



ADVANCING THE POWER CURVE®

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



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

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

DC-DC & AC Line Filters

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

BusQor®

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

- ▶ Ultra-high efficiency up to 96% 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)

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

Hi-Rel

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

- ▶ Efficiency up to 91% at full rated load
- ▶ Full power from -55 to +125 °C
- ▶ 28V and 270V nominal input voltages
- ▶ Parallel operation with current share

Mil-COTS

"Off-the-shelf" DC-DC converters for military 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 800W

PFC

AC-DC Power Factor Correction Module

- ▶ High efficiency up to 96% at 230Vrms
- ▶ Full power at 100 °C baseplate temperature
- ▶ Universal input voltage range: 85-264VRMS
- ▶ 700W output power
- ▶ ≥ 0.99 Power Factor



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 to 425V**
- ▶ **Output power up to 600W**
- ▶ **Fixed frequency switching, low output noise**
- ▶ **No minimum load requirement**
- ▶ **Conduction Cooled, Ruggedized Package**



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 40A**
- ▶ **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**



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

- ▶ **Efficiency up to 93% at full rated load**
- ▶ **No derating in 0 airflow up to +85 °C**
- ▶ **9-36V, 42V-110V, 12-150V & 66V-160V input voltage ranges**



Advanced Telecommunications Computing Architecture (ATCA™) power interface module

- ▶ **100V/1ms transient protection**
- ▶ **Auxiliary supply voltages: 3.3V@3.6A and 5.0V@150mA**



Product Guide

Isolated DC-DC Converters

PowerQor and DualQor

Single and Dual Output, Isolated Converters..... PQ-10

RailQor

Railway Transportation..... RQ-14

BusQor (Bus Converter)

Single Output, Isolated Bus Converters BQ-18

InQor

Ruggedized Industrial Converters..... IQ-20

CFQor

Medical Grade DC-DC Converters CFQ-27

Military/Avionics Converters, Filters & Supplies

MilQor Uninterruptible Power Supply

UPS (Military/Avionics)..... UPS-28

MilQor Mil-COTS

“Off-The-Shelf” Converters (Military/Avionics).. MCOTS-32

Mil-COTS Isolated DC-DC Converters MCOTS-34

Mil-COTS DC-DC Bus Converters..... MCOTS-36

Mil-COTS Non-Isolated DC-DC Converters..... MCOTS-37

MilQor Hi-Rel

High-Reliability Converters (Military/Avionics) ... Hi-Rel-38

Non-Isolated DC-DC Converters

NiQor (High-Voltage)

Single Output, Non-Isolated Converters NQ-42

NiQor

Single Output, Non-Isolated Converters NQ-44

EMI FILTERS

DC Line Filters

DC Line Filters for InQor, Mil-COTS, & Hi-Rel EMI-46

AC Line Filters

AC Line Filters for MCOTS & Industrial..... EMI-48

ATCA Modules

iQor

ATCA Interface Module iQ-49

AC-DC Power Supplies

ACuQor

Medical/Industrial-Grade AC-DC Converters..... AQ-50

PFCQor

Power Factor Correction Module..... PFC-53

General Information

Package Outlines..... Package-54

Integrated Process Tracking System MFG-63

Manufacturing Overview MFG-64



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
- Transient Suppression Circuits

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

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/AVIONICS



... the power behind strength

The MilQor series of Uninterruptible 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/Avionics 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)
- Bus Converters
- EMI Filters

Mil-COTS

- Isolated DC-DC Converters
- Non-isolated DC-DC Converters
- Bus Converters
- EMI Filters

Uninterruptible Power Supply Units

- Ultra Low Weight
- Dual Input (AC and DC)
 - Rugged
 - Smaller
 - Lighter
 - More Powerful

SynQor

RailQor™

**Rail Transportation
isolated DC-DC converters**
See page RQ-14



PFCQor™

**Power Factor Correction
Modules**
See page PFC-53

NiQor®

**High & low voltage,
non-isolated
DC-DC converters**
See page NQ-42



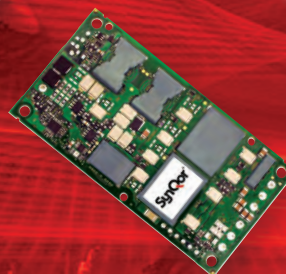
PowerQor®

**48V input, single & dual output
isolated DC-DC converters**
See page PQ-10



BusQor®

**High efficiency
DC-DC bus converters**
See page BQ-18



iQor™

**Advanced Telecommunications
Computing Architecture (ATCA™)
power interface module**
See page iQ-49

ACuQor®

**Medical & Industrial-grade highly
efficient AC-DC power supplies**
See page AQ-50



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



InQor®

Next-generation, ruggedized
isolated DC-DC converters
See page IQ-20



UPS

Military Tough — Sealed,
Weather-proof, Shock-proof
Uninterruptible Power Supply
See page UPS-28



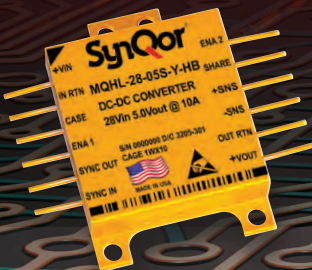
Mil-COTS

Military "Off-The-Shelf"
DC-DC converters
for cost sensitive applications
See page MCOTS-32



Hi-Rel

High-Reliability
Military/Avionics
DC-DC Converters
See page Hi-Rel-38



MilQor®

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. 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



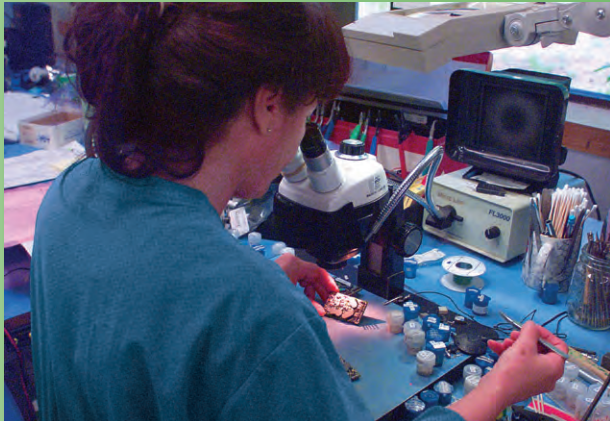
... the power behind innovation

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
8,149,597		



QUALITY & RELIABILITY



... 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

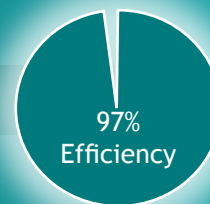
SynQor operates a multiple cell production flow in our state-of-the-art manufacturing facilities in Boxborough, MA, using the latest in automated surface mount technology. The in-line, flow manufacturing process allows for virtually hands free construction and minimal WIP processing, resulting in very 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.



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 $\pm 1.0\%$ - 1.5%
- Output Voltage Ripple <1% of V_{out} (typ.)
- Input Ref. Ripple Current <1% of I_{in} (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)

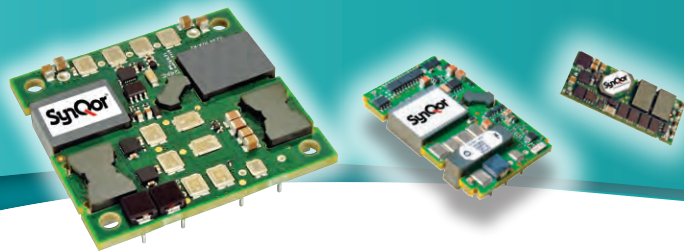
MECHANICAL

- 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, 30M Ω 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-54 for Package Outlines



PowerQor & DualQor PRODUCT FAMILY MATRIX

Input Voltage	Product Family	Input Range	Transient	Max. Power	Efficiency
18V	PQ24	18-36V	50V	600W	87%
35V	PQ30	18-60V	80V	100W	89%
50V	PQ40	18-75V	100V	100W	90%
80V	PQ48	35-75V	100V	165W	93%
100V	PQ60	35-75V	100V	728W	97%
	DQ6	35-75V	100V	100W	91%
	PQ65	40-75V	100V	100W	91%
	PQ55	38-55V	400W	95%	
	PQ50	44-52V	660W	94%	

PowerQor 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	010: 1V	080: 8V	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
	30: 18-60V	012: 1.2V	090: 9V							
	40: 18-75V	015: 1.5V	120: 12V							
	48: 35-75V	016: 1.65V	150: 15V							
	50: 44-52V	018: 1.8 V	180: 18V							
	55: 38-55V	020: 2V	240: 24V							
	60: 35-75V	025: 2.5V	260: 26V							
	65: 40-75V	033: 3.3V	280: 28V							
		050: 5V	480: 48 V							
		053: 5.3V	525: 52.5V							
	060: 6V	530: 53V	540: 54V							

Part Numbering Example: PQ48033HMA30NRS

DualQor PART NUMBERING GUIDE

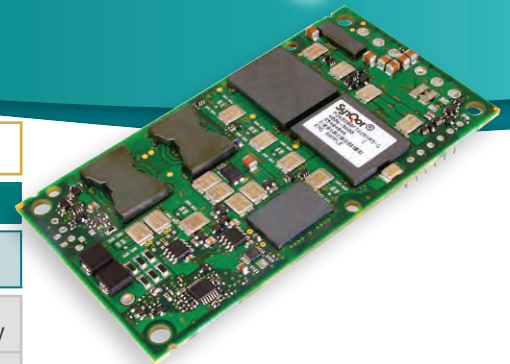
Product Family	Input Voltage	1st Output Voltage	2nd Output Voltage	Package Size	Performance Series	Thermal Design	Max Power Output	Enable Logic	Pin Length	Feature Set
DQ	6: 35-75V (100V Trans.)	33: 3.3V 50: 5.0V	25: 2.5V 33: 3.3V	Q: Quarter Brick	K: Kilo M: Mega G: Giga	A: Open frame B: Baseplate	04: 40W 06: 60W	P: Pos. N: Neg.	K: 0.110" N: 0.145" R: 0.180" Y: 0.250"	S: Std

Part Numbering Example: DQ65033QMA06NNS

Not all options shown, for valid part numbers, refer to the website or contact your local sales representative or distributor.

ISOLATED DC-DC CONVERTERS

PowerQor®



PQ24

Series	1.8V	3.3V	5V	8V	12V	15V	28V	50V
--------	------	------	----	----	-----	-----	-----	-----

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

Full Brick	FTA							21.5A 600W	
Quarter Brick	QEA			40A 200W		25A 300W	20A 300W	11A 308W	6A 300W
	QGL		25A 83W						
	QGA	25A 45W	25A 83W	20A 100W		8.33A 100W	6.67A 100W		

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				

PQ55

Series	53V	54V
--------	-----	-----

48Vdc Input (38-55Vdc Input Range)

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

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
---------------	-----	------------	-------------	-----------	---------------	---------------

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



ISOLATED DC-DC CONVERTERS



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 27W	15A 37.5W	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



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	





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, 12-150V & 66V-160V
- Input voltage ranges fully cover the requirements of EN 50155
- Full power operation at baseplate temperature range from -40°C to 100°C.
- Output power up to 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 4250Vdc |
| • 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



RAIL TRANSPORTATION ISOLATED DC-DC CONVERTERS



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)

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

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

RailQor DC-DC Converters designed for optimal performance in the most demanding applications.

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 (9.0V – 36Vdc) Continuous Input Range		40V Transient	QMC
	Max. Iout / Power out	5.3A / 26.5W	2.3A / 27.6W	1.1A / 26.4W	Quarter-Brick
RQ68	12 : 1 Input Ratio	68Vdc (12V – 150Vdc) Continuous Input Range		170V Transient	QMC

DC-DC Converter Part Numbering Guide

Family	Cont. Vin	Output Voltage	Package Size	Performance Series	Thermal Design	Max. Iout	Enable Logic	Pin Length	Features
RQ	18: 9 - 36V 68: 12 - 150V 72: 42 - 110V 1B: 66 - 160V	050: 5V 120: 12V 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.
Example: RQ72120QMC04NRS-G



TRANSIENT SUPPRESSION CIRCUIT



The RailQor series of Transient Suppression Circuits bring SynQor's field proven technology and manufacturing expertise to the railway power applications marketplace. SynQor's innovative design approach ensures survivability to the rigors of EN 50155 and RIA 12 voltage surges. Available in the industry standard sixteenth-brick package, these filters have high voltage tolerance, low DC resistance, and enable pass-through. They follow conservative component derating guidelines and they are designed and manufactured to the highest standards.

PRODUCT FEATURES

OPERATIONAL

- -40°C to 100°C operation.
- Input voltage ranges: 9-36V, 42-110V, & 66-160V
- Input voltage ranges fully cover the requirements of EN 50155
- Output power up to 75W
- Voltage suppression
- Very low DC resistance
- Fast response time

MECHANICAL

- Low weight only 0.30 oz. (8.6g)
- Standard footprint for Sixteenth Brick, 0.95" x 1.35" (24x34mm)
- Total height only 0.464" (11.8mm)

SAFETY -PENDING

- UL 60950-1:2007
- CAN/CSA C22.2 NO. 60950-1:2007
- EN 60950-1/A12:2011

RailQor Transient Suppression Circuits designed for optimal performance in the most demanding applications.

Family	Nominal Vin	Continuous Input Range	Transient	Power out	Sixteenth-Brick
RQ1B	110V	110Vdc (66V – 160Vdc)	170V Transient	75W	SMA
RQ72	72V	72Vdc (42V – 110Vdc)	110V Transient	75W	SMA
RQ18	18V	18Vdc (9V – 36Vdc)	40V Transient	75W	SMA

Transient Suppression Circuit Filter Part Numbering Guide

Family	Cont. Vin	Filter	Package Size	Performance	Thermal Design	Max. Power	Enable Logic	Pin Length	Features
RQ	18: 9 - 36V 72: 42 - 110V 1B: 66 - 160V	TSC: Transient Suppression Circuit	S: Sixteenth Brick	M: Mega	A: Open Frame	75: 75W	N: Negative	R: 0.180"	S: Standard

Refer to the website, contact your local sales representative or distributor for valid part numbers. Example: RQ18TSCSMA75NRS.

