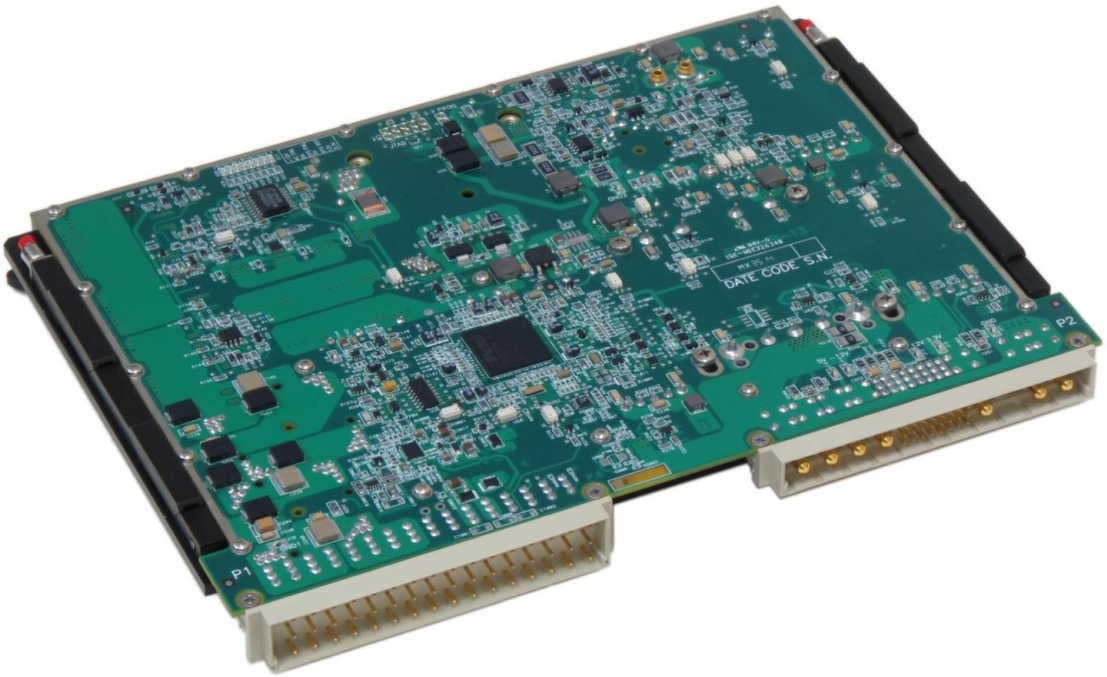
EM-P328-CC

Rugged 6U Power Supply Board



- 6U Form Factor
- 500 Watts Outputs Power
  - 5 V @ 60 A
  - 3.3V @ 25 A
  - +12 V @ 5.0 A
  - -12 V @ 5.0 A
- >85% Efficiency
- 18 - 35 Vdc Input Range
  16Vdc for 3 Seconds
- MIL-STD-704A/D/E/F and 1275
- EMI/RFI Filter for MIL-STD-461
- Input Transient Protection
- Input Reverse Polarity Protection
- Holdup Time
- Suitable for VME, CompactPCI, and VPX Systems
- Output Over/Undervoltage and Short Circuit Protections
- ~ACFAIL, ~SYSRST and ~SYSFAIL Control Signals
- Input/Output and Chassis Isolation
- Thermal Shutdown (with Override on request)
- External ON/OFF Control, DC Fan Output Drive and Control
- Internal BIT Status and Alarms for Voltages, Currents & Temperatures
- Metric screws for chassis wall (captive M3) and wedgelocks
- RoHS II compliant variant available

Overview

Designed for harsh environment applications, the EM-P328-CC is a versatile and reliable 6U power supply providing rugged systems with an exceptionally wide input voltage range (18 - 35 Vdc) to ensure excellent load and line regulation. For EMI reduction, an input line filter is used to reduce the input reflected ripple.

The power supply outputs four common voltages for VME, VPX and CompactPCI systems, with a total combined output capacity of 500 watts.

