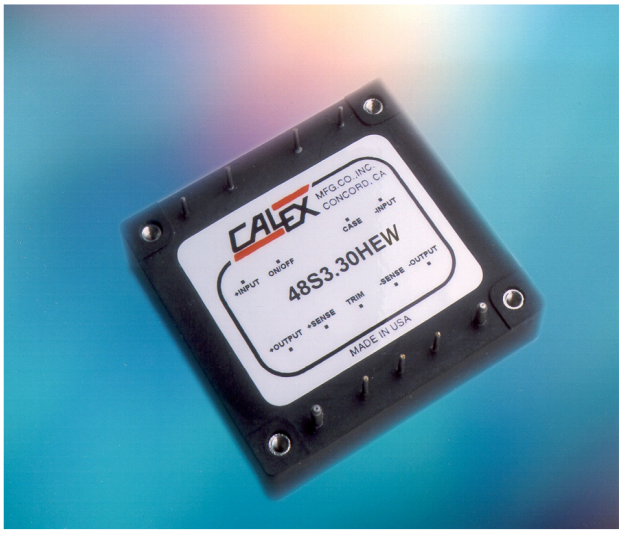
150 WATT HEW SINGLE SERIES DC/DC CONVERTERS



Description

The 4:1 Input Voltage 150 W single HEW Series of DC/DC converters provide precisely regulated dc outputs. The output voltage is fully isolated from the input, allowing the output to be positive or negative polarity and with various ground connections. The HEW Series meets the most rigorous performance standards in the industry standard case size for data communications and process control applications.

The 4:1 Input Voltage 150 Watt HEW Series includes remote sensing, output trim, and remote ON/OFF. Threaded-through holes are provided to allow easy mounting or add a heat sink for extended temperature use.

Features

- 4:1 Input voltage range
- High power density
- Small size 2.4” x 2.28” x 0.55”
- Excellent thermal performance with metal baseplate
- Volt-seconds clamp and fast over voltage protection
- Pulse-by-pulse current limiting, short circuit frequency foldback, dead short shut down
- Over-temperature protection
- Auto-softstart
- Low noise
- Industry-standard pinout
- Constant frequency during normal operation
- Remote sense
- Remote ON/OFF
- Super energy saving, 8 mA input idle current
- Output trim with very low temperature coefficient
- Water washable, wide humidity application
- Good shock and vibration damping
- Available in both RoHS and Non-RoHS construction. See ordering info below model selection chart

Selection Chart					
Model	Input Range VDC		Iin ADC	Vout VDC	Iout ADC
	Min	Max	TYP		
24S3.30HEW	9	36	5.00	3.3	30
24S5.30HEW	9	36	7.80	5	30
24S12.12HEW	9	36	7.18	12	12.5
24S15.10HEW	9	36	7.10	15	10
24S24.6HEW	9	36	7.10	24	6.26
48S3.30HEW	18	75	2.45	3.3	30
48S5.30HEW	18	75	3.60	5	30
48S12.12HEW	18	75	3.57	12	12.5
48S15.10HEW	18	75	3.50	15	10
48S24.6HEW	18	75	3.50	24	6.26

Default ON/OFF logic is positive.
Add -N to the model number to order negative ON/OFF logic.
To order RoHS, add (RoHS) to the part number.

A thermal management device, such as a heat sink is required to ensure proper operation of this device. The thermal management medium is required to maintain baseplate temperature < 100ºC

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Unless otherwise stated, these specifications apply for baseplate temperature T_B=23±2ºC, nominal input voltage, and rated full load. (1)

Input Parameters							
Model		**24S3.30HEW**	**24S5.30HEW**	**24S12.12HEW**	**24S15.10HEW**	**24S24.6HEW**	**Units**
Voltage Range	MIN TYP MAX	9 24 36					V
Input Overvoltage (100 ms)	MAX	50					V
Input Ripple Rejection (120Hz)	TYP	60					dB
Undervoltage Lockout		Yes					
Input Reverse Voltage Protection		Yes					
Input Current No Load 100% Load	TYP TYP	35 5.0	35 7.8	35 7.18	35 7.10	35 7.10	mA A
Inrush Current	MAX	0.5					A^2s
Reflected Ripple, 12µH Source Impedance (3)	TYP	30					mA P-P
Efficiency	TYP	78	80	85	86	86	%
Switching Frequency	TYP	260					kHz
Recommended Fuse		(2)					A

