Power shelf for NVIDIA
Vera Rubin NVL72

Power shelf for NVIDIA
Vera Rubin NVL72 or equivalent

Designed for demanding GPU workloads

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NVD-R-11E4ADT00-101	18.4kW PSU	6
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Power shelf for NVIDIA Vera Rubin NVL72

The Flex 110 kW 3RU MGX power shelf supports up to six PSUs, providing 110 kW of DC output power to the rack payload when operating with an AC input voltage range of 346 VAC to 480 VAC. The maximum power output per shelf is 110 kW under operating conditions. The shelf is designed to be supplied through input whips rated up to 96A maximum at 346–480 VAC.

Key Features

- Two rear-side RJ45 connectors enabling synchronized power-up between shelves and active current sharing
- Current sharing capability across multiple shelves
- Hot-pluggable PSUs and PSC
- Telemetry and monitoring available through Redfish
- Bootloader support for field firmware upgrades of PSC and PSUs
- Front-to-back airflow with internally controlled variable-speed fans

Fig: : Power shelf for NVIDIA Vera Rubin

Parameter	Power shelf for NVIDIA Vera Rubin NVL72
Output power max.	110kW
Output voltage	52V @ full load
Output current	354A
Input voltage range	360VAC to 480VAC
Frequency	47Hz to 63Hz
Cooling	Fan
Input connectors	BIZLINK: 117G0-167591-R1
Output connectors	BIZLINK: 117G0-169002-R1 AMPHENOL: 10179666-HX002LFC
Dimensions (H x W x L)	876.2 x 438 x 131.4mm
Safety	UL/IEC62368-1
EMC standards	EN55032 Class A, FCC part 15 Class A
Communication	I2C

Both the Power shelf for NVIDIA Vera Rubin NVL72 and the VR200 ATS Power Shelf share the same mechanical outline, ensuring identical physical dimensions and consistent fit within the rack infrastructure.

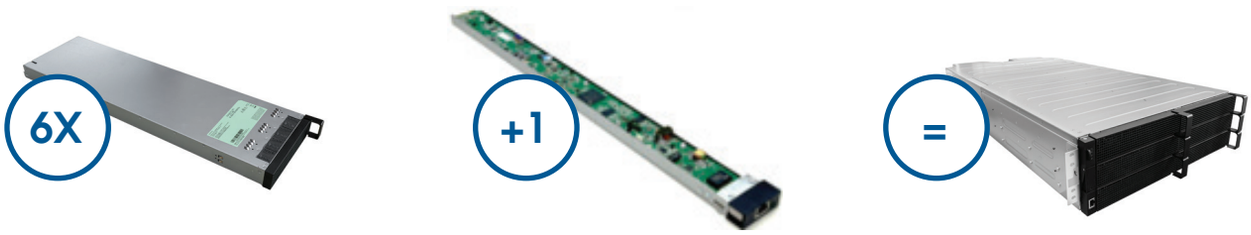


Fig: 3RU shelf with 6 Power Supply Units (PSUs) and 1 Power Supply Controller (PSC)

AC electrical requirements

The power shelf uses an X-style 5-pin connector that supports configurable AC input wiring for three-phase operation. The input parameters are defined below.

Parameter	Minimum	Typical	Maximum	Unit
3 phase input voltage	311	415	528	VAC (Line to Line)
Line frequency	47	50/60	63	Hz

Hi-Pot test for shelf level

For shelf-level insulation verification, two high-potential tests are performed.

In the first test, Line #1, Line #2, Line #3, and Neutral (N) are shorted together at the AC input power port, and the measurement is taken between this shorted group and the chassis ground. A voltage of 2500 VDC is applied with a 3-second dwell time, and the Hi-Pot equipment ramp-up time is set to 3 seconds.

In the second test, Line #1, Line #2, Line #3, and Neutral (N) at the AC input power port are shorted together, and the measurement is taken to the main output power port, where the 52 V positive output and return are shorted together. A voltage of 4000 VDC is applied with a 3-second dwell time, and the Hi-Pot equipment ramp-up time is again set to 3 seconds.

DC electrical requirements

The power shelf provides a various output voltage 52 V DC output that distributes power to network equipment, compute modules, and other rack-level payloads through a DC-DC bus architecture. Under an N+0 configuration, the shelf supports a maximum output power of 110 kW, supplying all connected loads within the rack.