All output voltages have sense lines to ensure voltage stability for high current loads. Furthermore, all outputs are individually protected against short-circuit and overvoltage.

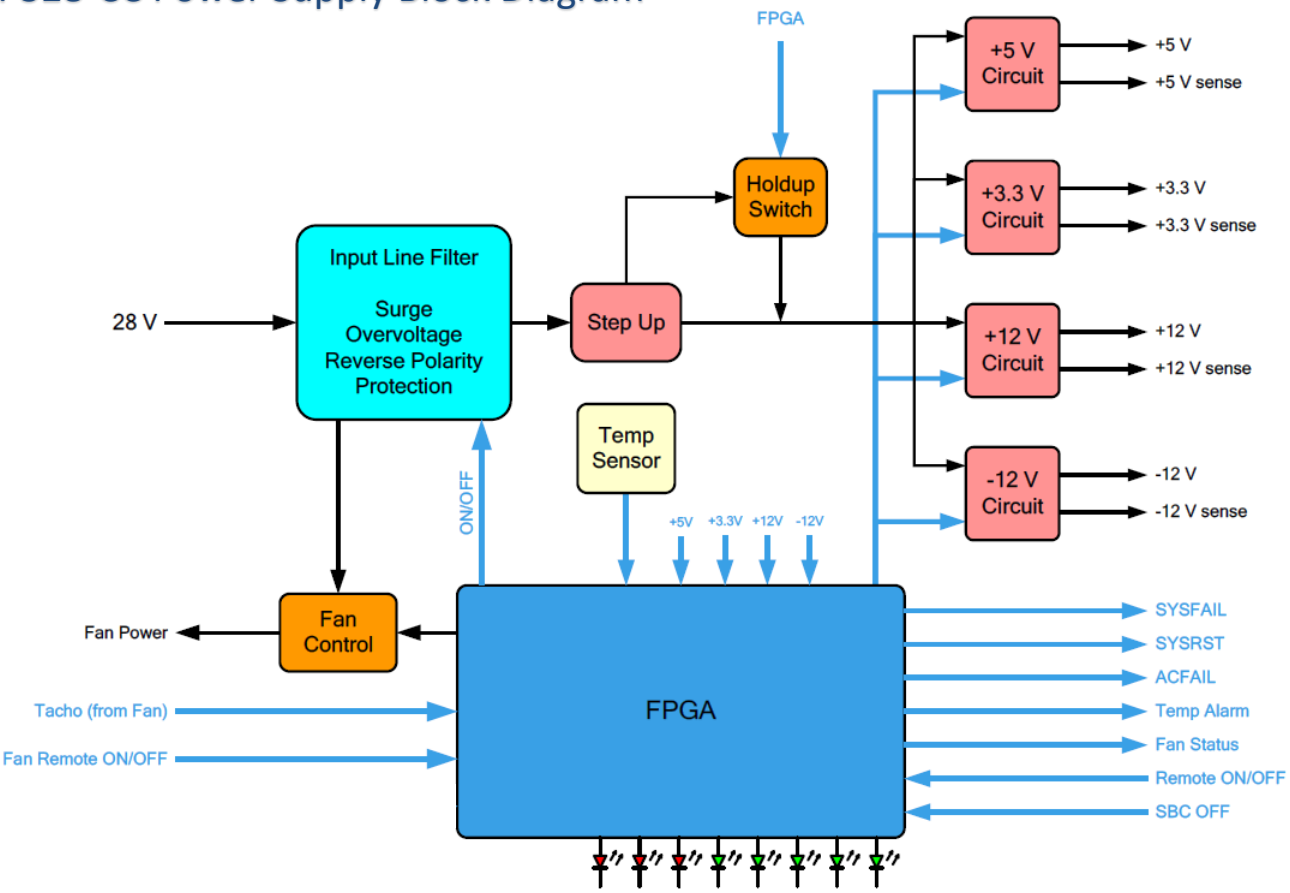
The EM-P328-CC features 500 V isolation from input to output, thus eliminating any possibility of ground loops.