TRANSIENT SUPPRESSION CIRCUIT

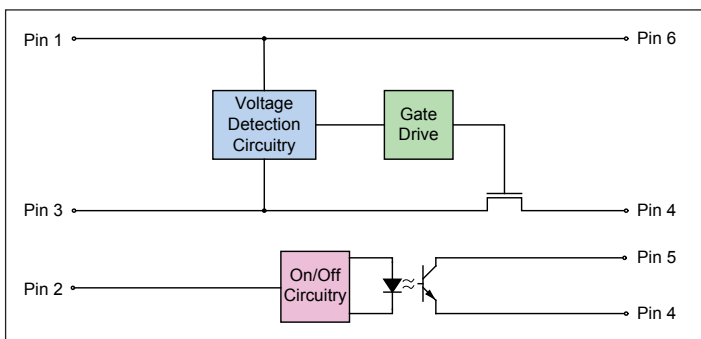
TSC BASIC OPERATION AND FEATURES

This module is a Transient Suppression Circuit designed to isolate DC-DC converters powered at its output from potentially damaging surges in input voltage. Each module can specifically handle the requirements found in EN 50155 and RIA 12 for input voltage surge immunity with minimal external components.

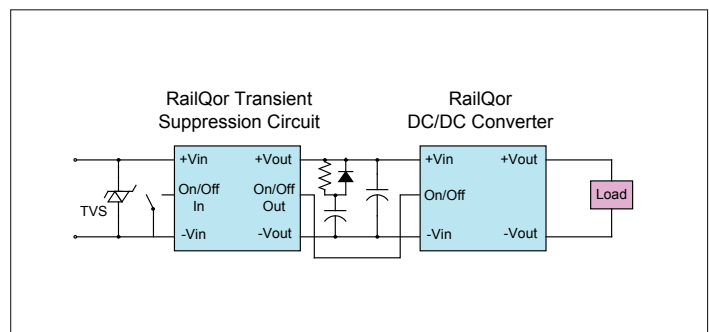
The circuit operates by disabling a switch in series with the input return line. During the input voltage surge, the DC-DC converter will rely on bulk energy storage capacitance to provide the necessary energy to continue to operate. Once the surge has ended, the transient suppression circuit will re-enable the switch so that power can once again flow from the source to the DC-DC module. An application note describing the circuit functionality and required surrounding circuitry can be found on the SynQor website (see the Rail Power Applications note).

An evaluation board is available for testing of the Transient Suppression Circuit along with any applicable RailQor or InQor DC-DC converter. This evaluation board is designed using the techniques described in the application note Rail Power Applications and for the purposes of demonstrating total system solution compliance to the standards EN 50155 and RIA 12. Please see the datasheet for ordering information.

FUNDAMENTAL CIRCUIT DIAGRAM



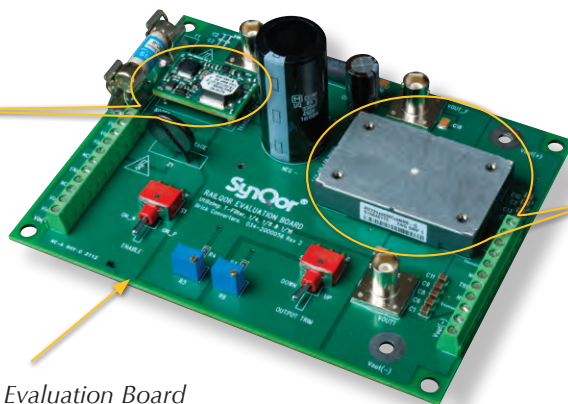
TYPICAL CONNECTION DIAGRAM



*RailQor
Transient
Suppression
Circuit*

RailQor Evaluation Board

*RailQor
DC-DC Converter*



ISOLATED BUS CONVERTERS



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.

96%
Efficiency

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-54 for package outlines

BusQor PRODUCT FAMILY MATRIX

Input Voltage Range(s)	UN-REGULATED			SEMI-REGULATED	FULLY-REGULATED
	35V				
	42V	BQ50 Input Range: 42-53V Max. Power: 331W Efficiency: 96%	BQ55 Input Range: 35-55V Max. Power: 800W Efficiency: 96%	BQ57 Input Range: 40-65V Max. Power: 1050W Efficiency: 96%	SQ60 Input Range: 36-75V Transient 100V Max. Power: 600W Efficiency: 95%
	55V				BQ60 & PQ60 Input Range: 35-75V Transient 100V Max. Power: 600W Efficiency: 95%
	100V				

BusQor 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	Z: Zeta E: Exa P: Peta T: Tera	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

BusQor listed by Package and output voltage

BQ55				SQ60				BQ60/PQ60			
Series	9.6V	12V		Series	6V	12V		Series	12V		
48Vdc Input (35-55Vdc Input Range)				48Vdc Input (36-75Vdc Input Range, Transient 100Vdc)				48Vdc Input (35-75Vdc Input Range, Transient 100Vdc)			
Quarter Brick	QZB	84A 560-880W	67A 565-885W	Half Brick	HZA	50A 600W		Half Brick	HZA	50A 600W	
	QEA	60A 420-660W	50A 450-688W	Quarter Brick	QZA	40A 480W		Quarter Brick	HEA	30A 360W	
	QPA	43A 300-473W			QPB	33A 396W			QEA	25A 300W	
	QTA	240W** 22-36A			QPA	55A 330W	28A 336W		QEA	17A 204W	
Eighth Brick	EZB	48A 320-500W	38A 323-503W	Eighth Brick	QEA	25A 300W		Eighth Brick	EPA	25A 300W	
	EPA	35A 228-385W			EPA	25A 300W			ETA	17A 204W	
	ETA	27A 189-297W	20A 175-275W		ETA	17A 204W			ETA	20A 240W	
	ETL	27A 189-297W	16A 140-220W		ETA	20A 240W					

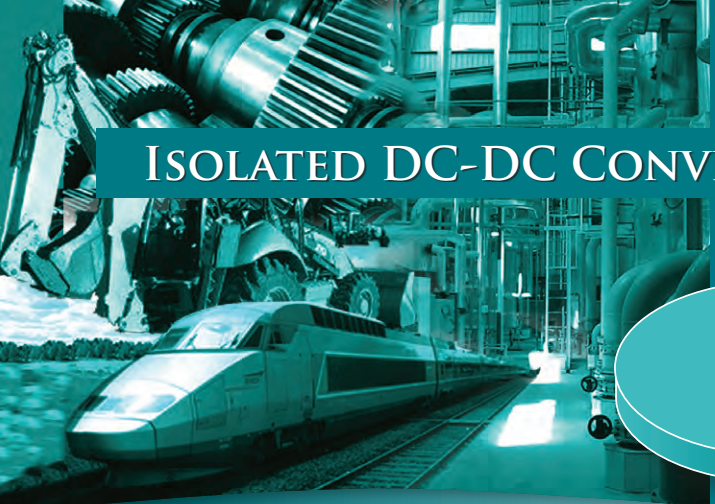
** BQ55090QTA27 is power limited @ 240W over Input Voltage Range 36-55Vdc

BQ57			
Series	9V	10.5V	12V
48Vdc Input (40-65Vdc Input Range)			
Quarter Brick	QZB	84A 634-1044W	67A 636-1050W
	QEA	60A 432-780W	50A 450-800W
Eighth Brick	EZB	48A 360-600W	38A 361-598W

BQ50			
Series	9V	12V	
48Vdc Input (42-53Vdc Input Range)			
Quarter Brick	QTA	20A 210-265W	
	QTA	25A 263-331W	



ISOLATED DC-DC CONVERTERS



95%
Efficiency



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 to 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 $\pm 1.0\%$
- Output Voltage Ripple $< 1\%$ of Vout (typ.)
- 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"

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, 30M Ω 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, 100M Ω input-to-output isolation
- CAN/CSA C22.2 NO. 60950-1:2007
- UL 60950-1:2007
- EN 60950-1/A11:2009
- CE marked

Visit our website for
more information



See page 56 for package outlines



InQor PRODUCT FAMILY MATRIX

2:1 INPUT RATIO		4:1 INPUT RATIO	
Input Voltage Range(s)	9V 18V	IQ12 Input Range: 9-22V Transient: 25V Max. Power: 182W Eff.: Up to 92%	IQ18 Input Range: 9-36V Transient: 40V Max. Power: 182W Eff.: Up to 92%
	25V	IQ24 Input Range: 18-36V Transient: 50V Max. Power: 504W Eff.: Up to 95%	IQ36 Input Range: 18-75V Max. Power: 220W Eff.: Up to 93%
	34V	IQ48 Input Range: 34-75V Transient: 100V Max. Power: 600W Eff.: Up to 95%	IQ70 Input Range: 34-135V Max. Power: 240W Eff.: Up to 93%
	75V	IQ1B Input Range: 66-160V Transient: 170V Max. Power: 255W Eff.: Up to 93%	
	100V	IQ2H Input Range: 90-210V Transient: 250V Max. Power: 600W Eff.: Up to 90%	
	170V	IQ4H Input Range: 180-425V Transient: 475V Max. Power: 600W Eff.: Up to 90%	
475V			
8:1 INPUT RATIO		12:1 INPUT RATIO	
Input Voltage Range(s)	9V 18V	IQ32 Input Range: 9-75V Transient: 100V Max. Power: 255W Eff.: Up to 91%	IQ68 Input Range: 12-150V Transient: 170V Max. Power: 53W Eff.: Up to 90%
	34V	IQ64 Input Range: 18-135V Max. Power: 200W Eff.: Up to 91%	
	75V	IQ90 Input Range: 34-160V Max. Power: 228W Eff.: Up to 94%	
	170V		



ISOLATED DC-DC CONVERTERS

InQor 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	012: 1.2V	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
	18: 9-36V	015: 1.5V							
	24: 18-36V	018: 1.8V							
	32: 9-75V	025: 2.5V							
	36: 18-75V	033: 3.3V							
	48: 34-75V	050: 5V							
	64: 18-135V	070: 7V							
	68: 12-150V	120: 12V							
	70: 34-135V	150: 15V							
	72: 42-110V	240: 24V							
	90: 34-160V	280: 28V							
	1B: 66-160V	300: 30V							
	2H: 90-210V	400: 40V							
	4H: 180-425V	480: 48V							
		500: 50V							

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

IQ12		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	QEC						40A 200W		25A 300W	20A 300W		11A 300W				6A 300W
	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

IQ1B	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



IQ4H	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



IQ2H	Vout	1.8V	2.5V	3.3V	5V	12V	15V	24V	28V	48V
-------------	------	------	------	------	----	-----	-----	-----	-----	-----

210Vdc Input (90-210Vdc Input Range, Transient 250V)

Quarter Brick	QTC				30A 150W				5A 140W	3A 140W
---------------	-----	--	--	--	-------------	--	--	--	------------	------------



4:1 input ratio listed by package and output voltage



IQ18

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					

IQ36

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					

IQ70

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

IQ32	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

IQ64	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

IQ90	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

IQ68	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.

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

		Output Voltage				
CFQor	Series	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	

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 24: 24A 20: 20A 12: 12A 10: 10A 08: 8A 07: 7A 06: 6A 05: 5A 04: 4A	N: Negative Logic	R: 0.180"	S: Standard

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 56 for package outlines

UPS UNINTERRUPTIBLE POWER SUPPLY

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/Avionics 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 standard range
45-65 Hz AC input
- 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



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



UPS

Military-Grade Uninterruptible Power Supply

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.	•	•	•	•	•	•
UPS-1500-E-2U (1 Extended Battery Pack)	1250W (1500VA)	>24 min. (>31 min.)	2U	50 lbs.	•	•	•	•	•	•
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 N: No Battery	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



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



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



UPS

UPS UNINTERRUPTIBLE POWER SUPPLY

Replacement Battery for UPS

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



Power Cables (10 Feet Long)

Connector	1500 S & E Series	3000 S & E Series
AC Input (NEMA 5-20P Plug)	SYN-9101	SYN-9105
AC Input (NEMA 5-15P Plug)	SYN-9104	
AC Input (Hardwire)	SYN-9102	
AC Output (115V _{rms}) (Hardwire)	SYN-9130	
AC Output (115V _{rms}) (NEMA 5-20R Receptacle)	SYN-9131	
AC Output (115V _{rms}) (NEMA 5-15R Receptacle)		SYN-9135
AC Output (230V _{rms}) (NEMA Receptacle)	SYN-9132	SYN-9136
DC Input (Ring Connectors)	SYN-9151	SYN-9155
DC Input (Hardwire)	SYN-9152	
DC Input (NATO Connector)	SYN-9154	
DC Output (Fork Connectors)	SYN-9171	SYN-9173
DC Output (Hardwire)	SYN-9172	



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

AC Output Power Strips (Cable has Circular Connector)

Connector	1500 S & E Series	3000 S & E Series
6 NEMA Receptacles with Breaker (1U Rackmount with 3' Cable)	SYN-9232	SYN-9236
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-9301	SYN-9301
HD DB15 to DB15 (RS232 and Digital I/O)	SYN-9305	SYN-9207



Configuration Cables

Connector	1500 S & E Series	3000 S & E Series
HD DB15F to DB15F (2 Units Parallel, 3')	SYN-9311	SYN-9311
HD DB15F to DB15F (3 Units Parallel, 6')	SYN-9315	SYN-9315
HD DB15F to DB15F (2 Units Series, 3')	SYN-9313	SYN-9313
HD DB15F to DB15F (3 Units 3 Phase, 6')	SYN-9317	SYN-9317

Transit Cases

Type	1500 S & E Series	3000 S & E Series
Transit Case, 3U (Grey with Casters)	SYN-9410	SYN-9410
Transit Case, 3U (Grey with No Casters)	SYN-9412	SYN-9412

