



Advancing the Power Curve®

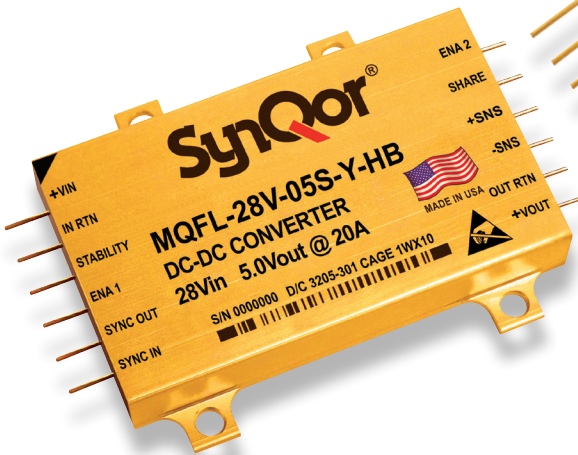
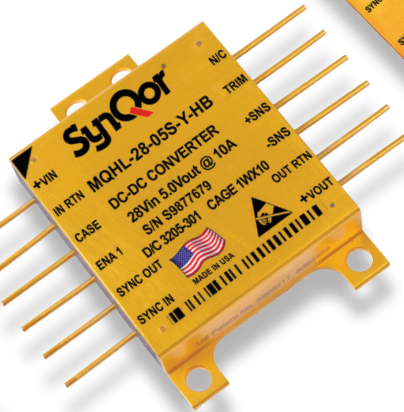
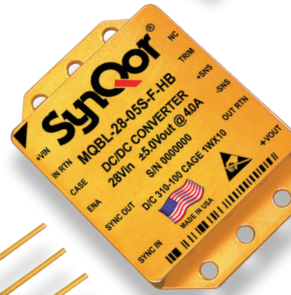
Hi-Rel™

Military / Aerospace DC-DC converters

MIL-STD Compliant
High Efficiency
Field Proven



Hi-Rel Military Grade DC-DC Converters & Filters



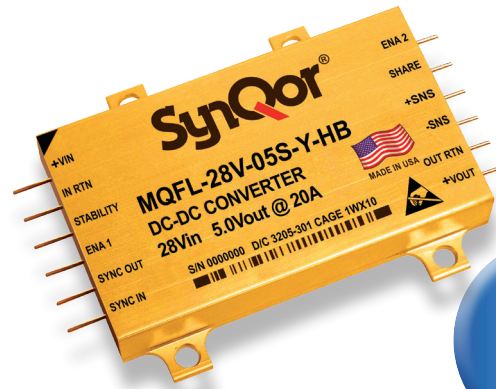
Made in USA

MilQor®

Products for the Military and Aerospace Industry

Hi-Rel™

Isolated Converters



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.

Hi-Rel Product Features

- ◆ 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 P-3641A guide
 - ◆ Designed with components derated per:
 - MIL-HDBK-1547A
 - NAVSO P-3641A

Mechanical

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

In-Line Manufacturing Process

- ◆ AS9100 and ISO 9001 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 Qual.
 - ◆ 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, 17, 18
 - ◆ MIL-STD-1275 (B, D)
 - ◆ DEF-STAN 61-5 (Part 6)/(5, 6)
 - ◆ MIL-STD-461 (C, D, E, F)
 - ◆ RTCA/DO-160 (E, F, G) Section 22





| Full Size (MQFL) | Single Output | | | | | | | | | | | Dual Output† | | |
|---|---------------|--------------|--------------|--------------|-------------|-------------|--------------|-------------|-------------|-------------|-------------|----------------------|----------------------|---------------------|
| | 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 99W | 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 99W | 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 99W | 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 99W | 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 99W | 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) | 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 |
| 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 |

| Half Size (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 |
|---|--|--------------|--------------|--------------|-------------|-----------|--------------|--------------|--------------|--------------|--------------|--------------------|--------------------|-----------------------|
| | 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 |
| 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 | 0.72A 20.2W | 4A 20W Total | 1.6A 19.2W 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 | 0.72A 20.2W | 4A 20W Total | 1.6A 19.2W Total | 1.3A 19.5W Total |

| Bottom Pin (MQSA) | Single Output | | | | Dual Output† | | |
|--|---------------|-------------|-------------|-------------|-------------------|----------------------|----------------------|
| | 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 18-40Vin Cont. 16-50Vin 1s Trans. Absolute Max Vin = 60V | 14A 400W |

| Bus Converters (MQBQ) | Vout = ~Vin/9 28B |
|--|----------------------|
| MQBQ-270 230-400Vin Cont. 155-450Vin 1s Trans. Absolute Max Vin = 550V | 14A 400W |

