

## JAH Series



- Low Cost
- DIP-24 Package
- Operating Temperature  $-40\text{ }^{\circ}\text{C}$  to  $+100\text{ }^{\circ}\text{C}$
- Single & Dual Outputs
- Optional Metal Case
- Optional Isolation to 6000 VDC
- 3 Year Warranty

## Specification

## Input

Input Voltage Range	• Nominal $\pm 10\%$
Input Current	• See table
Input Filter	• Pi network
Input Reverse Voltage Protection	• None
Undervoltage Lockout	• None
Input Reflected Ripple	• 35 mA pk-pk through 12 $\mu\text{H}$ inductor, 5 Hz to 20 MHz
Input Surge	• 5 V models 7 VDC for 100 ms 12 V models 15 VDC for 100 ms 24 V models 28 VDC for 100 ms

## Output

Output Voltage	• See table
Minimum Load	• No minimum load required
Initial Set Accuracy	• $\pm 2\%$ max
Start Up Delay	• 20 ms typical
Start Up Rise Time	• 20 ms typical
Line Regulation	• $\pm 0.5\%$ max
Load Regulation	• $\pm 0.5\%$ max single & dual models ( $\pm 1.0\%$ max for 3V3 versions) (see note 6)
Cross Regulation	• $\pm 5\%$ on dual output models (see note 4)
Transient Response	• $\pm 3\%$ max deviation ( $\pm 5\%$ for 3V3 output), recovery to within 1% in 2 ms for a 50% load change
Ripple & Noise	• 75 mV pk-pk measured with 20 MHz bandwidth
Short Circuit Protection	• Output shuts down with auto recovery
Maximum Capacitive Load	• See tables
Temperature Coefficient	• $\pm 0.02/^{\circ}\text{C}$ max

## General

Efficiency	• See tables
Isolation	• 1000 VDC input to output, for optional high isolation versions up to 6000 VDC input to output (see note 1) 1000 VDC input to case 1000 VDC output to case
Isolation Resistance	• $10^9\Omega$
Switching Frequency	• 40 kHz typical singles, 300 kHz typical duals
Power Density	• 5.21 W/in <sup>3</sup>
MTBF	• >3 Mhrs to MIL-HDBK-217F at 25 $^{\circ}\text{C}$ , GB

## Environmental

Operating Temperature	• $-40\text{ }^{\circ}\text{C}$ to $+100\text{ }^{\circ}\text{C}$ , derate from 100% load at $+85\text{ }^{\circ}\text{C}$ to no load at $+100\text{ }^{\circ}\text{C}$
Case Temperature	• $+100\text{ }^{\circ}\text{C}$ max
Storage Temperature	• $-40\text{ }^{\circ}\text{C}$ to $+125\text{ }^{\circ}\text{C}$
Humidity	• Up to 90%, non-condensing
Cooling	• Natural convection

## EMC &amp; Safety

Emissions	• EN55022 class A, conducted & radiated with external components (see Application Notes)
ESD Immunity	• EN61000-4-2, level 3, Perf Criteria A
EFT/Burst	• EN61000-4-4, level 3, Perf Criteria A (see note 5)
Surge	• EN61000-4-5, installation class 2, Perf Criteria A (see note 5)
Conducted Immunity	• EN61000-4-6, 10 Vrms, Perf Criteria A
Magnetic Fields	• EN61000-4-8, 1 A/m, Perf Criteria A