Mechanical layout

Front view

From the front view, there are 6 slots for power supply units and one slot on the left side is for power shelf system control management unit (PSC).

Figure 2: Front View of Power Shelf

Rear view

There are 2 AC power cords,and 3pcs BZlisa850s DC Output connectors, and 2pcs rear modules with 2 RJ45 connectors.

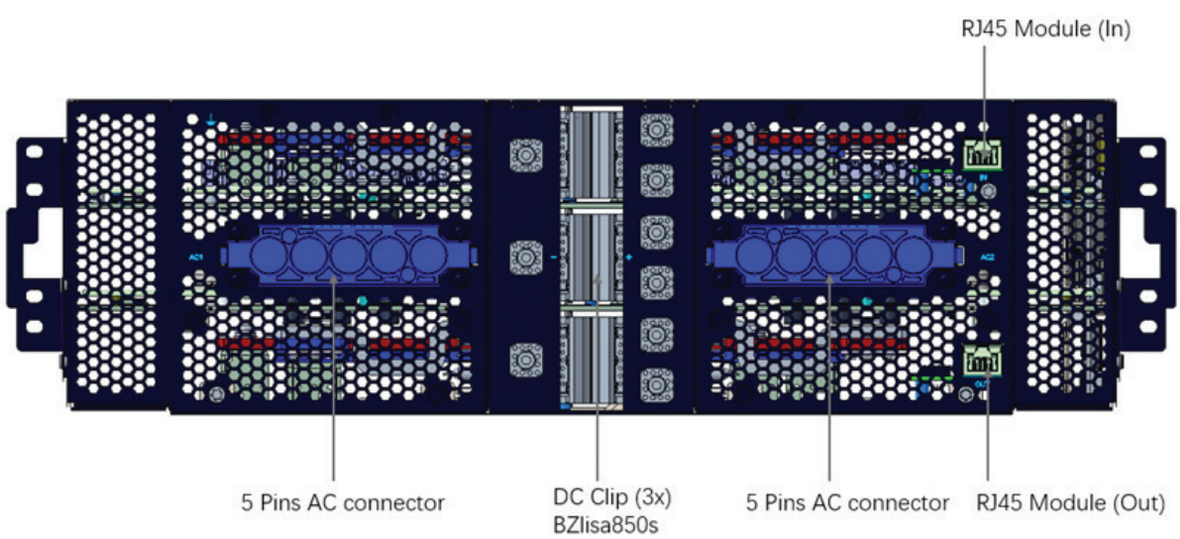
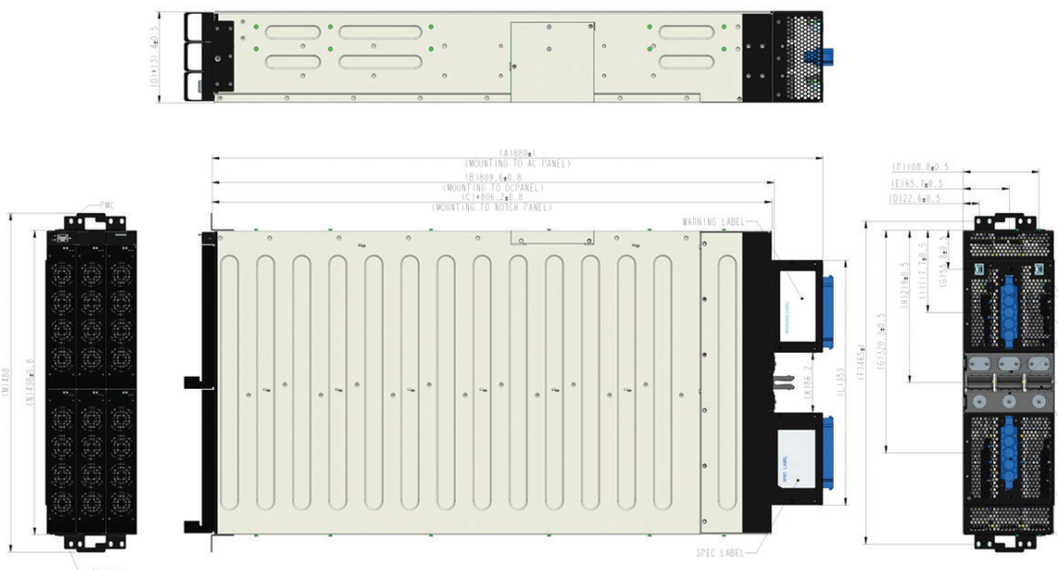


