P221

Rugged 6U VMEbus Power Supply Board

- ***175 Watt Output with Greater Than 75% Efficiency***
- ***16 - 36 Volt DC Input Range with Drop to 14 V for 45 Sec.***
- ***MIL-STD-704A and D Input Compliance***
- ***EMI/RFI Input Filter and Input Transient Protection***
- ***Outputs: 5 V @ 30 A, ±12 V @ 1.0 A each, 3.3V @ 12 A***
- ***Output Over/Undervoltage and Short-Circuit Protections***
- ***~ACFAIL, ~SYSRST and ~SYSFAIL VME Output Signals***
- ***50 ms Holdup Time***
- ***Input/Output and Chassis Isolation***
- ***Thermal Shutdown and Reverse Polarity Protection***
- ***External ON/OFF Control, DC Fan Output Drive and Control***
- ***Internal BIT Status and Alarms for Voltages, Currents, and Temperatures***

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Overview

Designed for harsh environment applications, the Aitech P221 is a versatile and reliable 6U VME power supply providing VME systems with an exceptionally wide input voltage range and all standard VME outputs and assures excellent load and line regulation.

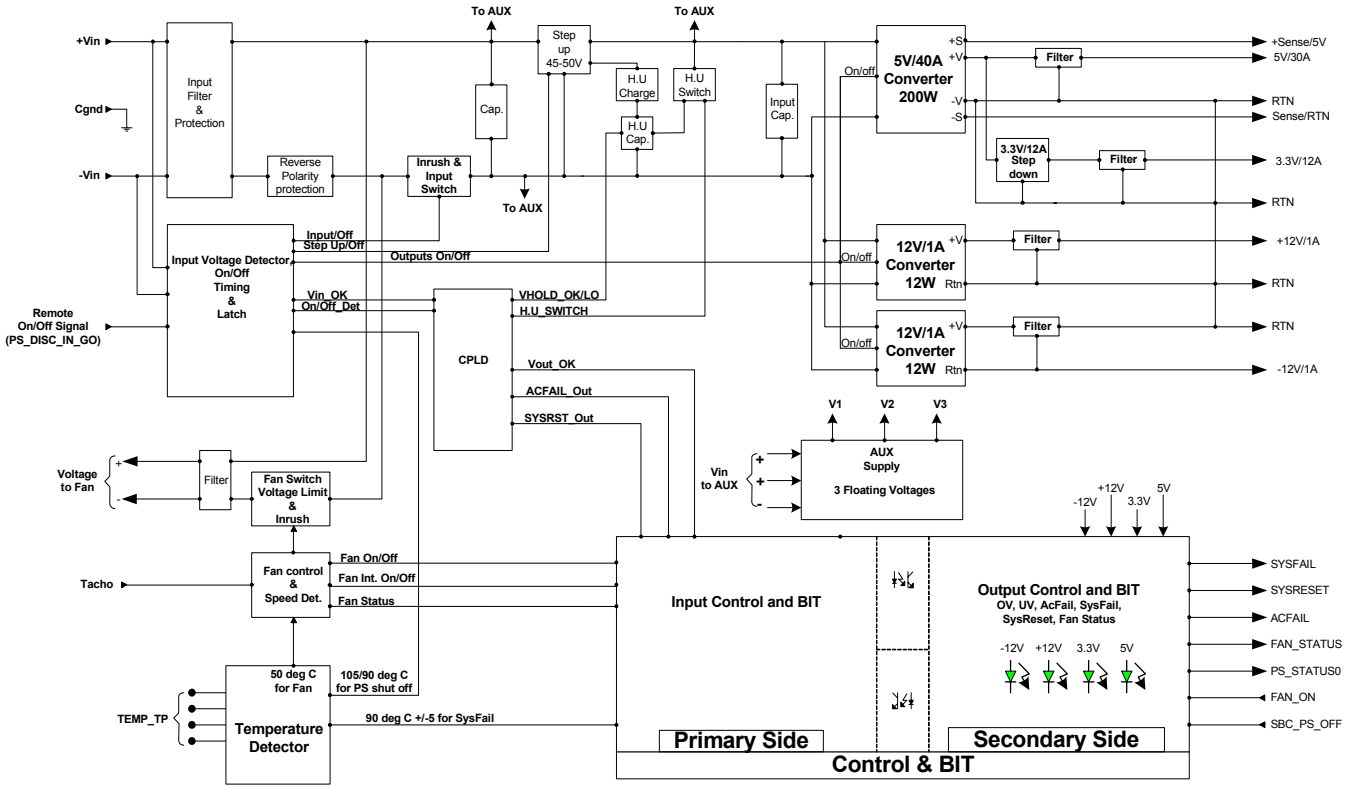
The P221 input power voltage can vary from 16 Vdc to 36 Vdc, with a drop to 14 Vdc for up to 45 seconds, and fully complies MIL STD 704A and D for 28 Vdc operation. For ultimate EMI reduction, an input line filter is used to reduce the input reflected ripple.