Input Parameters							
Model		**48S3.30HEW**	**48S5.30HEW**	**48S12.12HEW**	**48S15.10HEW**	**48S24.6HEW**	**Units**
Voltage Range	MIN TYP MAX	18 48 75					V
Input Overvoltage (100 ms)	MAX	80					V
Input Ripple Rejection (120Hz)	TYP	60					dB
Undervoltage Lockout		Yes					
Input Reverse Voltage Protection		Yes					
Input Current No Load 100% Load	TYP TYP	25 2.45	25 3.60	25 3.57	25 3.50	25 3.50	mA A
Inrush Current	MAX	0.5					A^2s
Reflected Ripple, 12µH Source Impedance (3)	TYP	30					mA P-P
Efficiency	TYP	81	85	88	88	89	%
Switching Frequency	TYP	260					kHz
Recommended Fuse		(2)					A

* Absolute Maximum Ratings. Caution: Stresses in excess of the Absolute Maximum Ratings can cause permanent damage to the device (see Note 1.)

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Output Parameters							
Model		**24S3.30HEW 48S3.30HEW**	**24S5.30HEW 48S5.30HEW**	**24S12.12HEW 48S12.12HEW**	**24S15.10HEW 48S15.10HEW**	**24S24.6HEW 48S24.6HEW**	**Units**
Output Voltage		3.3	5	12	15	24	V
Output Voltage Setpoint Accuracy	MAX	±1					%
Turn On Overshoot Min-Max Load	TYP	0					%
Temperature Coefficient	TYP MAX	0.005 0.01	0.003 0.005	0.003 0.005	0.003 0.005	0.003 0.005	%/ºC
Noise (8)	TYP TYP	75 20	75 20	150 60	150 60	250 100	mV P-P mV RMS
Load Current (4)	MIN MAX	3 30	3 30	1.25 12.5	1 10	0.626 6.26	A
Load Transient Overshoot (7)	TYP	3					%
Load Transient Recovery Time (6)	TYP	200					µs
Load Regulation (5) Min-Max Load	TYP MAX	0.02 0.2					%
Line Regulation Vin = Min-Max	TYP MAX	0.01 0.1					%
Overvoltage Protection (OVP) Threshhold OVP Type - Non-latching Open Loop Overvoltage Clamp	MIN MAX	115 135					%
Output Current Limit Vout = 90% of Vout-nom	TYP	120					%
Output Short Circuit Current Vout = 0.25V	TYP MAX	140 150					%

Notes:

(1) Refer to the CALEX Application Notes for the definition of terms, measurement circuits, and other information.

(2) Refer to the CALEX Application Notes for information of fusing. For inrush current, refer to the specifications above.

(3) 100µF capacitor connected between the two “Input” pins. Then insert current sensor in series with 1.0µH inductor between 100µF and the source. The reflected ripple current is measured over a 5 Hz to 20 MHz bandwidth. (current sensor is located between the converter input pin and the 1.0 µH inductor)

(4) Optimum performance is obtained when this power supply is operated within the minimum to maximum load specifications. No damage to the module will occur when the output is operated at less than minimum load, however, below minimum load the dynamic response will degrade. Operation below minimum load is not recommended.

(5) Load Regulation is defined as the output voltage change when changing load current from a maximum to minimum.

(6) Load Transient Recovery Time is defined as the time for the output to settle from a 50% to 75% step load change to a 1% error band (rise time of step = 2µs).

(7) Load Transient Overshoot is defined as the peak overshoot during a transient as defined in the Note 6 above.

(8) Noise is measured per the CALEX Application Notes. Output noise is measured with a 10µF tantalum capacitor in parallel with a 0.1µF ceramic capacitor connected across the output pins. Measurement bandwidth is 0-20MHz.

(9) When an external ON/OFF switch is used, such as open collector switch, logic high requires the switch to be high-impedance. Switch leakage currents greater than 10µA may be sufficient to trigger the ON/OFF to the logic-low state.

