

10 Watts

JHM10 Series



- International Medical Approvals
- 4000 VAC Reinforced Insulation
- Meets IEC60601-1, 3rd Edition
- 2 μ A Patient Leakage Current
- DIP-24 Package
- EN55011 Level A With No External Components
- 3 Year Warranty

Specification

Input

Input Voltage Range	• 5 V (4.5-9 VDC) • 12 V (9-18 VDC) • 24 V (18-36 VDC)
Input Current	• See table
Inrush Current	• 20 A max at 36 V
Input Filter	• Pi network
Patient Leakage Current	• 2 μA max
Undervoltage Lockout	• 5 V models, on at >4.4 V, off <4.2 V • 12 V models, on at >8.8 V, off <8.3 V • 24 V models, on at >17.5 V, off <17.0 V
Input Surge	• 5 V models 15 V for 3 s • 12 V models 25 V for 3 s • 24 V models 50 V for 3 s

Output

Output Voltage	• See table
Output Voltage Trim	• $\pm 10\%$
Minimum Load	• No minimum load required
Initial Set Accuracy	• $\pm 1\%$ max on V1, $\pm 2\%$ max on V2
Start Up Delay	• 5 ms typical
Start Up Rise Time	• 2 ms typical
Line Regulation	• $\pm 0.3\%$ max
Load Regulation	• $\pm 2\%$ max 0% to 10% load, • $\pm 1\%$ max 10% to 100% load
Cross Regulation	• $\pm 4\%$ max on dual with one output set to 50% load and the other varied from 10% to 100% load (D05 is 20% to 100%)
Transient Response	• 4% max deviation, recovery to within 1% in <500 μs for a 50% load change at 0.25 A/μs rate
Ripple & Noise	• 1% pk-pk max at 20 MHz bandwidth
Overload Protection	• 120% - 200%, trip and restart
Overvoltage Protection	• 115% - 140%
Temperature Coefficient	• $\pm 0.03/^{\circ}\text{C}$ max
Short Circuit Protection	• Trip and Restart (hiccup mode), auto recovery

General

Efficiency	• See tables
Isolation	• 4000 VAC for 1 min. double/reinforced with a working voltage of 250 VAC. Meets 2 x MOPP per 3rd edition of IEC60601-1 • 5000 VAC for 10 ms in accordance with IEC60664-1
Input to Output Capacitance	• 20 pF max
Switching Frequency	• 80 kHz to 1.2 MHz variable
Power Density	• 20.0 W/in³
MTBF	• >1 Mhrs typical to MIL-STD-217F at 25 $^{\circ}\text{C}$, GB

Environmental

Operating Temperature	• -40 $^{\circ}\text{C}$ to +80 $^{\circ}\text{C}$, see derating curve
Case Temperature	• +100 $^{\circ}\text{C}$ max
Storage Temperature	• -40 $^{\circ}\text{C}$ to +100 $^{\circ}\text{C}$
Operating Humidity	• 5-90%, non-condensing
Cooling	• Natural convection

EMC & Safety

Emissions	• EN55011 & EN55022 level A conducted & radiated with no external components
Immunity	• IEC60601-1-2, EN61204-3
ESD Immunity	• EN61000-4-2, level 2, Perf Criteria A
Radiated Immunity	• EN61000-4-3, 10 V/m Perf Criteria A
EFT/Burst	• EN61000-4-4, level 2 Perf Criteria A
Surge	• EN61000-4-5, level 1 Perf Criteria A
Conducted Immunity	• EN61000-4-6, 10 Vm, Perf Criteria A
Magnetic Field	• EN61000-4-8, 3 A/m Perf Criteria A
Safety Approvals	• ANSI/AMMI ES60601-1 3rd Edition • CSA-22.2 No.60601-1:2008 • IEC60601-1 3rd Edition