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

Hi-Rel™

EMI filters are available with passive components only, or with additional active circuitry that provides surge/spike suppression, soft start in-rush limiting, reverse polarity protection, and enable signal pass-through. They also are available in standard and extended input voltage ranges.



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 Size | | | | | | | |
| MQME-28-P | ± 40V | ±100V | 20A | 500V | 35mΩ | >80dB | >60dB |
| MQME-28-T¹ | ±40V | +100,-50V | 20A | 500V | 60mΩ | >80dB | >60dB |
| MQME-28E-P | ±70V | ±100V | 20A | 500V | 35mΩ | >80dB | >60dB |
| MQME-28E-T¹ | +70, -40V | +100V,-50V | 20A | 500V | 60mΩ | >80dB | >60dB |
| MQME-28E-T6¹ | +70, -40V | +100V, -50V | 20A | 500V | 60mΩ | >80dB | >60dB |
| MQME-270-P | ±400V | ±1000V | 2.0A | 500V | 1.6Ω | >80dB | >60dB |
| MQME-270-R² | ±400V | ±1000V | 2.0A | 500V | 1.6Ω | >80dB | >60dB |
| MQME-270L-P⁴ | ±400V | ±500V | 3.0A | 500V | 0.84Ω | >80dB | >60dB |
| MQME-270L-R^{2,4} | ±400V | ±500V | 3.0A | 500V | 0.84Ω | >80dB | >60dB |
| Half Size | | | | | | | |
| MQHE-28-P | ±40V | ±100V | 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

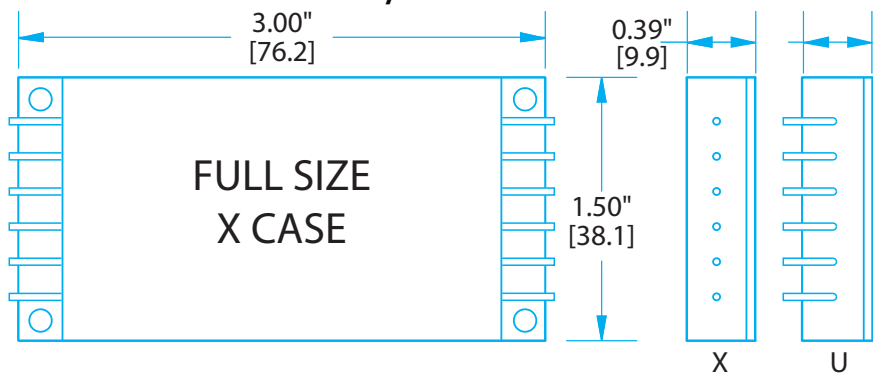
Note 4 - Designed specifically to be matched with MQFL-270L DC-DC converters.

Hi-Rel™ Screening

| Screening Level | Consistent with MIL-STD-883 | C-Grade (0°C to +70°C) | ES-Grade (-45°C to +100°C) | HB-Grade (-55°C to +125°C) |
|------------------------------|-----------------------------|------------------------|-------------------------------|-------------------------------|
| Element Evaluation | | No | Yes | Yes |
| 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 | 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® |

