www.us.tdk-lambda.com/lp/products/fqb-series
www.emea.tdk-lambda.com/fqb

MIL-COTS 20A, 40Vdc Active EMC Filters

COTS

The FQB filter modules have been designed to reduce differential and common mode conducted emissions from dc-dc switching converters. In addition, the series contains active suppression circuitry to block input voltage surges and transients. The FQB takes advantage of TDK technologies to simplify system level compliance to MIL-STD-461, MIL-STD-1275, RTCA/DO-160 and MIL-STD-704 per MIL-HDBK-704-8. The encapsulated rugged package design and a choice of baseplate options make the modules suitable for use in a wide variety of harsh and demanding environments, including MIL-COTS.

Features	Benefits
• Filtering for Compliance to MIL-STD-461(F,G)	• Simplifies the system EMC filter
• Input Spike and Surge Suppression per MIL-STD-1275(D,E), MIL-STD-704(A-F) and RTCA/DO-160G (Sec 16-18)	• Suitable for vehicle and airborne use
• High Differential and Common Mode Noise Attenuation	• Reduces system EMI
• -55 to 115°C Temperature Range (M-Grade)	• For operation in harsh environments
• Standard (S-Grade) or Enhanced Screening (M-Grade) Options	• Reduces cost for COTS applications
• Quarter Brick Size	• Industry standard mounting and heatsinks

Model Selector

Model	Operating Input Voltage (Vdc)	Maximum Current (A)	Flanged Baseplate	Non-Flanged Baseplate	Standard Screening (-S)	Enhanced Screening (-M)
FQB020ADC-007-S	8.5 to +40	20	X		X	
FQB020ADC-N07-S	8.5 to +40	20		X	X	
FQB020ADC-007-M	8.5 to +40	20	X			X
FQB020ADC-N07-M	8.5 to +40	20		X		X

Screening Options

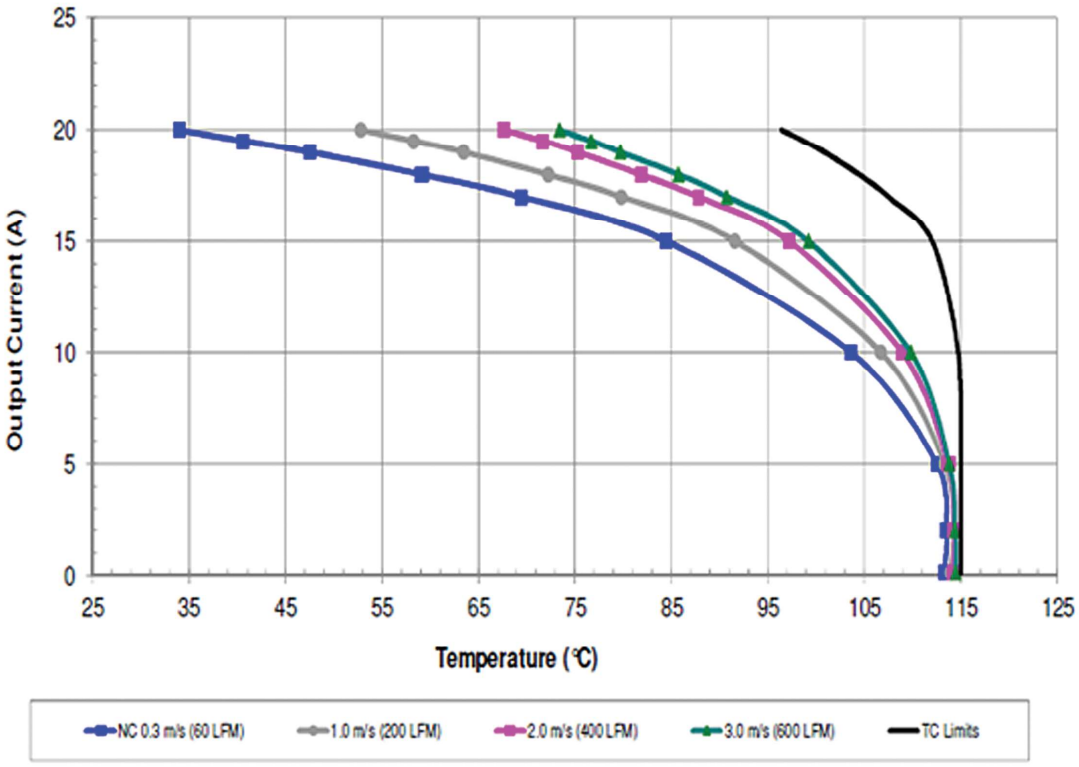
Operation	S-Grade (Standard Screening)	M-Grade (Enhanced Screening)
Functional Test	Room and Hot Test	Cold, Room, and Hot Test
Burn in	Yes	Extended, 96 hour
Temperature Cycling	No	10 Cycles
Hi-Pot	2250VDC	2250VDC
Visual Inspection	Yes	Yes

