

Size:
2.28 x 1.45 x 0.50 inches
(57.9 x 36.8 x 12.7 mm)

Applications:
- Railway Systems
- Measurement
- Telecom/Datacom
- Industry Control Systems
- IPC
- Automation
- Military

FEATURES

- Soft Start
- Single Outputs
- Input Under Voltage Protection
- High Efficiency up to 90%
- Remote ON/OFF Control
- 4:1 Ultra Wide Input Voltage Ranges
- No Minimum Load Required
- Low Stand-by Power Consumption
- Industry Standard Quarter-brick Package
- Compliant to RoHS II & Reach
- Up to 90 Watts Maximum Output Power
- 2250VDC I/O Basic Insulation
- Short Circuit, Over Voltage, Over Load, & Over Temp. Protection
- UL60950-1, EN60950-1, IEC60950-1, EN45545-2 & EN50155 Safety Approvals
- CE Marked
- Optional Heatsinks Available (Suffix “HS”)
- Threaded (Standard) or Thru-Hole (Optional) Inserts Available
- Railway Applications

DESCRIPTION

The DCQAW100 series of DC/DC power converters provides up to 90 Watts of output power in a 2.28” x 1.45” x 0.5” industry standard quarter-brick package. This series has single output models with 4:1 wide input voltage ranges of 8.5-36VDC, 16.5-75VDC, and 40-160VDC. Some features include high efficiency up to 90%, 2250VDC I/O basic insulation, and remote ON/OFF control. These converters are also protected against input under voltage, short circuit, over voltage, over load, and over temperature conditions. All models are RoHS compliant and have UL60950-1, EN60950-1, IEC60950-1, EN45545-2 and EN50155 safety approvals. Several different options are available for this series including negative logic remote ON/OFF, heatsinks, and thru-hole inserts.

MODEL SELECTION TABLE

Model Number	Input Voltage	Output Voltage	Output Current		Output Ripple & Noise	No Load Input Current	Output Power	Efficiency	Maximum Capacitive Load
			Min Load	Max Load					
DCQAW100-24S33	24 VDC (8.5 - 36 VDC)	3.3 VDC	0mA	25A	75mVp-p	25mA	82.5W	88%	75,000µF
DCQAW100-24S05		5 VDC	0mA	18A	75mVp-p	25mA	90W	89%	36,000µF
DCQAW100-24S12		12 VDC	0mA	7.5A	100mVp-p	25mA	90W	89%	6250µF
DCQAW100-24S15		15 VDC	0mA	6A	100mVp-p	25mA	90W	89%	4000µF
DCQAW100-24S24		24 VDC	0mA	3.7A	200mVp-p	25mA	88.8W	89%	1540µF
DCQAW100-24S30		30 VDC	0mA	3A	200mVp-p	25mA	90W	89%	1000µF
DCQAW100-24S48		48 VDC	0mA	1.8A	300mVp-p	25mA	86.4W	88%	380µF
DCQAW100-48S33	48 VDC (16.5 - 75 VDC)	3.3 VDC	0mA	25A	75mVp-p	15mA	82.5W	88%	75,000µF
DCQAW100-48S05		5 VDC	0mA	18A	75mVp-p	15mA	90W	89%	36,000µF
DCQAW100-48S12		12 VDC	0mA	7.5A	100mVp-p	15mA	90W	89%	6250µF
DCQAW100-48S15		15 VDC	0mA	6A	100mVp-p	15mA	90W	90%	4000µF
DCQAW100-48S24		24 VDC	0mA	3.7A	200mVp-p	15mA	88.8W	90%	1540µF
DCQAW100-48S30		30 VDC	0mA	3A	200mVp-p	15mA	90W	90%	1000µF
DCQAW100-48S48		48 VDC	0mA	1.8A	300mVp-p	15mA	86.4W	90%	380µF
DCQAW100-110S33	110 VDC (40 - 160 VDC)	3.3 VDC	0mA	23A	75mVp-p	8mA	75.9W	88%	70,000µF
DCQAW100-110S05		5 VDC	0mA	17A	75mVp-p	8mA	85W	89%	34,000µF
DCQAW100-110S12		12 VDC	0mA	7A	100mVp-p	8mA	84W	89%	5830µF
DCQAW100-110S15		15 VDC	0mA	5.5A	100mVp-p	8mA	82.5W	89%	3670µF
DCQAW100-110S24		24 VDC	0mA	3.5A	200mVp-p	8mA	84W	89%	1460µF
DCQAW100-110S30		30 VDC	0mA	2.8A	200mVp-p	8mA	84W	89%	930µF
DCQAW100-110S48		48 VDC	0mA	1.8A	300mVp-p	8mA	86.4W	89%	380µF

