SynQor®

MultiQor™ Plate
MTQ-Px-DC28T

Military COTS

Configurable Multi-Output DC-DC Power Supply

1 to 4 Outputs	18V to 40V	Spike & Surge	Up to 450W	90%-95%
Standard Configurations	Continuous Operating Input	Protection	Total Output Power	Typical Efficiency

Operation: -55°C to 100°C (at cold plate)

The MultiQor Plate format of input-filtered DC-DC power supplies provides up to FOUR customer defined output voltages that are isolated from the input, each other and the cold plate. Using SynQor's Mil-COTS line of high efficiency, high reliability, fixed switching frequency DC-DC converters and EMI filters, this supply is designed to comply with MIL-STD-704, MIL-STD-1275 and DEF-STAN 61-5 for a 28Vin system when continuous full power operation is only needed down to 18Vin. The complete assembly is designed to withstand the harsh environments of the Military and Aerospace industries and is compliant with MIL-STD-810G requirements.

MultiQor™ Plate
DC-DC Power Supply

Made in USA

Operational Features

- Internal EMI filter with ceramic stabilizing bulk capacitor
- Over-voltage Spike & Surge suppression circuitry to comply with:
  - MIL-STD-704 (A - F)
  - MIL-STD-1275 (B,D)
  - DEF-STAN 61-5 (Part 6)/(5 or 6)
- Reverse polarity protection
- High efficiency converters
- Fixed frequency switching provides predictable EMI
- No minimum load requirement
- Soft start of all outputs

Mechanical Features

- Multiple physical formats
  - P1: 3.80" x 6.84" x 0.92" (Single output)
  - P2: 3.80" x 6.84" x 0.92" (Dual output)
  - P3: 6.70" x 6.84" x 0.92" (Triple output)
  - P4: 6.70" x 6.84" x 0.92" (Quad output)
- Refer to mechanical diagrams for weight
- Cold plate with mounting holes for connection to heat removal system

Protection Features

- Input under-voltage lockout
- Output current limit and short circuit protection
- Output over-voltage protection
- Thermal shutdown
- Automatic restart for all of the above
- Active back bias current limit

Control Features

- System On/Off control (isolated)
- Individual output voltage Inhibit control (isolated)
- Remote Sense for each output voltage
- Output voltage trim (-20%, +10%) for each output
- Input Good signal (isolated)

Optional Features

- Remote Sense Jumpers
- Internal input fuse
- Cover

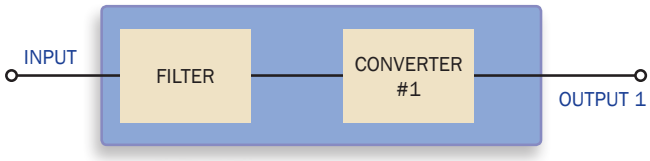
Safety Features

- 1500Vdc @ 30 MΩ input-to-output isolation
- Internal input fuse (optional)

Contents

Configurations

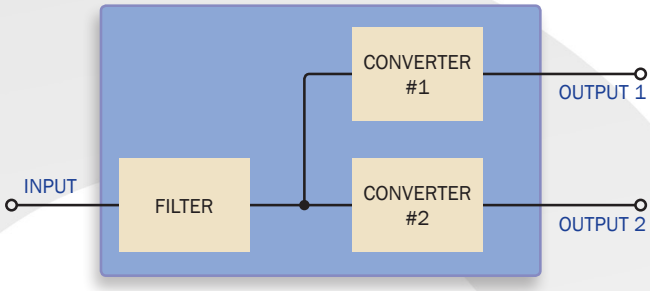
P1 **SINGLE OUTPUT**



P1 DC-DC CONVERTER OPTIONS:

- Any Quarter-Brick or Half-Brick converter from the MCOTS-28 Family
- Size: 3.80” x 6.84” x 0.92”
- Typical Weight: 1.0 LB to 1.3 LBS (1QB or 1 HB)

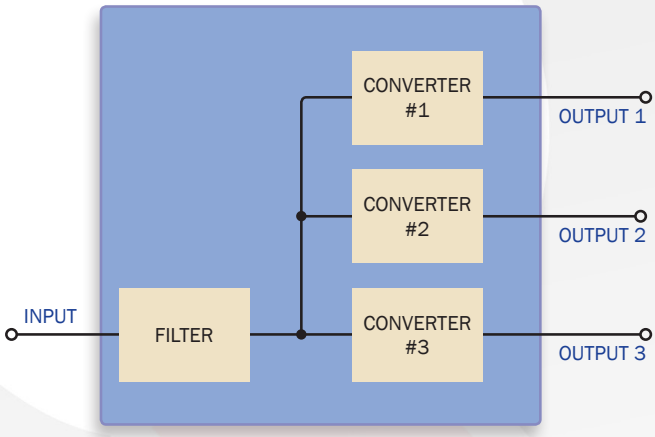
P2 **DUAL OUTPUT**



P2 DC-DC CONVERTER OPTIONS:

- Any Quarter-Brick converter from the MCOTS-28 Family
- Size: 3.80” x 6.84” x 0.92”
- Typical Weight: 1.4 LBS (2QB)

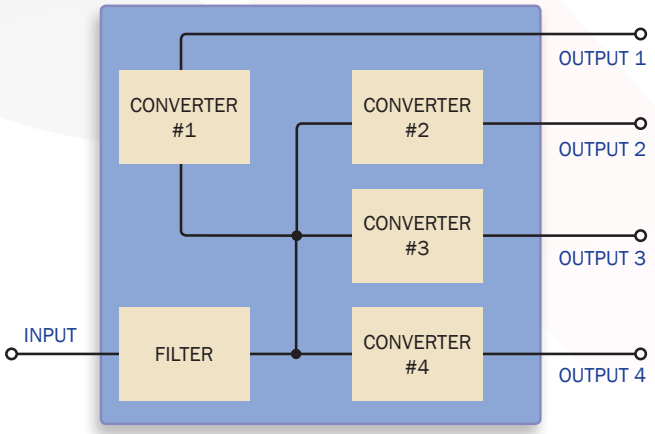
P3 **TRIPLE OUTPUT**



P3 DC-DC CONVERTER OPTIONS:

- Any Quarter-Brick or Half-Brick converter from the MCOTS-28 Family
- Size: 6.70” x 6.84” x 0.92”
- Typical Weight: 2.1 LBS to 2.5 LBS (3QB or 3 HB)

P4 **QUAD OUTPUT**



P4 DC-DC CONVERTER OPTIONS:

- Converter #1: Half-brick converter from the MCOTS-28 Family
- Converters #2, #3, #4: Any Quarter-Brick converter from the MCOTS-28 Family
- Size: 6.70” x 6.84” x 0.92”
- Typical Weight: 2.4 LBS (3QB and 1HB)

Converters Listed by Vout

Available MCOTS-28 DC-DC Converters

Quarter-Brick Tera Series (MCOTS-C-28-xx-QT)											
Vout	**1.8**	**3.3**	**5.0**	**7.0**	**12.0**	**15.0**	**24.0**	**28.0**	**40.0**	**48.0**	**50.0**
Power	72W	99W	120W	119W	120W	120W	120W	112W		120W	
Output Current	40A	30A	24A	17A	10A	8.0A	5.0A	4.0A		2.5A	
Efficiency @ Full Load (28Vin)	0.82	0.9	0.88	0.88	0.9	0.89	0.9	0.9		0.89	
Ripple & Noise (28Vin, pk to pk)	25mV	60mV	60mV	20mV	25mV	35mV	55mV	65mV		40mV	
Output OVP Setpoint (28Vin)	2.2V	4.0V	6.1V	8.5V	14.6V	18.3V	29.3V	34.2V		58.6V	
No Load Input Current (28Vin)	80mA	70mA	110mA	120mA	130mA	115mA	140mA	80mA		80mA	

