

**3-PHASE WYE (Y) or DELTA ( $\Delta$ ),  
or SINGLE PHASE or HVDC INPUT**

**28 kW, 48~58 VDC OUTPUT**

**AC-DC POWER SHELF  
SPSTET4V3-01**

The SPSTET4V3-01 power shelf solution provides rectification, system management, and power distribution functions while maintaining high reliability and offering flexibility for future expansion.

The power shelf can be configured with up to six hot-swap capable TET4000-48-069RAS510 / TET4000-48-069RAH series or TET4800-48-069RA series AC/DC-DC power modules that convert AC or HVDC input to 48~58 VDC output for powering IT racks, OCP racks and data centers.

The shelf has an optional slot for a Network Attached Controller, providing control functions and monitoring through a 10/100/1000 MB base Ethernet port. It can be connected directly to the data center management network.



## FEATURES

- Two inputs, each input supports 3 power modules
- Input configurations: 3-phase WYE (Y) or Delta ( $\Delta$ ) or single phase or HVDC input
- Power modules are hot-swap capable
- Power shelf and power modules support CAN bus communication for control, programming & monitoring
- The main output with programmable voltage set point of 48-58 VDC, with a default output of 50.5 V
- Parallel operation with active digital current sharing through CAN bus
- Power modules implement the following protections: over temperature, output over voltage & output over current
- Dimensions (L x W x H): 786.2 x 537.0 x 46.5 mm (30.95 x 21.14 x 1.83 in)

## APPLICATIONS

- IT racks
- OCP racks
- Data centers

## 1. POWER SHELF REFERENCE TABLE

		INPUT			
		AC (Y) 200-277 / 346-480 VAC	AC (Δ) 200-277 VAC	Single Phase 200-277 VAC	HVDC 240-380 VDC
OUTPUT	+48 - 58 VDC	Open Rack V3 connector <sup>1</sup>		SPSTET4V3-01 SPSTET4V3-01C	

<sup>1</sup> Mates with V3 rack

**NOTE:** For data sheets with alternative shelf configurations, check factory for availability.

## 2. ORDERING INFORMATION

MODEL	DC OUTPUT	OUTPUT CONNECTOR	CONTROLLER
SPSTET4V3-01	48-58 VDC	Open Rack V3 connector	No
SPSTET4V3-01C	48-58 VDC	Open Rack V3 connector	Yes

**NOTE:** SPSTET4V3-01 and SPSTET4V3-01C default output voltage of 50.5 V each time they are powered on. The output voltage can be set within the range of 48V-58V through CANBus or NAC. The changed voltage is only valid when SHELF's power supply is maintained. After power on again, the output voltage will return to the default value.

## 3. TECHNICAL SPECIFICATIONS

PARAMETER	DESCRIPTION / CONDITIONS
Input	3-Phase four wire Delta (200-277 VAC) or 3-Phase five wire Wye (200-277/ 346-480 VAC) or Single-Phase (200-277 VAC) or HVDC input (240-380 VDC)
Inlet Configuration	2 Inlets (J1107 and J1108) (Table 1)
Auxiliary Outlet	2 pcs low power outlet (J1206 and J1207) with max. 10 A (Table 1) Protected by F 15 A / 420 VAC Fuse (serviceable) When $T_A$ : +45 °C to +55 °C, the output load current must be linearly derating from full load to 75% full load.
Redundant Configuration	6+0 / 5+1 / 3+3 configuration
Rated Output Power	24060 W <sup>2</sup> 28848 W <sup>3</sup> When $T_A$ : +45 °C to +55 °C, the output load current must be linearly derating from full load to 75% full load.
Output Connection	Open Rack V3 Power Shelf Output Connector for +48 ~ 58 VDC output (Default output 50.5 V)
Standby Output	60 W (Standby output 12 V / 5 A) <sup>4</sup> 48 W (Standby output 12 V / 4 A) <sup>5</sup> Protected by POLY-FUSE® Resettable PPTC 9 A/16 V Trip Current 15.3 A / 23 °C (serviceable)
Communication	CANBus
NAC Controller	Network Attached Controller (optional accessory)

<sup>2</sup> Max total power with 6 PSU on shelf at 45°C, rated power is reduced as per current share accuracy characteristic.  
See TET4000-48-069RAH/ S510 datasheet.

<sup>3</sup> Max total power with 6 PSU on shelf at 45°C, rated power is as per current share accuracy characteristic.  
See TET4800-48-069RA datasheet.

<sup>4</sup> The Standby output rated power of a single TET4000-48-069RAH / S510 is 60 W.

<sup>5</sup> The Standby output rated power of a single TET4800-48-069RA is 48 W.

WYE Input				Delta Input				Single Input				HVDC Input			
J1107 and J1108			Auxiliary Outlet	J1107 and J1108			Auxiliary Outlet	J1107 and J1108			Auxiliary Outlet	J1107 and J1108			Auxiliary Outlet
PIN No	Signal	Function		PIN No	Signal	Function		PIN No	Signal	Function		PIN No	Signal	Function	
1	L1	AC line 1	AC line 1 (J1206)	1	L1	AC line 1	AC line 1 (J1206)	1	L	AC live	AC line (J1206)	1	(+ HVDC)	DC positive	DC positive (J1206)
2	N	Neutral	Neutral (J1206)	2	L2	AC line 2	AC line 2 (J1206)	2	N	Neutral	Neutral (J1206)	2	(- HVDC)	DC return	DC return (J1206)
3	L2	AC line 2		3	L2	AC line 2		3	L	AC live		3	(+ HVDC)	DC positive	
4	PE	Protective earth		4	PE	Protective earth		4	PE	Protective earth		4	PE	Protective earth	
5	N	Neutral		5	L3	AC line 3		5	N	Neutral		5	(- HVDC)	DC return	
6	L3	AC line 3	AC line 3 (J1207)	6	L3	AC line 3	AC line 3 (J1207)	6	L	AC live	AC line (J1207)	6	(+ HVDC)	DC positive	DC positive (J1207)
7	N	Neutral	Neutral (J1207)	7	L1	AC line 1	AC line 1 (J1207)	7	N	Neutral	Neutral (J1207)	7	(- HVDC)	DC return	DC return (J1207)

Table 1. Connection Options

#### 4. SAFETY WARNING

Please refer to the installation instructions for detailed safety warnings.

The user assumes all responsibility and liability for proper and safe handling of the goods. Further, the user indemnifies Bel Power Solutions Inc. from all claims arising from the handling or use of the goods. Persons handling the product(s) must have electronics training and observe good engineering practice standards.

**CAUTION:** Power shelf with installed PSU modules has high leakage current. Protective Earthing connection is essential.

- Multiple power source. Disconnect all power cords before servicing.
- Double pole/ neutral fusing. Disconnect mains before servicing.
- Connect to earth, before connecting to supply.
- Heavy Power Shelf equipped with PSUs, do not lift or move alone.

#### 5. REFERENCE DOCUMENTS

PARAMETER	DESCRIPTION / CONDITIONS
BCD.01051	TET4000-48-069RAH Datasheet
BCM.00498	TET4000-48-069RAH Installation Instruction
BCA.00231.0	TET4000-48-069RAH CAN Communication Manual
BCD.20219	Network Attached Controller Datasheet
BCA.00257.0	SPSTET4-xx CAN Communication Manual
BCD.20170	TET4800-48-069RA Datasheet
BCM.20054	TET4800-48-069RA Installation Instruction
BCM.20124	SPSTET4V3-01 Installation Instruction



## 6. OVERVIEW

The SPSTET4V3-01 is a 10U high power shelf. It can be configured with up to six hot-swap capable TET4000-48-069RAS510 / TET4000-48-069RAH Series or TET4800-48-069RA Series AC/DC-DC power modules that convert standard AC input to DC output.