NOTES

1. Input Source Impedance: The power modules will operate to specifications without external components, assuming that the source voltage has very low impedance and reasonable input voltage regulation. Highly inductive source impedances can affect the stability of the power module. Since real-world voltage sources have finite impedance, performance is improved by adding an external filter capacitor.
   - For 24VDC & 48VDC input models we recommend using Nippon Chemi-con KY series, 100µF/100V.
   - For 110VDC input models we recommend using Ruby-con BXF series, 39µF/200V.
2. If remote sense is not being used, sense pins should connect to the output pins with the same polarity.
3. The DCQAW100 series can only meet EMI Class A or Class B with external components added. Please contact factory for more information.
4. An external input filter capacitor is required if the module has to meet EN61000-4-4, EN61000-4-5.
   - For 24VDC & 48VDC input models we recommend 2pcs of aluminum electrolytic capacitor (Nippon chemi-con KY series, 220µF/100V
   - For 110VDC input models we recommend 3pcs of aluminum electrolytic capacitor (Ruby-con BXF series, 100µF/250V)
5. Both positive logic and negative logic remote ON/OFF control is available. Positive logic remote ON/OFF comes standard; for negative logic remote ON/OFF add the suffix “R” to the model number (Ex: DCQAW100-48S24R).
6. Optional heatsinks available. See page 5 for ordering details.
7. M3 x 0.5 threaded-thru inserts come standard. For Ø.126 thru-hole inserts add the suffix “TH” to the model number (Ex: DCQAW100-48S24TH). Models with thru- hole inserts cannot be equipped with a heatsink.
8. BASE-PLATE GROUNDING: EMI can be reduced when you connect two screw bolts to the shield plane.

CAUTION: This power module is not internally fused. An input line fuse must always be used.

SPECIFICATIONS: DCQAW100 SERIES

All specifications are based on 25°C, Nominal Input Voltage, and Full Load unless otherwise noted.
We reserve the right to change specifications based on technological advances.