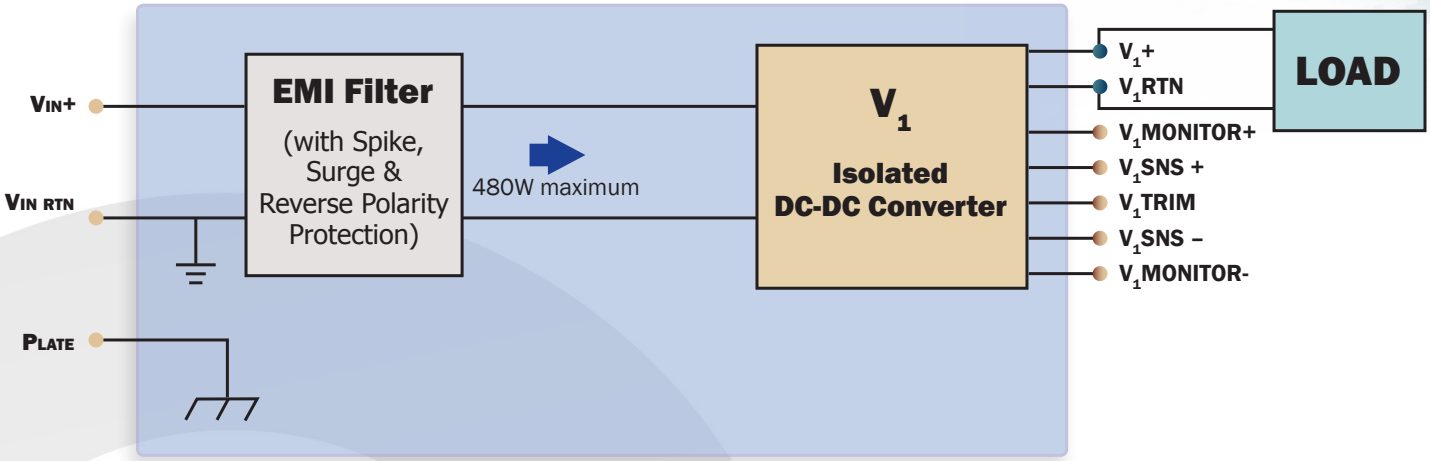
Quarter-Brick Exa Series (MCOTS-C-28-xx-QE)											
Vout	**1.8**	**3.3**	**5.0**	**7.0**	**12.0**	**15.0**	**24.0**	**28.0**	**40.0**	**48.0**	**50.0**
Power			200W		300W	300W		300W			300W
Output Current			50A		24A	20A		10.7A			6A
Efficiency @ Full Load (28Vin)			0.92		0.95	0.94		0.93			0.92
Ripple & Noise (28Vin, pk to pk)			50mV		60mV	130mV		210mV			150mV
Output OVP Setpoint (28Vin)			6.3V		14.4V	18.2V		33.6V			57.0V
No Load Input Current (28Vin)			230mA		180mA	200mA		230mA			190mA

Half-Brick Peta Series (MCOTS-C-28-xx-HP)											
Vout	**1.8**	**3.3**	**5.0**	**7.0**	**12.0**	**15.0**	**24.0**	**28.0**	**40.0**	**48.0**	**50.0**
Power	108W	165W	200W		192W	195W	200W	196W	200W	192W	
Output Current	60A	50A	40A		16A	13A	8.33A	7.0A	5.0A	4.0A	
Efficiency @ Full Load (28Vin)	0.83	0.9	0.87		0.91	0.9	0.91	0.91	0.9	0.9	
Ripple & Noise (28Vin, pk to pk)	90mV	60mV	55mV		70mV	65mV	120mV	140mV	110mV	105mV	
Output OVP Setpoint (28Vin)	2.2V	4.0V	6.1V		14.6V	18.3V	29.2V	34.2V	48.8V	58.6V	
No Load Input Current (28Vin)	80mA	130mA	95mA		130mA	130mA	135mA	135mA	140mA	120mA	

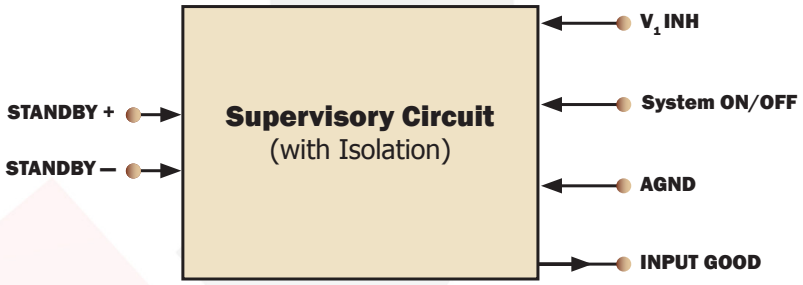
Half-Brick Zeta Series (MCOTS-C-28-xx-HZ)											
Vout	**1.8**	**3.3**	**5.0**	**7.0**	**12.0**	**15.0**	**24.0**	**28.0**	**40.0**	**48.0**	**50.0**
Power			300W		504W	510W	504W	504W			500W
Output Current			60A		42A	34A	21A	18A			10A
Efficiency @ Full Load (28Vin)			0.92		0.94	0.94	0.93	0.93			0.94
Ripple & Noise (28Vin, pk to pk)			135mV		100mV	100mV	250mV	100mV			250mV
Output OVP Setpoint (28Vin)			6.2V		14.8V	18.5V	29.5V	36.4V			—
No Load Input Current (28Vin)			290mA		310mA	340mA	300mA	340mA			340mA

Full power operation at –55 °C to +100 °C, designed for Mil-COTS applications.

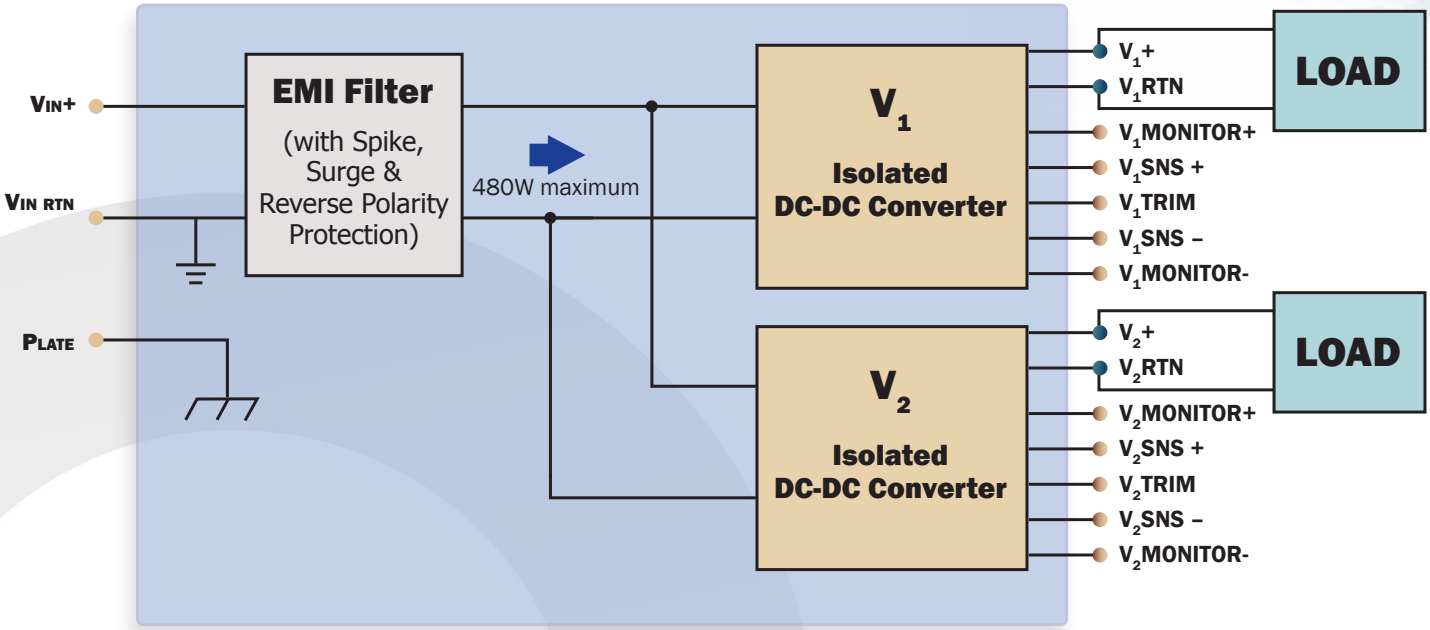
Block Diagram for P1



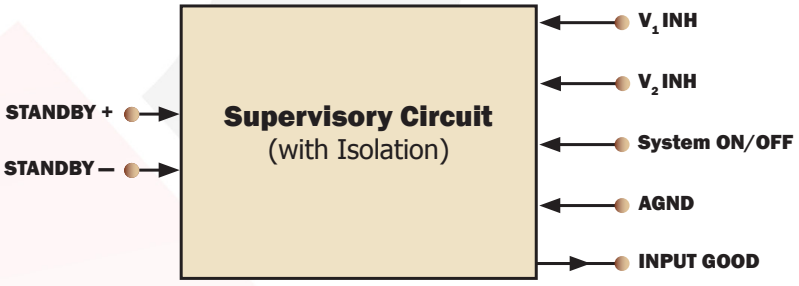
Note: Maximum total output power must be limited such that the power drawn from the filter is ≤480W. The efficiency of each converter should be considered in this calculation.