Specifications

Model				FQB
Input/Output				
Input Voltage range	Vdc			Continuous: -40 to +40V. Transient: -50 to +210V (t < 1s. Varies with load, refer to input surge voltage suppression row).
Input Voltage Spike Suppression (Vin 28V, 280W)	V			Typically 5V deviation for a ±250V, 100µs, 15mJ surge per MIL-STD-1275E Typically 5V deviation for a ±600V, 10µs, 50Ω source impedance per RTCA/DO-160G
Input Voltage Surge Suppression (Vin 28V)	V			47V maximum output with a 60V, 550ms surge per MIL-HDBK-704-8 (Po = 280W) 47V maximum output with an 80V, 80ms surge per MIL-HDBK-704-8 (Po = 280W) 47V maximum output with an 100V, 50ms surge per MIL-STD-1275(D,E) (Po = 280W) 47V maximum output with an 174V, 350ms surge per DEF-STAN 61-5 Part 6, (Po < 75W)"
Turn On/Off Voltage (Typical)	Vdc			Turn on: 8.5V, turn off: 8.3V
Input Under & Over Voltage Protection	-			Module shuts down if an input or over voltage condition occurs. Auto recovery.
Reverse Polarity Protection	-			Internal series MOSFET is held in an off state to avoid reverse current flow
Input Current (Maximum)	A			20A
Overcurrent Protection	-			Limits the output current, with timed shutdown to allow module to cool. Auto restart.
No Load Input Current (Typical at 28V Input)	mA			3mA. 1.5mA if module is turned off using the remote on/off.
DC Resistance (Typical)	mΩ			Positive leg: 25mΩ, negative leg: 5mΩ
Power Loss	W			Typically 12.5W at 20A
Remote On/Off	-			Module is ON when Pin 2 is left open; off when Pin 2 is connected to Pin 3 (-Vin)
DC Good / Fault Signal	-			Open collector signal, low = Good
Output Capacitance	uF			3,000uF maximum. Contact factory for higher values.
Differential Mode Attenuation at 300kHz	dB			50dB (typical with a 50Ω source & load impedance)
Common Mode Attenuation at 1MHz	dB			30dB (typical with a 50Ω source & load impedance)
Qualification Methods	-			Consistent with MIL-STD-883F and MIL-STD-202G
Compliance Testing (2)				(Tested to the most stringent listed)
		Radiated Emissions	RE101	Navy
			RE102	10kHz to 18GHz Fixed Wing internal, >25m Nose to Tail
		Conducted Emissions	CE101	Surface ships and submarines
			CE102	Basic Curve
		Conducted Susceptibility	CS101	Curve 2, Imax=10A
			CS114	Curve 5
			CS115	Basic Test Signal
			CS116	10kHz to 100MHz
Safety Agency Certifications	-			UL/CSA/IEC60950-1, CE Mark (LVD and RoHS)
Environmental				
Operating Baseplate Temperature (max) (1)	°C			Standard screening (-S): -40°C to +115°C, Enhanced screening (-M): -55°C to +115°C
Storage Temperature	°C			-65 to 125°C
Operating Humidity (non condensing)	%RH			MIL-STD 883 Method 1004.7
Cooling	-			Conduction, convection or forced air
Withstand Voltage (For 1 minute)	VAC			Terminals to Case: 2250Vdc
Vibration	-			MIL-STD-202G, Method 201A, Unpowered, sweep 1: 5 to 50 Hz at 0.5g, sweep 2: 50 to 500 Hz at 1.5g, three axis
Shock	-			MIL-STD-202G, Method 213B, Table 213-1, Test Condition I, Unpowered, 50G half sine 6ms, three axis
Other				
Weight (Typ)	g			100g (Flanged version)
Size (LxWxH)	mm			Flanged version: 60.6 x 55.9 x 12.7, Non-flanged version: 60.6 x 39 x 12.7
Size (LxWxH)	Inches			Flanged version: 2.39 x 2.2 x 0.5", Non-flanged version: 2.39 x 1.54 x 0.5"
MTBF - Telcordia SR-332 issue 3	Hours			50°C ambient, full load: 11,000,000 hours
Warranty	Years			3

