SynQor®

ADVANCING THE POWER CURVE®

DC-DC CONVERTERS, AC-DC POWER SUPPLIES, & EMI FILTERS

WINTER 2012
PRODUCT CATALOG

PowerQor®

48V input, single and dual output isolated DC-DC converters for telecom/networking applications

- *Ultra-high Efficiency up to 97% at full rated load*
- *Full power from -40 to +100°C*
- *Wide input voltage ranges: 18-75V — 35-75V*
- *100V, 100ms transient input voltages*
- *Fixed frequency switching, low output noise*
- *No minimum load requirement*

ACuQor®

Medical and industrial-grade AC-DC power supplies with PFC

- *High efficiency up to 93% at full rated load*
- *Delivers up to 1400W of output power (1800W transient)*
- *Semi-regulated output*
- *Universal 85-264V AC Input Voltage (47-63Hz)*
- *CF Patient Contact*
- *Defibrillation Proof*

CFQor®

Medical Grade DC-DC Converters

- *High Efficiency, up to 93% at full rated load*
- *Industry standard quarter-brick pin-out configuration*
- *Reinforced Insulation*
- *4250V, 100MΩ input-to-output*
- *CF Patient Contact*
- *Defibrillation Proof*

EMI Filter Modules

For InQor and MilQor DC-DC converters

- *Low DC resistance*
- *>80dB differential noise attenuation @500kHz*
- *>50dB common-mode noise attenuation @500kHz*
- *Bulk capacitance provides input system stabilization for downstream power converters*

MilQor®

UPS

Uninterruptible Power Supply for extreme environmental conditions of military applications

- *Sealed, Weather & Shock-proof construction*
- *Full power from -20 to +55°C*
- *Ultra Low weight*
- *Low Profile*
- *Dual Input (AC & DC)*
- *Hot-Swappable Battery Pack*
- *Cold-start with no AC or DC input connections*
- *Power factor correction at AC input*
- *Communications and Signal I/O port*

Mil-COTS

"Off-the-shelf" DC-DC converters for military/aerospace cost sensitive applications

- *Efficiency: up to 95% at full load*
- *Full power from -55 to +100°C*
- *9V to 425V continuous input voltage ranges*
- *Output power up to 600W*

Hi-Rel

High-Reliability, field proven DC-DC converters for military/aerospace applications

- *Efficiency up to 90% at full rated load*
- *Full power from -55 to +125°C*
- *28V and 270V nominal input voltages*
- *Parallel operation with current share*

BusQor®

Open-frame, high efficiency next generation DC-DC bus converters

- *Ultra-high efficiency up to 98% at full rated load*
- *Delivers 6V, 9.6V or 12V bus for Intermediate Bus Architectures (IBA)*
- *Unregulated & Semi-regulated models*
- *Wide input voltage ranges:*
  - *42V - 53V (BQ50)*
  - *35V - 55V (BQ55)*
  - *40V - 65V (BQ57)*
  - *36V - 75V (SQ60)*

Product Guide

Isolated DC-DC Converters

Military/Aerospace Converters, Filters & Supplies

Non-Isolated DC-DC Converters

EMI FILTERS

ATCA modules

AC-DC power supplies

General Information

InQor®

Next-generation, ruggedized isolated DC-DC converters for industrial applications

- ***High Efficiency up to 95% at full rated load***
- ***Full power from -40 to +100°C***
- ***Input voltage ranges from 9V-160V & 180V-425V***
- ***Output power up to 600W***
- ***Fixed frequency switching, low output noise***
- ***No minimum load requirement***
- ***Conduction Cooled, Ruggedized Package***

NiQor®

High voltage, non-isolated DC-DC converters for industrial applications

- ***Ultra-high efficiency up to 95%***
- ***Wide input & output voltage ranges***
- ***Buck or Buck/Boost Mode available***
- ***Maximum input/output currents up to 80A***
- ***Trimmable Current Limit for Battery Charging Applications***
- ***Suitable for use in Intermediate Bus Architectures***
- ***On-board input and output filtering***
- ***No minimum load requirement***
- **Remote sense and wide output voltage trim**

SIP & SMT Low voltage, DC-DC converters, non-isolated buck regulators

- ***Ultra-high efficiency up to 95%***
  Used at the point of load for low voltage outputs
- ***Wide trim module can be programmed to a variety of output voltages***

RailQor™

High-Reliability, field proven DC-DC converters for the Rail Transportation Industry

- ***Efficiency up to 93% at full rated load***
- ***No drating in 0 airflow up to +80°C***
- ***9-36V, 42V-110V, 12-150 & 66V-160V input voltage ranges***
- ***50W output at full power from -40°C to 100°C***

iQor™

Advanced Telecommunications Computing Architecture (ATCA™) power interface module

- ***100V/1ms transient protection***
- ***Auxiliary supply voltages: 3.3V@3.6A and 5.0V@150mA***
- ***Trimmable 50-95V hold-up capacitance voltage***

SynQor is a leading supplier of power conversion solutions to the communications, computing and industrial markets. SynQor's innovative products are designed to exceed the demanding performance, quality, and reliability requirements of today's power electronic engineers that are developing leading-edge infrastructure hardware.

Our global customer base extends from small Original Equipment Manufacturers to Fortune 500 multinationals and includes the 12 largest telecom OEMs in the world.

SynQor's capabilities include both standard and custom solutions for distributed power architectures and we deliver them with industry leading service and support. SynQor's total commitment to quality, customer satisfaction and continuous improvement drive our business processes and lay the foundation for our success.

Dr. Martin F. Schlecht
President, Chairman,
& CEO

INDUSTRIAL

... the power behind industry

SynQor's ruggedized DC-DC converters and filters are designed for a wide range of industrial applications including those required to withstand harsh environments: railway and transportation systems, industrial motion control, information displays, factory automation and power generation systems. SynQor converters feature a two-stage power topology with synchronous-rectification that greatly improves efficiency and optimizes the power dissipated by the converter.

InQor
- Isolated DC-DC Converters

RailQor
- Rail Transportation specific Isolated DC-DC Converters

NiQor HV (High Voltage)
- High Voltage Non-Isolated DC-DC Converters

ACuQor
- AC-DC Power Supplies

NiQor
- Non-Isolated DC-DC Converters

BusQor
- Bus Converters

InQor Filters
- EMI Filters

MEDICAL

... the power behind innovation

The ACuQor product line offers the best-in-class solutions for AC-DC power supplies designed to meet an extensive range of medical applications. Packing 500W of useable power into just 3.5" x 5.25" x 1.63", the E-Series is the world's smallest cardiac care, medical grade AC-DC converter for this power level.

The G-Series provides 1400W of useable power in a 4.75" x 7" x 1.63" package. The medical grade version meets UL60601-1 safety for cardiac contact without requiring an external isolation transformer. It also meets EN-61000-3-2 for PFC and EN60601-1 low leakage current.

ACuQor
- AC-DC Power Supplies

CFQor
- CF Grade Isolated DC-DC Converters

InQor
- Isolated DC-DC Converters

NiQor
- High Voltage Non-Isolated DC-DC Converters
- Non-Isolated DC-DC Converters

SynQor Headquarters 155 Swanson Road, Boxborough, MA 01719-1316 USA | 1.888.567.9596 (USA only) | **www.synqor.com**

SynQor®

TELECOM/DATACOM

... the power behind communications

SynQor is the worldwide leader in technology, quality and service for high-efficiency DC-DC converters for the telecom/datacom marketplace. SynQor's isolated, high-efficiency, open-frame DC-DC converter product lines combine our unmatched lead-times, flexibility and design support that the worldwide telecom market requires.

PowerQor
- 48V Single and Dual Output Isolated DC-DC Converters

BusQor
- Bus Converters

NiQor
- Non-Isolated DC-DC Converters

iQor
- ATCA Power Interface Module

InQor
- EMI Filters

MILITARY/AEROSPACE

... the power behind strength

The MilQor series of Unintrerruptible Power Supply units (UPS), Hi-Rel and Mil-COTS DC-DC converters and EMI filters brings SynQor's field proven high-efficiency synchronous-rectifier technology to the Military/Aerospace industry. Our innovative QorSeal™ packaging approach ensures survivability in the most hostile environments. MilQor products are designed and manufactured to comply with military standards.

MilQor
Hi-Rel
- 28V & 270V Single and Dual Output Isolated DC-DC Converters
- Extended input voltage ranges available (28E, 28V, 28VE, 270L)
- EMI Filters

Mil-COTS
- Bus Converters
- EMI Filters

Uninterrutible Power Supply Units
- Ultra Low Weight
- Dual input (AC and DC)
- Rugged
- Smaller
- Lighter
- More Powerful

SynQor is a world-class supplier of DC-DC power converters, EMI Filters and AC-DC power supply conversion solutions.

CUSTOMER SERVICE

... the power behind communications

SynQor is committed to providing you the highest level of customer support. We support our products with direct sales, manufacturers representatives and distribution partners. Click on your region in the map on the right to find the proper sales contacts.

If you have questions about customer support or ordering, you can visit our Sales Frequently Asked Questions (FAQ) website section. Our Technical Support Contacts are listed there on our website.

DESIGN ENGINEERING

... the power behind innovation

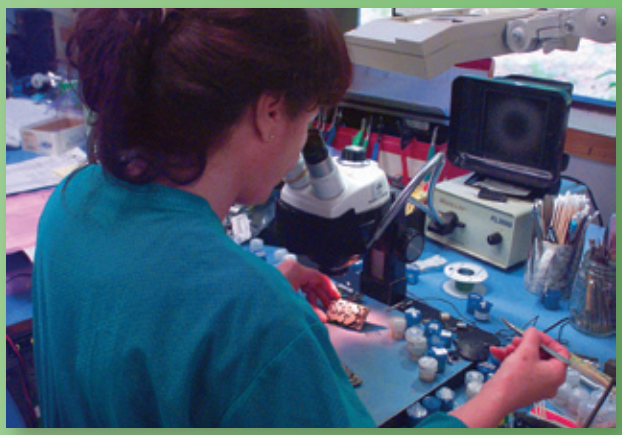
SynQor was founded in October 1997 by M.I.T. professor Dr. Martin F. Schlecht, who believed that a technology known as "synchronous rectification" would revolutionize the decades old industry of DC/DC power converters.

The introduction of SynQor's first open-frame, high-efficiency power converters in 1999 garnered widespread industry attention and praise. SynQor promptly began full scale manufacturing in its original Hudson, MA facilities and soon expanded their reach across Europe and Asia. Our expanding product line grew as fast as our list of customers, allowing SynQor to achieve critical mass and build on our early success.

SynQor holds the following U.S. patents, one or more of which apply to each product listed in this document.

5,999,417, 6,222,742, 6,545,890,
6,577,109, 6,594,159, 6,731,520,
6,894,468, 6,896,526, 6,927,987,
7,050,309, 7,072,190, 7,085,146,
7,119,524, 7,269,034, 7,272,021,
7,272,023, 7,558,083, 7,564,702,
7,765,687, 7,787,261 8,023,290

SAFETY TESTING

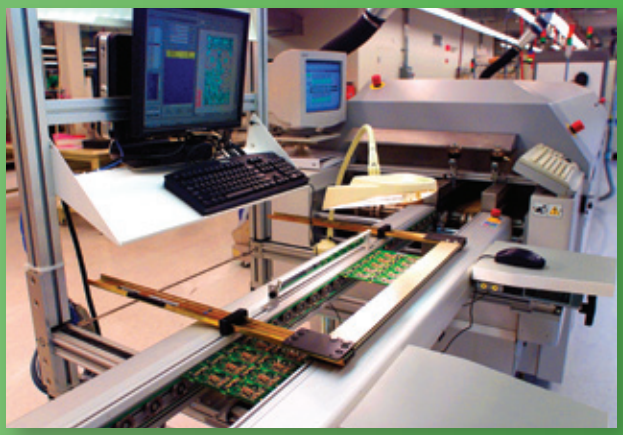


... the power behind industry

SynQor continues to thrive by adhering to our founding tenets of providing best in class performance, quality, reliability and service. Our customer focused, process-centered organization is designed to deliver operational excellence throughout the company and incorporate continual improvement for all our business processes.

By fostering innovation we continue to redefine industry expectations for quality and reliability metrics, in order to support a lowest cost of ownership model.

U.S. MANUFACTURING



... the power behind strength

SynQor operates a multiple cell production flow in our state-of-the-art manufacturing facilities in Boxborough, MA, using the latest in automated surface mount technology. The in-line, flow manufacturing process allows for virtually hands free construction and minimal WIP processing, resulting in very high throughput and product mix that supports a pull production strategy. SynQor's use of a single PCB construction, planar magnetics and a baseplate-free design, allows for simple automated manufacturing and inspection, resulting in higher yields.

Since SynQor units have 90% common materials, there is minimal breakdown and setup between production runs, leading to shorter cycle times, higher flexibility and simpler part sourcing. Consequently, SynQor has reduced the lead-time on the majority of our products to only four weeks. Our manufacturing expertise also remains in house so that we have complete control of the quality and traceability of our product.

SynQor®

RailQor™

Rail Transportation
isolated DC-DC converters

See page RQ14

NiQor®

High & low voltage,
non-isolated
DC-DC converters

See page NQ-38

PowerQor®

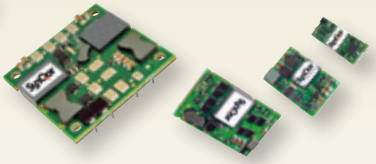
48V input, single & dual output
isolated DC-DC converters

See page PQ-10

BusQor®

High efficiency
DC-DC bus converters

See page BQ-16



iQor™

Advanced Telecommunications
Computing Architecture (ATCA™)
power interface module

See page page iQ-44

ACuQor®

Medical & Industrial-grade highly efficient
AC-DC power supplies

See page AQ-46

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DC-DC CONVERTERS, AC-DC POWER SUPPLIES, & EMI FILTERS

InQor®

Next-generation, ruggedized isolated DC-DC converters

See page IQ-18

UPS

Military Tough
Sealed, Weather-proof, Shock-proof
Uninterrutible Power Supply

See page UPS-26

Mil-COTS

Military "Off-The-Shelf" DC-DC converters for cost sensitive applications

See page MCOTS-30

Hi-Rel

High-Reliability
Military/Aerospace
DC-DC Converters

See page Hi-Rel-34

PowerQor®

Isolated DC-DC Converters

48V INPUT, SINGLE AND DUAL OUTPUT ISOLATED DC-DC CONVERTERS FOR TELECOM/NETWORK APPLICATIONS

Single and dual output converters are composed of next-generation, board-mountable, isolated, fixed switching frequency DC-DC converters that use synchronous rectification to achieve extremely high power conversion efficiency. The power dissipated by the converter is so low that a heatsink is not required, which saves cost, weight, height, and application effort. All of the power and control components are mounted to the multi-layer PCB substrate.

PRODUCT FEATURES

OPERATIONAL

- Ultra-high efficiency up to 97%
- Wide input voltage ranges:
  - 18-36V (PQ24)
  - 18-60V (PQ30)
  - 18-75V (PQ40)
  - 35-75V (PQ48, PQ60, DQ6)
  - 44-52V (PQ50)
  - 38-55V (PQ55)
  - 40-75V (PQ65)
- Withstand up to 100V, 100ms input voltage transient (PQ60, PQ40 models only)
- Fixed frequency switching, low output noise
- No minimum load requirement (except PQ60525HTA04)

GENERAL SPECIFICATIONS

- Operating Temperature -40°C to +100°C
- Output Voltage Set Point ±1.0% - 1.5%
- Output Voltage Ripple <1% of Vout (typ.)
- Input Ref. Ripple Current <1% of Iin (typ.)
- Switching Frequency 200 - 300kHz
- Transient Response ±50 - 300mV
- Output Voltage Trim Range +10% to -20%
  - Sixteenth Brick +10% to -10%
  - Half Brick Zeta +10% to -50%
- Isolation Voltage Up to 2250Vdc

PROTECTION/CONTROL

- Input under-voltage lockout (UVLO)
- Output current limit (OCP) and short circuit protection
- Output over-voltage protection (OVP)
- Thermal shutdown (OTP)
- Back-drive protection (starts into pre-biased load)
- On/Off control referenced to input side
- Remote sense
- Output voltage trim (industry std. trim equations)

MECHANICAL

- Industry standard pin-out configurations
- Industry standard footprints:
  - Sixteenth Brick: 0.95" x 1.35"
  - Eighth Brick: 0.90" x 2.3"
  - Quarter Brick: 1.45" x 2.3"
  - Half Brick: 2.3" x 2.4"
  - Full Brick: 4.6" x 2.4"
- Open-frame, single board construction for higher reliability (baseplated versions also available)

SAFETY

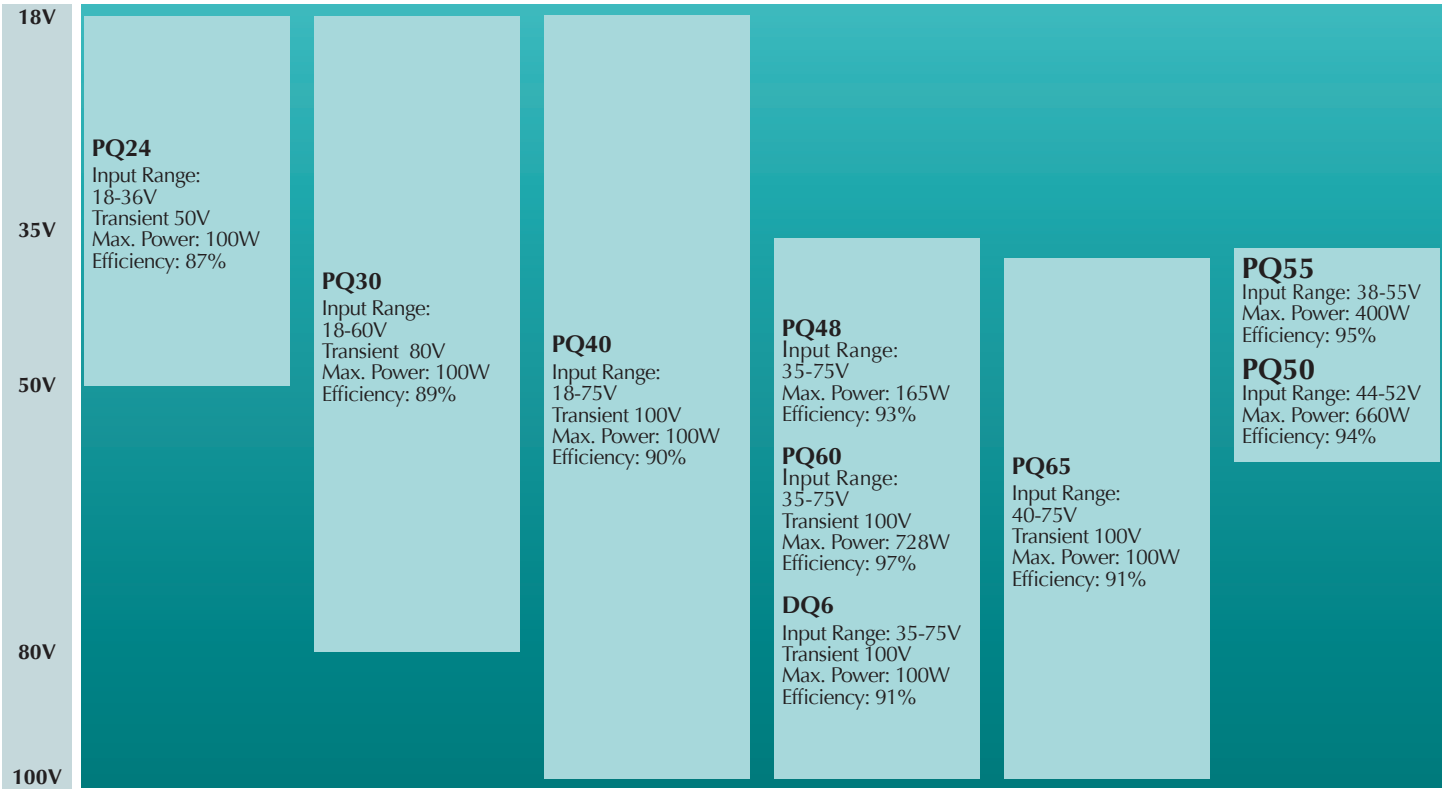
- Up to 2250V, 30MΩ input-to-output isolation
- Basic insulation rating
- CAN/CSA C22.2 NO. 60950-1:2007
- UL 60950-1:2007
- EN 60950-1:A1:2010

See page Package-49 for Package Outlines

PowerQor®

Isolated DC-DC Converters

*Power*Qor & *Dual*Qor PRODUCT FAMILY MATRIX



*Power*Qor PART NUMBERING GUIDE

Base Part Number								Option Descriptions		
Product Family	**Cont. Input Voltage**	**Output Voltage**		**Package Size**	**Performance Series**	**Thermal Design**	**Max. Output Current**	**Enable Logic**	**Pin Length**	**Features**
PQ	**24:** 18-36V **30:** 18-60V **40:** 18-75V **48:** 35-75V **50:** 44-52V **55:** 38-55V **60:** 35-75V **65:** 40-75V	**010:** 1V **012:** 1.2V **015:** 1.5V **016:** 1.65V **018:** 1.8 V **020:** 2V **025:** 2.5V **033:** 3.3V **050:** 5V **053:** 5.3V **060:** 6V	**080:** 8V **090:** 9V **120:** 12V **150:** 15V **180:** 18V **240:** 24V **260:** 26V **280:** 28V **480:** 48 V **525:** 52.5V **530:** 53V **540:** 54V	**S:** Sixteenth Brick **E:** Eighth Brick **Q:** Quarter Brick **H:** Half Brick **F:** Full Brick	**K:** Kilo **M:** Mega **G:** Giga **T:** Tera **P:** Peta **E:** Exa **Z:** Zeta	**A:** Open frame **B:** Baseplate **C:** Encased **D:** Encased Non-threaded Baseplate **L:**Low profile **M:** Low Profile Baseplate	**25:** 25A **30:** 30A **40:** 40A **60:** 60A **80:** 80A **A0:** 100A (not all models are shown)	**P:** Pos. **N:** Neg.	**K:** 0.110" **N:** 0.145" **R:** 0.180" **Y:** 0.250"	**S:** Standard **F:** Full Feature A:

Part Numbering Example: PQ48033HMA30NRS

*Dual*Qor PART NUMBERING GUIDE

Product Family	Input Voltage	1st Output Voltage	2nd Output Voltage	Package Size	Performance Series	Thermal Design	Max Power Output	Enable Logic	Pin Length	Feature Set
DQ	**6:** 35-75V	**50:** 5.0V	**33:** 3.3V	**Q**: Quarter Brick	**M:** Mega	**A:** Open Frame	**06**: 60 Watts	**N:** Neg	**N:** 0.145"	**S:** Std

Part Numbering Example: DQ65033QMA06NNS

For valid part numbers, refer to the website or contact your local sales representative or distributor.