The power shelf and power module support CANBus communication for control, programming, and monitoring. The power shelf and power module are connected to the same CANBus interface. Refer to the respective CAN Communication Manual for additional information.

The power shelf has a slot for a Network Attached Controller (NAC) for providing control functions and monitoring through a 10/100/1000 MB base Ethernet port. It is hot-pluggable and supplied via the 12 V standby output of the power modules. The NAC can be configured through a web interface; the monitoring and control functions are accessed through SNMPv3.

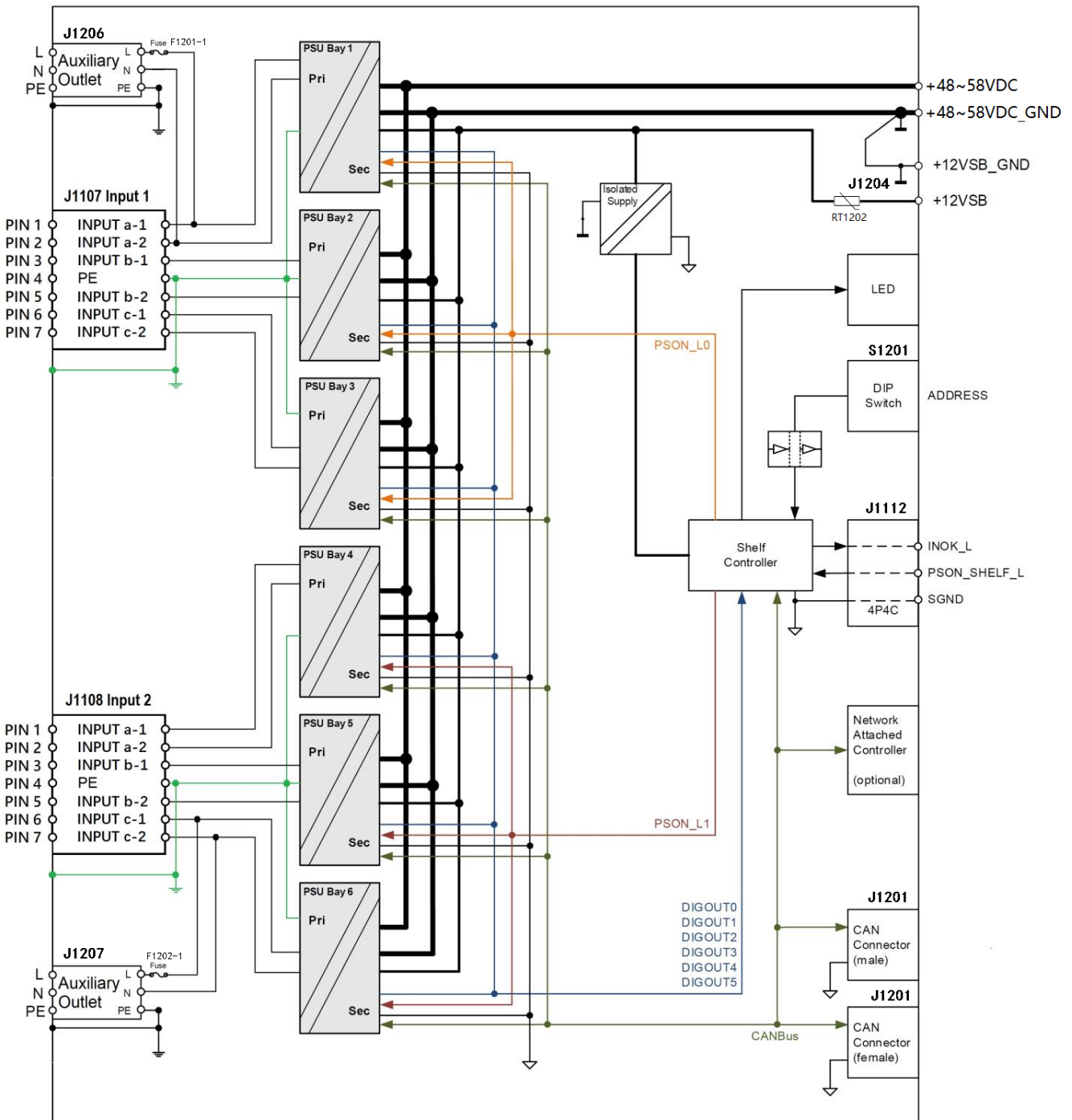
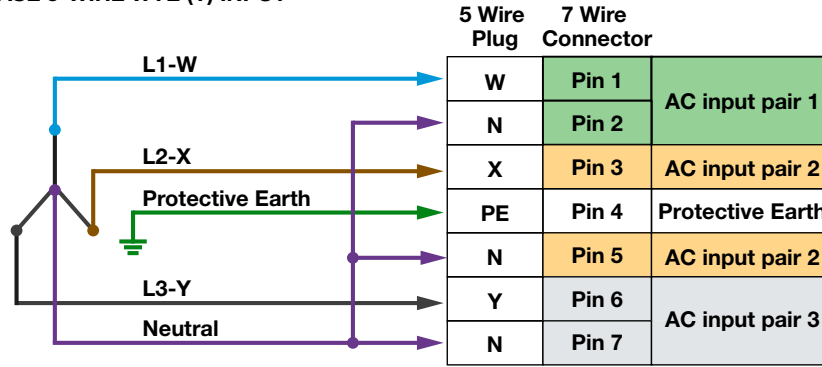
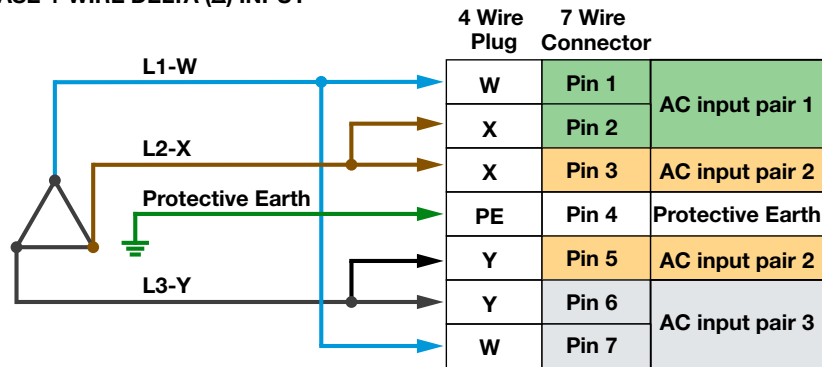


