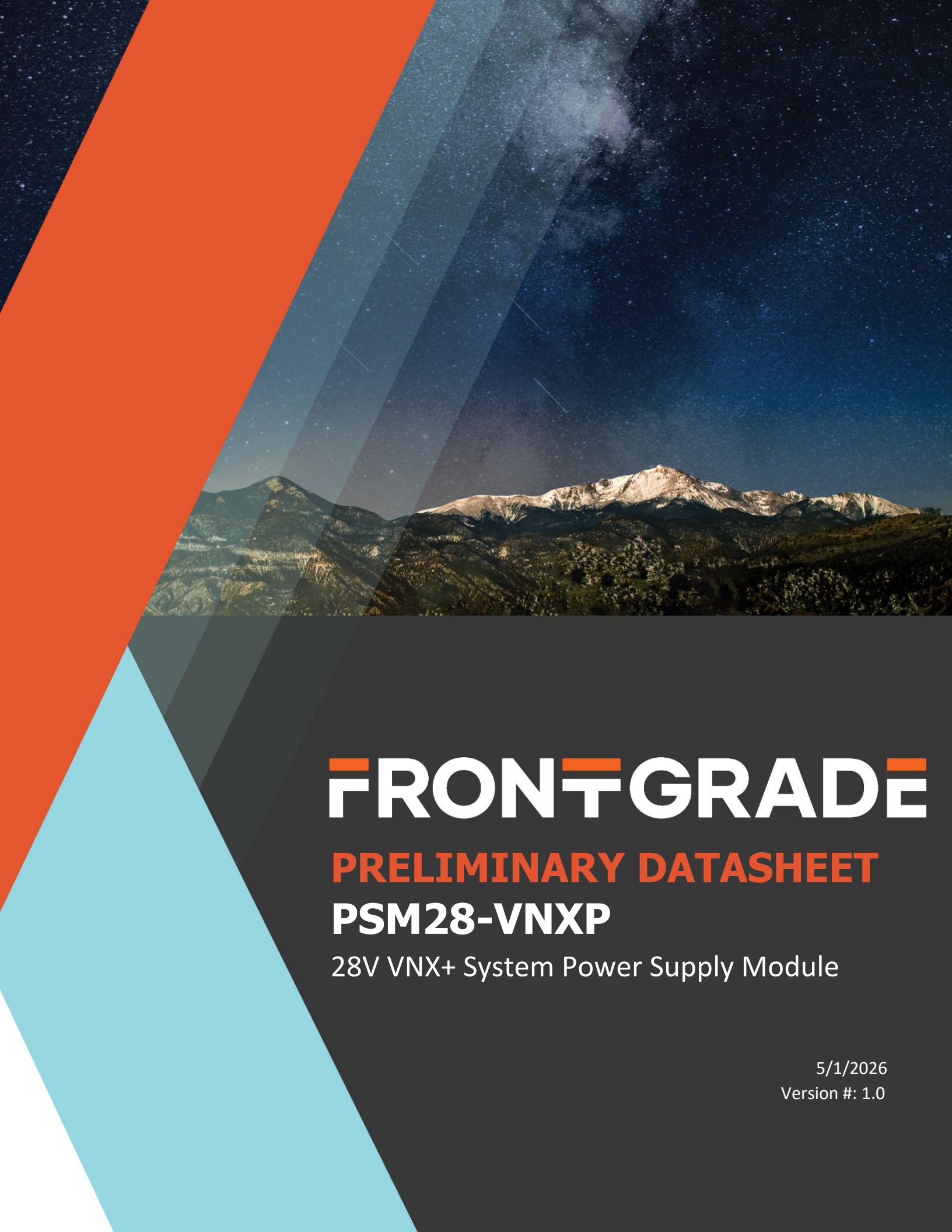




FRONTGRADE

PRELIMINARY DATASHEET

PSM28-VNXP

28V VNX+ System Power Supply Module

5/1/2026
Version #: 1.0



Introduction

The Frontgrade™ PSM28-VNXP is an isolated 28V input, 144W, GaN based power supply designed as a plug-in module for VITA 90.0 VNX+ subsystems. Operating from a regulated or unregulated external 28V power bus, the PSM28-VNXP provides efficient power conversion to deliver tightly regulated 12V (VS1) and 3.3V_Aux power to modules plugged into a VNX+ backplane. The power supply provides one dedicated and two switched 12V outputs, in addition to a dedicated, low power, 3.3V_Aux output.

The PSM28-VNXP is a conduction cooled module based on VITA 90.4 form-factor in Style B – 39mm pitch. The backplane profile is a Center “28V-Centric” 320-pin connector with “PSU_12V-Only” configuration as described in VITA 90.3.

Beyond power delivery to the subsystem, the PSM28-VNXP includes several fault protection features like input under/over voltage protection, EMI filtering, and output overcurrent. Additionally, the power supply includes the Frontgrade UT32M0R500 ARM-M0+™ microcontroller which provides chassis management functions to the system controller as well as gathers housekeeping telemetry for the power stages.

