COOLX®1800

HIGH EFFICIENCEY, INTELLIGENT AND RELIABLE 1800 W MODULAR POWER SUPPLIES

Advanced Energy's CoolX®1800 series, part of our low voltage solutions, is an intelligent modular power supply. The CoolX1800 delivers an incredible 1800 W in a compact 1U high package with PMBus™ digital communications, control and reliability in addition to the most comprehensive feature set and specifications available.

PRODUCT HIGHLIGHTS

Modular Power Supply
- Up to 1800 W
- Up to 12 outputs
- All outputs isolated (1850 VAC)
- Variable fan speed control

Reliability
- MTBF > 200,000 hours
- Level 4 input surge protection
- 23.5 W always ON auxiliary power output
- Safety approved to 5000 m altitude
- 93% efficiency
- Five-year warranty

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

TYPICAL APPLICATIONS

Medical
- Clinical diagnostic equipment, medical lasers, dialysis equipment, radiological imaging, chemical chemistry

Industrial
- Test and measurement, industrial machines, automation equipment, printing, telecommunications, MIL-COTS

Audio Equipment
- Hi Rel, harsh industrial electronics, radar (marine- and ground-based), communications, test and measurement

AT A GLANCE

	CX18S	CX18M
Power		
	1800 W	1800 W
Slots		
	6	6

Cooling

Variable fan speed control

Parameters

267 mm x 127 mm x 41 mm (10.5 in x 5 in x 1U)

Certifications

Medical (CX18M)
- IEC60601-1 3rd edition, IEC60601-1-2 4th edition (EMC)
- 2 MOPP
- Dual fused
- ISO13485

Industrial (CX18S)
- IEC60950, IEC62368-1
- SEMI F47

Defense/Aero (All Models)
- MIL-STD-810G

MODULES

CoolX CoolMods Table				
Single Output Modules (1 Slot)	**Vnom(V)**	**Set Point Adjust Range (V)**	**Imax(A)**	**Power (W)**
CmA	5	2.5-6.0	30.0	150
CmB[1]	12	6.0-15.0[2]	23.3	280
CmC	24	15.0-28.0	12.5	300
CmD	48	28.0-58.0[3]	6.25	300
High Power Modules (3 Slot)				
CmE[4]	24	22.8-25.2	37.5	900
CmF[4]	48	45.6-50.4	18.75	900
Dual Output Modules (1 Slot)				
CmG[5] V1	24	3.0-30.0	4.0	120
V2	24	3.0-30.0	4.0	120
CmH[6] V1	5	3.0-6.0	10.0	60
V2	24	3.0-30.0	4.0	120
Wide Trim Modules (1 Slot)				
CmA-W01	5	1.0-6.0	30	150
CmB-W01	12	1.0-15.0[2]	23.3	280
CmC-W01	24	2.0-28.0	12.5	300
CmD-W01	48	3.0-58.0[3]	6.25	300

[1] Full dynamic specifications may not be met at full load when output voltage is trimmed above 13 V.

[2] Max Trim 14 V when used with High Power Module

[3] Max Trim 56 V when used with High Power Module

[4] 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..

[5] For the CmG module the max combined power of both outputs is 200 W.

[6] For the CmH module the max combined power of both outputs is 180 W.

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

ELECTRICAL SPECIFICATIONS

Input					
Parameter	**Conditions/Description**	**Min**	**Nom**	**Max**	**Units**
Nominal Input Voltage Range	Universal Input 47-440Hz	100	—	240	VAC
AC Operating Input Range		85	—	264	VAC
Extended AC Operating Range	Maximum for 5 seconds	—	—	300	VAC
DC Input Voltage Range		120		300	VDC
Input Current	90 VAC @ 1800 W	—	—	14.5	A
Inrush Current	230 VAC @ 1800 W	—	—	25	A
Power Factor	120 VAC @ 1400 W	0.98	—	—	—
Undervoltage Lockout	Shutdown	65	—	74	VAC
Input Fuses Rating	Dual Fused (Line and Neutral) 250 VAC	—	16	—	A
Efficiency	230 VAC, 1800 W with 6 x CmC CoolMods	91		%	
	230 VAC, 1800 W with 2 x CmF CoolMod	—	93	—	%