Figure 1. SPSTET4V3-01 Block Diagram

**3-PHASE 5-WIRE WYE (Y) INPUT**



**3-PHASE 4-WIRE DELTA (Δ) INPUT**



**SINGLE PHASE OR HVDC INPUT**

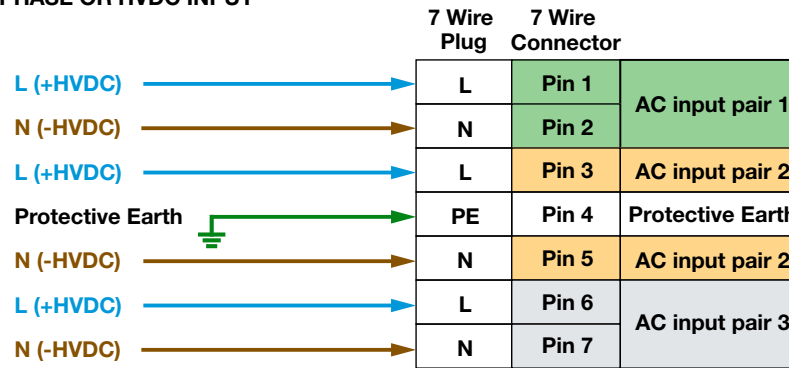


Figure 2. Input Connection Diagram

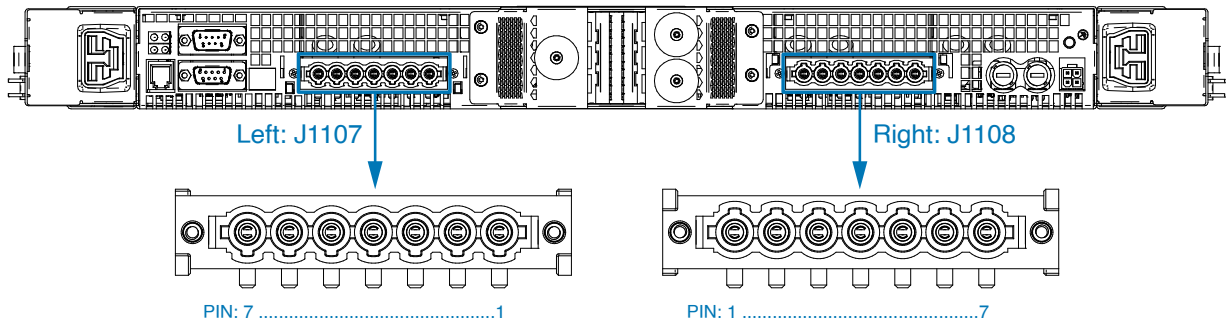


Figure 3. Position of Input Connectors (Rear view)



## 7. INPUT SPECIFICATIONS

PARAMETER	DESCRIPTION / CONDITIONS	MIN	NOM	MAX	UNIT
<i>Input Connector (J1107, J1108)</i>					
AC Input Voltage Ranges	Line to Line input (Delta source)	180	200~277	305	VAC
	Line to Line input (WYE source with neutral connection)	312	346~480	528	VAC
	Single-Phase input	200	230	277	VAC
	HVDC input	192	240~380	400	VDC
Max Input Current	Per Line			62	Arms
Input Frequency		47	50 / 60	63	Hz

## 8. OUTPUT SPECIFICATIONS

### TET4000-48-069RAH / S510

PARAMETER	DESCRIPTION / CONDITION	MIN	NOM	MAX	UNIT
<i>Main Output V1 (Output Bus Bar)</i>					
Nominal Output Voltage	When installing the PSU in SHELF, the default output will be 50.5 V when starting up, and the output voltage can be modified through NAC or CANBus.		48~58		VDC
Voltage Regulation	Programmable PSU module	-2		+2	% Vout nom
Nominal Output Power	6+0 / 5+1 / 3+3 configuration, T <sub>A</sub> ≤ 45°C			24000	W
Derated Output Power	6+0 / 5+1 / 3+3 configuration, T <sub>A</sub> = 55 °C			18000	W
Nominal Output Current	6+0 / 5+1 / 3+3 configuration, T <sub>A</sub> ≤ 45°C			500	ADC
Derated Output Current	6+0 / 5+1 / 3+3 configuration, T <sub>A</sub> = 55 °C			375	ADC
<i>Standby Output VSB (J1204)</i>					
Output Voltage			12		VDC
Voltage Regulation		-5		+5	% Vout nom
Output Power				60	W
Output Current				5	ADC

### TET4800-48-069RA

PARAMETER	DESCRIPTION / CONDITION	MIN	NOM	MAX	UNIT
<i>Main Output V1 (Output Bus Bar)</i>					
Nominal Output Voltage	When installing the PSU in SHELF, the default output will be 50.5V when starting up, and the output voltage can be modified through NAC or CANBus.		48~58		VDC
Voltage Regulation	Programmable PSU module	-2		+2	% Vout nom
Nominal Output Power	6+0 / 5+1 / 3+3 configuration, T <sub>A</sub> ≤ 45°C			28800	W
Derated Output Power	6+0 / 5+1 / 3+3 configuration, T <sub>A</sub> = 55 °C			21600	W
Nominal Output Current	6+0 / 5+1 / 3+3 configuration, T <sub>A</sub> ≤ 45°C			600	ADC
Derated Output Current	6+0 / 5+1 / 3+3 configuration, T <sub>A</sub> = 55 °C			450	ADC
<i>Standby Output VSB (J1204)</i>					
Output Voltage			12		VDC
Voltage Regulation		-5		+5	% Vout nom
Output Power				48	W
Output Current				4	ADC
<i>Auxiliary Outlet (J1206 and J1207)</i>					
Output Voltage (J1206 and J1207)	Line to Line input (Delta source)	180	200~277	305	VAC
	Line to Line input (WYE source with neutral connection)	312	346~480	528	VAC
	Single-Phase input	180	200~277	305	VAC
	HVDC input	192	240~380	400	VDC
Output Current (J1206 & J1207)				10	Arms
Fuse Protection per Line (F1206 & F1207)	Serviceable (15 A / 420 VAC Fast-Acting fuse)				

**NOTE:** When T<sub>A</sub>: +45 °C to +55 °C, the output load current must be linearly derating from full load to 75% full load.



8.1 PROTECTION (PER POWER MODULE)

TET4000-48-069RAH / S510

PARAMETER	DESCRIPTION / CONDITION	MIN	NOM	MAX	UNIT
Input Fuses (L+N)	Fast-acting 30 A input fuses (6.3 × 32 mm) in series with both the L- and N-line inside the power supply protect against severe defects.		30		A
OV Threshold $V_1$	Hardware protection	64	66	68	VDC
OV Latch Off Time $V_1$				1	ms
Nominal Power Limitation	$V_{in} > 180 \text{ VAC}$ , $T_A \leq 45^\circ\text{C}$ , $V_1 \geq 48 \text{ VDC}$	4000	4100		W
	$V_{in} > 180 \text{ VAC}$ , $T_A = 55^\circ\text{C}$ , $V_1 \geq 48 \text{ VDC}$	3000	3100		
Nominal Current Limitation	$V_{in} > 180 \text{ VAC}$ , $T_A \leq 45^\circ\text{C}$ , $V_1 = 50.5 \text{ VDC}$	83	82		A
	$V_{in} > 180 \text{ VAC}$ , $T_A \leq 45^\circ\text{C}$ , $V_1 = 42 \dots 48 \text{ VDC}$		86		
	$V_{in} > 180 \text{ VAC}$ , $T_A = 55^\circ\text{C}$ , $V_1 = 50.5 \text{ VDC}$		62		
Power Limit Blanking Time	Time until power limit is reduced to nominal value	10			ms
Power Limit during Over Subscription $V_1$	$V_{in} \geq 180 \text{ VAC}$ , $T_A \leq 45^\circ\text{C}$ , $V_1 \geq 48 \text{ V}$ . Max. duration 5 ms	4400	4500		W
Current Limit during Over Subscription $V_1$	$V_{in} \geq 180 \text{ VAC}$ , $T_A \leq 45^\circ\text{C}$ , $V_1 = 50.5 \text{ V}$ . Max. duration 5 ms	83	89		A
Max Short Circuit Current $V_1$	$V_1 < 10 \text{ VDC}$ , excluding output capacitor discharging current			83	A
Short Circuit Latch Off Time	Time to latch off when in short circuit or output under voltage ( $V_1 < V_{1 \text{ UV}}$ )		100		ms
Output Under Voltage Protection	$V_1 \text{ UV}$	39	40	41	VDC
Output Under Voltage Protection Delay Time $V_1$	$V_1 < V_{1 \text{ UV}}$		250		ms
Over Temperature on Critical Points	Inlet Ambient Temperature		60		°C
	PFC Primary Heatsink Temperature		90		
	DC/DC Primary Heatsink Temperature		90		
	Secondary Sync Mosfet Temperature		100		
OV Threshold $V_{SB}$	Output under voltage protection standby	13.0	13.6	14.4	VDC
UV Threshold $V_{SB}$	Output under voltage protection standby	9.9	10.0	10.1	VDC
Current Limitation $V_{SB}$	Standby over current limit	5.0	5.5		A