Applications

- Unmanned aerial systems (UAS/UAVs)
- Small satellite subsystems (LEO/MEO/GEO)
- Signal Intelligence (SIGINT) and electronic warfare (EW) systems
- Mission Computers—Powering embedded processors, GPUs, and FPGAs within VNX+ or VPX systems
- UAVs/UGVs/USVs
- EW/ECM Pods—for RF and processing subsystems
- Supports high-efficiency operation in both LEO (low-Earth orbit) constellations and deep-space exploration missions.
- Powers flight computers, command and data handling units, and reconfigurable processing system
- CubeSats or SmallSats

Why it Matters

The **PSM28-VNXP** power supply matters because it delivers **reliable, efficient, and scalable power** in the **extreme and harsh environments**, where failure is not an option. By combining high-efficiency DC-DC conversion, radiation tolerance, and intelligent power management, it ensures stable operation for mission critical systems like flight computers, payloads, and communication equipment. Its modular, VNX+ aligned design reduces system complexity while enabling flexibility and redundancy through parallel operation, making it easier to scale power as mission demands grow. Ultimately, this capability supports longer mission lifespans, improved reliability, and more adaptable system architectures.

Ordering Information

Ordering PN	Product Grade	Target Mission Class / Environment
PSM28-VNXP-OP-EDU	EM (Room Temp only)	Lab / Development Use Cases
PSM28-VNXP-OP-FM4	COTS Parts Grade (-10°C to +50°C)	Target Mission Class D
PSM28-VNXP-OP-FM3	Level 3 Parts Grade (-10°C to +50°C)	Target Mission Class C

Note: Frontgrade makes best effort to fit equivalent parts grading to build corresponding FM# level, but exceptions should be expected, particularly where Level 1 or Level 2 parts grades are not achievable/practical for standard hardware builds.

Features

Primary Input Power

- 24Vdc to 36Vdc Input range, 28Vdc Nominal
- 42Vdc for 2 seconds Survival Limit
- 150uF Max Input Capacitance
- Isolated from secondary > 1 Meg ohm at 50V
- MIL-STD-461 Revision G capable

Telemetry

- Analog Thermistor Interface
- Output Current and Voltage

Mass & Thermal

- Mass: <0.35 kg
- 39mm VNX+ form factor
- -10°C to +50°C operational case temperature
- Power Dissipation: <22W @ 144W Output Power

Secondary Output Power

- 12Vdc at 144W (peak)
- Three 12Vdc VS1 outputs
 - 1 Unswitched – “always on”
 - 2 Switched
 - Sharable
 - 12A max spread across all outputs
- One 3.3V_Aux (2A max)
- ENABLE_B and INHIBIT_B discrete controls for 3.3Vdc and 12Vdc output power generation

Operational Environment & Reliability

- Module reliability over 0.9 @ 5 years @ 70°C
- Module MTBF: > 481,263 hours
- System SEU rate: No more than one ground intervention per year for typical LEO Missions
- TID: Up to 30 krad(Si)
- NASA PEM-INST-001 Level-2 parts pedigree available