PQ24

Series	1.8V	3.3V	5V	8V	12V	15V	28V

24Vdc Input (18-36Vdc Input Range, 50Vdc Transient on Full Brick)

Full Brick	FTA							21.5A 600W
Quarter Brick	QGA	25A 45W	25A 83W	20A 100W		8.33A 100W	6.67A 100W	
	QGL		25A 83W					

PQ30

Series	3.3V	5V	8V	12V	15V

24 and 48Vdc Input (18-60Vdc Input Range, 80Vdc Transient)

Quarter Brick	QGA	30A 100W				
		25A 83W				
Eighth Brick	EGA	20A 66W				

PQ40

Series	3.3V	5V	8V	12V	15V

24 and 48Vdc Input (18-75Vdc Input Range, 100Vdc Transient)

Quarter Brick	QGA	25A 83W	20A 100W	9A 72W	8.33A 100W	6.67A 100W

PQ55

Series	53V	54V

48Vdc Input (38-55Vdc Input Range)

Half Brick	HEB	7.6A 400W	
	HTL		5A 275W

PQ65

Series	18V

48Vdc Input (40-75Vdc Input Range, 100Vdc Transient)

Quarter Brick	QGA	5.6A 100W

PQ48

Series	1.5V	1.8V	2V	2.5V	3.3V	5V	5.3V	12V	15V

48Vdc Input (35-75Vdc Input Range)

Half Brick	HTA	60A 90W	60A 108W	60A 120W	60A 150W	50A 165W	33A 165W	30A 160W	14A 168W	11A 165W
	HGA	40A 60W	40A 72W	40A 80W	40A 100W	40A 132W			12A 144W	10A 150W
	HMA	30A 54W	30A 45A	30A 60W	30A 75W	30A 99W	25A 125W			
	HKA	20A 30W	20A 36W	20A 40W	20A 50W	20A 66W	20A 100W			
Quarter Brick	QNA QGA	25A 37.5W	25A 45W	25A 50W	25A 62.5W	25A 82.5W	20A 100W		8.8A 100W	6.7A 100W

PQ50

Series	5V	7.3V	9V	12V	18V

48Vdc Input (44-52Vdc Input Range)

Half Brick	HZA		60A 438W		55A 660W	
	HPA	50A 250W				
	HTA					10A 180W
Quarter Brick	QGB			11A 99W		

Visit our website for more information

PowerQor®

PQ60	Series	1.2V	1.5V	1.8V	2.5V	3.3V	5V	12V	15V	18V	24V 26V	28V	40V	50V 52.5V
48Vdc Input (35-75Vdc Input Range, 100Vdc Transient)														
Full Brick	FTA											26A 728W		
Half Brick	HZA						60A 300W	50A 600W	40A 600W		25A 600W	21.5A 602W	15A 600W	12A 600W
	HEA											12.8A 360W		
	HPA	100A 120W	100A 150W	100A 180W	80A 200W	70A 230W	45A 225W	20A 240W						
	HTA	60A 72W	60A 90W			50A 165W	33A 165W	14A 168W		9.2A 166W	10A 260W			3.85A 200W
	HGA					40A 132W	30A 150W							
	HMA					30A 99W								

PQ60	Series	1V	1.2V	1.5V	1.65V	1.8V	2.5V	3.3V	5V	6V	12V	15V	24V	48V
48Vdc Input (35-75Vdc Input Range, 100Vdc Transient)														
Quarter Brick	QZB										33A 400W			
	QEA										25A 300W			
	QEA										17A 204W			
	QPA	60A 60W	60A 72W	60A 90W		60A 108W	60A 150W	45A 150W			12A 144W			
	QTA	40A 40W	40A 48W	40A 60W	40A 66W	40A 72W	40A 100W	35A 115W	30A 150W		8.3A 100W			3.0A 144W
	QGA			25A 37.5W		25A 45W	25A 62.5W	25A 82.5W	20A 100W	17A 100W			5.0A 120W	
	QML			15A 22.5W		15A 27W	15A 37.5W	15A 50W	15A 75W					
Eighth Brick	ETx			45A 67.5W		45A 81W	35A 87.5W	30A 99W						
	EGx	25A 25W	25A 30W	25A 37.5W		25A 45W	25A 62.5W	20A 66W	15A 75W		7.0A 84W	5.0A 75W	3.0A 72W	
	EGx	20A 20W	20A 24W	20A 30W		20A 36W	20A 50W							
	EMx	15A 15W	15A 18W	15A 22.5W		15A 37.5W	15A 27W	15A 50W	10A 50W		4.0A 48W			
	EKx		30A 36W	25A 37.5W		25A 45W	20A 50W	15A 50W	10A 50W		4.0A 48W	3.3A 50W		
Sixteenth Brick	SMx		25A 30W	25A 37.5W		25A 45W	20A 50W	15A 50W	10A 50W		4.0A 48W	3.0A 45W		

DualQor Isolated DC-DC Converters

DualQor®

DQ6	Series	2.4/1.2V	3.3/1.2V	3.3/1.5V	3.3/1.8V	3.3/2.5V	5.0/3.3V	+12/-12V
48Vdc Input (35-75Vdc Input Range, 100Vdc Transient)								
Quarter Brick	QGL		15/15A 68W	15/15A 73W	15/15A 77W	15/15A 88W	10/15A 100W	
	QMA				12/22A 40W	12/16A 40W	12/18A 60W	5/5A 60W
	QKA	8/16A 20W					8/9A 40W	

RailQor Modules

Isolated DC-DC Converters for the Rail Transportation Industry

SynQor's RailQor line of dc/dc converters is designed to provide isolated dc power in the transportation industry for such electronics as LED displays, audio amplifiers, safety monitors, lighting, and communications systems under the European Standard EN 50155. These converters use SynQor's synchronous rectifier based technology to achieve extremely efficient industry leading performance. Due to the difficult environmental conditions the transportation market poses on power supplies, SynQor has designed the RailQor line for optimal performance in the most demanding applications.

PRODUCT FEATURES

OPERATIONAL

- High efficiency at full load up to 93%
- No derating in environments with zero airflow and ambient temperatures up to 85°C with no heatsink.
- Input voltage ranges: 9-36V, 42V-110V, 12-150 & 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 50W
- 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: Quarter Brick: 1.54" x 2.39"

PROTECTION/CONTROL

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

GENERAL SPECIFICATIONS

• Operating Temperature	-40°C to +100°C
• Output Voltage Set Point	±1.0%
• Output Voltage Ripple	<1% of Vout (typ.)
• Switching Frequency	240 - 350kHz
• Transient Response	<7% of Vout (typ.)
• Output Voltage Trim Range	+10% to -20%
• Isolation Voltage	Up to 4,250Vdc
• EN50155 & RIA 12 Compliance	

SAFETY

RQ1B, RQ72 & RQ68

- Reinforced Insulation
- Up to 3000V, 100MΩ 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, 30MΩ 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

Family	Output Voltage	5V	12V	24V	Quarter-Brick
	Max. Iout / Power out	10A / 50W	4A / 48W	2A / 48W	
RQ1B	2 : 1 Input Ratio	110Vdc (66V – 160Vdc) Continuous Input Range		170V Transient	QMC
RQ72	2 : 1 Input Ratio	72Vdc (42V – 110Vdc) Continuous Input Range		N/A	QMC
RQ18	4 : 1 Input Ratio	18Vdc (9V – 36Vdc) Continuous Input Range		40V Transient	QMC
	Max. Iout / Power out	5.3A / 26.5W	2.3A / 27.6W	1.1A / 26.4W	QMC
RQ68	12 : 1 Input Ratio	68Vdc (12V – 150Vdc) Continuous Input Range		170V Transient	QMC

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***.

EN50155 Requirements			RailQor Capabilities		
Nominal Input	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)

Application Notes

- ***"Thermal Considerations for DC/DC Converter Modules"*** - Details optimal heat removal methods for power modules with a baseplate, both through the pins and with or without heatsinks.
- ***"InQor Railway"*** - Details the InQor/RailQor product line and its use in the railway industry and also addresses the European standards EN50155 and RIA12 and how to meet them using SynQor DC/DC converters.
- ***"Design and Implementation of a Transient Suppression Circuit"*** - Details the design of a transient and surge suppressor aimed at meeting RIA 12 requirements with RailQor products. Full schematic and BOM available.
- ***"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

- How to layout 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

PART NUMBERING GUIDE

Product Family	Cont. Input Voltage	Output Voltage	Package Size	Performance Series	Thermal Design	Max. Iout	Options Description		
							Enable Logic	Pin Length	Features
RQ	**18:** 9 - 36V **68:** 12 - 150V **72:** 42 - 110V **1B:** 66 - 160V	**050:** 5V **120:** 12V **240:** 24V	**Q:** Quarter Brick	**M:** Mega	**C:** Encased **V:** Flanged Baseplate	**10:** 10A **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.

Open-frame, high efficiency next generation DC-DC bus converters

The BusQor bus converters are the next-generation, board-mountable, isolated, fixed switching frequency DC-DC converters that uses synchronous rectification to achieve extremely high conversion efficiency. The power dissipated by the converter is so low that a heatsink is not required, which saves cost, weight, height, and application effort. BusQor converters are ideal for creating the mid-bus voltage required to drive point-of-load (non-isolated) converters in IBA.

PRODUCT FEATURES

OPERATIONAL

- Ultra-high efficiency up to 96%
- Wide input voltage ranges:
  - 42V - 53V (BQ50)
  - 35V - 55V (BQ55)
  - 40V - 65V (BQ57)
  - 35V - 75V (BQ60, PQ60)
  - 36V - 75V (SQ60)
- Delivers 6.0V, 9.6V or 12V bus for Intermediate Bus Architectures (IBA)

GENERAL SPECIFICATIONS

• Operating Temperature	-40°C to +100°C
• Output Voltage Ripple	<0.3% of Vout (typ.)
• Input Ref. Ripple Current	<5% of Iin (typ.)
• Transient Response	±50 - 200mV
• Current Share Accuracy	±10%
• Isolation Voltage	Up to 2250Vdc

MECHANICAL

- Industry standard pin-out configurations
- Industry standard footprints:
  - Eighth Brick: 0.90" x 2.3"
  - Quarter Brick: 1.45" x 2.3"
  - Half Brick: 2.3" x 2.4"
- Open-frame, single board construction for higher reliability (baseplated versions also available)

PROTECTION/CONTROL

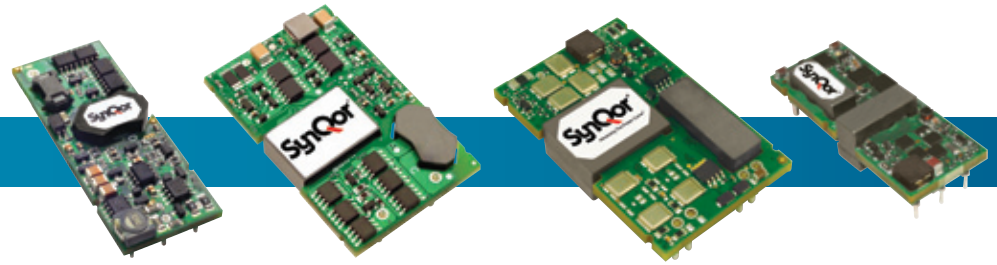
- Input under-voltage lockout (UVLO)
- Output current limit (OCP) and short circuit protection
- Output over-voltage protection (OVP)
- Thermal shutdown (OTP)
- Back-drive protection (starts into pre-biased load)
- On/Off control referenced to input side
- Remote sense
- Output voltage trim on select models

SAFETY

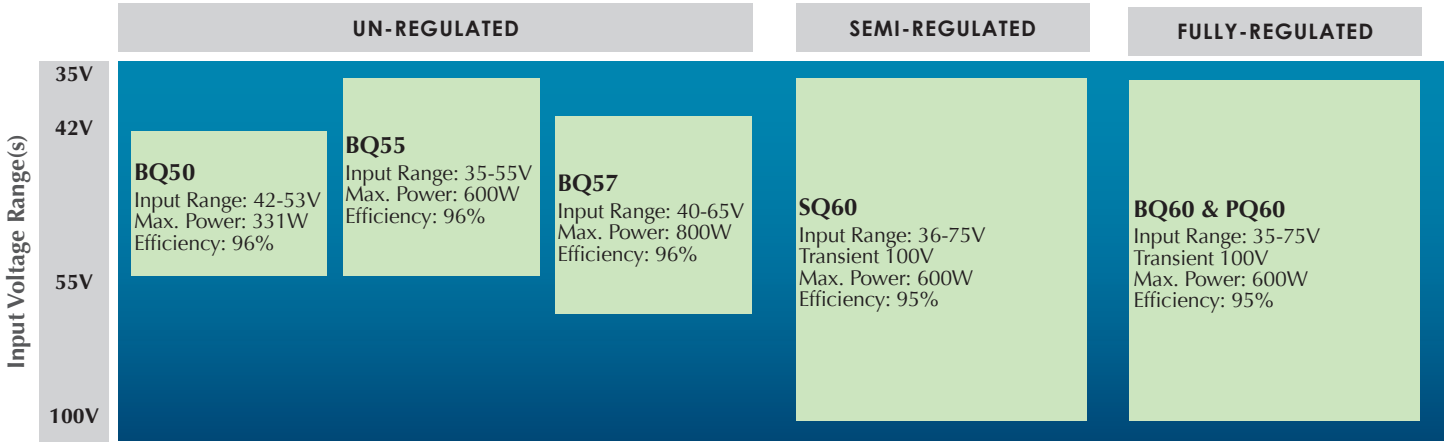
- Up to 2250Vdc, 30MΩ input-to-output isolation
- Basic insulation rating
- CAN/CSA C22.2 NO. 60950-1:2007
- UL 60950-1:2007
- EN 60950-1:A1:2010
- Meets UL94V-0 flammability requirements

Visit our website for more information

See page Package-49 for package outlines



*Bus*Qor PRODUCT FAMILY MATRIX



*Bus*Qor PART NUMBERING

Base Part Number							Option Description		
Product Family	Input Voltage	Output Voltage	Package Size	Performance Series	Thermal Design	Max. Output Current	Enable Logic	Pin Length	Features
BQ **SQ** **PQ**	**50:** 42-53V **55:** 35-55V **57:** 40-65V **60:** 35-75V	**060:** 6V **090:** 9.6V **120:** 12V	**E:** Eighth Brick **Q:** Quarter Brick **H:** Half Brick	**T:** Tera **P:** Peta **E:** Exa **Z:** Zeta	**A:** Open-frame **B:** Baseplated **C:** Encased	**16:** 16A **17:** 17A **20:** 20A **25:** 25A (not all currents shown)	**P:** Pos. **N:** Neg.	**K:** 0.110" **N:** 0.145" **R:** 0.180" **Y:** 0.250"	**S:** Standard **C:** No common mode capacitor **2:** Two sets of output pins

Part Numbering Example: **BQ55090QTA27NRS** *For valid part numbers, refer to the website or contact your local sales representative or distributor

*Bus*Qor listed by Package and output voltage

*BQ*55

Series	9.6V	12V
48Vdc Input (35-55Vdc Input Range)		
Quarter Brick – QPA	43A 300-473W	
Quarter Brick – QEA	60A 420-660W	50A 450-688W
Quarter Brick – QTA	240W** 22-36A	
Eighth Brick – EZA		40A 330-530W
Eighth Brick – ETA	27A 189-297W	20A 175-275W
Eighth Brick – ETL	27A 189-297W	16A 140-220W
Eighth Brick – EPA	35A 228-385W	

** BQ55090QTA27 is power limited @ 240W over Input Voltage Range 36-55Vdc

*SQ*60

Series	6V	12V
48Vdc Input (36-75Vdc Input Range, Transient 100Vdc)		
Half Brick – HZA		50A 600W
Quarter Brick – QZA		40A 480W
Quarter Brick – QPB		33A 396W
Quarter Brick – QPA	55A 330W	28A 336W
Quarter Brick – QEA		25A 300W
Eighth Brick – ETA		17A 204W
Eighth Brick – ETA		20A 240W

*BQ*57

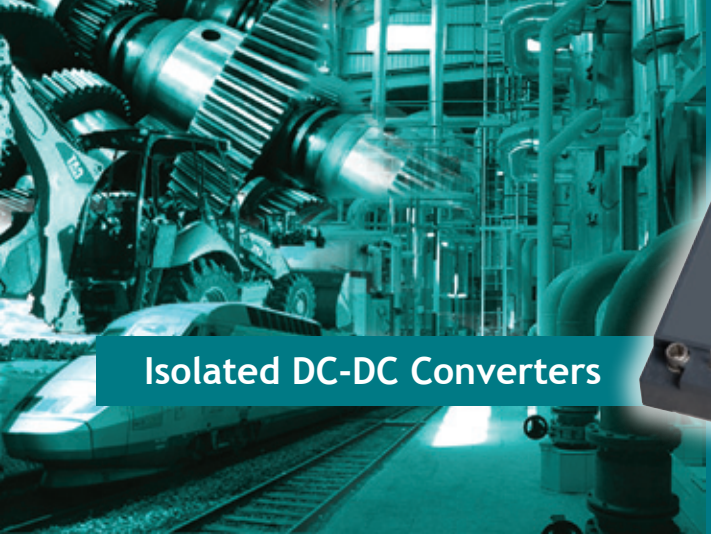
Series	10.5V	12V
48Vdc Input (40-65Vdc Input Range)		
Quarter Brick – QEA	60A 432-780W	50A 450-800W

*BQ*50

Series	12V
48Vdc Input (42-53Vdc Input Range)	
Quarter Brick – QTA	20A 210-265W
Quarter Brick – QTA	25A 263-331W

*BQ*60/*PQ*60

Series	12V
48Vdc Input (35-75Vdc Input Range, Transient 100Vdc)	
Half Brick – HZA	50A 600W
Half Brick – HEA	30A 360W
Quarter Brick – QEA	25A 300W
Quarter Brick – QEA	17A 204W



Isolated DC-DC Converters

InQor®

Next-Generation, Ruggedized Isolated DC-DC Converters for Industrial Applications

SynQor's ruggedized DC-DC converters and filters are designed for a wide range of industrial applications including those required to withstand harsh environments: railway and transportation systems, industrial motion control, information displays, factory automation and power generation systems. SynQor converters feature a two-stage power topology with synchronous-rectification that greatly improves efficiency and optimizes the power dissipated by the converter.

PRODUCT FEATURES

OPERATIONAL

- High efficiency up to 95%
- Input voltage ranges from 9V-160V and 180V-425V
- Output power up to 600W
- Fixed frequency switching, low output noise
- No minimum load requirement
- Full Feature optional on some models

GENERAL SPECIFICATIONS

- Operating Temperature -40°C to +100°C
- Output Voltage Set Point ±1.0%
- Output Voltage Ripple <1% of Vout (typ.)
- Switching Frequency 240 - 350kHz
  (IQ4H QT and HT) 450 - 550kHz
- Transient Response <7% of Vout (typ.)
- Output Voltage Trim Range +10% to -20%
  (Sixteenth Brick) +10% to -10%
  (Half Brick Zeta) +10% to -50%
- Isolation Voltage Up to 4250Vdc

MECHANICAL

- Industry standard pin-out configurations
- Flanged baseplate available
- Industry standard footprints:
  Full Brick: 2.48" x 4.69"
  Half Brick: 2.39" x 2.49"
  Quarter Brick: 1.54" x 2.39"
  Sixteenth Brick: 1.04" x 1.44"

See page 51 for package outlines

PROTECTION/CONTROL

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

SAFETY

IQ12 - IQ48

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

IQ64 - IQ4H

- Reinforced Insulation
- Up to 4250V, 100MΩ input-to-output isolation
- CAN/CSA C22.2 NO. 60950-1:2007
- UL 60950-1:2007
- EN 60950-1/A11:2009
- CE marked

Visit our website for more information

*In*Qor PRODUCT FAMILY MATRIX

2:1 INPUT RATIO

4:1 INPUT RATIO

Input Voltage Range(s)

9V
18V
25V
34V
75V
100V
170V
475V

IQ12
Input Range: 9-22V
Transient: 25V
Max. Power: 182W
Eff.: Up to 92%

IQ24
Input Range: 18-36V
Transient: 50V
Max. Power: 504W
Eff.: Up to 95%

IQ48
Input Range: 34-75V
Transient: 100V
Max. Power: 600W
Eff.: Up to 95%

IQ1B
Input Range: 66-160V
Transient: 170V
Max. Power: 255W
Eff.: Up to 93%

IQ72
Input Range: 42-110V
Max. Power: 255W
Eff.: Up to 93%

IQ4H
Input Range:
180-425V
Transient: 475V
Max. Power: 600W
Eff.: Up to 90%

IQ18
Input Range: 9-36V
Transient: 40V
Max. Power: 182W
Eff. : Up to 92%

IQ36
Input Range: 18-75V
Max. Power: 220W
Eff.: Up to 93%

IQ70
Input Range: 34-135V
Max. Power: 240W
Eff.: Up to 93%

8:1 INPUT RATIO

12:1 INPUT RATIO

Input Voltage Range(s)

9V
18V
34V
75V
170V

IQ32
Input Range: 9-75V
Transient: 100V
Max. Power: 255W
Eff.: Up to 91%

IQ64
Input Range: 18-135V
Max. Power: 200W
Eff.: Up to 91%

IQ90
Input Range: 34-160V
Max. Power: 228W
Eff.: Up to 94%

IQ68
Input Range: 12-150V
Transient: 170V
Max. Power: 53W
Eff. : Up to 90%

*In*Qor PART NUMBERING GUIDE

Product Family	Cont. Input Voltage	Output Voltage	Package Size	Performance Series	Thermal Design	Max. Iout	Options Description		
							Enable Logic	Pin Length	Features
IQ	**12:** 9-22V **18:** 9-36V **24:** 18-36V **32:** 9-75V **36:** 18-75V **48:** 34-75V **64:** 18-135V **68:** 12-150V **70:** 34-135V **72:** 42-110V **90:** 34-160V **1B:** 66-160V **4H:** 180-425V	**012:** 1.2V **015:** 1.5V **018:** 1.8V **025:** 2.5V **033:** 3.3V **050:** 5V **070:** 7V **120:** 12V **150:** 15V **240:** 24V **280:** 28V **300:** 30V **400:** 40V **480:** 48V **500:** 50V **720:** 72V **960:** 96V	**S:** Sixteenth Brick **Q:** Quarter Brick **H:** Half Brick **F:** Full Brick	**K:** Kilo **M:** Mega **G:** Giga **T:** Tera **P:** Peta **E:** Exa **Z:** Zeta	**C:** Encased **D:** Encased Non-threaded Baseplate **V:** Flanged Baseplate	**60:** 60A **50:** 50A **30:** 30A **10:** 10A **06:** 6A **02:** 2A (not all shown)	**N:** Negative	**R:** 0.180"	**S:** Standard **F:** Full Feature

Part Numbering Example: IQ1B480QTC03NRS * For valid part numbers, refer to the website or contact your local sales representative or distributor.