SPECIFICATION	TEST CONDITIONS			Min	Typ	Max	Unit
INPUT SPECIFICATIONS							
Input Voltage Range	24VDC nominal input models			8.5	24	36	VDC
	48VDC nominal input models			16.5	48	75	
	110VDC nominal input models			40	110	160	
Start-Up Voltage	24VDC nominal input models					9	VDC
	48VDC nominal input models					18	
	110VDC nominal input models					43	
Shutdown Voltage	24VDC nominal input models			7.3	7.7	8.1	VDC
	48VDC nominal input models			15.5	15.9	16.3	
	110VDC nominal input models			33.0	34.5	36.0	
Input Surge Voltage (1sec, max.)	24VDC nominal input models					50	VDC
	48VDC nominal input models					100	
	110VDC nominal input models					185	
Input Current	No Load			See Table			
Input Filter (See Note 1)				Pi type			
OUTPUT SPECIFICATIONS							
Output Voltage				See Table			
Voltage Accuracy				-1.0		+1.0	%
Line Regulation	Low line to high line at full load			-0.1		+0.1	%
Load Regulation	No load to full load		3.3V & 5V Output Models	-0.2		+0.2	%
			Others	-0.1		+0.1	
Voltage Adjustability	Maximum output deviation is inclusive of remote sense			-20		+10	%
Remote Sense (See Note 2)	% of Vo (nom)					10	%
Output Power				See Table			
Output Current				See Table			
Minimum Load				0			%
Maximum Capacitive Load	Minimum input and constant resistive load			See Table			
Ripple & Noise (20MHz BW)	Measured with a 22µF/25V X7R MLCC		3.3V & 5V Output Models		75		mVp-p
	Measured with a 22µF/25V X7R MLCC		12V & 15V Output Models		100		
	Measured with a 4.7µF/50V X7R MLCC		24V & 30V Output Models		200		
	Measured with a 2.2µF/100V X7R MLCC		48V Output Models		300		
Transient Response Recovery Time	25% load step change				250		µs
Start-Up Time	Constant resistive load		Power Up		75	100	ms
			Remote On/Off		75	100	
Temperature Coefficient				-0.02		+0.02	%/°C
PROTECTION							
Short Circuit Protection				Continuous, automatic recovery			
Over Load Protection	% of rated Iout; hiccup mode			110		140	%
Over Voltage Protection	% of Vo (nom); hiccup mode			115		130	%
Over Temperature Protection					+110		°C
GENERAL SPECIFICATIONS							
Efficiency	Nominal input voltage and full load			See Table			
Switching Frequency				270	300	330	kHz
Isolation Voltage	1 minute (reinforced insulation)	110VDC nominal input models	Input to Output	3000			VAC
			Input/Output to Base-plate	1500			VAC
	1 minute (basic insulation)	Others	Input to Output	2250			VDC
			Input/Output to Base-plate	2250			VDC
Isolation Resistance	500VDC			1			GΩ
Isolation Capacitance						1500	pF
REMOTE ON/OFF (See Note 5)							
Positive Logic (standard)	Referenced to –Input pin		DC/DC ON	Open or 3~12 VDC			
			DC/DC OFF	Short or 0~1.2VDC			
Negative Logic (optional)	Referenced to –Input pin		DC/DC ON	Short or 0~1.2 VDC			
			DC/DC OFF	Open or 3~12VDC			
Input Current of Remote Control Pin	Nominal Vin			-0.5		1	mA
Remote OFF State Input Current	Nominal Vin				3		mA

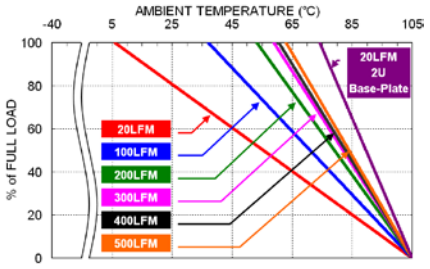
SPECIFICATIONS: DCQAW100 SERIES

All specifications are based on 25°C, Nominal Input Voltage, and Full Load unless otherwise noted.
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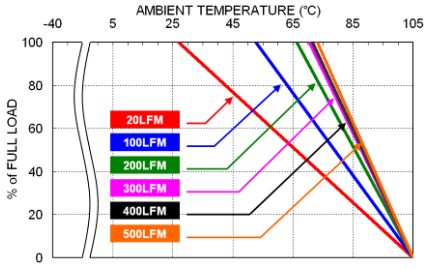
SPECIFICATION	TEST CONDITIONS		Min	Typ	Max	Unit
ENVIRONMENTAL SPECIFICATIONS						
Operating Base-Plate Temperature			-40		+105	°C
Storage Temperature Range			-55		+125	°C
Thermal Impedance (See Note 6)	Vertical direction by natural convection (20LFM)	Without Heatsink		9		°C/W
		With 0.24" Height Heatsink		7.1		
		With 0.5" Height Heatsink		5.5		
		Mounted on 2U iron base-plate		2.8		
Relative Humidity			5		95	% RH
Thermal Shock			MIL-STD-810F			
Shock			EN61373, MIL-STD-810F			
Vibration			EN61373, MIL-STD-810F			
MTBF	MIL-HDBK-217F, Full load		507,000 hours			
PHYSICAL SPECIFICATIONS						
Weight			2.26oz (64g)			
Dimensions (L x W x H)			2.28in x 1.45in x 0.50in (57.9mm x 36.8mm x 12.7 mm)			
Case Material			Aluminum base-plate with plastic case			
Potting Material			Silicon (UL94-V0)			
SAFETY & EMC CHARACTERISTICS						
Safety Approvals	IEC60950-1, UL60950-1, EN60950-1, EN50155, EN45545-2					
EMI (See Note 3)	EN55011, EN55032		Class A, Class B			
ESD	EN61000-4-2	Air ±8kV Contact ±6kV	Perf. Criteria A			
Radiated Immunity	EN61000-4-3	20 V/m	Perf. Criteria A			
Fast Transient (See Note 4)	EN61000-4-4	±2kV	Perf. Criteria A			
Surge (See Note 4)	EN61000-4-5	EN55024: ±2kV EN50155: ±2kV	Perf. Criteria A			
Conducted Immunity	EN61000-4-6	10 Vrms	Perf. Criteria A			
Power Frequency Magnetic Field	EN61000-4-8	100A/m continuous; 1000A/m 1 sec	Perf. Criteria A			