TET4800-48-069RA

PARAMETER	DESCRIPTION / CONDITION	MIN	NOM	MAX	UNIT
Input Fuses (L)	Fast-acting 60 A (parallel 2× 30 A) input fuses (6.3 × 32 mm) in series the L- line inside each the PSU protect against severe defects.		60		A
OV Threshold $V_1$	Hardware protection	64	66	68	VDC
OV Latch Off Time $V_1$				1	ms
Nominal Power Limitation	$V_{in} \geq 180 \text{ VAC}$ , $T_A \leq 45^\circ\text{C}$ , $V_1 \geq 48 \text{ V}$	4800	4909		W
	$V_{in} \geq 180 \text{ VAC}$ , $T_A = 55^\circ\text{C}$ , $V_1 \geq 48 \text{ V}$	4000	4349		
Nominal Current Limitation	$V_{in} \geq 180 \text{ VAC}$ , $T_A \leq 45^\circ\text{C}$ , $V_1 = 50.5 \text{ V}$	100	98		ADC
	$V_{in} \geq 180 \text{ VAC}$ , $T_A \leq 45^\circ\text{C}$ , $V_1 = 42 \dots 48 \text{ V}$		102		
	$V_{in} \geq 180 \text{ VAC}$ , $T_A = 55^\circ\text{C}$ , $V_1 = 50.5 \text{ V}$		84		
Power Limit Blanking Time	Time until power limit is reduced to nominal value	10			ms
Power Limit during Over Subscription $V_1$	$V_{in} \geq 180 \text{ VAC}$ , $T_A \leq 45^\circ\text{C}$ , $V_1 \geq 48 \text{ V}$ . Max. duration 5 ms	5340	5450		W
Current Limit during Over Subscription $V_1$	$V_{in} \geq 180 \text{ VAC}$ , $T_A \leq 45^\circ\text{C}$ , $V_1 = 50.5 \text{ V}$ . Max. duration 5 ms	98	107		A
Max Short Circuit Current $V_1$	$V_1 < 10 \text{ VDC}$ , excluding output capacitor discharging current			100	ADC
Short Circuit Latch off Time	Time to latch off when in short circuit or output under voltage ( $V_1 < V_{1 \text{ UV}}$ )		100		ms
Output Under Voltage Protection	$V_1 \text{ UV}$	39	40	41	VDC
Output Under Voltage Protection Delay Time	$V_1 < V_{1 \text{ UV}}$		250		ms
Over Temperature on Critical Points	Inlet Ambient Temperature		60		°C
	PFC Primary Heatsink Temperature		95		
	DC/DC Primary Heatsink Temperature		95		
	Secondary Sync MOSFET Temperature		115		
Output Over Voltage Protection Standby		13.0	13.6	14.4	VDC
Output Under Voltage Protection Standby		9.9	10.0	10.1	VDC
Standby Over Current Limit			4.7		ADC



## 8.2 MAIN OUTPUT CONNECTOR (V<sub>1</sub>)

The main output uses an Open Rack V3 Power Shelf Output Connector SPSTET4V3-01 and SPSTET4V3-01C default output voltage of 50.5 V each time they are powered on. The output voltage can be set within the range of 48 V~58 V through CANBus or NAC.

The changed voltage is only valid when SHELF's power supply is maintained. After power on again, the output voltage will return to the default value.

PIN OUTS (V <sub>1</sub> )	FUNCTION	DESCRIPTION
1 (Left)	Main output _GND	+48 ~ 58 V return
2 (Right)	Main output	+48 ~ 58 V output

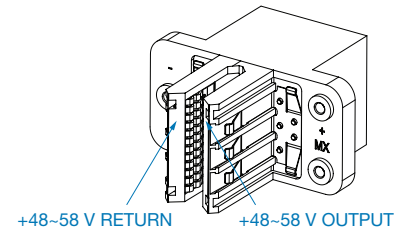


Figure 4. Main Output Connector V<sub>1</sub>

## 8.3 +12 V<sub>SB</sub> CONNECTOR (J1204)

The Standby output rated power of a single TET4000-48-069RAH/ S510 is 60 W (12 V/5 A) while the standby output rated power of a single TET4800-48-069RA is 48 W (12 V/4 A).

Protected by POLY-FUSE(RT1202)® Resettable PPTC 9 A/16 V Trip Current 15.3 A / 23 °C (serviceable)

PIN OUTS (J1204)	FUNCTION	DESCRIPTION
1, 3	V <sub>SB</sub> _GND	+12 V <sub>SB</sub> return
2, 4	V <sub>SB</sub>	+12 V <sub>SB</sub> output

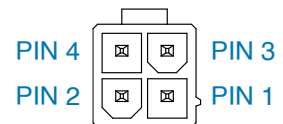


Figure 5. +12 V<sub>SB</sub> Connector (J1204)

## 8.4 LOGIC SIGNALS

### J1112 PINOUT

PIN	FUNCTION	DESCRIPTION
1	DNC	Do Not Connect
2	INOK_L	Active-low output Low = At least 1 power module has input in range High = Otherwise
3	PSON_SHELF_L	Active-low input Low = Turn-on main output V <sub>1</sub> of power modules High = Turn-off main output V <sub>1</sub> of power modules
4	SGND	Signal ground

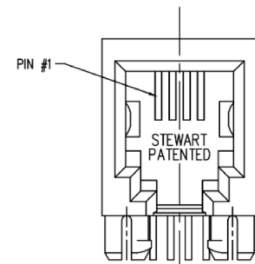


Figure 6. Signal Connector Pin Out (4P4C Modular Jack)

## MAXIMUM RATINGS

SYMBOL	DESCRIPTION	MIN	NOM	MAX	UNIT
V <sub>I/O</sub>	I/O Voltage	0		24	V
I <sub>I/O L</sub>	I/O Sink Current			20	mA



**I/O CHARACTERISTICS**

SYMBOL	DESCRIPTION	MIN	NOM	MAX	UNIT
V <sub>IL</sub>	High-level input voltage	1.5			V
V <sub>IH</sub>	Low-level input voltage			0.8	V
V <sub>OL</sub>	High-level output voltage		3.1 <sup>7</sup>		V
V <sub>OH</sub>	Low-level output voltage, @ 10 mA Sink Current	0.2			V
V <sub>OH</sub>	Low-level output voltage, @ 20 mA Sink Current	0.4			V

<sup>7</sup> Without external pull-up.

**SHELF I/O CIRCUITRY**

All I/O are implemented as open collector with a weak pull-up. The I/O are internally pulled up to 3.3 V via a 10 kΩ resistor. The schematic drawing represents the internal circuit of the shelf. External pullup resistors to higher voltages may be added. When selecting external pullups, please consider the maximum ratings.