2:1 input ratio listed by package and output voltage

*IQ*12	Vout	1.2V	1.5V	1.8V	2.5V	3.3V	5V	7V	12V	15V	24V	28V	30V	40V	48V
12Vdc Input (9-22Vdc Input Range, Transient 25V)															
Half Brick	HPC			60A 108W		50A 165W	36A 180W		15A 180W	12A 180W	7.5A 180W	6.5A 182W		4.5A 180W	3.7A 178W
	HTC			50A 90W		40A 132W	28A 140W		12A 144W	9.5A 143W	6A 144W	5A 140W		3.5A 140W	3A 144W
Quarter Brick	QTC			40A 72W		30A 99W	20A 100W	14A 98W	8A 96W	7A 105W	4A 96W		3A 90W		2A 96W
	QGC			30A 54W		20A 66W	15A 75W	10A 70W	6A 72W	5A 75W	3A 72W		2.4A 72W		1.5A 72W
	QMC										2A 48W		1.5A 45W		1A 48W
Sixteenth Brick	SMC	25A 30W	25A 38W	25A 45W	20A 50W	15A 50W	10A 50W	7A 49W	4A 48W	3A 45W					
	SKC	20A 24W	16A 24W	14A 25W	10A 25W	8A 26W	5A 25W	3.5A 25W	2A 24W	1.7A 26W					

2:1 input ratio listed by package and output voltage

IQ24

	Vout	1.2V	1.5V	1.8V	2.5V	3.3V	5V	7V	12V	15V	24V	28V	30V	40V	48V	50V
24Vdc Input (18-36Vdc Input Range, Transient 50V)																
Half Brick	HZC						60A 300W		42A 504W	34A 510W	21A 504W	18A 504W		12.5A 500W		10A 500W
	HEC											14A 392W				8A 400W
	HPC			60A 108W		50A 165W	40A 200W		18A 216W	15A 225W	9A 216W	7.5A 210W		5.5A 220W	4.5A 216W	
	HTC			50A 90W		40A 132W	30A 150W		13A 156W	10A 150W	6.5A 156W	5.5A 154W		4A 160W	3.3A 158W	
Quarter Brick	QTC			40A 72W		30A 99W	24A 120W	17A 119W	10A 120W	8A 120W	5A 120W		4A 120W		2.5A 120W	
	QGC			32A 58W		25A 83W	18A 90W	13A 91W	7.5A 90W	6A 90W	3.7A 89W		3A 90W		1.8A 91W	
	QMC												2A 60W		1.2A 58W	
Sixteenth Brick	SMC	25A 30W	25A 38W	25A 45W	20A 50W	15A 50W	10A 50W	7A 49W	4A 48W	3A 45W						
	SKC	20A 24W	16A 21W	14A 25W	10A 25W	8A 26W	5A 25W	3.5A 25W	2A 24W	1.7A 26W						

IQ48

	Vout	1.2V	1.5V	1.8V	2.5V	3.3V	5V	7V	12V	15V	24V	28V	30V	40V	48V	50V
48Vdc Input (34-75Vdc Input Range, Transient 100V)																
Half Brick	HZC						60A 300W		50A 600W	40A 600W	25A 600W	21.5A 602W		15A 600W		12A 600W
	HPC			60A 108W		60A 198W	46A 230W		21A 252W	17A 255W	10.5A 252W	9A 252W		6.3A 252W	5.2A 250W	
	HTC			50A 90W		45A 149W	34A 170W		16A 192W	13A 195W	8A 192W	7A 196W		5A 200W	4A 192W	
Quarter Brick	QTC			40A 72W		30A 99W	25A 125W	20A 140W	12A 144W	10A 150W	6A 144W		5A 150W		3A 144W	
	QGC			32A 58W		25A 83W	21A 105W	15A 105W	9A 108W	7A 105W	4.5A 108W		3.5A 105W		2.2A 106W	
	QMC												1.6A 48W		1A 48W	
Sixteenth Brick	SMC	25A 30W	25A 38W	25A 45W	20A 50W	15A 50W	10A 50W	7A 48W	4A 48W	3A 45W						
	SKC	20A 24W	16A 21W	14A 25W	10A 25W	8A 26W	5A 25W	3.5A 25W	2A 24W	1.7A 26W						

IQ72

	Vout	1.8V	3.3V	5V	7V	12V	15V	24V	28V	30V	40V	48V
72Vdc Input (42-110Vdc Input Range)												
Half Brick	HPC	60A 108W	60A 198W	46A 230W		21A 252W	17A 255W	10.4A 250W	9A 252W		6.3A 252W	5.2A 250W
	HTC	50A 90W	45A 149W	34A 170W		16A 192W	13A 195W	8A 192W	7A 196W		5A 200W	4A 192W
Quarter Brick	QTC	40A 72W	30A 99W	25A 125W	20A 140W	12A 144W	10A 150W	6A 144W		5A 150W		3A 144W
	QGC	32A 58W	25A 83W	20A 100W	15A 105W	9A 108W	7A 105W	4.5A 108W		3.5A 105W		2A 96W
	QMC									2A 60W		1.2A 58W

Isolated DC-DC Converters

2:1 input ratio listed by package and output voltage

*IQ*1B

	Vout	1.8V	3.3V	5V	7V	12V	15V	24V	28V	30V	40V	48V
110Vdc Input (66-160Vdc Input Range, Transient 170V)												
Half Brick	HPC	60A 108W	60A 198W	48A 240W		21A 252W	17A 255W	10A 240W	9A 252W		6.3A 252W	5.2A 250W
	HTC	50A 90W	45A 149W	34A 170W		16A 192W	13A 195W	8A 192W	7A 196W		5A 200W	4A 192W
Quarter Brick	QTC	40A 72W	30A 99W	25A 125W	20A 140W	12A 144W	10A 150W	6A 144W		5A 150W		3A 144W
	QGC	32A 58W	23A 76W	18A 90W	15A 105W	9A 108W	7A 105W	4.5A 108W		3.5A 105W		2A 96W
	QMC	25A 45W	15A 50W	10A 50W	7A 49W	4A 48W	3A 45W	2A 48W		1.5A 45W		1A 48W

*IQ*4H

	Vout	1.8V	2.5V	3.3V	5V	12V	15V	24V	28V	48V
385Vdc Input (180-425Vdc Input Range, Transient 475V)										
Full Brick	FTC				80A 400W	50A 600W	40A 600W	25A 600W	21.4A 600W	12.5A 600W
Half Brick	HTC	70A 126W	70A 175W	60A 198W	50A 250W	25A 300W	20A 300W	12.5A 300W	10.7A 300W	6.25A 300W
Quarter Brick	QTC	30A 54W	30A 75W	30A 100W	30A 150W	13A 156W	10A 150W	6.25A 150W	5.35A 150W	3.12A 150W

*IQ*18

	Vout	1.2V	1.5V	1.8V	2.5V	3.3V	5V	7V	12V	15V	24V	28V	30V	40V	48V
18Vdc Input (9-36Vdc Input Range, Transient 40V)															
Half Brick	HPC			60A 108W		50A 165W	36A 180W		15A 180W	12A 180W	7.5A 180W	6.5A 182W		4.5A 180W	3.7A 178W
	HTC			50A 90W		40A 132W	28A 140W		12A 144W	9.5A 143W	6A 144W	5A 140W		3.5A 140W	3A 144W
Quarter Brick	QTC			40A 72W		30A 99W	20A 100W	14A 98W	8A 96W	7A 105W	4A 96W		3A 90W		2A 96W
	QGC			30A 54W		20A 66W	15A 75W	10A 70W	6A 72W	5A 75W	3A 72W		2.4A 72W		1.5A 72W
	QMC										2A 48W		1.5A 45W		1A 48W
Sixteenth Brick	SMC	25A 30W	25A 38W	25A 45W	20A 50W	15A 50W	10A 50W	7A 49W	4A 48W	3A 45W					
	SKC	20A 24W	14A 21W	14A 25W	10A 25W	8A 26W	5A 25W	3.5A 25W	2A 24W	1.7A 26W					

*IQ*36

	Vout	1.2V	1.5V	1.8V	2.5V	3.3V	5V	7V	12V	15V	24V	28V	30V	40V	48V
36Vdc Input (18-75Vdc Input Range)															
Half Brick	HPC			60A 108W		50A 165W	40A 200W	30A 210W	18A 216W	14A 210W	9A 216W	7.5A 210W		5.5A 220W	4.5A 216W
	HTC			50A 90W		40A 132W	30A 150W	22A 154W	13A 156W	10A 150W	6.5A 156W	5.5A 154W		4A 160W	3.2A 154W
Quarter Brick	QTC			40A 72W		30A 99W	24A 120W	17A 119W	10A 120W	8A 120W	5A 120W		4A 120W		2.5A 120W
	QGC			32A 58W		25A 83W	18A 90W	13A 91W	7.5A 90W	6A 90W	3.7A 89W		3A 90W		1.8A 86W
	QMC												2A 60W		1.2A 58W
Sixteenth Brick	SMC	25A 30W	25A 38W	25A 45W	20A 50W	15A 50W	10A 50W	7A 49W	4A 48W	3A 45W					
	SKC	20A 24W	16A 24W	14A 25W	10A 25W	8A 26W	5A 25W	3.5A 25W	2A 24W	1.7A 26W					

*IQ*70

	Vout	1.8V	3.3V	5V	7V	12V	15V	24V	28V	30V	40V	48V
70Vdc Input (34-135Vdc Input Range)												
Half Brick	HPC	60A 108W	57A 188W	44A 220W		20A 240W	16A 240W	10A 240W	8.5A 238W		6A 240W	5A 240W
	HTC	50A 90W	43A 142W	32A 160W		15A 180W	12A 180W	7.5A 180W	6.5A 182W		4.5A 180W	3.8A 182W
Quarter Brick	QTC	40A 72W	30A 99W	24A 120W	18A 126W	11A 132W	8.6A 129W	5.5A 132W		4.4A 132W		2.7A 130W
	QGC	32A 58W	23A 76W	17A 85W	12A 84W	7A 84W	5.5A 83W	3.5A 84W		2.8A 84W		1.8A 86W
	QMC	25A 45W	15A 50W	10A 50W	7A 49W	4A 48W	3.3A 50W	2A 48W		1.6A 48W		1A 48W

8:1 input ratio listed by package and output voltage

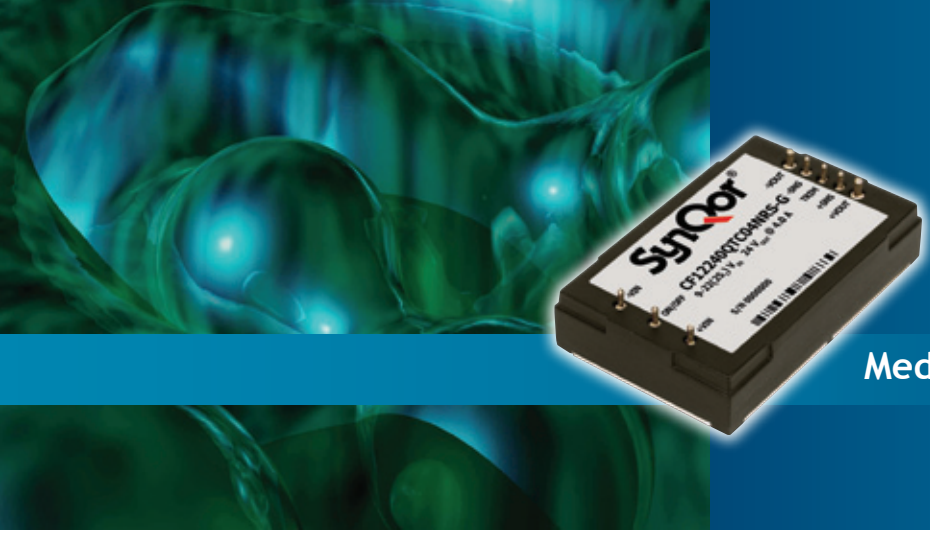
*IQ*32	Vout	1.8V	3.3V	5V	7V	12V	15V	24V	28V	30V	40V	48V
32Vdc Input (9-75Vdc Input Range, Transient 100V)												
Half Brick	HZC			50A 250W		21A 252W	17A 255W	10A 240W	9A 252W		6A 240W	5A 250W
	HPC	55A 99W	45A 149W	32A 160W		13A 156W	11A 165W	6.7A 161W	5.8A 162W		4A 160W	3.4A 163W
	HTC	45A 81W	33A 109W	24A 120W		10A 120W	8A 120W	5A 120W	4.5A 126W		3A 120W	2.5A 120W
Quarter Brick	QTC	35A 63W	25A 83W	17A 85W	12A 84W	7A 84W	5.5A 83W	3.5A 84W		2.8A 84W		1.8A 86W
	QGC	25A 45W	15A 50W	10A 50W	7A 49W	4A 48W	3.3A 50W	2A 48W		1.6A 48W		1A 48W

*IQ*64	Vout	1.8V	3.3V	5V	7V	12V	15V	24V	28V	30V	40V	48V
64Vdc Input (18-135Vdc Input Range)												
Half Brick	HPC	60A 108W	50A 165W	36A 180W		16A 192W	13A 195W	8A 192W	7A 196W		5A 200W	4A 192W
	HTC	50A 90W	40A 132W	28A 140W		12A 144W	10A 150W	6A 144W	5.5A 154W		3.8A 152W	3A 144W
Quarter Brick	QTC	36A 65W	27A 89W	20A 100W	14A 98W	8A 96W	6.5A 98W	4A 98W		3.2A 96W		2A 96W
	QGC	25A 45W	15A 50W	10A 50W	7A 49W	4A 48W	3.3A 50W	2A 48W		1.6A 48W		1A 48W

*IQ*90	Series	1.8V	3.3V	5V	7V	12V	15V	24V	28V	30V	40V	48V
90Vdc Input (34-160Vdc Input Range)												
Half Brick	HPC	60A 108W	53A 175W	40A 200W		19A 228W	15A 225W	9.5A 228W	8A 224W		5.7A 228W	4.6A 221W
	HTC	50A 90W	40A 132W	30A 150W		13A 156W	10A 150W	6.5A 156W	5.7A 160W		4A 160W	3.2A 154W
Quarter Brick	QTC	40A 72W	30A 99W	24A 120W	17A 119W	10A 120W	8A 120W	5A 120W		4A 120W		2.5A 120W
	QGC	32A 58W	23A 76W	17A 86W	12A 84W	7A 84W	5.5A 83W	3.5A 84W		2.8A 84W		1.8A 86W
	QMC	25A 45W	15A 50W	10A 49W	7A 49W	4A 48W	3.3A 50W	2A 48W		1.6A 48W		1A 48W

12:1 input ratio listed by package and output voltage

*IQ*68	Vout	1.8V	3.3V	5V	7V	12V	15V	24V	28V	30V	40V	48V
68Vdc Input (12-150Vdc Input Range, Transient 170V)												
Half Brick	HGC			10A 50W		4.4A 53W		2.2A 53W				1.1A 53W
Quarter Brick	QMC			5A 25W		2.2A 26W		1.1A 26W				0.55A 26W



Medical Grade DC-DC Power Supplies

Medical Grade DC-DC Converters Rated for CF Patient Contact and Defibrillation Proof

The CFQor series of Quarter-Brick DC-DC converters are high efficiency converters designed for those medical applications that require isolation and leakage current levels that comply with IEC60601-1 for CF patient contact and are also defibrillation proof.

CFQor	Series	Output Voltage 5V	12V	15V	24V
12Vdc Nominal Input (9-22V Continuous Input Range; 9-25V transient)					
Quarter Brick	CF12	20A 100W	8A 96W	7A 105W	4A 96W
24Vdc Nominal Input (18-36V Continuous Input Range; 18-50V transient)					
Quarter Brick	CF24	24A 120W	10A 120W	8A 120W	5A 120W
48Vdc Nominal Input (34-75V Continuous Input Range; 34-100V transient)					
Quarter Brick	CF48	25A 125W	12A 144W	10A 150W	6A 144W

PRODUCT FEATURES

- High Efficiency, up to 93% at full rated load current
- Industry standard quarter-brick pin-out configuration
- Reinforced Insulation
- 4250V, 100MΩ input-to-output
- UL 60601-1:2003
- CAN/CSA-C22.2 No. 60601-1-M90
- EN60601-1/A2:1995
- IEC 60601-1/A2:1995
- CAN/CSA-C22.2 No. 60601-1-08
- ANSI/AAMI ES60601-1:2005
- EN 60601-1:2006
- IEC 60601-1:2005
- CF Patient Contact
- Defibrillation Proof

CFQor PART NUMBERING GUIDE

Product Family	Cont. Input Voltage	Output Voltage	Package Size	Performance Series	Thermal Design	Maximum Output Current	Options Description: Enable Logic	Pin Length	Features
CF	**12:** 9-22V **24:** 18-36V **48:** 34-75V	**050:** 5V **120:** 12V **150:** 15V **240:** 24V	**Q:** Quarter Brick	**T:** Tera	**C:** Encased **V:** Flanged Baseplate	**25:** 25A **08:** 8A **24:** 24A **07:** 7A **20:** 20A **06:** 6A **12:** 12A **05:** 5A **10:** 10A **04:** 4A	**N:** Negative Logic	**R:** 0.180″	**S:** Standard Features

Part Numbering Example: CF24120QTC10NRS * For valid part numbers, refer to the website or contact your local sales representative or distributor.

Visit our website for more information

See page 51 for package outlines

UPS

Sealed Shock-Proof Weather-Proof Rugged Construction

Military Grade Uninterruptible Power Supply (UPS)

SynQor's UPS is designed for the extreme environmental and demanding electrical conditions of Military/ Aerospace applications. SynQor's UPS incorporates field proven high efficiency designs and rugged packaging technologies. This UPS will accept a wide range of input voltage and frequency values while delivering a well-conditioned AC output to the load. Its use of lithium polymer batteries permits the lowest profile and lowest weight solution in its power class. It is designed and manufactured to comply with a wide range of military standards. Options include a DC output and the ability to also draw power from a military standard 28VDC input.

PRODUCT FEATURES

Operational

- Full power operation
  -20°C to +55°C (Storage: -20°C to +65°C)
- True on-line double conversion
- Hot swappable internal battery pack lithium polymer
- Universal AC input voltage and frequency range
- Dual input: AC and optional DC
- Cold-start with no AC or DC input connections
- Power factor correction at AC input
- Pure sinusoidal AC output voltage
- Handles non-linear loads
- Communications and Signal I/O port

In-Line Manufacturing Process

- AS9100 and ISO 9001:2008 certified facility
- Full component traceability

Mechanical

- Sealed, Weather-proof, Shock-proof construction
- Military Tough, Die-Cast Aluminum Chassis
- Ultra Low weight (See Table)
- Low profile (See Table)

Specification Compliance (Pending)

- MIL-STD-704F - Aircraft Electrical Power Characteristics
- Mil-STD-1399-300B - Interface Std for Shipboard Systems
- MIL-STD-1275D - Vehicle Electrical Power Characteristics
- MIL-STD-461F - Electromagnetic Interference
- MIL-STD-810G - Environmental Engineering Considerations

Options

- DC input (28Vnom) for Dual Source
- Standard / Extended internal battery pack
- 360 – 800Hz AC input
- 50Hz or 400Hz AC output
- Auxiliary isolated DC output up to 500W
- Shipboard version with floating neutral wire
- Rack mounting style

SynQor Headquarters 155 Swanson Road, Boxborough, MA 01719-1316 USA | 1.888.567.9596 (USA only) | **www.synqor.com**

UPS

Military Grade Uninterruptible Power Supply

1250W (1500VA)
1U High Rack-Mount Package
>10 Minutes Battery Run Time
Only 32 lbs.

Model Number	Power	Battery Run-Time @ Full Power (80% Power)	Height	Weight	Options					
					DC Input (28V nom)	DC Output (500W)	Floating Neutral AC Output	AC Input Frequency (50/60Hz or 400Hz)	AC Output Voltage (115Vrms or 230Vrms)	AC Output Frequency (50Hz, 60Hz or 400Hz))
UPS-1500-S-1U *(1 Standard Battery Pack)*	1250W (1500VA)	**>10 min.** *(>13 min.)*	**1U**	**32 lbs.**	•	•	•	•	115Vrms ONLY	•
UPS-1500-E-2U *(1 Extended Battery Pack)*	1250W (1500VA)	**>24 min.** *(>31 min.)*	**2U**	**50 lbs.**	•	•	•	•	115Vrms ONLY	•
UPS-3000-S-2U *(2 Standard Battery Packs)*	2500W (3000VA)	**>10 min.** *(>13 min.)*	**2U**	**62 lbs.**	•	•	•	•	•	•
UPS-3000-E-4U *(2 Extended Battery Packs)*	2500W (3000VA)	**>24 min.** *(>31 min.)*	**4U**	**98 lbs.**	•	•	•	•	•	•

UPS with Internal Battery Pack PART NUMBERING

Family	Output Power	Battery Pack Size	Height	AC Input Frequency	AC Output Voltage	AC Output Neutral Wire	AC Output Set Point Frequency	DC Input	DC Output Voltage
UPS	**1500**	**E**	**2U**	**L**	**1**	**G**	**6**	**D**	**28**
UPS	**1500:** 1500VA 1250W **3000:** 3000VA 2500W	**S:** Standard **E:** Extended	**1U:** 1.73" **2U:** 3.48" **4U:** 6.98"	**L:** 50/60Hz **H:** 400Hz	**1:** 115Vrms **2:** 230Vrms	**G:** Grounded **F:** Floating	**5:** 50Hz **6:** 60Hz **4:** 400Hz	**S:** Not Installed **D:** Installed	**00:** None **12:** 12V **24:** 24V **28:** 28V **40:** 40V **50:** 50V

Part Numbering Example: UPS-1500-E-2U-L1G6D28-000

For valid part numbers, refer to the website or contact your local sales representative or distributor.