Fig: Rear View of Power Shelf

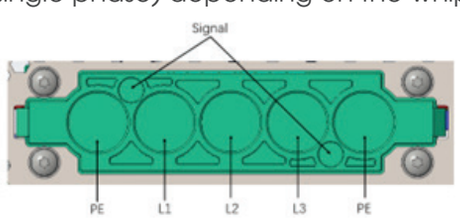
Dimension drawings

Both the ATS and non-ATS versions of the power shelf share the same mechanical outline.



AC input connector details

The shelf input connections provide high voltage inputs into the PSUs. The connection used is a 5-pin connector that allows various input power configurations (star, delta, single phase) depending on the whip used and its internal junction box connection configuration. This allows supporting different AC infrastructures with different whip configurations and a common power shelf. The power shelf AC input connector shall be Blzlink 115H0-043008-R12 Or Nvidia approved equivalent part.



Pin Number	3 Phase Assignment	Remarks
1	PE	Safety ground
2	L1	360 V – 480 VAC (Line to Line)
3	L2	360V – 480 VAC (Line to Line)
4	L3	360 V – 480 VAC (Line to Line)
5	PE	Safety ground
Short Pin S1	S1	S1 and S2 are shorted inside whip connector housing
Short Pin S2	S2	S1 and S2 are shorted inside whip connector housing

DC output connector details

The power shelf DC output floating connector blind mates to the busbar in the rear side of the power shelf. The DC Output connector shall be Bizlink BZlisa850s or NVIDIA approved equivalent part.

The connector incorporates two NTC thermistors as close to the power contacts as possible to monitor the busbar clip temperature. One thermistor is in contact with the positive (+) metal contact, and the other thermistor is in contact with the negative (-) metal contact.

FLEX 3RU MGX POWER SUPPLY UNIT (18.4KW)

The Flex 3RU MGX 18.4 kW Power Supply Unit operates with a true three-phase AC input configuration using L1, L2, L3, and PE, with a 120-degree phase angle between each line. The PSU output voltage ranges from 54 V at 0% load down to 52 V at 100% load. It is designed to integrate into the 3RU MGX 110 kW power shelf, supplying DC power to all rack-level payloads. The PSU incorporates a power pulsation buffer device that ensures sinusoidal AC input current under dynamic load conditions, including EDPP scenarios, with an energy storage capacity of greater than 1200 J.

Fig: Power supply unit (18.4kW)

Product characteristics

Electrical specifications

- 18.4 kW rated output power
- Nominal input voltage: 36 V to 480 VAC ±10%
- Output power: 52 V @ 354 A under normal operation
- More than 20 ms hold-up time, meeting ITIC requirements
- Support for pulsed power load
- Power factor (PF) ≥ 0.9 during EDPP loading

Performance and efficiency

- Titanium+ efficiency at 400 VAC, 415 VAC, and 480 VAC (measured with fans)
- Active power factor correction (meets EN/IEC 61000-3-12)
- Active current sharing plus output voltage droop
- Power pulsation buffer device to avoid AC input current swing and non-linearity during EDPP

Protection features

- DC output overvoltage and overcurrent protection
- AC input overvoltage and undervoltage protection
- Over-temperature warning and protection

Mechanical and thermal

- Hot insertion/removal (hot plug)
- Front-to-back airflow
- Internally controlled variable-speed fan
- Operating ambient temperature: –5°C to 40°C

Control and management

- Field firmware upgrade capability (with bootloader), upgradable online by system
- Support for 400 kHz I^2C communication with rack management device

Technical specifications

Parameter	Specification
Ac input section	
Input operation voltage	346 VAC to 480 VAC (L to L)
Line frequency	47–63 Hz
Power factor	> 0.99 at full load
iTHD	< 5% at full loading
Hold up time	> 20 ms at full load
Dc output section	
Rated output power	18,400 W
Efficiency	ErP+ (with PSU fans)
Dynamic loading	Supports 10% to 150% pulse power loading
Ripple and noise	≤ 500 mV peak to peak with 20 MHz bandwidth
Capacitive load	≤ 20 mF
Active current sharing	0 to 7 V (0% to 100% loading)
Protection function	OCP, SCP, OVP
Communication interface	I^2C
Environment	
Operating ambient temperature	–5°C to 40°C