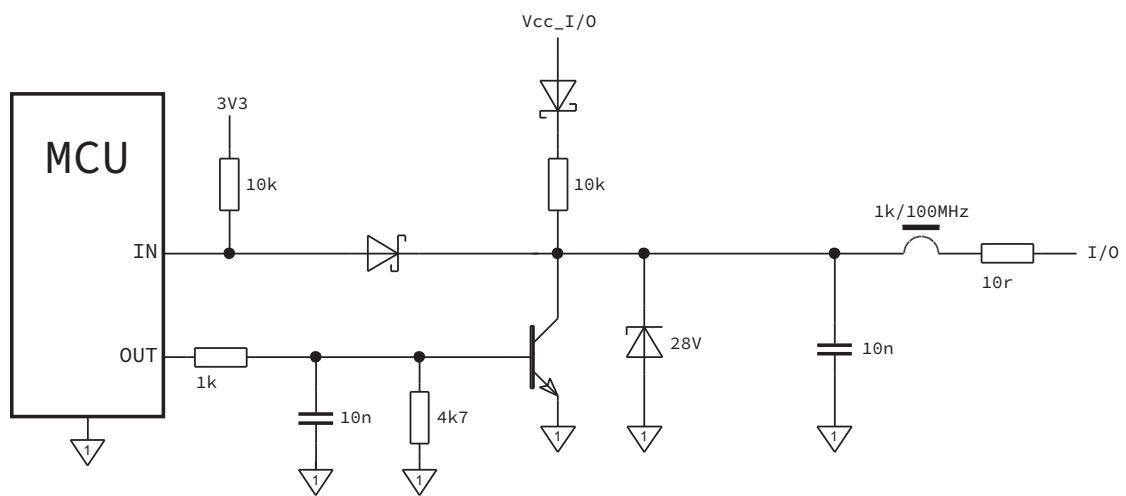


Figure 7. I/O Circuitry



## 9. COMMUNICATION

Communication to the power shelf and the power modules is via CANBus. The power modules also use CANBus for its active current-share function. For further information please refer to the CAN Communication Manual documents (BCA.00257.0 and BCA.00231.0).

### 9.1 J1201 PINOUT

D-Sub 9 PIN OUTS (J1201)	FUNCTION	DESCRIPTION
1	NC	NC
2	CAN_L	Dominant Low
3	CAN_GROUND	Ground
4	NC	NC
5	CAN_SHIELD	Shield, Optional
6	CAN_GROUND	Ground, Optional
7	CAN_H	Dominant High
8	NC	NC
9	NC	NC

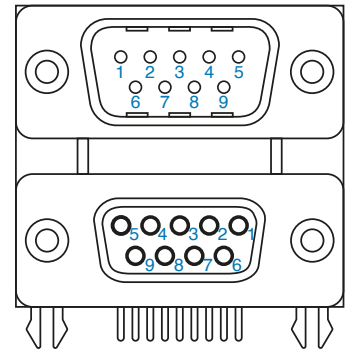


Figure 8. J1201 Pinout

### 9.2 ADDRESSING

The power shelf and the power modules are individually addressed. The individual addresses are configured via DIP Switch (S1201) according to the table below.

DIP SWITCH			ADDRESS			
POSITION 1	POSITION 2	POSITION 3	PSU1	PSU2	PSU6	Backplane
OFF	OFF	OFF	0x01	0x02	0x06	0x0F
OFF	OFF	ON	0x11	0x12	0x16	0x1F
OFF	ON	OFF	0x21	0x22	0x26	0x2F
OFF	ON	ON	0x31	0x32	0x36	0x3F
ON	OFF	OFF	0x41	0x42	0x46	0x4F
ON	OFF	ON	0x51	0x52	0x56	0x5F
ON	ON	OFF	0x61	0x62	0x66	0x6F
ON	ON	ON	0x71	0x72	0x76	0x7F

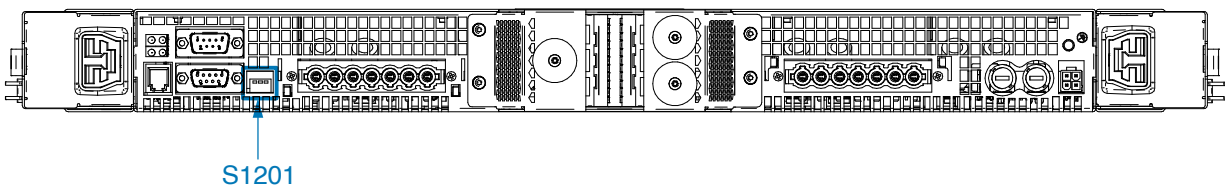


Figure 9. DIP Switch Connector S1201 (Rear view)

### 9.3 NETWORK ATTACHED CONTROLLER (OPTIONAL)

The Network Attached Controller is a shelf level controller providing monitoring and control functions through a 10/100/1000 MB base Ethernet port. It is hot-pluggable and supplied via the 12 V standby output of the power modules. The controller can be configured through a web interface; the monitoring and control functions are accessed through SNMP. See BCA.20048 for Network Attached Controller Software Documentation (TBD).

## 10. PARALLEL OPERATION

Up to 8 SPSTET4V3-0x power-shelves can be configured for parallel operation.

For parallel operation:

- Connect the following:
  - V<sub>1</sub> Main Output
  - V<sub>SB</sub> Standby Output
  - CANBus
- NAC
  - Per power-zone, install only 1 NAC.
  - If a NAC is used, then install it either on the top-shelf or the bottom-shelf.
  - If a NAC is installed, a CAN Terminator on that shelf is not required. The NAC has termination assembled internally.
- CANBus connection and termination
  - Use CANBus Cables (see Accessories) to connect the CAN ports between shelves.
  - Connect a CAN Terminator (see Accessories) to the top-shelf and bottom-shelf. If a NAC is installed, a CAN Terminator on that shelf is not required.
- Set the power-shelf address via the DIP Switches