1250W (1500VA)
Expanded Internal Battery for
>24 Minutes of Run Time at Full Power

Rackmount Kits

Kit Style	1500S Series (1U; 32 Lbs.)	1500E Series (2U; 50 Lbs.)	3000S Series (2U; 62 Lbs.)	3000E Series (4U; 98 Lbs.)
Slide Rail Kit	SYN-9001	SYN-9001	SYN-9001	SYN-9005
Fixed Bracket Kit	SYN-9031	SYN-9033	SYN-9033	SYN-9035
Tray Kit	SYN-9051	SYN-9051	SYN-9051	SYN-9051

UPS

UPS *Uninterruptible Power Supply*

Battery Packs

Unit Height	1500S Series	1500E Series	3000S Series	3000E Series
Standard 1U	**SYN-BAT-STD** (1 used in UPS)		**SYN-BAT-STD** (2 used in UPS)	
Extended 2U		**SYN-BAT-EXT** (1 used in UPS)		**SYN-BAT-EXT** (2 used in UPS)

2500W (3000VA)
4U High Rack-Mount Package
>24 Minutes Battery Run Time

Battery for UPS PART NUMBERING

Family	Energy	Battery Pack Size	Height
BAT	**0500**	**E**	**2U**
BAT	**0200:** 200 Watt Hours **0500:** 500 Watt Hours	**S**: Standard **E**: Extended	**1U**: 1.73" **2U**: 3.48"

Part Numbering Example: BAT-0500-E-2U-000

2500W (3000VA)
2U High Rack-Mount Package
>10 Minutes Battery Run Time
Only 60 lbs.

Power Cables (10 Feet Long)

Connector	1500 S & E Series	3000 S & E Series
AC Input (NEMA Plug)	**SYN-9101**	**SYN-9105**
AC Output (115V_{rms}) (NEMA Receptacle)	**SYN-9131**	**SYN-9135**
AC Output (230V_{rms}) (NEMA Receptacle)		**SYN-9136**
AC Output (230V_{rms}) (Circular Connector)		**SYN-9138**
DC Input (Ring Connectors)	**SYN-9151**	**SYN-9155**
DC Output (Fork Connectors)	**SYN-9171**	**SYN-9171**

AC Output Power Strips (Cable has Circular Connector)

Connector	1500 S & E Series	3000 S & E Series
6 NEMA Receptacles (with 10' Cable)	**SYN-9201**	**SYN-9205**
6 NEMA Receptacles (1U Rackmount with 3' Cable)	**SYN-9231**	**SYN-9235**

Communication Cables (Cable is 10' Long)

Connector	1500 S & E Series	3000 S & E Series
HD DB15 to DB9 (RS232)	**SYN-9201**	**SYN-9205**
HD DB15 to DB9 (RS232 and Digital I/O)	**SYN-9203**	**SYN-9207**

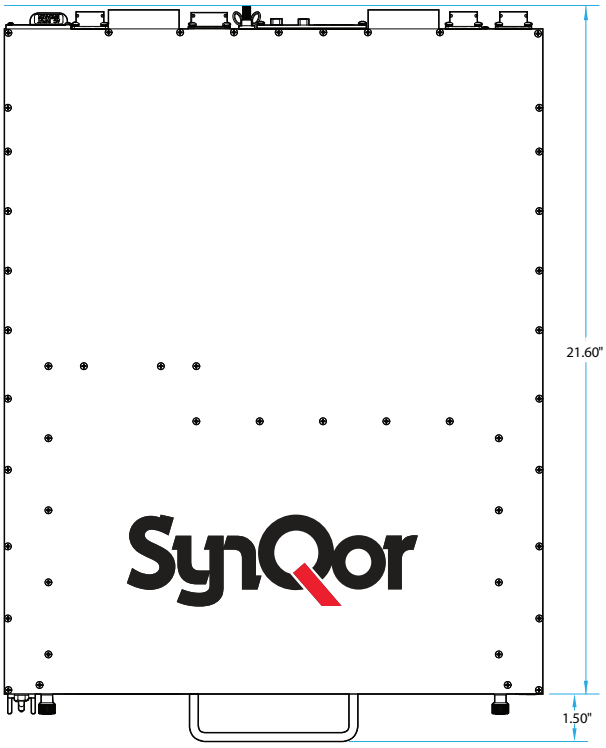
Other Options also available, for further information check the website or contact power@synqor.com.

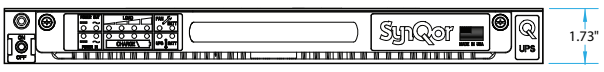
P A C K A G E

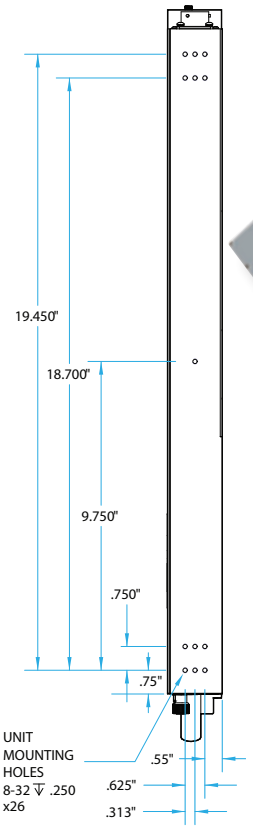
UPS products are available in a variety of rack mounting and extended battery configurations.
See website for data sheets with more details.

Front Panel

Rear Panel







Hot swappable battery pack

Visit our website for more information

Isolated DC-DC Converters

Mil-COTS

"Off-the-shelf" DC-DC converters for military/aerospace cost sensitive applications

The MilQor series of Mil-COTS DC-DC converters brings SynQor's field proven high-efficiency synchronous rectifier technology to the Military/Aerospace industry. These "off-the-shelf" converters are compatible with the industry standard format, operate at a fixed frequency, and follow conservative component derating guidelines. MilQor products are designed and manufactured to comply with a wide range of military standards.

PRODUCT FEATURES

OPERATIONAL

- High efficiency, up to 95% at full rated load current
- Operating input voltage range: 9-75V, 155-425V
- Fixed frequency switching provides predictable EMI
- Switching frequency: 240 - 350kHz, 450 - 550kHz
- No minimum load requirement
- Rugged design for harsh environments
- Full Feature optional on some models

MECHANICAL

- Industry standard pin-out configurations
- Flanged baseplate available
- Industry standard footprints:

Full Brick:	2.48" x 4.69"
Half Brick:	2.39" x 2.49"
Quarter Brick:	1.54" x 2.39"
Sixteenth Brick:	1.04" x 1.44"

CONTROL

- On/Off control referenced to input side
- Remote sense for the output voltage
- Output voltage trim range of +10% to -20%
  (Sixteenth Brick +10% to -10%)
  (Half-Brick Zeta +10% to -50%)

PROTECTION

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

IN-LINE MANUFACTURING PROCESS

- AS9100 and ISO 9001:2008 certified facility
- Full component traceability
- Temperature cycling
- 12 or 96 hour burn-in
- Two level temperature screening

SAFETY

***Mil*-COTS 28, 28E, 28V, 28VE and 48**

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

***Mil*-COTS 270**

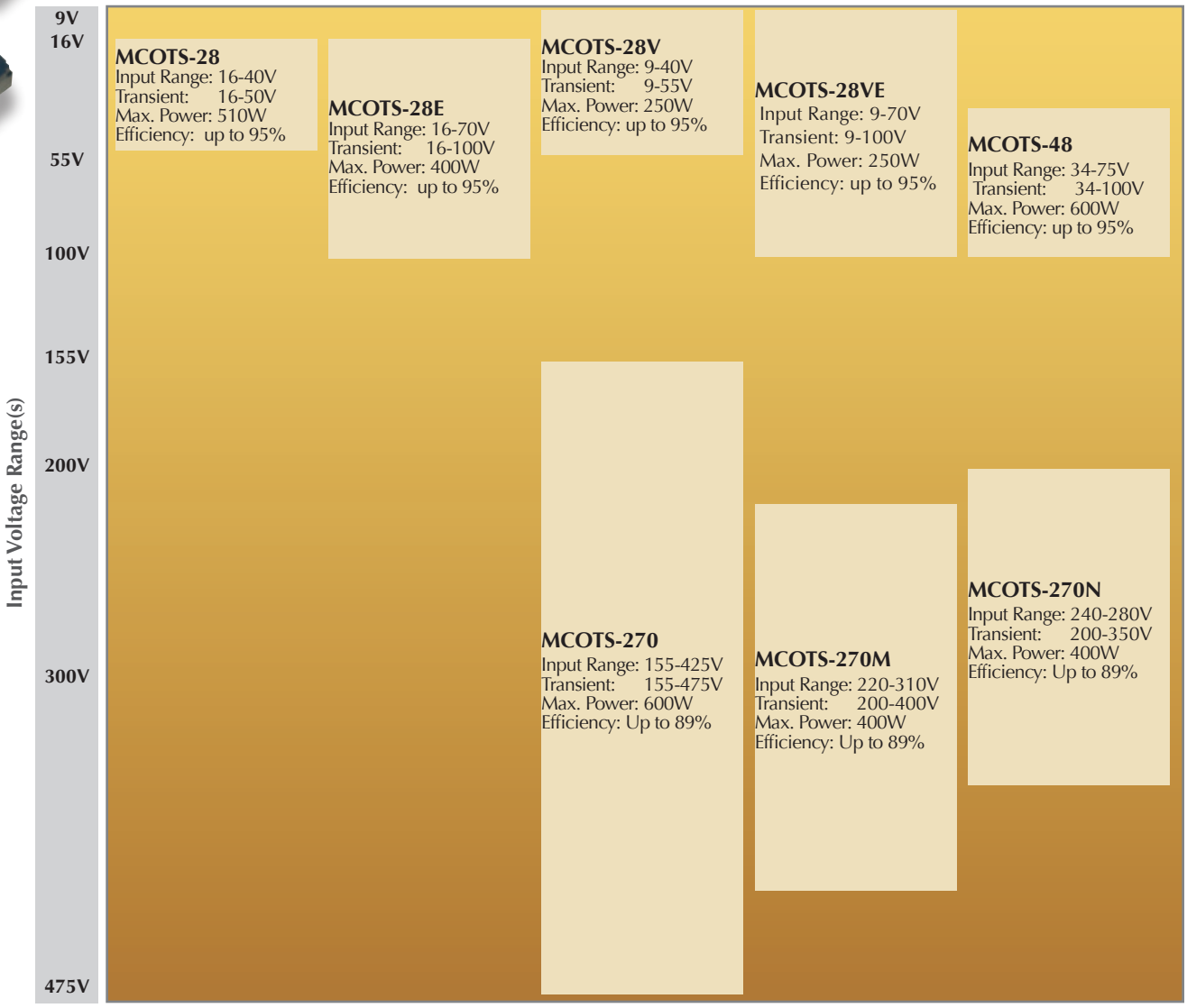
- Reinforced Insulation
- 4250V, 100MΩ input-to-output isolation
- CAN/CSA C22.2 NO. 60950-1:2007
- UL 60950-1:2007
- EN 60950-1/A11:2009
- CE Marked

Visit our website for more information

See page 51 for package outlines

MilQor

MilQor Mil-COTS PRODUCT FAMILY MATRIX



MilQor Mil-COTS PART NUMBERING

Product Family	Product	Cont. Input Voltage	Output Voltage		Package Size/ Pin Configuration	Heatsink Option	Screening Level	Options
MCOTS	C: Converter	**28:** 16-40V **28E:** 16-70V **28V:** 9-40V **28VE:** 9-70V **48:** 34-75V **270:** 155-425V **270N:** 240-280V **270M:** 220-310V	**1R2:** 1.2V **1R5:** 1.5V **1R8:** 1.8V **2R5:** 2.5V **3R3:** 3.3V **05:** 5V **07:** 7V **7R5:** 7.5V	**08:** 8V **12:** 12V **15:** 15V **24:** 24V **28:** 28V **36:** 36V **40:** 40V **48:** 48V **50:** 50V	**FT:** Full Brick (Tera) **HZ:** Half Brick (Zeta) **HP:** Half Brick (Peta) **HT:** Half Brick (Tera) **QT:** Quarter Brick (Tera) **SM:** Sixteenth Brick (Mega)	**N:** Normal **D:** Non-Threaded Inserts **F:** Flanged	**S:** S-Grade **M:** M-Grade	**F:** Full Feature

Part Numbering Example: MCOTS-C-28-12-HP-F-M

For valid part numbers, refer to the website or contact your local sales representative or distributor.

Isolated DC-DC Converters

Mil-COTS

MCOTS-28	Brick Size	1.2V	1.5V	1.8V	2.5V	3.3V	5V	7V	7.5V	12V	15V	24V	28V	40V	48V	50V
16-40Vin Cont. 50Vin 1s Trans.* Absolute Max Vin = 60V	1/2 Zeta						60A 300W			42A 504W	34A 510W	21A 504W	18A 504W	12.5A 500W		10A 500W
	1/2 Peta			60A 108W		50A 165W	40A 200W		27A 202W	16A 192W	13A 195W	8.33A 200W	7A 196W	5A 200W	4A 192W	
	1/4	40A 48W	40A 60W	40A 72W	40A 100W	30A 99W	24A 120W	17A 119W		10A 120W	8A 120W	5A 120W	4A 112W	3A 120W	2.5A 120W	
	1/16	25A 30W	25A 38W	25A 45W	20A 50W	15A 50W	10A 50W	7A 49W		4A 48W						

MCOTS-28E	Brick Size	1.5V	1.8V	2.5V	3.3V	5V	7V	7.5V	12V	15V	24V	28V	30V	40V	48V	50V
16-70Vin Cont. 100Vin 1s Trans.* Absolute Max Vin = 100V	1/2 Zeta					60A 300W			33A 396W	26A 390W	16A 384W	14A 392W		10A 400W		8A 400W
	1/2 Peta		60A 108W		50A 165W	36A 180W		24A 180W	15A 180W	12A 180W	7.5A 180W	6.5A 182W		4.5A 180W	3.7A 178W	
	1/4				30A 99W	24A 120W			10A 120W	8A 120W		4.3A 120W			2.5A 120W	

MCOTS-28V	Brick Size	1.5V	1.8V	2.5V	3.3V	5V	7V	7.5V	12V	15V	24V	28V	30V	40V	48V	50V
9-40Vin Cont. 55Vin 1s Trans.* Absolute Max Vin = 60V	1/2 Zeta					50A 250W			21A 252W	17A 255W	10A 240W	9A 252W		6A 240W		5A 250W
	1/2 Peta		60A 108W		50A 165W	36A 180W		24A 180W	15A 180W	12A 180W	7.5A 180W	6.5A 182W		4.5A 180W	3.7A 178W	
	1/4		35A 63W		25A 83W	17A 85W	12A 84W		7A 84W	5.5A 83W	3.5A 84W	2.8A 78W			1.8A 86W	

MCOTS-28VE	Brick Size	1.5V	1.8V	2.5V	3.3V	5V	7V	7.5V	12V	15V	24V	28V	30V	40V	48V	50V
9-70Vin Cont. 100Vin 1s Trans.* Absolute Max Vin = 100V	1/2 Zeta					50A 250W			21A 252W	17A 255W	10A 240W	9A 252W		6A 240W		5A 250W
	1/2 Peta		55A 99W		45A 149W	32A 160W		22A 165W	13A 156W	11A 165W	6.7A 161W	5.8A 162W		4A 160W	3.4A 163W	
	1/4				25A 83W	17A 85W	12A 84W		7A 84W	5.5A 83W	3.5A 84W	2.8A 78W			1.8A 86W	

MCOTS-48	Brick Size	1.2V	1.5V	1.8V	2.5V	3.3V	5V	7V	12V	15V	24V	28V	30V	40V	48V	50V
34-75Vin Cont. 100Vin 1s Trans.* Absolute Max Vin = 100V	1/2 Zeta						60A 300W		50A 600W	40A 600W	25A 600W	21.5A 602W		15A 600W		12A 600W
	1/2 Peta	60A 72W	60A 90W	60A 108W	60A 150W	60A 198W	46A 230W	35A 245W	21A 252W	17A 255W	10.5A 252W	9A 252W		6.3A 252W	5.2A 250W	
	1/4	40A 48W	40A 60W	40A 72W	40A 100W	30A 99W	25A 125W	20A 140W	12A 144W	10A 150W	6A 144W	4A 112W	5A 140W	3A 120W	3A 144W	
	1/16	25A 30W	25A 38W	25A 45W	20A 50W	15A 50W	10A 50W	7A 49W	4A 48W	3A 45W						

* Converters may be operated continuously at the highest transient input voltage, but some component electrical and thermal stresses would be beyond MIL-HDBK-1547A guidelines.

Isolated DC-DC Converters

MilQor

MCOTS-270

Brick Size	1.8V	2.5V	3.3V	5V	8V	12V	15V	24V	28V	48V
Full				80A 400W		50A 600W	40A 600W	25A 600W	21.4A 600W	12.5A 600W
1/2	70A 126W	70A 175W	60A 198W	50A 250W	37.5A 300W	25A 300W	20A 300W	12.5A 300W	10.7A 300W	6.2A 300W
1/4	30A 54W	30A 75W	30A 99W	30A 150W		13A 156W	10A 150W	6.25A 150W	5.35A 150W	3.12A 150W

155-425Vin Cont. 475Vin 1s Trans.* Absolute Max Vin = 600V

* Converters may be operated continuously at the highest transient input voltage, but some component electrical and thermal stresses would be beyond MIL-HDBK-1547A guidelines.

Mil-COTS Screening

Screening	Process Description	S-Grade	M-Grade
Baseplate Operating Temperature		-55°C to +100°C	-55°C to +100°C
Storage Temperature		-65°C to +135°C	-65°C to +135°C
Pre-Cap Inspection	IPC-610 Class III	•	•
Temperature Cycling	Method 1010, Condition B, 10 Cycles	N/A	•
Burn-In	100°C Baseplate	12 hours	96 hours
Final Electrical Test	100%	25°C	-55°C, +25°C, +100°C
Final Visual Inspection	MIL-STD-2008	•	•

Mil-COTS Qualification

Test Name	Details	# Tested (# Failed)	Consistent with MIL-STD-883F Method	Consistent with MIL-STD-883F Method 5005
Life Testing	Visual, mechanical and electrical test before, during and after 1000 hour burn-in @ full load	15 (0)	Method 1005.8	—
Shock-Vibration	Visual, mechanical and electrical test before, during and after shock and vibration tests	5 (0)	—	MIL-STD 202, Methods 201A and 213B
Humidity	+85°C, 85%RH, 1000 hours, 2 minutes on 6 hours off	8 (0)	Method 1004.7	—
Temperature Cycling	500 cycles of -40°C to +100°C (30 minute dwell at each temperature)	10 (0)	Method 1010.8	Condition A
Solderability	15 pins	15 (0)	Method 2003	—
DMT	-65°C to +110°C across full line, and load specifications in 5°C steps	7 (0)	—	—
Altitude	70,000 feet (21 km)	2 (0)	—	—

See page 51-44 for package outlines

High-Reliability, Field Proven DC-DC Converters for Military/Aerospace Applications

The MilQor series of high-reliability DC-DC converters brings SynQor's field proven high-efficiency synchronous rectifier technology to the Military/Aerospace industry. SynQor's innovative QorSeal™ packaging approach ensures survivability in the most hostile environments. Compatible with the industry standard format, these converters operate at a fixed frequency, have no opto-isolators, and follow conservative component derating guidelines.