AC Input Current and Power Factor Performance During Dynamic Load

The 18.4 kW PSU incorporates a power pulsation buffer device designed to maintain a sinusoidal AC input current during dynamic loading conditions, including EDPP scenarios. This buffer stabilizes input behavior by compensating for rapid load transitions, ensuring that both input current waveform quality and power factor (PF) remain within acceptable limits. The energy stored in the power pulsation buffer exceeds 1200 J, providing sufficient capacity to prevent AC input current distortion during transient events.

Hi-Pot test for PSU

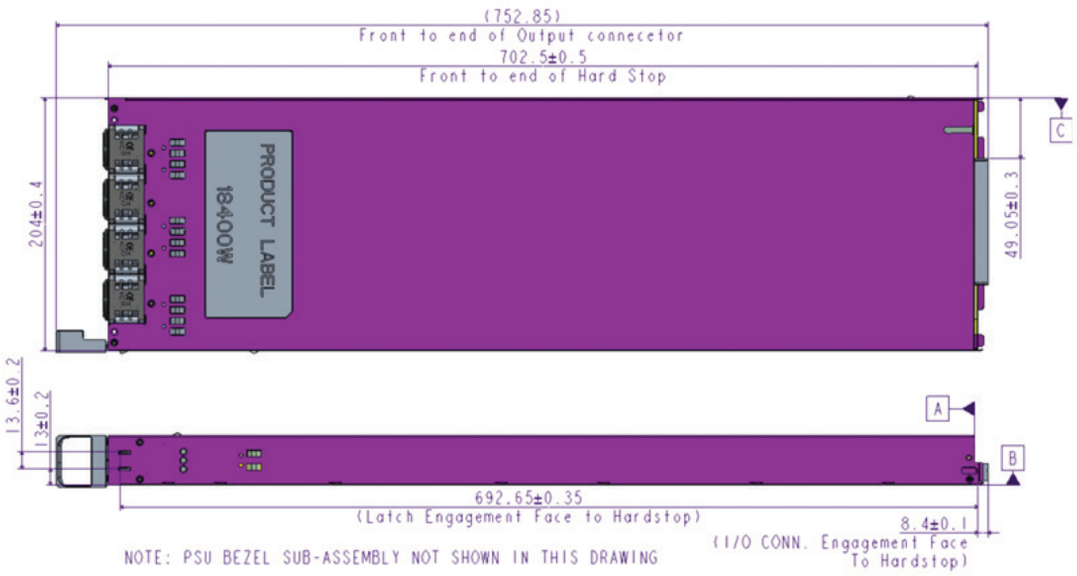
Two high-potential tests are performed at the PSU level to verify insulation strength.

In the first test, L1, L2, and L3 at the AC input power port are shorted together, and the measurement is taken between this shorted group and the chassis ground. A voltage of 2500 VDC is applied with a 3-second dwell time, and the Hi-Pot tester ramp-up time is set to 3 seconds.