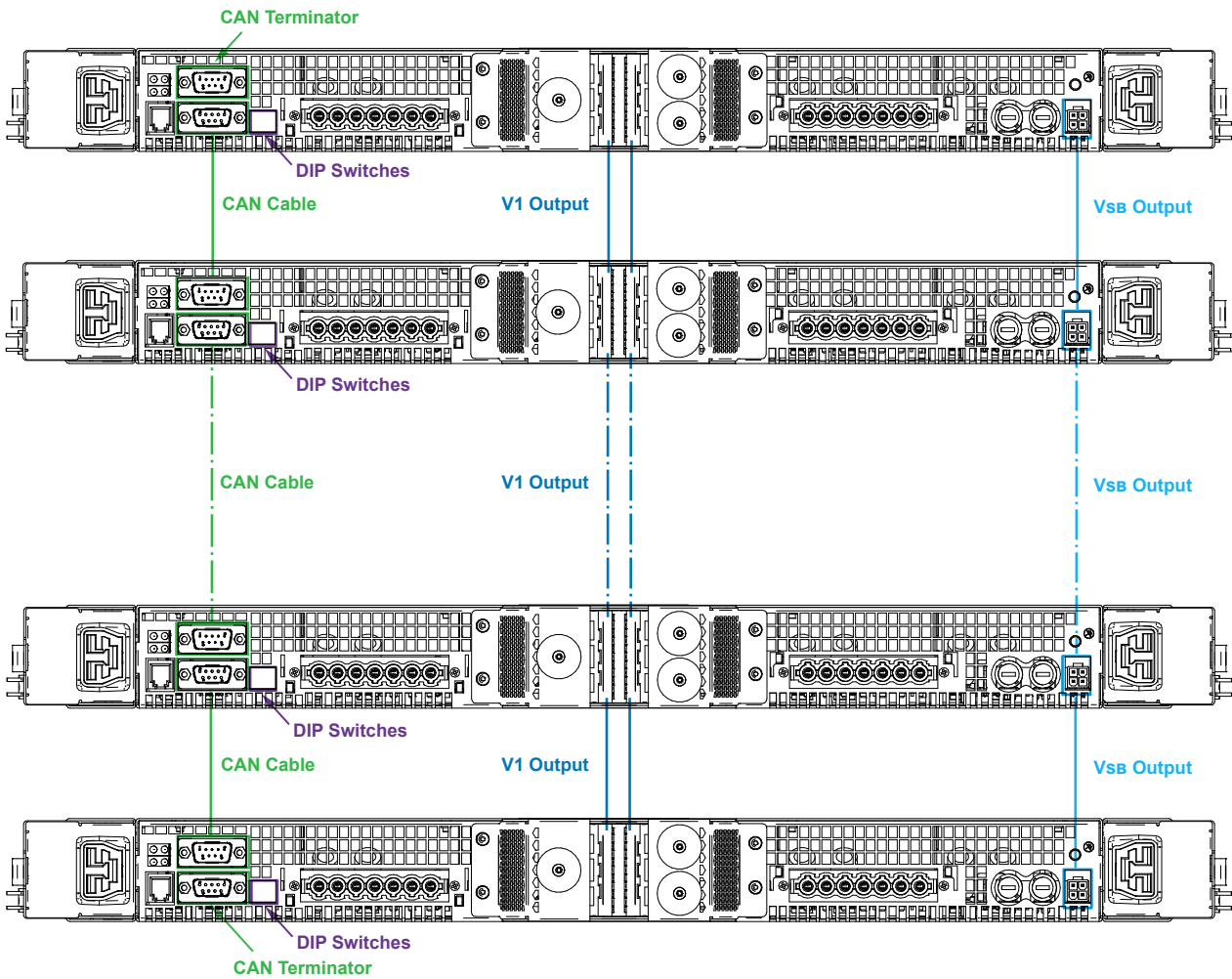


Figure 10. Parallel Operation

## 11. LEDs

### 11.1 POWER MODULE LEDs (FRONT SIDE)

Each power module has 2 LEDs to indicate status condition. LED number one is green and indicates AC power is on or off, while LED number two is bi-colored: green and yellow to indicate DC power presence or fault conditions.

OPERATING CONDITION	LED SIGNALING
<b>AC LED</b>	
AC Line within range	Solid Green
AC Line out of range	Off
<b>DC LED<sup>8</sup></b>	
V <sub>1</sub> or V <sub>SB</sub> out of regulation	Solid Yellow
Over temperature shutdown	
Output over voltage shutdown (V <sub>1</sub> or V <sub>SB</sub> )	
Output under voltage shutdown (V <sub>1</sub> or V <sub>SB</sub> )	
Output over current shutdown (V <sub>1</sub> or V <sub>SB</sub> )	Blinking Yellow
Invalid CANBus Node-Id	
Main output V <sub>1</sub> is turned off	Blinking Green
Normal Operation	Solid Green
Power module is back supplied and AC Line out of range	Blinking Yellow
Otherwise	Off

<sup>8</sup> The order of the criteria in the table corresponds to the testing precedence in the controller. LEDs are only available if sufficient input voltage is applied for operation of the internal supply circuits.

### 11.2 POWER SHELF LEDs (REAR SIDE)

LED	FUNCTION	DESCRIPTION
LED 1	INOK_L	On if INOK_L is low. See "Logic Signals"
LED 2	PSON_SHELF_L	On if PSON_SHELF_L is low. See "Logic Signals"
LED 3	-	Reserved
LED 4	WATCHDOG	Blink 1 Hz if the Shelf Controller is alive.



NOTE: All 4 LEDs will blink during the FW bootloader.

## 12. AUXILIARY OUTLET

The 2 connectors are used to provide power to the Network Switch Devices. Each connector is connected to one of the LIVE terminals (L1, L2, and L3) and NEUTRAL @ WYE (Y) or Line to Line @ DELTA (Δ) from input connector (J1107 and J1108). These are protected by a 15 A / 420 VAC Fast-Acting fuse (Littelfuse / 487, BUSSMANN / S520, BETTER / 529) on the LIVE terminal. See Safety Warning when servicing the fuse.

When a power shelf is operated at ambient temperature of +45 °C to +55 °C, the Output load current must be linearly derating from full load to 75% full load.

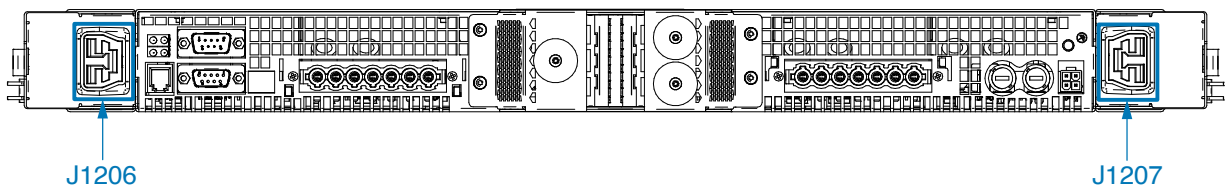


Figure 11. Auxiliary outlet connectors position (Rear view)

### 13. SAFETY, REGULATORY AND EMC SPECIFICATIONS

PARAMETER	DESCRIPTION / CONDITION	CRITERION
Agency Approvals	Approved to the latest revisions/amendments of the following standards: UL/CSA 62368-1, EN 62368-1 and IEC 62368-1	Approved
Insulation	Input (L/N) to case (PE) Input (L/N) to output Output to case (PE)	Basic Reinforced Functional
Electrical Strength Test	Input to case Input to output (tested by manufacturer only)	Min. 2500 VDC Min. 5000 VDC
Conducted Emission	EN 55032 / CISPR 22: 0.15 ... 30 MHz, QP and AVG	Class A
Radiated Emission	EN 55032 / CISPR 22: 30 MHz ... 1 GHz, QP	Class A
Harmonic Emissions (per module)	IEC 61000-3-2, $V_{in} = 230 \text{ VAC}$ , 50 Hz, 100% Load (per module)	Class A
AC Flicker	IEC / EN 61000-3-3, $d_{max} < 3.3\%$	PASS
ESD Contact Discharge	IEC / EN 61000-4-2, $\pm 8 \text{ kV}$ , 25+25 discharges per test point (metallic case, LEDs, connector body)	A
ESD Air Discharge	IEC / EN 61000-4-2, $\pm 15 \text{ kV}$ , 25+25 discharges per test point (non-metallic user accessible surfaces)	A
Radiated Electromagnetic Field	IEC / EN 61000-4-3, 10 V/m	A
Burst	IEC / EN 61000-4-4, level 3 AC port $\pm 2 \text{ kV}$ , 1 minute DC port $\pm 1 \text{ kV}$ , 1 minute	A
Surge	IEC / EN 61000-4-5 Line to earth: level 3, $\pm 2 \text{ kV}$ Line to line: level 2, $\pm 1 \text{ kV}$	A
RF Conducted Immunity	IEC/EN 61000-4-6, Level 3, 10 Vrms	A
Voltage Dips and Interruptions (per module)	IEC/EN 61000-4-11 (per module) 1: $V_i$ 230 VAC, 100% Load, Dip 100%, Duration 12 ms 2: $V_i$ 230 VAC, 100% Load, Dip 100%, Duration < 150 ms 3: $V_i$ 230 VAC, 100% Load, Dip 100%, Duration > 150 ms	A $V_i$ : B, $V_{SB}$ : A B

### 14. ENVIRONMENTAL SPECIFICATIONS

PARAMETER	DESCRIPTION / CONDITION	MIN	NOM	MAX	UNIT
Operating Temperature	@ full load, up to 4000 m:	0		+35	°C
	@ full load, up to 1800 m:	0		+45	
	@ 75% load, up to 1800 m:	0		+55	
Non-Operating Temperature		-40		+70	°C
Humidity	Operating: @ at 40 °C, non-condensing	7		93	%RH
	Non-Operating: non-condensing	5		95	
Altitude	Operating:			4000	m
	Non-Operating:			13000	
Shock	Operating: 11 ms half-sine shocks in 6 axis 5 per each direction		6		g
	Non-Operating: 11 ms half-sine shocks in 6 axis 10 per each direction		12		
Vibration	Operating: 0.5 g Sinusoidal in 3 axis (x, y, z) 10 sweep cycles for each direction (2 hours 13 minutes)	5		500	Hz
	Non-Operating: 1 g Sinusoidal in 3 axis (x, y, z) 10 sweep cycles for each direction (2 hours 13 minutes)	5		500	
Cooling	When equipped with operating PSUs			50	Pa