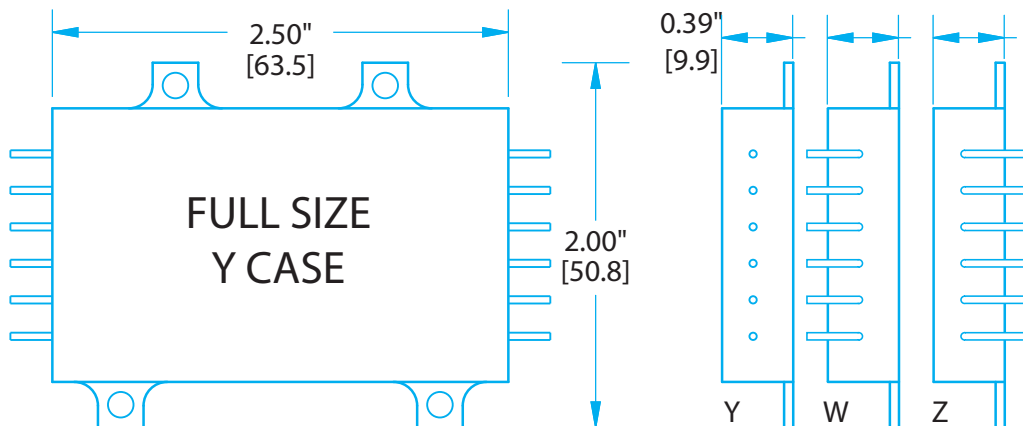
* Per IPC-A-610 Class III

FL/ME PACKAGE

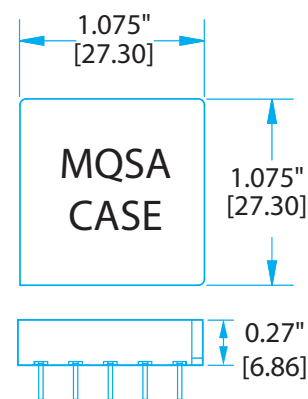


MilQor[®] Hi-Rel[™]
P A C K A G E S

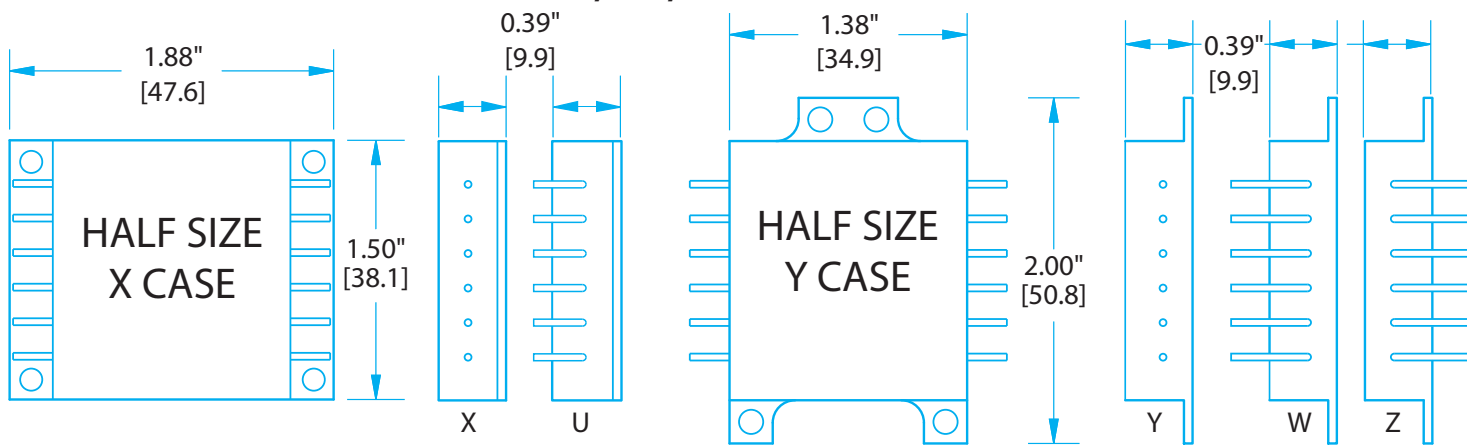
Hi-Rel products are available in a variety of package mounting and lead form configurations. See website for data sheets with more details.