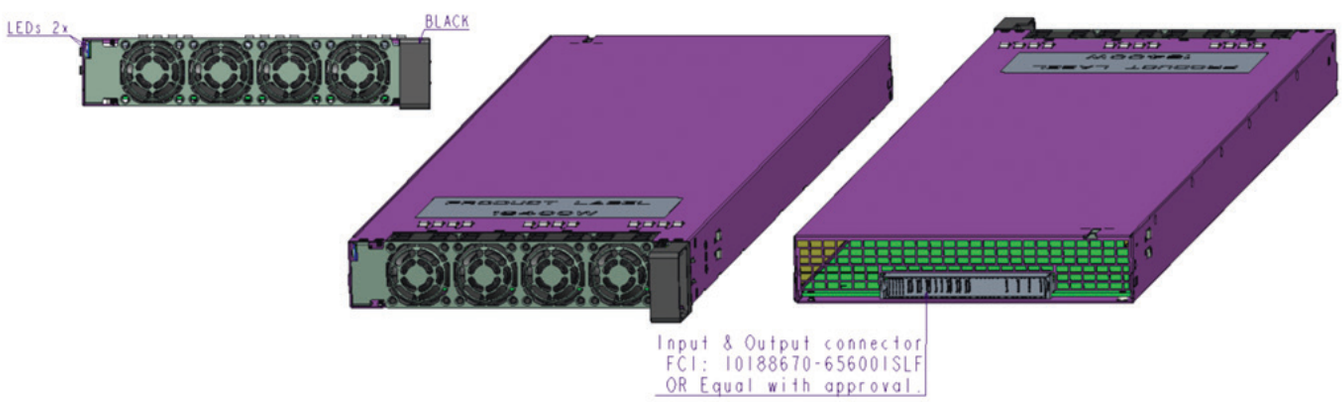
In the second test, L1, L2, and L3 at the AC input port are again shorted together, and the measurement is taken to the 52 V output power port, where the 52 V positive terminal and return are shorted together. The same 4000 VDC test voltage is applied with a 3-second dwell time and a 3-second ramp-up time.

Mechanical layout

The PSU measures 40 mm (H) × 204 mm (W) × 702 mm (D). Refer to the drawing for detailed dimensions. It has a black latch and handle.

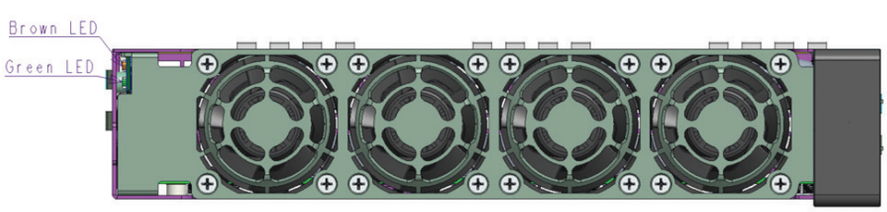


Isometric View



LED indicators

A green LED and an amber LED are mounted near the PSU handle for visibility.

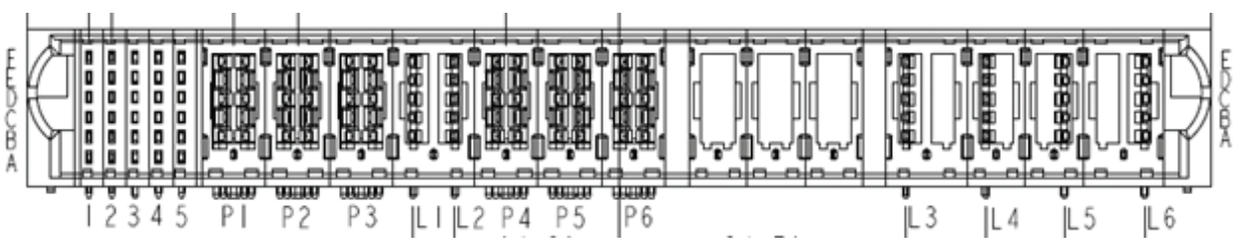


The LED behavior under different PSU operating conditions is shown in the table below.

PSU Status	Power LED	Fault LED
AC_OK, VOUT off	Blinking at 4 Hz	—
VOUT on	Solid	—
VOUT off	Off	—
Bootloading	—	Blinking at 4 Hz
Fault	—	Solid
Fault not present	—	Off

Rear I/O connectors

The PSU uses a rear blind-mate connector specified as FCI 10188670-656001SL or an NVIDIA-approved equivalent. The connector includes 6 high-power pins, 30 signal pins, and 4 low-power pins to support both power delivery and control interfaces.



Rear I/O connectors

Pin List	Pin Name	Function
P1	+52V	52 V output terminal
P2	+52V	52 V output terminal
P3	+52V	52 V output terminal
P4	+52V_Return	52 V return
P5	+52V_Return	52 V return
P6	+52V_Return	52 V return
L3	PE	Safety ground
L4	Line #3	3 phase AC input terminal
L5	Line #2	3 phase AC input terminal
L6	Line #1	3 phase AC input terminal

FLEX 1RU EIA power supply controller (PSC) module

The PSC is a hot-pluggable controller for the power shelf and can be powered through PoE via the RJ45 connector, the PSU main output, or standby power. The RJ45 connector is located on the front side of the assembly and provides 1 Gb Ethernet with PoE capability for communication with all rack-level BMC controllers. The PSC communicates with up to six PSUs in the power shelf using PMBus or the reserved CAN bus through the back-end 84-pin edge finger connector interfacing to the backplane.