CHARACTERISTIC CURVES

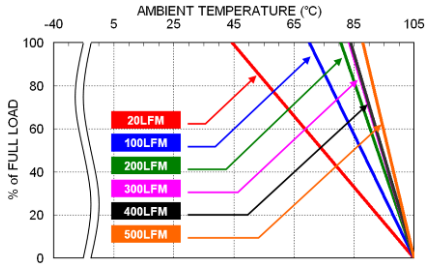
DCQAW100-24S05 Derating Curve



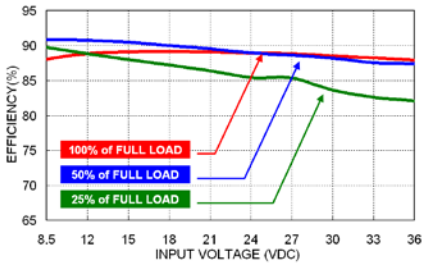
DCQAW100-24S05 Derating Curve w/ 0.24" Heatsink



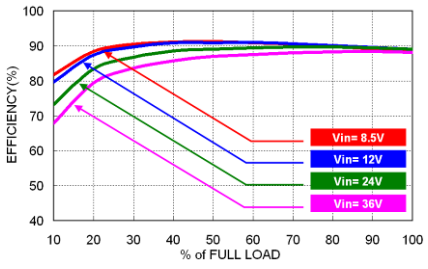
DCQAW100-24S05 Derating Curve w/ 0.5" Heatsink



DCQAW100-24S05 Efficiency vs Input Voltage



DCQAW100-24S05 Efficiency vs Output Load



OUTPUT VOLTAGE ADJUSTMENT

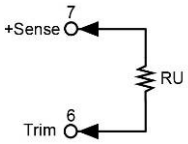
Output is adjustable for 10% trim up or -20% trim down of nominal output voltage by connecting an external resistor between the TRIM pin and either the +SENSE or -SENSE pins.
With an external resistor between the TRIM and -SENSE pin, the output voltage set decreases.
With an external resistor between the TRIM and +SENSE pin, the output voltage set point increases.
Maximum output deviation is +10% inclusive of remote sense. The external Trim resistor needs to be at least 1/8W of rated power.
Trim Up Equation

$$R_U = \left(\frac{5.11 V_{OUT}(100+\Delta\%)}{1.225\Delta\%} - \frac{(511+10.22\Delta\%)}{\Delta\%} \right) K\Omega$$

Trim Down Equation

$$R_D = \left(\frac{511}{\Delta\%} - 10.22 \right) K\Omega$$

TRIM UP



3.3V Output Models

ΔV (%)	1	2	3	4	5	6	7	8	9	10
Vout (V)	3.333	3.366	3.399	3.432	3.465	3.498	3.531	3.564	3.597	3.630
RU (kΩ)	869.117	436.331	292.07	219.939	176.66	147.808	127.198	111.742	99.72	90.103

5V Output Models

ΔV (%)	1	2	3	4	5	6	7	8	9	10
Vout (V)	5.05	5.10	5.15	5.20	5.25	5.30	5.35	5.40	5.45	5.50
RU (kΩ)	1585.35	797.994	535.542	404.316	325.58	273.09	235.596	207.476	185.605	168.109

12V Output Models

ΔV (%)	1	2	3	4	5	6	7	8	9	10
Vout (V)	12.12	12.24	12.36	12.48	12.60	12.72	12.84	12.96	13.08	13.20
RU (kΩ)	4534.55	2287.19	1538.08	1163.52	938.78	788.956	681.939	601.676	539.25	489.309