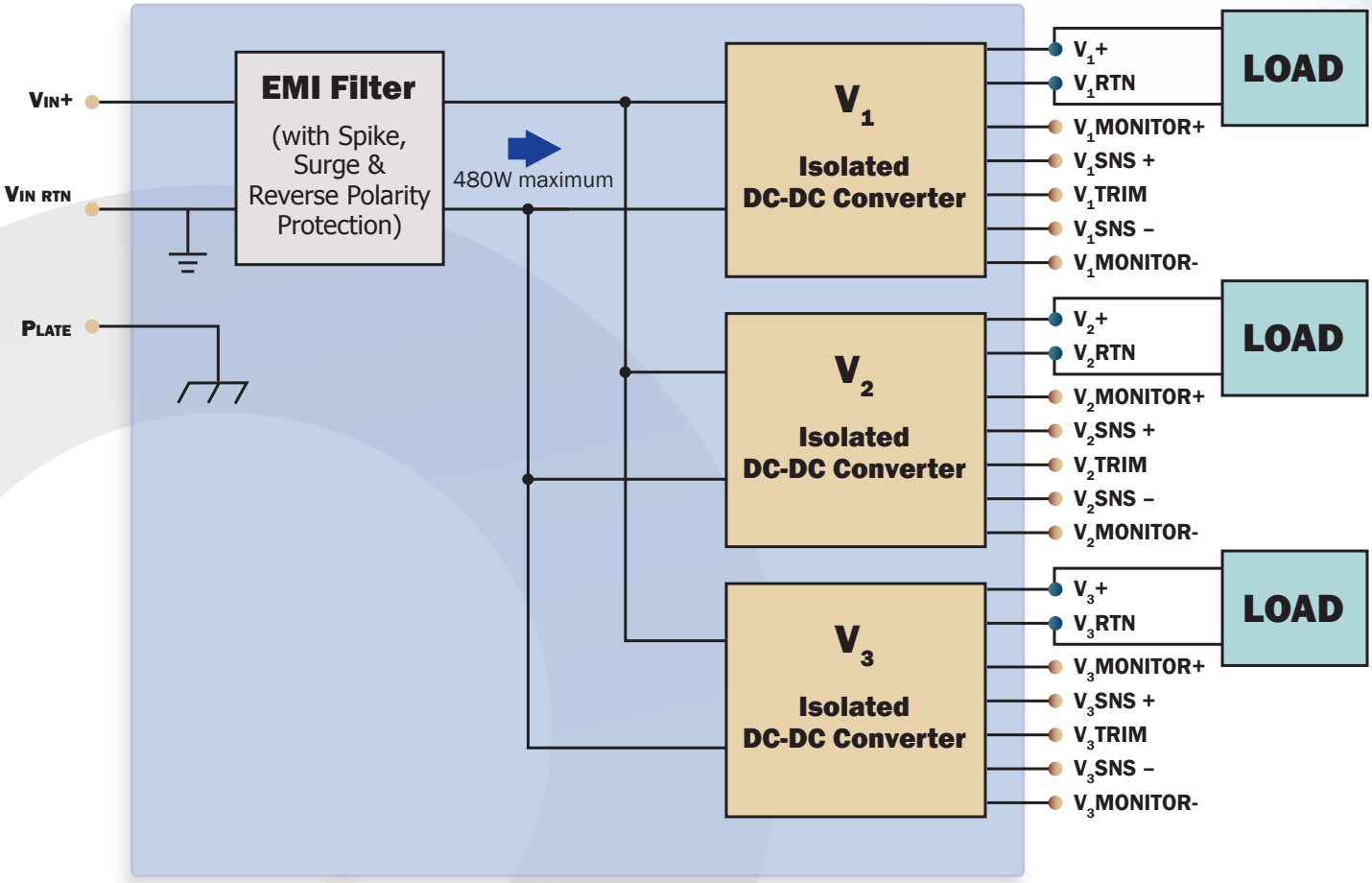
Block Diagram for P2



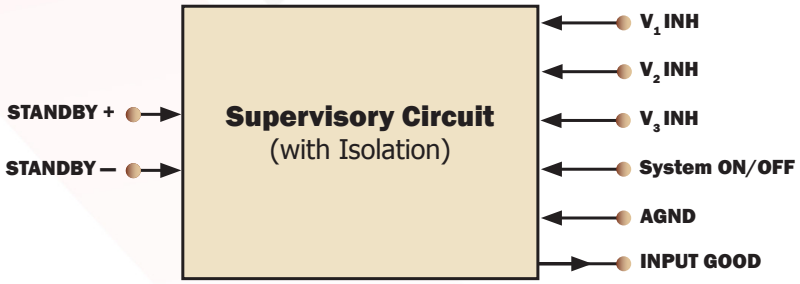
Note: Maximum total output power must be limited such that the power drawn from the filter is ≤480W. The efficiency of each converter should be considered in this calculation.



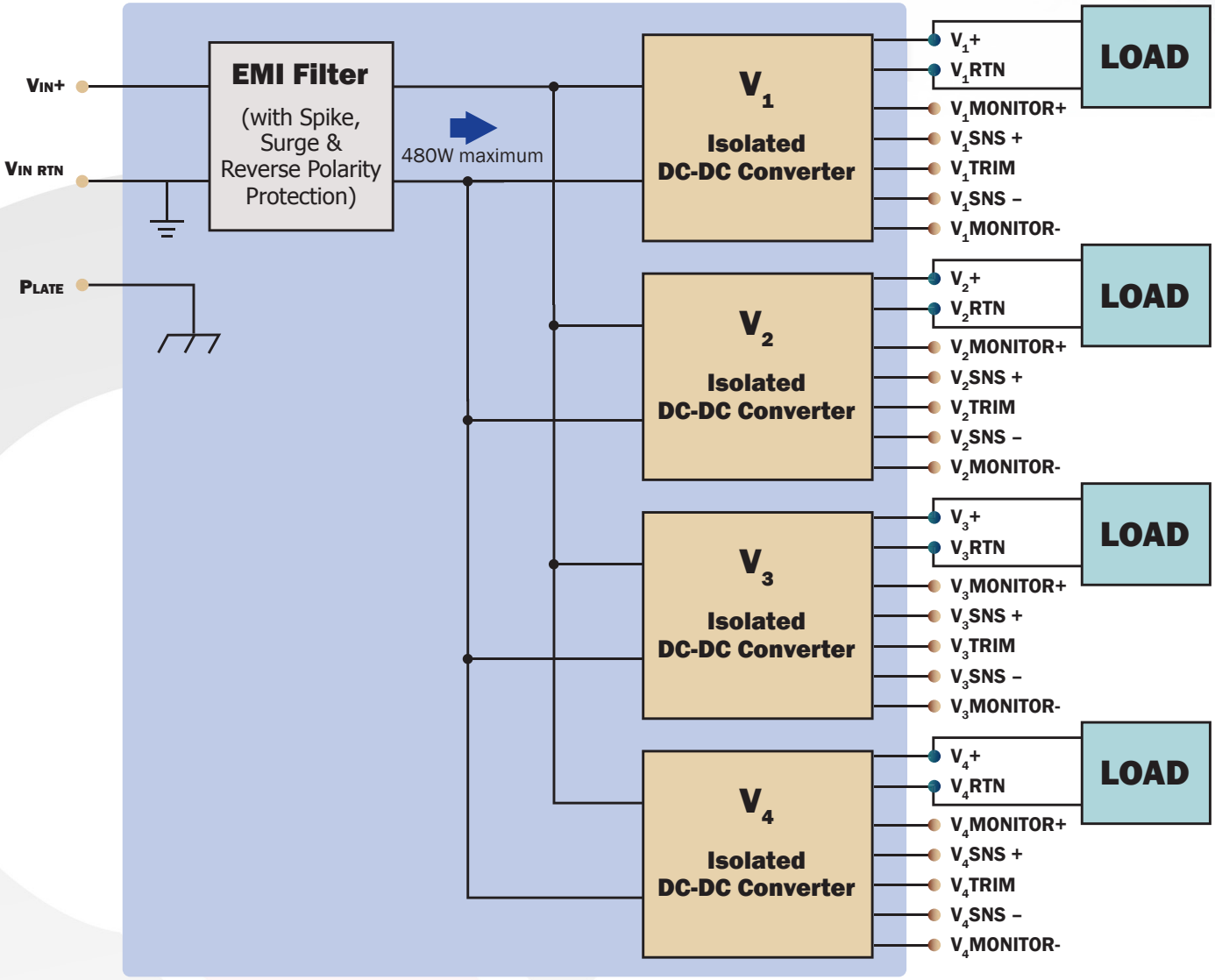
Block Diagram for P3



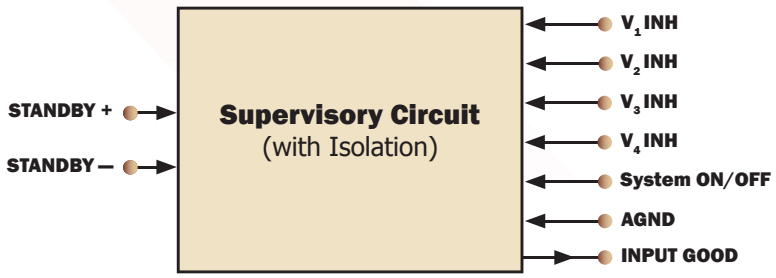
Note: Maximum total output power must be limited such that the power drawn from the filter is ≤480W. The efficiency of each converter should be considered in this calculation.



Block Diagram for P4



Note: Maximum total output power must be limited such that the power drawn from the filter is ≤480W. The efficiency of each converter should be considered in this calculation.