Block Diagram

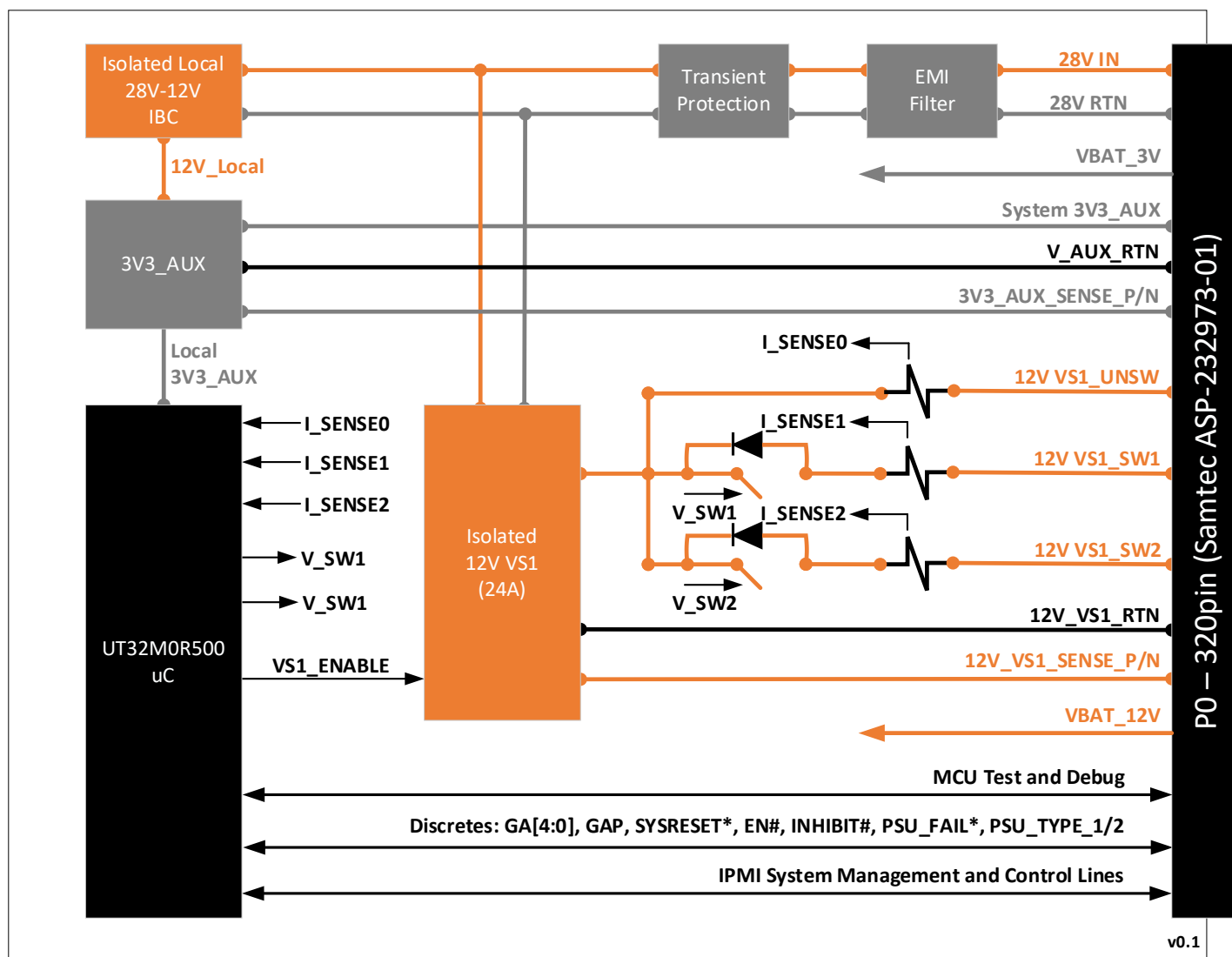


Figure 1. PSM28-VNXP Block Diagram

Backplane Slot Profile and Connection Tables

The PSM28-VNXP Power Supply is a 39mm pitch VNX+ plug-in module (PIM) whose form factor is outlined in VITA 90.4. The backplane profile is a Center “28V-Centric” 320-pin connector with “PSU_12V-Only” configuration as described in VITA 90.3.

For reference, the connector pinout taken from VITA 90.3 Figures 3.5.23-5 and Figure 3.5.23-6 are shown below.

	A	B	C	D	E	F	G	H
1						RFU (2)	SYNC_1	RFU (2)
2						VS4	SYNC_2	
3						VS4_RTIN	GND	PGOOD
4						VS4	IO_OVLY_1	VHeater
5							GND	VHeater_RTIN
6							IO_OVLY_2	VBAT_3V_RTIN
7						CAN_1P	GND	VBAT_3V
8						CAN_1N	IO_OVLY_3	
9							GND	GDISCRETE1
10	DC_IN (20)	VS1_RTIN (20)	VS1 (20)		VS1 (20)	CAN_2P	IO_OVLY_4	GND
11						CAN_2N	GND	NVMRO
12							IO_OVLY_5	GND
13						USB_1_VBUS	GND	SYSRESET*
14							IO_OVLY_6	GND
15						USB_1_DP	GND	ENABLE*
16						USB_1_DN	IO_OVLY_7	GND
17							GND	INHIBIT*
18							IO_OVLY_8	GND
19						MP_1_RXD	GND	CROWBAR
20						MP_1_TXD	IO_OVLY_9	CROWBAR_RTIN
21							GND	PSU_FAIL*
22					VS1_SENSE_P	MP_EN	IO_OVLY_10	TP_EN*
23					VS1_SENSE_N		GND	
24				VS1_RTIN (47)	VS1_DCHN_OUT	SER_OVLY_1P	IO_OVLY_11	GND
25					VS1_BUS1	SER_OVLY_1N	GND	SM_A_SCK
26					VS1_BUS2		IO_OVLY_12	GND
27					VS1_BUS3	SER_OVLY_2P	GND	SM_A_SDA
28						SER_OVLY_2N	IO_OVLY_13	GND
29							GND	SM_B_SCK
30	DC_IN_RTIN (20)	VS1 (20)				RFU	IO_OVLY_14	GND
31						PSU_TYPE_1	GND	SM_B_SDA
32						PSU_TYPE_2	IO_OVLY_15	GND
33						VAUX_SENSE_P	GND	GA0*
34						VAUX_SENSE_N	IO_OVLY_16	GA1*
35						VAUX_DCHN_IN	GND	GA2*
36						VAUX_DCHN_OUT	IO_OVLY_17	GA3*
37						VAUX_BUS1	GND	GA4*
38						VAUX_BUS2	IO_OVLY_18	GAP*
39						VAUX_BUS3	GND	
40						PSU_TYPE_3	HOLD_NODE	