Fig: Power supply controller (PSC) module

Technical specifications

Parameter	Specification
Parameter	Specification
Supply input	DC voltage input range 43–57 V, acceptable for ORV3
Front end network connectivity	RJ45 port: 1000Base T / 100Base TX / 10Base T Ethernet with PoE PD
Back end serial communication	I^2C (SMBus / PMBus), UART, and reserved USB, CAN / RS485 interface
Operating temperature	–5°C to +45°C (23°F to 113°F)
Storage temperature	–40°C to +70°C (–40°F to 158°F)

Functionality

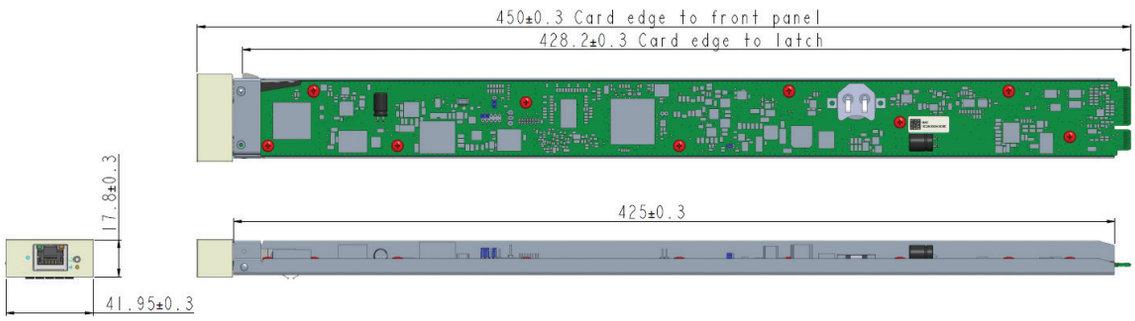
- Redfish
- Power and Thermal Management
- PLDM Firmware Update
- Remote Debug
- Status/health monitoring telemetry
- Inventory check for Data Center automation
- Rack Power Cycle
- Power Controls at shelf and PSU level (all on/off and individual PSU on/off)

Hardware Features

- ASPEED AST2620A3
- Single 1Gb Ethernet RJ45 port with PoE PD
- Dual 256MB SPI flash parts for image redundancy
- 8GB eMMC for storing logs, configuration, etc.
- External Hardware Watchdog
- Local 256B EEPROM FRU
- Directly supplied from shelf voltage, low consumption
- Hot-Swappable with the rack is powered
- Security of Rot support
- Amber indicator LED for warning
- Shelf Plug Detection

Mechanical layout

Dimensions

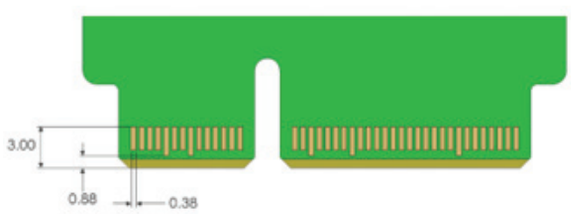


RJ45 connector (front side)

Amphenol RJE72-188-13G2-HF or NVIDIA-approved equivalent

Golden finger blind-mate connector

- TE 2327671-8 – Through-hole version
- TE 2470289-3 – Straddle-mount version



Mechanical layout

Pin #	PIN name	Type	Comment	PIN length
A1	ALERT_0_N	I	PSU/BBU PMBus alert	
A2	ALERT_2_N	I		
A3	ALERT_4_N	I		
A4	ADDR_ID_0	I	Shelf ID - 8 possible shelf types 00 - XX 01 - Power shelf - 1 feed 60A 02 - Power shelf - 2 feed 30A	
A5	ADDR_ID_2	I		
A6	REAR_CAN1_H	I/O	Reserved CAN bus/RS485	
A7	REAR_CAN1_L	I/O	Reserved CAN bus/RS485	
A8	Signal_SGND	GND		Pre
A9	UART7_RXD_MCU	I/O		
A10	UART7_TXD_MCU	I/O		
A11	PSU1_RST	O		
A12	PSU3_RST	O		