## 15. CONNECTORS

DESCRIPTION	REFERENCE DESIGNATOR	TYPE	MANUFACTURER	MPN
Input Connector	J1107 J1108	/	Positronic Industries Positronic Industries BIZLINK	SP10RSSS48RM220A1/AA-2269 SP10RSSS48M220A1/AA-2269 747-G3-07B
Logic Signal Connector	/	J1112	4P4C Modular Jack	Bel Fuse Inc.
+12 V <sub>SB</sub> Output Connector	J1204	/	Amtek	5W4200L1-202T0BAUK01
CAN Connector	J1201	Dual port D-SUB 9	Norcomp	189-009-413R571
V1 output connector	/	Open Rack V3 Power Shelf Output Connector	BIZLINK	747-BL01B
Aux. outlet	/	/	ANDERSON	2006G1 or SAF-D-GRID

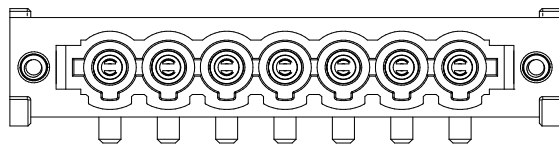
NOTE: Equivalent connectors might be used without notice.

### 15.1 CONNECTOR PIN ASSIGNMENT

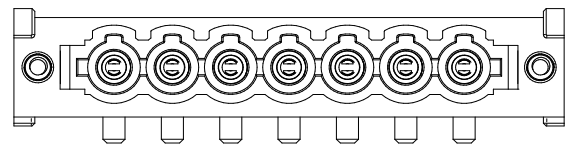
#### 3-Phase Input Connector (J1107, J1108)

J1107: FCI: 10156982 or Positronic: SP10RSSS48RM220A1/AA-2269 or equivalent  
 J1108: FCI: 10156981 or Positronic: SP10RSSS48M220A1/AA-2269 or equivalent

Mating Part for J1107 and J1108:  
 Connector: Positronic: SP10RSSS1F0W01/AA-2268 or equivalent  
 Terminal: Positronic: FC4008DS/AA-2272 or equivalent



J1107 PINS: 7 .....1



J1108 PINS: 1 .....7

Figure 12. 3-Phase Input Connectors (J1107, J1108)

#### Auxiliary Outlet (J1206, J1207)

MPN: Anderson 2006G1 or equivalent

PIN	FUNCTION	DESCRIPTION
1	Positive or Line	Pin 1 is as Positive / Line for DC input / three-phase input
2	Negative or Neutral or Line	Pin 2 is as Negative for DC input, and as Neutral / Line for Wye / Delta input
3	Ground	Protective bonding earth

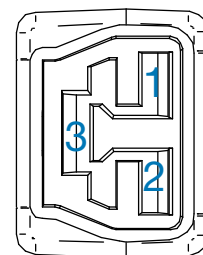


Figure 13. Auxiliary Outlet (J1206, J1207)

### 16. MECHANICAL SPECIFICATIONS

PARAMETER	DESCRIPTION / CONDITIONS	MIN	TYP	MAX	UNIT
Dimensions	(W x H x D)	537.0 x 46.5 x 786.2			mm
		21.14 x 1.83 x 30.95			in
Weight	Shelf only	9			kg
	6 PSU installed	25			kg

### SPSTET4-01 MECHANICAL DATA

NOTE: Finished good may look different from images.

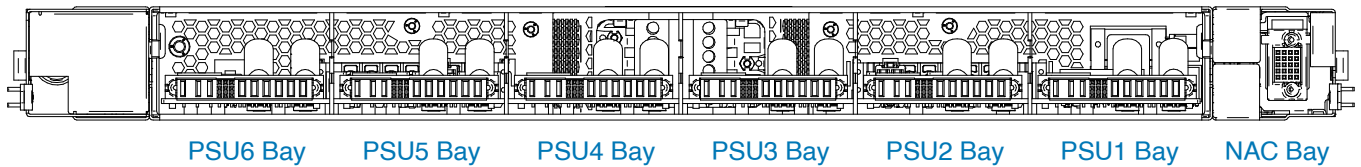


Figure 14. SPSTET4V3-01 PSUss Bay Arrangement (Front View)

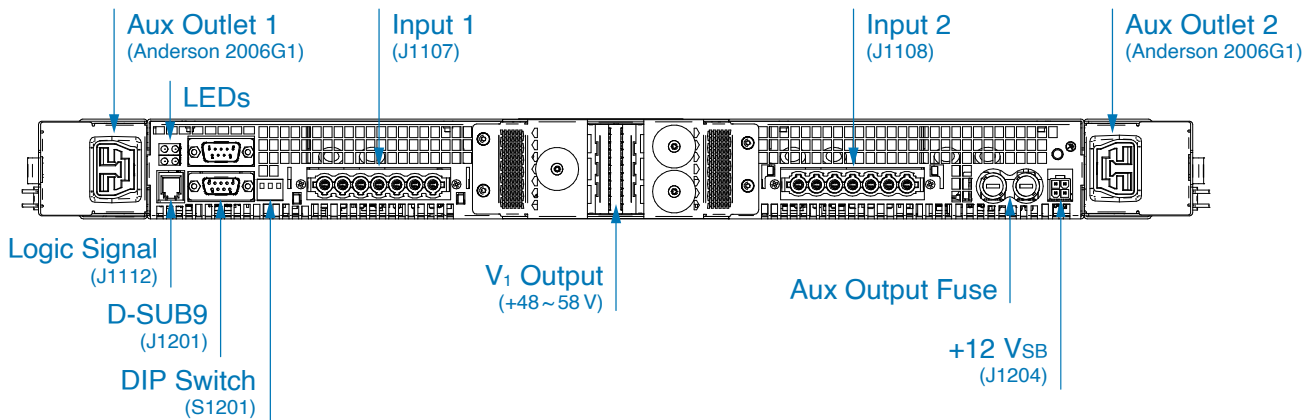


Figure 15. SPSTET4V3-01 Connector Positions (Rear View)

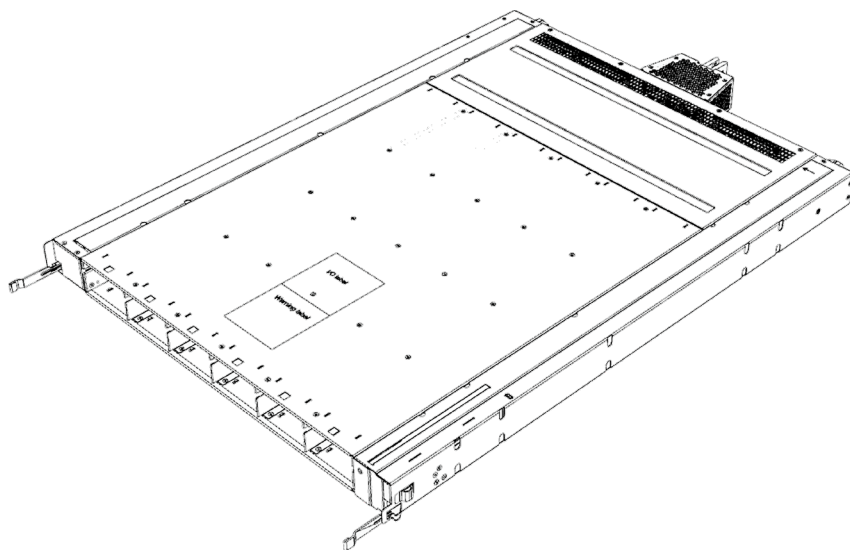


Figure 16. SPSTET4V3-01 (Isometric View)



