SOSA
Sensor Open Systems Architecture™

PSU-Polar-3U

PSU-S3U-1000H-28C

VPX 1000 W-class Power Supply Module Conduction cooled

DESCRIPTION

PSU-Polar-3U is a SOSA-aligned 3U VPX power supply module for high-reliability aerospace and defence platforms using a nominal 28 VDC power bus. The module provides 1000 W-class output power through two VPX backplane rails: +12 V_MAIN and +3.3 V_AUX. It combines a balanced modular isolated power architecture, controlled MIL-STD-1275 input protection, active output ORing, redundant management-bus support, telemetry, and fault reporting in a conduction-cooled 10HP / 2.0 inch VPX power-module envelope with integrated hold-up energy storage.

KEY FEATURES

- SOSA-aligned 3U VPX power module, 2.0 inch pitch
- 16–36 VDC continuous input for nominal 28 VDC platforms
- Full 1000 W-class output power from 27–36 VDC input
- Derated operation below 27 VDC input
- +12 V_MAIN output rated at 80 A / 960 W
- +3.3 V_AUX output rated at 15 A / 50 W
- MIL-STD-1275 input transient protection
- MIL-STD-461G CE101, CE102, CS101, CS114, CS115, and CS116 conducted EMI/EMC support
- Active output ORing for dual-module redundant operation
- Remote sense support for both output rails
- Dual IPMB-style management-bus support
- Telemetry, fault reporting, and nonvolatile event logging
- Integrated 75 J-class hold-up capacitor bank
- Typical ride-through greater than 65 ms at full 1000 W load, configuration dependent

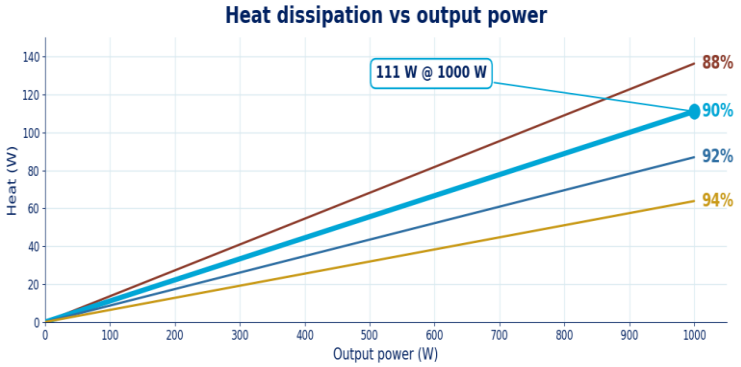
ELECTRICAL CHARACTERISTICS

Input range:	16–36 VDC continuous
Nominal input:	28 VDC
Full-power input:	27–36 VDC
Low-line op.:	Derated below 27 VDC
Input path:	45 A continuous
+12 V_MAIN out:	+12.0 VDC, 80 A, 960 W
+3.3 V_AUX out:	+3.3 VDC, 15 A, 50 W
Total out power:	1000 W class, allocated as 950 W + 50 W
POWER_RETURN:	95 A continuous combined return
Output redundancy	Active output ORing on both rails
Remote sense:	+12 V_MAIN and +3.3 V_AUX
Output isolation:	500 VDC minimum input-to-output, input-to-case, output-to-case
Interface ESD:	±8 kV contact, ±15 kV air
Hold-up:	Integrated hold-up capacitor bank
Typical Hold Up:	>65 ms at 1000 W load

THERMAL & HEAT DISSIPATION

Dissipation is measured at the rated output power of 1000 W.

Eff.	Output	Input	Heat dissipation
88%	1000 W	1136.4 W	136.4 W
89%	1000 W	1123.6 W	123.6 W
90%	1000 W	1111.1 W	111.1 W
91%	1000 W	1098.9 W	98.9 W
92%	1000 W	1087.0 W	87.0 W
93%	1000 W	1075.3 W	75.3 W
94%	1000 W	1063.8 W	63.8 W



Typical full-load heat dissipation is 111 W at 90% efficiency and 1000 W output power. The chassis shall maintain the card-edge temperature at or below +85 °C at rated load.

VPX P0 CONNECTOR

Input power	P1 –DC_IN; P2 +DC_IN
Chassis	LP1 CHASSIS
Main output	P3 / PO3 and P6 / PO1 +12 V_MAIN
Output return	P4 / P5 POWER_RETURN
Auxiliary output	LP2 / PO2 +3.3 V_AUX
Remote sense	A8 +12 V_SENSE; B8 +3.3 V_AUX_SENSE; D8 SENSE_RETURN
Control & status	D2 ENABLE*; C2 INHIBIT*; B2 FAIL*; D6 SYSRESET*
Management	C5 / D5 IPMB-A; A6 / B6 IPMB-B
Geographic address	A5 GA0*; B5 GA1*
Emergency input	C3 NED; D3 NED_RETURN
No-connect	A4 / B4 / C4 / D4 and C8 NC

PSU-S3U-1000-28C uses the VITA 62.0-2022 3U 12 V-centric output allocations, with PO1 and PO3 assigned to +12 V_MAIN and PO2 assigned to the CAVU +3.3 V_AUX rail. SIGNAL_RETURN and CHASSIS shall not be used as load-current returns.

