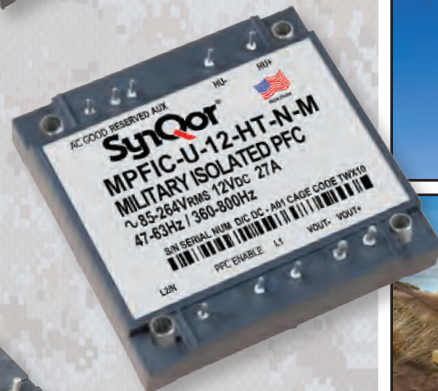


MIL-STD Compliant
High Efficiency
Field Proven



Military “Off-The-Shelf”
AC Power Converters
& Filters





Military Grade Power Factor Correction Module

The MPFCQor 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 MCOTS DC-DC converters and SynQor's MCOTS AC line filter, the MPFCQor will draw a nearly perfect sinusoidal current ($PF > 0.99$) from a single phase AC input. The MPFCQor module can be paralleled to achieve higher power. The module is supplied completely encased to provide protection from the harsh conditions seen in many military and extreme environments.

Operational Features

- ◆ Universal input voltage range: 85-264 Vrms
- ◆ Narrow input voltage range: 85-180 Vrms
- ◆ Universal input frequency range: 47 - 63Hz / 360 - 800 Hz
- ◆ Up to 700 W output power
- ◆ ≥ 0.99 Power Factor
- ◆ High efficiency: Up to 95% (115 Vrms)
- ◆ Internal inrush current limit
- ◆ Auxiliary 10 V bias supply
- ◆ 100 °C max baseplate temperature at full power
- ◆ -55 °C to +100 °C Operating Temperature
- ◆ Can be paralleled with current sharing
- ◆ Compatible with SynQor's MCOTS DC-DC Converters and SynQor's MCOTS AC line filters

Protection/Control Features

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

MIL-COTS POWER FACTOR CORRECTION MODULE

Family	Vin Range	Output Voltage	Package Size	Thermal Design	Screening Level
MPFC	U: 85-264 Vrms 115: 85-180 Vrms	270: 270 Vdc 390: 390 Vdc	QP: Quarter-brick Peta HP: Half-brick Peta	N: Encased, Threaded Baseplate D: Encased, Non-threaded Baseplate F: Encased, Flanged Baseplate	S: S-Grade M: M-Grade

Part Numbering Example: MPFC-U-390-HP-N-M For valid part numbers, refer to the website or contact your local sales representative.

Model Number	Input Voltage	Output Voltage	Output Power
MPFC-U-390-HP	85-264 Vrms	390 Vdc	700 W
MPFC-115-270-HP	85-180 Vrms	270 Vdc	700 W
MPFC-U-390-QP	85-264 Vrms	390 Vdc	350 W
MPFC-115-270-QP	85-180 Vrms	270 Vdc	350 W



Isolated Power Factor Correction



Military Grade Isolated Power Factor Correction Module

The MPFICQor Power Factor Correction module is a high power, high efficiency AC-DC converter. It operates from a universal AC input and generates an isolated output. Both regulated and semi-regulated (droop version) modules are available. Used in conjunction with a hold-up capacitor, and SynQor's MCOTS AC line filter, the MPFICQor will draw a nearly perfect sinusoidal current ($PF > 0.99$) from a single phase AC input. The module is supplied completely encased to provide protection from the harsh environments seen in many military and aerospace environments.

Operational Features

- ◆ Isolated output: 325 W, 600 W & 800 W
- ◆ Universal input frequency range: 47 - 63 Hz / 360 - 800 Hz
- ◆ Input voltage range: 85-264 Vrms
- ◆ ≥ 0.99 Power Factor
- ◆ High efficiency: 92% (230 Vrms)
- ◆ -55 °C to +100 °C Operating Temperature
- ◆ Internal inrush current control. Full-brick model has enhanced control that keeps inrush current to nearly zero
- ◆ Auxiliary bias supply
- ◆ Hold-up available on the 600 W FG model only
- ◆ Can be paralleled (droop version only)
- ◆ Compatible with SynQor's MCOTS 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
- ◆ Battle Short - (Full-bricks Only)
- ◆ Asynchronous Serial data interface (Full-bricks Only)

MIL-COTS ISOLATED POWER FACTOR CORRECTION MODULE

Family	Input Voltage	Output Voltage	Package Size	Thermal Design	Screening Level	Option
MPFIC	U: 85-264 V	12: 12 V 24: 24 V 28: 28 V 48: 48 V	HT: Half-brick Tera FG: Full-brick Giga FT: Full-brick Tera	N: Encased D: Encased with Non-threaded Baseplate F: Encased with Flanged Baseplate	S: S-Grade M: M-Grade	[]: Standard D: Droop H: Hold-up DH: Droop w/ Hold-up

Part Numbering Example: MPFIC-U-12-HT-N-M For valid part numbers, refer to the website or contact your local sales representative.



