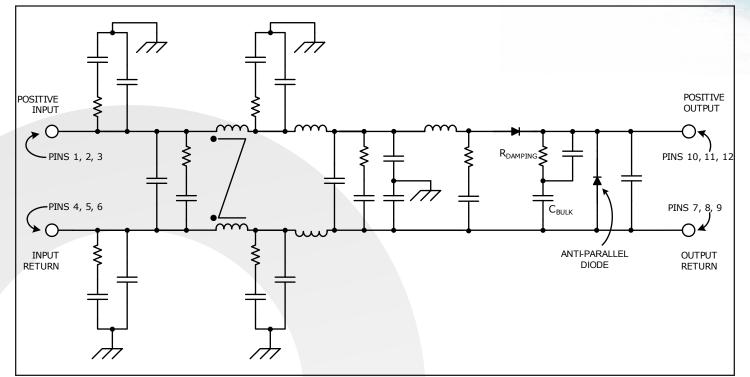
Syn	ROT®		MQME-270-R Reverse Polarity Protection Filter
	HIGH RELIABI	LITY EMI FILT	ER
-400V to +400V	2A	1.6Ω @ 125°C Max. DC Resistance	>80dB @ 500kHz Differential Attenuation
Continuous Input		TION: -55°C to +125°	
field proven technology and Military/Aerospace industry, packaging approach ensures environments. Compatible w these filters have high of mode attenuation, low DC bulk capacitor resistor. They	NAVSO-P3641-A guidelines	the al® tile at, on- ing ent red +vm +vm +vm NRTM SM SM EMI EMI EMI T ZTOI NRTM NRTM SIN 0000 DESIGNED &	A MANUFACTURED IN THE USA QORSEAL® HI-REL ASSEMBLY
- NAVSO P-3641A		Eeatures 2A output current Payorso polarity protect	stion
Qualification Process	ifinal tax	Reverse polarity protect Very low DC resistance Occup Liff	e
MQME series filters are qual • MIL-STD-810F — consistent with RTCA/ • SynQor's First Article Qualif — consistent with MIL-STE • SynQor's Long-Term Storage • SynQor's on-going life test	D0-160E/F/G ication D-883F	 > 60 dB common-mod Stabilizing bulk capace All capacitors are X7R Designed to meet all N 	ode attenuation at 500kHz de attenuation at 500kHz citor and damping resistor included R multi-layer ceramic MIL-STD 461 EMI and most Section 22 lightning requirements
In-Line Manufacturing	Process	Specification Com	pliance
 AS9100 and ISO 9001 cer Full component traceability Temperature cycling Constant acceleration 24, 96, 160 hour burn-in Three level temperature scre 	tified facility	MQME series filters (w designed to meet: • MIL-HDBK-704-7 (A th • RTCA/DO-160 Sectio • MIL-STD-461 (C, D, E, • RTCA/DO-160E/F/G	n 16, 17, 18 F)