(10) Most switches would be suitable for the logic ON/OFF control. In case there is a problem you can make the following estimations and then leave some margin.
When open collector is used for logic high, “Open Circuit Voltage at ON/OFF Pin”, “Output Resistance” and “External Leakage Current Allowed for Logic High” are used to estimate the high impedance requirement of open collector.
When switch is used for logic low, “Open Circuit Voltage at ON/OFF Pin”, “Output Resistance” and “LOW Logic Level” are used to estimate the low impedance requirement of the switch.

(11) Thermal impedance is tested with the converter mounted vertically and facing another printed circuit board 1/2 inch away. If converter is mounted horizontally with no obstruction, thermal impedance is approximately 8°C/W.

(12) Water Washability - Calex DC/DC converters are designed to withstand most solder/wash processes. Careful attention should be used when assessing the applicability in your specific manufacturing process. Converters are not hermetically sealed.

(13) Torque fasteners into threaded mounting inserts at 12 in.lbs. or less. Greater torque may result in damage to unit and void the warranty.

(14) Input impedance on these units needs to be kept to a minimum. The 9-36Vdc DC units need a maximum input impedance of 0.135 Ohms and the 18-75Vdc DC units need a maximum input impedance of 0.54 Ohms. In order to support this requirement, the 9-36Vdc DC units need 55 µF of capacitance (low ESR) for every 1.0 µH of inductance between the power source and the DC/DC converter. The 18-75Vdc DC units need 3.5µF of capacitance (low ESR) for every 1.0 µH of inductance between the power source and the DC/DC converter. Inductance includes all sources and should take into account input power lines.

(15) RoHS Compliance:
See Calex Website www.calex.com/RoHS.html for the complete RoHS Compliance statement.
The RoHS marking is as follows.

RoHS

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General Specifications			
All Models			**Units**
ON/OFF Function			
HIGH Logic Level or Leave ON/OFF Pin Open	MIN	3.0	VDC
External Leakage Current Allowed for Logic High (9)	MAX	10	µA
Input Diode Protection Voltage	MAX	50	VDC
LOW Logic Level or Tie ON/OFF Pin to -INPUT	MAX	1.0	VDC
Sinking Current for Logic Low	MAX	500	µA
Open Circuit Voltage at ON/OFF Pin (10) Positive Logic Negative Logic	 TYP TYP	 2.3 1.5	 VDC VDC
Output Resistance	TYP	3	k Ω
Idle Current (Module is OFF)	TYP	8	mADC
Turn-on Time to 1% error	TYP	60	ms
Positive Logic Option	HIGH - Module ON LOW - Module OFF		
Negative Logic Option	HIGH - Module OFF LOW - Module ON		
Output Voltage Remote Sensing			
Maximum Voltage Drops on Leads	MAX	10	%
Line Regulation under remote sensing	TYP MAX	0.02 0.1	%
Load Regulation under remote sensing	TYP MAX	0.05 0.2	%
Output Voltage Trim			
Trim Range	MIN MAX	-10 +10	% of Vout
Input Resistance	TYP	10	kΩ
Open Circuit Voltage	TYP	2.5	V
Trim Limit			
Maximum Output Voltage	MAX	110	% of Vout
Isolation			
Input to Output Isolation 10µA Leakage Vnom = 24V Vnom = 48V	 MAX MAX	 700 1544	 VDC VDC
Input to Output Resistance	MIN	10	MΩ
Input to Output Capacitance	TYP	1600	pF

General Specifications			
All Models			**Units**
Environmental			
Calculated MTBF, Bellcore Method 1, Case 1	>1,000,000		h
Baseplate Operating Temperature Range	MIN MAX	-40 100	ºC
Storage Temperature	MIN MAX	-40 120	ºC
Thermal Impedance (11)	TYP	7	ºC/W
Thermal Shutdown Baseplate Temperature (Auto Restart)	MIN TYP	100 110	ºC
General			
Unit Weight	TYP	4.6/114	oz/g
Case Dimension		2.4” x 2.28” x 0.55”	
Torque on Mounting Inserts	MAX	12 in. lbs.	
Agency Approvals			
UL		IEC 60950-1, EN60950-1	
Chassis Mounting Kit		MS21	