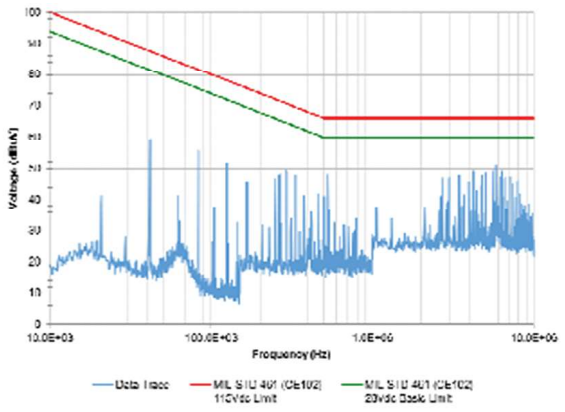
Notes
See website for detailed specifications, test methods and installation manual
1. See thermal performance section
2. Tested using TDK-Lambda evaluation kit containing FQB020ADC-007-S transient filter, combined with HQA2W120W280V-007-S and HQA2W120W050V-007-S power modules and a 200W resistive load.

Thermal Performance

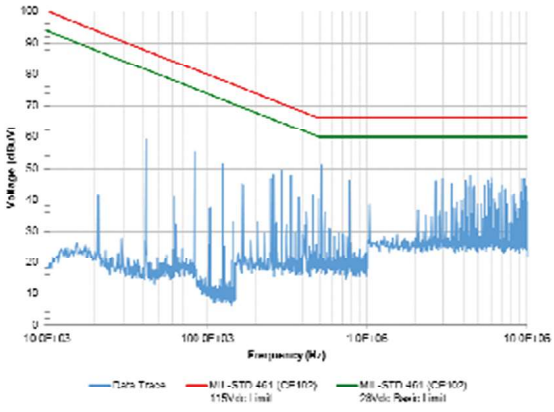


Maxmum output current vs. ambient temperature at nominal input voltage for natural convection (60 LFM) to 400 LFM with airflow from pin 1 to pin 3.