MTQ-Px-DC28T Family Input Characteristics

Parameter	Min.	Typ.	Max.	Units	Notes & Conditions
ABSOLUTE MAXIMUM RATINGS					
Input Voltage					
Continuous	-40		60	V	See Note 1
Transient (≤ 1 s)	-50		210	V	See Note 1
Isolation Voltage	-1500		1500	V	Input/Output to Plate
Operating Temperature	-55		100	°C	Plate Temperature
Storage Temperature	-65		135	°C	
ELECTRICAL CHARACTERISTICS					
Input Voltage					
Continuous	18		40	V	
Transient (1 s, Rs* = 0Ω)	18		50	V	For shorter transients, see input voltage spike & surge table below
Under-Voltage Lockout					
Turn-On Input Voltage Threshold	15	15.5	16	V	
FEATURE CHARACTERISTICS					
System On/Off Control					Pin 9 of J5, referenced to AGND
System On-State Voltage	-0.5		0.7	V	Pin can also be left open
System Off-State Voltage	2.5		8	V	
Inhibit Control					Pins 2-5 of J5, referenced to AGND
Converter On-State Voltage	-0.5		0.7	V	Pin can also be left open
Converter Off-State Voltage	2.5		8	V	
Standby Control					Pin 7 of J5, referenced to STANDBY-, optional
Filter On-State Voltage	2.5		8	V	
Filter Off-State Voltage	-0.5		0.7	V	Pin can also be left open

Note 1: Shutdown and Restart if the input voltage goes below the UVLO value or above 84V.
See the MCOTS-F-28-T-HT Datasheet for more information about the input over voltage shutdown characteristics.

See individual DC-DC Converter and Filter Datasheets for more information regarding performance specifications, (MCOTS-C-28-xx-QT, MCOTS-C-28-xx-QE, MCOTS-C-28-xx-HP, MCOTS-C-28-xx-HZ).

Input Voltage Spike and Surge Compliance

INPUT VOLTAGE SPIKE SUPPRESSION	
System Operates through these Spikes	
Input Voltage Spike (Centered on Vin)	
±250V, 100µs, Emax = 15mJ	**MIL-STD-1275D**
±200V, 10µs, Rs ≤ 0.5Ω	**MIL-STD-461C (CS06); DEF-STAN 61-5**
±400V, 5µs, Rs ≤ 0.5Ω	**MIL-STD-461C (CS06)**
±600V, 10µs, Rs = 50Ω	**RTCA/DO-160E**
INPUT VOLTAGE SURGE SUPPRESSION	
System Operates through these Surges	
Input Surge Voltage and Duration	
60V, 550 ms, Rs = 0 Ω	**MIL-HDBK-704A**
80V, 100 ms, Rs = 0 Ω	**MIL-HDBK-704A; RTCA/DO-160E**
100V, 80 ms, Rs = 0 Ω	**MIL-STD-1275D; DEF-STAN 61-5 (Part 6)/5**
110V, 5 ms, Rs = 0 Ω	**DEF-STAN 61-5 (Part 6)/5**
System shuts down & restarts for these Surges	
202V, 350 ms, Rs = 0 Ω	**MIL-STD-1275D; DEF-STAN 61-5 (Part 6)/6**

Mil-COTS DC-DC Converter and Filter Qualification

Test Name	Details	# Tested (# Failed)	Consistent with MIL-STD-883F Method	Consistent with MIL-STD-883F Method 5005
Life Testing	Visual, mechanical and electrical testing before, during and after 1000 hour burn-in @ full load	15 (0)	Method 1005.8	
Shock-Vibration	Visual, mechanical and electrical testing before, during and after shock and vibration tests	5 (0)		MIL-STD-202, Methods 201A & 213B
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	Condition A
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), see Note	2 (0)		

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

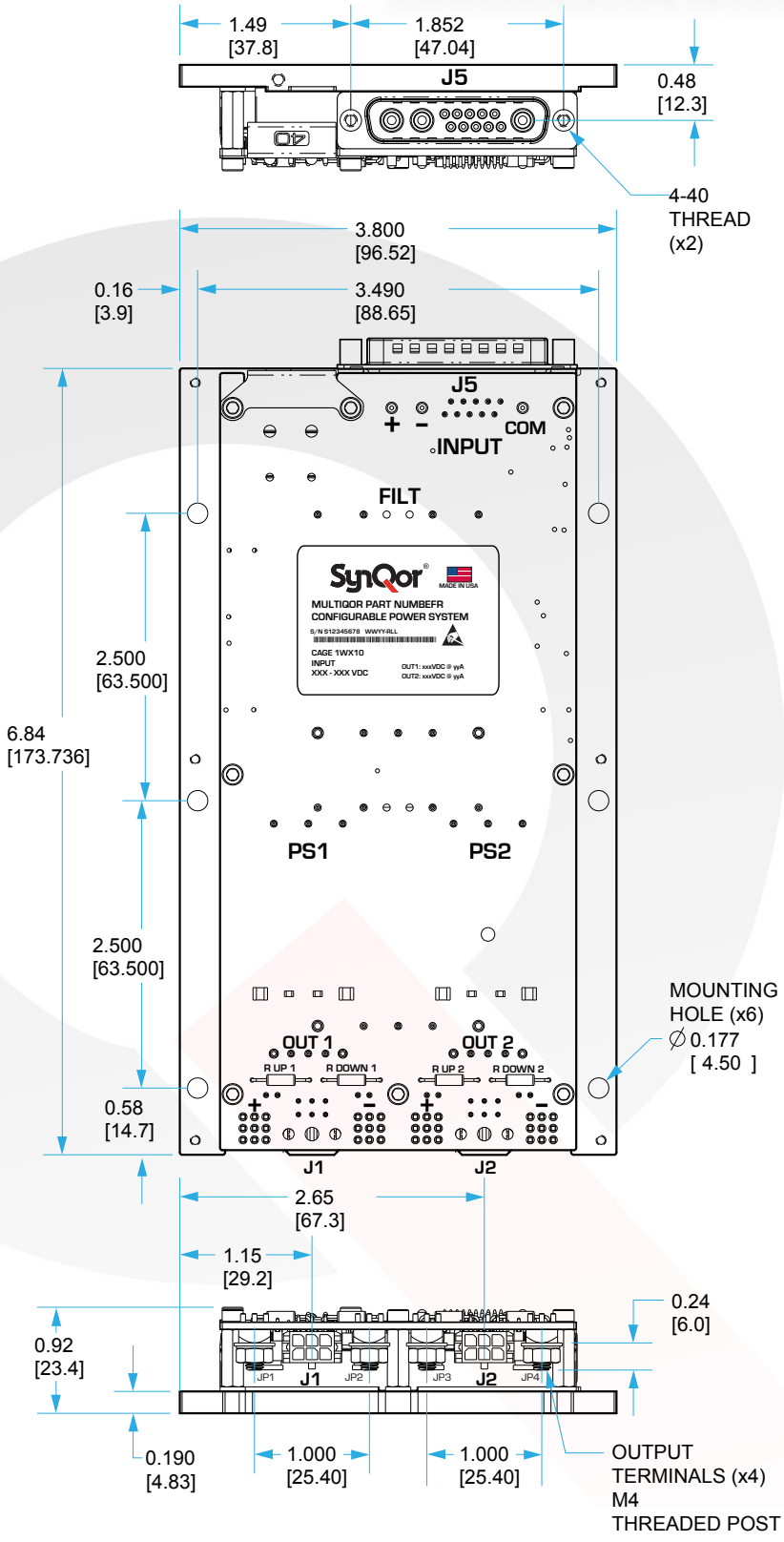
Mil-COTS DC-DC Converter and Filter Screening

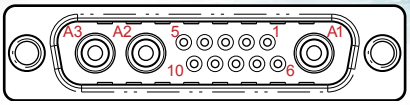
Screening	Process Description	S-Grade	M-Grade
Baseplate Operating Temperature		-55˚C to +100˚C	-55˚C to +100˚C
Storage Temperature		-65˚C to +135˚C	-65˚C to +135˚C
Pre-Cap Inspection	IPC-610, Class III	Yes	Yes
Temperature Cycling	Method 1010, Condition B, 10 Cycles		Yes
Burn-In	100˚C Baseplate	12 Hours	96 Hours
Final Electrical Test	1	25˚C	-55˚C, +25˚C, +100˚C
Final Visual Inspection	MIL-STD-2008	Yes	Yes

MTQ-Px-DC28T Assembly Qualification

Environment Tests	Process Description	Details	Specification
Vibration	Method 514.6	Procedure I	20G's (0.2 g2/Hz); 10-2000Hz
Shock/Drop	Method 516.6	Procedure I	40G's (11ms); 75G'speak (6ms); Sawtooth Pulse
ESD	EN 61000-4-2	Contact Discharge	Level 2

MECHANICAL DRAWING P1





Input Connector (J5)

Pin	Name	Function
1	AGND	Analog Ground[1]
2	INH_1	Inhibit 1 [Ref to AGND]
3	NC	Not Connected
4	NC	Not Connected
5	NC	Not Connected
6	INPUT_GOOD	[Ref to AGND]
7	STANDBY+	[Ref to STANDBY–]
8	STANDBY–	STANDBY–
9	ON/OFF	[Ref to AGND]
10	VIN–	[Signal Connection][2]
A1	COM IN	Chassis
A2	VIN–	[Power connection]
A3	VIN+	[Power connection]

NOTES:

1. AGND, Pin 1, is the reference for control inputs INH_1, ON/OFF, and control output INPUT_GOOD. It should be connected to the reference of the external drivers and receivers of these signals. It is isolated from VIN- and VIN+.
2. Vin-, Pin 10, should not be connected externally to Vin-, Pin A2. It can be connected to AGND, Pin 1, externally if the user wishes the control signal reference to be local to the MTQ assembly.