The power supply asserts four VME 64X compliant voltages, each featuring an extended holdup time of 50 ms. The four outputs are provided by three DC-to-DC converters, with a total power rating of up to 175 W, and feature a minimum of 500 V isolation from input to output, thus eliminating any possibility of ground loops.

All outputs are individually protected against short-circuit and overvoltage. The power supply asserts all three VME 64x compliant control signals, namely SYSRST, SYSFAIL and ACFAIL. The 5 Vdc output carries sense lines for remote sensing.

The power supply provides temperature measurements and alarms, as well as DC fan output controlled by temperature. In addition the P221 is equipped with a sophisticated BIT logic that monitors inputs and outputs, the temperatures, the fan status, and provides the VME and BIT status signals.

In addition, the P221 features four visible LEDs to show proper output voltages and an external ON/OFF signal for remote shutdown.



P221 Power Supply Board Block Diagram

Functional Description

Output Voltages

The P221 provides the following output voltages:

Voltage	Maximum Current
+5.0V	30A
+3.3V	12A
+12V	1A
-12V	1A

All output voltages are filtered and protected against overvoltage, current limit, and transients.

An automatic shutdown protects the unit in the event of overvoltage or output shorts.

The 3.3 V output is derived from the 5 V output; therfore the total combined power of both the 5 V and the 3.3 V should not exceed 150 Watts. However, the overall total power is limited to 175 Watts, due to the module's limited heat dissipation capability.

Input Voltage Operation and Protection

The P221 power supply is operated within a continuous voltage range of 16 to 36 V and can be safely used with a DC voltage of up to 50 V.

A momentary input voltage drop to 14 volts is allowed for a period of 45 seconds, after which, an automatic shutdown will occur.

Inrush current is limited to 35 amperes.

The power supply provides full specifications under input power compliant with Mil STD 704D and A, excluding input voltage surges for MIL-STD-704A for non-damage only.

The input is protected against a reverse voltage of 50 Vdc.

The power supply is equipped with an on board EMI/RFI line filter on the input power lines, to meet the requirements of MIL-STD-461.

VME Power Monitor Circuit

The P221 provides 3 power-fail signals (~ACFAIL, ~SYSFAIL and ~SYSRST) that indicate the valid output voltage level during power-up and power down. In case of a power drop below the minimum input voltage (14 Vdc), the ~ACFAIL signal is asserted followed by ~SYSRST signal. This also triggers the holdup circuit. If the 5 V output drops below 4.85 V, or 3.3 V drops below 2.9 V the same mechanism is asserted.

During an occurrence of +12 V and -12 V over and under voltages, and 3.3 V and 5 V overvoltages, a ~SYSFAIL signal is asserted to meet the VME specifications.

Hold-up Circuit

The P221 uses an extended time holdup circuit that enables the board to maintain all the output (within the VME specifications) for at least 50 ms after the input voltage drops below 14 Vdc. This allows the system to take all necessary emergency actions before halting.

The total power supported during these conditions is 125 Watts.