PRODUCT FEATURES

OPERATIONAL

- Fixed switching frequency
- No opto-isolators
- Parallel operation with current share on MQFL
- Remote sense
- Clock synchronization
- Primary referenced enable
- Secondary referenced enable on MQFL
- Continuous short circuit and overload protection with auto-restart feature
- Input under-voltage and over-voltage shutdown
- Output voltage trim range (MQHL, MQHR & MQBL) +10% to -10%

DESIGN PROCESS

***Hi*-Rel series converters are:**

- Designed for reliability per NAVSO-P3641-A guidelines
- Designed with components derated per:
  - ◊ MIL-HDBK-1547A
  - ◊ NAVSO P-3641A

MECHANICAL

- *Qor*Seal packaging
- Industry standard footprint for MQFL & MQME
- Multiple mounting configurations & lead form options
- Gold plated nickel barrier finish on an extruded aluminium case

IN-LINE MANUFACTURING PROCESS

- AS9100 and ISO 9001:2008 certified facility
- Full component traceability
- Temperature cycling
- Constant acceleration screening
- 24, 96, 160 hour burn-in
- Three level temperature screening

QUALIFICATION PROCESS

***Hi*-Rel series converters are qualified to:**

- MIL-STD-810
  - ◊ consistent with RTCA/DO-160
- SynQor's First Article Qualification
  - ◊ consistent with MIL-STD-883
- SynQor's Long-Term Storage Survivability Qualification
- SynQor's on-going life test
- SynQor's element evaluation for HB & ES Grade

SPECIFICATION COMPLIANCE

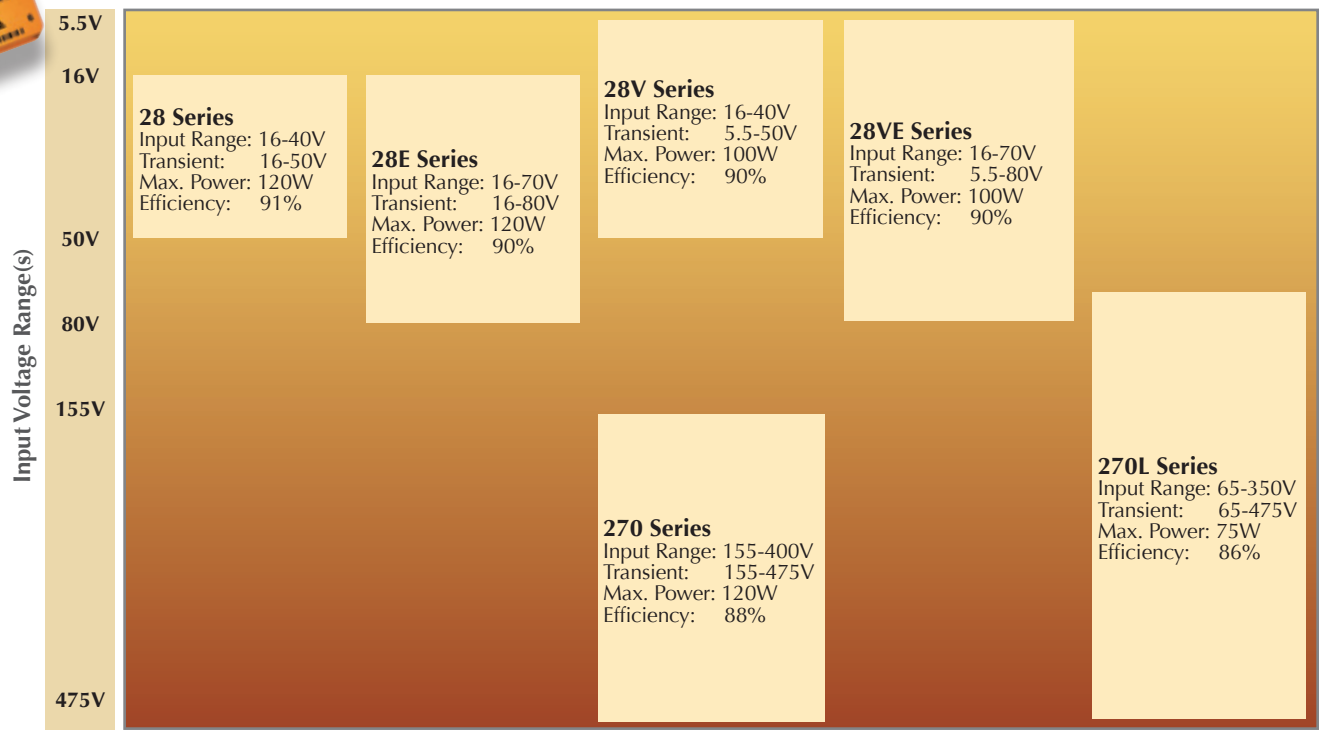
***Hi*-Rel series converters (with *Hi*-Rel filter) are designed to meet:**

- MIL-HDBK-704
- RTCA/DO-160 Section 16
- MIL-STD-1275
- DEF-STAN 61-5 (Part 6)/6
- MIL-STD-461
- RTCA/DO-160 Section 22

Visit our website for more information

See page 53 for package outlines

MilQor Hi-Rel PRODUCT FAMILY MATRIX



MilQor Hi-Rel PART NUMBERING

Product Family	System Input Voltage (with transients)	Output Voltage(s)		Package Size/ Pin Configuration	Screening Grade
		Single Output	Dual Output		
MQFL MQHL MQHR MQBL	**28:** 16-40V (16-50V) **28E:** 16-70V (16-80V) **28V:** 16-40V (5.5-50V) **28VE:** 16-70V (5.5-80V) **270:** 155-400V (155-475V) **270L:** 65-350V (65-475V)	**1R5S:** 1.5V **1R8S:** 1.8V **2R5S:** 2.5V **3R3S:** 3.3V **05S:** 5V **06S:** 6V **7R5S:** 7.5V **09S:** 9V **12S:** 12V **15S:** 15V **28S:** 28V	**05D:** ±5.0V **12D:** ±12V **15D:** ±15V	**U** **X** **Y** **W** **Z** (FL, HL, HR) **S** **F** (BL)	**C** **ES** **HB**

Product Family	Nominal System Input Voltage (with transients)	Nominal Output Voltage(s)	Package Size/ Pin Configuration	Screening Grade
MQBQ	**28:** 16-40V (16-50V) **270:** 230-400V (155-450V)	**28B:** (1:1) **28B:** (9:1)	**U** **X** **Y** **W** **Z**	**C** **ES** **HB**

Part Numbering Example: MQHL-28-05S-Y-HB

For valid part numbers, refer to the website or contact your local sales representative or distributor.

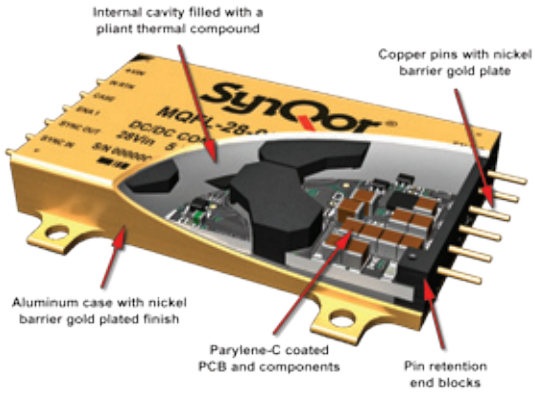
Hi-Rel Screening

Screening	Consistent with MIL-STD-883	C-Grade (-40°C to +100°C)	ES-Grade (-55°C to +125°C) Element Evaluation	HB-Grade (-55°C to +125°C) Element Evaluation
Internal Visual	•	Yes	Yes	Yes
Temperature Cycle	Method 1010	No	Condition B (-55°C to +125°C)	Condition C (-65°C to +150°C)
Constant Acc.	Method 2001 (Y1 direction)	No	500g	Condition A (5000g)
Burn-In Method 1015 Load Cycled	-10s period -2s 100% load -8s 0% load	24hrs @ +125°C	96hrs @ +125°C	160hrs @ +125°C
Final Electrical Test	Method 5005 (Group A)	+25°C	-45°C, +25°C, +100°C	-55°C, +25°C, +125°C
Packaging		QorSeal	QorSeal	QorSeal
External Visual	2009	•	Yes	Yes
Construction		QorSeal	QorSeal	QorSeal

• Per IPC-A-610 Class 3

QorSeal Packaging

Our unique QorSeal™ packaging approach provides a conduction-cooled mechanical assembly around an SMT constructed power circuit that is low-profile, light-weight, and shielded. This process provides three levels of Tin Whisker mitigation.



	Single Output											Dual Output†		
Full Size (MQFL)	**1.5V 1R5S**	**1.8V 1R8S**	**2.5V 2R5S**	**3.3V 3R3S**	**5V 05S**	**6V 06S**	**7.5V 7R5S**	**9V 09S**	**12V 12S**	**15V 15S**	**28V 28S**	**±5V 05D**	**±12V 12D**	**±15V 15D**
MQFL-28 (120W) 16-40Vin Cont. 16-50Vin 1s Trans. * Absolute Max Vin = 60V	40A 60W	40A 72W	40A 100W	30A 100W	24A 120W	20A 120W	16A 120W	13A 117W	10A 120W	8A 120W	4A 112W	24A 120W Total	10A 120W Total	8A 120W Total
MQFL-28E (120W) 16-70Vin Cont. 16-80Vin 1s Trans. * Absolute Max Vin =100V	40A 60W	40A 72W	40A 100W	30A 100W	24A 120W	20A 120W	16A 120W	13A 117W	10A 120W	8A 120W	4A 112W	24A 120W Total	10A 120W Total	8A 120W Total
MQFL-28V (100W) 16-40Vin Cont. 5.5-50Vin 1s Trans. * Absolute Max Vin = 60V	40A 60W	40A 72W	40A 100W	30A 100W	20A 100W	17A 102W	13A 98W	11A 99W	8A 96W	6.5A 98W	3.3A 92W	20A 100W Total	8A 96W Total	6.5A 98W Total
MQFL-28VE (100W) 16-70Vin Cont. 5.5-80Vin 1s Trans. * Absolute Max Vin = 100V	40A 60W	40A 72W	40A 100W	30A 100W	20A 100W	17A 102W	13A 98W	11A 99W	8A 96W	6.5A 98W	3.3A 92W	20A 100W Total	8A 96W Total	6.5A 98W Total
MQFL-270 (120W) 155-400Vin Cont. 155-475Vin 1s Trans. * Absolute Max Vin = 550V	40A 60W	40A 72W	40A 100W	30A 100W	24A 120W	20A 120W	16A 120W	13A 117W	10A 120W	8A 120W	4A 112W	24A 120W Total	10A 120W Total	8A 120W Total
MQFL-270L (75W) 65-350Vin Cont. 65-475Vin 1s Trans. * Absolute Max Vin = 550V	40A 60W	40A 72W	30A 75W	22A 72.6W	15A 75W	12A 72W	10A 75W	8A 72W	6A 72W	5A 75W	2.7A 75W	15A 75W Total	6A 72W Total	5A 75W Total
Half Size (MQHL, MQHR)	**1.5V 1R5S**	**1.8V 1R8S**	**2.5V 2R5S**	**3.3V 3R3S**	**5V 05S**	**6V 06S**	**7.5V 7R5S**	**9V 09S**	**12V 12S**	**15V 15S**	**28V 28S**	**±5V 05D**	**±12V 12D**	**±15V 15D**
MQHL-28 (50W) 16-40Vin Cont. 16-50Vin 1s Trans. Absolute Max Vin = 60V	20A 30W	20A 36W	20A 50W	15A 50W	10A 50W	8A 48W	6.6A 50W	5.5A 50W	4A 48W	3.3A 50W	1.8A 50W	10A 50W Total	4A 48W Total	3.3A 50W Total
MQHL-28E (50W) 16-70Vin Cont. 16-80Vin 1s Trans. * Absolute Max Vin =100V	20A 30W	20A 36W	20A 50W	15A 50W	10A 50W	8A 48W	6.6A 50W	5.5A 50W	4A 48W	3.3A 50W	1.8A 50W	10A 50W Total	4A 48W Total	3.3A 50W Total
MQHR-28 (25W) 16-40Vin Cont. 16-50Vin 1s Trans. * Absolute Max Vin = 60V	10A 15W	10A 18W	10A 25W	7.5A 25W	5A 25W	4A 24W	3.3A 25W	2.75A 25W	2A 24W	1.65A 25W	0.9A 25W	5A 25W Total	2A 24W Total	1.65A 25W Total
MQHR-28E (25W) 16-70Vin Cont. 16-80Vin 1s Trans. * Absolute Max Vin =100V	10A 15W	10A 18W	10A 25W	7.5A 25W	5A 25W	4A 24W	3.3A 25W	2.75A 25W	2A 24W	1.65A 25W	0.9A 25W	5A 25W Total	2A 24W Total	1.65A 25W Total
Bottom Pin (MQBL)	**1.5V 1R5S**	**1.8V 1R8S**	**2.5V 2R5S**	**3.3V 3R3S**	**5V 05S**	**6V 06S**	**7.5V 7R5S**	**9V 09S**	**12V 12S**	**15V 15S**	**28V 28S**	**±5V 05D**	**±12V 12D**	**±15V 15D**
MQBL-28 (20W) 16-40Vin Cont. 16-50Vin 1s Trans. * Absolute Max Vin = 60V	8A 12W	8A 14.4W	8A 20W	6A 19.8W	4A 20W	3.3A 19.8W	2.6A 19.5W	2.2A 19.8W	1.6A 19.2W	1.3A 19.5W	0.7A 19.6W	4A 20W Total	1.6A 19.2W Total	1.3A 19.5W Total
MQBL-28E (20W) 16-70Vin Cont. 16-80Vin 1s Trans. * Absolute Max Vin =100V	8A 12W	8A 14.4W	8A 20W	6A 19.8W	4A 20W	3.3A 19.8W	2.6A 19.5W	2.2A 19.8W	1.6A 19.2W	1.3A 19.5W	0.7A 19.6W	4A 20W Total	1.6A 19.2W Total	1.3A 19.5W Total

	Single Output				Dual Output†		
Bottom Pin (MQSA)	**5V 05S**	**12V 12S**	**15V 15S**	**28V 28S**	**±5V 05D**	**±12V 12D**	**±15V 15D**
MQSA-28 (5W) 16-40Vin Cont. 16-50Vin 1s Trans. * Absolute Max Vin = 60V	1A 5W	0.42A 5W	0.33A 5W	0.18A 5W	1A 5W Total	0.42A 5W Total	0.33A 5W Total
MQSA-28E (5W) 16-70Vin Cont. 16-80Vin 1s Trans. * Absolute Max Vin =100V	1A 5W	0.42A 5W	0.33A 5W	0.18A 5W	1A 5W Total	0.42A 5W Total	0.33A 5W Total

Bus Converters (MQBQ)	**Vout = ~Vin/1 28B**
MQBQ-28 16-40Vin Cont. 16-50Vin 1s Trans. * Absolute Max Vin = 60V	16Vin: 20A @ 15V = 300W 23Vin: 19A @ 22V = 420W 28Vin: 18A @ 27V = 485W 40Vin: 15A @ 39V = 585W

Bus Converters (MQBQ)	**Vout = ~Vin/9 28B**
MQBQ-270 230-400Vin Cont. 155-450Vin 1s Trans.* Absolute Max Vin = 550V	230Vin: 17A @ 23.5V = 400W 270Vin: 15A @ 29V = 435W 400Vin: 11A @ 42V = 470W

* Converters may be operated continuously at the highest transient input voltage, but some component electrical and thermal stresses would be beyond MIL-HDBK-1547A guidelines.

† 80% of total output available on any one output.

NiQor®

Non-Isolated DC-DC Converters

Hi-Voltage

HIGH VOLTAGE, NON-ISOLATED DC-DC CONVERTERS FOR INDUSTRIAL APPLICATIONS

The high input voltage NiQor family of DC-DC converters offers unique solutions for converting high-powered, variable voltages to a wide range of output voltages. The converter is a non-isolated buck-boost regulator, which employs synchronous rectification to achieve extremely high conversion efficiency. These products are suitable for use in IBA, or to provide a regulated output voltage from a variable voltage source such as a battery. They can be configured to 'buck' the input voltage down or 'boost' the input voltage up using a single external resistor.

PRODUCT FEATURES

OPERATIONAL

- Ultra-high efficiency up to 95%
- Wide input voltage ranges:
  9-20V (NQ20); 9-40V (NQ40); 9-60V (NQ60); 9-90V (NQ90)
- Buck or Buck/Boost Mode available
- Maximum input/output currents up to 80A
- Suitable for use in Intermediate Bus Architectures
- On-board input and output filtering
- No minimum load requirement
- Remote sense and wide output voltage trim

SAFETY

- CAN/CSA C22.2 NO. 60950-1:2007
- UL 60950-1:2007
- EN 60950-1/A1:2010

MECHANICAL

- Industry standard pin-out configurations
- Industry standard footprints:

Eighth Brick:	0.99" x 2.39" x 0.50"
Quarter Brick:	1.54" x 2.39" x 0.50"
Half Brick:	2.49" x 2.39" x 0.51"

PROTECTION/CONTROL

- Input under-voltage lockout (UVLO)
- Output current limit (OCP) and short circuit protection
- Output over-voltage protection (OVP)
- Thermal shutdown (OTP)
- Output voltage trim

BATTERY CHARGING (KEY FEATURE OF TRIMMABLE CURRENT LIMIT)

- Provides the power conversion platform for battery charging
- Output current limit is externally controlled for constant-current charging
- Current can be set with an external resistor or an active circuit
- Current analog signal provided for instrumentation and control functions
- Ideal diode output stage with zero back-drive currents prevents discharge of battery when not charging
- Output voltage set-point is independently controlled through trim pin
- Unit will smoothly transition between current and voltage modes as charging cycle needs charge

See page 51 for package outlines

Visit our website for more information

NiQor Hi-Voltage PRODUCT FAMILY MATRIX

Input Voltage Range(s)

9V
20V
40V
60V
100V

NQ20
Input Range: 9-20V
Max. Power: 800W
Efficiency: 94%

NQ40
Input Range: 9-40V
Max. Power: 1600W
Efficiency: 94%

NQ60
Input Range: 9-60V
Max. Power: 1600W
Efficiency: 95%

NQ90
Input Range: 9-90V
Max. Power: 1600W
Efficiency: 95%

NiQor Hi-Voltage PART NUMBERING

Product Family	Input Voltage	Mode	Output Voltage	Package Size	Performance Series	Thermal Design	Maximum Current	Options Description: Enable Logic	Pin Length	Feature Set
NQ	**20:** 9-20V **40:** 9-40V **60:** 9-60V **90:** 9-90V	**T:** Buck **W:** Buck/ Boost	**20:** 0-20V **40:** 0-40V **60:** 0-60V **90:** 0-90V	**E:** Eighth Brick **Q:** Quarter Brick **H:** Half Brick	**G:** Giga **T:** Tera	**C:** Encased **D:** Encased Non-threaded Baseplate **V:** Encased Flanged Baseplate	**05:** 5A **08:** 8A **10:** 10A **15:** 15A **20:** 20A **26:** 26A **30:** 30A **40:** 40A **60:** 60A **80:** 80A	**N:** Neg.	**K:** 0.110″ **N:** 0.145″ **R:** 0.180″ **Y:** 0.250″	**S:** Standard **C:** Current monitor output/ trimmable current limit **F:** Current share/ trimmable current limit (half brick only)

Part Numbering Example: **NQ20W20ETC20NRS** *For valid part numbers, refer to the website or contact your local sales representative or distributor.

NiQor Hi-Voltage listed by Package and output voltage

NQ20 Series 0-20V — 9-20Vdc Input Range

Quarter Brick	QG	40A
Eighth Brick	ET	20A
	EG	10A

NQ40 Series 0-40V — 9-40Vdc Input Range

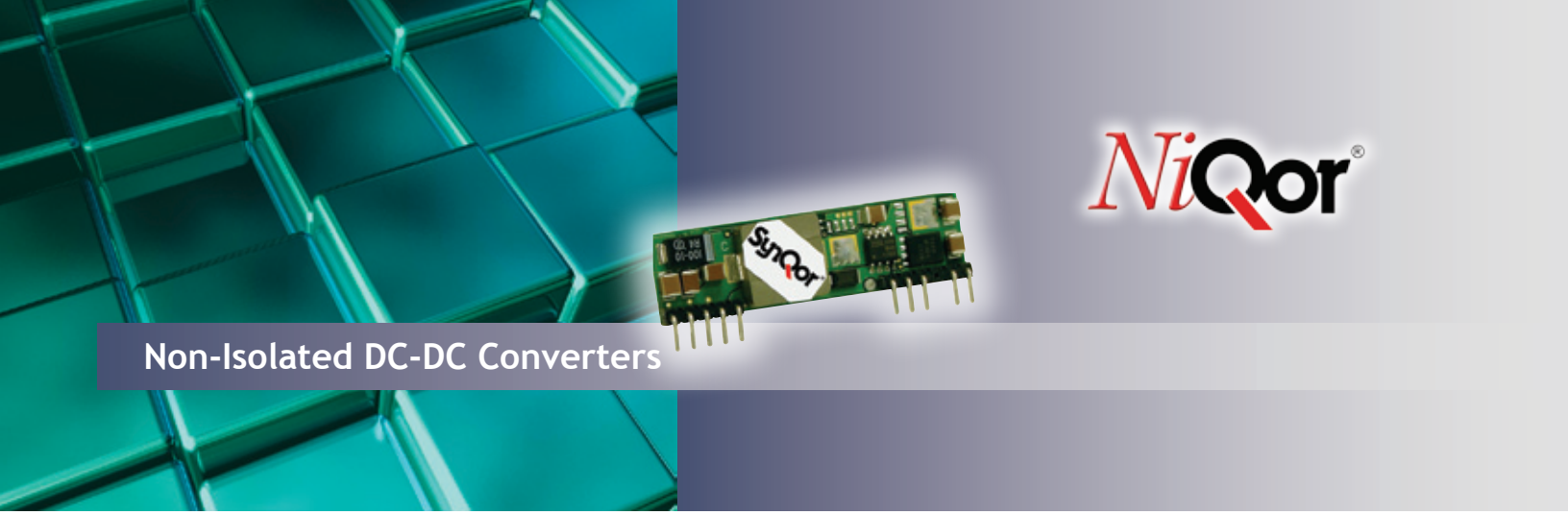
Half Brick	HG	60A
Quarter Brick	QG	30A
Eighth Brick	ET	15A
	EG	8A

NQ60 Series 0-60V — 9-60Vdc Input Range

Half Brick	HG	40A
Quarter Brick	QG	20A
Eighth Brick	ET	10A
	EG	5A

NQ90 Series 0-90V — 9-100Vdc Input Range

Half Brick	HG	26A



Non-Isolated, Ultra-High Efficiency DC-DC Converters for Telecom, Industrial and Medical Applications

The NiQor DC-DC converter is a non-isolated buck regulator, which employs synchronous rectification to achieve extremely high conversion efficiency. The NiQor family of converters are used predominately in DPA systems using a front end DC-DC high power brick (48Vin to low voltage bus). The non-isolated NiQor converters are then used at the point of load to create the low voltage outputs required by the design. The wide trim module can be programmed to a variety of output voltages through the use of a single external resistor.