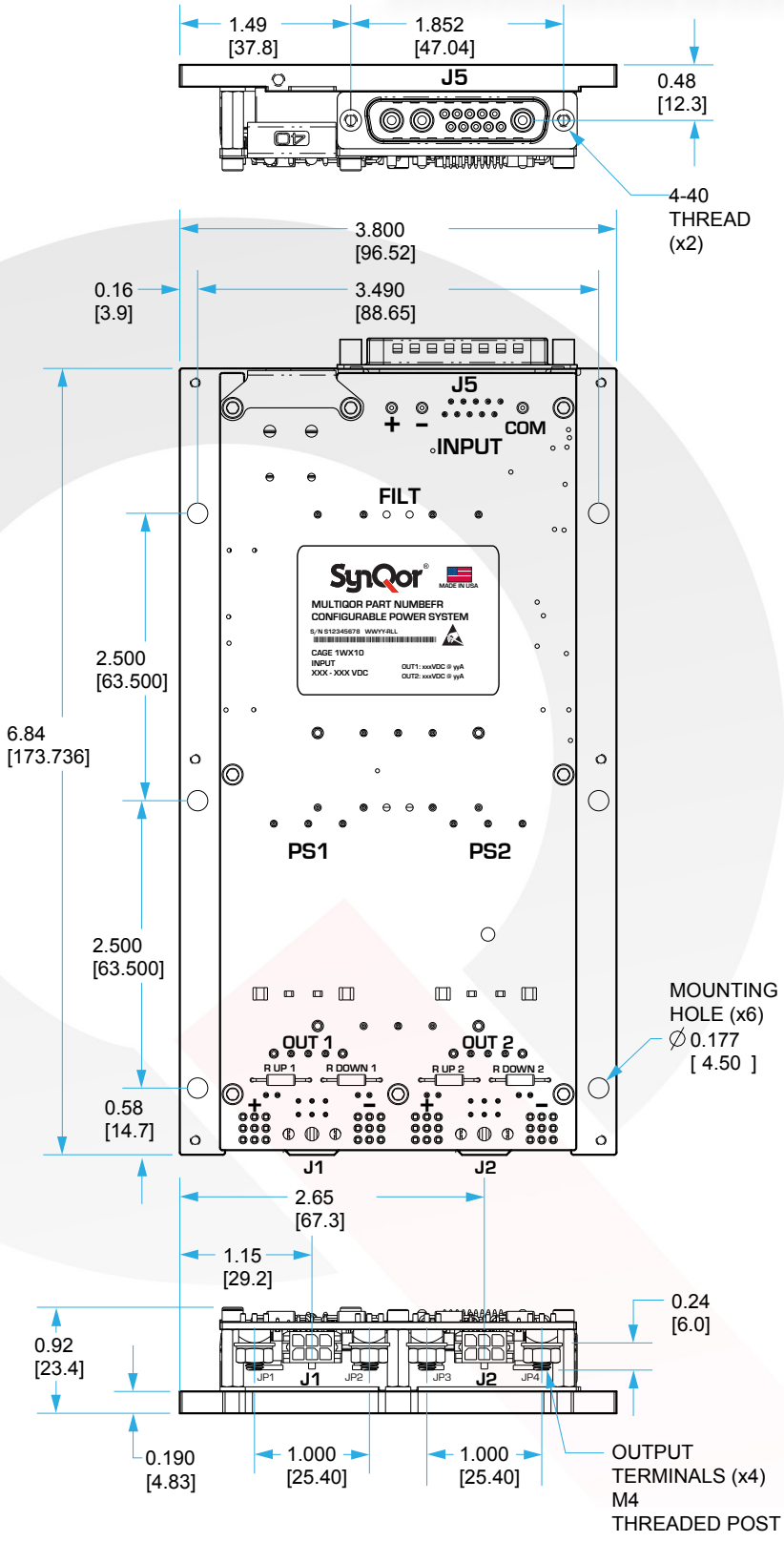
Output Connector (J1)

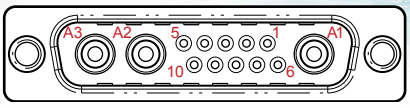
Pin	Name	Function
1	MONITOR+	Monitor of Vout+
2	NC	Not Connected
3	MONITOR–	Monitor of Vout–
4	VSENSE+	Sense Positive
5	TRIM	Trim Pin
6	VSENSE–	Sense Negative

NOTES:

1. All dimensions in inches [MM]
2. Tolerances: X.XX ±0.02 IN [±0.5MM]
   X.XXX ±0.010 IN [±0.25MM]
3. Connector Part Numbers:
   J5 COMBO-D 13W3 MALE
   J1-2 MOLEX 430450606
4. Weight: Total assembly weight depends on (Excluding converter) 1.0 LBS [0.46 kg]
   Typical Weight: 1.2 LBS to 1.3 LBS (1 QB or 1 HB)
5. Torque Spec for Mounting Holes and Output Terminals, 6in—lbs.

MECHANICAL DRAWING P2





Input Connector (J5)

Pin	Name	Function
1	AGND	Analog Ground[1]
2	INH_1	Inhibit 1 [Ref to AGND]
3	INH_2	Inhibit 2 [Ref to AGND]
4	NC	Not Connected
5	NC	Not Connected
6	INPUT_GOOD	[Ref to AGND]
7	STANDBY+	[Ref to STANDBY–]
8	STANDBY–	STANDBY–
9	ON/OFF	[Ref to AGND]
10	VIN–	[Signal Connection][2]
A1	COM IN	Chassis
A2	VIN–	[Power connection]
A3	VIN+	[Power connection]

NOTES:

1. AGND, Pin 1, is the reference for control inputs INH_1, 2, ON/OFF, and control output INPUT_GOOD. It should be connected to the reference of the external drivers and receivers of these signals It is isolated from VIN- and VIN+.
2. Vin-, Pin 10, should not be connected externally to Vin-, Pin A2. It can be connected to AGND, Pin 1, externally if the user wishes the control signal reference to be local to the MTQ assembly.

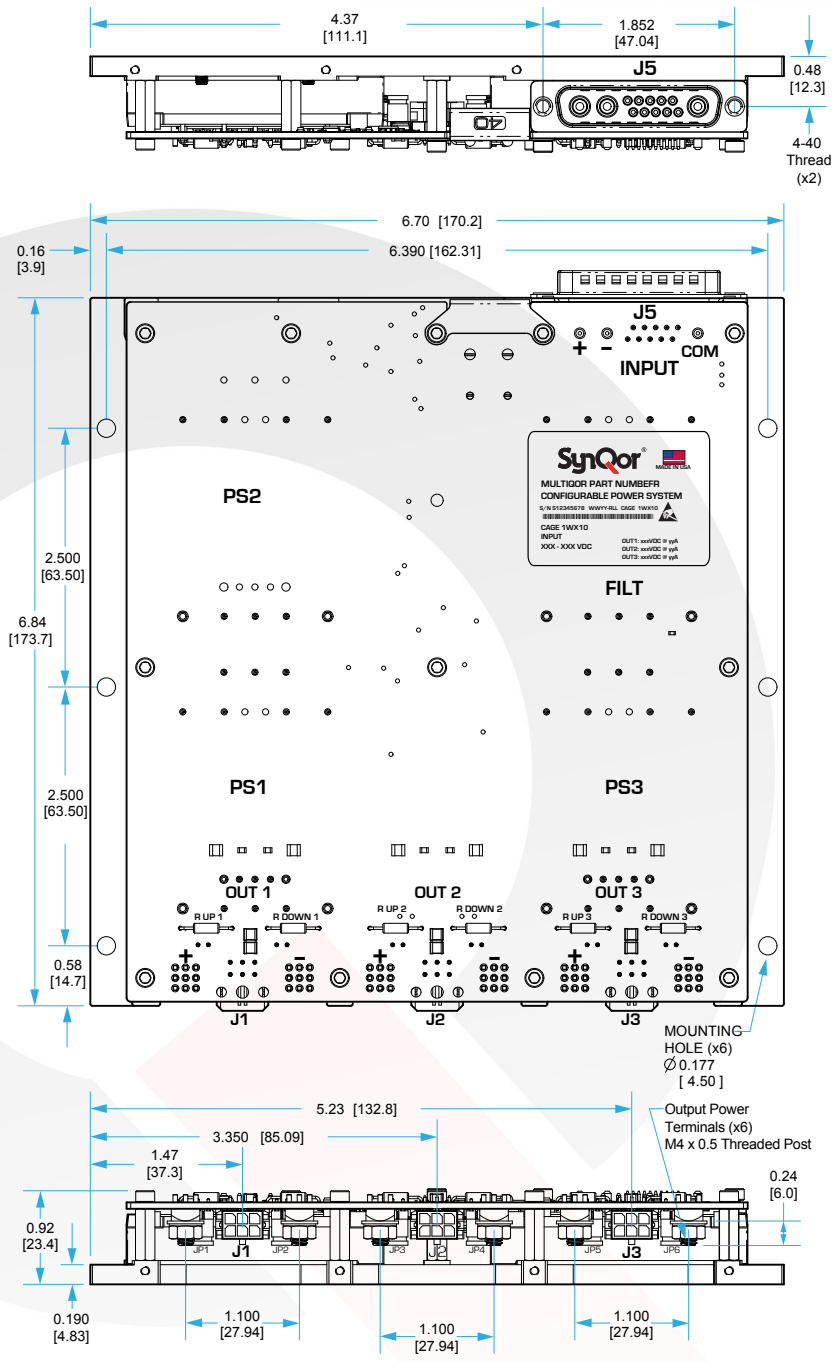
Output Connector (J1 & J2)