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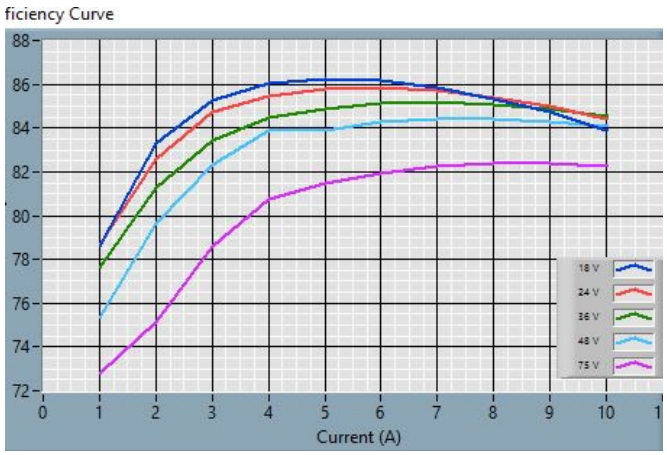
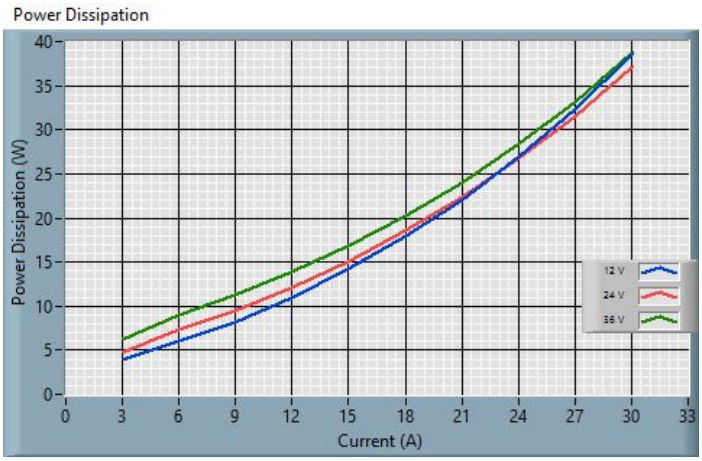
Characteristic Curves-
Efficiency and Power Dissipation