Figure 2. PSU_12V-Only Pin Map

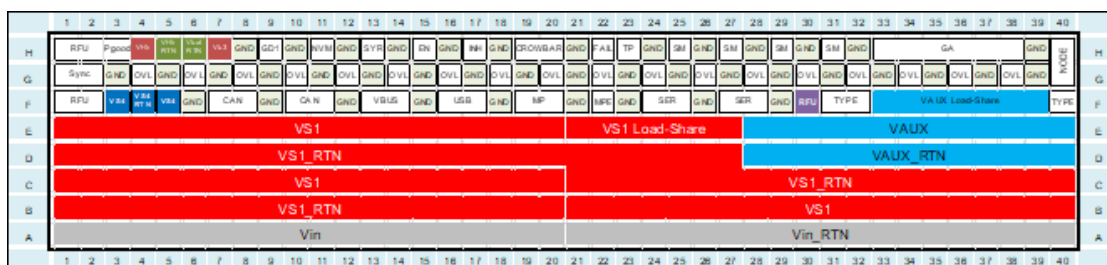


Figure 3. Physical Mapping for PSU_12V-Only PSU Connector (Front View)

PSM28-VNXP Backplane Pinout

Connector Manufacturer: Samtec

Manufacturer Part Number: ASP-232973-01

Mates with Backplane Connector Part Number: TBS

Table 1. 320-pin P0 Pin List Connection Table

P0 Connector Pin Location	P0 Connector Pin Name	Power Supply Connection	P0 Connector Pin Location	P0 Connector Pin Name	Power Supply Connection
A1	DC_IN	+28V_INPUT	E1	VS1	+12V_OUT_SW2
A2	DC_IN	+28V_INPUT	E2	VS1	+12V_OUT_SW2
A3	DC_IN	+28V_INPUT	E3	VS1	+12V_OUT_SW2
A4	DC_IN	+28V_INPUT	E4	VS1	+12V_OUT_SW2
A5	DC_IN	+28V_INPUT	E5	VS1	+12V_OUT_SW2
A6	DC_IN	+28V_INPUT	E6	VS1	+12V_OUT_SW2
A7	DC_IN	+28V_INPUT	E7	VS1	+12V_OUT_SW2
A8	DC_IN	+28V_INPUT	E8	VS1	+12V_OUT_SW2
A9	DC_IN	+28V_INPUT	E9	VS1	+12V_OUT_SW2
A10	DC_IN	+28V_INPUT	E10	VS1	+12V_OUT_SW2
A11	DC_IN	+28V_INPUT	E11	VS1	+12V_OUT_SW2
A12	DC_IN	+28V_INPUT	E12	VS1	+12V_OUT_SW2
A13	DC_IN	+28V_INPUT	E13	VS1	+12V_OUT_SW2
A14	DC_IN	+28V_INPUT	E14	VS1	+12V_OUT_SW2
A15	DC_IN	+28V_INPUT	E15	VS1	+12V_OUT_SW2
A16	DC_IN	+28V_INPUT	E16	VS1	+12V_OUT_SW2
A17	DC_IN	+28V_INPUT	E17	VS1	+12V_OUT_SW2
A18	DC_IN	+28V_INPUT	E18	VS1	+12V_OUT_SW2
A19	DC_IN	+28V_INPUT	E19	VS1	+12V_OUT_SW2
A20	DC_IN	+28V_INPUT	E20	VS1	+12V_OUT_SW2
A21	DC_IN_RTN	+28V_INPUT_GND	E21	VS1_SENSE_P	N/A
A22	DC_IN_RTN	+28V_INPUT_GND	E22	VS1_SENSE_N	N/A
A23	DC_IN_RTN	+28V_INPUT_GND	E23	VS1_DCHN_IN	N/A
A24	DC_IN_RTN	+28V_INPUT_GND	E24	VS1_DCHN_OUT	N/A
A25	DC_IN_RTN	+28V_INPUT_GND	E25	VS1_BUS1	N/A
A26	DC_IN_RTN	+28V_INPUT_GND	E26	VS1_BUS2	N/A
A27	DC_IN_RTN	+28V_INPUT_GND	E27	VS1_BUS3	N/A
A28	DC_IN_RTN	+28V_INPUT_GND	E28	VAUX	+3.3V_OUT
A29	DC_IN_RTN	+28V_INPUT_GND	E29	VAUX	+3.3V_OUT
A30	DC_IN_RTN	+28V_INPUT_GND	E30	VAUX	+3.3V_OUT