Output					
Parameter	**Conditions/Description**	**Min**	**Nom**	**Max**	**Units**
Power Rating	CX18: See derating curves	—	—	1800	W
Minimum Load		0	—	—	A
Line Regulation	For ±10% change from nominal line	—	—	±0.1	%
	CmE, CmF, CmG, CmH	—	—	±0.5	%
Load and Cross Regulation	For 25% to 75% load change	—	—	±0.2	%
Transient Response	Voltage Deviation, for 25% to 75% load change 0.5A/uS	—	—	4 (4)	%
	Settling Time, *CmE and CMF in ()	—	—	500 (1000)	µS
Ripple and Noise	100 mV or 1.0% pk-pk. 20 MHz BW	—	—	1	%
	CmF	—	—	1.5	%
Overvoltage Protection	Tracking OVP Level (N/A in CmE and CmF, CmG, CmH)	105	—	125	%
	Latching OVP Level	125	—	160	%
Remote Sense	Max. line drop compensation (N/A in CmG and CmH)	—	—	0.5	VDC
Overshoot		—	—	1	%
Rise Time	Monotonic	—	—	10	ms
	CmG and CmH	—	—	20	ms
Capacitive Load	CmA-CmE			10	mF
	CmG, CmH			< 0.47	mF
Turn-On Delay	From AC in	—	—	1000	ms
	From Global Enable	—	—	10	ms
	From CoolMod Enable	—	—	10	—
Hold-Up Time	For nominal output voltages at full load CmE and CmF combination at 1300 W	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)	—	—	—	—

ELECTRICAL SPECIFICATIONS (CONTINUED)

Auxiliary Output					
Parameter	**Conditions/Description**	**Min**	**Nom**	**Max**	**Units**
Auxiliary Output Voltage	Aux Voltage Option A	11.76	12	12.24	V
	Aux Voltage Option B	4.75	5	5.25	V
Load Regulation		—	—	±2	%
Line Regulation	For ±10% change from nominal line	—	—	±0.5	%
Maximum Output Current	Aux Voltage Option A	—	—	1.96	A
	Aux Voltage Option B	—	—	4.7	A
Load Capacitance		—	—	1000	uF
Output Overcurrent Protection	Hiccup	110		140	%
Short Circuit Protection	Yes, Autorecovery	—	—	—	—

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
Input to Case	Basic (1 x MOPP)	1850	—	—	VAC
Output to Case	Basic (1 x MOPP)	1850	—	—	VAC
Output to Output	Basic (1 x MOPP)	1850	—	—	VAC
CmG, CmH V1-V2	Operational	500	—	—	VDC

Reliabilty					
Parameter	**Conditions/Description**	**Min**	**Nom**	**Max**	**Units**
Reliability and MTBF	MTBF of >>3 million hours, Telecordia SR-332, Issue 4 CoolPac (excludes fans)	—	0.33	—	Fpmh
Warranty	5 years	—	—	—	—

Environmental					
Parameter	**Conditions/Description**	**Min**	**Nom**	**Max**	**Units**
Operating Temperature	Operates to specification below -20°C after 10 min warmup	-40	—	70	°C
Storage Temperature		-40	—	85	°C
Derating	See derating curves	—	—	—	—
Relative Humidity	Non-condensing	5	—	95	%RH
Shock and Vibration	MIL-STD-810G Method 514.6	—	—	—	—
Altitude		—	—	5000	m

ELECTRICAL SPECIFICATIONS (CONTINUED)

Leakage Currents			
Parameter	**Conditions/Description**	**Nom**	**Units**
AC Leakage Current	**Input to earth ground**		
Normal Condition (High Line)	Mains Voltage 264 VAC/60 Hz	244	µA
Single Fault Condition (High Line)	Mains Voltage 264 VAC/60 Hz	435	µA
Touch Current			
Normal Condition	Mains Voltage 264 VAC/60 Hz	14.2	µA
Single Fault Condition	Mains Voltage 264 VAC/60 Hz	246	µA