3-Phase Power Factor Correction



Military Grade 3-Phase Power Factor Correction Module

The 3-Phase MPFCQor Power Factor Correction module is an essential building block of an AC-DC power supply. Used in conjunction with SynQor's MCOTS AC line filter and a limited amount of stabilizing capacitance, the 3-Phase MPFCQor will draw a nearly perfect sinusoidal current from each phase of a 3-Phase AC input. The modules are supplied completely encased to provide protection from the harsh conditions seen in many military and extreme environments.

Operational Features

- ◆ Full-brick form factor industry standard
- ◆ 1.5 kW continuous (2.0 kW surge)
- ◆ Semi-regulated output: 270 Vdc
- ◆ Compatible with Military Standard 60 Hz, 400 Hz and variable frequency systems
- ◆ Meets military standards for harmonic content
- ◆ Minimal Inrush current
- ◆ Compatible with large external hold-up capacitors
- ◆ Additional Half-brick input filter available to meet full EMI
- ◆ 100 °C max baseplate temperature at full power
- ◆ -55 °C to +100 °C Operating Temperature
- ◆ Parallelable for higher power on a common input filter
- ◆ Compatible with SynQor's MCOTS Converters
- ◆ Enables systems with repetitive load transients to pass MIL-STD-461 CE101 with superior load current rejection

Protection/Control Features

- ◆ PFC Enable
- ◆ AC and DC Power Good outputs
- ◆ Clock synchronization output
- ◆ 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
- ◆ Parallel Option Available

MIL-COTS 3-PHASE POWER FACTOR CORRECTION MODULE

Family	Vin Range	Input Phases	Vout	Package Size	Thermal Design	Screening Level
MPFC	115: 85-140 Vrms L-N	3PH: 3-Phase	270: 270 Vdc 270P: 270 Vdc, parallel option	FP: Full-brick Peta	N: Encased, Threaded Baseplate D: Encased, Non-Threaded Baseplate F: Encased, Flanged Baseplate	S: S-Grade M: M-Grade

Example: MPFC-115-3PH-270-FP-N-M For valid part numbers, refer to the website or contact your local sales representative.

Model Number	Input Voltage	Output Voltage	Output Power
MPFC-115-3PH-270-FP	3-Phase 85-140 Vrms L-N	270 Vdc	1500 W
MPFC-115-3PH-270P-FP	3-Phase 85-140 Vrms L-N	270 Vdc	N*1500 W



3-Phase Isolated Power Factor Correction

Military Grade 3-Phase Isolated Power Factor Correction Module

The 3-Phase MPFICQor Military Isolated PFC Module is a high power, high efficiency AC-DC converter. It operates from a 115 Vrms AC input and generates an isolated DC output. Both regulated output and droop output modules are available. Used in conjunction with a holdup capacitor, and SynQor's MCOTS AC line filter, the MPFICQor 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 military and aerospace environments.

Operational Features

- ◆ Compatible with Military Standard 60 Hz, 400 Hz and variable frequency systems
- ◆ Harmonic content meets military standards
- ◆ Superior load current rejection, enabling systems with repetitive load CE101 requirement by offering superior load current rejection
- ◆ 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 (Droop version only)

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

MIL-COTS ISOLATED POWER FACTOR CORRECTION MODULE

Family	Input Voltage	Output Voltage	Regulation	Package Size	Thermal Design	Screening Level
MPFIC	115-3PH: 3-Phase 115 Vrms L-N	12: 12 V 24: 24 V 28: 28 V 48: 48 V 54: 54 V	R: Regulated output D: Droop Sharing	FT: Full-brick Tera	N: Encased D: Encased with Non-threaded Baseplate F: Encased with Flanged Baseplate	S: S-Grade M: M-Grade

Example: MPFIC-115-3PH-12R-FT-N-S For valid part numbers, refer to the website or contact your local sales representative.



High Voltage 3-Phase Power Factor Correction



Military Grade 3-Phase Power Factor Correction Module

The high voltage 3-Phase MPFCQor Power Factor Correction module is an essential building block of an AC-DC power supply. Used in conjunction with one of SynQor's matched 3-Phase AC line filters and a limited amount of stabilizing capacitance, this MPFCQor will draw well-balanced and low-distortion sinusoidal currents from each phase of a 3-Phase AC input. It is designed to comply with a wide range of military standards and is manufactured in the United States.

