750 $\mu$ F	89%	JMM2024S15
	24.0V	0.84 A		0.93 A	27.0 V	295 $\mu$ F	90%	JMM2024S24
	$\pm 12.0V$	$\pm 0.84$ A		0.93 A	$\pm 15.0$ V	$\pm 590$ $\mu$ F	90%	JMM2024D12
	$\pm 15.0V$	$\pm 0.67$ A		0.94 A	$\pm 18.0$ V	$\pm 380$ $\mu$ F	89%	JMM2024D15
36-75V	5.0V	4.00 A	10 mA	0.47 A	6.2 V	6800 $\mu$ F	88%	JMM2048S05
	5.1V	4.00 A		0.48 A	6.2 V	6800 $\mu$ F	88%	JMM2048S5V1
	12.0V	1.67 A		0.70 A	15.0 V	1160 $\mu$ F	89%	JMM2048S12
	15.0V	1.33 A		0.46 A	18.0 V	750 $\mu$ F	90%	JMM2048S15
	24.0V	0.84 A		0.47 A	27.0 V	295 $\mu$ F	89%	JMM2048S24
	$\pm 12.0V$	$\pm 0.84$ A		0.48 A	$\pm 15.0$ V	$\pm 590$ $\mu$ F	88%	JMM2048D12
	$\pm 15.0V$	$\pm 0.67$ A		0.47 A	$\pm 18.0$ V	$\pm 380$ $\mu$ F	89%	JMM2048D15

## Notes

1. Input currents measured at nominal input voltage.

2. Maximum capacitive load is per output.

## Mechanical Details



## Pin Connections

Pin	Single	Dual
1	+Vin	+Vin
2	-Vin	-Vin
3	+Vout	+Vout
4	No Pin	Common
5	-Vout	-Vout

## Notes

1. All dimensions are in inches (mm)
2. Weight: 0.066 lbs (30 g) approx.

3. Tolerance: X.XX $\pm$ 0.01 (X.X $\pm$ 0.25), X.XXX $\pm$ 0.005 (X.XX $\pm$ 0.13)
4. Pin Tolerance:  $\pm$ 0.002 ( $\pm$ 0.05)

### Input

Characteristic	Minimum	Typical	Maximum	Units	Notes & Conditions
Input Voltage Range	9.0		18	VDC	12 V nominal
	18.0		36	VDC	24 V nominal
	36.0		75	VDC	48 V nominal
Input Filter	Internal Pi type				
Input Surge			25	VDC for 100 ms	12 V models
			50		24 V models
			100		48 V models
Undervoltage Lockout	ON >9V, OFF at <7.5V				12 V models
	ON >18 V, OFF at <15 V				24 V models
	ON >36 V, OFF at <33 V				48 V models

### Output

Characteristic	Minimum	Typical	Maximum	Units	Notes & Conditions
Output Voltage	5		30	VDC	See Models and Ratings table
Initial Set Accuracy			±1.0	%	At full load
Output Voltage Balance			±2.0	%	For dual output with balanced loads
Minimum Load				A	No minimum load required
Line Regulation			±0.5	%	From minimum to maximum input at full load
Load Regulation			±0.5/±1.0	%	Single / Dual output, from 0 to full load
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 300 μs for a 25% load change.
Ripple & Noise		50		mV pk-pk	5 & 5.1 V output
		100			12 V, 15 V, ±12 V & ±15 V output
		150			24 V
Overload Protection		150		%	20 MHz bandwidth. Measured using 4.7 μF ceramic capacitor.
Short Circuit Protection					
Maximum Capacitive Load					
Temperature Coefficient			0.02	%/°C	

### General

Characteristic	Minimum	Typical	Maximum	Units	Notes & Conditions
Efficiency		88		%	See Models and Ratings table
Isolation: Input to Output	4200			VAC	60 s
Patient Leakage Current			5	μA	
Isolation Resistance	10 <sup>9</sup>			Ω	At 500 VDC
Isolation Capacitance			80	pF	
Switching Frequency		285		kHz	
Power Density			62.5	W/in <sup>3</sup>	
Mean Time Between Failure	1			MHrs	MIL-HDBK-217F, +25 °C GB
Weight		0.066 (30 g)		lb (g)	

### Environmental

Characteristic	Minimum	Typical	Maximum	Units	Notes & Conditions
Operating Temperature	-40		+95	°C	See Derating Curve.
Storage Temperature	-50		+125	°C	
Case Temperature			+95	°C	
Humidity			95	%RH	Non-condensing
Cooling					Natural convection
Thermal Impedance	13			°C/W	

### EMC: Emissions

Phenomenon	Standard	Test Level	Notes & Conditions
Conducted	EN55011	Class A	

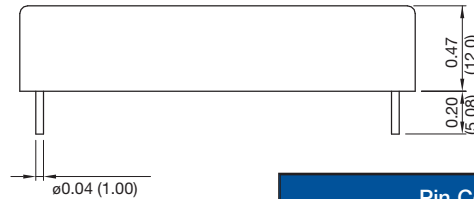
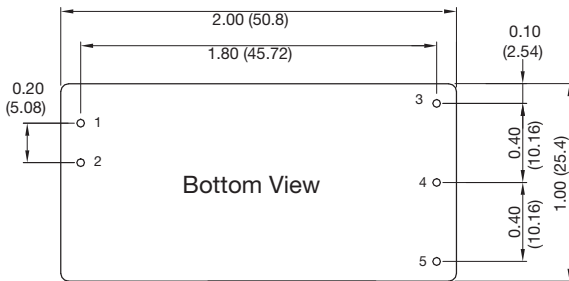
### EMC: Immunity

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	With external capacitor, suggested part is CHEMI-CON KY 220µF/100V
Surge	EN61000-4-5	±1 kV	A	With external capacitor, suggested part is CHEMI-CON KY 220µF/100V
Conducted	EN61000-4-6	10 V rms	A	
Magnetic Fields	EN61000-4-8	30 A/m	A	

### Safety Approvals

Safety Agency	Safety Standard	Notes & Conditions
CB Report	IEC60601-1	Medical
UL	ANSI/AMMI ES60601-1	Medical

### Mechanical Details



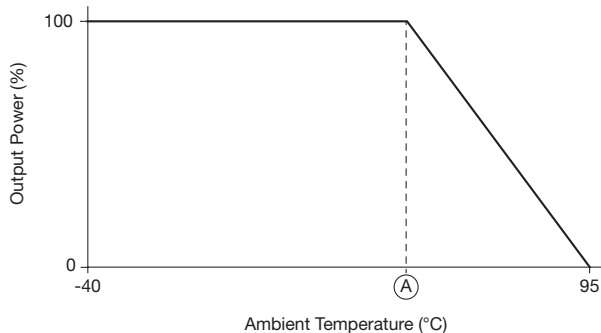
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### Notes

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X.XXX±0.005 (X.XX±0.13)
- Pin Tolerance: ±0.002 (±0.05)

### Application Notes

#### Derating Curve



Models - JMM20	Max Ambient Temperature (A)
24S24, 24D12, 24D15, 48S15, 48D15	66°C
12S24, 12S12, 12D12, 12D15, 24S15, 24S12, 24D15, 48S24, 48S12, 48D12	62°C
12S15, 24S05, 24S5V1, 48S05, 48S5V1, 48D12	58°C
12S05, 12S5V1	51°C