



VPX Power
3U



Power Supply 3U 4HP 715W, DC/DC

**New Version, ruggedized.
Tested to MIL-STD-810**





VPX Power 3U



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1 Power Supply 3U 4TE 715W, DC/DC, conduction cooled

1.1 Key Features

- Compliant to VITA 62 baseline specification
- Up to 715 Wmax. Power *
- 600 W over all
- up to 21A for +12V :VS1
- up to 50A for +3.3V :VS2
- up to 40A for +5V :VS3
- +12V / -12V AUX 4.2A
- +3V3 AUX 7A
- up to 88% efficiency
- -40 to +85°C Operating Temperature **
- Voltage sense controlled ***
- 19 – 35 VDC INPUT
- Minimum Input Voltage start up rise time > 50 V/s

* Derating: ~2% Wattage per Kelvin from 40°C on **

** At hottest outer case temperature / wedge lock edge temp. values in work

*** Over Voltage, Under Voltage, Over Current, Over Temperature
Shutdown control over each power rail, common control via VITA62 control bus

- MTBF = 105.000h
- Storage Temperature: -40°C to +100°C
- Weight: 0.6kg/1.23 Lbs
- Isolation Voltage: 500V

Order Number: D575.00701

1.2 Block diagram

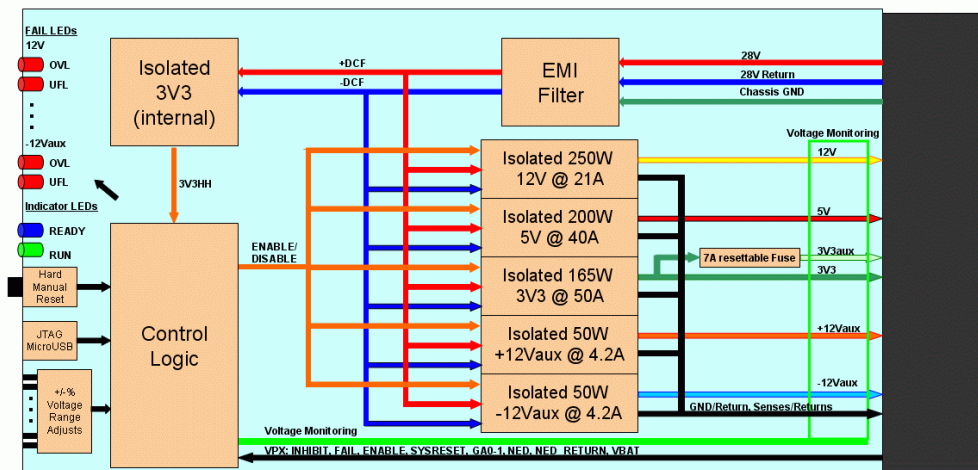




Figure 1 Block diagram 3U

All voltage ZVS converters are isolated (1500V isolation voltage) and fed via a common Filter Network from the same 28V main supply (19V – 35V, shortly 36V). 3V3aux is not independent but protected by a resettable fuse (PTC). All individual output voltages are monitored from a central control logic device (CPLD). Any failure on the output voltages are signaled on the FAIL-Signal. If all internals are normal the blue READY LED is working. Figure 1 show gives an overview over the front panel elements.

For correct operation all sens signals has to be connected

1.3 Front panel



Figure 2 Front panel functional elements of the VPX3C Power Supply

1.3.1 Control Logic:

Depending on the main bus signals also the green RUN LED goes on and the power supply tries to start working. According to VITA 62 and VITA 46 the logic *run line condition* is – when “#” is nomenclature for the negative logic main bus signals, logic negation is signaled by the “¬” sign, and a positive logic transition by “↑”:

$$\text{RUN} = (\neg \# \text{ENABLE AND } \# \text{INHIBIT AND } \# \text{FAIL AND } \neg \text{INTERNAL_FAIL})$$

$$\text{“REFRESHED AFTER FAIL WHEN”}$$

$$\uparrow (\neg \# \text{SYSRESET})$$

This means that if the global inhibit is not set (= released to H), whether no internal or external failure occurs (both are released to H) the power supply starts.

1.4 Technical Specification

Form Factor	3U VPX CC
Pitch	4HP / 0.8 inch
Weight	0.6 kg / 1.23 Lbs / 21.2 oz.