Page 1

Technical Specification

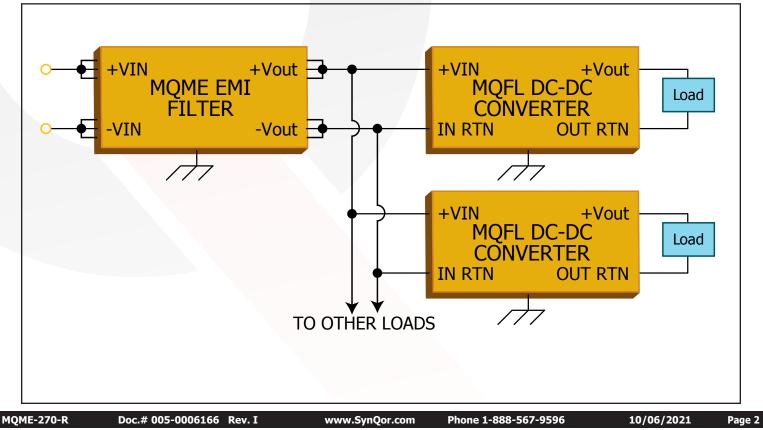
®

BLOCK DIAGRAM



MQME-270-R Current: 2A

TYPICAL CONNECTION DIAGRAM





periodications subject to change without notice N Viscand Calibration Subgroup BSSULTE MAXIMUM RATINCS Imput Voltage See Note 1 Subgroup Continuous -800 800 V See Note 1 Imput Voltage Continuous -800 800 V See Note 1 Imput Voltage Imput Voltage <td< th=""><th>MQME-270-R Electrical</th><th></th><th></th><th>1</th><th>1</th><th></th><th></th></td<>	MQME-270-R Electrical			1	1			
Becinition subject to change without note: Image of the second subject to	Parameter	Min.	Тур.	Max.	Units		Group A	
nput Voltage Continuous-800-800-800VSee Note 1-1000-1000Transient (s1 s)-10001000V <th>Specifications subject to change without notice</th> <th></th> <th></th> <th></th> <th></th> <th></th> <th colspan="2">Subgroup³</th>	Specifications subject to change without notice						Subgroup ³	
Continuous Transient (s1 s)-800800VVTansient (s1 s)-1000-1000VContinuous-500500VContinuous-500500VTransient (s1 s)-10001000VDutput Current3Aperating Case Temperature-55125 \mathbb{C} Koraga Case Temperature-55125 \mathbb{C} case Temperature (20 s)-6300 \mathbb{C} Transient (s1 s, Rs* = 0 Ω)-500500VTransient (s1 s, Rs* = 0 Ω)-10001000VStopp Upt Uvitage (continuous)-400400VStopp Upt Uvitage (continuous)-4001000VVoute Vin - (lin x Rdc) - Vid2A1, 2, 3Transient (s1 s, Rs* = 0 Ω)-10001000VSee Note 1Dutput Voltage (continuous)-400400VSee Note 1Output Voltage (continuous)-10001000VSee Note 1Trassert (s1 s, Rs* = 0 Ω)-100010001, 2, 3Other (continuous)-10010002AContinuous-100-100-1001Trassert (s1 s, Samperature)-16Ω-100TotASE = 25°C-0.8-0.2A-10.2Forward Voltage ($\mathbb{G} 0.1 A$)0.41VMeasured across input or output pinsForward Voltage ($\mathbb{G} 0.1 A$)0.41VSee Note 2Forward Voltage ($\mathbb{G} 0.1 A$	ABSOLUTE MAXIMUM RATINGS							
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solation Voltage (I/O to case, 1 to O) Continuous -500 500 V Transient (S1 s) -1000 1000 V Subput Current	Continuous	-800		800	V			
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Lead Temperature (20 s)Image: Second Se	Operating Case Temperature	-55		125	°C	HB grade Products, See Note 6		
ELECTRICAL CHARACTERISTICS mput Voltage Continuous-400400VSee Note 1 for negative limits1, 2, 3Transient ($\leq 100 \text{ ms, Rs}^* = 0.0$)-500500V"See Note 11, 2, 3Dutput Voltage (continuous)Vout = Vin - (Iin \times Rdc) - VdVSee Note 11, 2, 3Juptuf Current (continuous)Vout = Vin - (Iin \times Rdc) - VdVA1, 2, 3Jower (continuous)22ASee Note 51JCASE = 25°C1.30111TCASE = 25°C1.60V33TCASE = 25°C6.5W131TCASE = 125°C6.5W131TCASE = 125°C0.8V331TCASE = 125°C0.41V1, 2, 33Transient ($\leq 8 \text{ ms}$)0.41VW1, 2, 3Forward Voltage (@ 0.1.A)0.41VWeasured across input or output pinsForward Voltage (@ 0.1.A)0.41VVVoltage Common-Mode Capacitance0.6 μ FSee Figure 1Voltupt Voltage Deviation due to a Spike0.6See See Note 2See Figure 1Dutput Voltage Spike (Centered on Vin)200V, 10U, SR s ≤ 0.50 , 1 $\leq 1 \leq 50$ UC-50150AVAdux, Spis, R ≤ 0.50 , 1 $\leq 1 \leq 250$ UC-50150AVMIL-STD-461C (CS06). See Note 4	Storage Case Temperature	-65		135	°C			
Imput VoltageImput	Lead Temperature (20 s)			300	°C			
