

PSU-Polar-3U

VPX 600 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 600 W-class output power through two VPX backplane rails: +12 V_MAIN and +3.3 V_AUX. It combines isolated power conversion, controlled input protection, active output ORing, redundant management-bus support, telemetry, and fault reporting in a conduction-cooled 1.0 inch VPX power-module envelope.

KEY FEATURES

- SOSA-aligned 3U VPX power supply module, 1.0 inch pitch
- 16–36 VDC continuous input for nominal 28 VDC platforms
- 600 W-class total output allocation
- +12 V_MAIN output rated at 46 A / 550 W
- High-current +3.3 V_AUX output rated at 15 A / 50 W
- Conduction cooled through card edge and wedge-lock thermal path
- 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
- Input reverse-polarity, inrush, overcurrent, overvoltage, short-circuit, and overtemperature protection
- External hold-up interface supported

ELECTRICAL CHARACTERISTICS

Input range	16–36 VDC continuous
Nominal input	28 VDC
Input current path	45 A continuous
+12 V_MAIN output	+12.0 VDC, 46 A, 550 W
+3.3 V_AUX output	+3.3 VDC, 15 A, 50 W
Total output power	600 W class, allocated as 550 W + 50 W
POWER_RETURN	65 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	External hold-up interface supported

PSU-Polar-3U implements the SOSA-aligned two-rail power allocation. Legacy VITA 62 rails are not populated on this product.

OUTPUT PERFORMANCE

Efficiency	90% typical at nominal input and 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
Short-circuit protection	Protected shutdown / controlled recovery
Overtemperature protection	Protected shutdown with event logging

ARCHITECTURE

The module uses a balanced internal power architecture to support the 600 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; load-balance status; output ORing status; six temperature sensors; runtime hours; a restart counter; and a nonvolatile fault log.

THERMAL & HEAT DISSIPATION

Dissipation is measured at the rated output power of 600 W.

Efficiency	Output power	Input power	Heat dissipation
88%	600 W	681.8 W	81.8 W
89%	600 W	674.2 W	74.2 W
90%	600 W	666.7 W	66.7 W
91%	600 W	659.3 W	59.3 W
92%	600 W	652.2 W	52.2 W
93%	600 W	645.2 W	45.2 W
94%	600 W	638.3 W	38.3 W

Typical full-load heat dissipation is 67 W at 90% efficiency and 600 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 / P6 +12 V_MAIN
Output return	P4 / P5 POWER_RETURN
Auxiliary output	LP2 +3.3 V_AUX
Remote sense	A8 +12 V_SENSE; B8 +3.3 V_AUX_SENSE; D8 SENSE_RETURN
Control and 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 NC

SIGNAL_RETURN and CHASSIS shall not be used as load-current returns.

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, 1.0 inch pitch
Envelope (max)	3.94 in W × 6.63 in L × 0.97 in H
Mass	1.8 lb typical, 2.0 lb maximum
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-461G CE102, CS101, CS115, CS116

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 where applicable; RTCA/DO-160 where applicable.