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Storage Temperature	-55°C to 105°C
Operating Temperature	-40°C to 85°C
Input to Output Insulation	1500V
Input to Output Isolation with Case	550V
Input to Case Ground Isolation	500V
Output to Case Ground Isolation	50V
Case Ground to Safety Ground Resistance	< 10 mΩ
Main Power	
Maximum Output Power	715W
Maximum Input Power	~760W
Maximum Dissipated Power @ max. Power	~45W
Minimum Turn ON Voltage	20 V
Minimum Turn OFF Voltage	19 V
Hysteresis	1 V
Maximum Continuous Input Voltage	35 V
Maximum Short Time Input Voltage	(15 s) 36 V
Maximum Currents 12V / 3V3 / 5V	21 A / 50 A / 40 A
Fixed Switching Frequencies 12V / 3V3 / 5V	120 kHz / 125 kHz / 130 kHz
Peak Efficiencies 12V / 3V3 / 5V	94% / 92% / 92%
Max. Output Ripple and Noise: 12V / 3V3 / 5V (0-20 MHz Bandwidth)	15 mVrms / 4 mVrms / 4 mVrms 65 mVpp / 27 mVrms / 27 mVpp
Line Regulation: 12V / 3V3 / 5V.	40 mV / 2 mV / 4 mV
V _{in} =V _{in,min} to V _{in,max} , I _o and T _c fixed	< 0.1%
Load Regulation: 12V / 3V3 / 5V	70 mV / 2 mV / 4 mV
V _{in} =V _{in,nom} , I _o =I _{o,min} to I _{o,max} , T _c fixed	< 0.1%
Controlled Overvoltage Protection: +/-12V / 3V3 / 5V	+ 0 %..+ 50 % variable by trimmer. + 5..7 % per factory setup
Uncontrolled	14.4 V / 4.1 V / 6.1 V (hardware)
Controlled Undervoltage Protection: +/-12V / 3V3 / 5V	- 0 %.- 50 % variable by trimmer - 5..7% per factory setup
Temperature Protection Sensing Point (identical to case)	85°C (Latching)
Maximum Internal Working Temperatures	125°C
Auxiliary +/-12V Power	
Maximum Current	4.2 A
Fixed Switching Frequency	900 kHz
Efficiency	88%
Max. Output Ripple and Noise (0-20 MHz Bandwidth)	120 mVpp / 30 mVrms
Load Transient Recovery Time	100 μs
Control Logic	
Failure hold time	0.5..1 s*
Full* Shutdown	OVC, OVT, OFLW, UFLW
Timing	
Minimum Hold up Time (at max. Power)	~ 1 ms
Minimum input voltage start up rise time	> 50 V/s



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Output voltage rise time: 12 V / 3V3 / 5V / 12Vaux
 Startup Delay time: 12 V / 3V3 / 5V / +/- 12Vaux
 *by default firmware

38 V/s, 30 V/s, 27 V/s, 30 V/s (exponential)
 30 ms, 28 ms, 30 ms, 80 ms

1.4.1 Compatibility

VDE 0805

IEC 950

Tested and passed:

- Altitude: MIL-STD-810F, Methode 500.4, Procedure II
- Vibration: MIL-STD-810G, Methode 514.6 D-1, Category 12
- Shock: MIL-STD 810G, 40g, 11ms semisinusoidal

Designed to meet MIL-STD-461F

1.5 Switch-On Behavior

All voltage outputs are switched on exponentially with relatively slow rise times of 30-80 ms and do settle smooth to the final voltage without any overshoot or glitch.

