

# EXCELSYS COOLX<sup>®</sup> MODULES

## INTELLIGENT MODULAR POWER SUPPLIES

Advanced Energy's CoolX<sup>®</sup> modules are designed to be used with the Advanced Energy's CoolX series, part of our Excelsys product line of intelligent modular power supplies.

CoolX modules can be used with the fanless, convection cooled CoolX1000 or CoolX600 U-Channel designs, or the fan cooled CoolX1800 to deliver up to 1800 W in a compact 1U high package.

The CoolX<sup>®</sup> series also offers increased flexibility by allowing system designers to monitor and control power supply performance — essential for staving off process disruption — using either analog or digital communications (PMBus<sup>™</sup>).

### PRODUCT HIGHLIGHTS

#### Reliability

- High-input surge protection — 4 kV line to PE for harsh environments
- Reverse energy protection — no blocking diodes required
- Safety approved to 5000 m altitude
- 93% efficiency
- Five-year warranty

#### Flexibility

- Analog and digital management — PMBus<sup>™</sup> monitoring and control capability
- Field-configurable — plug and play power
- Series and parallel outputs — higher voltages/currents
- Mounting options — base/side and DIN-Rail mounting

### TYPICAL APPLICATIONS

#### Medical

- Clinical diagnostic equipment, medical lasers, dialysis equipment, radiological imaging, clinical chemistry

#### Industrial

- Test and measurement, industrial machines, automation equipment, printing, telecommunications, audio equipment

#### Hi Rel

- Harsh industrial electronics, radar (naval- and ground-based), communications, test and measurement

### AT A GLANCE

#### Power

Standard modules deliver up to 300 W in fan cooled chassis, 200 W in convection cooled chassis

High Power Modules deliver 900 W in fan cooled chassis, 600 W in convection cooled chassis

#### Cooling

Fan Cooled or Convection Cooled options

#### Certifications

##### Medical

- IEC60601-1 3rd edition, IEC60601-1-2 4th edition (EMC)
- 2 MOPP
- Dual fused
- ISO 9001:2015

##### Industrial

- IEC60950, IEC62368-1
- SEMI F47\*

## MODULES

CoolX CoolMods						
Single Output Modules (1 Slot)	Vnom (V)	Set Point Adjust Range (V)	I <sub>max</sub> (A) (CX600 & CX1000)	Power (W) – Convection Cooled (CX600 & CX1000)	I <sub>max</sub> (A) (CX1800)	Power (W) – Fan Cooled (CX1800)
CmA	5	2.5-6.0	21.0	105	30.0	150
CmB <sup>1</sup>	12	6.0-15.0 <sup>2</sup>	15.0	180	23.3	280
CmC	24	15.0-28.0	8.3	200	12.5	300
CmD	48	28.0-58.0 <sup>3</sup>	4.17	200	6.25	300
High Power Modules (3 Slot)						
CmE <sup>4</sup>	24	24-25.2	25.0	600	37.5	900
CmF <sup>4</sup>	48	48-50.4	12.50	600	18.75	900
Dual Output Modules (1 Slot)						
CmG <sup>5</sup> V1	24	3.0-30.0	3.0	90	4.0	120
V2	24	3.0-30.0	3.0	90	4.0	120
CmH <sup>6</sup> V1	5	3.0-6.0	6.0	36	10.0	60
V2	24	3.0-30.0	3.0	90	4.0	120
Wide Trim Modules (1 Slot)						
CmA-W01	5	1.0-6.0	21	105	30.0	150
CmB-W01	12	1.0-15.0 <sup>2</sup>	15	180	23.3	280
CmC-W01	24	2.0-28.0	8.33	200	12.5	300
CmD-W01	48	3.0-58.0 <sup>3</sup>	4.17	200	6.25	300

\* SEMI F47 compliant at input voltages > 180 VAC. Consult Advanced Energy for details.