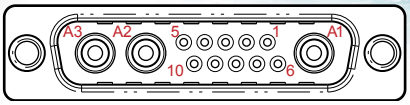
Pin	Name	Function
1	MONITOR+	Monitor of Vout+
2	NC	Not Connected
3	MONITOR–	Monitor of Vout–
4	VSENSE+	Sense Positive
5	TRIM	Trim Pin
6	VSENSE–	Sense Negative

NOTES:

1. All dimensions in inches [MM]
2. Tolerances: X.XX ±0.02 IN [±0.5MM]
   X.XXX ±0.010 IN [±0.25MM]
3. Connector Part Numbers:
   J5 COMBO-D 13W3 MALE
   J1-2 MOLEX 430450606
4. Weight: Total assembly weight depends on (Excluding converter) 1.0 LBS [0.46 kg]
   Typical Weight: 1.4 LBS (2QB)
5. Torque Spec for Mounting Holes and Output Terminals, 6in—lbs.

Mechanical Drawing P3





Input Connector (J5)

Pin	Name	Function
1	AGND	Analog Ground[1]
2	INH_1	Inhibit 1 [Ref to AGND]
3	INH_2	Inhibit 2 [Ref to AGND]
4	INH_3	Inhibit 3 [Ref to AGND]
5	NC	Not Connected
6	INPUT_GOOD	[Ref to AGND]
7	STANDBY+	[Ref to STANDBY–]
8	STANDBY–	STANDBY–
9	ON/OFF	[Ref to AGND]
10	VIN–	[Signal Connection][2]
A1	COM IN	Chassis
A2	VIN–	[Power connection]
A3	VIN+	[Power connection]

NOTES:

1. AGND, Pin 1, is the reference for control inputs INH_1, 2, 3, ON/OFF, and control output INPUT_GOOD. It should be connected to the reference of the external drivers and receivers of these signals. It is isolated from VIN- and VIN+.
2. Vin-, Pin 10, should not be connected externally to Vin-, Pin A2. It can be connected to AGND, Pin 1, externally if the user wishes the control signal reference to be local to the MTQ assembly.

Output Connector (J1,J2,J3)

Pin	Name	Function
1	MONITOR+	Monitor of Vout+
2	NC	Not Connected
3	MONITOR–	Monitor of Vout–
4	VSENSE+	Sense Positive
5	TRIM	Trim Pin
6	VSENSE–	Sense Negative

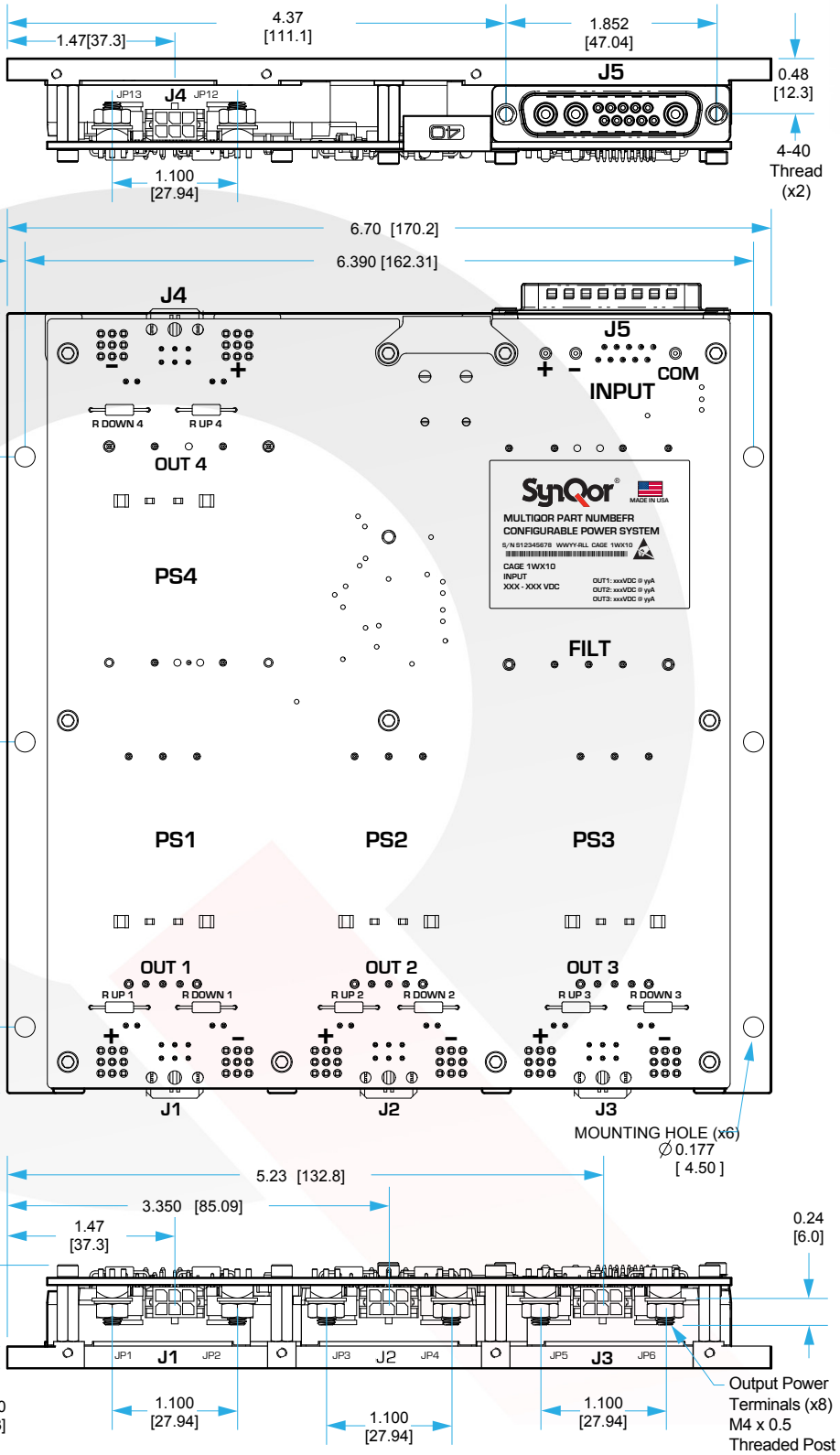
NOTES:

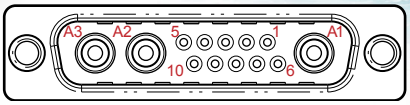
1. All dimensions in inches [MM]
2. Tolerances: X.XX ±0.02 IN [±0.5MM]
   X.XXX ±0.010 IN [±0.25MM]
3. Connector Part Numbers:
   J5 COMBO-D 13W3 MALE
   J1-3 MOLEX 430450606
4. Weight: Total assembly weight depends on (Excluding converter) 1.5 LBS [0.68 kg]
   Typical Weight: 2.1 to 2.5 LBS (3 QB or 3 HB)
5. Torque Spec for Mounting Holes and Output Terminals, 6in—lbs.

MultiQor™ Plate

MTQ-Px-DC28T

Mechanical Drawing P4





Input Connector (J5)

Pin	Name	Function
1	AGND	Analog Ground[1]
2	INH_1	Inhibit 1 [Ref to AGND]
3	INH_2	Inhibit 2 [Ref to AGND]
4	INH_3	Inhibit 3 [Ref to AGND]
5	INH_4	Inhibit 4 [Ref to AGND]
6	INPUT_GOOD	[Ref to AGND]
7	STANDBY+	[Ref to STANDBY–]
8	STANDBY–	STANDBY–
9	ON/OFF	[Ref to AGND]
10	VIN–	[Signal Connection][2]
A1	COM IN	Chassis
A2	VIN–	[Power connection]
A3	VIN+	[Power connection]

NOTES:

1. AGND, Pin 1, is the reference for control inputs INH_1, 2, 3, 4, ON/OFF,and control output INPUT_GOOD. It should be connected to the reference of the external drivers and receivers of these signals. It is isolated from VIN- and VIN+.
2. Vin-, Pin 10, should not be connected externally to Vin-, Pin A2. It can be connected to AGND, Pin 1, externally if the user wishes the control signal reference to be local to the MTQ assembly.