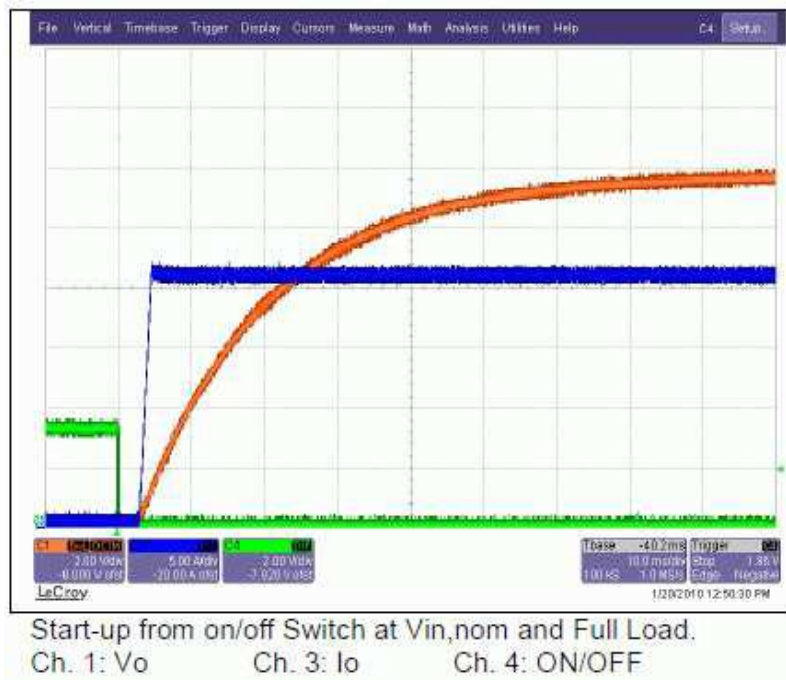


Figure 3 Startup Delay and Exponential Rise (orange) of VS1 = 12V Output Voltage

The power supply has to be switched on by a source of a minimum ramp up speed of the 28V source voltage of $> 50 \text{ V/s}$ or a maximum ramp up time $< \sim 500 \text{ ms}$. If the ramp up time is longer than half a second the control logic may stall during switch on.



1.6 Derating

Alternatively as orientation the derating of power plays a role for case temperatures above 60°C this can be derived as rule of thumb from the air-conditioned data of the individual converters. Figure 4 gives an example for the VS1 12V main voltage.

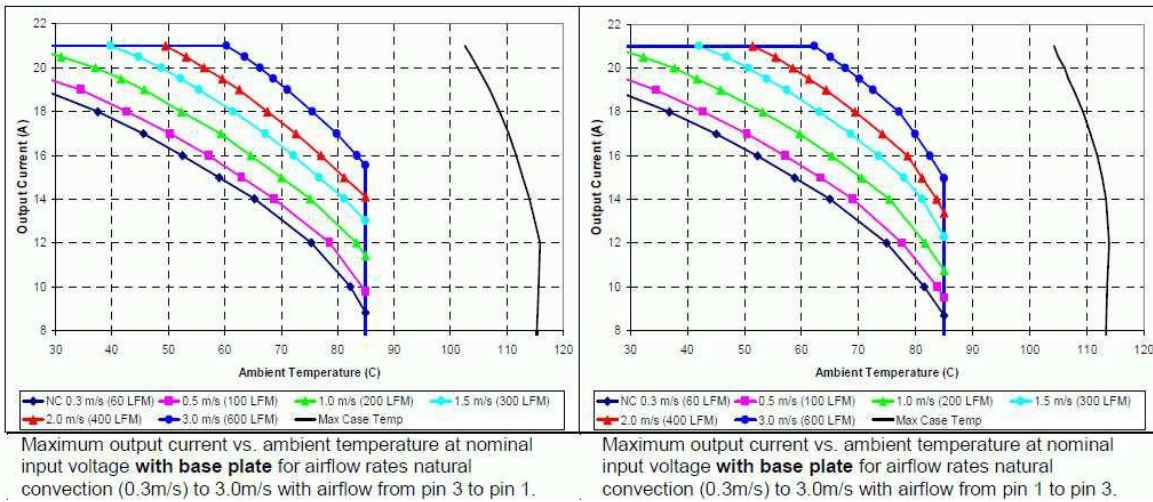
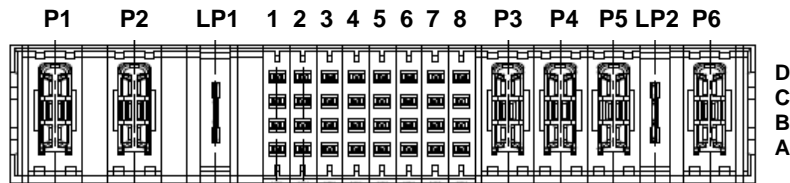


Figure 4 Derating curves dependent on the airflow speed and direction by example for the 12V VS1 main voltage

1.7 P1 Connector Pin Out



Pin Number	Rated Current (A)	Pin Name
P1	40A	- DC_IN/ACN
P2	40A	+ DC_IN/ACL
LP1	20A	CHASSIS
A1	<1A	UD1
B1	<1A	UD2
C1	<1A	UD3
D1	<1A	UD4
A2	<1A	VBAT
B2	<1A	FAIL*
C2	<1A	INHIBIT*
D2	<1A	ENABLE*
A3	<1A	UD0
B3	<1.5A	+12V_AUX
C3	<1A	NED
D3	<1A	NED_RETURN
A4	<1.5A	3,3V_AUX
B4	<1.5A	3,3V_AUX
C4	<1.5A	3,3V_AUX
D4	<1.5A	3,3V_AUX
A5	<1A	GA0*
B5	<1A	GA1*