P0 Connector Pin Location	P0 Connector Pin Name	Power Supply Connection	P0 Connector Pin Location	P0 Connector Pin Name	Power Supply Connection
A31	DC_IN_RTN	+28V_INPUT_GND	E31	VAUX	+3.3V_OUT
A32	DC_IN_RTN	+28V_INPUT_GND	E32	VAUX	+3.3V_OUT
A33	DC_IN_RTN	+28V_INPUT_GND	E33	VAUX	+3.3V_OUT
A34	DC_IN_RTN	+28V_INPUT_GND	E34	VAUX	+3.3V_OUT
A35	DC_IN_RTN	+28V_INPUT_GND	E35	VAUX	+3.3V_OUT
A36	DC_IN_RTN	+28V_INPUT_GND	E36	VAUX	+3.3V_OUT
A37	DC_IN_RTN	+28V_INPUT_GND	E37	VAUX	+3.3V_OUT
A38	DC_IN_RTN	+28V_INPUT_GND	E38	VAUX	+3.3V_OUT
A39	DC_IN_RTN	+28V_INPUT_GND	E39	VAUX	+3.3V_OUT
A40	DC_IN_RTN	+28V_INPUT_GND	E40	VAUX	+3.3V_OUT
B1	VS1_RTN	+12V_OUT_UNSW_GND	F1	RFU	N/A
B2	VS1_RTN	+12V_OUT_UNSW_GND	F2	RFU	N/A
B3	VS1_RTN	+12V_OUT_UNSW_GND	F3	VS4	N/A
B4	VS1_RTN	+12V_OUT_UNSW_GND	F4	VS4_RTN	N/A
B5	VS1_RTN	+12V_OUT_UNSW_GND	F5	VS4	N/A
B6	VS1_RTN	+12V_OUT_UNSW_GND	F6	GND	GND
B7	VS1_RTN	+12V_OUT_UNSW_GND	F7	CAN_1+	N/A
B8	VS1_RTN	+12V_OUT_UNSW_GND	F8	CAN_1-	N/A
B9	VS1_RTN	+12V_OUT_UNSW_GND	F9	GND	GND
B10	VS1_RTN	+12V_OUT_UNSW_GND	F10	CAN_2+	N/A
B11	VS1_RTN	+12V_OUT_UNSW_GND	F11	CAN_2-	N/A
B12	VS1_RTN	+12V_OUT_UNSW_GND	F12	GND	GND
B13	VS1_RTN	+12V_OUT_UNSW_GND	F13	USB_1_VBUS	N/A
B14	VS1_RTN	+12V_OUT_UNSW_GND	F14	USB_1_VBUS	N/A
B15	VS1_RTN	+12V_OUT_UNSW_GND	F15	GND	GND
B16	VS1_RTN	+12V_OUT_UNSW_GND	F16	USB_1_D+	N/A
B17	VS1_RTN	+12V_OUT_UNSW_GND	F17	USB_1_D-	N/A
B18	VS1_RTN	+12V_OUT_UNSW_GND	F18	GND	GND
B19	VS1_RTN	+12V_OUT_UNSW_GND	F19	MP_1_RXD	uC_UART_RXD
B20	VS1_RTN	+12V_OUT_UNSW_GND	F20	MP_1_TXD	uC_UART_TXD
B21	VS1	+12V_OUT_UNSW	F21	GND	GND
B22	VS1	+12V_OUT_UNSW	F22	MP_EN	N/A
B23	VS1	+12V_OUT_UNSW	F23	GND	GND
B24	VS1	+12V_OUT_UNSW	F24	SER_OVLY_1P	N/A
B25	VS1	+12V_OUT_UNSW	F25	SER_OVLY_1N	N/A
B26	VS1	+12V_OUT_UNSW	F26	GND	GND
B27	VS1	+12V_OUT_UNSW	F27	SER_OVLY_2P	N/A
B28	VS1	+12V_OUT_UNSW	F28	SER_OVLY_2N	N/A
B29	VS1	+12V_OUT_UNSW	F29	GND	GND
B30	VS1	+12V_OUT_UNSW	F30	RFU	N/A