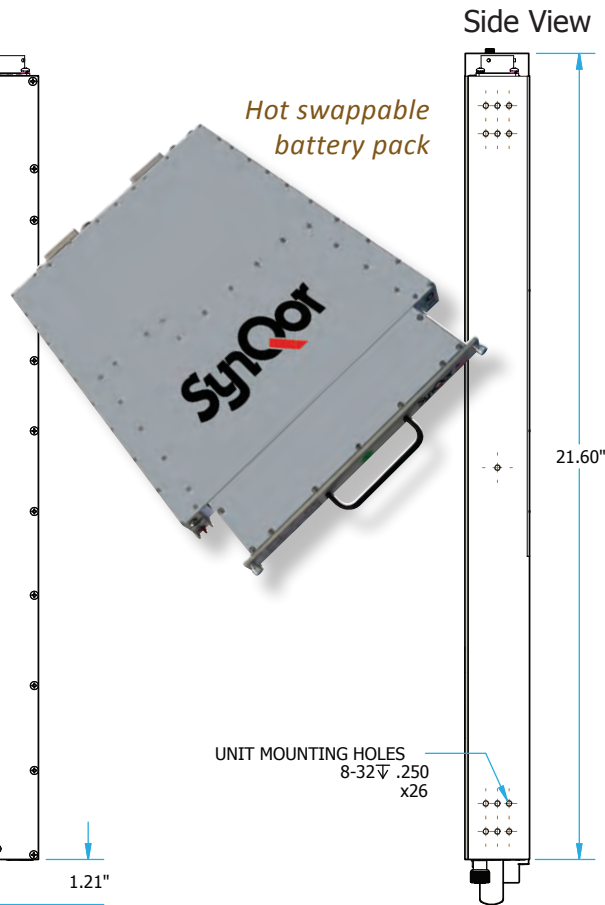
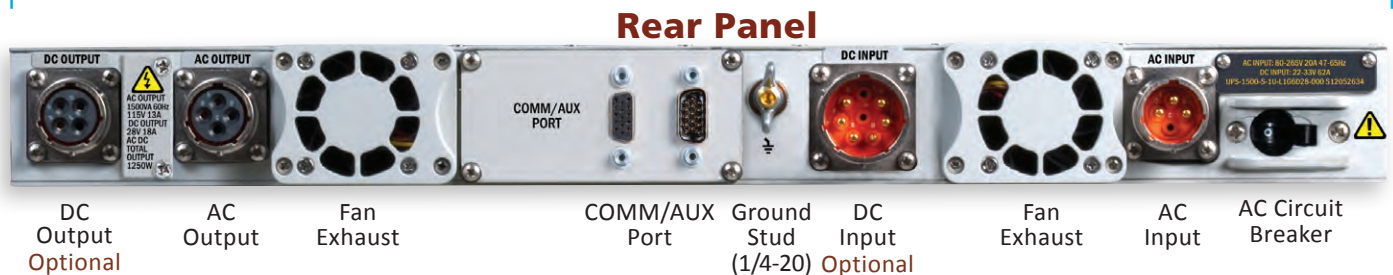
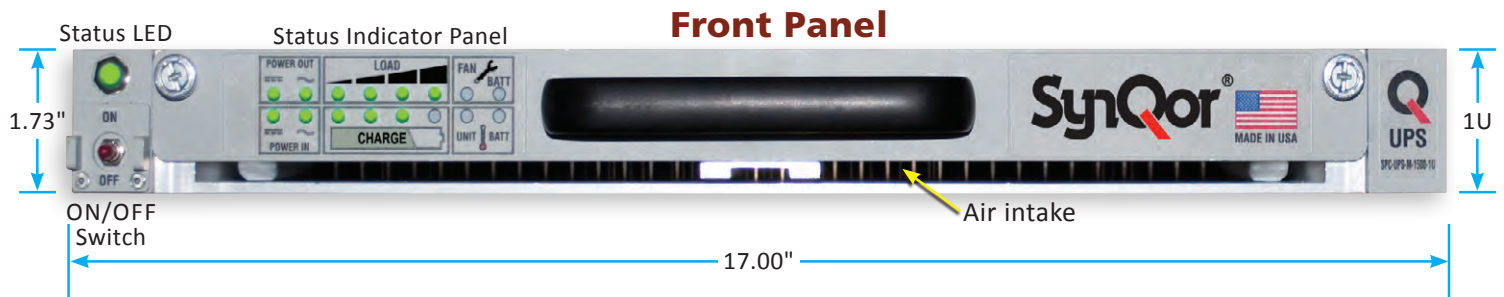


Other Options also available, for further information check the website or contact power@synqor.com.

Military-Grade Power

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.



Visit our website for more information



Mil-COTS95%
Efficiency

“OFF-THE-SHELF” DC-DC CONVERTERS FOR MILITARY/AVIONICS 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/Avionics 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
- 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%

(Half-Brick Zeta	+10% to -50%)
(Quarter-Brick Zeta	+10% to -50%)
(Sixteenth Brick	+10% to -10%)

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

Mil-COTS 270, 270H, 270N

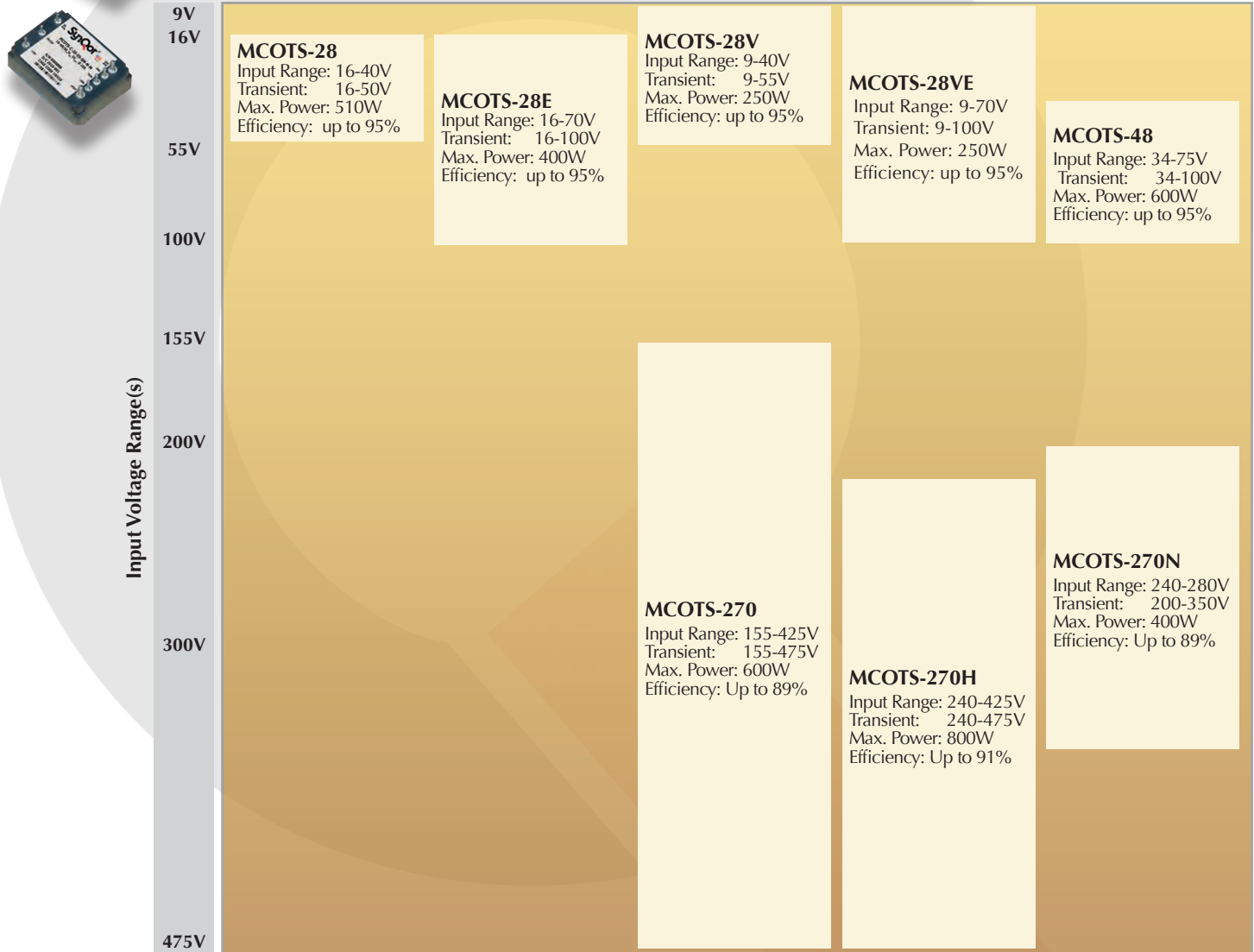
- Reinforced Insulation
- 4250V, 100M Ω input-to-output isolation
- CAN/CSA C22.2 NO. 60950-1:2007
- UL 60950-1:2007
- EN 60950-1/A11:2009
- CE Marked

See page 56 for package outlines



Visit our website for
more information

MilQor Mil-COTS PRODUCT FAMILY MATRIX



MilQor Mil-COTS PART NUMBERING

Product Family	Product	Cont. Input Voltage	Output Voltage	Package Size/ (Performance Level)	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 270H: 240-425V 270N: 240-280V	1R2: 1.2V 1R5: 1.5V 1R8: 1.8V 2R5: 2.5V 3R3: 3.3V 05: 5V 07: 7V 7R5: 7.5V	08: 8V 10: 10V 12: 12V 15: 15V 24: 24V 28: 28V 36: 36V 40: 40V 48: 48V 50: 50V	FP: Full Brick (Peta) FT: Full Brick (Tera) HZ: Half Brick (Zeta) HP: Half Brick (Peta) HT: Half Brick (Tera) QE: Quarter Brick (Exa) 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.

Military-Grade Isolated DC-DC Converters



MCOTS-270

	Brick Size	3.3V	5V	12V	15V	24V	28V	48V
155-425Vin Cont. 475Vin 1s Trans.* Absolute Max Vin = 600V	Full		80A 400W	50A 600W	40A 600W	25A 600W	21.4A 600W	12.5A 600W
	1/2	60A 198W	50A 250W	25A 300W	20A 300W	12.5A 300W	10.7A 300W	6.2A 300W
	1/4	30A 99W	30A 150W	13A 156W	10A 150W	6.25A 150W	5.35A 150W	3.12A 150W

* 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.

MCOTS-270H

	Brick Size	5V	28V	36V
240-425Vin Cont. 475Vin 1s Trans.* Absolute Max Vin = 600V	Full	10A 500W	28.6A 800W	22.2A 800W

MCOTS-270N

	Brick Size	8V	10V	28V
240-280Vin Cont. 200-350Vin 1s Trans.* Absolute Max Vin = 600V	Half	50A 400W	40A 400W	14.5A 400W

* 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 & QUALIFICATION

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	•	•

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)	—	—

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 EXA						40A 200W			25A 200W	20A 300W		11A 300W			6A 300W
	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.

DC-DC BUS CONVERTERS

Mil-COTS



95%
Efficiency

RUGGED, HIGH EFFICIENCY NEXT GENERATION DC-DC BUS CONVERTERS

These military-grade 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. MCOTS-Bus converters are ideal for creating the mid-bus voltage required to drive point-of-load (non-isolated) converters in IBA.

MIL-COTS ISOLATED DC-DC BUS CONVERTERS

Model Number	Package Size	Input Voltage	Input Transient	Output Voltage	Output Current	Max Output Power	Efficiency
MCOTS-B-270-28	1/2 Brick	230-400Vin	155-450Vtrans	28Vout	32A	1000W	95%
MCOTS-B-600-28	1/2 Brick	440-700Vin	400-750Vtrans	28Vout	32A	1000W	95%

PRODUCT FEATURES

OPERATIONAL

- High efficiency, up to 95% at full rated load current
- Delivers 32A full power with minimal derating
 - no heatsink required
- Operating input voltage range: 230-400 & 440-700V
- Fixed frequency switching provides predictable EMI
- No minimum load requirement

MECHANICAL

- Industry standard half-brick pin-out configuration
 - Half Brick: 2.39" x 2.49"
- Total Baseplate weight: 2.7 oz. (78 g)

CONTROL

- On/Off control referenced to input side
 - Inherent current share (by droop method) for high current and parallel applications

PROTECTION

- Input under-voltage and over voltage lockout protects against abnormal input voltages
- Output current limit and short circuit protection (auto recovery)
- Thermal shutdown

SCREENING/QUALIFICATION

- AS9100 and ISO 9001:2008 certified facility
- Qualification consistent with MIL-STD-883
- Available with S-Grade or M-Grade screening
- Pre-cap inspection per IPC-610, Class III
- Temperature cycling per MIL-STD-883, Method 1010, Condition B, 10 cycles
- Burn-In at 100°C baseplate temperature
- Final visual inspection per MIL-STD-2008
- Full component traceability

HIGH VOLTAGE NON-ISOLATED DC-DC CONVERTERS



MILITARY-GRADE HIGH VOLTAGE, NON-ISOLATED DC-DC CONVERTERS

The high input voltage non-isolated 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.

MIL-COTS NON-ISOLATED DC-DC CONVERTERS

Model Number	Package Size	Input Voltage	Output Voltage	Max Output Power	High Efficiency
MCOTS-N-28V-60	1/2 Brick	9-60Vin	0-60Vout	1600W	95 % Efficiency
MCOTS-N-28VE-90	1/2 Brick	9-90Vin	0-90Vout	1600W	95 % Efficiency

PRODUCT FEATURES

OPERATIONAL

- Ultra-high efficiency up to 95%
- Wide input voltage ranges:
9-60V (28V); 9-90V (28VE)
- Buck/Boost Mode available
- Maximum input/output currents up to 40A
- 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

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

MECHANICAL

- Industry standard pin-out configurations
- Industry standard footprints:
Half Brick: 2.49" x 2.39" x 0.51"

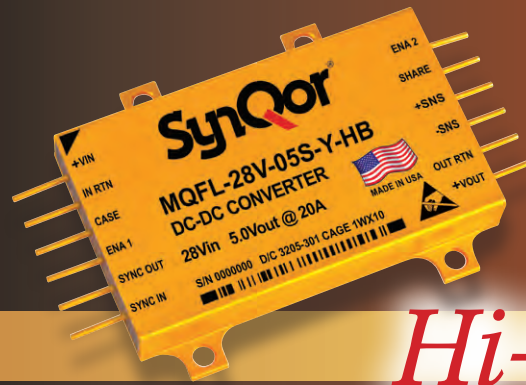
PROTECTION/CONTROL

- 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



ISOLATED DC-DC CONVERTERS

Hi-Rel

HIGH-RELIABILITY, FIELD PROVEN DC-DC CONVERTERS FOR MILITARY/AVIONICS APPLICATIONS

The MilQor series of high-reliability DC-DC converters brings SynQor's field proven high-efficiency synchronous rectifier technology to the Military/Avionics 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

- QorSeal 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 58 for package outlines



MilQor Hi-Rel PRODUCT FAMILY MATRIX

Input Voltage Range(s)	28 Series	28E Series	28V Series	28VE Series	270 Series	270L Series
5.5V						
16V	Input Range: 16-40V Transient: 16-50V Max. Power: 120W Efficiency: 91%	Input Range: 16-70V Transient: 16-80V Max. Power: 120W Efficiency: 90%	Input Range: 16-40V Transient: 5.5-50V Max. Power: 100W Efficiency: 90%	Input Range: 16-70V Transient: 5.5-80V Max. Power: 100W Efficiency: 90%		
50V						
80V						
155V						
475V					Input Range: 155-400V Transient: 155-475V Max. Power: 120W Efficiency: 88%	Input Range: 65-350V Transient: 65-475V Max. Power: 75W Efficiency: 86%

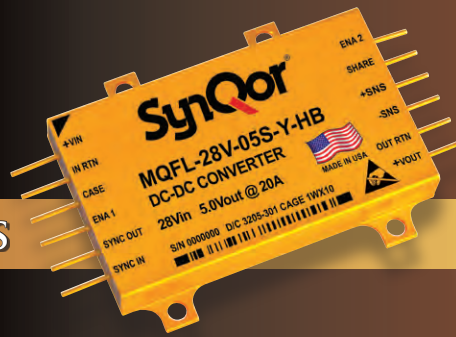
MilQor Hi-Rel PART NUMBERING

Product Family	System Input Voltage (with transients)	Output Voltage(s)		Package Size/ Pin Configuration	Screening Grade
		Single Output	Dual Output		
MQFL MQHL MQHR MQBL MQSA	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: 5.0V 06S: 6.0V 7R5S: 7.5V 09S: 9V 12S: 12V 15S: 15V 28S: 28V	05D: $\pm 5.0V$ 12D: $\pm 12V$ 15D: $\pm 15V$	U X Y W Z (FL, HL, HR) S F (BL) S (SA)	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.