24V Models Typical

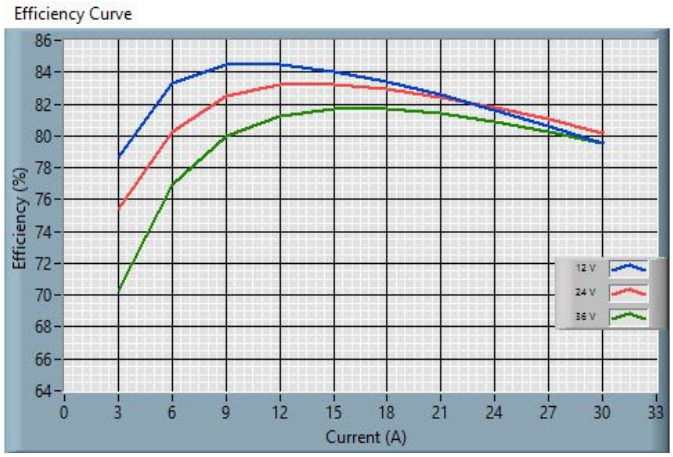


Based on 24S5.30HEW Efficiency Curve

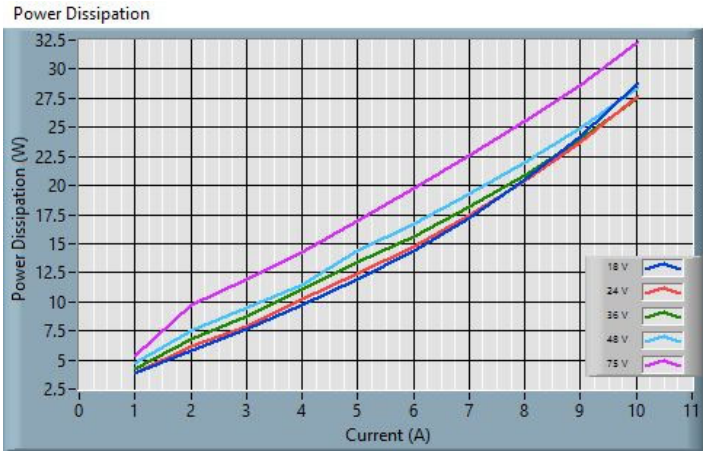


Based on 24S5.30HEW Power Dissipation Curve

48V Models Typical



Based on 48S15.10HEW Efficiency Curve



Based on 48S15.10HEW Power Dissipation Curve

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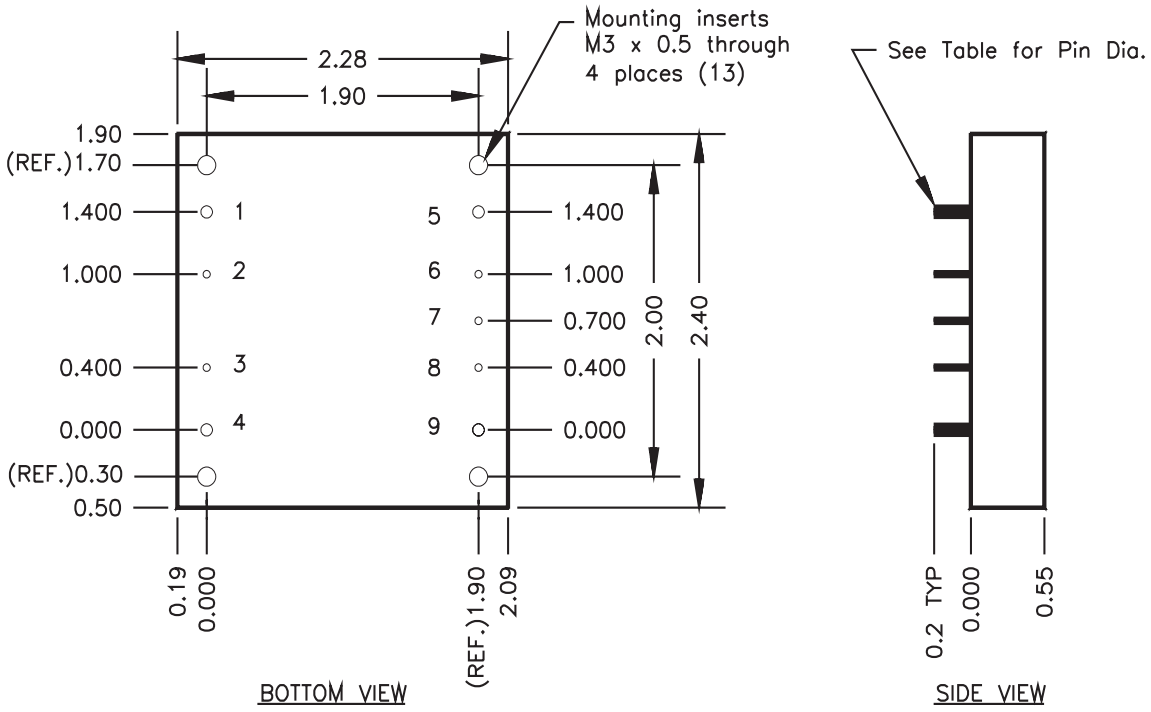
Case Mechanicals:



TOLERANCE: ALL DIMENSIONS ARE TYPICAL IN INCHES UNLESS OTHERWISE NOTED:	
X.XX	±0.020
X.XXX	±0.005

Pin	Name	24Vin Pin Dia.	48Vin Pin Dia.
1	-INPUT	0.08”	0.04”
2	CASE	0.04”	0.04”
3	ON/OFF	0.04”	0.04”
4	+INPUT	0.08”	0.04”
5	-OUTPUT	0.08”	0.08”
6	-SENSE	0.04”	0.04”
7	TRIM	0.04”	0.04”
8	+ SENSE	0.04”	0.04”
9	+ OUTPUT	0.08”	0.08”

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