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Transient ($\leq 100 \text{ ms, Rs}^* = 0 \Omega$) -1000 1000 VSee Note 1Dutput Voltage (continuous)Vout = Vin - (Iin x Rdc) - VdVV1, 2, 3Dutput Current (continuous)2AVSee Note 5Occesistance (Rdc)1.6 Ω 1.6 Ω TCASE = 25°C1.6 Ω 0.8VSee Note 5Sectifier Drop (Vd)0.80.8V1Power Dissipation (2A output current)0.8V1TCASE = 25°C1.46.5W1TCASE = 25°C7.5W11TCASE = 12°C6.5W11TCASE = 12°C0.8V11TCASE = 12°C0.8V11TCASE = 12°C0.8V11TCASE = 12°C0.8V11TCASE = 12°C0.8V11TCASE = 12°C1111TCASE = 12°C1111TCASE = 12°C1111TCASE = 12°C1111TCASE = 12°C1111TCASE = 12°C1111Total Differential-Mode Capacitance111Solut Differential-Mode Capacitance0.41VSulk Capacitor10QSee Rigure 11Damping Resistor10QSee Rigure 11Nuput Voltage Spi	Transient (≤ 1 s, Rs [*] = 0 Ω)	-500		500	V	"		
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Total Common-Mode CapacitanceImage: Capacitance </td <td>0 (-)</td> <td></td> <td>1</td> <td>_</td> <td></td> <td>Measured across input or output pins</td> <td>_, _, _</td>	0 (-)		1	_		Measured across input or output pins	_, _, _	
Bulk Capacitor0.6 μ FImage: Mark CapacitorDamping Resistor10 Ω Ω Noise AttenuationSee Figure 1INPUT VOLTAGE SPIKE SUPPRESSIONSee Note 2Dutput Voltage Deviation due to a SpikeSee Note 2Input Voltage Spike (Centered on Vin)See Note 2±200V, 10 µs, Rs ≤ 0.5 Ω , Q ≤ 250 µC-50±400V, 5µs, Rs ≤ 0.5 Ω , Q ≤ 250 µC-50±400V, 5µs, Rs ≤ 0.5 Ω , Q ≤ 250 µC-50Low See Note 2MIL-STD-461C (CS06). See Note 4±400V, 5µs, Rs ≤ 0.5 Ω , Q ≤ 250 µC-50Low See Note 2MIL-STD-461C (CS06). See Note 4								
Damping Resistor10 Ω See Figure 1Noise AttenuationImage: Constraint of the systemSee Figure 1CNPUT VOLTAGE SPIKE SUPPRESSIONImage: Constraint of the systemSee Note 2Dutput Voltage Deviation due to a SpikeImage: Constraint of the systemSee Note 2Input Voltage Spike (Centered on Vin)Image: Constraint of the systemImage: Constraint of the system $\pm 200V$, 10µs, Rs $\leq 0.5\Omega$, $ Q \leq 250µC$ -50Iso ΔV $\pm 400V$, 5µs, Rs $\leq 0.5\Omega$, $ Q \leq 250µC$ -50Iso ΔV MIL-STD-461C (CS06). See Note 4Image: Constraint of the systemImage: Constraint of the system								
Noise AttenuationImage: Constraint of the sector of the sect	· · · · · · · · · · · · · · · · · · ·							
INPUT VOLTAGE SPIKE SUPPRESSIONSee Note 2Dutput Voltage Deviation due to a Spike Input Voltage Spike (Centered on Vin)See Note 2 $\pm 200V$, 10µs, Rs $\leq 0.5\Omega$, $ Q \leq 250\mu$ C-50150 ΔV $\pm 400V$, 5µs, Rs $\leq 0.5\Omega$, $ Q \leq 250\mu$ C-50150 ΔV MIL-STD-461C (CS06). See Note 4 ΔV MIL-STD-461C (CS06). See Note 4					32	See Figure 1		
Dutput Voltage Deviation due to a SpikeImage: Spike (Centered on Vin)See Note 2 $\pm 200V$, 10µs, Rs $\leq 0.5\Omega$, $ Q \leq 250\mu$ C-50150 ΔV MIL-STD-461C (CS06). See Note 4 $\pm 400V$, 5µs, Rs $\leq 0.5\Omega$, $ Q \leq 250\mu$ C-50150 ΔV MIL-STD-461C (CS06). See Note 4								
Input Voltage Spike (Centered on Vin)Imput Voltage Spike (Centered on Vin) $\pm 200V$, 10μ s, $Rs \le 0.5\Omega$, $ Q \le 250\mu$ C -50 150 ΔV MIL-STD-461C (CS06). See Note 4 $\pm 400V$, 5μ s, $Rs \le 0.5\Omega$, $ Q \le 250\mu$ C -50 150 ΔV MIL-STD-461C (CS06). See Note 4						See Note 2		
$\pm 200V$, 10µs, Rs $\le 0.5\Omega$, Q $\le 250\mu$ C -50 150 ΔV MIL-STD-461C (CS06). See Note 4 $\pm 400V$, 5µs, Rs $\le 0.5\Omega$, Q $\le 250\mu$ C -50 150 ΔV MIL-STD-461C (CS06). See Note 4								
\pm 400V, 5μs, Rs ≤ 0.5Ω, Q ≤ 250μC -50 150 ΔV MIL-STD-461C (CS06). See Note 4		-50		150	۸V	MIL-STD-461C (CS06), See Note 4		
	± 600 V, 10µs, Rs = 50Ω	-50		150	ΔV	RTCA/DO-160E		