EMC			
Parameter	**Conditions/Description**		**Notes**
Radiated Emissions[1]	EN 55011, EN 55022 and FCC, Class B	—	Compliant
Conducted Emissions[1]	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, 10 V/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 and Interruptions	EN61000-4-11	10 ms 100 ms 500 ms	A B B

[1] Consult AE applications for system level compliance

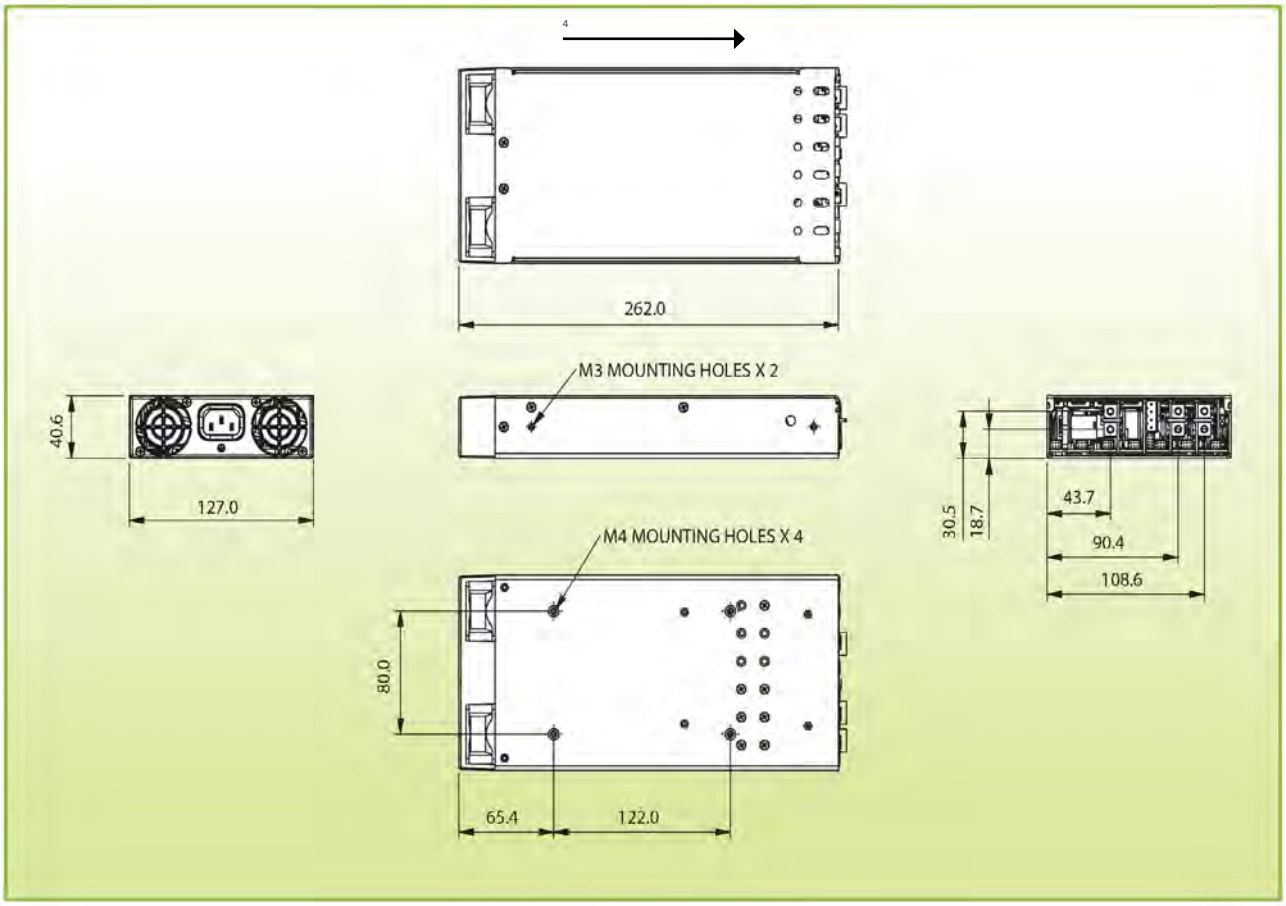
Standards and Directives	
Standard	**Conditions/Description**
Safety Agency Approvals	EN60601-1 3rd Edition, UL60601-1, CSA601, EN60950 2nd Edition, CSA C22.2 No. 60950-1
IEC/EN 60950-1, Edition 2 and all national deviations	UL 60950-1/CSA 22.2 No 60950-1, Edition 2; 5000 m (16,400 ft) altitude, 100 VAC to 240 VAC ±10%
IEC/EN 60601-1, Edition 3 and all national deviations	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 VAC to 240 VAC ±10%
IEC 62368 Edition 2	IEC 62368-1 (2014) Edition 2; 5000 m (16,400 ft) altitude, 100 VAC to 240 VAC ±10%
IEC 60601-1-2 Edition 4	IEC 60601-1-2 (2014)
Protection class	Class I
ROHS	EU DIRECTIVE 2015/863 RoHS compliant
REACH-171	Compliant
Conflict Materials	Compliant with Conflict Free Sourcing Initiative