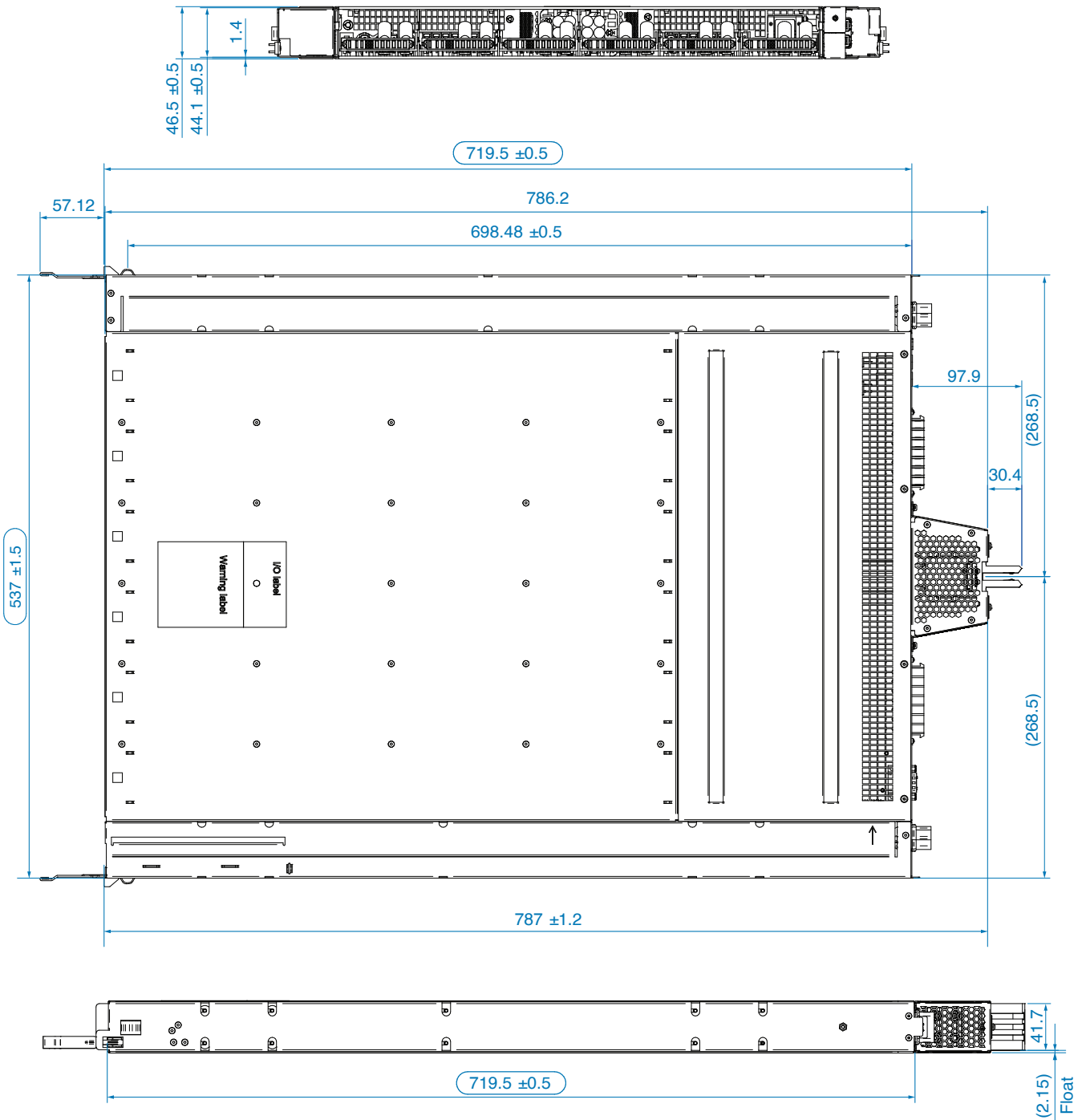


Figure 17. SPSTET4V3-01 Mechanical Drawing with Dimensions (Front, Top, Side View)



## 17. ACCESSORIES

ITEM	DESCRIPTION	ORDERING PN
Network Attached Controller	The Network Attached Controller provides easy access to monitoring and control functions through SNMP.	NAC3006-02
Blanking Panel	Power Rack Blanking Panel	SPSPFE3-BP01G
CANBus Terminator (female)	D-SUB 9; Pinout the same as J1201; 120 Ohm resistor between CAN_H and CAN_L	
CANBus Terminator (male)	D-SUB 9; Pinout the same as J1201; 120 Ohm resistor between CAN_H and CAN_L	SPSTET4-CAN-KIT
CANBus Cable	D-SUB 9; Pinout the same as J1201; Cable length = 110 mm	

## 18. REVISION HISTORY

REV	DESCRIPTION	PRODUCT VERSION	DATE	AUTHOR
1	Initial Draft	V001	06-05-2023	Eisen Xu
A	<ol style="list-style-type: none"> <li>1. "3-PHASE WYE (Y) OR DELTA (Δ) CONNECTION 277/480 VAC INPUT" change to "3-PHASE WYE (Y) OR DELTA (Δ) OR SINGLE PHASE OR HVDC INPUT"</li> <li>2. Update the description on the first page</li> <li>3. Update 1. POWER SHELF REFERENCE TABLE</li> <li>4. Update the main output voltage range to 48-58V, with a default output of 50.5V. The output voltage can be changed through NAC or CANBus.</li> <li>5. Update the DC OUTPUT and NOTE in the 2. ORDERING INFORMATION</li> <li>6. Update 3. TECHNICAL SPECIFICATIONS list</li> <li>7. Update Auxiliary Outlet fuse from 15A/500V to 15A/420V</li> <li>8. Update 4. SAFETY WARNING's CAUTION</li> <li>9. Update Figure 1. SPSTET4V3-01 Block Diagram</li> <li>10. Update Figure 2. Input Connection Diagram</li> <li>11. Update 7. INPUT SPECIFICATIONS</li> <li>12. Update 8. OUTPUT SPECIFICATIONS</li> <li>13. Update 8.1 PROTECTION (PER POWER MODULE)</li> <li>14. Add 8.2 Main output Connector (V1)</li> <li>15. +12VSB CONNECTOR (J1204) moved from 11.3 to 8.3 and added description content.</li> <li>16. Correct the arrangement order of LEDs.</li> <li>17. Update 12. AUXILIARY OUTLET description content.</li> <li>18. Delete Creepage / Clearance (dC) from "13 SAFETY, REGULATORY AND EMC SPECIFICATIONS"</li> <li>19. The Conducted Emission and Radiated Emission standards have been updated from EN 55022 to EN 55032</li> <li>20. Update the specifications on vibration and Shock in point 14.</li> <li>21. Update all exterior mechanical structure images</li> <li>22. Update 15. CONNECTORS: MPN of the Main output connector and +12VSB Output Connector</li> </ol>	V002	03-14-2024	Eisen Xu

**NUCLEAR AND MEDICAL APPLICATIONS** - Products are not designed or intended for use as critical components in life support systems, equipment used in hazardous environments, or nuclear control systems.

**TECHNICAL REVISIONS** - The appearance of products, including safety agency certifications pictured on labels, may change depending on the date manufactured. Specifications are subject to change without notice.