* Rs = Source Impedance



MQME-270-R Electrical Characteristics (Continued)								
Parameter	Min.	Min. Typ. Max. Units Notes & Conditions			Group A			
Specifications subject to change without notice					Vin=270V DC \pm 5%, P= 320W unless otherwise specified	Subgroup ³		
ISOLATION CHARACTERISTICS								
Isolation Voltage (any pin to case)								
Continuous	-500		500	V		1		
Transient (≤ 100 µs)	-800		800	V				
Isolation Resistance (any pin to case)	100			MΩ		1		
RELIABILITY CHARACTERISTICS								
Calculated MTBF (MIL-STD-217F2)								
GB @ Tcase = 70°C		32		10 ⁶ Hrs.				
AIF @ Tcase = 70°C		1.2		10 ⁶ Hrs.				
WEIGHT CHARACTERISTICS								
Device Weight		79		g				

Electrical Characteristics Notes

1. While the filter will survive these input voltage limits, the filter's output voltage will be outside the limits for an MQFL converter input voltage range.

2. Verified by qualification testing and analysis.

3. Only the ES and HB grade products are tested at three temperatures. The C grade products are tested at one temperature. Please refer to the

Construction and Environmental Stress Screening Options table for details.

4. With an external 2uF capacitor in series with a 50hm resistor connected across the output of the MQME filter module.

5. Product of input current and output voltage must be less than 320W

6. The specified operating case temperature for ES grade products is -45°C to 100°C. The specified operating case temperature for C grade products is 0°C to 70°C.

* Rs = Source Impedance

Technical Specification

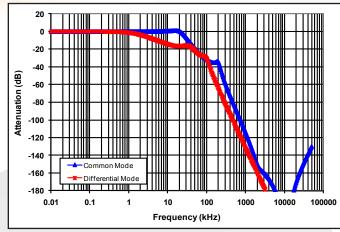


Figure 1: Typical Common Mode and Differential Mode Attenuation provided by the filter as a function of frequency. Both input lines are connected to chassis ground through 50Ω resistors. The filter case is also connected to chassis ground.

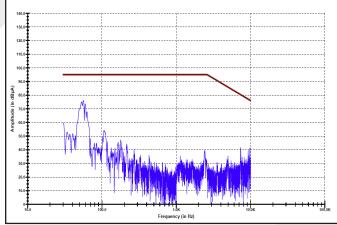


Figure 3: MIL-STD-461E Method CE101 Low Frequency Conducted Emissions. Limit line (in brown) is the 'Submarine Applications DC Curve'. Setup described on Page 6.

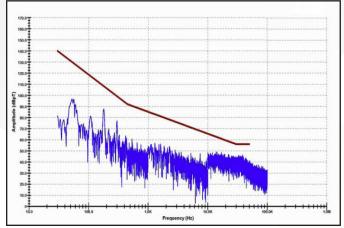


Figure 5: MIL-STD-461E Method RE101 Low Frequency Radiated Emissions. Limit line (in brown) is the 'Standard Curve' from MIL-STD-461C Method RE01, which is more strict than all RE101 limits. Setup described on Page 6.

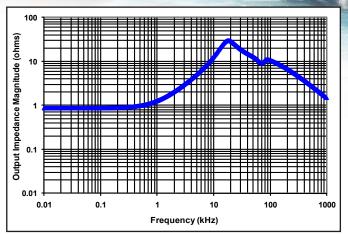


Figure 2: Typical Output Impedance (magnitude) of the filter looking back into its output pins with the input pins connected to a source with zero source impedance.

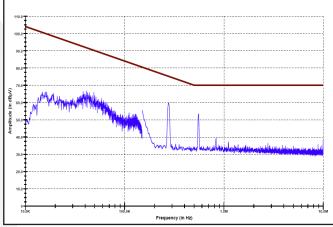


Figure 4: MIL-STD-461E Method CE102 High Frequency Conducted Emissions. Limit line (in brown) is the 'Basic Curve'. Setup described on Page 6.

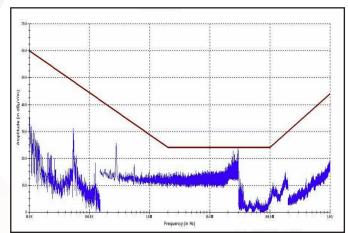


Figure 6: MIL-STD-461E Method RE102 High Frequency Radiated Emissions. Limit line (in brown) is the 'Submarine External to Pressure Hull Curve'. Setup described on Page 6.



BASIC OPERATION AND FEATURES

The MQME-270-R is a multi-stage differential-mode and commonmode passive EMI filter designed to interface a power source with one or more SynQor DC/DC converters (or other loads that create EMI). Each stage of this filter is well damped to avoid resonances and oscillations, and only X7R multi-layer ceramic capacitors are used. Figure 1 shows the typical differential and common-mode attenuation provided by this filter when the source impedance is 50W to chassis ground on each input line.

The MQME-270-R EMI filter includes a large bulk capacitor (also X7R) with a series damping resistor to correct for the unstabilizing effect of a converter's negative input resistance. A white paper discussing this negative input resistance and the need for corrective damping can be found on the SynQor website (see Input System Instability application note). Figure 2 shows the magnitude of the filter's output impedance when the filter input is connected to a stiff voltage source.