Attenuation Characteristics



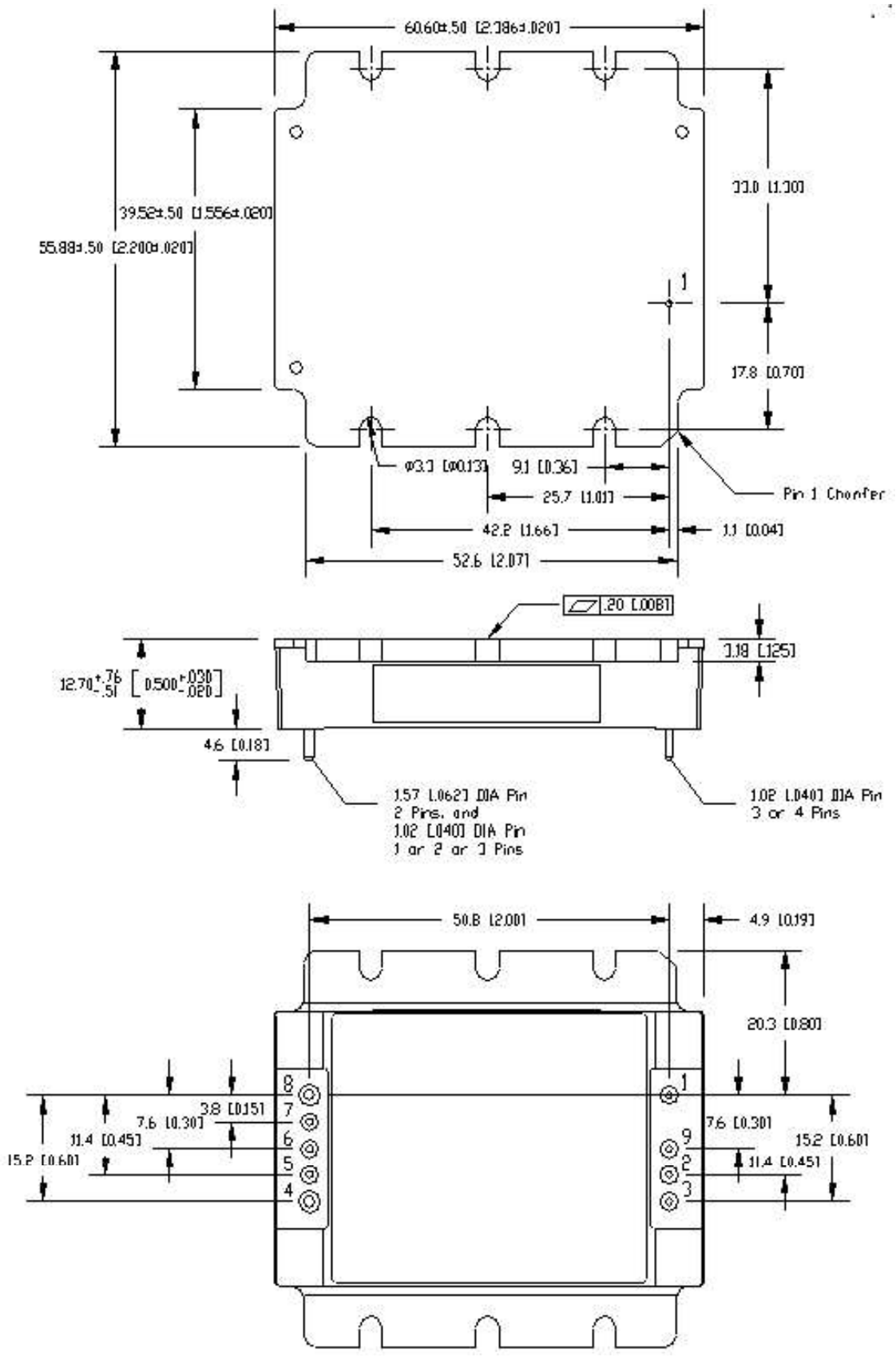
HQA2W120W480V-007-S typical conducted emissions with FQB filter module and 0.01uF common mode capacitors.



HQA2W120W280V-007-S typical conducted emissions with FQB filter module and 0.01uF common mode capacitors.

