

QUARTER-BRICK DC-DC CONVERTERS

2:1 ULTRA WIDE INPUT RANGE 150 WATT

INDUSTRIAL APPLICATIONS

QA150 SERIES



FEATURES

- 2:1 Ultra Wide Input Range
- No Minimum Load Required
- Low Standby Power Consumption
- High Efficiency (up to 92%)
- 2250 Vdc Input to Output Basic Insulation
- Compact 2.28" × 1.45" × 0.50" Quarter Brick Package
- Safety Meets UL60950-1, EN60950-1 & IEC60950-1
- CE Marked
- Compliant to RoHS II and Reach

SELECTION GUIDE All specifications are typical at nominal input, full load and 25°C, unless otherwise noted.

Input Voltage Range Vdc	Output Voltage Vdc	Output Current at Full Load A	Input Current at No Load mA	Efficiency %	Model Number	Maximum Capacitor Load µF
8.5 - 22	3.3	30	50	89	QA150-12S33	91000
8.5 - 22	5	24	50	90	QA150-12S5	48000
8.5 - 22	12	10	50	91	QA150-12S12	8300
8.5 - 22	15	8	50	91	QA150-12S15	5300
8.5 - 22	24	5	50	90	QA150-12S24	2100
8.5 - 22	30	4	50	90	QA150-12S30	1300
8.5 - 22	48	2.5	50	89	QA150-12S48	520
16.5 - 36	3.3	30	25	89	QA150-24S33	91000
16.5 - 36	5	24	25	90	QA150-24S5	48000
16.5 - 36	12	10	25	91	QA150-24S12	8300
16.5 - 36	15	8	25	91	QA150-24S15	5300
16.5 - 36	24	5	25	91	QA150-24S24	2100
16.5 - 36	30	4	25	91	QA150-24S30	1300
16.5 - 36	48	2.5	25	89	QA150-24S48	520
33 - 75	3.3	30	15	89	QA150-48S33	91000
33 - 75	5	25	15	91	QA150-48S5	50000
33 - 75	12	12	15	90	QA150-48S12	10000
33 - 75	15	10	15	90	QA150-48S15	6670
33 - 75	24	6	15	92	QA150-48S24	2500
33 - 75	30	5	15	91	QA150-48S30	1670
33 - 75	48	3	15	92	QA150-48S48	630

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Input Specifications			Output Specifications		
Operating input voltage range, Vdc	8.5 Min., 12 Typ., 22 Max.	12Vin(nom)	Voltage accuracy, %	-1.0 Min., +1.0 Max.	
	16.5 Min., 24 Typ., 36 Max.	24Vin(nom)	Line regulation, %	-0.1 Min., +0.1 Max.	Low Line to High Line at Full Load
	33 Min., 48 Typ., 75 Max.	48Vin(nom)	Load regulation, %	-0.2 Min., +0.2 Max.	No Load to Full Load, 3.3 and 5Vout
Start up voltage, Vdc	9 Max.	12Vin(nom)		-0.1 Min., +0.1 Max.	No Load to Full Load, Others
	18 Max.	24Vin(nom)	Voltage and adjustability, %	-20 Min., +10 Max.	
	36 Max.	48Vin(nom)	Remote sense, %	10 Max.	Maximum output deviation is inclusive of remote sense
Shutdown voltage, Vdc	7.3 Min., 8.1 Max.	12Vin(nom)			% of Vout(nom). If remote sense is not being used, sense pins should connect to the corresponding polarity OUTPUT pins.
	15.5 Min., 16.3 Max.	24Vin(nom)			Measured by 20MHz bandwidth
	31.6 Min., 32.5 Max.	48Vin(nom)			With a 22µF/25V X7R MLCC, 3.3Vout, 5Vout
Start up time, ms	75 Typ., 100 Max.	Constant resistive load, Power up			
	75 Typ., 100 Max.	Remote ON/OFF			
Input surge voltage, Vdc	30 Max.	1 second, max., 12Vin(nom)	Ripple and noise, mVp-p	75 Typ.	With a 22µF/25V X7R MLCC, 12Vout, 15Vout
	50 Max.	1 second, max., 24Vin(nom)		100 Typ.	With a 4.7µF/50V X7R MLCC, 24Vout, 30Vout
	100 Max.	1 second, max., 48Vin(nom)		200 Typ.	With a 2.2µF/100V X7R MLCC, 48Vout
				300 Typ.	
Input filter ⁽¹⁾	Pi type		Temperature coefficient, %/°C	-0.02 Min., +0.02 Max.	
Remote ON/OFF		Referenced to -Vin pin	Transient response recovery time, µs	250 Typ.	25% load step change
	Short or 0 - 1.2 Vdc	Negative logic, DC-DC ON	Over voltage protection, %	115 Min., 130 Max.	% of Vout(nom); Hiccup mode
	Open or 3 - 12 Vdc	(Standard), DC-DC OFF	Over load protection, %	110 Min., 140 Max.	% of Iout rated; Hiccup mode
	Open or 3 - 12 Vdc	Positive logic, DC- DC ON	Short circuit protection	Continuous, automatic recovery	
	Short or 0 - 1.2 Vdc	(Option), DC-DC OFF			
	-0.5 Min., 1 Max., mA	Input current of Ctrl pin			
	3 mA Typ.	Remote off input current			

