

QUARTER-BRICK DC-DC CONVERTERS

4:1 ULTRA WIDE INPUT RANGE 100 WATT

RAILWAY APPLICATIONS

QB100 SERIES



FEATURES

- Railway Systems Application
- 4:1 Ultra Wide Input Range
- No Minimum Load Required
- Low Standby Power Consumption
- High Efficiency (up to 90%)
- 2250Vdc Input to Output Basic Insulation
- Remote Control
- 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 - 36	3.3	25	25	88	QB100-24S33	75000
8.5 - 36	5	18	25	89	QB100-24S5	36000
8.5 - 36	12	7.5	25	89	QB100-24S12	6250
8.5 - 36	15	6	25	89	QB100-24S15	4000
8.5 - 36	24	3.7	25	89	QB100-24S24	1540
8.5 - 36	30	3	25	89	QB100-24S30	1000
8.5 - 36	48	1.8	25	88	QB100-24S48	380
16.5 - 75	3.3	25	15	88	QB100-48S33	75000
16.5 - 75	5	18	15	89	QB100-48S5	36000
16.5 - 75	12	7.5	15	89	QB100-48S12	6250
16.5 - 75	15	6	15	90	QB100-48S15	4000
16.5 - 75	24	3.7	15	90	QB100-48S24	1540
16.5 - 75	30	3	15	90	QB100-48S30	1000
16.5 - 75	48	1.8	15	90	QB100-48S48	380
40 - 160	3.3	23	8	88	QB100-110S3P3	70000
40 - 160	5	17	8	89	QB100-110S05	34000
40 - 160	12	7	8	89	QB100-110S12	5830
40 - 160	15	5.5	8	89	QB100-110S15	3670
40 - 160	24	3.5	8	89	QB100-110S24	1460
40 - 160	30	2.8	8	89	QB100-110S30	930
40 - 160	48	1.8	8	89	QB100-110S48	380

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Input Specifications			Output Specifications		
Operating input voltage range, Vdc	8.5 Min., 24 Typ., 36 Max.	24Vin(nom)	Voltage accuracy, %	-1.0 Min., +1.0 Max.	
	16.5 Min., 48 Typ., 75 Max.	48Vin(nom)	Line regulation, %	-0.1 Min., +0.1 Max.	Low Line to High Line at Full Load
	40 Min., 110 Typ., 160 Max.	110Vin(nom)	Load regulation, %	-0.2 Min., +0.2 Max.	No Load to Full Load, 3.3 and 5Vout
Start up voltage, Vdc	9 Max.	24Vin(nom)	Voltage and adjustability, %	-0.1 Min., +0.1 Max.	No Load to Full Load, Others
	18 Max.	48Vin(nom)		Maximum output deviation is inclusive of remote sense	
	43 Max.	110Vin(nom)	Remote sense, %	10 Max.	% of Vout(nom). If remote sense is not being used, sense pins should connect to the corresponding polarity OUTPUT pins.
Shutdown voltage, Vdc	7.3 Min., 8.1 Max.	24Vin(nom)	Ripple and noise, mVp-p	Measured by 20MHz bandwidth	
	15.5 Min., 16.3 Max.	48Vin(nom)		75 Typ.	With a 22µF/25V X7R MLCC, 3.3Vout, 5Vout
	33 Min., 36 Max.	110Vin(nom)		100 Typ.	With a 22µF/25V X7R MLCC, 12Vout, 15Vout
Start up time, ms	75 Typ., 100 Max.	Constant resistive load, Power up		200 Typ.	With a 4.7µF/50V X7R MLCC, 24Vout, 30Vout
	75 Typ., 100 Max.	Constant resistive load, Remote ON/OFF	300 Typ.	With a 2.2µF/100V X7R MLCC, 48Vout	
	50 Max.	1 second, max., 12Vin(nom)	Temperature coefficient, %/°C	-0.02 Min., +0.02 Max.	
Input surge voltage, Vdc	100 Max.	1 second, max., 24Vin(nom)	Transient response recovery time, µs	250 Typ.	25% load step change
	185 Max.	1 second, max., 148Vin(nom)	Over voltage protection, %	115 Min., 130 Max.	% of Vout(nom); Hiccup mode
	Input filter ⁽¹⁾	Pi type	Over load protection, %	110 Min., 140 Max.	% of Iout rated; Hiccup mode
Remote ON/OFF		Referenced to -Vin pin	Short circuit protection	Continuous, automatic recovery	
	Short or 0 - 1.2Vdc	Negative logic, DC-DC ON			
	Open or 3 - 12Vdc	(Standard), DC-DC OFF			
	Open or 3 - 12Vdc	Positive logic, DC- DC ON			
	Short or 0 - 1.2Vdc	(Option), DC-DC OFF			
	-0.5 Min., 1 Max., mA	Input current of Ctrl pin			
	3mA 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	Continuous, automatic recovery				1500 Max.
Switching frequency, kHz			270 Min.	300 Typ.	330 Max.