ISOLATED DC-DC CONVERTERS



Hi-Rel

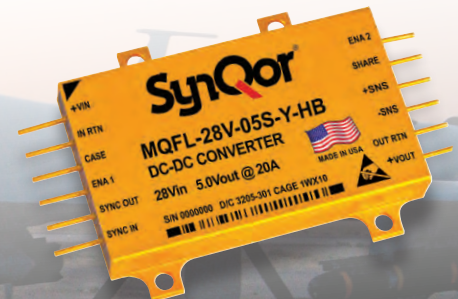
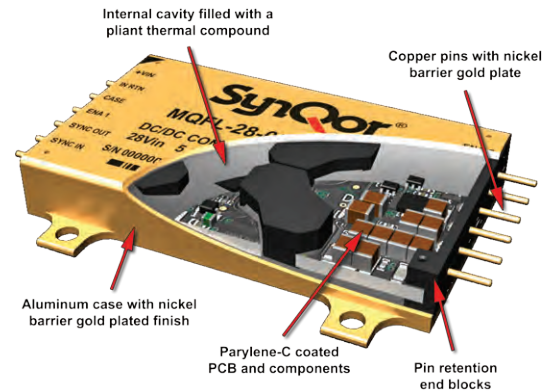
Hi-Rel Screening

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			
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			
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

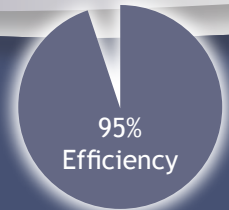
Bus Converters (MQBQ)	Vout = ~Vin/9 28B
MQBQ-270 230-400Vin Cont. 155-450Vin 1s Trans. * Absolute Max Vin = 550V	230Vin: 17A @ 23.5V = 400W 270Vin: 15A @ 29V = 435W 400Vin: 11A @ 42V = 470W

* 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.



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 40A
- 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)

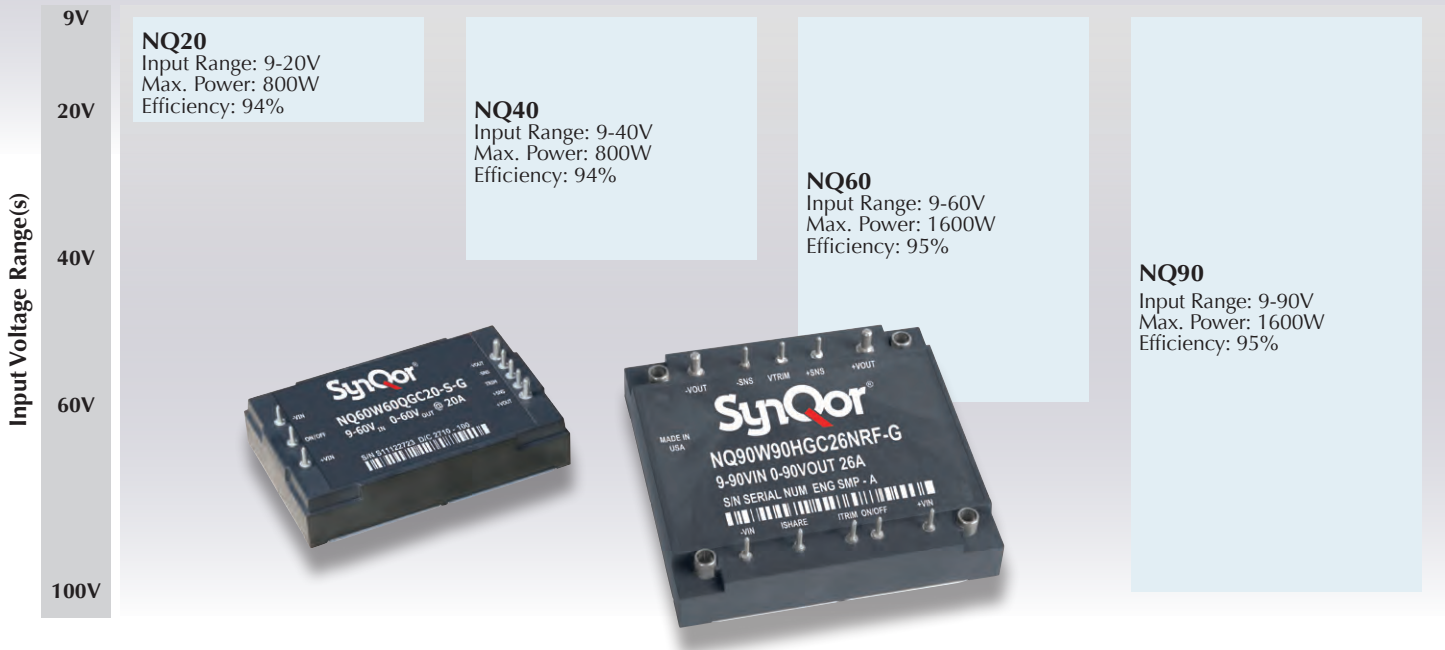
- Provides the power conversion platform for battery charging
- Output current limit is externally controlled for constant-current charging
- Current can be set with an external resistor or an active circuit
- Current analog signal provided for instrumentation and control functions
- Ideal diode output 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 56 for package outlines

Visit our website for more information

NiQor Hi-Voltage PRODUCT FAMILY MATRIX



NiQor Hi-Voltage listed by Package and output voltage

NQ20			NQ40			NQ60			NQ90		
Series	0-20V		Series	0-40V		Series	0-60V		Series	0-90V	
9-20Vdc Input Range			9-40Vdc Input Range			9-60Vdc Input Range			9-100Vdc Input Range		
Quarter Brick	QG	40A	Quarter Brick	QG	30A	Half Brick	HG	40A	Half Brick	HG	26A
Eighth Brick	ET	20A	Eighth Brick	ET	15A	Quarter Brick	QG	20A			
	EG	10A		EG	8A	Eighth Brick	ET	10A			
							EG	5A			



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	N: Neg.	K: 0.110" N: 0.145" R: 0.180" Y: 0.250"	S: Standard (1/8 & 1/4 only) C: Current monitor output/ trimmable current limit (1/8 & 1/4 only) 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.



NON-ISOLATED DC-DC CONVERTERS

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 $\pm 0.7 - 2.0\%$
- Output Voltage Ripple $< 1.5\%$ of Vout (typ.)
- Input Ref. Ripple Current $< 5\%$ of Iin (typ.)
- Switching Frequency 300 - 390kHz
- Transient Response $\pm 40 - 100\text{mV}$

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"

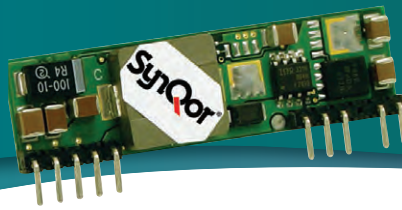
SAFETY

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

Visit our website for more information



See page 60 for package outlines



NiQor PRODUCT FAMILY MATRIX

Input Voltage Range(s)	3V	NQ04 Input Range: 3-6V Max. Power: 58W Efficiency: 95%	
	6V	NQ15 Input Range: 6-15V Max. Power: 150W Efficiency: 95%	NQ16 Input Range: 6-16V Max. Power: 80W Efficiency: 95%
	16V		

NiQor listed by Package and output voltage

NQ04

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	

NQ15, NQ16

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	

NiQor 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	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
	15: 6-15V 16: 6-16V								

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



EMI DC FILTERS

EMI

EMI DC 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.

DC 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



See page 56 & 58 for package outlines

MECHANICAL

- Industry standard form factors

Hi-Rel

Full-Size: 3.00" x 1.50"

Half-Size: 1.88" x 1.50"

Mil-COTS

Quarter Brick: 1.54" x 2.39"

Half Brick: 2.39" x 2.49"

InQor

Quarter Brick: 1.54" x 2.39"

- 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.

EMI DC Filters

Hi-Rel EMI DC 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	+70, -40V	+110V, -70V	20A	500V	60mΩ	>80dB	>60dB
MQME-28E-T6 ¹	+70, -40V	+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	450mΩ	>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 DC 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)					
HALF BRICK							
MCOTS-F-28-T-HT	±40V	+210V, -50V	30A	2250V	50mΩ	>80dB @ 250kHz	>36dB @ 250kHz
MCOTS-F-270-P-HT	±500V	±630V	9A	2250V	80mΩ	>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

InQor EMI DC 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

EMI AC LINE FILTERS



EMI

EMI AC LINE FILTER MODULES

SynQor provides AC Line filters for the InQor and MIL-COTS series PFC modules and DC-DC converters. SynQor's high-performance filters are designed to comply with industry EMI standards.

AC PRODUCT FEATURES

OPERATIONAL

- Universal Input voltage range
- Up to 765W output power
- All ceramic capacitor design
- Internally damped
- Output TVS device included to clamp filter over-ring
- High voltage isolation between baseplate and input/output
- Wide temperature range operation
- Low power dissipation
- Complies with industry EMI standards when used with SynQor PFC and DC-DC converter modules

MECHANICAL

- Industry standard form factors
InQor
Half Brick: 2.39" x 2.49"
- Also available with a flanged baseplate

IN-LINE MANUFACTURING PROCESS

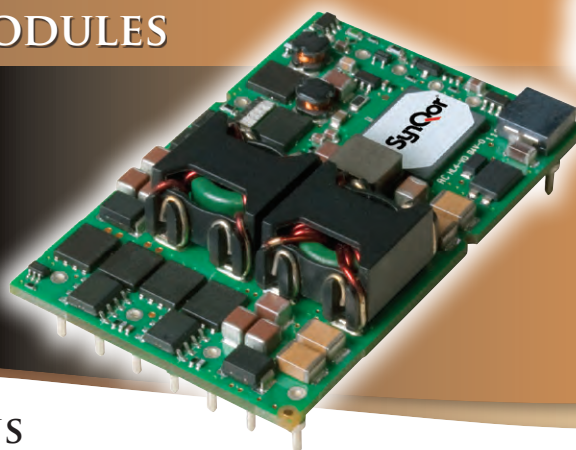
- AS9100 and ISO 9001:2008 certified facility
- Full component traceability

AC EMI Filters

Model Number	AC Line Frequency	AC Line Voltage	Output Current	$P_{OUT}^{MAX} @ V_{AC}^{MIN}$	Dissipation at $P_{OUT}^{MAX} @ V_{AC}^{MIN}$	Isolation Voltage (to case)
InQor						
ACFI060HTC230	50/60Hz	85-264V _{rms}	9A _{rms}	765W	13W	2250V _{pk}

See page 56 for package outlines

ATCA POWER INTERFACE MODULES



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.

iQor 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

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

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

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

See page 55 for package outlines

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

Visit our website for
more information



AC-DC POWER SUPPLIES



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 C-Series is a fully-regulated, conductive cooled, fanless design in a 4.25" x 7.25" x 1.00" U Channel housing to improve cost effectiveness. The medical grade version meets UL60601-1 medical safety specs for cardiac contact without requiring an external isolation transformer. The products are available in an industrial grade.