MECHANICAL SPECIFICATIONS

Mechanica Data		
Parameter	**Description**	
Dimensions (L x W x H)	L x W x H	267 mm x 127 mm x 41 mm (10.5” x 5” x 1U)
Weight	Nominal Weight: CoolPac + 6 x CoolMods	1.6 Kg
Connectors	**Description**	**Mating Connectors (if applicable)**
AC/DC IEC input (Option)	Screw terminal Block and IEC inlet options. In Mating Connectors column state "See Interface page"	—
Main DC output terminal block (CmA-CmF, CmM-CmQ)	M4 Screws	—
Main DC output terminal block (CmG, CmH)	Camden - CTB9350/4A	—
Output Signal Connector (CmG, CmH)	Molex - 87833-0831	Camden - CTB9200/4A or Würth Elektronik - 691 352 710 004
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 Signal Connector (CmG, CmH)	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 Sense Connectors J3	JST-S2BPH-K(LF)(SN)	JST PHR2. Crimp Terminal JST BPH-002TP.0.5S or SPH-002T-P.05S
Auxiliary Output Connector J1	Molex 1041880210 2pin	

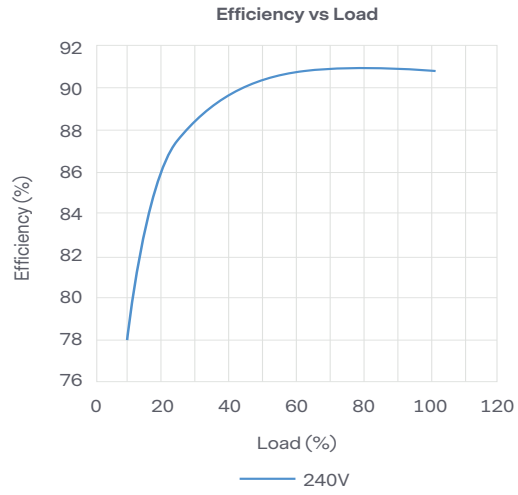
MECHANICAL SPECIFICATIONS (CONTINUED)