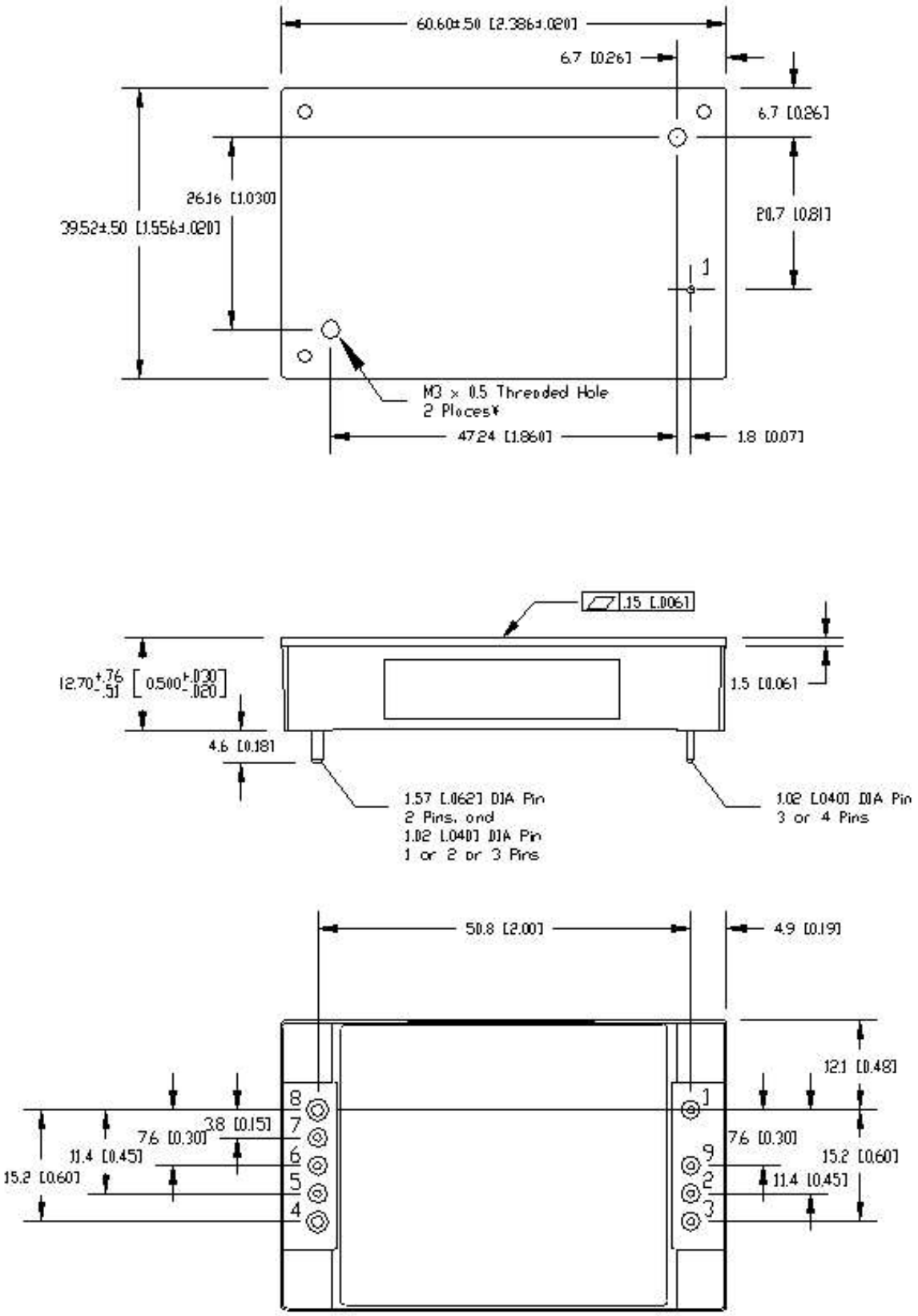
Outline Drawing

007 option (flange baseplate)



Outline Drawing

N07 option (non flange baseplate)



Pinout

PIN	Function
1	VIN (+)
2	ON / OFF
3	VIN (-)
4	VOUT (-)
5	No connection
6	Common mode out*
7	DC Good / Fault
8	VOUT (+)
9	COM (IN)*

* In a typical application pin 6 would be connected to the Vout-/ground plane and pin 9 to chassis/ground for EMI measurement

Evaluation Board

Evaluation Board Part #	Content
FQX-HQX-EVK-D0	Evaluation PCB that can accommodate FQA or FQB filters plus two (2) HQA DC-DC Quarter Brick Modules. Filters and DC-DC bricks are not included.

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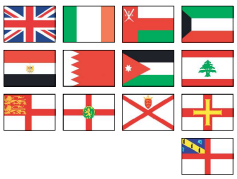

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