PRODUCT FEATURES

GENERAL SPECIFICATIONS

- High efficiency up to 93% at full rated load current
- Delivers up to 1400W of output power (1800W transient)
- Semi-regulated output – G-Series & E-Series
- Fully regulated output – C-Series
- 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
- Operating ambient temperature 0-70°C

MECHANICAL

- 1U High
- Small sizes
- E-Series: 3" x 5" products
- G-Series: 4.75" x 7" products
- C-Series: 4.25" x 7.25" products

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. 60601-1-08
- Can/CSA-C22.2 No. 60601-1-M90
- EN 60601-1:2006
- EN 60601-1/A2:1995
- IEC 60601-1:2005
- IEC 60601-1/A2:1995
- ANSI/AAMI ES60601-1:2005
- EN55011, 55022 and 61000
- CE Marked

Visit our website for
more information



See page 61 for package outlines



G-Series



E-Series



C-Series

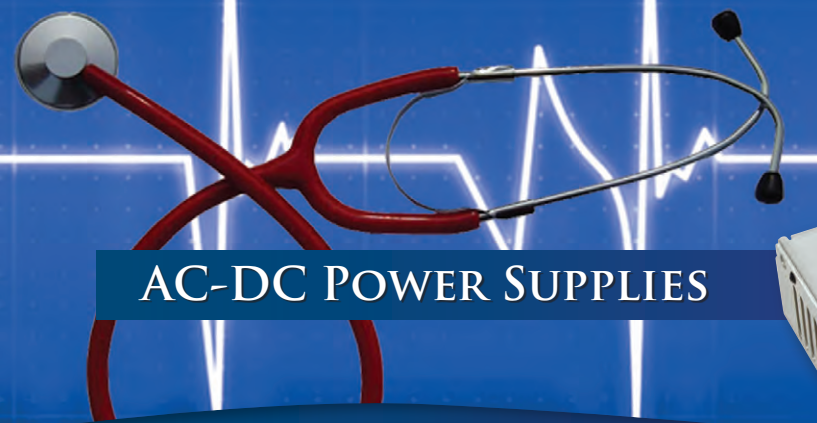
MEDICAL GRADE	Output Voltage	Power Rating		
	G-Series (Single Output) (4.75" x 7" x 1.65" Encased Package) 12V, 15V, 24V, 28V, 48V (includes 5V@50mA standby)	800W (1000W Transient)	1100W (1300W Transient)	1400W (1800W Transient)
	E-Series (Single Output) (3" x 5" x 1.45" Open Frame Package) 12V, 24V, 36V or 48V (includes 5V@50mA standby)	300W (400W Transient)	400W (500W Transient)	500W (700W Transient)
	E-Series (Triple Output) (3.59" x 5.25" x 1.65" Encased Package) 12V, 24V, 36V or 48V (includes 5V@2A and 12V@4.2A)	300W (400W Transient)	400W (500W Transient)	500W (700W Transient)
	C-Series (Single Output) (4.25" x 7.25" x 1.00" Package) 12V, 24V, or 48V (includes 5V@50mA standby)	300W (400W Transient)	400W (500W Transient)	

INDUSTRIAL GRADE	Output Voltage	Power Rating		
	E-Series (Single Output) (3" x 5" x 1.45" Open Frame Package) 12V, 24V, 36V or 48V (includes 5V@50mA standby)	300W (400W Transient)	400W (500W Transient)	500W (700W Transient)
	E-Series (Triple Output) (3.59" x 5.25" x 1.65" Encased Package) 12V, 24V, 36V or 48V (includes 5V@2A and 12V@4.2A)	300W (400W Transient)	400W (500W Transient)	500W (700W Transient)
	G-Series (Single Output) (4.75" x 7" x 1.65" Encased Package) 12V, 15V, 24V, 28V, 48V (includes 5V@50mA standby)	800W (1000W Transient)	1100W (1300W Transient)	1400W (1800W Transient)
	C-Series (Single Output) (4.25" x 7.25" x 1.00" Package) 12V, 24V, or 48V (includes 5V@50mA standby)	300W (400W Transient)	400W (500W Transient)	

ACuQor 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" C: 1 Unit 4.25" x 7.25" 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 U: U Channel	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

A red stethoscope is positioned over a blue background with a white ECG (heart rate) line.

AC-DC POWER SUPPLIES



ACuQor E-SERIES 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.





POWER FACTOR CORRECTION MODULE

The PFCQor Power Factor Correction module is an essential building block of an AC-DC power supply. Used in conjunction with a hold-up capacitor, SynQor's high efficiency DC-DC converters and SynQor's AC line filter, the PFCQor will draw a nearly perfect sinusoidal current ($PF > 0.99$) from a single phase AC input. Up to three PFCQor modules can be paralleled to achieve higher power. The module is supplied completely encased to provide protection from the harsh environments seen in many industrial and transportation environments.

PRODUCT FEATURES

OPERATIONAL

- Universal input voltage range: 85-264Vrms
- Universal input frequency range: 45 - 65Hz / 360 - 800Hz
- Up to 700W output power
- ≥ 0.99 Power Factor
- High efficiency: $> 96\%$ (230Vrms), $> 94\%$ (115Vrms)
- Internal inrush current limit
- Auxiliary 10V bias supply
- 100°C max baseplate temperature at full power
- Up to 3 modules can be paralleled with current sharing
- Compatible with SynQor IQ4H Converters & AC line filters

MECHANICAL

- Industry standard Half-brick
- Size: 2.4" x 2.5" x 0.51" (60.6 x 63.1 x 13mm)
- Total weight: 4.9 oz (139 g)
- Flanged baseplate version available

Model Number	Input Voltage	Output Voltage	Max Output Power
PFCU390HPC07SRS	85-264Vrms	390Vdc	Up to 700W

CONTROL FEATURES

- PFC Enable
- Load Enable (also: Power Out Good signal)
- AC Power Good Signal
- Clock synchronization
- Output current monitor/current sharing

PROTECTION/CONTROL

- Input current limit and auto-recovery short circuit protection
- Auto-recovery input under/over-voltage protection
- Auto-recovery output over-voltage protection
- Auto-recovery thermal shutdown

SAFETY

- Input/Output to baseplate isolation 4250Vdc
- UL 60950-1:2007, reinforced insulation to baseplate
- CAN/CSA-C22.2 No. 60950-1:2007
- EN60950-1 Ed. 2.0
- CE Marked

See page 56 for package outlines

POWER FACTOR CORRECTION MODULE

PFCQor PART NUMBERING

Family	Input Voltage Range	Output Voltage	Package Size	Performance Level	Thermal Design	Output Power	Input Phases	Pin Style	Feature Set
PFC	U:85-264 Vrms	390:390V	H: Half-brick	P: Peta	C: Encased V: Encased with Flanged Baseplate	07: 700W	S: Single-Phase	R: 0.180"	S: Standard

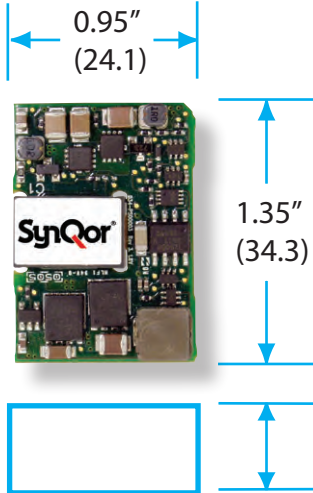
OPEN FRAME PACKAGES

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. All dimensions in inches (mm).

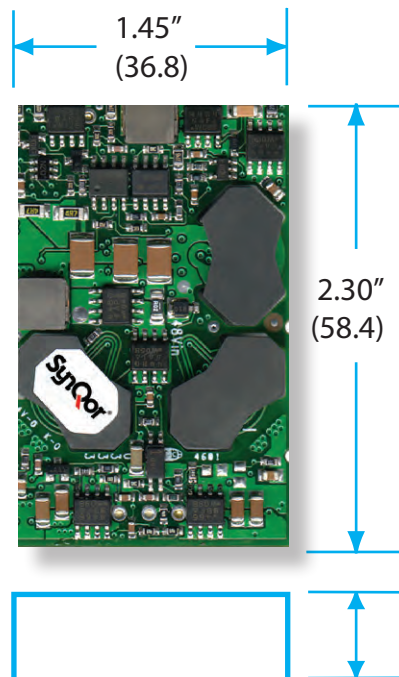


* See website for datasheets with more details.

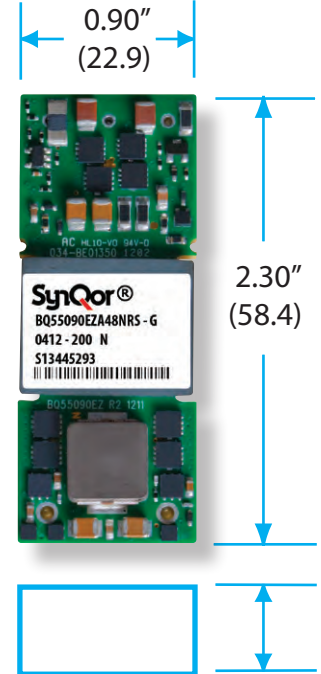
SIXTEENTH BRICK



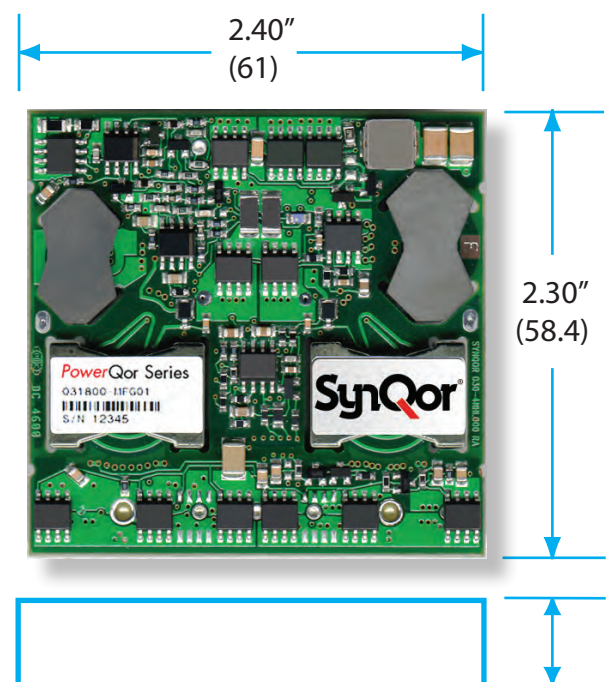
QUARTER BRICK



EIGHTH BRICK

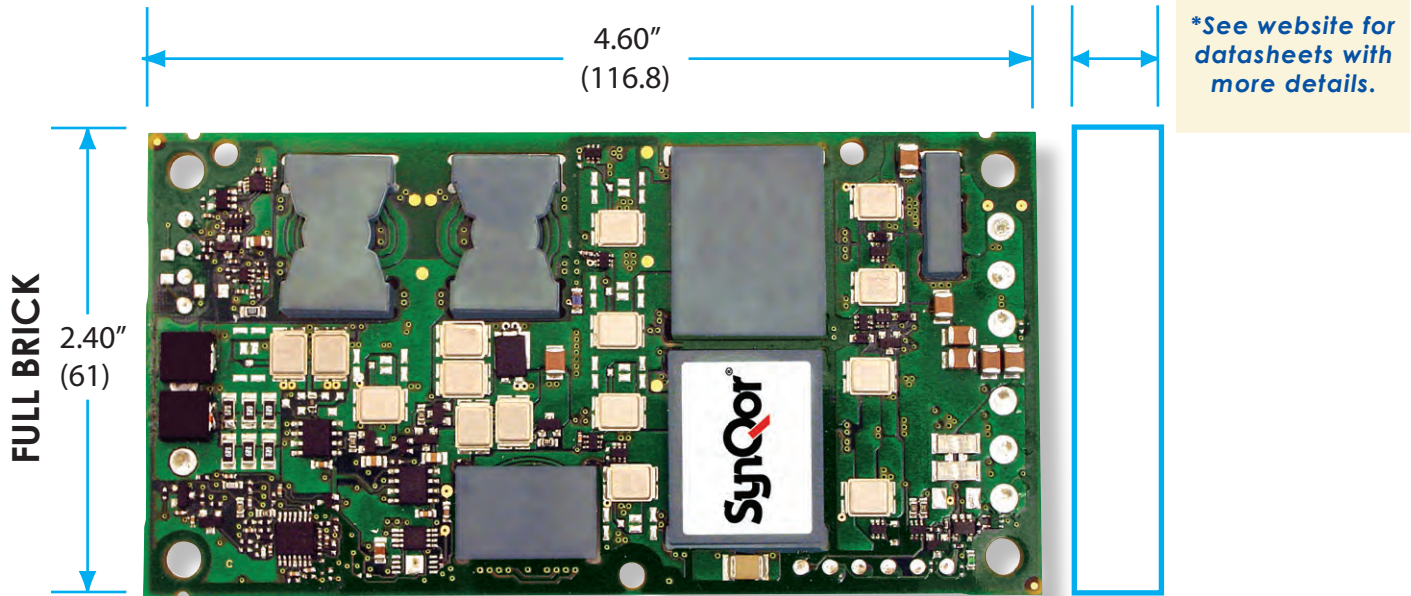


HALF BRICK



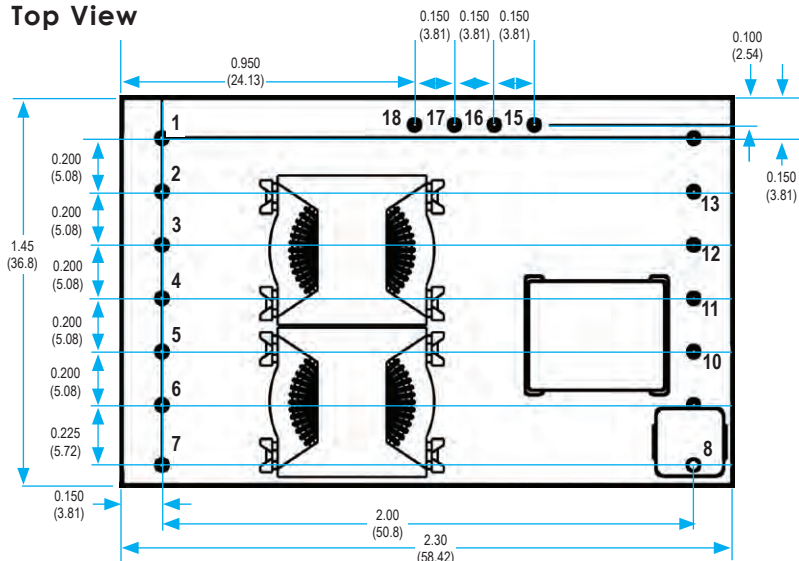
OPEN FRAME PACKAGES

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.

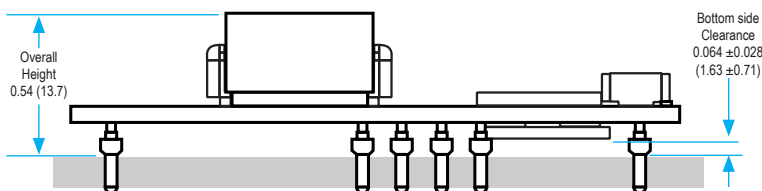


ATCA OPEN FRAME PACKAGES

Top View



Side View

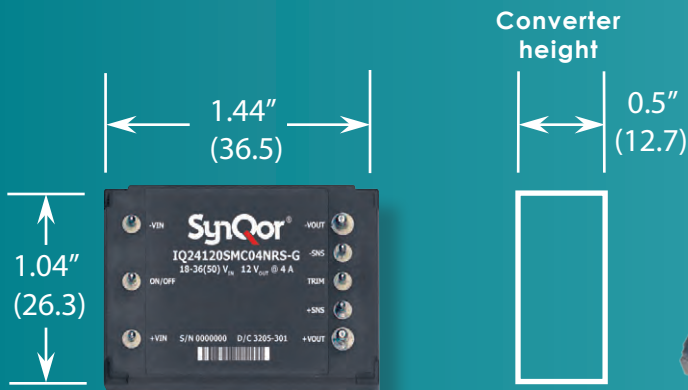


Pin No.	Name	Function
1	-48V_A	Negative 48V A feed
2	-48V_B	Negative 48V B feed
3	VRTN_A	48V Return A feed
4	VRTN_B	48V Return B feed
5	ENABLE_A	Enable A feed
6	ENABLE_B	Enable B feed
7	SHELF_GND	Shelf ground
8	5.0V	+5.0V Management power
9	3.3V	+3.3V Management power
10	I2C_ADR	Address (Full feature 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

ENCASED PACKAGES

InQor, Mil-COTS, high voltage NiQor, RailQor 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, through-hole inserts and mounting flanges. See website for data sheets with more details.