Fan Output and Control

The power supply is equipped with internal control circuitry to operate an external 28 Vdc input cooling fan, at a steady state output of 14 - 32 Vdc at 2.5 A, with peak current of 13 A, during fan turn on.

Power is provided to the fan when the temperature of the power supply wall exceeds 55±5°C.

The fan unit can be activated by an external signal.

5 V Sensing

The 5V output is equipped with sense lines that are routed to the power connector.

Thermal Measurements and Shutdown

The power supply is equipped with a thermal measurement and control mechanism.

In case temperature of the modules exceeds 90±5 °C, an alarm is asserted, and at 100±5 °C the shutdown mechanism turns off the output voltages until the module temperature decreases below 100 °C.

Integral BIT Status and Alarms

The power supply is equipped with an internal BIT mechanism that monitors the outputs at all times.

The four LEDs are lit when the four voltages are within the VME specifications.

If a deviation occurs, an alarm is asserted and each LED reacts separately to the change due to damaged voltage by turning off.

The fan is also monitored in a similar manner. If it fails to operate properly, its speed is measured and an alarm is asserted.

Remote ON/OFF Signal

The power supply includes a control input to enable it to be externally turned off. The shutdown is done by external short to input GND.

Mechanical and Thermal construction

The 4P221-R01is constructed as single 6U VME board, easily removable and equipped with 2 extractors and 2 wedge locks. The thickness of the board is a bit bigger than a single slot VME board.

Cooling of the power supply is accomplished by mounting it in the last slot of the backplane tightened against the inner surface of the enclosure wall by 2 wedge locks and 2 screws.

All high power and noisy components are cooled and shielded by a unique monolithic 3D heatsink mounted on the CS of the board. The maximum operating temperature is measured at the outer face the heatsink plate.

Power Supply Connector

The power supply is utilizing 2 DIN 41612 power connectors located at the bottom of the board.

Specifications

Input

Voltage Range (DC Continuous)	16 V to 36 V
Voltage input drop	14 V to 45 Sec
Non Damage DC input voltage	Max 50 V
Nominal Input Voltage	24 V
Reverse Polarity	Protected 0 to 50 Vdc
General Characteristics and transient suppression	Per MIL-STD 704 D and A, (with the exception of meeting the input voltage surges for MIL-STD-704A for non damage only)

Outputs

Voltage	Combined Operation	Independent Operation
+5.0V	30A	Max combined output power 5 and 3.3 Volts outputs = 150W
+3.3V	12A	
+12V	1A	
-12V	1A	

Total Output Power, Maximum - 175 W

- Low output ripple
- Outputs isolated from inputs
- Isolation to chassis
- Short-circuit protection and overvoltage protection

Output Specifications	MAIN	OUT2	OUT3	OUT4
Voltage (Vdc) Min	+4.875	+3.2	+11.64	-11.64
Voltage (Vdc) Max	+5.25	+3.45	+12.6	-12.6
Overvoltage Protection (V)	6-6.45	3.8-4.2	+13.8-14.9	-13.8-14.9
Current (A), Max	30	12	1	1
Current Limit, Max Load (%)	110-160	120-165	110-230	110-230
Ripple/Noise (P-P, mV)	<50	<50	<50	<50

Efficiency

- >75%

Thermal Shutdown

- Above 100 °C ± 5 °C

Isolation Resistance

- >10 MΩ at 500 V input to chassis and 100 V output to chassis.

5 V Output Voltage Sensing

- Sense lines routed to the power connector for remote sensing.

EMI/RFI Input filter

- The power supply is equipped with an EMI/RFI input Filter.