Environmental Specifications

Operating case temperature, °C		-40 Min.		+110 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" Hight 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	3.873 x 10 ⁵ hrs , MIL-HDBK-217F, Full load

EMC Specifications

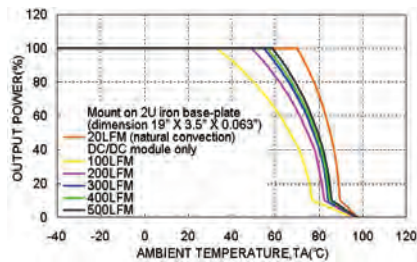
Specifications	Conditions	Level
EMI ⁽³⁾	EN55022	Class B
ESD	EN61000-4-2 Air ±8kV and Contact ±6kV	Perf. Criteria A
Radiated immunity	EN61000-4-3 20V/m	Perf. Criteria A
Fast transient ⁽⁴⁾	EN61000-4-4 ±2kV	Perf. Criteria A
Surge ⁽⁴⁾	EN61000-4-5 EN55024:±2kV	Perf. Criteria A
Conducted immunity	EN61000-4-6 10 Vr.m.s	Perf. Criteria A

Note:

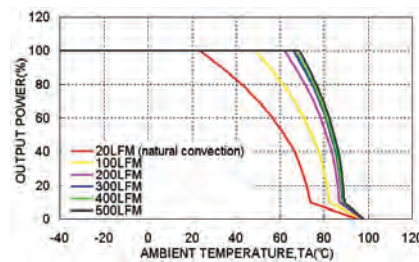
- Input source impedance: The power modules will operate as specifications without external components, assuming that the source voltage has a very low impedance and reasonable input voltage regulation. Highly inductive source impedances can affect the stability of the power module. Since real-world voltage source has finite impedance, performance can be improved by adding external filter capacitor. Recommended Nippon Chemi-con KY series, 100µF/100V.
- 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.
- The standard modules meet EMI Class A or Class B with external components. For further information, please contact Polytron Devices.
- 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.
- 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.

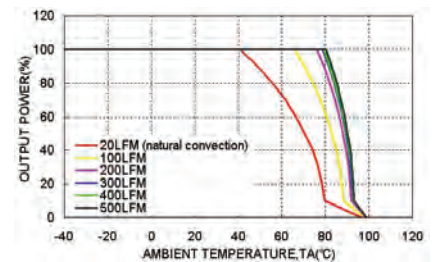
Characteristic Curve



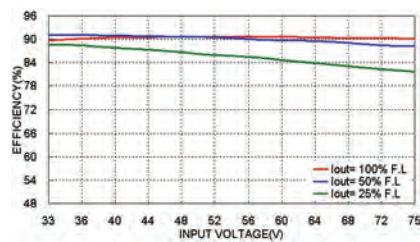
QB100-48S05 Derating Curve



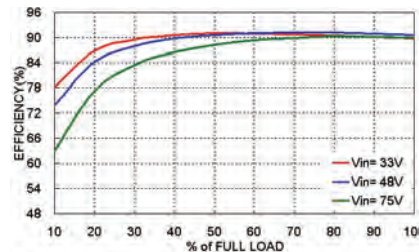
QB100-48S05 Derating Curve
 With 0.24" Height Heat-sink



QB100-48S05 Derating Curve
 With 0.5" Height Heat-sink



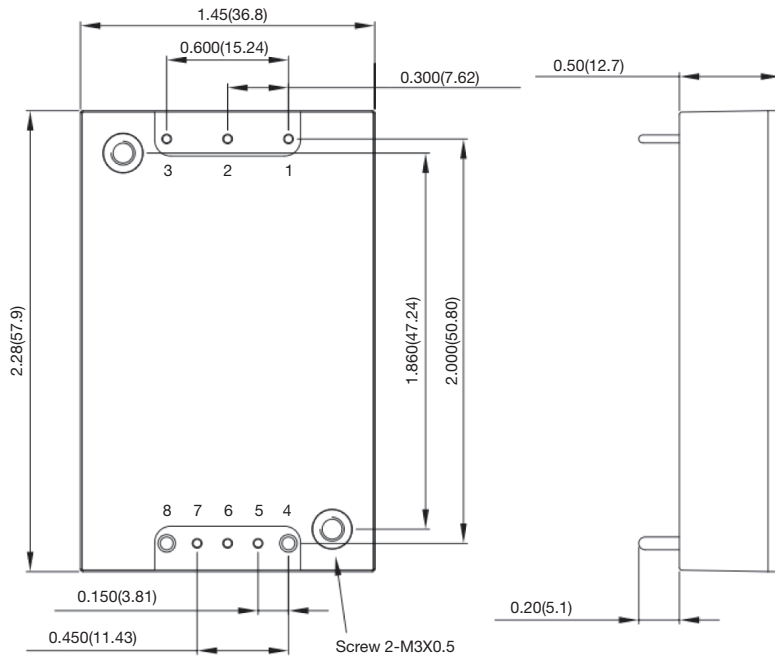
QB100-48S05 Efficiency vs. Input Voltage



QB100-48S05 Efficiency vs. Output Load

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Mechanical Drawing



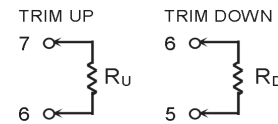
- x.xxx±0.01 (x.xx±0.25)
- 3. Pin pitch tolerance ±0.01 (0.25)
- 4. Pin dimension tolerance ±0.004(0.1)
- 5. The screw locked torque: MAX3.5kgf-cm (0.34N-m)

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	0.08 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.

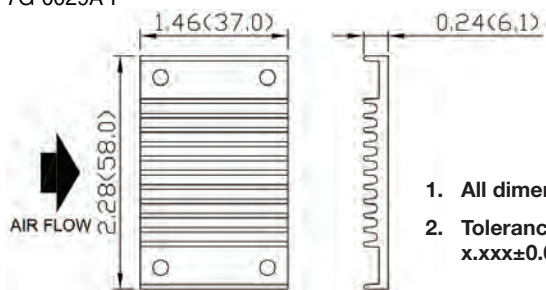


$$R_U = \left(\frac{5.11V_{OUT}(100 + \Delta\%)}{1.225\Delta\%} - \frac{(511 + 10.22\Delta\%)}{\Delta\%} \right) k\Omega$$

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

Heat-sink Type Options

7G-0029A-F



- 1. All dimensions in inch (mm)
- 2. Tolerance :x.xx±0.02 (x.x±0.5)
x.xxx±0.01 (x.xx±0.25)