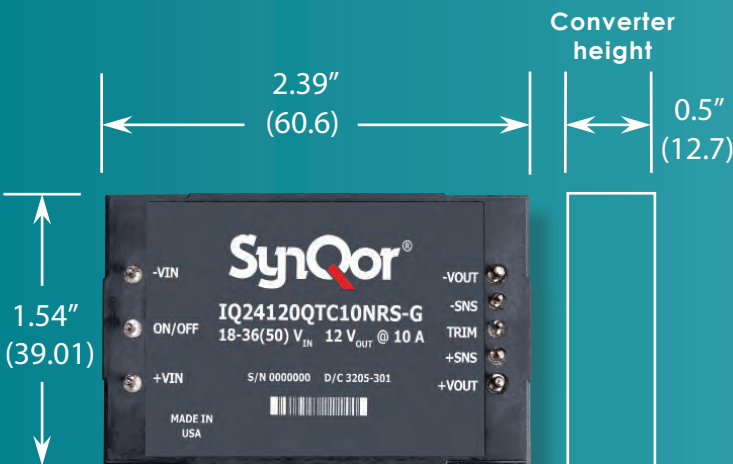
SIXTEENTH BRICK



EIGHTH BRICK

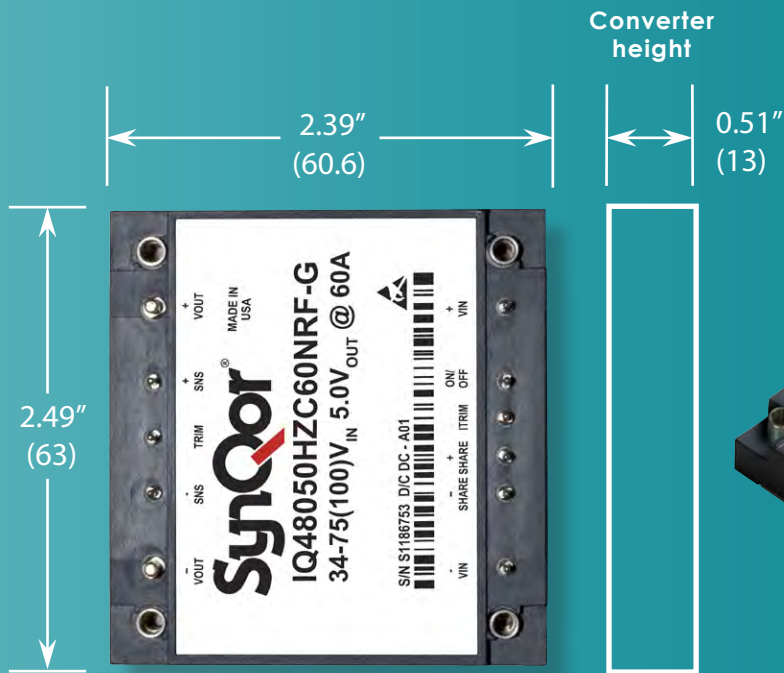


QUARTER BRICK

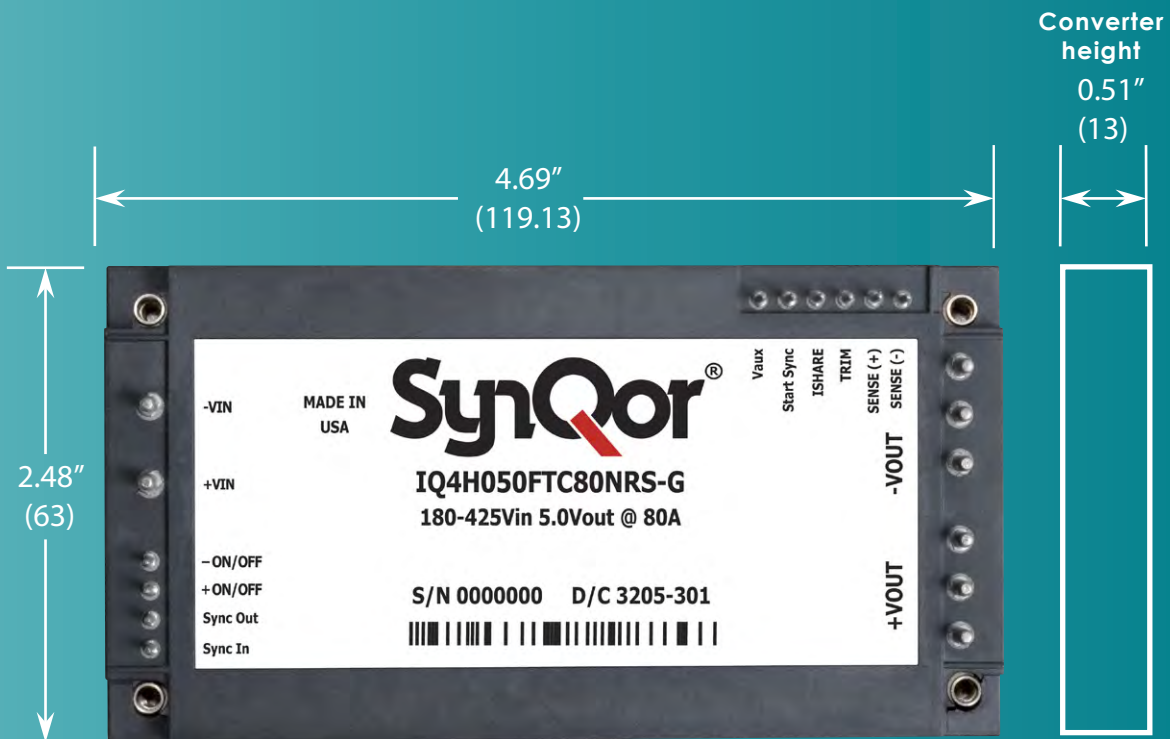


ENCASED PACKAGES

HALF BRICK



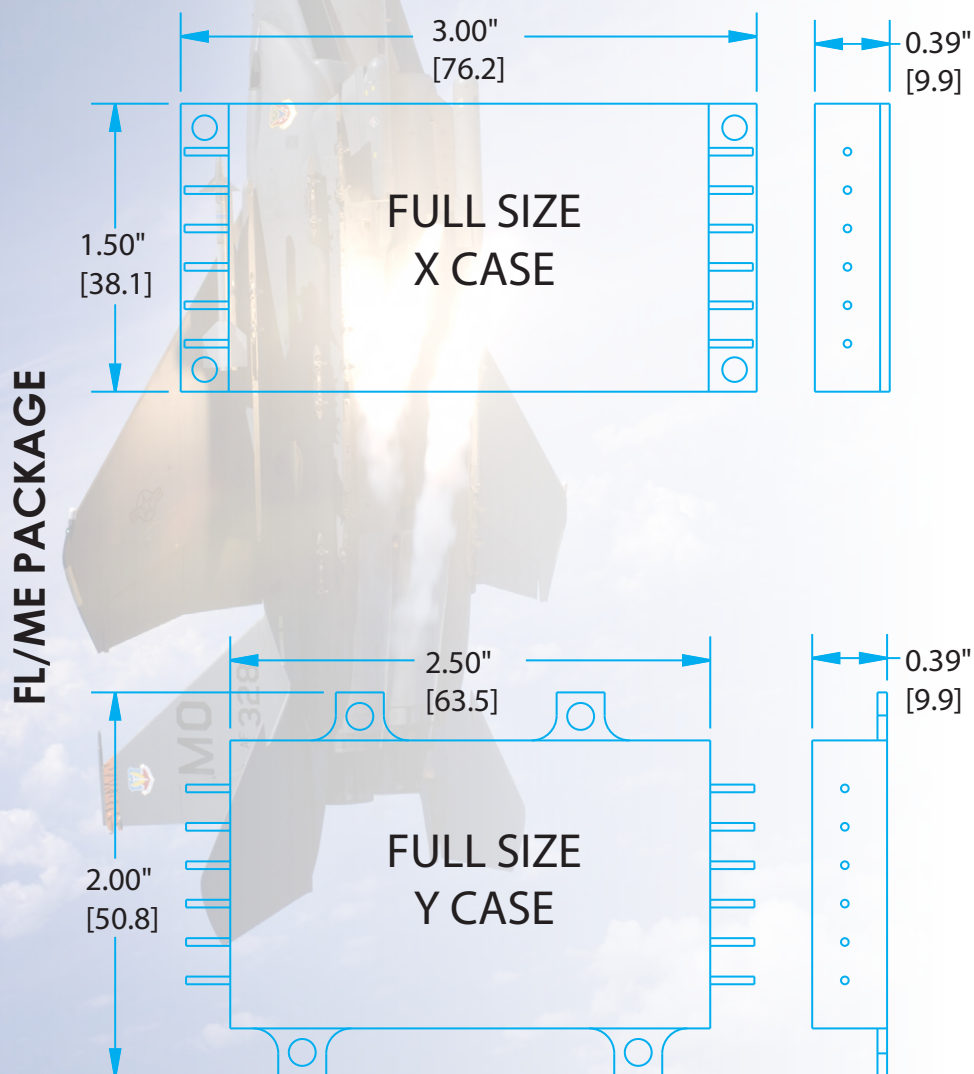
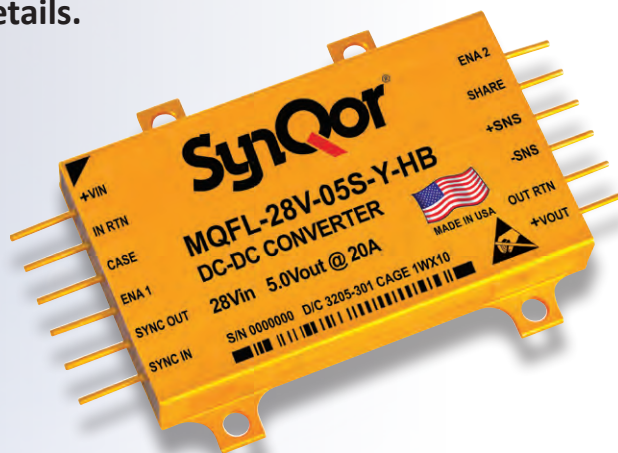
FULL BRICK



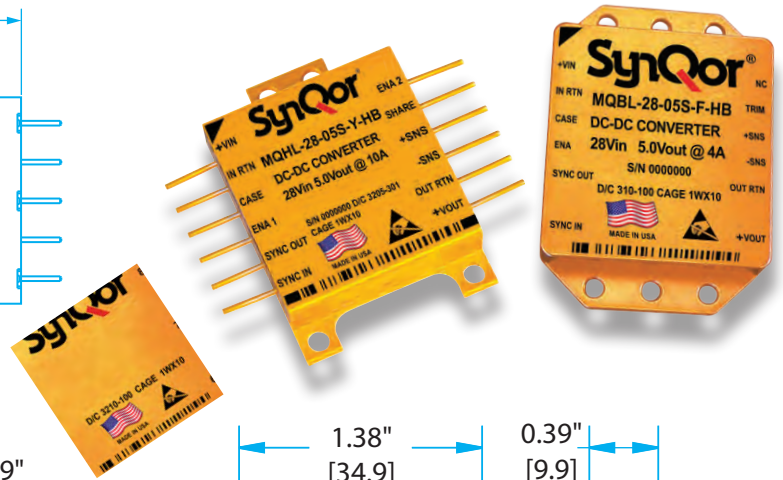
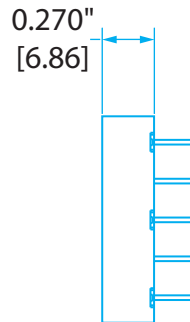
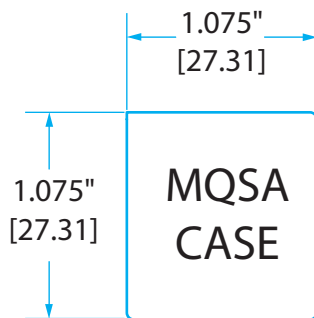
MilQor HI-REL PACKAGES

Hi-Rel products are available in a variety of package mounting and lead form configurations.

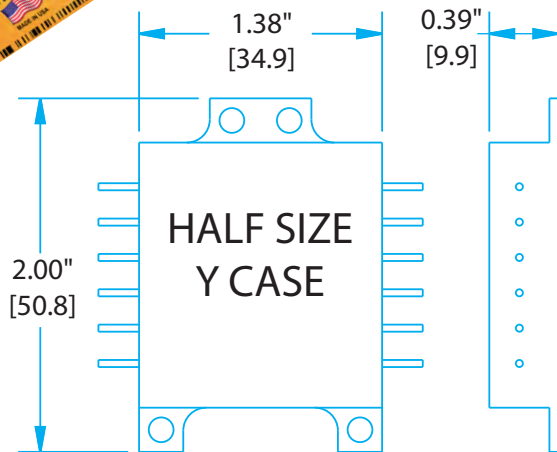
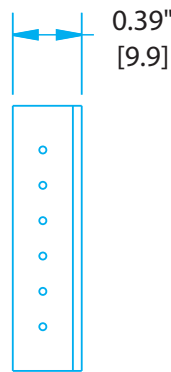
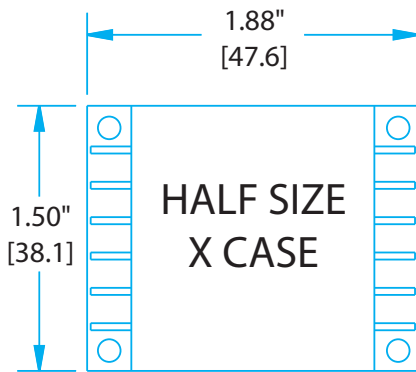
See website for data sheets with more details.