When used with SynQor's DC/DC converters, the MQME-270-R EMI filter is designed to pass all of the relevant MIL-STD-461C/D/ E/F requirements to their most stringent limits. The MIL-STD-461 Compliance Matrix Table lists these requirements and describes the setup used to pass them. Figures 3 - 6 show results from selected conductive and radiated emissions tests.

The filter is also designed to pass the waveform types and applications specified in RTCA/DO-160E/F/G Section 22 (Lightning Induced Transient Susceptibility) to Level 4 (some waveforms / applications require external transient suppression circuitry). The Section 22 Compliance Matrix Table lists these waveforms and applications and describes the setup used to pass them.

A typical application would place the MQME filter close to the input of the DC/DC converter, with the cases of the filter and the converter connected together through a ground plane. Both cases are electrically conductive, so connection to the cases can be made with the fasteners used to secure the device.

MQME-270-R Current: 2A

Do not connect the outputs of multiple MQME-270-R filters in parallel. Connecting filters in this manner may result in slightly unequal currents to flow in the positive and return paths of each filter. These unequal currents may cause the internal common-mode chokes to saturate and thus cause degraded common-mode rejection performance.

REVERSE POLARITY PROTECTION: The MQME-270-R EMI filter has a series-connected diode. This diode blocks reverse current flow if the filter's input voltage is mistakenly connected with the wrong polarity. The anti-parallel diode, working with the reverse polarity diode, ensures that the filter's output voltage goes only slightly negative during this time, and therefore satisfying the minimum input voltage specifications of SynQor's MQFL converters.

The reverse polarity diode also preforms a useful function during negative polarity spikes and surges, and during brief power interrupts. Since it stops current from flowing negatively through the EMI filter back toward the source, thediode allows the total bulk capacitor (located both within and external to the filter) to better hold up the output voltage during these transients.

MQME-270-R Current: 2A Technical Specification SEE NOTE 7 \bigcirc 0.250 [6.35] ۰. • 12 1 +VIN +VOUT \overline{O} 2 +VOUT +VIN 11 1.50 [38.10] ٥ 0.200 [5.08] 3 +VOUT 10 1.260 +VIN MQME-270-R-X-HB 0 TYP. NON-CUM. EMI FILTER OUT RTN [32.00] 4 IN RTN 9 0 270in 2A 360W ADE IN LISA OUT RTN 5 IN RTN 8 Ø 0.040 [1.02] S/N 0000000 D/C 3205-301 CAGE 1WX10 OUT RTN 6 IN RTN 7 PIN \bigcirc 0 \bigcirc 2.50 [63.50] Ø 0.128 [3.25] 0.050 [1.27] 2.760 [70.10] 3.00 [76.20] 0.22 [5.59] 2.96 [75.2] 0.228 [5.79] 0.390 [9.91] Case X SEE NOTE 7 0.250 [6.35] \cap ٥ 12 +VIN Sun +VOUT 1 O TO ō 0.200 [5.08] 2 +VIN +VOUT 11 č 1.50 [38.10] TYP. NON-CUM. 3 +VIN +VOUT 10 1.260 ٥L MQME-270-R-U-HB [32.00] 4 IN RTN OUT RTN 9 о EMI FILTER 270in 2A 360W OUT RTN 5 IN RTN 8 ണ MADE IN USA Ø 0.040 [1.02] S/N 0000000 D/C 3205-301 CAGE 1WX10 IN RTN OUT RTN 6 7 PIN **1** \bigcirc \bigcirc 0 2.50 [63.50] 0.42 0.050 [1.27] Ø.128 [3.25] 2.760 [70.10] [10.7] 3.00 [76.20] 0.22 [5.59] 2.80 [71.1] 0.390 [9.91] Case U

NOTES

- 1) Pins 0.040" (1.02 mm) diameter
- 2) Pins Material: Copper Alloy Finish: Gold over Nickel plating, followed by Sn/Pb solder dip
- All dimensions in inches (mm) Tolerances: x.xx + -0.02 in. (x.x + -0.5 mm) 3) x.xxx +/-0.010 in. (x.xx +/-0.25 mm)
- 4) Weight: 2.8 oz (78.5 g) typical
- 5) Workmanship: Meets or exceeds IPC-A-610C Class III
- 6) Print Labeling on Top Surface per Product Label Format Drawing
- Pin 1 identification hole, not intended for mounting (case X and U) 7)

Function Pin # **Function** Pin # Positive input 7 Output Return 8 Positive input Output Return 9 **Output Return** Positive input