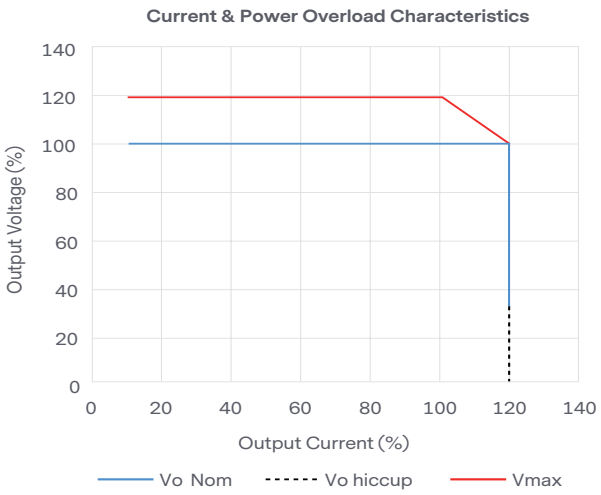
Mechanical Drawings

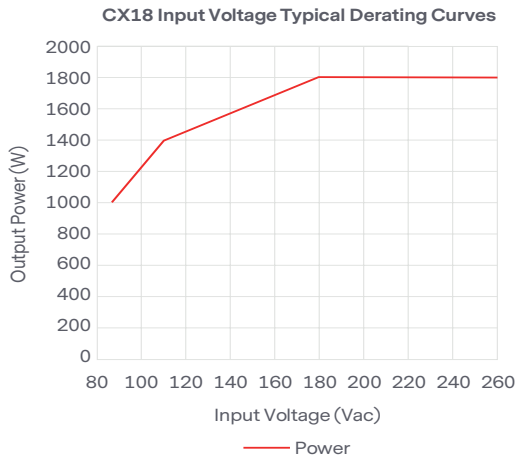


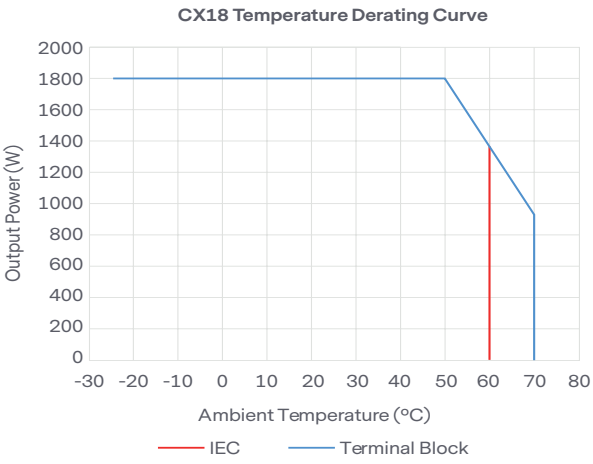
[1] Standard airflow direction
[*] Maximum screw penetration from base does not exceed 2mm.