<sup>1</sup> Full dynamic specifications may not be met at full load when output voltage is trimmed by above 13 V

<sup>2</sup> Max trim 14 V when used with high power module

<sup>3</sup> Max trim 56 V when used with high power module

<sup>4</sup> a) Only one high power module (CmE or CmF) can be used per CoolPac.

b) During load transients starting from 0% load on the High Power modules, other modules in the CoolPac may experience an output voltage dynamic during the load change. Contact applications support for details or support.

<sup>5</sup> For the CmG module, the max combined power of both outputs is 120 W (Convection Cooled) or 200 W (Fan Cooled)

<sup>6</sup> For the CmH module, the max combined power of both outputs is 100 W (Convection Cooled) or 180 W (Fan Cooled)

## ELECTRICAL SPECIFICATIONS

Output						
Parameter	Conditions/Description	Min	Nom	Max	Units	
Minimum Load		0	—	—	A	
Line Regulation	For $\pm 10\%$ change from nominal line	—	—	$\pm 0.1$	%	
	CmE, CmF, CmG, CmH	—	—	$\pm 0.5$	%	
Load and Cross Regulation	For 25% to 75% load change	—	—	$\pm 0.2$	%	
Transient Response	For 25% to 75% load change 0.5 A/ $\mu$ S: Voltage deviation	—	—	4 (4)	%	
	*CmE and CmF, figures in ( ) settling time	—	—	500 (1000)	$\mu$ S	
Ripple and Noise	100 mV or 1.0% pk-pk. 20 MHz BW	—	—	1	%	
	CmE, CmF	—	—	3	%	
Overvoltage Protection	Tracking OVP Level (N/A in CmE and CmF, CmG, CmH)	105	—	125	%	
	Non-latching OVP	110	—	160	%	
Remote Sense	Max. line drop compensation. (N/A in CmG, CmH)	—	—	0.5	VDC	
Overshoot		—	—	1	%	
Rise Time	Monotonic CmG, CmH figures in ( )	—	—	10 (20)	ms	
Turn-On Delay	From AC	—	—	800	ms	
	From global enable	—	—	12 (20)	ms	
	From CoolMod enable	—	—	12 (20)	ms	
Hold-Up Time	For nominal output voltages at full load	16	—	—	ms	
CoolMod Power	As per CoolMod table	—	—	—	—	
Output Adjustment Range	Manual: Multi-turn potentiometer. As per CoolMod table Vtrim: As per CoolMod table	—	—	—	—	
Overcurrent Protection	Straight line with hiccup activation @ 35% Vo nom CmE, CmF, CmG, CmH: Current limit hiccup autorecovery	110	130	150	%	
Short Circuit Protection	Yes, autorecovery	—	—	—	—	
OverTemperature Protection	Yes, autorecovery (CmG, CmH latch off)					
Capacitive Load	Nominal output voltages at full load	CmG	—	—	270	$\mu$ F
		CmH	—	—	270	$\mu$ F
		CmE	—	—	10	mF
		CmF	—	—	2.5	mF

ELECTRICAL SPECIFICATIONS (CONTINUED)

Galvanic Isolation					
Parameter	Conditions/Description	Min	Nom	Max	Units
Input to Output	Reinforced (2 x MOPP); contact Advanced Energy for Hi-Pot instructions	4000	—	—	VAC
Output to Case	Basic (1 x MOPP)	1850	—	—	VAC
Output to Output	Basic (1 x MOPP)	1850	—	—	VAC
Output to Output (Dual)	CmG, CmH V1-V2	500	—	—	VDC

Environmental					
Parameter	Conditions/Description	Min	Nom	Max	Units
Operating Temperature	Operates to specification below -20°C after 10 min warm-up	-40	—	85	°C
Storage Temperature		-40	—	85	°C
Derating	See derating curves in the Designers Manual	—	—	—	—
Relative Humidity	Non-condensing	5	—	95	%RH
Shock and Vibration	MIL-STD-810G Method 514.6	—	—	—	—
Altitude		—	—	5000	m