P0 Connector Pin Location	P0 Connector Pin Name	Power Supply Connection	P0 Connector Pin Location	P0 Connector Pin Name	Power Supply Connection
B31	VS1	+12V_OUT_UNSW	F31	PSU_TYPE_1	N/A
B32	VS1	+12V_OUT_UNSW	F32	PSU_TYPE_2	N/A
B33	VS1	+12V_OUT_UNSW	F33	VAUX_SENSE_P	N/A
B34	VS1	+12V_OUT_UNSW	F34	VAUX_SENSE_N	N/A
B35	VS1	+12V_OUT_UNSW	F35	VAUX_DCHN_IN	N/A
B36	VS1	+12V_OUT_UNSW	F36	VAUX_DCHN_OUT	N/A
B37	VS1	+12V_OUT_UNSW	F37	VAUX_BUS1	N/A
B38	VS1	+12V_OUT_UNSW	F38	VAUX_BUS2	N/A
B39	VS1	+12V_OUT_UNSW	F39	VAUX_BUS3	N/A
B40	VS1	+12V_OUT_UNSW	F40	GND	GND
C1	VS1	+12V_OUT_SW1	G1	SYNC_1	N/A
C2	VS1	+12V_OUT_SW1	G2	SYNC_2	N/A
C3	VS1	+12V_OUT_SW1	G3	GND	GND
C4	VS1	+12V_OUT_SW1	G4	IO_OVLY_1	IO_OVLY_1
C5	VS1	+12V_OUT_SW1	G5	GND	GND
C6	VS1	+12V_OUT_SW1	G6	IO_OVLY_2	IO_OVLY_2
C7	VS1	+12V_OUT_SW1	G7	GND	GND
C8	VS1	+12V_OUT_SW1	G8	IO_OVLY_3	IO_OVLY_3
C9	VS1	+12V_OUT_SW1	G9	GND	GND
C10	VS1	+12V_OUT_SW1	G10	IO_OVLY_4	IO_OVLY_4
C11	VS1	+12V_OUT_SW1	G11	GND	GND
C12	VS1	+12V_OUT_SW1	G12	IO_OVLY_5	IO_OVLY_5
C13	VS1	+12V_OUT_SW1	G13	GND	GND
C14	VS1	+12V_OUT_SW1	G14	IO_OVLY_6	N/A
C15	VS1	+12V_OUT_SW1	G15	GND	GND
C16	VS1	+12V_OUT_SW1	G16	IO_OVLY_7	N/A
C17	VS1	+12V_OUT_SW1	G17	GND	GND
C18	VS1	+12V_OUT_SW1	G18	IO_OVLY_8	N/A
C19	VS1	+12V_OUT_SW1	G19	GND	GND
C20	VS1	+12V_OUT_SW1	G20	IO_OVLY_9	N/A
C21	VS1_RTN	+12V_OUT_UNSW_GND	G21	GND	GND
C22	VS1_RTN	+12V_OUT_UNSW_GND	G22	IO_OVLY_10	N/A
C23	VS1_RTN	+12V_OUT_UNSW_GND	G23	GND	GND
C24	VS1_RTN	+12V_OUT_UNSW_GND	G24	IO_OVLY_11	N/A
C25	VS1_RTN	+12V_OUT_UNSW_GND	G25	GND	GND
C26	VS1_RTN	+12V_OUT_UNSW_GND	G26	IO_OVLY_12	N/A
C27	VS1_RTN	+12V_OUT_UNSW_GND	G27	GND	GND
C28	VS1_RTN	+12V_OUT_UNSW_GND	G28	IO_OVLY_13	N/A
C29	VS1_RTN	+12V_OUT_UNSW_GND	G29	GND	GND
C30	VS1_RTN	+12V_OUT_UNSW_GND	G30	IO_OVLY_14	N/A

P0 Connector Pin Location	P0 Connector Pin Name	Power Supply Connection	P0 Connector Pin Location	P0 Connector Pin Name	Power Supply Connection
C31	VS1_RTN	+12V_OUT_UNSW_GND	G31	GND	GND
C32	VS1_RTN	+12V_OUT_UNSW_GND	G32	IO_OVLY_15	N/A
C33	VS1_RTN	+12V_OUT_UNSW_GND	G33	GND	GND
C34	VS1_RTN	+12V_OUT_UNSW_GND	G34	IO_OVLY_16	N/A
C35	VS1_RTN	+12V_OUT_UNSW_GND	G35	GND	GND
C36	VS1_RTN	+12V_OUT_UNSW_GND	G36	IO_OVLY_17	N/A
C37	VS1_RTN	+12V_OUT_UNSW_GND	G37	GND	GND
C38	VS1_RTN	+12V_OUT_UNSW_GND	G38	IO_OVLY_18	N/A
C39	VS1_RTN	+12V_OUT_UNSW_GND	G39	GND	GND
C40	VS1_RTN	+12V_OUT_UNSW_GND	G40	HOLD NODE	HOLD_NODE
D1	VS1_RTN	+12V_OUT_UNSW_GND	H1	RFU	N/A
D2	VS1_RTN	+12V_OUT_UNSW_GND	H2	RFU	N/A
D3	VS1_RTN	+12V_OUT_UNSW_GND	H3	RFU	N/A
D4	VS1_RTN	+12V_OUT_UNSW_GND	H4	VBAT_12V	VBAT_12V
D5	VS1_RTN	+12V_OUT_UNSW_GND	H5	VBAT_12V_RTN	VBAT_12V_RTN
D6	VS1_RTN	+12V_OUT_UNSW_GND	H6	VBAT_3V_RTN	N/A
D7	VS1_RTN	+12V_OUT_UNSW_GND	H7	VBAT_3V	N/A
D8	VS1_RTN	+12V_OUT_UNSW_GND	H8	GND	GND
D9	VS1_RTN	+12V_OUT_UNSW_GND	H9	GDISCRETE1	uC_Reset_B
D10	VS1_RTN	+12V_OUT_UNSW_GND	H10	GND	GND
D11	VS1_RTN	+12V_OUT_UNSW_GND	H11	NVMRO	N/A
D12	VS1_RTN	+12V_OUT_UNSW_GND	H12	GND	GND
D13	VS1_RTN	+12V_OUT_UNSW_GND	H13	SYSRESET*	SYSRESET_B
D14	VS1_RTN	+12V_OUT_UNSW_GND	H14	GND	GND
D15	VS1_RTN	+12V_OUT_UNSW_GND	H15	ENABLE*	ENABLE_B
D16	VS1_RTN	+12V_OUT_UNSW_GND	H16	GND	GND
D17	VS1_RTN	+12V_OUT_UNSW_GND	H17	INHIBIT*	INHIBIT_B
D18	VS1_RTN	+12V_OUT_UNSW_GND	H18	GND	GND
D19	VS1_RTN	+12V_OUT_UNSW_GND	H19	CROWBAR	N/A
D20	VS1_RTN	+12V_OUT_UNSW_GND	H20	CROWBAR_RTN	N/A
D21	VS1_RTN	+12V_OUT_UNSW_GND	H21	GND	GND
D22	VS1_RTN	+12V_OUT_UNSW_GND	H22	PSU_FAIL*	PSU_FAIL_B
D23	VS1_RTN	+12V_OUT_UNSW_GND	H23	TP_EN*	N/A
D24	VS1_RTN	+12V_OUT_UNSW_GND	H24	GND	GND
D25	VS1_RTN	+12V_OUT_UNSW_GND	H25	SM_A_SCK	IPMB_SCK_A
D26	VS1_RTN	+12V_OUT_UNSW_GND	H26	GND	GND
D27	VS1_RTN	+12V_OUT_UNSW_GND	H27	SM_A_SDA	IPMB_SDA_A
D28	VAUX_RTN	+3.3V_OUT_GND	H28	GND	GND
D29	VAUX_RTN	+3.3V_OUT_GND	H29	SM_B_SCK	SM_STAT
D30	VAUX_RTN	+3.3V_OUT_GND	H30	GND	GND

