AeroQor®

Product Family

SynQor®'s AC-DC Solutions for Avionics

Power Factor Correction (PFC)

- Single Phase and 3-Phase Input Options
- Isolated Output
- 100W, 325W and 750W Units
- PF > 0.99 / THD < 3% / Efficiency > 90%

AC Line Filter

Specification Compliance

- RTCA/DO-160
- Airbus ABD0100.1.8
- Boeing 787B3-0147
- Boeing D6-36440
- Boeing D6-44588
- CE marked

Made in the USA

www.SynQor.com

SynQor®

AeroQor AC Line Filter Modules

The AeroQor EMI AC Line Filters brings SynQor's field proven technology and manufacturing expertise to the Avionics COTS Component marketplace. SynQor's innovative packaging approach ensures survivability in the most hostile environments. Compatible with the industry standard format, these filters have high differential-mode and common-mode attenuation and low series resistance. They follow conservative component derating guidelines and they are designed and manufactured to the highest standards.

Filter Features

- 85 to 264 Vrms
- Very low series resistance
- High Differential & Common-mode Attenuation
- All capacitors are safety-rated X7R multi-layer ceramic
- Meets common EMC standards in properly designed system with SynQor APFIC modules.
- -40°C to +100°C Operating Temperature
- Low power dissipation

Specification Compliance

- RTCA/DO-160
- Airbus ABD0100.1.8
- Boeing 787B3-0147
- Boeing D6-36440
- Boeing D6-44588
- CE marked

AeroQor AC Line Filter

Family	Input Frequency	Input Voltage	Package Size	Thermal Design	RoHS
ACF	**U:** 45 - 800 Hz	**230:** 85 to 264Vrms	**QT:** Quarter-brick Tera **QM:** Quarter-brick Mega	**C:** Encased **V:** Encased with Flanged Baseplate	**G:** RoHS

Example: ACF-U-230-ET-C-G For valid part numbers, refer to the website or contact your local sales representative.

Model Number	Input Frequency	Input Voltage (L-N)	Output Current	Output Power	Max Series Resistance	Differential-mode Attenuation	Common-mode Attenuation
ACF-U-230-QT-x-G	45-800Hz	85-264Vrms	5Arms	575W@115Vrms 1.1kW@230Vrms	330mΩ@100°C	>40dB @ 250kHz	>40dB @ 250kHz
ACF-U-230-QM-x-G	45-800Hz	85-264Vrms	2Arms	230W@115Vrms 460W@230Vrms	900mΩ@100°C	>45dB @ 250kHz	>45dB @ 250kHz

AeroQor 3-Phase AC Line Filter

Family	Input Frequency	Input Voltage	Phase	Package Size	Thermal Design	RoHS
ACF	**U:** 45 - 800 Hz	**115:** 85 to 264Vrms	**3PH:** 3-Phase	**QG:** Quarter-brick Giga	**C:** Encased **V:** Encased with Flanged Baseplate	**G:** RoHS

Example: ACF-U-115-3PH-QG-C-G For valid part numbers, refer to the website or contact your local sales representative.

Model Number	Input Frequency	Input Voltage (L-N)	Output Current	Output Power	Max Series Resistance	Differential-mode Attenuation	Common-mode Attenuation
ACF-U-115-3PH-QG-x-G	45-800Hz	85-140Vrms	3Arms	1kW@115Vrms	655mΩ@100°C	>55dB @ 200kHz	>40dB @ 200kHz

Avionic Electronic Isolated PFC Converters & Filters

AeroQor Single-Phase Isolated Power Factor Correction Modules

The AeroQor Isolated PFC Module is a high efficiency, active PFC, AC-DC converter designed to be used as a COTS Component in airborne applications. It operates from a universal AC input and generates an isolated DC output. Regulated output and droop output modules are available. Used in conjunction with a hold-up capacitor, and SynQor's AeroQor AC line filter, the PFC Module will draw a nearly perfect sinusoidal current (PF>0.99) from a single phase AC input. The module is designed with a high level of documentation and traceability.