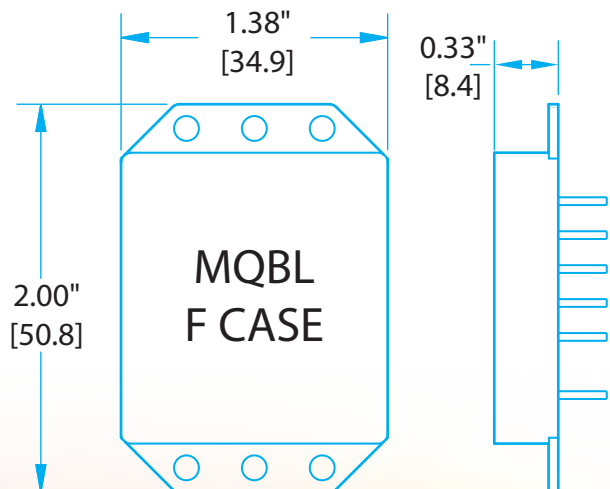
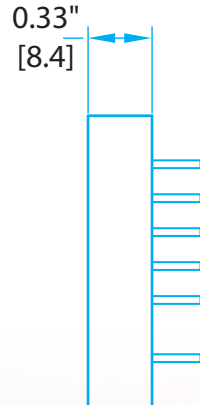
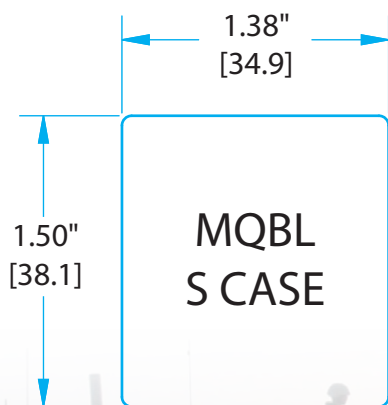
SA PACKAGE



HL/HR/HE PACKAGE



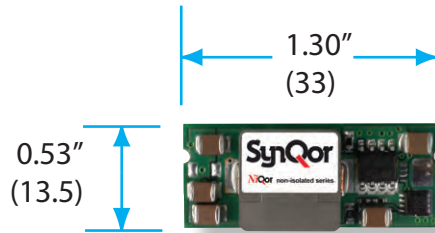
BL PACKAGE



SIP & SMT PACKAGES

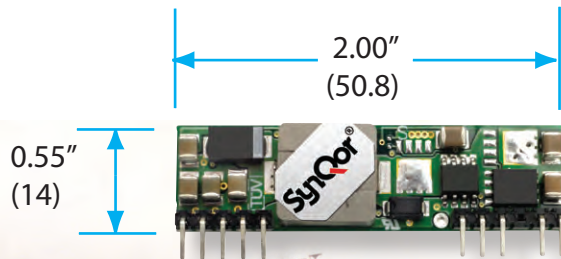
NiQor products are available in SIP and SMT packages. SIPS package options include vertical and horizontal mounting pins. See website for data sheets with more details.

NQ
SURFACE
MOUNT
CONVERTER



See product
datasheet for
converter height

NQ
SIPS
CONVERTER



See product
datasheet for
converter width

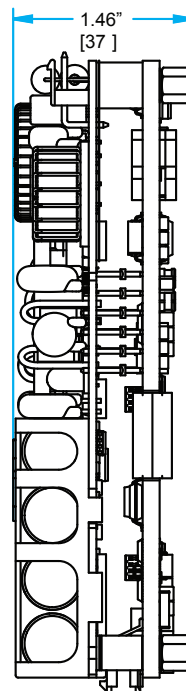
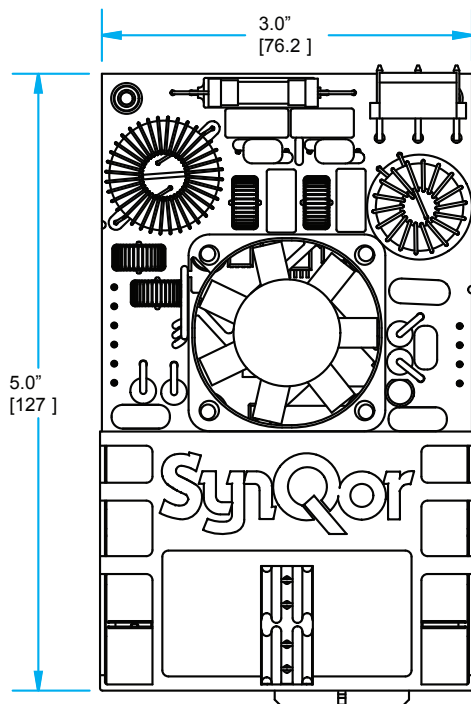


ACuQor E-SERIES PACKAGES

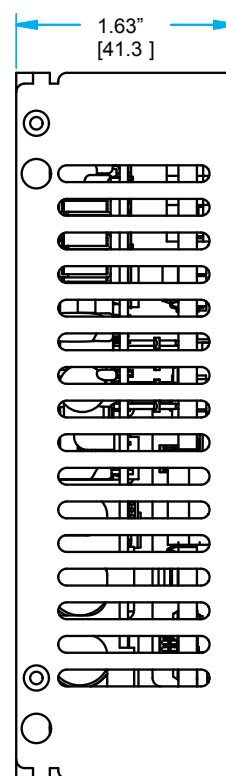
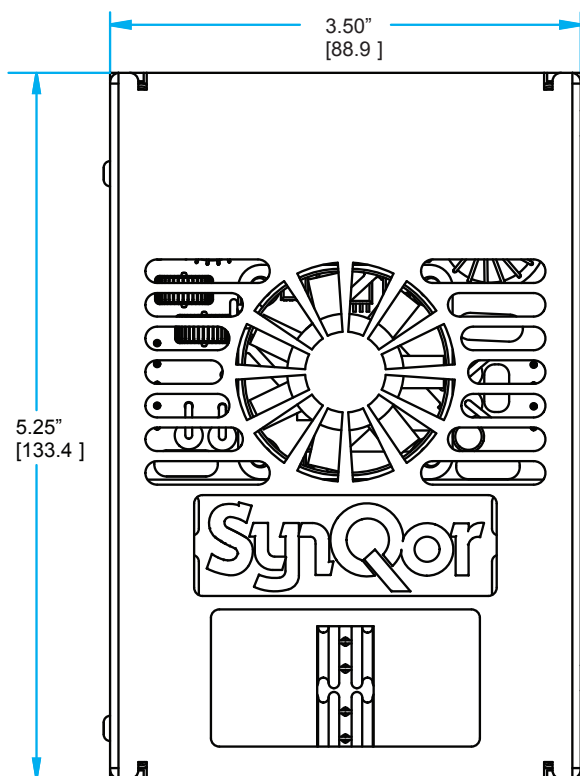
E-Series ACuQor products are available open framed or encased.
They can also be double or triple stacked for additional power output.
Accessories including input and output cables are also available.
See website for data sheets with more details.



**E-SERIES
OPEN FRAME
CONVERTER**



**E-SERIES
CONVERTER**

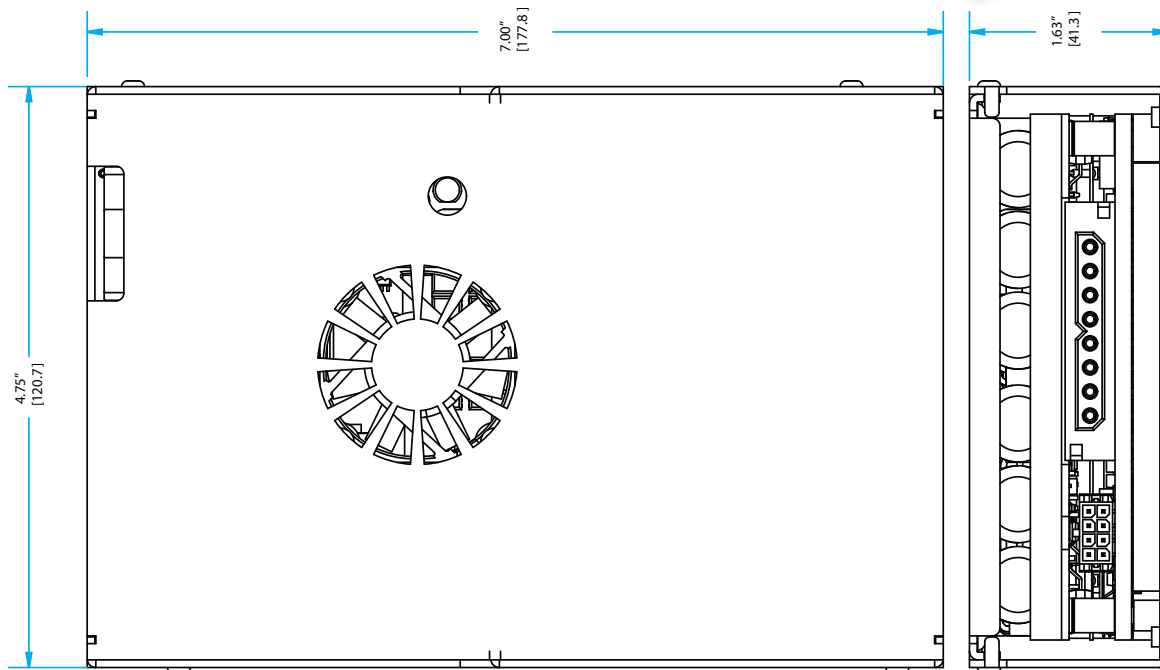


ACuQor G-SERIES PACKAGES



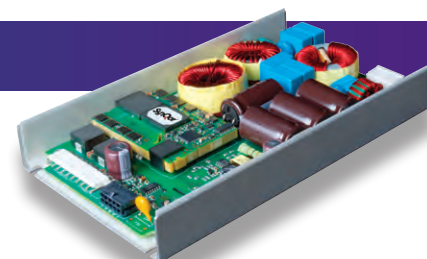
G-Series ACuQor products are available as encased product only. Accessories including input and output cables are also available. See website for data sheets with more details.

G-SERIES CONVERTER

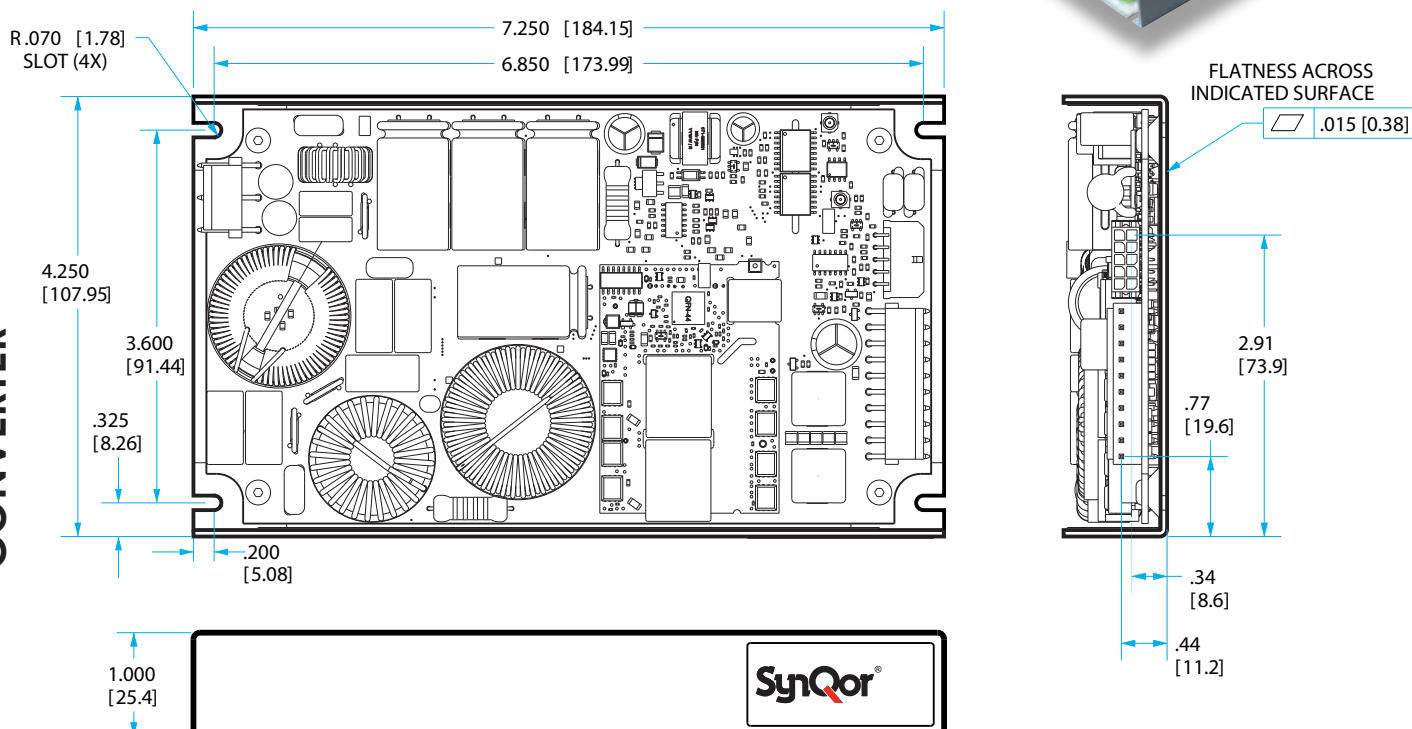


ACuQor C-SERIES PACKAGES

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

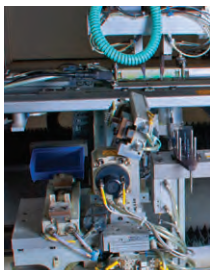
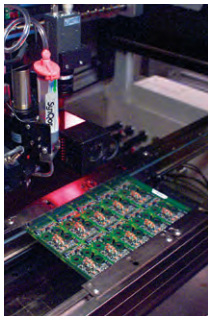
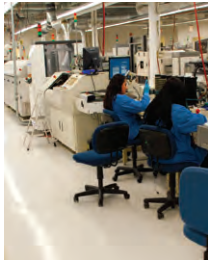
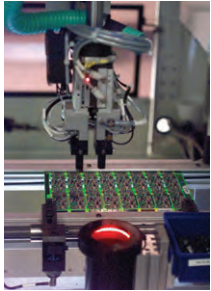