15V Output Models

ΔV (%)	1	2	3	4	5	6	7	8	9	10
Vout (V)	15.15	15.30	15.45	15.60	15.75	15.90	16.05	16.20	16.35	16.50
RU (kΩ)	5798.49	2925.42	1967.73	1488.89	1201.58	1010.04	873.229	770.619	690.812	626.966

24V Output Models

ΔV (%)	1	2	3	4	5	6	7	8	9	10
Vout (V)	24.24	24.48	24.72	24.96	25.20	25.44	25.68	25.92	26.16	26.40
RU (kΩ)	9590.32	4840.11	3256.7	2465	1989.98	1673.3	1447.1	1277.45	1145.5	1039.94

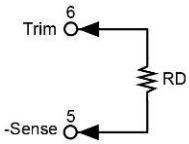
30V Output Models

ΔV (%)	1	2	3	4	5	6	7	8	9	10
Vout (V)	30.3	30.6	30.9	31.2	31.5	31.8	32.1	32.4	32.7	33
RU (kΩ)	12118.2	6116.57	4116.02	3115.74	2515.58	2115.47	1829.68	1615.33	1448.62	1315.25

48V Output Models

ΔV (%)	1	2	3	4	5	6	7	8	9	10
Vout (V)	48.48	48.96	49.44	49.92	50.40	50.88	51.36	51.84	52.32	52.80
RU (kΩ)	19701.9	9945.94	6693.96	5067.97	4092.38	3441.99	2977.42	2628.99	2357.99	2141.19

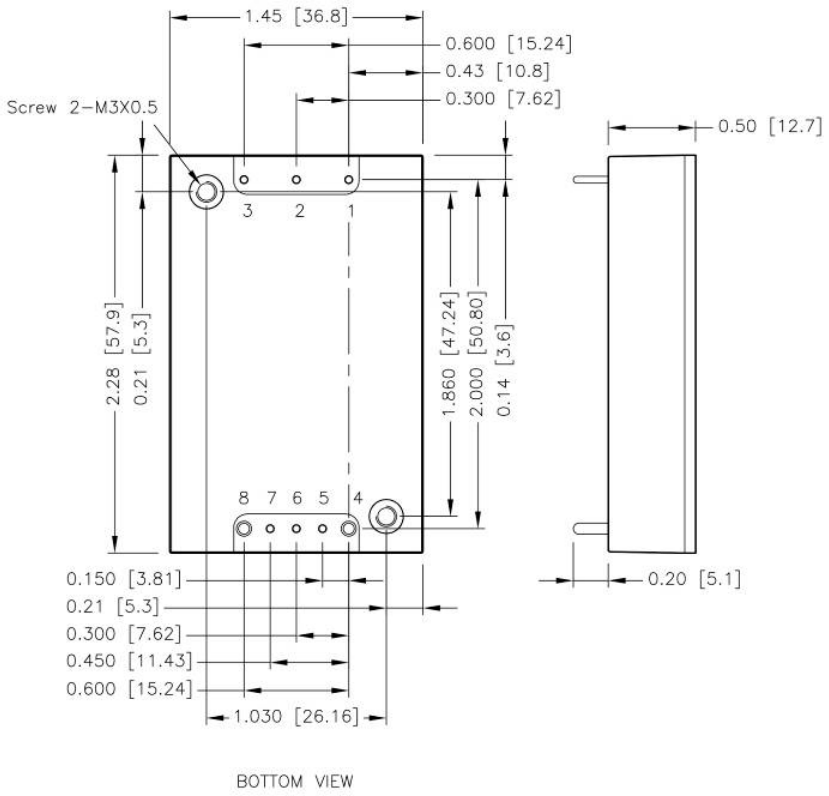
TRIM DOWN



All models

ΔV (%)	1	2	3	4	5	6	7	8	9	10
RD (kΩ)	500.78	245.28	160.113	117.53	91.98	74.947	62.78	53.655	46.558	40.88
ΔV (%)	11	12	13	14	15	16	17	18	19	20
RD (kΩ)	36.235	32.363	29.088	26.28	23.847	21.718	19.839	18.169	16.675	15.33