10

PIN DESIGNATIONS

Input return	11	Positive output
Input return	12	Positive output

Input return

1

2

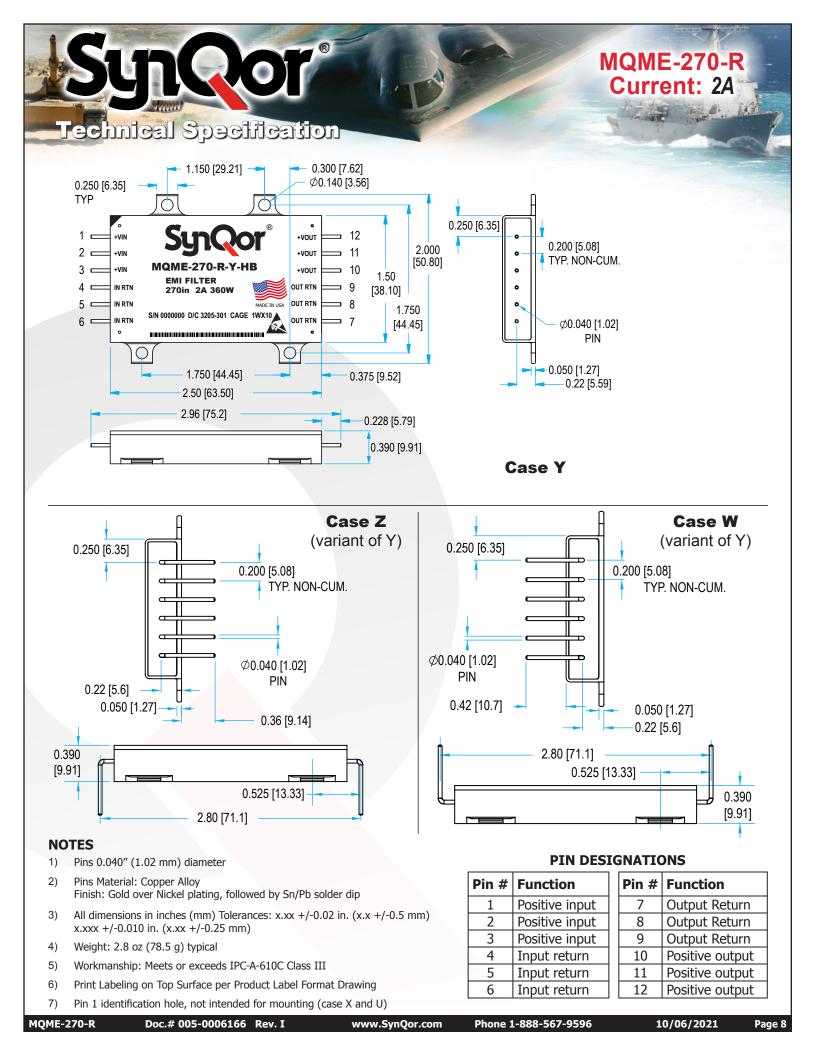
3

4

5

6

Positive output





Lightning Induced Transient Susceptibility

RTCA/DO-160E/F/G Section 22 Compliance Matrix

This table shows the RTCA/DO-160 Section 22 requirements/limits that will be met* by a stand-alone setup comprised of:

- MQME-270-P Filter
- MQFL-270-05S Converter
- 120W Resistive load
- Metal Chassis Plane

		RTCA/DO-160E/F/G Section 22			
RTCA/DO-160E/F/G	Waveform	Maximum Level Passed	Test Conditions		
	3	4			
Pin Injection	4	4†	Signal applied to +Vin pin. Input Return pin connected to system ground		
	5a	4†	gioana		
Single- and Multiple-Stroke	2	4**	Signal applied to unabiologic power cable bundle		
Cable Induction	3	4	Signal applied to unshielded power cable bundle		
Single- and Multiple-Stroke	4	4	Signal applied between metal ground plane and system ground		
Ground Injection	5	4	Signal applied between metal ground plane and system ground		
Multiple-Burst Cable Induction	3	4	Signal applied to unshielded power cable bundle		

* Requirement is deemed to have been met as long as transient deviations in the converter's output voltage remain within ±10% of its initial value.

† For these waveforms at Level 3 and above, an external transient suppressor of sufficient energy rating must placed across the filter's input pins to keep the differential transient input voltage below +200V/-50V. Negative polarity waveforms may cause power flow to the converter to be interrupted long enough to cause a graceful shutdown and restart of the converter. Also, the reverse voltage protection feature of the -R filter is required to protect the converter (but not the filter) from negative polarity waveform.

** For this waveform at a Level 4 and above, external transient suppressors of sufficient energy rating must be added between the filter's input power pins and its case to keep the common-mode transient input voltage below +800V.