Pin #	PIN name	Type	Comment	PIN length
A13	PSU5_RST	O		
A14	12V_AUX	Power In	PSU standby power	
A15	12V_RTN_GND	GND		
A16	PSU0_PRESENT_N	I	PSU/BBU present Local pullup Low: PSU present High: No PSU present	
A17	PSU2_PRESENT_N	I		
A18	PSU4_PRESENT_N	I		
A19	RSVD_CAN0_H	I/O	Reserved CAN bus/RS485	
A20	RSVD_CAN0_L	I/O	Reserved CAN bus/RS485	
A21	Signal_SGND	GND		Pre
A22	PMBUS0_SDA_A	I/O I^2C	PMBus PSU/BBU 0-5	
A23	PMBUS0_SCL_A	I/O I^2C	PMBus PSU/BBU 0-5	
A24	SYNC_STOP_L	I		
A25	REAR_GPIO1_ RECOVERY_N	I/O		
A26	Signal_SGND	GND		Pre
A27	AC_OK_L_0	I	Detect loss of AC Low: AC ok High: AC loss	
A28	AC_OK_L_1	I		
A29	AC_OK_L_2	I		
A30	AC_OK_L_3	I		
A31	AC_OK_L_4	I		
A32	AC_OK_L_5	I		
A33	VOUT_SEL	O	Reserved	
A34	VBAT	O		
A35	Signal_SGND	GND		Pre
A36	BUSBAR_CLIP_TEMP+	I	Busbar clip temperature PSC monitor from positive metal contact	
A37	BUSBAR_CLIP_TEMP-	I	Busbar clip temperature PSC monitor from negative metal contact	
A38	Signal_SGND	GND		Pre
A39	N.C.	I/O		
A40	P50V_RTN	I		
A41	N.C.	I/O		
A42	P50V_Vout	Power In		

Pin #	PIN name	Type	Comment	PIN length
B1	ALERT_1_N	I		
B2	ALERT_3_N	I		
B3	ALERT_5_N	I		
B4	ADDR_ID_1	I	Shelf ID	
B5	ADDR_ID_3	I	Reserved	
B6	Signal_SGND	GND		Pre
B7	USB2A_DIFF_P	I/O		
B8	USB2A_DIFF_N	I/O		
B9	Signal_SGND	GND		Pre
B10	N.C.			
B11	PSU0_RST	O	PSU/BBU reset (error latch) high for 1s: clear faults and start PSU to operate if not working due to a fault	
B12	PSU2_RST	O		
B13	PSU4_RST	O		
B14	12V_AUX			
B15	12V_RTN_GND	GND		
B16	PSU1_PRESENT_N	I		
B17	PSU3_PRESENT_N	I		
B18	PSU5_PRESENT_N	I		
B19	ALERT_MCU_BMC_N			
B20	ISHARE_N	I	Ishare line, to be monitored by ADC	
B21	ISHARE_P	I	Ishare line, to be monitored by ADC	
B22	Signal_SGND	GND		Pre
B23	ALERT_BMC_MCU_N	I/O		
B24	REAR_GPIO0_RST	I/O		
B25	N.C.			
B26	REAR_SDA_A	I/O I^2C		
B27	REAR_SCL_A	I/O I^2C		
B28	Signal_SGND	I		Pre
B29	SHELF_SDA_A	I/O I^2C	I^2C Shelf EEPROM	
B30	SHELF_SCL_A	I/O I^2C	I^2C Shelf EEPROM	
B31	N.C.			
B32	SYNC_START_N	I	PSU/ BBU sync start info	
B33	EEPROM_WP_N	O	EEPROM write protect enable /disable	
B34	Signal_SGND	GND		Pre
B35	BACKUP_TRIGGER_C	O		
B36	REAR_GPIO2	I		
B37	REAR_GPIO3	I		
B38	POWER_KILL	I	Power kill, pull down to GND on shelf	Post
B39	N.C.	I/O		
B40	P50V_RTN	I		
B41	N.C.	I/O		
B42	P50V_Vout	Power In		

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Designed for demanding GPU workloads

Revision number	Revision change	Date	Revisor
Rev A.	05/2026 NVL72 REV A	01/2026	SME

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