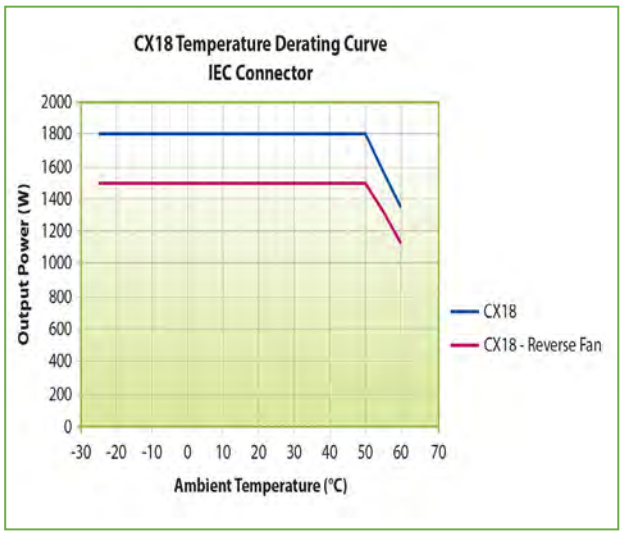
EFFICIENCY AND DERATING CURVES

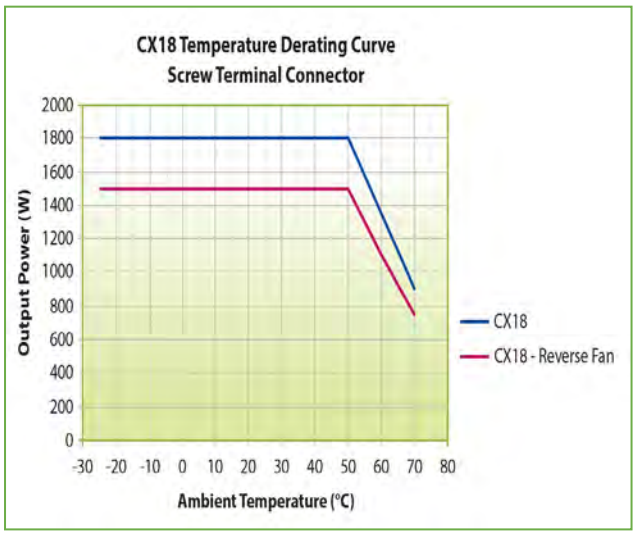






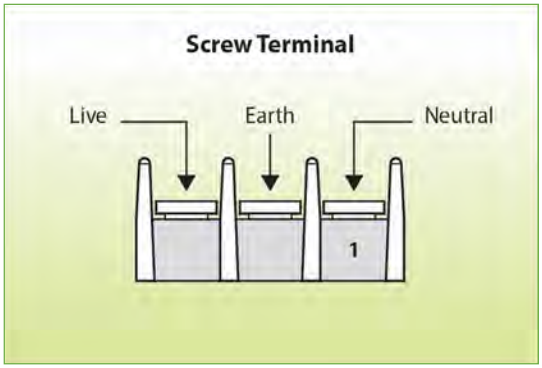




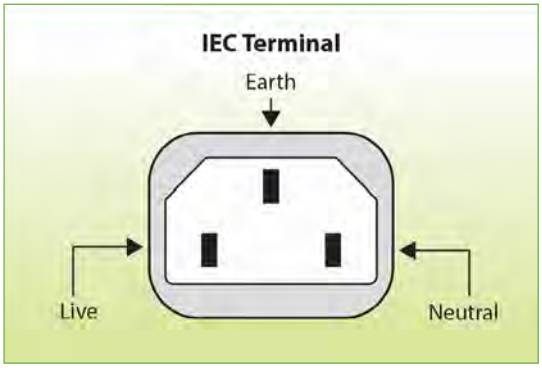


INTERFACE (CONTINUED)

Input Connectors

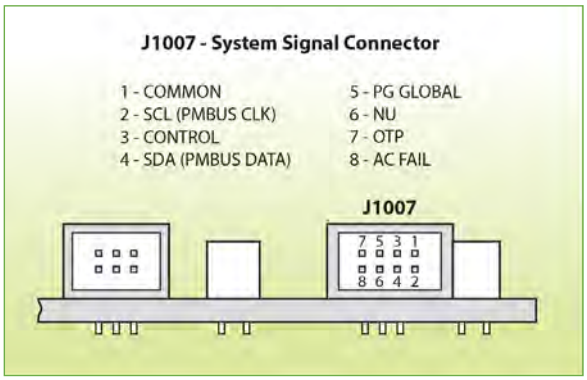


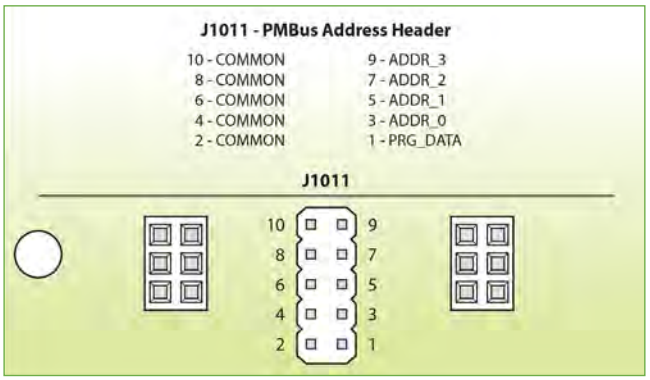
Standard (Screw Terminal)