Operational Features

- ◆ Large-module form factor
- ◆ 5.0 kW continuous rating at 80 °C baseplate temperature
- ◆ Semi-regulated output: 400 Vdc
- ◆ Compatible with Military Standard 60 Hz, 400 Hz & var. freq. systems
- ◆ Meets military standards for harmonic content
- ◆ Drives pulsed output loads without passing transients back to the input (requires adequate capacitance; see pulsed loads section)
- ◆ Minimal inrush current
- ◆ Balanced phase currents
- ◆ High power factor (0.999 at 60 Hz / 5.0 kW)
- ◆ Minimal external output capacitance needed
- ◆ Supports full load current during startup ramp
- ◆ Additional input filters available to meet full EMI
- ◆ N * 5.0 kW power levels when paralleled

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

MIL-COTS 3-PHASE POWER FACTOR CORRECTION MODULE

Family	Vin Range	Vout	Package Size	Thermal Design	Screening Level
MPFC	440-3PH: 3-Phase 440 Vrms L-L	400: 400 Vdc	LE: Large-module Exa	D: Encased, Non-Threaded Baseplate	S: S-Grade M: M-Grade

Example: MPFC-440-3PH-400-LE-D-M For valid part numbers, refer to the website or contact your local sales representative.

AC Line Filter Modules

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

MCOTS AC Filter Features

- ◆ Up to 1 kW @ 115 V_{RMS} (Single Phase)
- ◆ 2 kW @ 115 V_{RMS (L-N)} (3-Phase)
- ◆ 7.6 kW @ 440 V_{RMS (L-L)} (HV 3-Phase)
- ◆ All ceramic capacitor design
- ◆ High voltage isolation between baseplate and input/output
- ◆ Internally damped
- ◆ Low power dissipation
- ◆ Complies with industry EMI standards when used with SynQor MPFC and DC-DC converter modules



Model Number	Input Phase	Input Frequency	Input Voltage	Output Current	Output Power
MACF-U-230-ET	Single Phase	50 / 60 Hz & 400 Hz	85-264 V _{RMS}	4.5 A _{RMS}	500 W @ 115 V _{RMS} / 1 kW @ 230 V _{RMS}
MACF-060-230-HT	Single Phase	50 / 60 Hz	85-264 V _{RMS}	9 A _{RMS}	1 kW @ 115 V _{RMS} / 2 kW @ 230 V _{RMS}
MACF-400-230-HT	Single Phase	400 Hz	85-264 V _{RMS}	9 A _{RMS}	1 kW @ 115 V _{RMS} / 2 kW @ 230 V _{RMS}
MACF-115-3PH-UNV-QG	3-Phase	45-800 Hz	85-140 V _{RMS (L-N)}	3 A _{RMS}	1 kW @ 115 V _{RMS (L-N)}
MACF-115-3PH-UNVD-QT	3-Phase	45-800 Hz	85-140 V _{RMS (L-N)}	6 A _{RMS}	2 kW @ 115 V _{RMS (L-N)}
MACF-115-3PH-UNV-HT	3-Phase	45-800 Hz	85-140 V _{RMS (L-N)}	6 A _{RMS}	2 kW @ 115 V _{RMS (L-N)}
MACF-440-3PH-UNV-MP	3-Phase	45-800 Hz	320-528 V _{RMS (L-L)}	10 A _{RMS}	7.6 kW @ 440 V _{RMS (L-L)}

Product Screening & Qualification

Product Screening			
Screening	Process Description	S-Grade	M-Grade
Baseplate Operating Temperature		-55 °C to +100 °C	-55 °C to +100 °C
Storage Temperature		-65 °C to +135 °C	-65 °C to +135 °C
Pre-Cap Inspection	IPC-610 Class III	•	•
Temperature Cycling	MIL-STD-883F, Method 1010, Condition B, 10 Cycles		•
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-883, Method 2009	•	•

Product Qualification			
Qualification	Details	# Tested (# Failed)	Consistent with MIL-STD-883F Method
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)	—
Humidity	+85 °C, 95% RH, 1000 hours, 2 minutes on 6 hours off	8 (0)	Method 1004.7
Temperature Cycling	500 cycles of -55 °C to +100 °C (30 minute dwell at each temperature)	10 (0)	Method 1010.8
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)	—



Advancing the Power Curve®

Located in Boxborough, MA USA, 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, and it also provides complete power systems. SynQor's capabilities include both standard and custom solutions, and it delivers them with industry leading service and support. SynQor's total commitment to quality, customer satisfaction and continuous improvement drives our business processes.

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: mqnbofae@synqor.com

www.SynQor.com

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For more information
Visit us at
www.SynQor.com