C5	<1A	SM0
D5	<1A	SM1
A6	<1A	SM2
B6	<1A	SM3
C6	<1.5A	-12V_AUX
D6	<1A	SYSRESET*
A7	<1A	PO1_SHARE (VS1)
B7	<1A	PO2_SHARE (VS2)
C7	<1A	PO3_SHARE (VS3)
D7	<1A	SIGNAL_RETURN
A8	<1A	PO1_SENSE (VS1)
B8	<1A	PO2_SENSE (VS2)
C8	<1A	PO3_SENSE (VS3)
D8	<1A	SENSE_RETURN
P3	40A	PO3 (VS3)
P4	40A	POWER_RETURN
P5	40A	POWER_RETURN
LP2	20A	PO2 (VS2)
P6	40A	PO1 (VS1)

Figure 5 Connector Pin Out



1.8 FAIL Signal

The FAIL* signal is activated when PO1, PO2, PO3, or AUX voltages are not within their voltage specifications. The signal complies with VITA 65 for active low.

The intent of the FAIL signal is to indicate to other modules in the system a failure has occurred in the power supply.

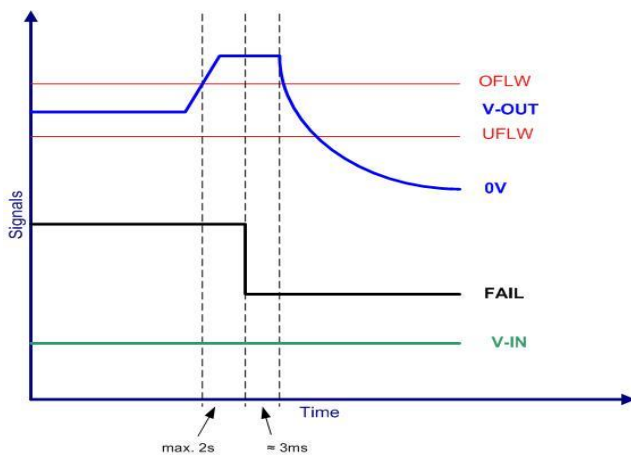


Figure 6 Fail Signal Diagram D575.00701

1.9 Current sharing

Combined with the VPX Power Backplane 1 Slot, 3U, 1HP, 24VDC No.: B1931D4221 up to 4 VPX Power Supplies D575.00701 can be used in parallel in parallel operation.

With the VPX Power Backplane 2 Slot, 3U, 5 HP 24VDC No.: B1931D4220, two VPX Power Supplies D575.00701 can be used in parallel operation.

1.10 Wedge Lock

Allen screw M2,5 mm

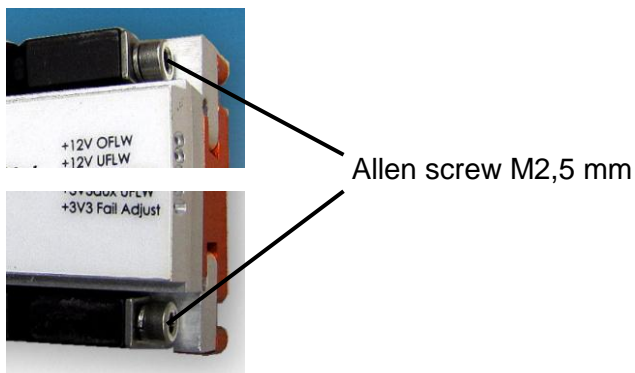


Figure 7 Allen Screw



VPX Power 3U



2 Available Accessories

Hartmann Electronic produces different Power-Backplanes for Vita 62 VPX PSUs

Part Number	Description
B1931D4221	3U, 1Slot for Vin=24VDC, designed for parallel Operation
B1932D4220	3U, 2Slot for Vin=24VDC, designed for parallel Operation
VPXDC-3U-FILT1	3U, Filter Module, according to MIL-STD-461F
VPXDC-3U-HOLD	3U, Hold-Up Module, for 15ms Hold-Up-Time with 715W max.