

# 75 WATT QH SINGLE SERIES DC/DC CONVERTERS



## Features

- Small size, 1.45" x 2.28" x 0.52" industry standard 1/4 brick
- Excellent thermal performance with metal baseplate
- High Efficiency
- Fast over voltage protection
- Pulse-by-pulse current limiting, dead short current limiting
- Over-temperature protection
- Auto-softstart
- Very Low noise
- Low profile magnetics run cooler
- Constant frequency for normal operation
- More than 2:1 input voltage range
- Remote Sense with high regulation
- Remote ON/OFF
- Super energy saving, 6 mA input idle current
- Output trim with very low temperature coefficient
- Water Washable, wide humidity application
- Good shock and vibration damping
- Low Cost

## Description

The 75 Watt single QH series of DC/DC Converters provide precisely regulated dc outputs. All outputs are fully isolated from the inputs, allowing the output to be used with positive or negative polarity and various grounding options. The QH Series meets the most rigorous requirements in an industry standard case size for industrial process control and telecom applications. Standard features include 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.

Selection Chart					
Model	Input Range VDC		lin ADC	Vout VDC	Iout ADC
	Min	Max	TYP		
24S3.20QH	18	36	3.31	3.3	20
24S5.15QH	18	36	3.63	5	15
24S12.6QH	18	36	3.59	12	6.25
24S15.5QH	18	36	3.55	15	5
24S24.3QH	18	36	3.55	24	3.13
48S24.3QH	36	75	1.76	24	3.13

Default ON/OFF logic is positive.  
Add -N to the model number to order negative On/Off logic.



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

Input Parameters							
Model		24S3.20QH	24S5.15QH	24S12.6QH	24S15.5QH	24S24.3QH	Units
Voltage Range	MIN TYP MAX	18 24 36					VDC
Input Overvoltage (100 ms)	MAX	50					VDC
Input Ripple Rejection (120Hz)	TYP	60					dB
Undervoltage Lockout		Yes					
Input Reverse Voltage Protection		Yes					
Input Current	No Load 100% Load	TYP TYP	50 3.3	50 3.6	50 3.6	50 3.6	mA A
Inrush Current	MAX	0.2					A <sup>2</sup> s
Reflected Ripple, 12µH Source Impedance (3)	TYP	10					mA P-P
Efficiency	TYP	79	85	86	87	87	%
Switching Frequency	TYP	360					kHz
Recommended Fuse		(2)					A

Input Parameters				
Model		48S24.3QH		Units
Voltage Range	MIN TYP MAX	36 48 75		VDC
Input Overvoltage (100 mSec)	MAX	85		VDC
Input Ripple Rejection (120Hz)	TYP	60		dB
Undervoltage Lockout		Yes		
Input Reverse Voltage Protection		Yes		
Input Current	No Load 100% Load	TYP TYP	80 1.8	mA A
Inrush Current	MAX	0.2		A <sup>2</sup> s
Reflected Ripple, 12µH Source Impedance (3)	TYP	10		mA P-P
Efficiency	TYP	87		%
Switching Frequency	TYP	360		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		24S3.20QH	24S5.15QH	24S12.6QH	24S15.5QH	24S24.3QH 48S24.3QH	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	%/°C
Noise (8)	TYP	50	50	75	100	150	mV P-P
Ripple	TYP	20	20	40	50	70	mV RMS
Load Current (4)	MIN MAX	1 20	0.75 15	0.32 6.25	0.25 5	0.16 3.13	% I <sub>OUT</sub> Rated
Load Transient Overshoot (7)	TYP	2					%
Load Transient Recovery Time (6)	TYP	0.8					µs
Load Regulation (5) Min-Max Load	TYP MAX	0.05 0.5					%
Line Regulation V <sub>in</sub> = Min-Max	TYP MAX	0.02 0.5					%
Overvoltage Protection (OVP) Threshold OVP Type - Non-latching Open Loop Overvoltage Clamp	MIN MAX	115 135					%
Output Current Limit V <sub>out</sub> = 90% of V <sub>out-nom</sub>	TYP	120					%
Output Short Circuit Current V <sub>out</sub> = 0.1V	TYP	160					%