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OUTPUT PERFORMANCE

Efficiency	90% at nominal input & 50–100% load
Line regulation	0.5% max
Load regulation	0.5% max
+12 V_MAIN ripple and noise	120 mV p-p max, 20 MHz bandwidth
+3.3 V_AUX ripple and noise	50 mV p-p max, 20 MHz bandwidth
Output overvoltage protection	130% typical
Output overcurrent protection	130% typical
Output transient capability	Each rail 110% of rated current for ≥20 ms within the specified transient envelope; current limiting activates above the envelope or at protection thresholds
Short-circuit protection	Protected shutdown / controlled recovery
Overtemperature protection	Protected shutdown with event logging

ARCHITECTURE

The module uses a balanced modular isolated power architecture to support the 1000 W-class output rating. The +12 V_MAIN and +3.3 V_AUX outputs are generated by isolated conversion stages and combined through active output ORing before being presented to the VPX backplane. The ORing stage provides reverse-current blocking for redundant dual-module operation. Input and output telemetry are reported through the management interface.

MANAGEMENT & TELEMETRY

The module presents a managed power-supply endpoint over two redundant IPMB-style management buses; loss of one bus does not interrupt module operation. Telemetry and status include input voltage, current, and power; output voltage, current, and power for both rails; input load status; output ORing status; six temperature sensors; runtime hours; restart counter; and nonvolatile fault log.

PROTECTION & FAULT HANDLING

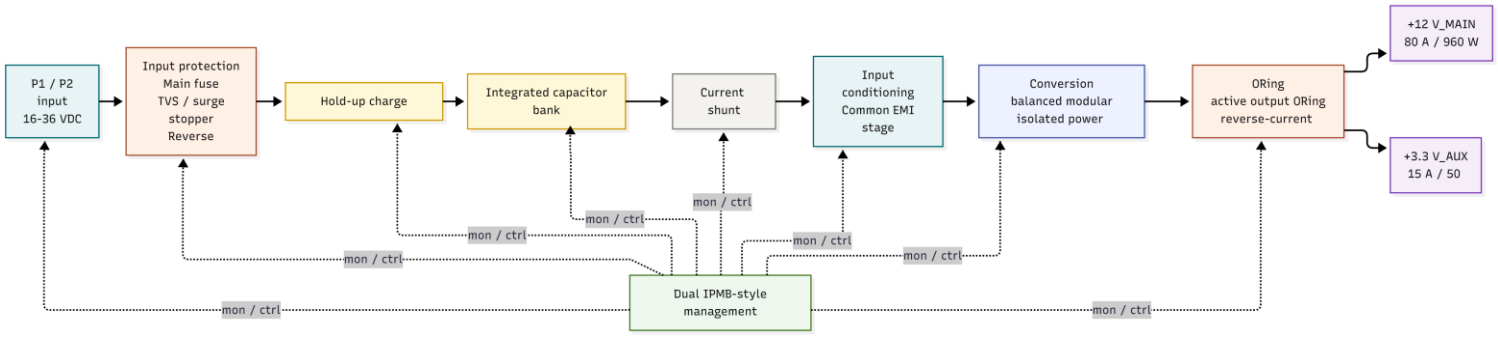
The module provides comprehensive protection with fault reporting and nonvolatile event logging. Detected, reported, and logged events include input undervoltage and overvoltage; input overcurrent; output overvoltage and undervoltage; output overcurrent; short circuit; reverse-current event; ORing fault; overtemperature; management-bus fault; and controller watchdog event.

MECHANICAL & ENVIRONMENTAL

Form factor	3U VPX power module per VITA 62.0 / VITA 48.2, 2.00 inch pitch
Envelope (max)	3.94 in W × 6.63 in L × 2.00 in H
Mass	3.6 lb typical, 3.8 lb maximum
Alignment / keying	Two alignment-keying devices
Deflection clearance	0.800 in min for PCB deflection at wedge-lock expansion
Connector	VITA 62.0 VPX P0; 500 mate/unmate end-of-life cycles
Cooling	Conduction cooled through card edge and wedge-lock path
Operating temperature	−40 °C to +85 °C card-edge
Startup temperature	−46 °C minimum
Storage temperature	−55 °C to +105 °C
Temperature cycling	500 cycles, −55 °C to +105 °C
Altitude	−1,500 ft to +70,000 ft equivalent
Vacuum operation	≤1 × 10^{-5} torr with conduction cooling
Mechanical shock	40 g, 11 ms half-sine, 18 shocks
Random vibration	0.1 g^2/Hz, 1 hour per axis
Humidity	95% RH, non-condensing
Salt fog / corrosion	SL1 / ASTM G85 Annex A4 style exposure
Interface ESD	±8 kV contact, ±15 kV air
EMI / EMC	MIL-STD-461 CE101, CE102, CS101, CS114, CS115, CS116 (configuration controlled)
Vehicle input	MIL-STD-1275 application support

STANDARDS

- VITA 46.0; VITA 46.11; VITA 48.x; VITA 62; VITA 65
- OpenVPX; SOSA Technical Standard;
- MIL-STD-704; MIL-STD-461; MIL-STD-810; MIL-STD-1275;
- RTCA/DO-160 where applicable.



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