P0 Connector Pin Location	P0 Connector Pin Name	Power Supply Connection	P0 Connector Pin Location	P0 Connector Pin Name	Power Supply Connection
D31	VAUX_RTN	+3.3V_OUT_GND	H31	SM_B_SDA	SM_RESET
D32	VAUX_RTN	+3.3V_OUT_GND	H32	GND	GND
D33	VAUX_RTN	+3.3V_OUT_GND	H33	GA0*	GA
D34	VAUX_RTN	+3.3V_OUT_GND	H34	GA1*	GA1
D35	VAUX_RTN	+3.3V_OUT_GND	H35	GA2*	GA2
D36	VAUX_RTN	+3.3V_OUT_GND	H36	GA3*	GA3
D37	VAUX_RTN	+3.3V_OUT_GND	H37	GA4*	GA4
D38	VAUX_RTN	+3.3V_OUT_GND	H38	GAP*	GAP
D39	VAUX_RTN	+3.3V_OUT_GND	H39	GND	GND
D40	VAUX_RTN	+3.3V_OUT_GND	H40	HOLD_NODE	HOLD_NODE

Operating Environment

Maximum Ratings

Parameter	Description/Comments	Min	Max	Units
Vin	28Vdc Bus Input	24	36	Vdc
Vout (Unswitched)	12Vdc Voltage Output	11.4	12.5	Vdc
Vout (Switched)	12Vdc Voltage Output	11.4	12.5	Vdc
Iout	Max current spread across all outputs		12	A
3.3V_AUX VOUT		3.0	3.3	Vdc
3.3V_AUX IOUT	Continuous Output Current		2	A
Pout	Secondary Output Power		144 Peak	W
Cin	Max Input Capacitance		150	uF
Riso_secondary_50V	Isolated from Secondary		1	MOhm
Vin_survival	42V Survival Voltage		2	S
Peak Inrush Current	During Transient		< 3x Load	A
Inrush Current Transient Duration			5	ms
Efficiency (η)	@ 140W Power	88		%
Storage Temp		-40	+105	°C
Operating Temp	Measured at wedge lock	-10	+50	°C
Mass			0.5	kg

Radiation Performance

Parameter	Description/Comments	Limit	Units
TID	Total ionizing dose	30	krads (Si)
SEL Immunity		37	MeV-cm ² /mg

Reliability & Quality

Parameter	Description/Comments	Limit	Units
MTBF (Note 1)	@ 70°C / Max Vin / 100% Operation	481,263	hours
Reliability (R) (Note 1)	5 Years / 70°C /Max VIN / 100% Operation 7 Years / 70°C /Max VIN / 100% Operation 12 Years / 70°C /Max VIN / 100% Operation	0.9130 0.8803 0.8037	

Note 1: (a) MIL-HDBK-217F, Notice 2 Analysis (b) Space, Flight (SF) Environment (c) 70°C Ambient (d) 100% Active (e) ANSI/VITA 51.1 updates allowed (f) Manufacturer Data used whenever available (60% confidence level) (g) Mechanical Enclosure not included in analysis (h) 5-year mission.