## Notes:

- Refer to the CALEX Application Notes for the definition of terms, measurement circuits, and other information.
- Refer to the CALEX Application Notes for information on fusing. For inrush current, refer to the specifications above.
- 33 µF capacitor connected between the two "Input" pins. Then insert current sensor in series with 12 µH inductor between 33 µF 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 12 µH inductor).
- 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, but the output voltage may contain a low frequency component that may exceed output noise specifications.  
At no load the converter output voltage will fall out of regulation, typically rising to the OVP limit. A load current between 0.5% to 1% of maximum rated load will usually suffice to bring the output voltage within regulation.
- Load regulation is defined as the output voltage change when changing load current from a maximum to minimum. The voltage is measured at the output pin.
- Load Transient Recovery Time is defined as the time for the output to settle from a 50% to 75% or 25% step load change to a 1% error band of output voltage (rise time of step = 2 µs).
- Load Transient Overshoot is defined as the peak overshoot during a transient as defined in the Note 6 above.
- Noise is measured per the CALEX Application Notes. Output noise is measured with a 10 µF tantalum capacitor in parallel with a 0.1 µF ceramic capacitor connected across the output pins. Measurement bandwidth is 0-20 MHz.
- 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.
- 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.
- 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 10°C/W.  
If heat sink is needed, apply a very thin layer of thermally conductive grease on the metal base of converter, then properly tighten the screws.
- 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.
- Torque fasteners into threaded mounting inserts at 12 in.oz. or less. Greater torque may result in damage to unit and void the warranty.

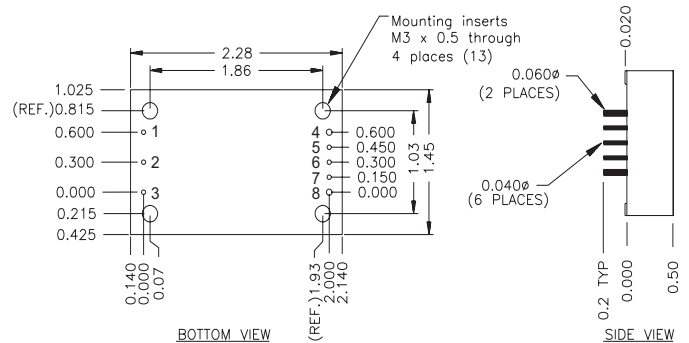


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General Specifications			
All Models			Units
<b>Remote ON/OFF Function</b>			
HIGH Logic Level or Leave ON/OFF Pin Open	MIN	3.0	VDC
External Leakage Current Allowed for Logic High (9)	MAX	20	µA
Input Diode Protection Voltage	MAX	50	VDC
LOW Logic Level or Tie ON/OFF Pin to -INPUT	MAX	0.8	VDC
Sinking Current for Logic Low	MAX	2	mA
	MAX	4	mA
Open Circuit Voltage at Primary ON/OFF Pin (10)	TYP	5.6	VDC
	TYP	1.5	VDC
Idle Current (Module is OFF)	TYP	6	mADC
Turn-on Time to 1% error	TYP	8	ms
Positive Logic Option	HIGH - Module ON LOW - Module OFF		
Negative Logic Option	HIGH - Module OFF LOW - Module ON		
<b>Output Voltage Trim</b>			
Trim Range	MIN MAX	±10	% of Vout
Input Resistance 2.5V and 3.3V	TYP	5	kΩ
Input Resistance All other voltages	TYP	10	kΩ
Open Circuit Voltage 2.5V and 3.3V	TYP	1.22	V
Open Circuit Voltage All other voltages	TYP	2.5	V
<b>Output Voltage Remote Sensing</b>			
Maximum Voltage Drops on Leads	MAX	0.5	VDC
Line Regulation under remote sensing	TYP	0.02	%
	MAX	0.5	%
Load Regulation under remote sensing	TYP	0.05	%
	MAX	0.5	%
<b>Sense and Trim Limit</b>			
Maximum Output Voltage	MAX	110	% of Vout
<b>Isolation</b>			
Input to Output Isolation 10µA Leakage Vnom = 24 V models Vnom = 48 V models	MAX	700	VDC
	MAX	1544	VDC
<b>Environmental</b>			
Calculated MTBF, Bellcore Method 1, Case 1		>1,000,000	h
Baseplate Operating Temperature Range	MIN	-40	°C
	MAX	100	°C
Storage Temperature	MIN MAX	-40 120	°C
Thermal Impedance (11)	TYP	9	°C/W

General Specifications			
All Models			Units
Thermal Shutdown Baseplate Temperature (Auto Restart)	MIN	100	°C
	TYP	110	
<b>General</b>			
Case Dimension	2.28" x 1.45" x 0.50"		
Agency Approvals - Designed to Meet	UL/CUL 60950		
Chassis Mounting Kit	MS21		
Torque on Mounting Inserts	MAX	12 in. lbs.	



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

Pin	Name	Pin Dia.
1	-INPUT	0.04"
2	ON/OFF	0.04"
3	+INPUT	0.04"
4	-OUTPUT	0.06"
5	-SENSE	0.04"
6	TRIM	0.04"
7	+ SENSE	0.04"
8	+ OUTPUT	0.06"