General Specifications				
Isolation voltage, Vdc	1 minute (Basic insulation)	Input to Output	2250 Min.	
	1 minute (Basic insulation)	Input (Output) to Base-Plate	2250 Min.	
Isolation resistance, GΩ	500Vdc		1 Min.	
Isolation capacitance, pF			1500 Max.	
Switching frequency, kHz			270 Min.	300 Typ. 330 Max.

Environmental Specifications				
Operating case temperature, °C			-40 Min.	+105 Max.
Over temperature protection, °C				+110 Typ.
Storage temperature range, °C			-55 Min.	+125 Max.
Thermal impedance ⁽²⁾ , °C/W	Vertical direction by natural convection (20LFM)			
	Without Heat-sink			9 Typ.
	Mount on 2U iron base-plate			2.8 Typ.
	With 0.24" Height Heat-sink			7.1 Typ.
	With 0.5" Height Heat-sink			5.5 Typ.
Thermal shock			MIL-STD-810F	
Vibration			MIL-STD-810F	
Relative humidity			5% to 95% RH	

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Physical Specifications	
Design meet safety standard	UL60950-1, EN60950-1, IEC60950-1
Case material	Aluminum base-plate with plastic case
Potting material	Silicone (UL94 V-0)
Weight	64g (2.26oz)
MTBF	3.870 x 10 ⁵ hrs , MIL-HDBK-217F, Full load

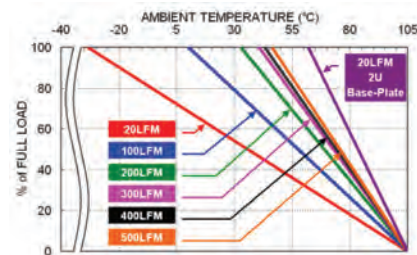
EMC Specifications		
Specifications	Conditions	Level
EMI ⁽³⁾	EN55022	Class A, Class B
ESD	EN61000-4-2 Air ±8kV and Contact ±6kV	Perf. Criteria A
Radiated immunity	EN61000-4-3 20V/m	Perf. Criteria A
Fast transient ⁽⁴⁾	EN61000-4-4 ±2kV	Perf. Criteria A
Surge ⁽⁴⁾	EN61000-4-5 EN55024:±2kV	Perf. Criteria A
Conducted immunity	EN61000-4-6 10 Vr.m.s	Perf. Criteria A
Power frequency magnetiv field	EN61000-4-8 100A/m continuous; 1000A/m 1 second	Perf. Criteria A

Note:

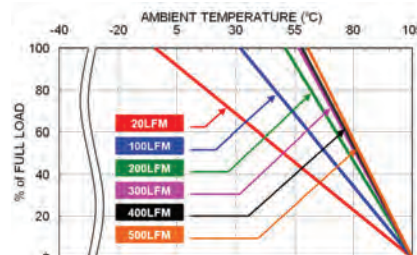
1. Input source impedance: The power modules will operate as specifications without external components, assuming that the source voltage has a very low impedance and reasonable input voltage regulation. Highly inductive source impedances can affect the stability of the power module. Since real-world voltage source has finite impedance, performance can be improved by adding external filter capacitor. Recommended Nippon Chemi-con KY series, 100µF/100V.
2. The heat-sink is optional and P/N: 7G-0029A-F , 7G-0030A-F , 7G-0031A-F , 7G-0032A-F. Please refer to heat-sink selection guide.
3. The standard modules meet EMI Class A or Class B with external components. For further information, please contact Polytron Devices.
4. An external input filter capacitor is required if the module has to meet EN61000-4-4, EN61000-4-5. Recommended 2 pcs of aluminum electrolytic capacitor (Nippon chemi-con KY series, 220µF/100V) to connect in parallel.
5. BASE-PLATE GROUNDING: When connect two screw bolts to shield plane, the EMI could be reduced.

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

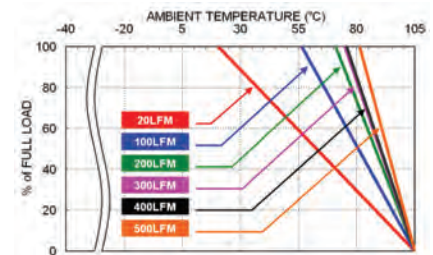
Characteristic Curve



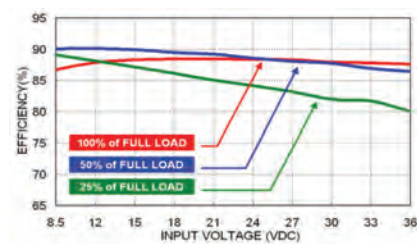
QA150-48S5 Derating Curve



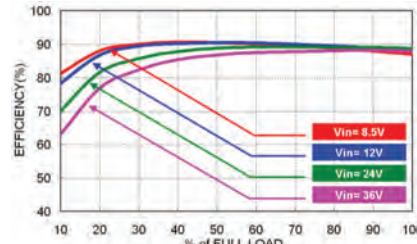
QA150-48S5 Derating Curve
With 0.24" Height Heat-sink