Operational Features

- Isolated output, 100W & 325W output power options
- Universal input frequency range: 47 - 63Hz / 360 - 800Hz
- Input voltage range: 85-264Vrms
- ≥0.99 Power Factor
- High efficiency: 92% (230Vrms)
- -40°C to +100°C Operating Temperature
- Internal inrush current limit
- Auxiliary 10V bias supply, primary-side referenced
- Can be paralleled (droop version only)
- Compatible with SynQor's AeroQor AC line filters

Protection/Control Features

- PFC Enable
- AC and DC Power Good outputs
- 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

Specification Compliance

- RTCA/DO-160
- Airbus ABD0100.1.8
- Boeing 787B3-0147
- Boeing D6-36440
- Boeing D6-44588
- CE marked

AeroQor Isolated Power Factor Correction Module

Family	Input Voltage	Output Voltage	Regulation	Package Size	Thermal Design	RoHS
APFIC	**U:** 85-264V	**12:** 12V **24:** 24V **28:** 28V **48:** 48V **55:** 55V	**R:** Regulated Output **D:** Droop Sharing	**HT:** Half-brick Tera **HM:** Half-brick Mega	**C:** Encased **D:** Encased with Non-threaded Baseplate **V:** Encased with Flanged Baseplate	**G:** RoHS

Example: APFIC-U-24D-HT-C-G For valid part numbers, refer to the website or contact your local sales representative.

AeroQor 3-Phase Isolated Power Factor Correction Modules

The AeroQor Isolated PFC Module is a high efficiency, active PFC, AC-DC converter designed to be used as a COTS Component in airborne applications. It operates from a 115 Vrms AC input and generates an isolated DC output. Regulated output and droop output modules are available. Used in conjunction with a holdup capacitor, and SynQor's AeroQor AC line filter, the PFC Module will draw a nearly perfect sinusoidal current (PF>0.99) from a 3-Phase AC input. The module is supplied completely encased to provide protection from the harsh environments seen in many industrial areas.

Operational Features

- Compatible with commercial aircraft 60 Hz, 400 Hz and variable frequency systems
- Harmonic content meets commercial aircraft standards
- Minimal inrush current
- Balanced phase currents
- High power factor (0.99 at 400 Hz / 750 W)
- Minimal external output capacitance requirement
- Full load current during startup
- Ability to meet full EMI with available additional EMI filters
- N * 750 W power levels when paralleled
- 100°C max baseplate temperature at full power
- -40°C to +100°C Operating Temperature

Protection/Control Features

- All control pins referenced to separate floating return
- Asynchronous serial data interface
- AC and DC Power Good outputs
- PFC Enable and Battle Short inputs
- 3.3 V always-on standby power output
- Clock synchronization output
- Output 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

Specification Compliance

- RTCA/DO-160
- Airbus ABD0100.1.8
- Boeing 787B3-0147
- Boeing D6-36440
- Boeing D6-44588
- CE marked

AeroQor 3-Phase Isolated Power Factor Correction Module

Family	Vin Range	Input Phases	Vout	Regulation	Package Size	Thermal Design	RoHS
APFIC	**115:** 115Vrms$_{L-N}$	**3PH:** 3-Phase	**12:** 12V **24:** 24V **28:** 28V **48:** 48V **54:** 54V	**R:** Regulated Output **D:** Droop Sharing	**FT:** Full-brick Tera	**C:** Encased **D:** Encased with Non-threaded Baseplate **V:** Encased with Flanged Baseplate	**G:** RoHS

Example: APFIC-115-3PH-28R-FT-C-G For valid part numbers, refer to the website or contact your local sales representative.

Qualification & Compliance

Parameter	# Units	Test Conditions
QUALIFICATION TESTING		
Cold Temperature - Ground Survival	5	RTCA/DO-160G section 4.5.1
Hot Temperature - Ground Survival	5	RTCA/DO-160G section 4.5.3
Cold Temperature - Operating	5	RTCA/DO-160G section 4.5.2
Hot Temperature - Operating	5	RTCA/DO-160G section 4.5.4
Temperature Variation	5	RTCA/DO-160G section 5.3.1
Temperature Cycling	5	MIL-STD-810G Method 503.5 – Procedure I
Humidity	3	RTCA/DO-160G section 6.3.1 (Category A)
Waterproofness - Condensing	3	RTCA/DO-160 section 10.3.1 (Category Y)
Fungus Resistance	1	MIL-STD-810G Method 508.6
Vibration - Fixed Wing and Helicopter	5	RTCA/DO-160G sections 8.5.2 (Level B4), 8.8.3 (Levels G and F1)
Operational Shock and Crash Safety	5	RTCA/DO-160G section 7.2.1, 7.3.1, and 7.3.3 (Category B)
Altitude - Steady State	5	RTCA/DO-160G section 4.6.1; 70,000 ft (21 km), see note
Altitude - Decompression	5	RTCA/DO-160G section 4.6.2
Loss of Cooling	5	DO-160G Section 4.5.5
Design Marginality	5	Tmin-10 °C to Tmax+10 °C, 5 °C steps, Vin = min to max, 0-105% load
Life Test	32	95% rated Vin and load, units at derating point, 1000 hours
Solderability	15 pins	MIL-STD-883, method 2003