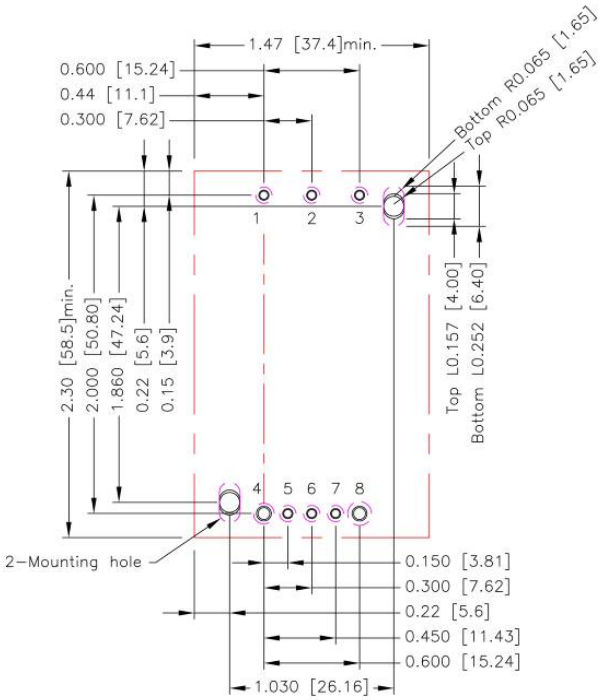
MECHANICAL DRAWING



PIN	DEFINE	DIAMETER
1	- Vin	0.04 Inch
2	Ctrl	0.04 Inch
3	+ Vin	0.04 Inch
4	- Vout	0.06 Inch
5	- Sense	0.04 Inch
6	Trim	0.04 Inch
7	+ Sense	0.04 Inch
8	+ Vout	0.06 Inch

Notes:
1. All dimensions in inch [mm]
2. Tolerance :x.xx±0.02 [x.x±0.5]
   x.xxx±0.01 [x.xx±0.25]
3. Pin pitch tolerance ±0.01 [0.25]
4. Pin dimension tolerance ±0.004[0.10]
5. The screw locked torque:MAX 3.5kgf-cm [0.34N-m]

RECOMMENDED PAD LAYOUT

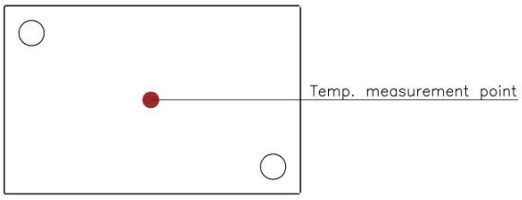


Notes:
All dimensions in inch[mm]
Pad size(lead free recommended)
Through hole 1.2.3.5.6.7: ∅0.051[1.30]
Through hole 4.8: ∅0.075[1.90]
Through hole of mounting: ∅0.126[3.20]
Top view pad 1.2.3.5.6.7: ∅0.064[1.63]
Top view pad 4.8: ∅0.094[2.38]
Top view pad of mounting:Groove R0.065[1.65]L0.157[4.00]
Bottom view pad 1.2.3.5.6.7: ∅0.102[2.60]
Bottom view pad 8: ∅0.150[3.80]
Bottom view pad 4: ∅0.130[3.30]
Bottom view pad of mounting:Groove R0.065[1.65]L0.252[6.40]

FUSE CONSIDERATION

This power module operates in a variety of thermal environments.
However, sufficient cooling should be provided to help ensure reliable operation of the unit.
Heat is removed by conduction, convection, and radiation to the surrounding environment.
Proper cooling can be verified by measuring the point as the figure below.
The temperature at this location should not exceed 105ºC.
When operating, adequate cooling must be provided to maintain the test point temperature at or below 105ºC.
Although the maximum point temperature of the power modules is 105ºC, you can limit this temperature to a lower value for extremely high reliability.