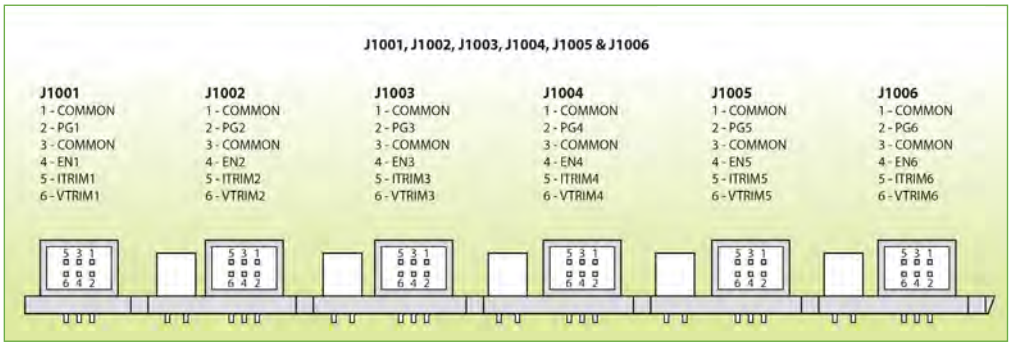


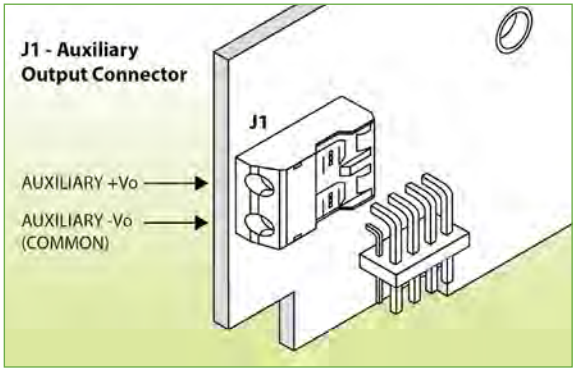
Option 1 (IEC Terminal)

