



RAILQOR MODULES



ISOLATED DC-DC CONVERTERS FOR THE RAIL TRANSPORTATION INDUSTRY

The RailQor converter series is composed of next-generation, board-mountable, isolated, fixed switching frequency dc-dc converters that use synchronous rectification to achieve extremely high power conversion efficiency, even at low output power levels. The Quarter-brick 25W-50W Mega Series has power dissipation is so low that no heatsink is necessary to operate at 85°C in an enclosed environment without airflow. Each module is supplied completely encased to provide protection from the harsh environments seen in many industrial and transportation applications.

PRODUCT FEATURES

OPERATIONAL

- High efficiency at full load up to 93%
- Quarter-brick 25-50W Mega Series has no derating in environments with zero airflow and ambient temperatures up to 85°C with no heatsink.
- Input voltage ranges:
9-36V, 42V-110V, 12-150V & 66V-160V
- Input voltage ranges fully cover the requirements of EN 50155
- Full power operation at baseplate temperature range from -40°C to 100°C.
- Output power up to 255W
- Fixed frequency switching, low output noise
- No minimum load requirement
- Encased module to provide protection from harsh environments and available with optional flanged style baseplate.

MECHANICAL

- Industry standard pin-out configuration
- Flanged baseplate available
- Industry standard footprint:
Half-brick: 2.4" x 2.5"
Quarter-brick: 1.5" x 2.4"

PROTECTION/CONTROL

- Input under-voltage lockout
- Output current limit and short circuit protection
- Active back bias limit prevents damage to converter
- Output over-voltage protection
- Thermal shutdown

GENERAL SPECIFICATIONS

- Operating Temperature -40°C to +100°C
- Output Voltage Set Point $\pm 1.0\%$
- Output Voltage Ripple $< 1\%$ of V_{out} (typ.)
- Switching Frequency 240 - 350kHz
- Transient Response $< 7\%$ of V_{out} (typ.)
- Output Voltage Trim Range +10% to -20%
- Isolation Voltage Up to 3000Vdc
- EN50155 Compliance
- RIA 12 Compliance with external circuit

SAFETY

RQ1B, RQ72 & RQ68

- Reinforced Insulation
- Up to 3000V, 100M Ω input-to-output isolation
- CAN/CSA C22.2 NO. 60950-1:2007
- UL 60950-1:2007
- EN 60950-1/A11:2009
- CE marked

RQ18

- Basic Insulation
- 2250V, 30M Ω input-to-output isolation
- CAN/CSA C22.2 NO. 60950-1:2007
- UL 60950-1:2007
- EN 60950-1/A11:2009

Visit our website for
more information



See page 56 for package outlines

RAIL TRANSPORTATION ISOLATED DC-DC CONVERTERS



APPLICATIONS

VIDEO
SURVEILLANCE
SYSTEMS



CABIN ELECTRICAL
EQUIPMENT



LED
INFORMATION
DISPLAYS



DOOR CONTROL

ENTERTAINMENT
SYSTEMS

WIRELESS & RADIO
COMMUNICATIONS



INTERNAL &
EXTERNAL
LIGHTING



ACCESS &
TICKETING
MACHINES

MOTOR
DRIVE
SYSTEM



BRAKING CONTROL



MOTOR DRIVE CONTROLLERS



EMBEDDED
COMPUTER SYSTEMS



RAIL TRANSPORTATION

TECHNICAL SUPPORT

SynQor understands the need for rapid development of new projects in the transportation industry and provides excellent support for new designs incorporating the RailQor product lines. Concerns regarding EN 50155 compliance, transient and surge suppression to meet RIA 12, design for optimal thermal performance and other techniques are described in our RailQor datasheets and in technical papers available at www.synqor.com/support-technical-documents.html.