PRODUCT FEATURES

OPERATIONAL

- Ultra-high efficiency up to 96%
- Wide input voltage ranges:

2.4-6.0Vin (NQ04W33 SMT)	0.75-3.6Vout	@10A/16A
3.0-6.0Vin (NQ04W33 SIP)	0.75-3.6Vout	@10A/16A
3.0-5.5Vin (NQ04T33 SIP)	0.9-5.5Vout	@10A/16A
6.0-15Vin (NQ15W50 SMT)	0.8-5.0Vout	@30A
6.0-16Vin (NQ16W50 SIP)	0.75-5.0Vout	@10A/16A
6.0-16Vin (NQ16W50 SMT)	0.75-5.0Vout	@10A/16A

- Wide Trimmable Output Voltage Ranges:
  - 0.75-5.0V (W50)
  - 0.75-3.6V (W33)
  - 0.85-3.6V (T33)
- Output Voltage Trim Range 0.7 - 5.5V
- Suitable for use in Intermediate Bus Architectures
- On-board input and output filtering
- No minimum load requirement
- Optional features include remote sense, wide output voltage trim, and output current sharing
- Follows DOSA standard pinout and footprint

GENERAL SPECIFICATIONS

Operating Temperature	-40°C to +105°C
Output Voltage Set Point	±0.7 - 2.0%
Output Voltage Ripple	<1.5% of Vout (typ.)
Input Ref. Ripple Current	<5% of Iin (typ.)
Switching Frequency	300 - 390kHz
Transient Response	±40 - 100mV

PROTECTION/CONTROL

- Input under-voltage lockout (UVLO)
- Output current limit (OCP) and short circuit protection
- Output over-voltage protection (OVP)
- Thermal shutdown (OTP)
- On/Off control referenced to input side
- Output voltage trim (industry std. trim equations)

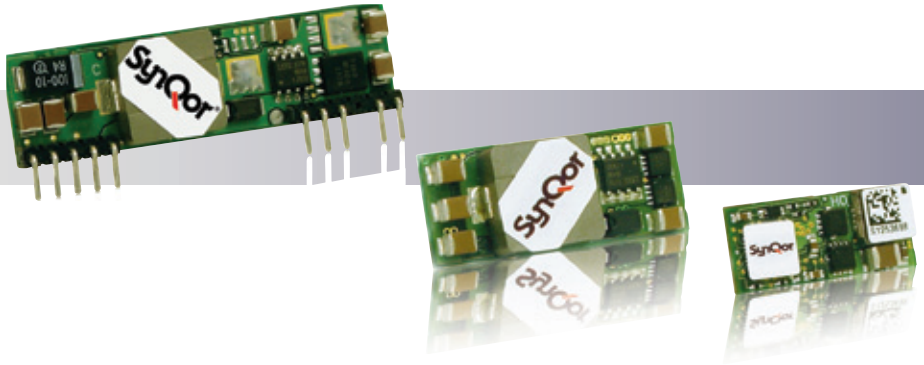
MECHANICAL

- Available in SIP (vertical and horizontal) & SMT mounting configurations
- Industry standard pin-out configurations
- Industry standard footprints:
  - SIP: 2.0" x 0.55" x 0.34"
  - SMT: 1.3" x 0.53" x 0.29"

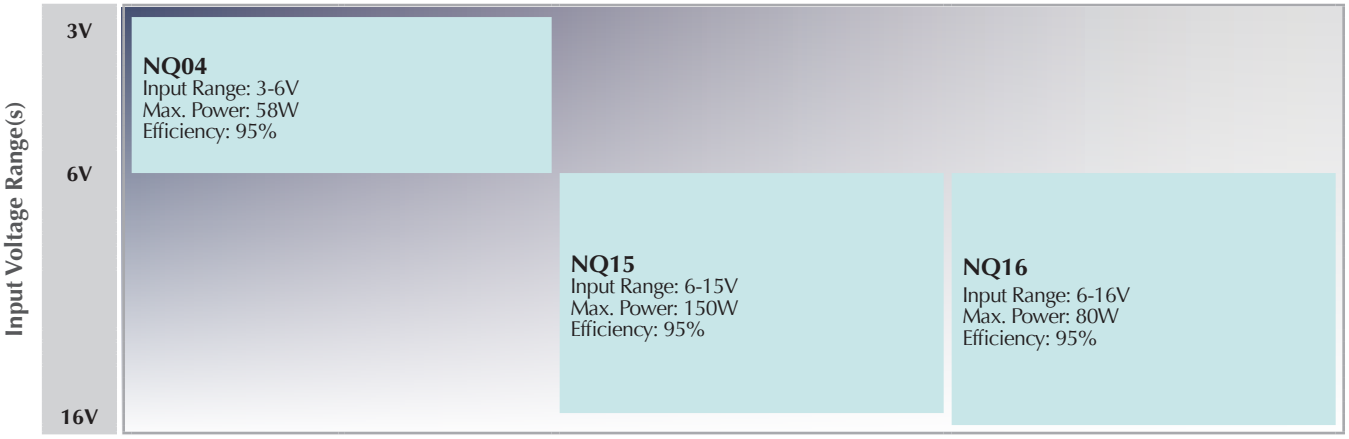
SAFETY

- CAN/CSA C22.2 NO. 60950-1-2007
- UL 60950-1:2007
- EN 60950-1/A1:2010

Visit our website for more information



*Ni*Qor PRODUCT FAMILY MATRIX



*Ni*Qor PART NUMBERING

Product Family	Input Voltage	Output Voltage	Package Type	Performance Series	Thermal Design	Maximum Current	Options Description		
							Enable Logic	Pin Style	Feature Set
NQ	**04:** 2.4-6V **15:** 6-15V **16:** 6-16V	**W50:** 0.75-5V **W33:** 0.75-3.6V **T33:**0.9-3.6V	**V:** Vert. SIP **H:** Horiz. SIP **S:** Surface-Mount	**K:** Kilo **M:** Mega **G:** Giga	**A:** Open frame	**07:** 7A **10:** 10A **15:** 15A **16:** 16A **30:** 30A	**P:** Pos./Open **O:** Neg./Open **N:** Negative	**R:** 0.160″ SIP Std **V:** 0.160″ Rev. Vert. **S:** SMT Std.	**N:** None **S:** Sense **D:** Sense & Share **G:** Sense, Share & Gnd Pins

Part Numbering Example: **NQ04W33SMA16PSS** * For valid part numbers, refer to the website or contact your local sales representative or distributor.

*Ni*Qor listed by Package and output voltage

*NQ*04

	Package	0.75-3.6V	0.9-3.6V
3.3, 5.0Vdc Input (2.4-6.0Vdc Input Range)			
2.4-6.0Vin	SMT	10A 36W	
		16A 58W	
3.0-5.5Vin	SIP	10A 36W	16A 58W
3.0-6.0Vin	SIP	10A 36W	
		16A 58W	

*NQ*15, *NQ*16

	Package	0.75-5.0V	0.8-5.0V
12Vdc Input (6.0-16Vdc Input Range)			
6.0-15Vin	SMT		30A 150W
6.0-16Vin	SIP	10A 50W	
		16A 80W	
	SMT	10A 50W	
		16A 80W	

EMI Filter Modules for InQor and MilQor DC-DC converters

SynQor provides EMI filters for the InQor, MIL-COTS and Hi-Rel series DC-DC converters. All EMI filters provide >80dB differential mode attenuation and >36dB or >60dB common mode attenuation (model dependent) and include stabilizing bulk capacitors and damping resistors.

PRODUCT FEATURES

OPERATIONAL

- Low DC resistance
- >80dB differential noise attenuation @500kHz
- >50dB common-mode noise attenuation @500kHz
- Bulk capacitance provides input system stabilization for downstream power converters
- No electrolytic capacitors (all ceramic design)
- High-voltage isolation between chassis and input / output
- Wide temperature range operation

PRODUCT OPTIONS

- Input voltage ranges match available SynQor DC-DC converters
- Advanced control features available (*Hi*-Rel model)
  - ◊ Input surge suppression
  - ◊ Reverse polarity protection with synchronous rectifiers available
  - ◊ Enable pass-through
  - ◊ Soft-start
  - ◊ Current limit
  - ◊ Standby

Visit our website for more information

MECHANICAL

- Industry standard form factors

InQor

Quarter Brick:	1.54" x 2.39"

Mil-COTS

Quarter Brick:	1.54" x 2.39"
Half Brick:	2.39" x 2.49"

Hi-Rel

Full-Size:	3.00" x 1.50"
Half-Size:	1.88" x 1.50"

- Quarter and Half Brick also available with a flanged baseplate

IN-LINE MANUFACTURING PROCESS

- AS9100 and ISO 9001:2008 certified facility
- Full component traceability
- Environmental screening options available for *Mil*-COTS and *Hi*-Rel products

DESIGN PROCESS

- Designed to operate with SynQor DC-DC converters to create systems compliant with industry standards. See product datasheets for details.
- Conservative derating guidelines used for reliable operation. See product datasheets for details.

See page 51 for package outlines

add package size

*In*Qor *EMI Filters*

Model Number	Input Voltage		Output Current	Isolation Voltage (to case)	Maximum DC Resistance @ 100°C	Differential-Mode Attenuation	Common-Mode Attenuation
	Continuous	Surge[3] (<100ms)					
QUARTER BRICK							
IQ040PFQTC30	±40V	±50V	30A	2250V	20mΩ	>80dB @ 250kHz	>36dB @ 250kHz
IQ080PFQTC20	±80V	±100V	20A	2250V	32mΩ	>80dB @ 250kHz	>36dB @ 250kHz
IQ200PFQTC10	±200V	±250V	10A	2250V	70mΩ	>80dB @ 500kHz	>50dB @ 500kHz
IQ500PFQTC04	±500V	±630V	4.0A	2500V	180mΩ	>80dB @ 500kHz	>50dB @ 500kHz

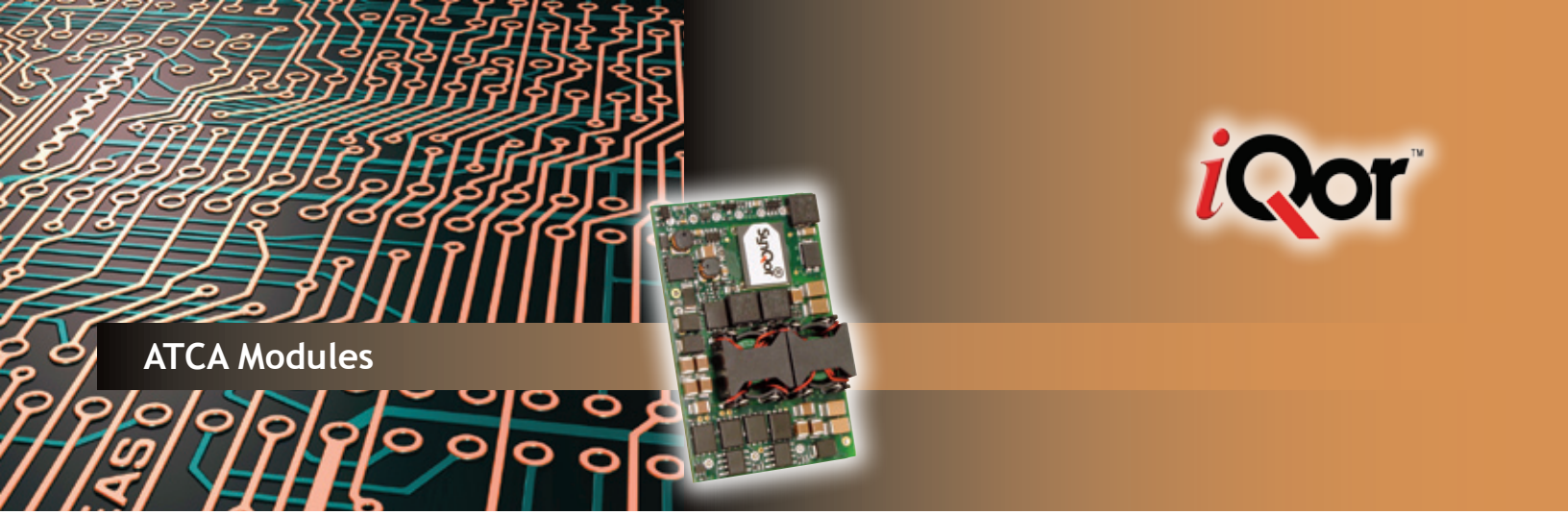
Hi-Rel EMI Filters

Model Number	Input Voltage		Output Current	Isolation Voltage (to case)	Maximum DC Resistance @ 125°C	Differential- Mode Attenuation (@ 500kHz)	Common-Mode Attenuation (@ 500kHz)
	Continuous	Surge[3] (<100ms)					
FULL BRICK							
MQME-28-P	± 40V	±50V	20A	500V	35mΩ	>80dB	>60dB
MQME-28-T[1]	±40V	+110, -50V	20A	500V	60mΩ	>80dB	>60dB
MQME-28E-P	±70V	±100V	20A	500V	35mΩ	>80dB	>60dB
MQME-28E-T[1]	±70V	+110V, -70V	20A	500V	60mΩ	>80dB	>60dB
MQME-28E-T6[1]	±70V	+210V, -70V	20A	500V	60mΩ	>80dB	>60dB
MQME-270-P	±400V	±500V	2.0A	500V	1.6Ω	>80dB	>60dB
MQME-270-R[2]	±400V	±500V	2.0A	500V	1.6Ω	>80dB	>60dB
HALF BRICK							
MQHE-28-P	±40V	±50V	10A	500V	60mΩ	>80dB	>60dB
MQHE-28E-P	±70V	±100V	10A	500V	60mΩ	>80dB	>60dB
MQHE-270-P	±400V	±500V	1.0A	500V	500mΩ	>50dB	>60dB

Note 1 - T and T6 filters feature enable pass-through, transient suppression, soft-start and reverse polarity protection circuitry in addition to passive filter components.
Note 2 - R filters feature reverse polarity protection circuitry in addition to passive filter components.
Note 3 - While the passive filters can withstand these long-duration surge voltages, the surge voltage will be passed to the filter's load. Care should therefore be taken to make sure that the load will also be able to withstand any applied surges. The transient suppression filters block surges of either polarity, as specified in their data sheets

Mil-COTS EMI Filters (Quarter Brick and Half Brick Size)

Model Number	Input Voltage		Output Current	Isolation Voltage (to case)	Maximum DC Resistance @ 100°C	Differential-Mode Attenuation	Common-Mode Attenuation
	Continuous	Surge[3] (<100ms)					
HALF BRICK							
MCOTS-F-28-T-HT	±40V	+210V, -50V	30A	2250V	50mΩ	>80dB @ 250kHz	>36dB @ 250kHz
QUARTER BRICK							
MCOTS-F-28-P-QT	±40V	±50V	30A	2250V	20mΩ	>80dB @ 250kHz	>36dB @ 250kHz
MCOTS-F-48-P-QT	±80V	±100V	20A	2250V	32mΩ	>80dB @ 250kHz	>36dB @ 250kHz
MCOTS-F-270-P-QT	±500V	±630V	4.0A	2500V	180mΩ	>80dB @ 500kHz	>50dB @ 500kHz



ADVANCED TELECOMMUNICATIONS COMPUTING ARCHITECTURE (ATCA™) POWER INTERFACE MODULE

The iQor™ Power Interface Modules integrate all features required by the Advanced TCA Base Specification for a frame board power entry into a Quarter-Brick footprint. Minimal external components are required for all the key functions. The product family provides efficient utilization of hold-up capacitance. A full-feature module with I²C interface is also available.

PRODUCT FEATURES

OPERATIONAL

- 100V/1ms transient protection
- Auxiliary supply voltages:
  - ◊ 3.3V, 3.6A
  - ◊ 5.0V, 150mA
- Standard Quarter Brick package size: 1.45" x 2.3"
- Trimmable 50-95V hold-up capacitance voltage
- Optional I²C interface for feedback on:
  - ◊ A & B Feed Voltage
  - ◊ Hold-up Voltage
  - ◊ 48Vout Voltage & Current
  - ◊ Temperature
  - ◊ Fuse and MOSFET failure
- Random start-up delay

PROTECTION/CONTROL

- Inrush current limiting
- EMI filtering
- Output current limit (OCP) and short circuit protection
- Output over-voltage protection (OVP)
- Thermal shutdown (OTP)
- Hold-up capacitor discharge control

SAFETY

- Up to 2250Vdc 30MΩ input to output isolation voltage
- CAN/CSA C22.2 NO. 60950-1:2007
- UL 60950-1:2007
- EN 60950-1/A1:2010

Visit our website for more information

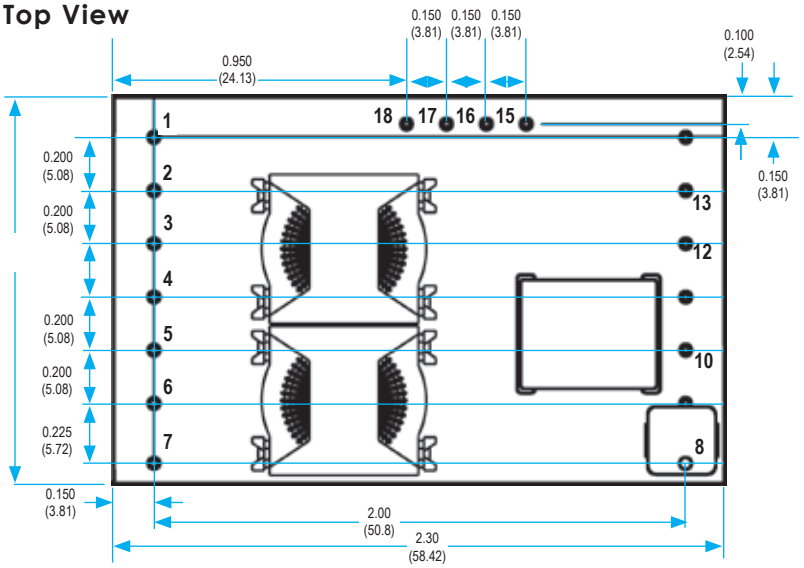
For valid part numbers, refer to the website or contact your local sales representative or distributor.

*i*Qor PART NUMBERING

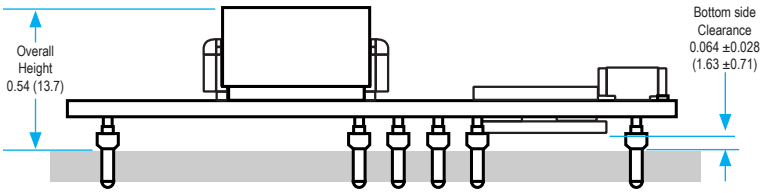
Product Family	Input Voltage	Auxiliary Output 1	Auxiliary Output 2	Package Size	Performance Series	Thermal Design	Output Current	Threshold Protocols	Pin Length	Feature Set
IQ	6	50	33	Q	M: Mega G: Giga	A	10 12	S	N	S

Threshold Protocols	Pin Length	Feature Set
S: Standard (ATCA) **N:** NEDS (Mega only) **E:** ETSI	**K:** 0.110″ **N:** 0.145″ **R:** 0.180″ **Y:** 0.250″	**S:** Standard Feature **F:** Full Feature

Top View



Side View



Pin No.	Name	Function
1	-48V_A	Negative 48V A feed
2	-48V_B	Negative 48V B feed
3	VRTN_A	48V Return A feed
4	VRTN_B	48V Return B feed
5	ENABLE_A	Enable A feed
6	ENABLE_B	Enable B feed
7	SHELF_GND	Shelf ground
8	5.0V	+5.0V Management power
9	3.3V	+3.3V Management power
10	I2C_ADR	Address (Full feature version)
11	I2C_DAT	Data (Full feature version)
12	I2C_CLK	Clock (Full feature version)
13	LOGIC_GND	Logic ground
14	ALARM	Alarm
15	-48V_OUT	Negative 48V output
16	HU_TRIM	Hold-up voltage trim
17	VRTN_OUT	Positive 48V output
18	HU_CAP	Hold-up capacitor connect

MEDICAL AND INDUSTRIAL-GRADE HIGHLY EFFICIENT AC-DC POWER SUPPLIES WITH PFC

The ACuQor product line offers the best-in-class solutions for AC-DC power supplies designed to meet an extensive range of medical applications. Packing 500W of useable power into just 3.5" x 5.25" x 1.63", the E-Series is the world's smallest cardiac care, medical grade AC-DC converter for this power level. The G-Series provides 1400W of useable power in a 4.75" x 7" x 1.63" package.The medical grade version meets UL60601-1 medical safety specs for cardiac contact without requiring an external isolation transformer. The product is also available in an industrial grade.

PRODUCT FEATURES

GENERAL SPECIFICATIONS

- High efficiency up to 93% at full rated load current
- E-Series delivers up to 500W of output power (700W transient)
- G-Series delivers up to 1400W of output power (1800W transient)
- Semi-regulated output
- Universal 85-264V AC Input Voltage (47-63Hz)
- Single output voltages: 12V, 15V, 24V, 28V, 36V, 48V
- 5V "Always On" standby power output
- Active PFC; EN61000-3-2 compliant
- Low leakage; EN60601-1 compliant
- Low noise; EN55011 / EN55022 Class B compliant

MECHANICAL

- 1U High
- Small sizes
- E-Series: 3" x 5" products
- G-Series: 4.75" x 7" products
- Operating ambient temperature 0-70°C

PROTECTION/CONTROL

- Over-current, over-voltage, and over-temp protection
- DC Power Good and AC Power Good signals
- Remote enable input

SAFETY AND EMI

- Type B, BF, CF & Defibrillator proof variants available
- UL 60601-1:2003
- CAN/CSA-C22.2 No. 60601-1-M90
- EN60601-1/A2:1995
- IEC 60601-1/A2:1995
- CAN/CSA-C22.2 No. 60601-1-08
- ANSI/AAMI ES60601-1:2005
- EN 60601-1:2006
- IEC 60601-1:2005

Visit our website for more information

See page 56 for package outlines

E-Series

G-Series

Output	Power Rating: Medical Grade	Power Rating: Industrial Grade
E-Series (Single Output) (3" x 5" Package) 12V, 24V, 36V or 48V (includes 5V@50mA standby)	300W (400W Transient)	300W (400W Transient)
	400W (500W Transient)	400W (500W Transient)
	500W (700W Transient)	500W (700W Transient)
G-Series (Single Output) (4.75" x 7" Package) 12V, 15V, 24V, 28V, 48V (includes 5V@50mA standby)	800W (1000W Transient)	800W (1000W Transient)
	1100W (1300W Transient)	1100W (1300W Transient)
	1400W (1800W Transient)	1400W (1800W Transient)
E-Series (Triple Output) (3" x 5" Package) 12V, 24V, 36V or 48V (includes 5V@2A and 12V@4.2A)	300W (400W Transient)	300W (400W Transient)
	400W (500W Transient)	400W (500W Transient)
	500W (700W Transient)	500W (700W Transient)

*ACu*Qor PART NUMBERING

Product Family	Output Power	Grade	Range	Output Voltage	Package Size	Thermal Design	Options
AQ	**0300:** 300W **0400:** 400W **0500:** 500W **0600:** 600W **0800:** 800W **0900:** 900W **1000:** 1000W **1100:** 1100W **1200:** 1200W **1400:** 1400W **1500:** 1500W	**I:** Industrial **M:** Medical	**U:** Universal (85-264VRMS)	**12:** 12V **1T:** 12V/12V/5V **15:** 15V **24:** 24V **2T:** 24V/12V/5V **28:** 28V **36:** 36V **3T:** 36V/12V/5V **48:** 48V **4T:** 48V/12V/5V	**E:** 1 Unit 3″ x 5″ **G:** 1 Unit 4.75″ x 7″ **Multiple E-Series Packages** **R:** 2 Units (flat) **S:** 2 Units (stacked) **T:** 3 Units (flat) **U:** 3 Units (stacked)	**A:** Open-frame **C:** Encased	**Medical Grade** **B:** B isolation rating **BF:** BF isolation rating **CF:** CF isolation rating **CFD:** CF isolation rating, defibrillator proof **Industrial Grade** **IND:** Industrial

Part Numbering Example: AQ0400MU24ECBF

*ACu*Qor Product Family Configurations

Mix and match a combination of 2 or 3 of any of the E-Series (3" x 5") packages in either flat or stacked packages to achieve a higher power and multiple outputs.