Note: A conductive cooling design is generally needed for high altitude applications because of naturally poor convection cooling at rare atmospheres.

Category Description	Single-Phase 115Vrms Specification Compliance
Input Voltage	787B3-0147, D6-44588, Airbus ABD0100.1.8, RTCA/DO-160G
Switching Transients	787B3-0147, D6-44588, Airbus ABD0100.1.8, RTCA/DO-160G, EN61000-4-4, EN61000-4-5
Voltage Spikes	787B3-0147, D6-44588, Airbus ABD0100.1.8, RTCA/DO-160G, EN61000-4-6
Frequency Transients	787B3-0147, D6-44588, Airbus ABD0100.1.8, RTCA/DO-160G
Harmonic Content	787B3-0147, D6-44588, Airbus ABD0100.1.8, RTCA/DO-160G, EN61000-3-2, MIL-STD-1399
DC Content on Input Voltage	787B3-0147, D6-44588, Airbus ABD0100.1.8, RTCA/DO-160G
Audio Frequency Conducted Susceptibility	D6-36440, RTCA/DO-160G
Audio Frequency Conducted Emissions	D6-36440, RTCA/DO-160G
Induced Signal Susceptibility	D6-36440, RTCA/DO-160G, EN61000-4-6
Conductive Emissions	D6-36440, RTCA/DO-160G, CE101, CE102, EN55011/22
Magnetic Effect	D6-36440, RTCA/DO-160G, EN61000-4-11
Radiated Emissions	D6-36440, RTCA/DO-160G, RE101, RE102, EN 61000-4-3
Electrostatic Discharge	D6-36440, RTCA/DO-160G, EN61000-4-2
Electrical Bonding and Grounding	D6-36440, D6-44588, UL 60950-1
Lightning Requirements	D6-36440, D6-16050-5, RTCA/DO-160G
Reliability	Telcordia, MIL-HDBK-217F

Validation, Verification & Certification

USA Manufacturing Facility: AS9100 & ISO 9001 Certified

SynQor considers in-house manufacturing to be a core competency and strategic advantage. All SynQor products are manufactured in our manufacturing facility at our corporate headquarters in Boxborough, MA, USA, utilizing state-of–the art equipment and proprietary assembly techniques. By maintaining both AS9100 and ISO9001 certifications, SynQor is able to provide the same level of attention to detail in our manufacturing processes as we do in our products. We utilize proprietary in-house developed manufacturing data and document control systems that allow us to operate in a paperless manufacturing environment, providing both maximized manufacturing efficiency and flexibility. Ultimately, our manufacturing expertise remains in-house, allowing us to maintain complete control over the quality and traceability of our product down to the component level to meet the most stringent customer and industry requirements.

Design, Engineering & Manufacturing Process

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 and DFM review process 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 units and electrically characterize • Verify electrical performance • Verify component stress analysis • Statistical variations • Thermal analysis and imaging • HALT testing • Complete datasheet	• Controlled Production Build • 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, altitude and solderability)	• Processes transfer • Full documentation release (SCD's, BOM, processes, procedures, etc.) • Release qualification reports • Release final datasheet • Transfer units to finished goods

SynQor®

Power Converters & Systems

SynQor is a leading supplier of power conversion solutions to the military, avionics, transportation, medical, industrial, telecommunications and computing markets. SynQor's innovative products are designed to exceed the demanding performance, quality, and reliability requirements of today's power electronic engineers who develop leading-edge infrastructure hardware. SynQor provides all the power conversion modules needed to build a power system, as well as complete power systems. SynQor's core capabilities include both standard and custom solutions, delivered with industry leading service and support. SynQor's total commitment to quality, customer satisfaction and continuous improvement drives our business processes.