EMC		
Parameter	Conditions/Description	Criteria
Radiated Emissions <sup>1</sup>	EN 55011, EN 55022 and FCC, Class B	Compliant
Conducted Emissions	EN 55011, EN 55022 and FCC, Class B	Compliant
Power Line Harmonics	EN 61000-3-2, Class A	Compliant
Voltage Flicker	EN 61000-3-3	Compliant
ESD	EN 61000-4-2, level 4, 8 kV contact, 15 kV air	A
Radiated Immunity	EN 61000-4-3, level 3, 10V/m 80-2700 MHz	A
Electrical Fast Transient	EN 61000-4-4, level 4, ±4 kV	A
Surge Immunity	EN 61000-4-5, level 4, 2 kV DM, 4 kV CM	A
Conducted RF Immunity	EN 61000-4-6, level 3, 10 Vemf 150 KHz-80 MHz	A
Power Frequency Magnetic Field	EN 61000-4-8, level 4, 30 A/m	A
Voltage Dips & Interruptions	EN 61000-4-11	A & B Compliant

<sup>1</sup> Consult AE applications for system level compliance

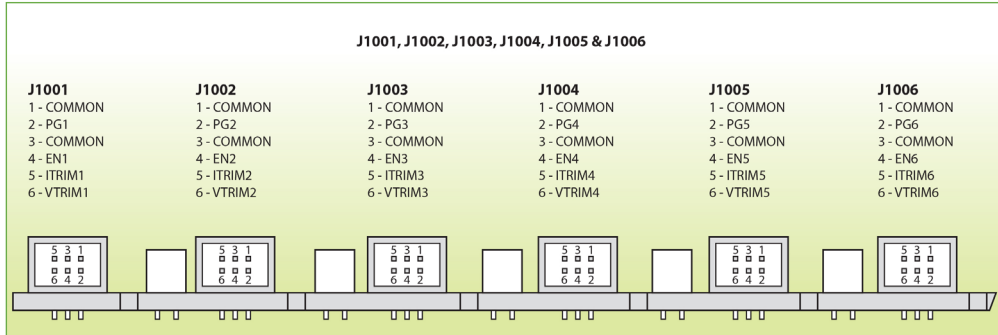
Standards & Directives	
Standard	Conditions/Description
Safety Agency Approvals	EN60601-1 3rd edition, UL60601-1, CSA601, EN60950 2nd edition, CSA C22.2 No. 60950-1, IEC 62368-1
IEC/EN 60950-1, Edition 2	UL 60950-1/CSA 22.2 No 60950-1, Edition 2; 5000 m (16,400 ft) altitude, 100 V to 240 VAC ±10%
IEC/EN 60601-1, Edition 3	IEC 60601-1(2005), EN60601-1(2006), ANSI/AAMI ES 60601-1(2005), CAN/CSA C22.2 No. 60601-1 (2008); 5,000 m (16,400 ft) altitude, 100 V to 240 VAC ±10%
IEC 62368 Edition 2	IEC 62368-1 (2014) Edition 2 5000 m (16,400 ft) altitude, 100 V to 240 VAC ±10%
IEC 60601-1-2 Edition 4	IEC 60601-1-2 (2014)
Protection class	Class I
WEEE	Waste Electrical and Electronic Equipment Directive (WEEE) 2002/96/EC
ROHS	EU DIRECTIVE 2011/65/EC RoHS compliancy
REACH	Compliant