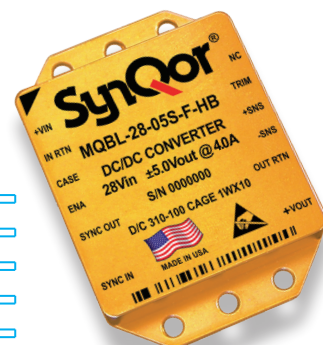
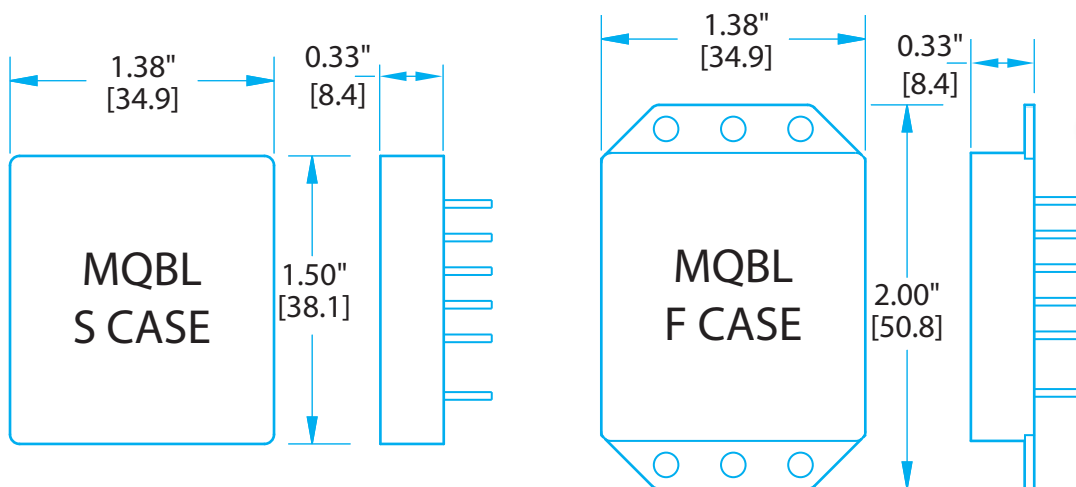
SA PACKAGE



HL/HR/HE PACKAGE



BL PACKAGE





Advancing The Power Curve®

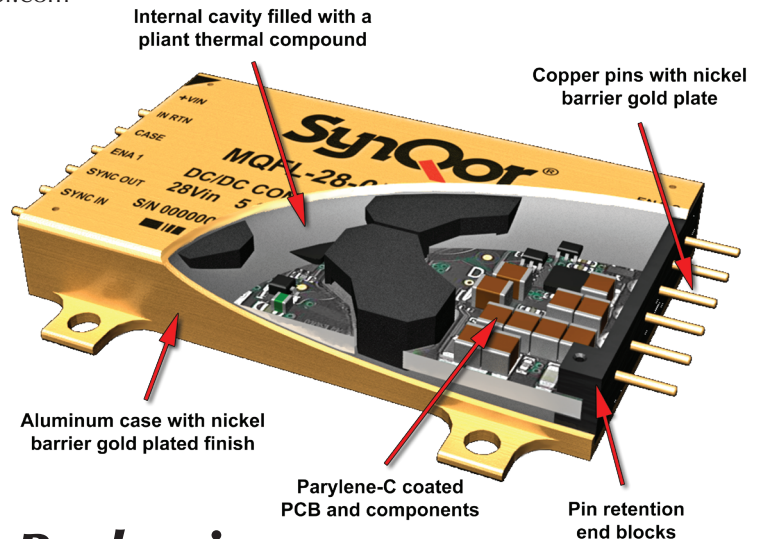
Headquartered in Boxborough, Massachusetts, at the location of its manufacturing operations, SynQor is a privately owned U.S. AS9100 and ISO 9001 company. SynQor’s converters feature a patented two-stage power topology that greatly improves efficiency and optimizes the power dissipated by the converter. With a design center in Dallas, Texas, and sales/marketing offices throughout the World, SynQor is the technology, quality and service leader for power conversion modules and systems.

SynQor’s rugged DC-DC converters, AC-DC converters, filters and systems are designed for a wide range of industrial and military applications including those required to withstand harsh environments: railway and transportation systems, industrial motion control, information displays, factory automation, critical military and power generation systems.

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/ Aerospace industry.

SynQor Headquarters

155 Swanson Road Boxborough, MA 01719-1316
Phone: 978-849-0600 Fax: 978-849-0602
Toll Free (USA): 888-567-9596
E-mail: power@synqor.com
www.SynQor.com



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.