Double/Triple Stacked

- Double Package: S, Thermal Design: C
- Small size: 3.5" x 5.25" x 3.25"
- 600W/800W @ 12V, 24V, 36V or 48V

- Triple Package: U, Thermal Design: C
- Small size: 3.5" x 5.25" x 4.875"
- 900W/1200W @ 12V, 24V, 36V or 48V

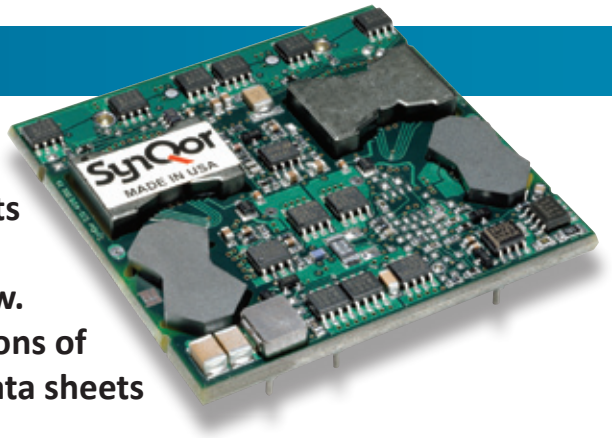
Double/Triple Flat

- Double Package: R, Thermal Design: C
- Small size: 6.75" x 5.25" x 1.625"
- 600W/800W/1000W @ 12V, 24V, 36V or 48V

- Triple Package: T, Thermal Design: C
- Small size: 10" x 5.25" x 1.625"
- 900W/1200W/1500W @ 12V, 24V, 36V or 48V

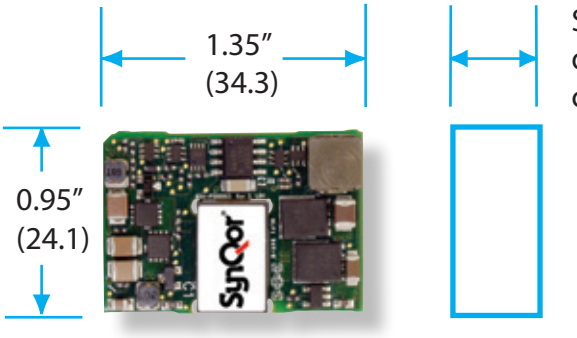
For valid part numbers, refer to the website or contact your local sales representative or distributor.

Open Frame Packages

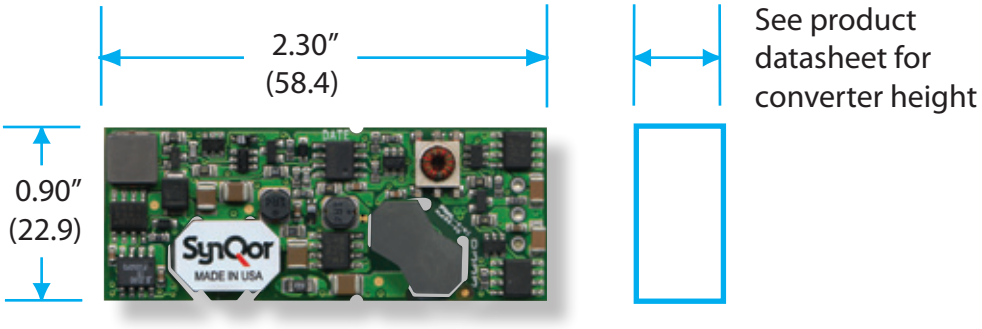


PowerQor, DualQor and BusQor products are available in a variety of industry standard sizes/pinouts depending on power level and features. All units are available in open frame configurations as shown below. Many units are also available with varying configurations of base plates and mounting features. See website for data sheets with more details.

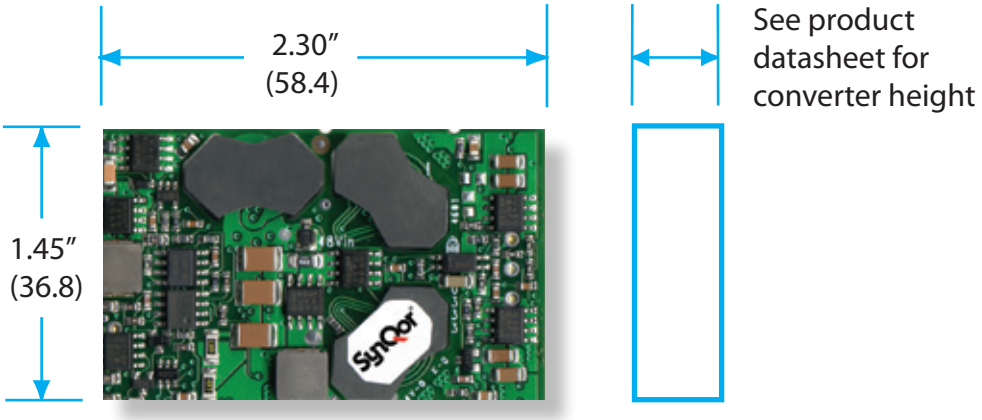
SIXTEENTH BRICK



EIGHTH BRICK



QUARTER BRICK

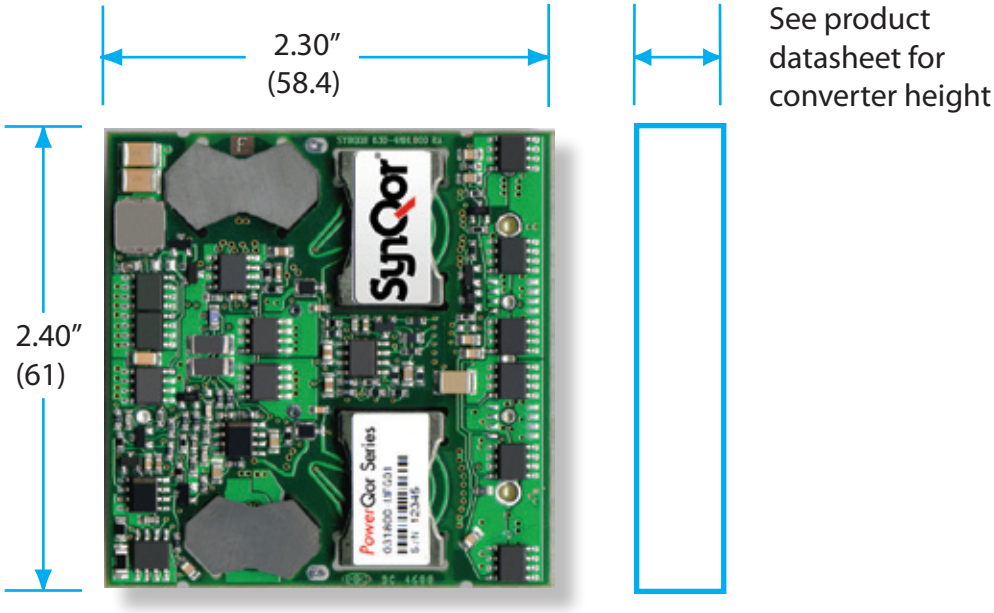


** See website for datasheets with more details.*

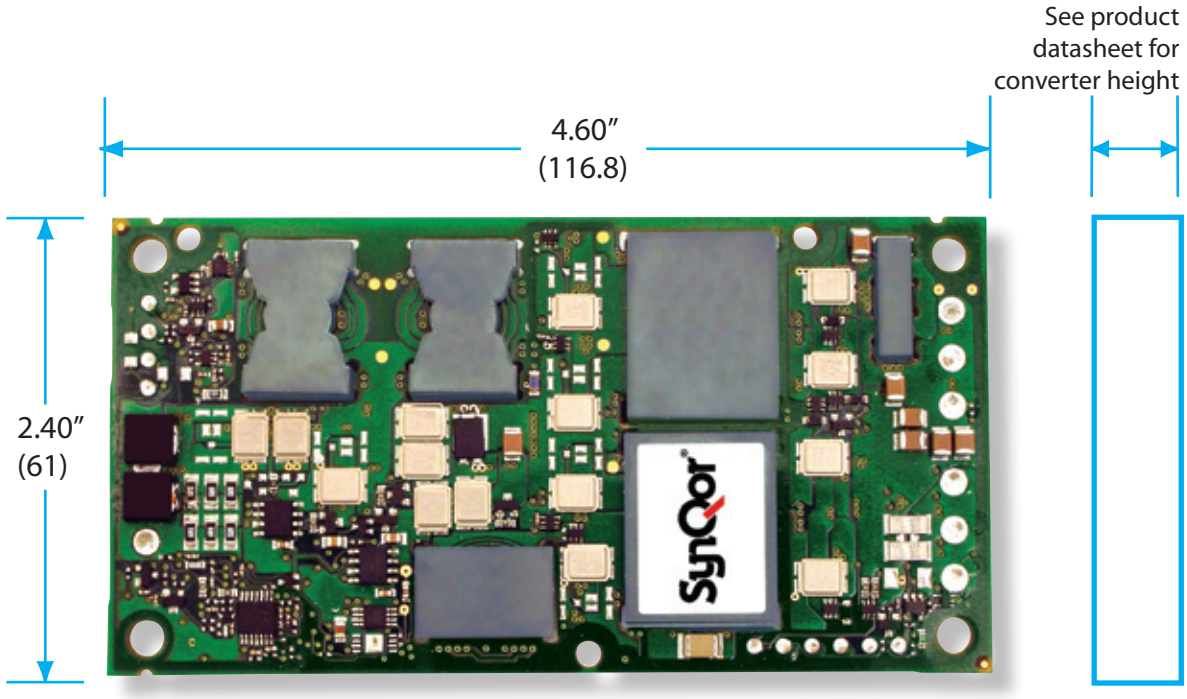
Open Frame Packages

PowerQor, DualQor and BusQor products are available in a variety of industry standard sizes/pinouts depending on power level and features. All units are available in open frame configurations as shown below. Many units are also available with varying configurations of base plates and mounting features. See website for data sheets with more details.

HALF BRICK



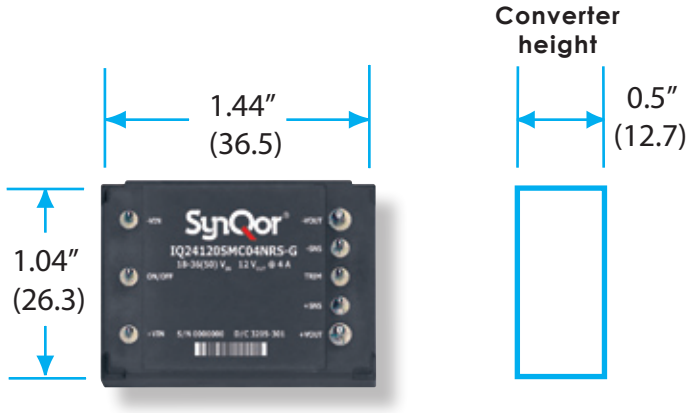
FULL BRICK



Encased Packages

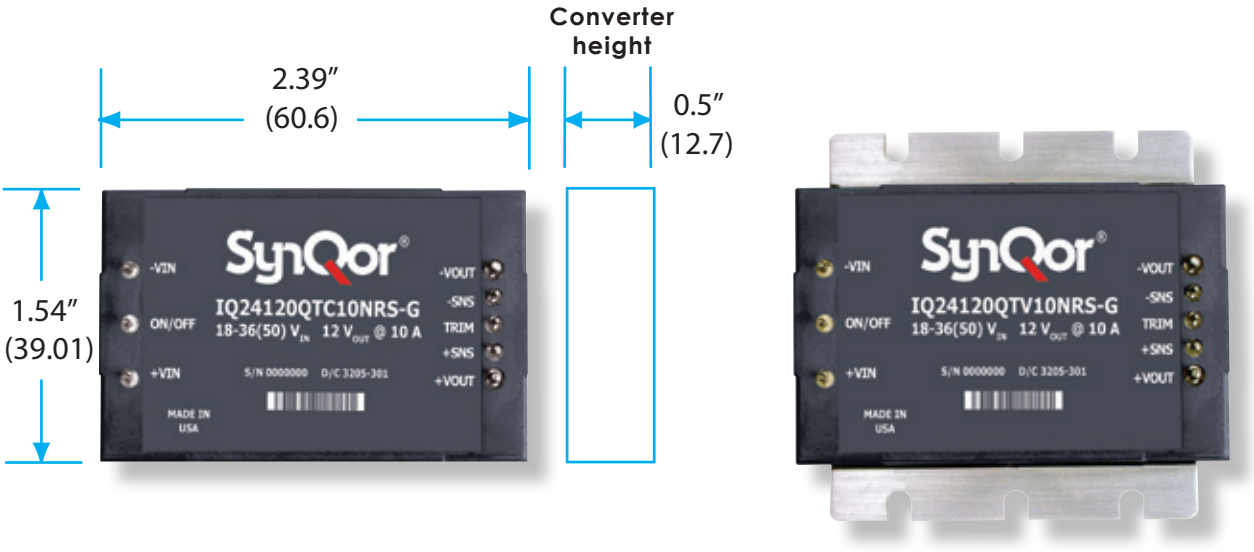
InQor, Mil-COTS, high voltage NiQor and CFQor products are fully encased for additional environmental protection and available in a variety of industry standard sizes/pinouts. There are various mounting configurations consisting of threaded inserts, though-hole inserts and mounting flanges. See website for data sheets with more details.

SIXTEENTH BRICK



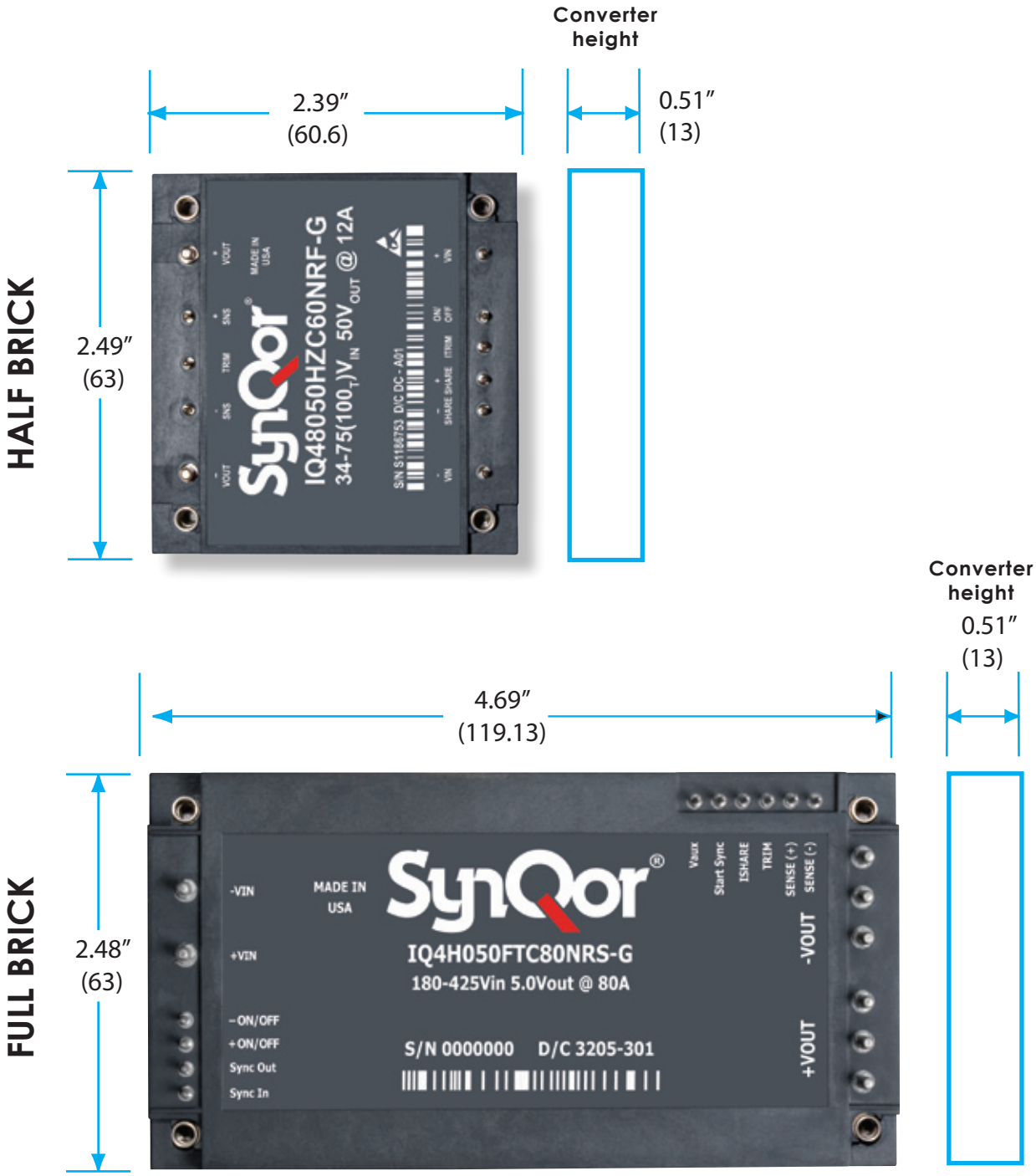
EIGHTH BRICK

QUARTER BRICK



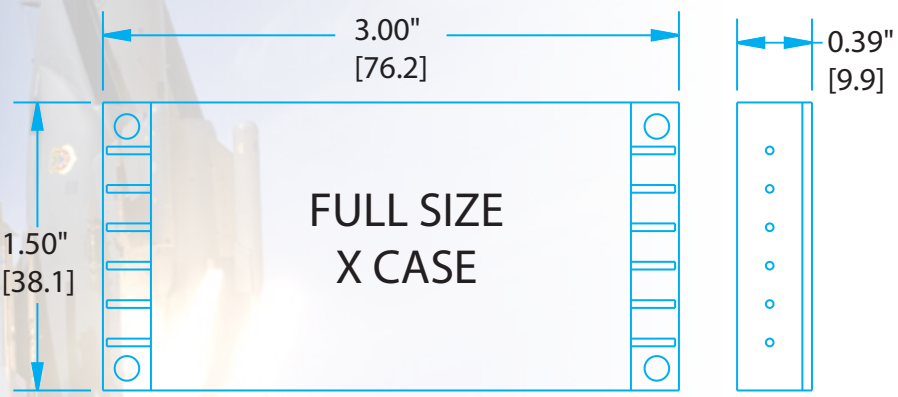
Encased Packages

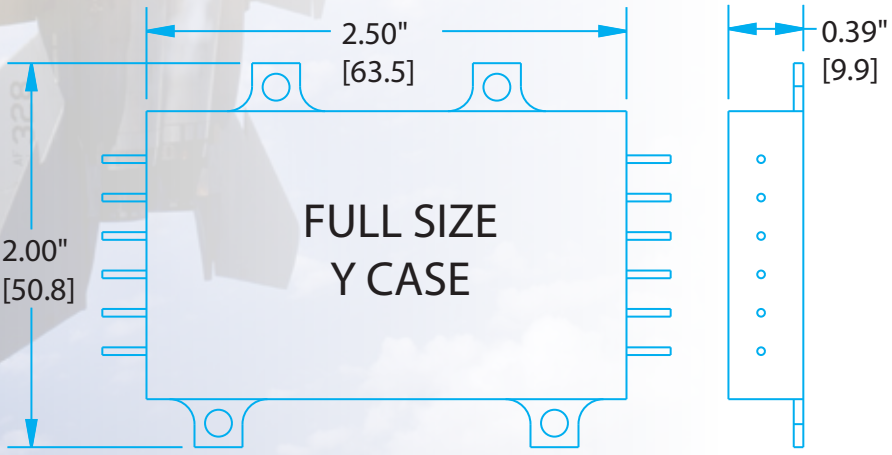
InQor, Mil-COTS, high voltage NiQor and CFQor products are fully encased for additional environmental protection and available in a variety of industry standard sizes/pinouts. There are various mounting configurations consisting of threaded inserts, though-hole inserts and mounting flanges. See website for data sheets with more details.



Hi-Rel products are available in a variety of package mounting and lead form configurations. See website for data sheets with more details.

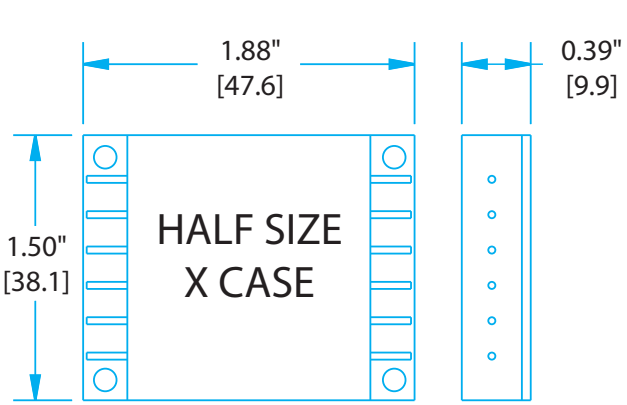
FL/ME PACKAGE

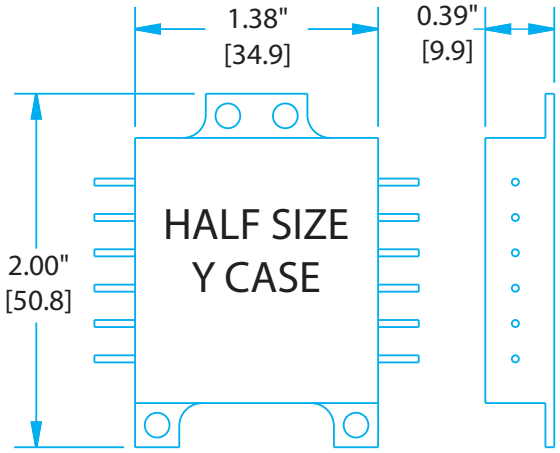


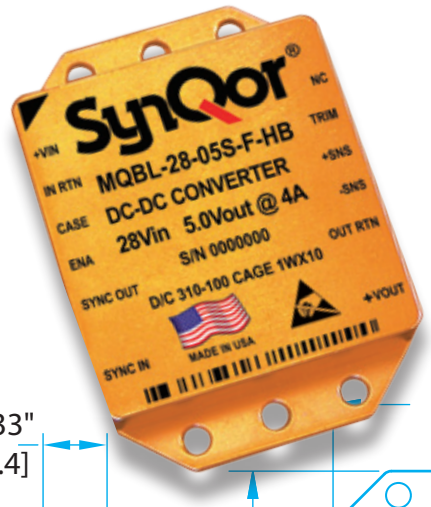


Hi-Rel products are available in a variety of package mounting and lead form configurations. See website for data sheets with more details.