## Models and Ratings

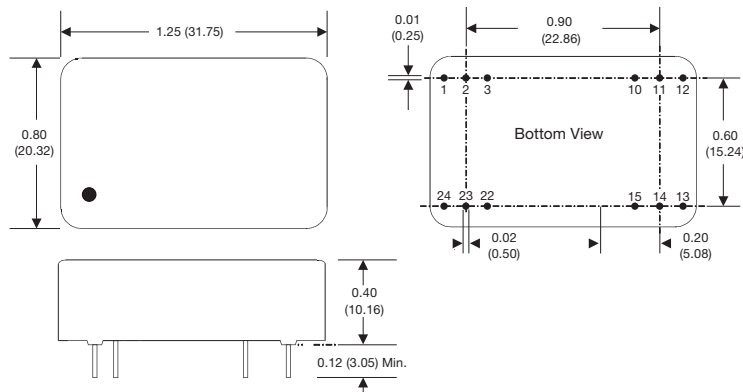
Input Voltage	Output Voltage	Output Current	Input Current <sup>(2)</sup>		Maximum Capacitive Load	Efficiency	Model Number <sup>(1,3)</sup>
			No Load	Full Load			
5 V	3.3 V	500 mA	75 mA	622 mA	330 µF	53%	JAH0205S3V3
	5.0 V	400 mA	75 mA	615 mA	330 µF	65%	JAH0205S05
	9.0 V	222 mA	75 mA	597 mA	330 µF	67%	JAH0205S09
	12.0 V	166 mA	75 mA	571 mA	330 µF	70%	JAH0205S12
	15.0 V	133 mA	75 mA	588 mA	330 µF	68%	JAH0205S15
	24.0 V	83 mA	75 mA	615 mA	330 µF	65%	JAH0205S24
	±3.3 V	±300 mA	30 mA	638 mA	±1000 µF	62%	JAH0205D03
	±5.0 V	±200 mA	30 mA	588 mA	±1000 µF	68%	JAH0205D05
	±9.0 V	±111 mA	40 mA	571 mA	±470 µF	70%	JAH0205D09
	±12.0 V	±83 mA	40 mA	571 mA	±470 µF	70%	JAH0205D12
12 V	3.3 V	500 mA	70 mA	245 mA	330 µF	56%	JAH0212S3V3
	5.0 V	400 mA	70 mA	260 mA	330 µF	64%	JAH0212S05
	9.0 V	222 mA	70 mA	245 mA	330 µF	68%	JAH0212S09
	12.0 V	166 mA	70 mA	238 mA	330 µF	70%	JAH0212S12
	15.0 V	133 mA	70 mA	252 mA	330 µF	66%	JAH0212S15
	24.0 V	83 mA	70 mA	256 mA	330 µF	65%	JAH0212S24
	±3.3 V	±300 mA	20 mA	250 mA	±1000 µF	66%	JAH0212D03
	±5.0 V	±200 mA	20 mA	228 mA	±1000 µF	73%	JAH0212D05
	±9.0 V	±111 mA	20 mA	222 mA	±470 µF	75%	JAH0212D09
	±12.0 V	±83 mA	20 mA	213 mA	±470 µF	78%	JAH0212D12
24 V	3.3 V	500 mA	25 mA	120 mA	330 µF	57%	JAH0224S3V3
	5.0 V	400 mA	25 mA	132 mA	330 µF	63%	JAH0224S05
	9.0 V	222 mA	25 mA	132 mA	330 µF	63%	JAH0224S09
	12.0 V	166 mA	25 mA	122 mA	330 µF	68%	JAH0224S12
	15.0 V	133 mA	25 mA	122 mA	330 µF	68%	JAH0224S15
	24.0 V	83 mA	25 mA	122 mA	330 µF	68%	JAH0224S24
	±3.3 V	±300 mA	15 mA	121 mA	±1000 µF	68%	JAH0224D03
	±5.0 V	±200 mA	15 mA	114 mA	±1000 µF	73%	JAH0224D05
	±9.0 V	±111 mA	15 mA	111 mA	±470 µF	75%	JAH0224D09
	±12.0 V	±83 mA	15 mA	104 mA	±470 µF	80%	JAH0224D12
24 V	3.3 V	500 mA	25 mA	120 mA	330 µF	57%	JAH0224D15
	5.0 V	400 mA	25 mA	132 mA	330 µF	63%	JAH0224D05
	9.0 V	222 mA	25 mA	132 mA	330 µF	63%	JAH0224D09
	12.0 V	166 mA	25 mA	122 mA	330 µF	68%	JAH0224D12
	15.0 V	133 mA	25 mA	122 mA	330 µF	68%	JAH0224D15
	24.0 V	83 mA	25 mA	122 mA	330 µF	68%	JAH0224D24
	±3.3 V	±300 mA	15 mA	121 mA	±1000 µF	68%	JAH0224D03
	±5.0 V	±200 mA	15 mA	114 mA	±1000 µF	73%	JAH0224D05
	±9.0 V	±111 mA	15 mA	111 mA	±470 µF	75%	JAH0224D09
	±12.0 V	±83 mA	15 mA	104 mA	±470 µF	80%	JAH0224D12
±15.0 V	±67 mA	20 mA	108 mA	±470 µF	77%	JAH0224D15	
±24.0 V	±42 mA	20 mA	111 mA	±220 µF	75%	JAH0224D24	

### Notes

- For optional 3000 VDC isolation add suffix '-H' to model number.  
For optional 4000 VDC isolation add suffix '-H4' to model number.  
For optional 5000 VDC isolation add suffix '-H5' to model number.  
For optional 6000 VDC isolation add suffix '-H6' to model number.
- Input current measured at nominal input voltage.
- For optional metal case add suffix '-M'. Metal case is only an option up to 3000 VDC isolation versions eg. JAH0212S15-HM.
- Cross regulation is ±5% when one output is at 100% and the other is varied between 25% and 100%.
- A 220 µF/250 V capacitor across the input is required in order to meet EN61000-4-4 and EN61000-4-5.
- Dual output regulation is specified with a balanced load.

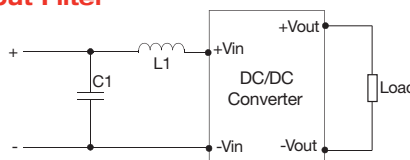
## Mechanical Details

PIN CONNECTIONS				
Pin	Single	Dual	Single -H	Dual -H
1	+Vin	+Vin	+Vin	+Vin
2	N.C.	-Vout	+Vin	+Vin
3	N.C.	Common	N.P	N.P
10	-Vout	Common	N.P	Common
11	+Vout	+Vout	N.P	Common
12	-Vin	-Vin	-Vout	N.P
13	-Vin	-Vin	+Vout	-Vout
14	+Vout	+Vout	N.P	N.P
15	-Vout	Common	N.P	+Vout
22	N.C.	Common	N.P	N.P
23	N.C.	-Vout	-Vin	-Vin
24	+Vin	+Vin	-Vin	-Vin



### Application Notes

#### Input Filter



Single Output Models		Dual Output Models	
C1	L1	C1	L1
220 µF/100 V	12 µH	220 µF/100 V	22 µH

N.P : No Pin

N.C : No Connection

### Notes

- All dimensions are in inches (mm)
- Weight: Plastic Case: 0.028 lbs (12.5 g), Metal Case: 0.033 lbs (15.0 g)
- Pin diameter: 0.02±0.002 (0.5±0.05)
- Pin pitch tolerance: ±0.014 (±0.35)
- Case tolerance: ±0.02 (±0.5)