ACFAIL and SYSRST

Input/Output Under Voltage Sensing

	Output		Input
ACFAIL State	**3.3V**	**5V**	**24V**
Decreasing Voltage	2.9	4.5	13.7 ± 0.3
Increasing Voltage	3.18	4.85	17.7 ± 0.3

- ACFAIL low to SYSRST low: >2 ms
- ACFAIL high to SYSRST high: >200 ms

SYSFAIL

Output Undervoltage Sensing

SYSFAIL State	+12V	-12V
Decreasing Voltage	11	-11
Increasing Voltage	11.64	-11.64

Output Overvoltage Sensing and Indication

SYSFAIL State	5V	3.3V	12V	-12V
Decreasing Voltage	5.35	3.46	12.65	-12.65
Increasing Voltage	5.9	3.75	13.7	-13.7

Holdup Circuit

Enables all outputs for at least 50 ms after input drops under 14 Vdc, at load conditions of 125 Watts.

Environmental Features

Temperature Range (per MIL-STD-810E)

- Maximum Operating Temperatures: -55°C* to + 85°C** at heatsink plate
- Storage Temperature: -60°C to + 100°C

* Wake up is guarantied @ -45°C.
** @ 85% maximum rated power; full rated power at 75 °C.

Altitude (per MIL-STD-810E)

- Operating: Up to 70,000 ft.

Humidity (per MIL-STD-810E)

- 5 - 95% relative humidity

Vibration

- On the move full functionality (MIL-STD-810E)
- Random (maximum 0.1 g^2 /Hz at 20 - 2k Hz, with total of 12 GRMS)
- Gun firing shock.

Shock (per MIL-STD-810E)

- Single shock, operating - 40g peak, half-sine shaped, for 11 ms, in 3 axes.
- Packaged Drop (per MIL-STD-810E), three, 3 ft. drops, on each face.
- Bench handling

EMC Protection

Per MIL-STD-461D, Part IV with line filter:

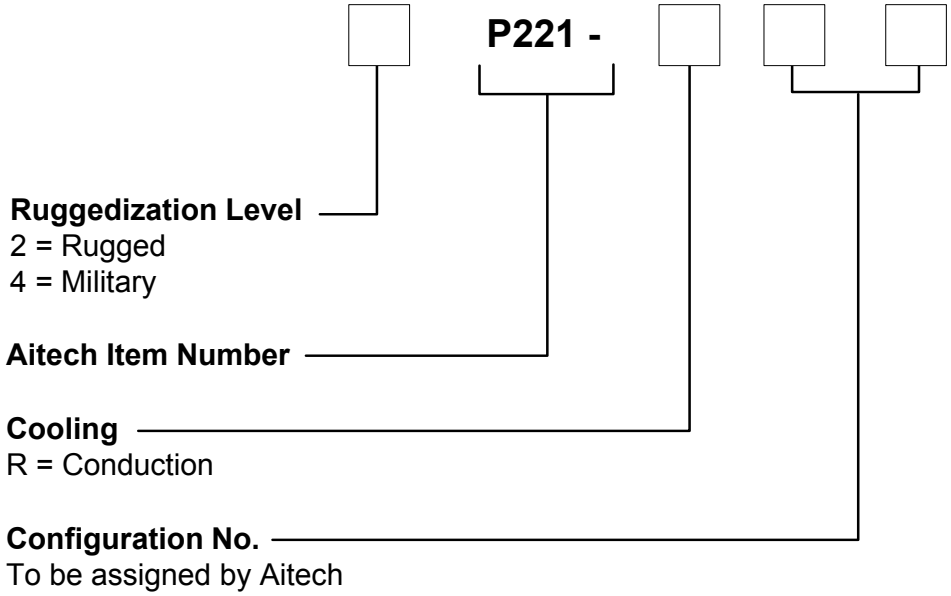
- CS101 (20 Hz - 50 kHz)
- CE102 (10 KHz - 10 MHz)
- CS114 (10 KHz - 400 MHz)
- RE102 (10 KHz - 10 GHz)

Mechanical Specifications

Dimensions and Weight

Height:	233.35 mm
Depth:	160 mm excluding VME connectors protrusion
Width:	23.2 mm
Weight:	1300 g

Ordering Information for the P221



Example: 2P221-R00

For more information about the P221 or any Aitech product, please contact Aitech Defense Systems sales department at (888) Aitech-8 (248-3248).

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