- Thermal test condition with vertical direction by natural convection (20LFM).
- The iron base-plate dimension is 19” x 3.5” x 0.063” (the height is EIA standard 2U).
- The heat-sink is optional and P/N: 7G-0029B-F, 7G-0030B-F. 7G-0031B-F, 7G-0032B-F



BASE PLATE

THERMAL CONSIDERATION

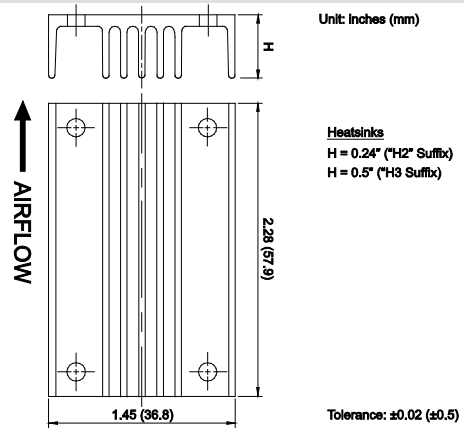
This power module is not internally fused. An input line fuse must always be used.
This encapsulated power module can be used in a wide variety of applications, ranging from simple stand-alone operation to an integrated part of sophisticated power architecture.
To maximum flexibility, internal fusing is not included; however, to achieve maximum safety and system protection, always use an input line fuse.
Input line fuse suggestions are below:

Model	Fuse Rating (A)	Fuse Type
24VDC nominal input models	20A	Fast-Acting
48VDC nominal input models	10A	Fast-Acting
110VDC nominal input models	4A	Slow-Blow

Table is based on the information provided in this data sheet on inrush energy and maximum DC input current at low Vin.

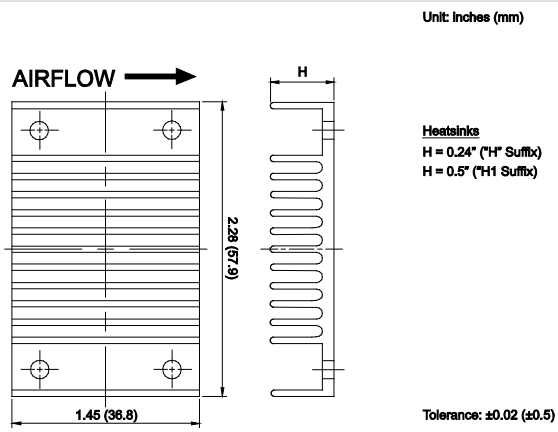
HEATSINK OPTIONS

Vertical Fin Orientation (Suffix Options: H2, H3)



Note: Models with thru-hole inserts cannot be equipped with a heatsink

Horizontal Fin Orientation (Suffix Options: H, H1)



Note: Models with thru-hole inserts cannot be equipped with a heatsink

MODEL NUMBER SETUP

DCQAW	100	-	48	S	05	R	H (1)
Series Name	Output Power		Input Voltage	Output Quantity	Output Voltage	Remote ON/OFF	Hole Thread & Heatsink Options
	100: 100 Watts		**24:** 8.5~36 VDC	**S:** Single Output	**33:** 3.3 VDC	**None:** Positive Logic	**None:** M3x0.5 Threaded-thru Inserts
			48: 16.5~75 VDC		**05:** 5 VDC	**R:** Negative Logic	**TH:** Ø.126 Thru-hole Inserts (1)
			110: 40~160 VDC		**12:** 12 VDC		**H:** 0.24" Horizontal Heatsink
					15: 15 VDC		**H1:** 0.5" Horizontal Heatsink
					24: 24 VDC		**H2:** 0.24" Vertical Heatsink
					30: 30 VDC		**H3:** 0.5" Vertical Heatsink
					48: 48 VDC		

(1) Models with thru-hole inserts cannot be equipped with a heatsink.

COMPANY INFORMATION

Wall Industries, Inc. has created custom and modified units for over 50 years. Our in-house research and development engineers will provide a solution that exceeds your performance requirements on-time and on budget. Our ISO9001-2008 certification is just one example of our commitment to producing a high quality, well-documented product for our customers.

Our past projects demonstrate our commitment to you, our customer. Wall Industries, Inc. has a reputation for working closely with its customers to ensure each solution meets or exceeds form, fit and function requirements. We will continue to provide ongoing support for your project above and beyond the design and production phases. Give us a call today to discuss your future projects.

Contact **Wall Industries** for further information:

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