C-SERIES CONVERTER

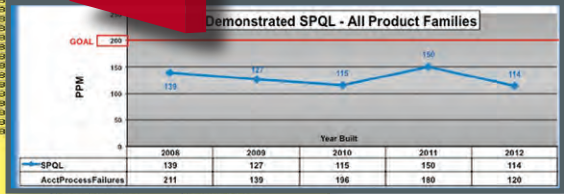


SynQor® Tracking System

Integrates Business Processes & Enforces Process Adherence



Action Log									
TSN:	S8660420	Origin:	SynQor						
Serial:	S8660420	Work Order:	Prod021996						
Part:	MGLFL2700005D-1	Location:	PE DALLAS						
Lot:	Unloaded	Routing:	QualificationRouting						
Qty:	1	DC:	3308	SMTAlias:	PS05276				
TSN Status:	Prototype	HPRelStatus:	COMMERCIAL						
TSN	StepName	ActionPerformed	StationN	DatePerfor	Detail	Value			
S8660420	NOP	To HRC	NONE	2008-08-13					
S8660420	Depanelization	Depanelization	ASYS_1	2008-08-13					
S8660420	Print Label	Print Label	NONE	2008-08-13					
S8660420	To CELL 1	To CELL 1	NONE	2008-08-13					
S8660420	Out of Batch Oven	EndBatchOven	NONE	2008-08-13					
S8660420	Into Batch Oven	StartBatchOven	NONE	2008-08-13					
S8660420	E-Core	E-Core	NONE	2008-08-13					
S8660420	NOP	To HRC	NONE	2008-08-13					
S8660420	NOP	Process Audit	NONE	2008-08-13					
S8660420	SMT	SMT	SM32	2008-08-13					
S8660420	SMT	SMT	SM31	2008-08-13					
S8660420	SMT	SMT	SM31	2008-08-13					
S8660420	SMT	SMT	SM32	2008-08-13					
S8660420	SMT	SMT	SM31	2008-08-13					
S8660420	NOP	NONE	NONE	2008-08-13					
S8660420	TSN Entry	Recipe011178	MAB-FPR	2008-08-13					



WIP Table									
Production WIP Report									
Order Number	Part Number	Quantity	Location	Status	Comments	Created By	Created Date	Last Modified By	Last Modified Date
0000000001	0000000001	1	0000000001	0					
0000000002	0000000002	1	0000000002	0					
0000000003	0000000003	1	0000000003	0					
0000000004	0000000004	1	0000000004	0					
0000000005	0000000005	1	0000000005	0					
0000000006	0000000006	1	0000000006	0					
0000000007	0000000007	1	0000000007	0					
0000000008	0000000008	1	0000000008	0					
0000000009	0000000009	1	0000000009	0					
0000000010	0000000010	1	0000000010	0					
0000000011	0000000011	1	0000000011	0					
0000000012	0000000012	1	0000000012	0					
0000000013	0000000013	1	0000000013	0					
0000000014	0000000014	1	0000000014	0					
0000000015	0000000015	1	0000000015	0					
0000000016	0000000016	1	0000000016	0					
0000000017	0000000017	1	0000000017	0					
0000000018	0000000018	1	0000000018	0					
0000000019	0000000019	1	0000000019	0					
0000000020	0000000020	1	0000000020	0					
0000000021	0000000021	1	0000000021	0					
0000000022	0000000022	1	0000000022	0					
0000000023	0000000023	1	0000000023	0					
0000000024	0000000024	1	0000000024	0					
0000000025	0000000025	1	0000000025	0					
0000000026	0000000026	1	0000000026	0					
0000000027	0000000027	1	0000000027	0					
0000000028	0000000028	1	0000000028	0					
0000000029	0000000029	1	0000000029	0					
0000000030	0000000030	1	0000000030	0					
0000000031	0000000031	1	0000000031	0					
0000000032	0000000032	1	0000000032	0					
0000000033	0000000033	1	0000000033	0					
0000000034	0000000034	1	0000000034	0					
0000000035	0000000035	1	0000000035	0					
0000000036	0000000036	1	0000000036	0					
0000000037	0000000037	1	0000000037	0					
0000000038	0000000038	1	0000000038	0					
0000000039	0000000039	1	0000000039	0					
0000000040	0000000040	1	0000000040	0					
0000000041	0000000041	1	0000000041	0					
0000000042	0000000042	1	0000000042	0					
0000000043	0000000043	1	0000000043	0					
0000000044	0000000044	1	0000000044	0					
0000000045	0000000045	1	0000000045	0					
0000000046	0000000046	1	0000000046	0					
0000000047	0000000047	1	0000000047	0					
0000000048	0000000048	1	0000000048	0					
0000000049	0000000049	1	0000000049	0					
0000000050	0000000050	1	0000000050	0					
0000000051	0000000051	1	0000000051	0					
0000000052	0000000052	1	0000000052	0					
0000000053	0000000053	1	0000000053	0					
0000000054	0000000054	1	0000000054	0					
0000000055	0000000055	1	0000000055	0					
0000000056	0000000056	1	0000000056	0					
0000000057	0000000057	1	0000000057	0					
0000000058	0000000058	1	0000000058	0					
0000000059	0000000059	1	0000000059	0					
0000000060	0000000060	1	0000000060	0					
0000000061	0000000061	1	0000000061	0					
0000000062	0000000062	1	0000000062	0					
0000000063	0000000063	1	0000000063	0					
0000000064	0000000064	1	0000000064	0					
0000000065	0000000065	1	0000000065	0					
0000000066	0000000066	1	0000000066	0					
0000000067	0000000067	1	0000000067	0					
0000000068	0000000068	1	0000000068	0					
0000000069	0000000069	1	0000000069	0					
0000000070	0000000070	1	0000000070	0					
0000000071	0000000071	1	0000000071	0					
0000000072	0000000072	1	0000000072	0					
0000000073	0000000073	1	0000000073	0					
0000000074	0000000074	1	0000000074	0					
0000000075	0000000075	1	0000000075	0					
0000000076	0000000076	1	0000000076	0					
0000000077	0000000077	1	0000000077	0					
0000000078	0000000078	1	0000000078	0					
0000000079	0000000079	1	0000000079	0					
0000000080	0000000080	1	0000000080	0					
0000000081	0000000081	1	0000000081	0					
0000000082	0000000082	1	0000000082	0					
0000000083	0000000083	1	0000000083	0					
0000000084	0000000084	1	0000000084	0					
0000000085	0000000085	1	0000000085	0					
0000000086	0000000086	1	0000000086	0					
0000000087	0000000087	1	0000000087	0					
0000000088	0000000088	1	0000000088	0					
0000000089	0000000089	1	0000000089	0					
0000000090	0000000090	1	0000000090	0					
0000000091	0000000091	1	0000000091	0					
0000000092	0000000092	1	0000000092	0					
0000000093	0000000093	1	0000000093	0					
0000000094	0000000094	1	0000000094	0					
0000000095	0000000095	1	0000000095	0					
0000000096	0000000096	1	0000000096	0					
0000000097	0000000097	1	0000000097	0					
0000000098	0000000098	1	0000000098	0					
0000000099	0000000099	1	0000000099	0					
0000000100	0000000100	1	0000000100	0					

Configuration Control

- Documentation Control
- Manufacturing Routings
- Design Drawings
- BOMs

MANUFACTURING OVERVIEW



USA Manufacturing AS9100 and ISO 9001 Certified Facility

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 and 100% component level traceability. 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.

USA Design & Engineering



SynQor employs a stringent, ECO controlled, 5 stage 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)	• Processes transfer • Full documentation release (SCD's, BOM, processes, procedures, etc.) • Release qualification reports • Release final datasheet • Transfer units to finished goods

SynQor's use of a single PCB construction, planar magnetics and a baseplate-free design, allows for simplified 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.

High-Reliability Center

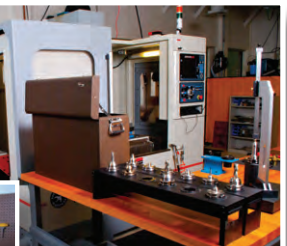
SynQor's Military-grade MilQor Hi-Rel and MCOTS products are manufactured to IPC-A-610 Class III standards in the Hi-Rel Center, a Class 10,000 capable clean room environment. Meticulous attention to detail by specially trained personnel, following exacting assembly and testing protocols that include Temperature Cycle, Extended Burn-In, -55°C to +125°C Functional Verification, and Constant Acceleration, produce products of the highest reliability to meet stringent MIL-STD requirements.

Hi-Rel Center



Prototype Milling Machine Lab

Our manufacturing facility has recently made significant investments into our precision milling technology equipment and with increased capabilities, we are ready to meet even the most stringent quality and delivery requirements from any customer. Our full complement of precision components produced on our enhanced tool room equipment enables us to respond effectively and quickly to deliver prototypes to our customer design specifications.



State of the Art Machine Shop

Product Qualification

SynQor's structured product qualification process tests all aspects of converter performance through DMT (design marginality testing), PTC (power thermal cycling), thermal and mechanical shock/drop, EMI, fungus, vibration, humidity, altitude and solderability. Our extensive product characterization and qualification testing, coupled with our state-of-the-art flow manufacturing processes ensure our ability to deliver products at industry leading quality and reliability levels.





Automated Manufacturing Center

Our manufacturing facility has multiple production lines that are integrated into the plant resources. The engineering and design units are within seconds of the Manufacturing areas. Component supply, production, testing and shipping areas of the company are readily available to the design engineers to check performance under specific conditions which will not show up in the normal design characterization.

Designers are able to achieve more energy efficient robust products with an integrated design and manufacturing workflow.



Quality & Reliability

Since its founding, SynQor has fostered a culture of quality and continual improvement across every facet of the business, which provides trackable world-class quality levels throughout the organization.

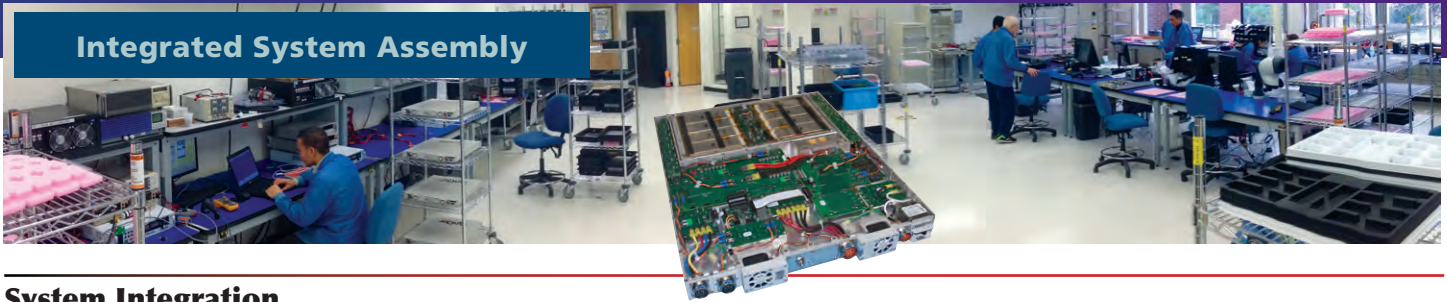
At SynQor, we view quality as a system, not a result. Achieving quality and high reliability requires a company-wide commitment to a closed loop process that incorporates continual improvement.

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. Our manufacturing expertise also remains in house so that we have complete control of the quality and traceability of our product lines.

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)

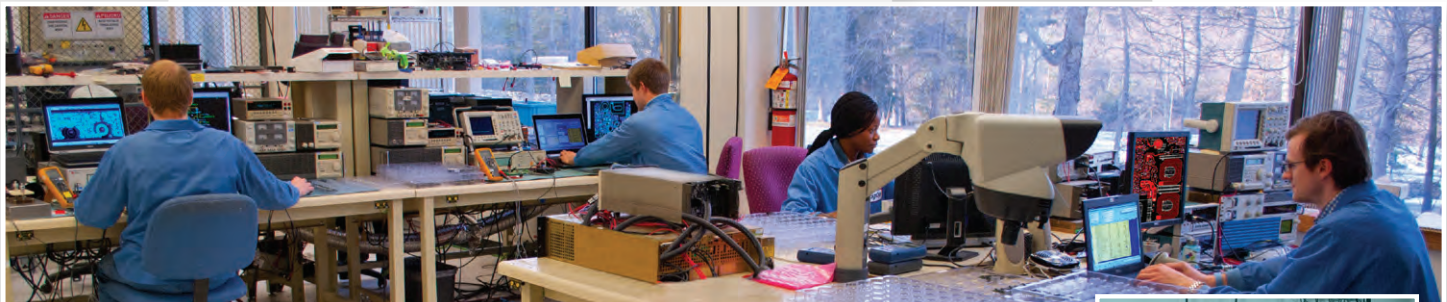
Integrated System Assembly



System Integration

“SynQor System-Level Products include ACuQor (medical), UPS (military/industrial), as well as Custom Hi-Rel Military products. “SynQor manufactured sub-assemblies are delivered to dedicated production areas for system final assembly, integration, and test for SynQor’s System-Level products “System assembly and test capabilities include:

- THT (through-hole-technology) assembly and soldering to IPC-A-610 class II and class III standards.
- Mechanical sub-assembly integration and hardware installation.
- Wire harness installation and sub-assembly staking and potting.
- Sub-assembly Hi-Pot and Electrical Functional Test.
- System-level Leakage, Burn-In, and Electrical Functional Test.
- Final QA and Packaging.



Custom Design Products

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 integrated design and manufacturing facility expedites 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.





SynQor Headquarters

155 Swanson Road Boxborough, MA 01719-1316

Phone: 978-849-0600 Fax: 978-849-0602

Toll Free (USA): 888-567-9596

North America E-mail: power@synqor.com

Europe E-mail: saleseurope@synqor.com

Asia E-mail: salesasia@synqor.com

www.SynQor.com

Founded in 1997, SynQor® quickly became the technology, quality and service leader for high efficiency DC-DC converters for the telecom/datacom marketplace. The PowerQor®, BusQor®, DualQor®, iQor™, and NiQor® product lines, combined with SynQor's unmatched lead-times, flexibility, design support and lowest total cost of ownership are the benchmark sought by SynQor's worldwide customers.

In 2004, SynQor began its successful entry into the industrial, railway, medical and military market segments with the InQor®, RailQor®, ACuQor®, MilQor® and UPS 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 throughout the World. More information is available on the company's website at www.synqor.com.

ADVANCING THE POWER CURVE®

Visit our website for
more information