RAILQOR INPUT/OUTPUT RATINGS

Family	Output Voltage	5V	12V	15V	24V	Package Size / Power Level
RQ1B	2:1 Input Ratio	110V (66V - 160V) Continuous Input Range, 170V Transient				
	Max. Iout / Power Out	10A / 50W	4.1A / 50W	3.3A / 50W	2A / 48W	QUARTER-BRICK MEGA
		25A / 125W	12A / 144W	10A / 150W	6A / 144W	QUARTER-BRICK TERA
		48A / 240W	21A / 252W	17A / 255W	10A / 240W	HALF-BRICK PETA
RQ72	2:1 Input Ratio	72V (42V - 110V) Continuous Input Range				
	Max. Iout / Power Out	10A / 50W	4.1A / 50W	3.3A / 50W	2A / 48W	QUARTER-BRICK MEGA
		25A / 125W	12A / 144W	10A / 150W	6A / 144W	QUARTER-BRICK TERA
		46A / 230W	21A / 252W	17A / 255W	10A / 240W	HALF-BRICK PETA
RQ68	12:1 Input Ratio	68V (12V - 150V) Continuous Input Range, 170V Transient				
	Max. Iout / Power Out	5.3A / 26.5W	2.3A / 27.6W	1.8A / 27W	1.1A / 26.4W	QUARTER-BRICK MEGA
		10.6A / 53W	4.4A / 53W	3.5A / 52.5W	2.2A / 53W	HALF-BRICK GIGA
RQ18	4:1 Input Ratio	18V (9V - 36V) Continuous Input Range, 40V Transient				
	Max. Iout / Power Out	10A / 50W	4.1A / 50W	3.3A / 50W	2A / 48W	QUARTER-BRICK MEGA
		20A / 100W	8.3A / 96W	6.6A / 100W	4.1A / 98W	QUARTER-BRICK TERA
		36A / 180W	15A / 180W	12A / 180W	7.5A / 180W	HALF-BRICK PETA

EN50155 REQUIREMENTS AND RAILQOR FEATURES

EN50155 Requirements			RailQor Capabilities		
Nominal	Continuous Input	Transient Input	Family	Continuous Input	Transient Input
24V	17V – 30V	14V – 34V	RQ18	9V – 36V	9V – 40V (100ms)
72V	50V – 90V	43V – 101V	RQ72	42V – 110V	42V – 110V
110V	77V – 137V	66V – 160V	RQ1B	66V – 160V	66V – 170V (100ms)
24V – 110V	17V – 137V	14V – 160V	RQ68	12V – 150V	12V – 170V (100ms)

ISOLATED DC-DC CONVERTERS



RAILQOR DC-DC CONVERTER PART NUMBERING GUIDE

Family	Cont. Vin	Output Voltage	Package Size	Performance Series	Thermal Design	Max. Iout	Enable Logic	Pin Length	Features
RQ	18: 9 - 36V 68: 12 - 150V 72: 42 - 110V 1B: 66 - 160V	050: 5V 120: 12V 150: 15V 240: 24V	Q: Quarter-brick H: Half-brick	G: Giga M: Mega P: Peta T: Tera	C: Encased D: Encased Non-Threaded Baseplate V: Flanged Baseplate	48: 48A 46: 46A 36: 36A 25: 25A 21: 21A 15: 15A 12: 12A 10: 10A 08: 8A 07: 7A 06: 6A 05: 5A 04: 4A 02: 2A 01: 1A	N: Negative	R: 0.180"	S: Standard

Refer to the website, contact your local sales representative or distributor for valid part numbers. Specifications change without notice.
Example: RQ72120QMC04NRS-G

APPLICATION NOTES

- **“RailQor EN 50155 / RIA-12 Compliance & Evaluation Board Application Note”** – Addresses the input voltage requirements of the European Railway Standards EN50155 and RIA-12 and how to meet them using SynQor’s RailQor DC-DC converters. The RailQor converters are designed to meet or exceed EN50155 input static and transient DC voltage requirements. Since some equipment is being designed to also comply with RIA-12 surges and transients, those requirements are discussed as well, along with the supplemental circuitry needed to meet those requirements.
- **“EMI Characteristics”**
– On overview of EMI with suggestions for external filtering solutions and suggested layout and grounding practices.
- **“Input System Instability”**
– Describes the phenomena of input instability in DC-DC converters and the preferred solution for correcting it.

DATASHEET APPLICATION INFORMATION

- How to lay out a board for optimal thermal performance with RailQor product
- Circuits for driving the enable pin
- How to trim the converter to compensate for resistive drops between supply and load

RAILQOR QUALIFICATION TESTING

Testing Type	Units	Test Conditions
Vibration	5	EN 61373:1999 Category I, Class B, Body mounted
Life Test	30	95% rated Vin and load, units at derating point, 1000 hours
Cold	5	EN 60068-2-1:2007
Dry Heat	5	EN 60068-2-2:2007
Mechanical Shock	5	EN 61373:1999 Category I, Class B, Body mounted
Temperature Cycling	5	-40°C to 100°C, unit temp. ramp 15°C/min., 500 cycles
Power/Thermal Cycling	5	Toperating = min to max, Vin = min to max, full load, 100 cycles
Design Marginality	5	Tmin-10°C to Tmax+10°C, 5°C steps, Vin = min to max, 0-105% load
Damp Heat, Cyclic	5	EN 60068-2-3:2005
Solderability	15	Pins MIL-STD-883, method 2003

Note: Governing Standard BS EN 50155:2007 Railway applications - Electronic equipment used on rolling stock