**MECHANICAL SPECIFICATIONS**

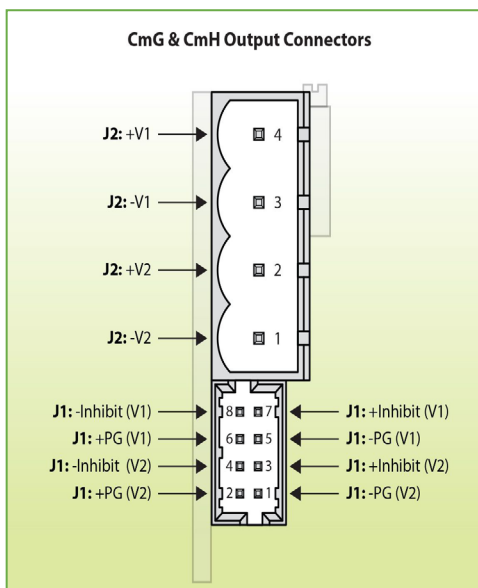
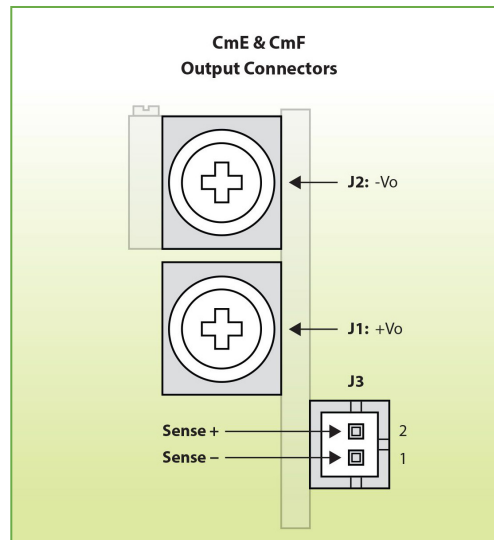
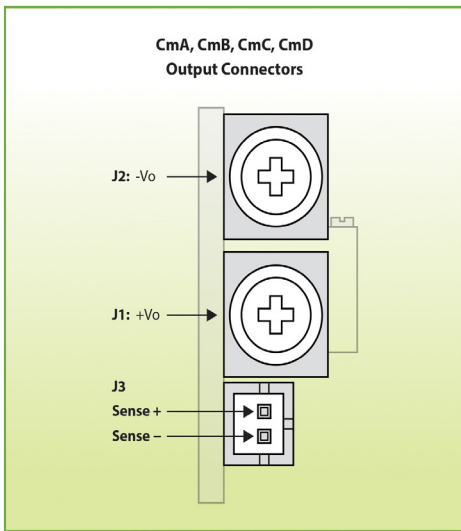
Mechanical Data		
Connectors	Description	Mating Connectors (if applicable)
AC/DC Input Terminal Block	TE 2-1437667-S, DINKLE DT-35-B07W-03	—
Main DC Output Terminal Block (CmA-CmF)	M4 Screws	—
Main DC Output Terminal Block (CmG, CmH)	Camden - CTB9350/4A	—
Output Signal Connector (CmG, CmH)	Molex - 87833-0831	—
System Signal Connector J1007	Molex 87833-0831 8-way	Locking Molex 51110-0860; Non Locking Molex 51110-0850; Crimp Terminal: Molex p/n 50394 or Molex 51110-0856 which includes locking tab and polarization keying
Output Signal Connectors J1001-1006	Molex 87833-0631 6-way	Locking Molex 51110-0660; Non Locking Molex 51110-0650; Crimp Terminal: Molex p/n 50394 or Molex 51110-0656 which includes locking tab and polarization keying
Output Sense Connectors J3	JST-S2BPH-K(LF)(SN)	JST PHR2. Crimp Terminal JST BPH-002TP.05S or SPH-002T-P.05S
Auxiliary Output Connector J1	Molex 1041880210 2pin	—

INTERFACE

Signal Connectors



CoolMod Connectors





## ABOUT ADVANCED ENERGY

Advanced Energy (AE) has devoted more than three decades to perfecting power for its global customers. AE designs and manufactures highly engineered, precision power conversion, measurement and control solutions for mission-critical applications and processes.

AE's power solutions enable customer innovation in complex semiconductor and industrial thin film plasma manufacturing processes, demanding high and low voltage applications, and temperature-critical thermal processes.

With deep applications know-how and responsive service and support across the globe, AE builds collaborative partnerships to meet rapid technological developments, propel growth for its customers and power the future of technology.

PRECISION | POWER | PERFORMANCE



For international contact information, visit [advancedenergy.com](http://advancedenergy.com)

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