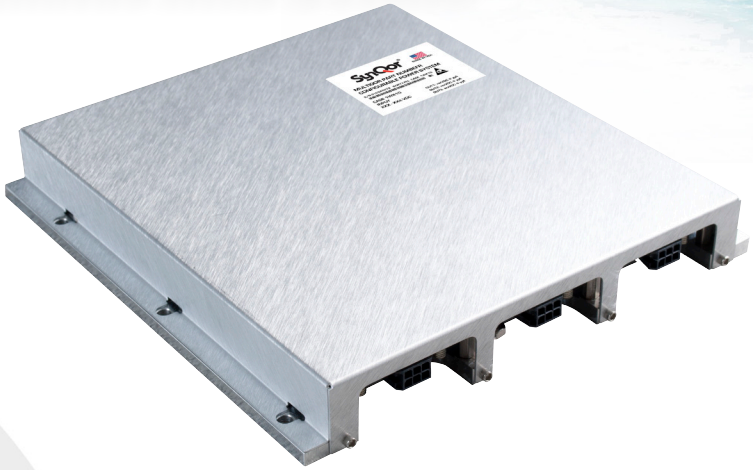
Output Connector (J1,J2,J3,J4)

Pin	Name	Function
1	MONITOR+	Monitor of Vout+
2	NC	Not Connected
3	MONITOR–	Monitor of Vout–
4	VSENSE+	Sense Positive
5	TRIM	Trim Pin
6	VSENSE–	Sense Negative

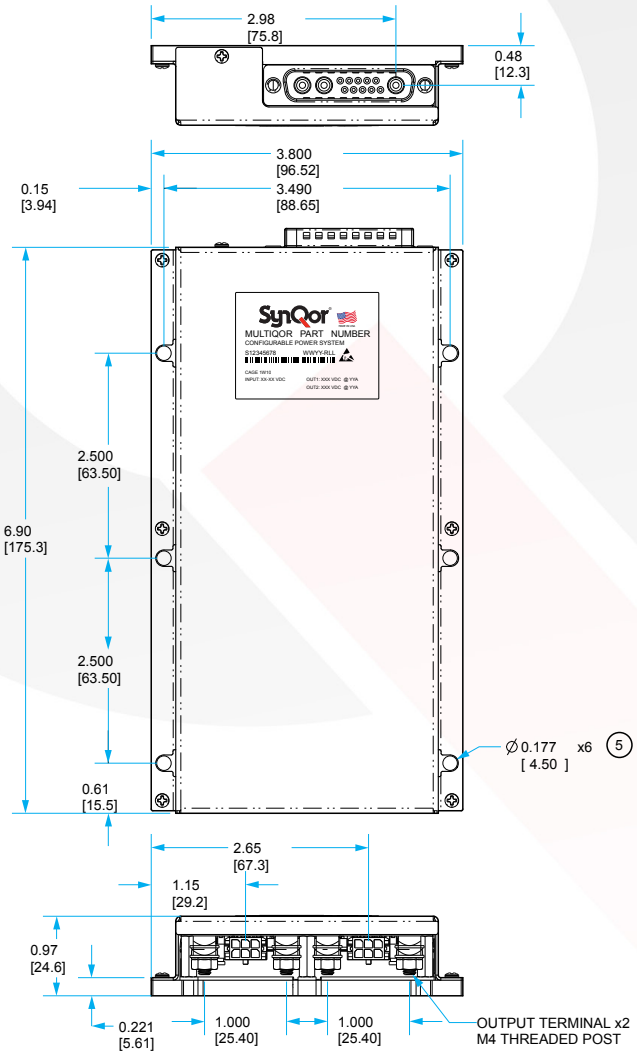
NOTES:

1. All dimensions in inches [MM]
2. Tolerances: X.XX ±0.02 IN [±0.5MM]
   X.XXX ±0.010 IN [±0.25MM]
3. Connector Part Numbers:
   J5 COMBO-D 13W3 MALE
   J1-4 MOLEX 430450606
4. Weight: Total assembly weight depends on (Excluding converter) 1.5 LBS [0.68 kg]
   Typical Weight: 2.4 LBS (3 QB & 1 HB)
5. Torque Spec for Mounting Holes and Output Terminals, 6in—lbs.

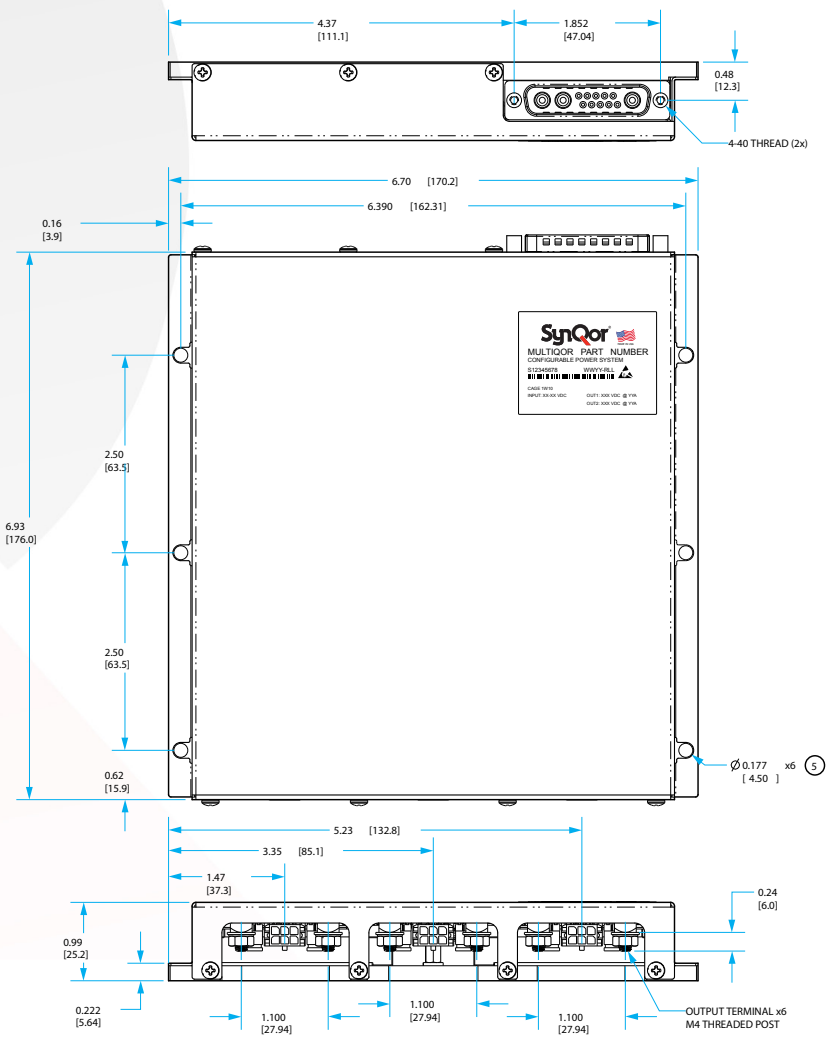
Mechanical Drawings with Covers



P1 & P2 have similar covers



P3 & P4 have similar covers



MultiQor Control Circuitry Features

The MTQ-Px-DC28T has control feature signals available on the connector, J5.

Converter SYSTEM ON/OFF:

The MTQ-Px-DC28T has two options for the user to control when a converter is on or off. There is a SYSTEM ON/OFF control, shown in Figure A. The SYSTEM ON/OFF pin, Pin 9 of J5, must be pulled high to turn all the converters off. The SYSTEM ON/OFF controls are referenced to AGND, Pin 1 of J5.

INHIBIT Controls:

Each converter has an independent INHIBIT control, shown in Figure B. The specific INHIBIT pin, Pins 2 through 5 of J5, must be pulled high to keep the corresponding converter off even when the SYSTEM ON/OFF pin is low. The INHIBIT controls are referenced to AGND, Pin 1 of J5.

Control Summary

Standby	System On/Off	Inhibit	Output(s)
Low/open			Off
High	High		Off
High	Low/open	High	Off
High	Low/open	Low/open	On

STANDBY:

The MTQ-Px-DC28T's internal filter has standby circuitry that minimizes the power drawn from the input power source when the standby feature is activated. Figure C shows the equivalent circuit looking into the STANDBY+/- pins, Pin 7 & 8 of J5. The voltage across these two pins should be pulled high to have the filter operate in its normal mode. If the pin is left open-circuit or pulled low, the standby feature will be activated. Note: As an option the standby control circuitry can be removed, which would cause the filter to always remain in its normal mode.

INPUT GOOD:

The INPUT GOOD signal, Pin 6 of J5, is an open collector output which is pulled low when the converters have an input voltage above 16V. This signal is referenced to AGND, Pin 1 of J5. An example external 5V pull-up circuit is shown in Figure D.