CoolPac Connectors



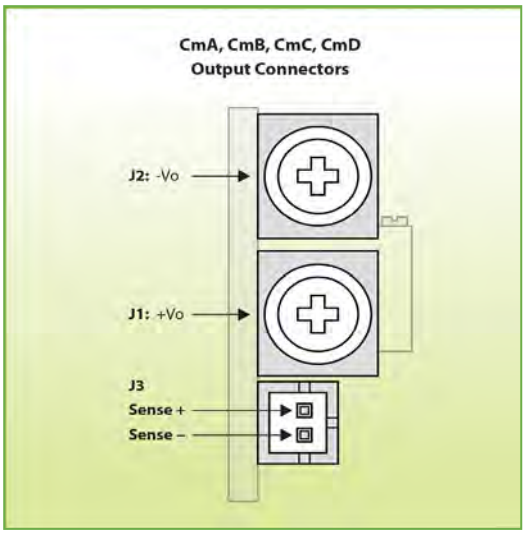


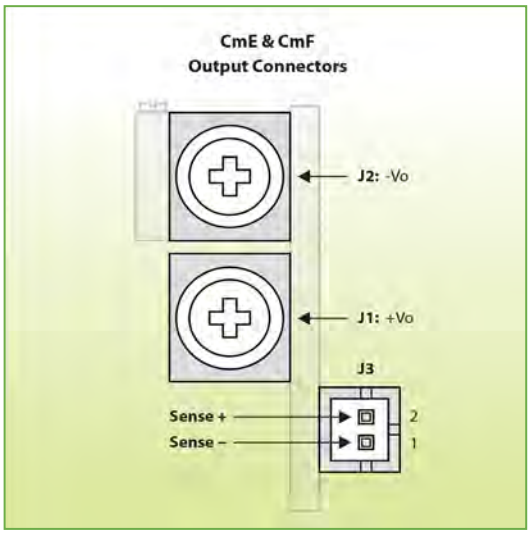


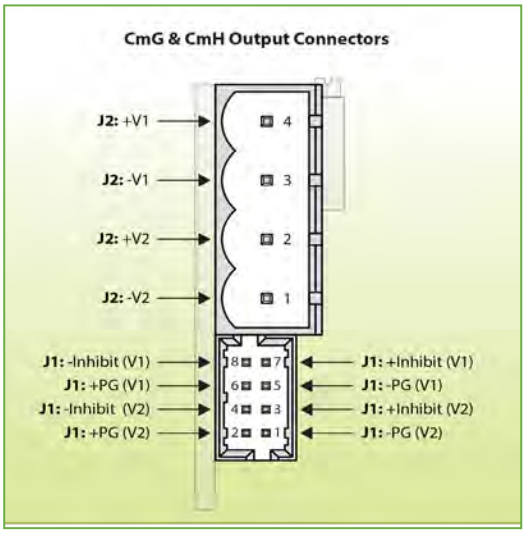


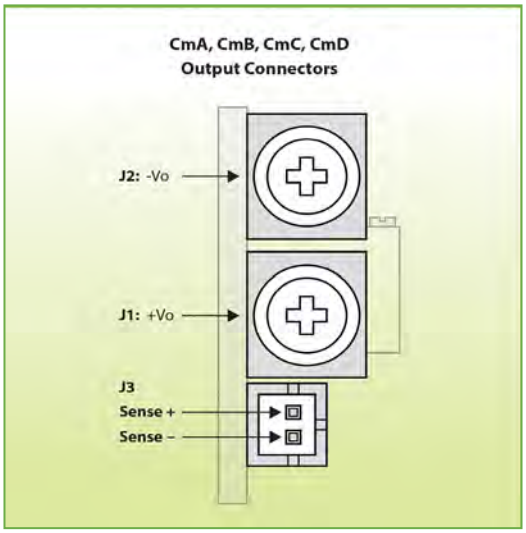
INTERFACE (CONTINUED)

CoolMod Connectors

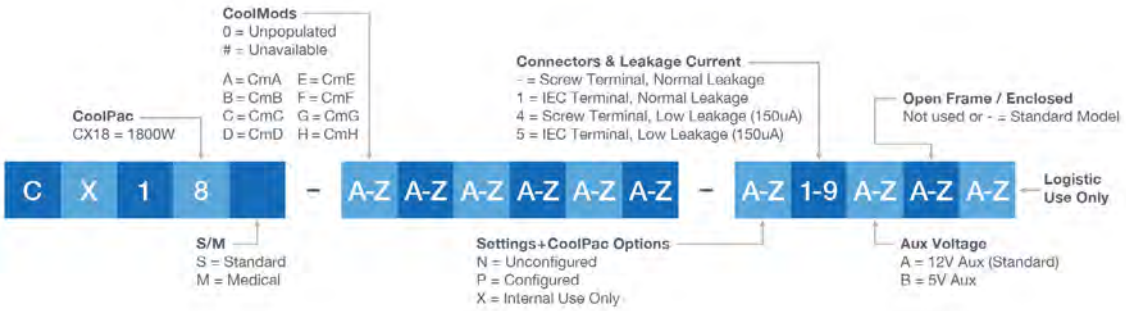








CONFIGURATION



*CmE or CmF High Power Module (3 slot module) can only occupy Slots D/E/F.

Configuration Example 1
CoolX part number CX18S-ADG##E-N-A specifies the following product;
- CX18S 1800W IEC60950 approved
- Slot 1: CmA: 2.5-6.0V (150W)
- Slot 2: CmD: 28-58V (300W)
- Slot 3: CmG: Dual output 3-30V (120 per channel)
- Slot 4: Not Available (CmE is three slot CoolMod module)
- Slot 5: Not Available (CmE is three slot CoolMod module)
- Slot 6: CmE: 22.8-25.2 (900W)
- Option N: Nominal Output voltage settings
- Option A: 12V/(1.96)A Bias Supply Voltage

Configuration Example 2
CoolX part number CX18M-BABBDC-N-B specifies the following product;
- CX18M 1800W IEC60601-1 approved
- Slot 1: CmB: 6-15V (280W)
- Slot 2: CmA: 2.5-6.0V (150W)
- Slot 3: CmB: 6-15V (280W)
- Slot 4: CmB: 6-15V (280W)
- Slot 5: CmD: 28-58V (300W)
- Slot 6: CmC: 15-28V (300W)
- Option N: Nominal Output voltage setting
- Option B: 5V/(4.7A) Nominal Output voltage setting

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.

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