Acceptance Testing (FM3 Class C and FM4 Class D)

Temp Cycling	-10°C to +50°C (per SMC-S-016 – 6.3.8)	4	Cycles
Random Vibration (Unbiased)	3-axis / 1 min per axis (20Hz to 2kHz) (per SMC-S-016 – 6.3.5)	7.1	GRMS
Electrical Testing	Functional and Performance	Pass/Fail	

Qualification Testing

Thermal Vacuum	-20°C to +60°C (per SMC-S-016 – 6.3.9)	10	Cycles
Random Vibration (Unbiased)	3-axis / 2 min per axis (20Hz to 2kHz) (per SMC-S-016 – 6.3.5)	14.1	GRMS
Mechanical Shock	3-axis / 1 per axis (per SMC-S-016 – 6.3.4)	MPE + 6dB	
Electrical Testing	Functional and Performance	Pass/Fail	

Electrical Specifications

Input Electricals

Parameter	Description/Comments	Min	Typ/Nom	Max	Units
Input UVLO	Input Undervoltage Lockout (Falling)	17.6			Vdc
Input OVLO	Input Over Voltage Lockout (Rising)			38	Vdc

Output Electricals

Parameter	Description/Comments	Min	Typ/Nom	Max	Units
12Vdc Out Power	12Vdc (VS1) Output Power		144	288	W
Power-UP Init State	Dynamic 12Vdc Output Power-Up Initial State		50		W
Power-UP Init State	Dynamic 12Vdc Output Power-Up End State		100		W
Power-Up Trans Time	Dynamic 12Vdc Output Transition Time (Up or Down)		1		seconds
VS1 VOUT		11.4		12.6	Vdc
VS1 IOUT	Continuous Output Current			12	A
VS1 Output Tolerance		-5		+5	%
VS1 Output Ripple	Peak-to-Peak Ripple Voltage	-1		+1	%
3.3V_AUX VOUT		3.0	3.3	3.6	V
3.3V_AUX IOUT	Continuous Output Current			2	A
3.3V_AUX I_LIM	Overcurrent Limit Trip Point	2.2		3	A
V_TLM_ACC	Voltage Telemetry Accuracy	-3		+3	%
I_TLM_ACC	Current Telemetry Accuracy	-5		+5	%

Functional Description

The **PSM28-VNXP** power supply is designed to convert an input bus voltage into a regulated 12 Vdc output while supporting the power distribution needs of a modular avionics system. It is nominally rated at 144 watts, a limit driven primarily by thermal constraints within the system enclosure rather than the absolute electrical capability of the hardware. While the unit may be capable of handling higher total power under certain conditions, the 144 W specification ensures reliable operation within the intended thermal environment and provides a clear guideline for system-level power budgeting.

A key feature of the **PSM28-VNXP** is its distribution architecture, which includes two switchable output channels and one unswitched output. The unswitched output is typically used to power critical system components, such as the main processor module, ensuring they are always powered when input voltage is applied. The switchable outputs provide flexibility for controlling power to individual payloads or subsystem cards, enabling operators to selectively power cycle components in orbit. This capability is particularly useful for mitigating radiation-induced faults by resetting affected hardware without disrupting the entire system.

The output channels are designed to support up to approximately 12 amps total; a value derived from the total system power limit and the 12 Vdc output. This ensures that even in a worst-case configuration—where a single channel carries most of the load, the system remains within safe operating limits. The total available power is shared across all outputs, meaning that higher consumption on one channel reduces the available capacity on others. This shared power architecture requires careful allocation of loads across channels to maintain overall system performance and reliability.

The **PSM28-VNXP** incorporates built-in fault protection, including input under/over-voltage, output overcurrent, and EMI filtering, helps ensure mission continuity, even under power anomalies or environmental stress. These protections reduce risk and support longer system life with fewer field failures.

From an input perspective, the power supply is designed to operate over an asymmetric voltage range, with a lower bound of 24 Vdc and an upper bound extending to approximately 36 Vdc.

Overall, the **PSM28-VNXP** power supply balances performance, flexibility, and integration within a constrained form factor. Its combination of switchable outputs, integrated filtering, and carefully managed power limits makes it well-suited for modular system architectures use in harsh and mission critical applications.

Characteristic Curves

To Be Added

Mechanical Drawings

To Be Added

Revision History

Date	Rev	Author	Change Description	Page #
5/1/2026	1.0	DPA	Initial Preliminary Datasheet Draft	All

Datasheet Definitions

	Definition
Advanced Datasheet or Product Brief	Frontgrade reserves the right to make changes to any products and services described herein at any time without notice. The product is still in the development stage and the datasheet is subject to change . Specifications can be TBD and the part package and pinout are not final .
Preliminary Datasheet or Product Brief	Frontgrade reserves the right to make changes to any products and services described herein at any time without notice. The product is in the characterization stage and prototypes are available.
Datasheet or Product Brief	Product is in production and any changes to the product and services described herein will follow a formal customer notification process for form, fit or function changes.

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