Met by any MQME Filter	Met by a MQME Filter with Reverse Polarity Protection having external Transient Suppression
Met by any MQME Filter	Polarity Protection having external Transient Suppression

MQME-270-R Current: 2A



EMI

Military Standard 461 Compliance Matrix

This table shows the MIL-STD-461 requirements/limits that will be met* by the stand-alone setups indicated below:

- MQME-270-P Filter
- MQFL-270-05S Converter
- 120W Resistive load
- Metal Chassis Plane

Mil-Std-461	MIL-STD-461C		Mil-Std-461	MIL-STD-461D/E/F		
WIII-510-461	Requirement	Most Stringent Limit Listed	WIII-Sta-461	Requirement	Most Stringent Limit Listed	
Conducted Emissions	CE01 CE03 CE07	Class A5 (Submarine) Class A5 (Submarine)‡ Class A1 (Aircraft)	Conducted Emissions	CE101 CE102	Submarine Basic Curve	
	CS01	Class A5 (Submarine)		CS101	Curve #2	
	CS02 Class A5 (Submarine) Conducted Susceptibility CS06 Class A1/A5 (Aircraft/Sub) CS10 Class A5 (Submarine)	Class A5 (Submarine)		CS106	(461F Only)	
		Class A1/A5 (Aircraft/Sub)	Conducted Susceptibility	CS114	Curve #5	
oucceptionity		Class A5 (Submarine)	cuccoptionity	CS115	Basic Waveform	
	CS11	Class A5 (Submarine)		CS116	lmax = 10A	
				RE101	Navy	
Radiated	RE01	Class A5 (Submarine)	Radiated		Submarine	
Emissions	Emissions RE02† Class A5 (Submarine)	Emissions	RE102†	Fixed Wing Internal, >25 meters Nose to Tail		
Radiated Susceptibility	RS01 RS02 RS03	Class A5 (Submarine) Class A1/A5 (Aircraft/Sub) Class A4 (Surface Ship)	Radiated Susceptibility	RS101 RS103	Army Aircraft External	

* Susceptibility requirements/limits are considered to be met as long as transient deviations in the converter's output voltage remain within ±10% of its initial value.

† Met with metal screen shield covering the filter, converter, and resistive load.

‡ In almost every case the limit listed is the most stringent of the requirements. The one exception is CE03 - High Frequency Broadband Conducted Emissions, Converter with Passive Filter. In this case the filter and converter passed the A1 limit. The filter and converter pass the CE03 - Narrowband Conducted Emissions at the A5 limit level.

Technical Specification

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CONSTRUCTION AND ENVIRONMENTAL STRESS SCREENING OPTIONS							
Screening	Consistent with MIL-STD-883F	C-Grade (specified from 0 °C to +70 °C)	ES-Grade (specified from -45 °C to +100 °C)	HB-Grade (specified from (-55 °C to +125 °C)			
Element Evaluation		No	Yes	Yes			
Internal Visual	IPC-A-610 Class 3	Yes	Yes	Yes			
Temperature Cycle	Method 1010	No	Condition B (-55 °C to +125 °C)	Condition C (-65 °C to +150 °C)			
Constant Acceleration	Method 2001 (Y1 Direction)	No	500 g	Condition A (5000 g)			
Burn-in	Method 1015	24 Hrs @ +125 °C	96 Hrs @ +125 °C	160 Hrs @ +125 °C			
Final Electrical Test	Method 5005 (Group A)	+25 °C	-45, +25, +100 °C	-55, +25, +125 °C			
Mechanical Seal, Thermal, and Coating Process			Full QorSeal	Full QorSeal			
External Visual	Method 2009	Yes	Yes	Yes			
Construction Process			QorSeal	QorSeal			

MilQor[®] Hi-Rel converters and filters are offered in three variations of environmental stress screening options. All ES-Grade and HB-Grade MilQor Hi-Rel converters use SynQor's proprietary QorSeal[®] Hi-Rel assembly process that includes a Parylene-C coating of the circuit, a high performance thermal compound filler, and a nickel barrier gold plated aluminum case. Each successively higher grade has more stringent mechanical and electrical testing, as well as a longer burn-in cycle. The ES- and HB-Grades are also constructed of components that have been procured through an element evaluation process that pre-qualifies each new batch of devices.

MIL-STD-810F Qualification Testing

MIL-STD-810F Test	Method	Description
Fungus	508.5	Table 508.5-I
Altitude 500.4 - Procedure I		Storage: 70,000 ft / 2 hr duration
Annuae	500.4 - Procedure II	Operating: 70,000 ft / 2 hr duration; Ambient Temperature
Rapid Decompression	500.4 - Procedure III	Storage: 8,000 ft to 40,000 ft
Acceleration	513.5 - Procedure II	Operating: 15 g
Salt Fog	509.4	Storage
High Temperature	501.4 - Procedure I	Storage: 135 °C / 3 hrs
	501.4 - Procedure II	Operating: 100 °C / 3 hrs
Low Temperature	502.4 - Procedure I	Storage: -65 °C / 4 hrs
	502.4 - Procedure II	Operating: -55 °C / 3 hrs
Temperature Shock	503.4 - Procedure I - C	Storage: -65 °C to 135 °C; 12 cycles
Rain	506.4 - Procedure I	Wind Blown Rain
Immersion	512.4 - Procedure I	Non-Operating
	507.4 - Procedure II	Aggravated cycle @ 95% RH (Figure 507.5-7 aggravated temp -
Humidity	507.4 - Procedure II	humidity cycle, 15 cycles)
Random Vibration	514.5 - Procedure I	10 - 2000 Hz, PSD level of 1.5 g^2/Hz (54.6 g_{rms}), duration = 1 hr/axis
Chaoli	516.5 - Procedure I	20 g peak, 11 ms, Functional Shock (Operating no load) (saw tooth)
Shock	516.5 - Procedure VI	Bench Handling Shock
		Rotary wing aircraft - helicopter, 4 hrs/axis, 20 g (sine sweep from
Sinusoidal vibration	514.5 - Category 14	10 - 500 Hz)
Sand and Dust	510.4 - Procedure I	Blowing Dust
	510.4 - Procedure II	Blowing Sand