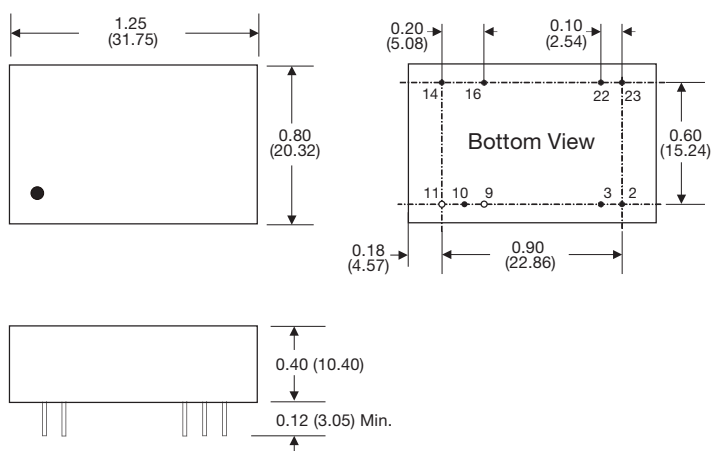
Input Voltage	Output Voltage	Output Current	Input Current		Maximum Capacitive Load	Efficiency ⁽³⁾	Model Number
			No Load ⁽¹⁾	Full Load ⁽²⁾			
4.5-9 V	5.0 V	2000 mA	100 mA	2690 mA	2200 μ F	83.5%	JHM1005S05
	12.0 V	833 mA	115 mA	2640 mA	1000 μ F	85.0%	JHM1005S12
	15.0 V	666 mA	115 mA	2640 mA	680 μ F	85.0%	JHM1005S15
	± 5.0 V	± 1000 mA	130 mA	2760 mA	± 1000 μ F	81.5%	JHM1005D05
	± 12.0 V	± 420 mA	115 mA	2695 mA	± 470 μ F	84.0%	JHM1005D12
9-18 V	5.0 V	2000 mA	50 mA	1310 mA	2200 μ F	86.0%	JHM1012S05
	12.0 V	833 mA	50 mA	1280 mA	1000 μ F	88.0%	JHM1012S12
	15.0 V	666 mA	50 mA	1265 mA	680 μ F	89.0%	JHM1012S15
	± 5.0 V	± 1000 mA	50 mA	1345 mA	± 1000 μ F	84.0%	JHM1012D05
	± 12.0 V	± 420 mA	50 mA	1290 mA	± 470 μ F	88.0%	JHM1012D12
18-36 V	5.0 V	2000 mA	25 mA	645 mA	2200 μ F	87.0%	JHM1024S05
	12.0 V	833 mA	20 mA	630 mA	1000 μ F	89.0%	JHM1024S12
	15.0 V	666 mA	20 mA	630 mA	680 μ F	89.0%	JHM1024S15
	± 5.0 V	± 1000 mA	20 mA	660 mA	± 1000 μ F	85.0%	JHM1024D05
	± 12.0 V	± 420 mA	25 mA	640 mA	± 470 μ F	88.0%	JHM1024D12
	± 15.0 V	± 333 mA	25 mA	635 mA	± 470 μ F	88.0%	JHM1024D15

Notes

1. Input current measured at nominal input voltage.
2. Input current measured at lowest input voltage.

3. Typical values.

Mechanical Details



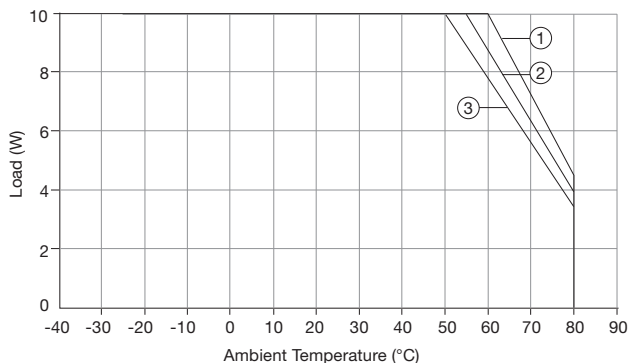
Pin Connections		
Pin	Single	Dual
2	-Vin	-Vin
3	-Vin	-Vin
9	No Pin	Common
10	Trim	Trim
11	No Pin	-Vout
14	+Vout	+Vout
16	-Vout	Common
22	+Vin	+Vin
23	+Vin	+Vin

Notes

1. All dimensions are in inches (mm)
2. Weight: 0.04 lbs (20 g) approx.
3. Pin diameter: 0.02 $\pm$ 0.002 (0.5 $\pm$ 0.05)
4. Pin pitch tolerance: $\pm$ 0.01 ($\pm$ 0.25)
5. Case tolerance: $\pm$ 0.02 ($\pm$ 0.5)

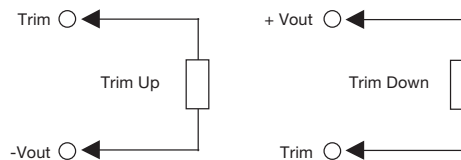
Application Notes

Derating Curve



- ① JHM1012/24 S05, S12, S15, D12, D15
- ② JHM1012/24 D05, JHM1005S05, S12, S15, D12, D15
- ③ JHM1005D05

External Output Trim



For 5 V output:
 Trim +10%, R = 3.4 k typical
 Trim -10%, R = 1 k typical

For 12 V output:
 Trim +10%, R = 5.9 k typical
 Trim -10%, R = 11.3 k typical

For 15 V output:
 Trim +10%, R = 8.3 k typical
 Trim -10%, R = 10 k typical

For ± 5 V output:
 Trim +10%, R = 12.0 k typical
 Trim -10%, R = 8.0 k typical

For ± 12 V output:
 Trim +10%, R = 12.8 k typical
 Trim -10%, R = 9.5 k typical

For ± 15 V output:
 Trim +10%, R = 18 k typical
 Trim -10%, R = 14.8 k typical