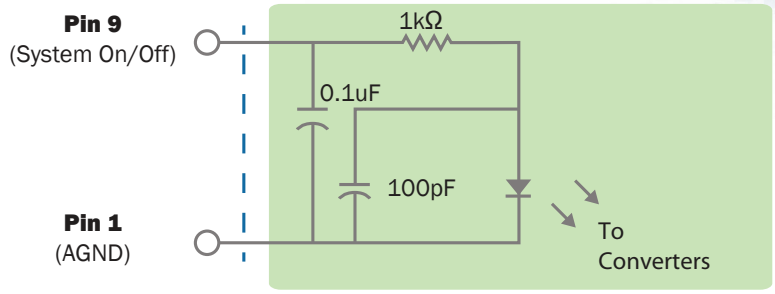


Figure A: An equivalent circuit looking into the SYSTEM ON/OFF pin.

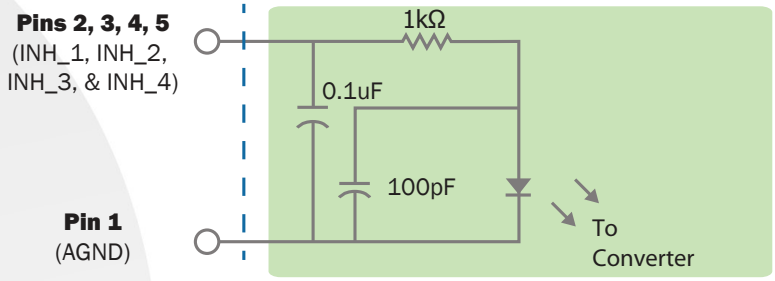


Figure B: An equivalent circuit looking into any INHIBIT pin.

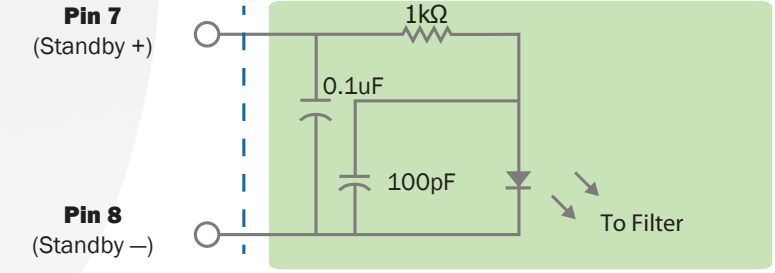


Figure C: An equivalent circuit looking into the STANDBY pin.

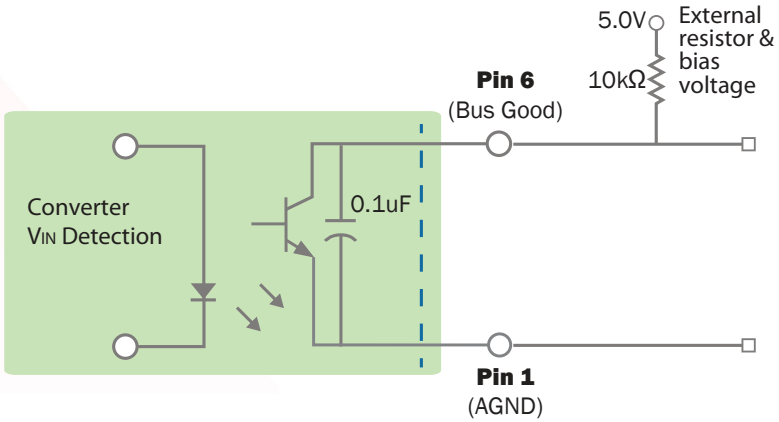
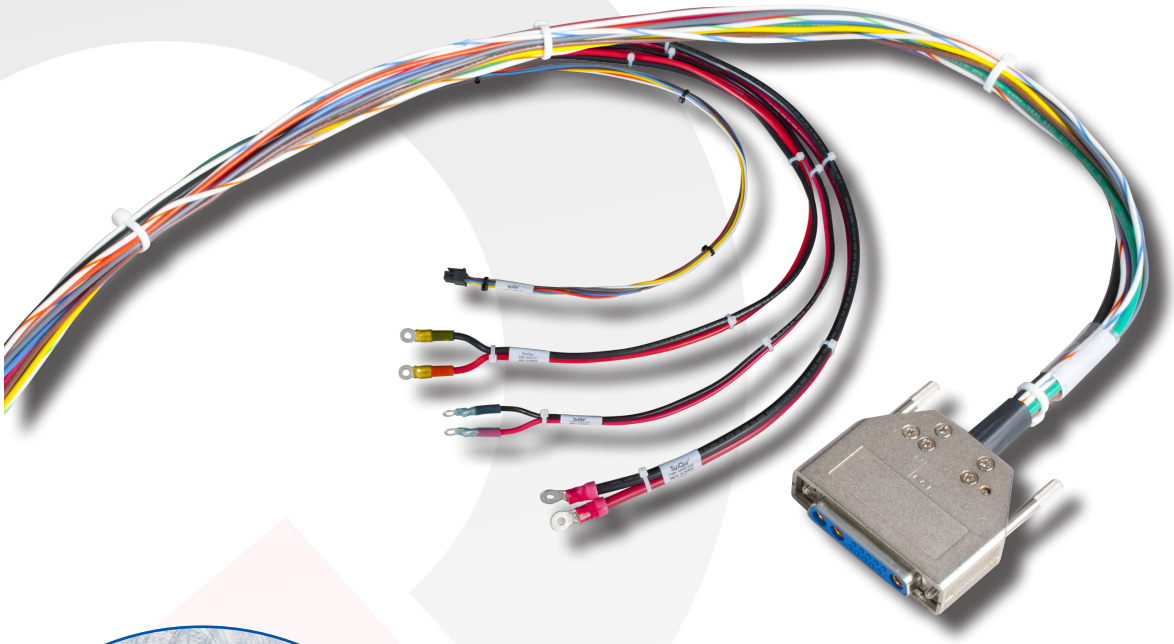


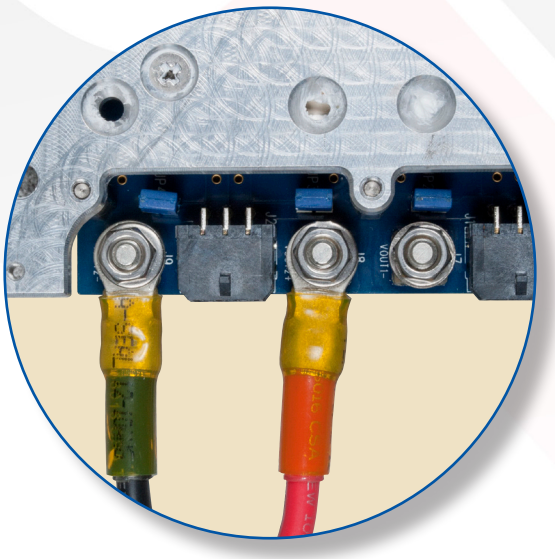
Figure D: An equivalent circuit looking into the INPUT GOOD pin with an example external pull-up circuit.

MultiQor Plate Cables

These cables can be used with MultiQor Plates and Adaptor Boards with multiple output options to accommodate different levels of output current.

Description	Part Number
Input mating cable with pre-stripped wire ends (36”)	MTQ-CBL-INPUT1C
Output signal mating cable with pre-stripped wire ends (36”)	MTQ-CBL-OUT1CS
Output power mating cable (20A) with pre-stripped wire ends (36”)	MTQ-CBL-OUT1CP20
Output power mating cable (40A) with pre-stripped wire ends (36”)	MTQ-CBL-OUT1CP40
Output power mating cable (60A) with pre-stripped wire ends (36”)	MTQ-CBL-OUT1CP60





POWER CONNECTION

NOTE: J1 - J4 Monitor Pins are not rated to carry the converter’s output.

Output terminal studs should be used as shown.

Ordering Information / Part Numbering

MTQ - P1 - DC28T - XXXXXXXX - S _

Family	-	Plate Format (# of Outputs)	-	MIL-STD Compliance	-	8 Digit Application Identification Number	-	Screening	Optional Character
MTQ		**P1:** 1 output **P2:** 2 output **P3:** 3 output **P4:** 4 output		MIL-STD-704 (A-F) MIL-STD-1275(B,D) **DC28T:** DEF-STAN 61-5 (Part 6)/6 (converters shut off below 16Vin)		8 Digit Application Identification Number		**S:** S-Grade **M:** M-Grade	**Blank:** Standard **V:** Cover

Not all combinations make valid part numbers, please contact SynQor to order a configured solution.

Example: MTQ-P3-DC28T-XXXXXXXX-S

Contact SynQor for further information and to order:

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

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:

6,545,890 6,594,159 6,894,468 6,896,526 6,927,987 7,050,309
7,085,146 7,119,524 7,765,687 7,787,261 8,149,597 8,644,027
9,143,042

WARRANTY

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