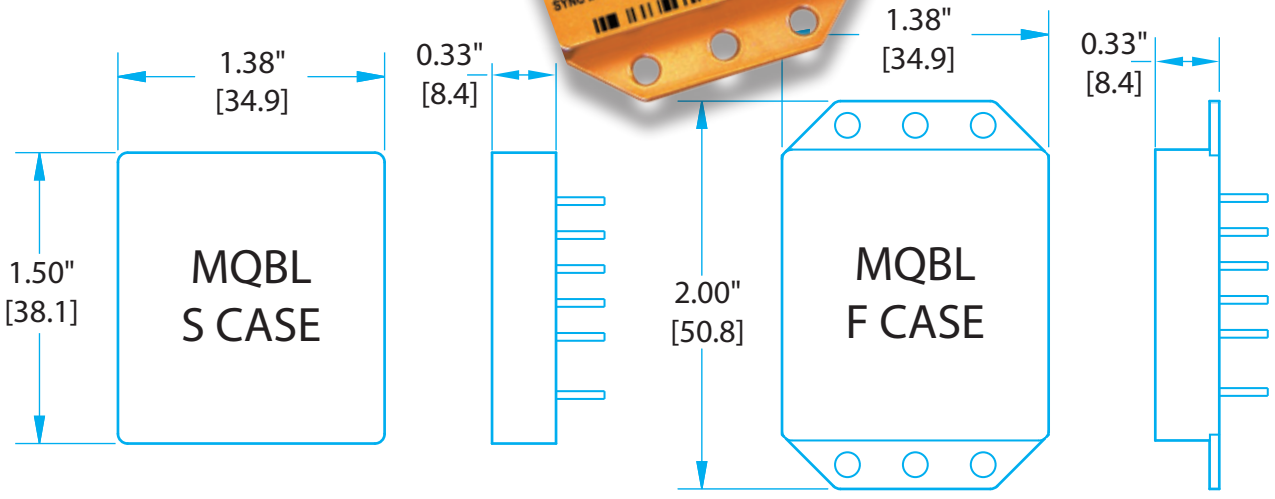
HL/HR/HE PACKAGE







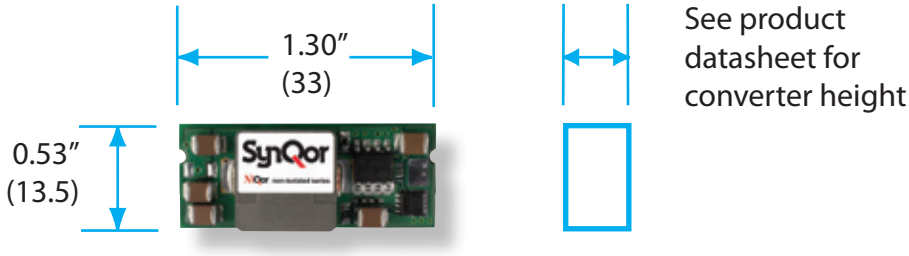
BL PACKAGE



SIP & SMT Packages

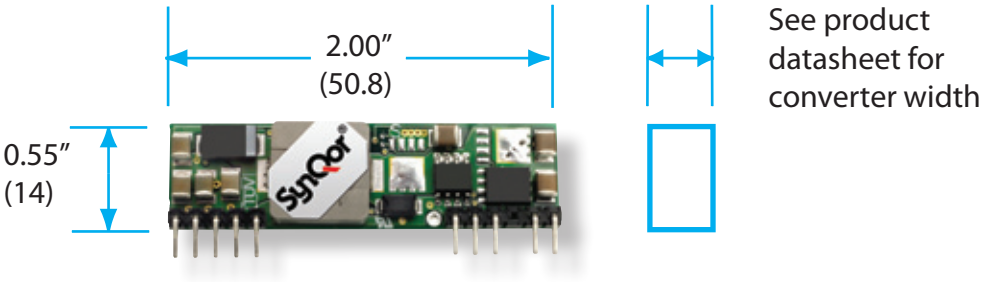
NiQor products are available in SIP and SMT packages. SIPS package options include vertical and horizontal mounting pins. See website for data sheets with more details.

NQ SURFACE MOUNT CONVERTER



See product datasheet for converter height

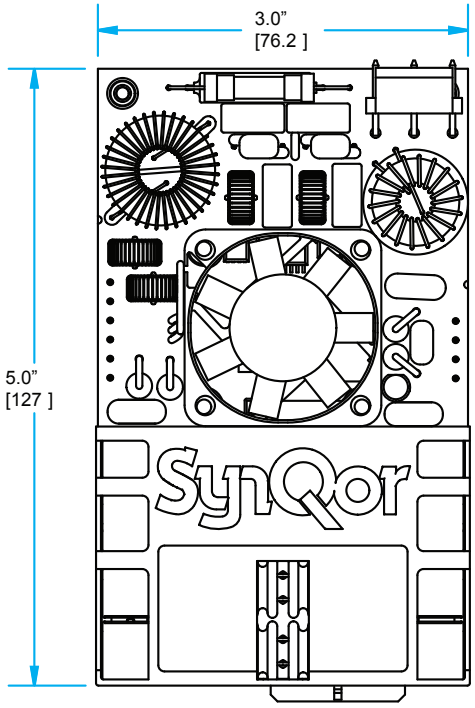
NQ SIPS CONVERTER

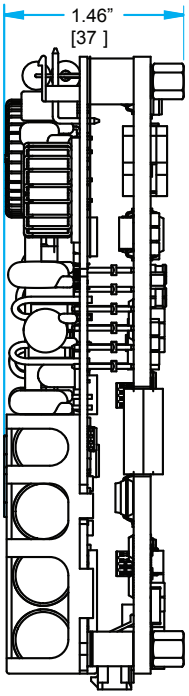


See product datasheet for converter width

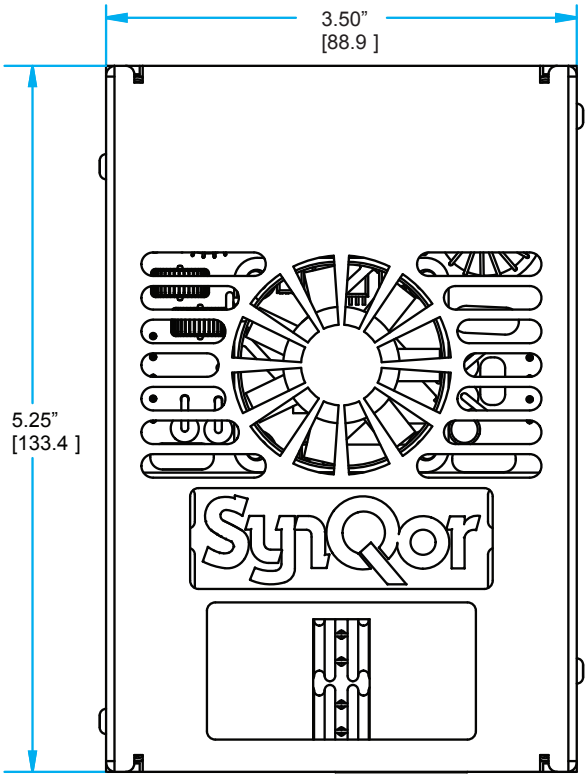
E-Series ACuQor products are available open framed or encased. They can also be double or triple stacked for additional power output. Accessories including input and output cables are also available. See website for data sheets with more details.

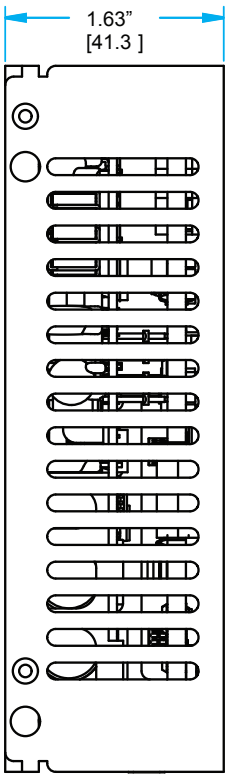
E-SERIES
OPEN FRAME
CONVERTER





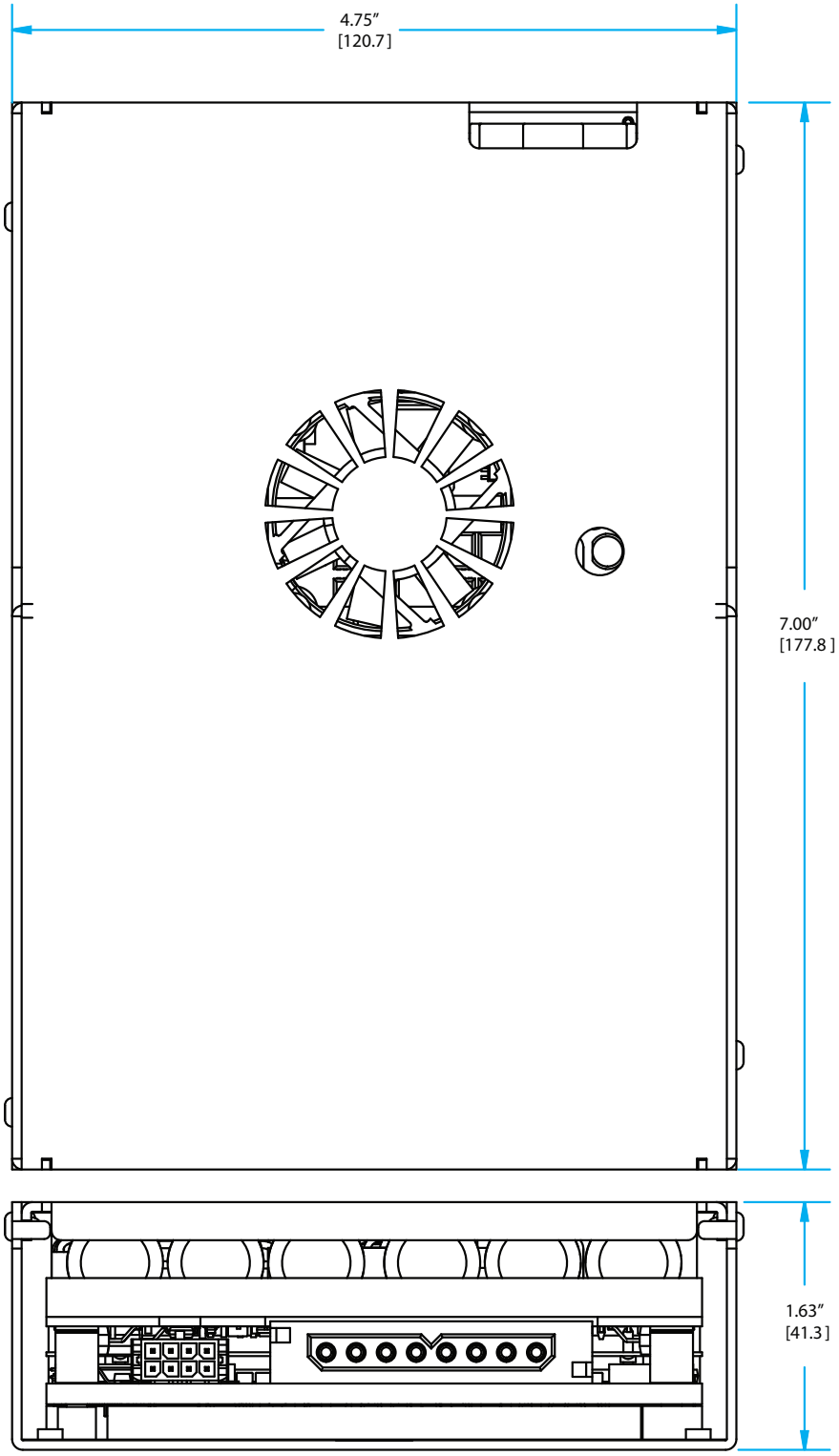
E-SERIES
CONVERTER





G-Series ACuQor products are available as encased product only. Accessories including input and output cables are also available. See website for data sheets with more details.

G-SERIES CONVERTER

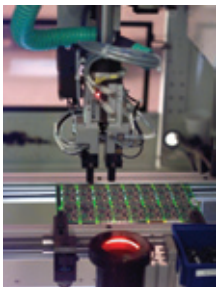
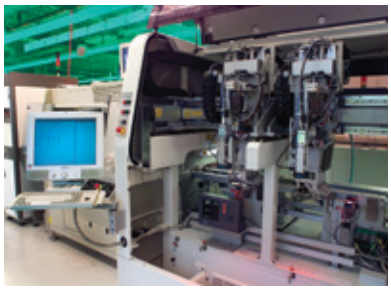
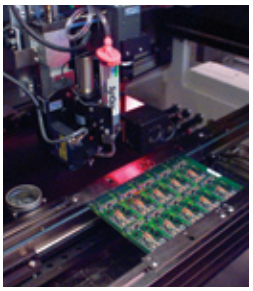
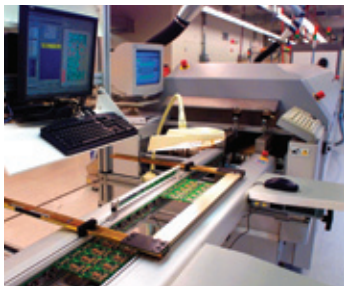


USA Manufacturing

SynQor is committed to achieving the highest quality manufacturing processes while ensuring a timely supply of highly reliable product at competitive prices to our customers. To meet these objectives, SynQor designs and operates its own production lines, assuring high volume production, while retaining control over industry leading quality levels.

In our state-of-the art AS9100 and ISO 9001 certified manufacturing facility in Boxborough, MA, USA, SynQor operates a multiple cell production flow, using the latest in automated surface mount technology. The in-line, flow manufacturing process allows for virtually hands-free construction and minimal WIP processing, resulting in very high throughput and product mix that supports a flow production strategy.

SynQor's use of a single PCB construction, planar magnetics and a baseplate-free design, allows for simple automated manufacturing and inspection, resulting in higher first pass yields. The high commonality of materials in SynQor designs facilitates the use of internally developed off-line set-up optimization software that allows us to plan for minimal down time and set-up between production runs. Consequently, SynQor can deliver most standard products in as little as four weeks. Also, our manufacturing expertise remains in-house, allowing us to maintain complete control over the quality and traceability of our product to the component level.

USA Design & Engineering

SynQor employs a stringent, 5 stage (ECO controlled, serial phase) product development process, starting with product concept design and ending with manufacturing integration. We believe that a solid design leads to efficient manufacturing, higher performance, and enhanced reliability. By designing for reliability, SynQor greatly reduces the chance of field defects and increases product integrity.

Concept Design	Design & Verification	Proof of Design	Proof of Manufacturing	Manufacturing Integration
• Generate electrical specification • Review performance requirements • Design simulation • Schematic • Qualify new components • Breadboard • Prelim thermal analysis	• Full layout • DFM/DFT Review • Build engineering prototypes • Debug circuit • Worst-case electrical testing • Component stress analysis • Stability analysis • Abnormal electrical testing • Specification review • Preliminary datasheet	• Build 50-100 units and electrically characterize • Verify electrical performance • Verify component stress analysis • Statistical variations • Thermal analysis and imaging • HALT testing • Complete datasheet	• 300 units in mfg. run • ATE testing • Yield analysis • Validate and finalize manufacturing processes and Tooling • 1000 hour life test • Qualification testing (humidity, vibration, DMT, PTC, thermal and mechanical shock)	• Processs transfer • Full documentation release (SCD's, BOM, processes, procedures, etc.) • Release qualification reports • Release final datasheet • Transfer units to finished goods

Quality & Reliability

Since its founding, SynQor has fostered a culture of quality and continual improvement across every facet of the business. Any costs associated with implementing our Quality Management System (QMS) are surpassed by the benefits of achieving world-class quality levels throughout the organization.

Product Family	Demonstrated MTBF based on Field Failures	Supplied Product Quality Level (SPQL) % Failure @ Installation
PowerQor	> 985 Million Hours	95 ppm

NOTE: Data for PowerQor series bricks only. For all other products contact SynQor.

At SynQor, we view quality as a system, not a result. Achieving quality and high reliability does not simply follow from being diligent in a few key areas. Quality requires a company-wide commitment to a closed loop process that incorporates continual improvement. At SynQor, all processes are built upon this framework and philosophy, which are detailed in our comprehensive QMS documentation. By properly defining the desired results and metrics for each process, a continual improvement system is created at every level that is consistent with SynQor's documented quality objectives.

Product Qualification

SynQor's multi-step product qualification process tests all aspects of converter performance through DMT (design marginality testing), PTC (power thermal cycling), thermal and mechanical shock, vibration, humidity and solderability. Our extensive characterization, testing of products and manufacturing processes ensure a supply of robust and reliable product.

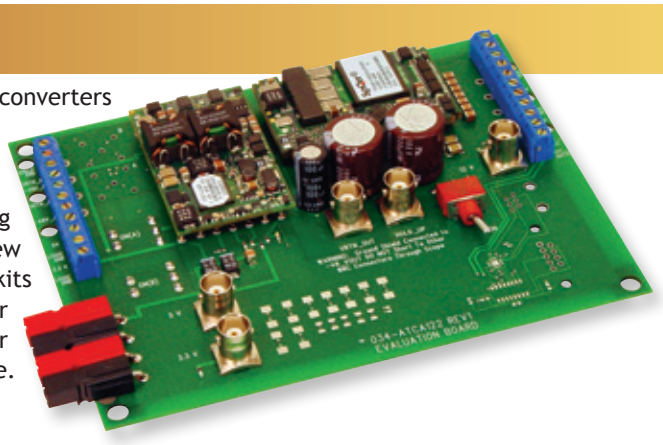
COMMERCIAL QUALIFICATION TESTING

Parameter	# of Units	Test Conditions
Life Test	32	1000 hours, 95% rated V_{in} and load, units at derating point
Vibration	5	10 - 55Hz sweep, 0.060" total excursions, 1 minute/sweep, 120 sweeps for 3 axis
Mechanical Shock	5	100G minimum, 3 drops in x and y axis, 1 drop in z axis
Temperature Cycling	10	500 cycles, -40°C to 100°C, unit temperature ramp of 15°C/minute
Power/Thermal Cycling	5	100 cycles, $T_{operating}$ = min to max, V_{in} = min to max, full load
Design Marginality	5	T_{min} -10°C to T_{max} +10°C, 5°C steps, V_{in} = min to max, I_{out} = 0 - 105% load
Humidity	5	1000 hours, +85°C, 85% Relative Humidity, 2 minutes on and 6 hours off
Solderability	15 pins	MIL-STD-883, method 2003 & JESD22-B102D Solderability Requirements (lead-free)

Evaluation Boards

SynQor makes it easy and affordable to evaluate the performance of our converters with our evaluation boards. All evaluation boards include socketed connectors to allow easy "plug and play" insertion and removal of multiple units while providing precise, sensed voltage measurements.

Evaluation boards are designed to simplify testing of the product by providing built-in BNC connectors for easy connection to standard test equipment, screw terminals for input/output connections, and a replaceable fuse. All evaluation kits also ship with a detailed testing procedure. You can order standard (*Power*Qor and *In*Qor), dual output (*Dual*Qor), IBA (intermediate bus architecture), *i*Qor (ATCA), *ACu*Qor (AC/DC) evaluation kits through your local sales representative.



RoHS Lead-Free & REACH Environmental Directive Compliance

The EU-led RoHS (Restriction of Hazardous Substances) Directive restricts the use of Lead, Cadmium, Hexavalent Chromium, Mercury, Polybrominated Biphenyls (PBB), Polybrominated Diphenyl Ethers (PBDE), Deca Brominated Diphenyl Ether (Deca BDE), and intentional additives Perfluoroocantylsulfonates (PFOS). Additionally, the European Chemical Agency (ECHA) has listed SVHC (Substances of Very High Concern) under the EU-led REACH (Registration, Evaluation, Authorization, and Restriction of Chemicals) provisions.

SynQor products built prior to June 2006 are RoHS compliant with the exception of lead. SynQor will continue to support all existing product offerings in their current forms and will continue to support non-lead-free product going forward. All SynQor products are fully REACH compliant.

All SynQor products, with the exception of the MilQor Product Line, are currently available in fully RoHS compliant versions. SynQor has qualified the following materials that are used in SynQor's lead-free, RoHS compliant product:

- PWB Finish: ENIG
- Solder & Solder Paste: No Clean SAC 305 Lead-Free Alloy, exceeds Telcordia GR78-CORE requirements for SIR and electromigration
- Pins: Solder finish is Matte Tin over Ni under-plating (mitigates tin whisker growth)

Custom Power Solutions

SynQor is eager to develop partnerships with customers requiring modified standard or custom DC-DC converter designs. Our in-house power design engineers have the expertise to deliver quick and reliable solutions for your most demanding power conversion specifications. Our converter topology lends itself to fast and easy development of modified standards, including diverse output voltages, reduced current limits and special testing requirements. Please contact your local SynQor sales representative for additional information.

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Founded in 1997, SynQor® has become the technology, quality and service leader for high efficiency power converters, filters, DC-DC converters for the military/aerospace, industrial, medical, transportation and telecom/datacom marketplaces. The MilQor®, RailQor®, ACuQor®, CFQor®, PowerQor®, BusQor®, DualQor®, iQor™, and NiQor® product lines, combined with SynQor's unmatched lead-times, flexibility, design support and lowest total cost of ownership have become the benchmark sought by SynQor's worldwide customer base.

In 2004, SynQor began its successful entry into the industrial, medical and military market segments with the InQor®, ACuQor® and MilQor® product lines. These new technology leading DC-DC and AC-DC product lines have enabled customers to realize vast savings in space, weight and overall system costs while dramatically increasing power densities and end-system performance. Equally important is the service and support advantage SynQor has brought to customers in these market segments.

SynQor is a privately owned U.S. company headquartered in Boxborough, Massachusetts, which is also the location of all of its manufacturing operations. SynQor has a design center in Dallas, Texas, and sales/marketing offices in Europe, Malaysia, Korea and China. More information is available on the company's website at www.synqor.com.

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