QA150-48S5 Derating Curve
With 0.5" Height Heat-sink



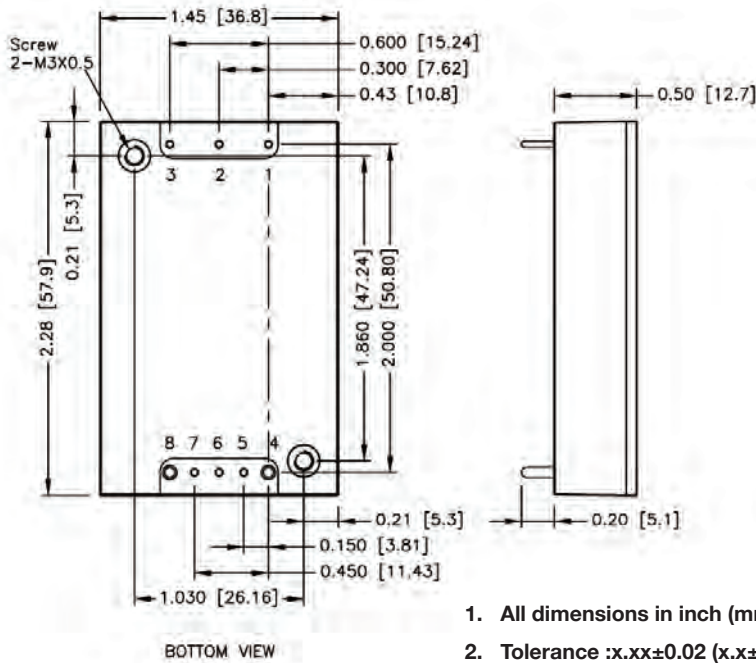
QA150-48S5 Efficiency vs. Input Voltage



QA150-48S5 Efficiency vs. Output Load

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Mechanical Drawing



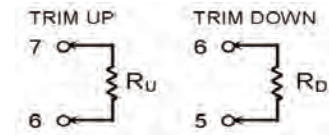
1. All dimensions in inch (mm)
2. Tolerance :x.xx±0.02 (x.x±0.5)
x.xxx±0.01 (x.xxx±0.25)
3. Pin pitch tolerance ±0.01 (0.25)
4. Pin dimension tolerance ±0.004(0.1)
5. The screw locked torque:
MAX3.5kgf-cm (0.34N-m)

PIN CONNECTION

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

EXTERNAL OUTPUT TRIMMING

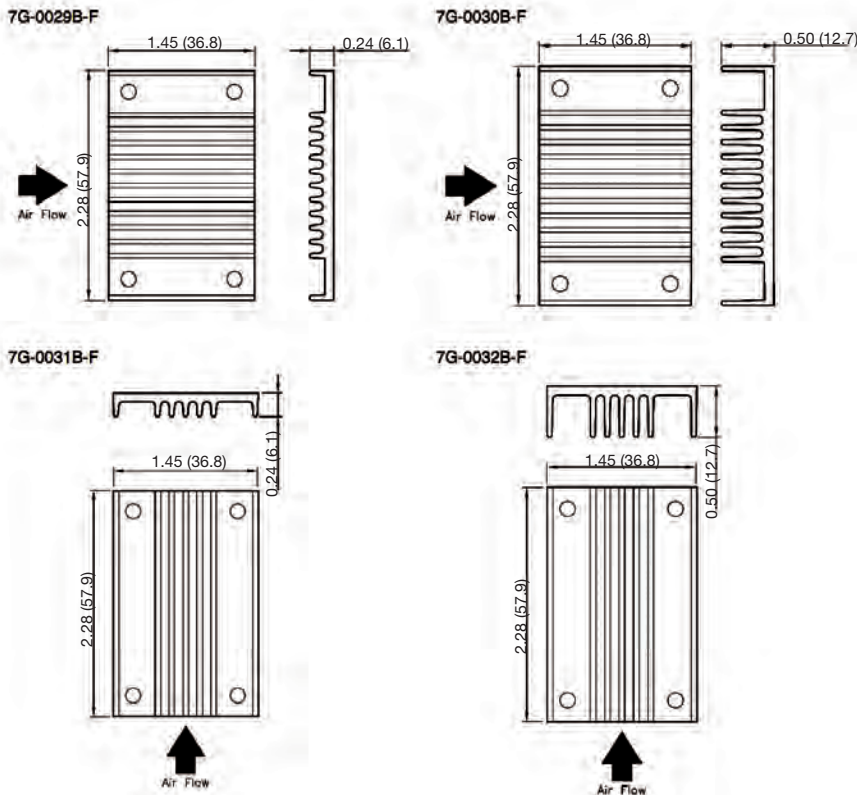
Output can be externally trimmed by using the method shown below.



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

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

Heat-sink Type Options



TYPE: DIMENSIONS:

HS	Height H = 0.24" Horizontal fin, 7G-0029B-F
HS1	Height H = 0.5" Horizontal fin, 7G-0030B-F
HS2	Height H = 0.24" Vertical fin, 7G-0031B-F
HS3	Height H = 0.5" Vertical fin, 7G-0032B-F

1. All dimensions in inch (mm)
2. Tolerance :x.xx±0.02 (x.x±0.5)