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Technical Specification

MQME-270-R Current: 2A

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Page 12

Support Technical Specification

MQME-270-R Current: 2A

First Article Testing consistent with MIL-STD-883F						
MIL-STD-883F Test	Method	Description				
Electrical Tests	5005					
Physical Dimensions test	2016					
Resistance to Solvents test	2015.13					
Solderability test	2003.8					
Lead Integrity test	2004.5					
Salt Atmosphere test	1009.8	Condition "A"				
Adhesion of Lead Finish test	2025.4					
Altitude Operation test	1001	Condition "C"				
ESD Sensitivity	3015.7	Class 2				
Stabilization Bake test	1008.2	Condition "C"				
Vibration Fatigue test	2005.2	Condition "A"				
Random Vibration test	2026	Condition "II K"				
Sequential Test Group #1						
Life Test – Steady State test	1005.8					
Life Test – Intermittent Duty test	1006					
Sequential Test Group #2						
Temperature Cycle test	1010.8	Condition "C"				
Constant Acceleration test	2001.2	Condition "A"				
Sequential Test Group #3						
Thermal Shock test	1011.9	Condition "B"				
Temperature Cycle test	1010.8	Condition "C"				
Moisture Resistance test	1004.7	With Sub cycle				
Sequential Test Group #4						
Mechanical Shock test	2002.4	Condition "B"				
Variable Frequency Vibration test	2007.3	Condition "A"				



MilQor Filter Family Matrix The tables below show the array of MilQor filters available. When ordering SynQor converters, please ensure that you use the complete part number accord-ing to the table in the last page.Contact the factory for other requirements.

Product	Continuous	Power	Version	Features Available (In Addition to Passive Filter Components				
Family Designator	Family Input (Amperage)	(see table below)	Enable Pass- Through Circuitry	Transient Suppression Circuitry	Soft-Start Circuitry	Reverse Polarity Protection Circuitry		
MQME-28	40V		Р					
	70\/	320W (20A)	т	•	•	٠	•	
	MQME-28E 70∨		Т6	•	•	٠	•	
MQHE-28	40V	160\4/(104)	Р					
MQHE-28E	70V	160W (10A)	P					
MQHE-270	400V	160W (1A)	Р					
	400V	22014/ (2.4.)	Р					
MQME-270	MQME-270 400V 320W (2A)	R				•		
MOME-2701	MQME-270L 400V 2	200W (3A)	Р					
		2000 (JA)	R				•	



PART NUMBERING SYSTEM

The part numbering system for SynQor's *MilQor* DC-DC converters follows the format shown in the table below.

Model Name	Input Voltage Range	Version	Package Outline/Pin Configuration	Screening Grade
MQME MQHE	28 28E	Р Т Т6	U X Y W Z	C ES HB
	270 270L	P R		

Not all combinations make valid part numbers, please contact SynQor for availability. See the Product Summary web page for more options.

Example: MQME-270-R-Y-ES

APPLICATION NOTES

A variety of application notes and technical white papers can be downloaded in pdf format from the SynQor website.

PATENTS

SynQor holds numerous U.S. patents, one or more of which apply to most of its power conversion products. Any that apply to the product(s) listed in this document are identified by markings on the product(s) or on internal components of the product(s) in accordance with U.S. patent laws. SynQor's patents include the following:

6,896,526	6,927,987	7,050,309	7,085,146
7,765,687	7,787,261	8,149,597	8,644,027

Contact SynQor for further information and to order:

<u>Phone</u> :	978-849-0600
<u>Toll Free</u> :	888-567-9596
Fax:	978-849-0602
<u>E-mail</u> :	mqnbofae@synqor.com
<u>Web</u> :	www.synqor.com
<u>Address</u> :	155 Swanson Ro <mark>ad</mark>
	Boxborough, MA 01719
	USA

<u>Warranty</u>

SynQor offers a two (2) year limited warranty. Complete warranty information is listed on our website or is available upon request from SynQor.