The power supply includes a fan control circuit to control and monitor the operation of a cooling fan. The circuit includes voltage regulation to maintain constant fan power, regardless of supply voltage and load, to ensure maximum fan RPM. A temperature monitoring and control circuit controls fan operation, issuing an alarm to indicate power supply overtemperature, and shutting the power supply off if temperature reaches damaging levels. In addition, the EM-P328-CC is equipped with sophisticated BIT logic that monitors inputs and outputs, temperature, and fan status, and provides BIT and status signals (SYSRST, SYSFAIL and ACFAIL).

A discrete input enables the power supply to be turned on and off remotely.

Eight indicator LEDs provide a convenient visual indication of power supply status.

EM-P328-CC Power Supply Block Diagram



Functional Description

Input Voltage Operation and Protection

The EM-P328-CC power supply operates over a continuous DC input voltage range of 18 - 35 V.

Input power protection circuitry protects the power supply from reverse input voltage up to 50 Vdc, and in-rush current greater than 35 A.

The power supply provides full specification operation with input power compliant to MIL-STD-704A/D/E/F and 1275 (non damage with minimum voltage of 18 V).

Output Voltage Operation and Protection

Four independent power supply circuits provide four isolated outputs (+5 Vdc/60 A, +3.3 Vdc/25 A, +12 Vdc/5 A, and -12 Vdc/5 A respectively) with a total combined output power capacity of 500 W before derating (see derating graph on next page).

The power supply circuits feature > 500 V input to output isolation, eliminating any possibility of ground loops. Moreover, each output channel has an independent current limitation implemented by the on-board logic.

Outputs are protected against short circuit, overcurrent, and overvoltage.

All output voltages are equipped with sense lines that are routed to the power connector.

External Control Signals

2 discrete inputs enable external control of the EM-P328-CC.

- Remote ON/OFF – Referenced to input GND
- SBC OFF – Referenced output GND. This signal puts the EM-P328-CC into a latched OFF state. To turn it back ON, input voltage must be removed and re-applied or the Remote ON/OFF signal (above) must be used to turn power off and on again.

Fan Control and Monitoring

The EM-P328-CC is designed to operate a cooling fan with integral tachometer (for example EG&G Rotron Propimax3 or similar), by feeding the filtered power supply input voltage to the fan.

A fan control unit in the power supply provides the following functions:

- Regulated constant 30 V fan power to ensure high RPM. The fan supply is independent of EM-P328-CC input voltage.
- Monitoring of fan tachometer - Activates an external fan status signal if speed is out of spec. limits.
- Monitoring of fan voltage and current
- Overvoltage protection - Protects fan by turning it off if voltage exceeds 32 V
- Overcurrent protection - Protects fan by turning it off if current exceeds 13 A
- High temperature control - Protects power supply and system from overheating by turning fan on if power supply temperature exceeds 50 °C
- Low temperature control - Protects fan from damage by turning it off if power supply temperature is less than 0 °C
- Remote control - Enables fan to be turned on and off via a discrete input. This control is overridden by the high and low temperature control described above.

Temperature Detector

A temperature detector circuit monitors power supply operating temperature using an integral temperature sensor. The temperature detector circuit is connected to the fan control circuit enabling control of the fan as described above.

In the event of the power supply overheating, the temperature detector circuit triggers a discrete output alarm signal at the power supply connector when a temperature of 90 °C is detected. If the temperature reaches 100 °C, the temperature detector circuit shuts the power supply down. When temperature returns to a safe operating level, the power supply automatically turns back on.

Status LEDs

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

Four green LEDs indicate that the four output voltages are within specification limits, and three red LEDs indicate when the SYSRESET, SYSFAIL, and ACFAIL signals are asserted. An additional green LED indicates power supply normal operation by blinking.

Power Monitor Circuit

The EM-P328-CC performs as a power monitor with respect to the SYSRST#, SYSFAIL#, and ACFAIL#.

ACFAIL# is asserted in the event of an input power loss or failure of the +5 V or +3.3 V output. This also triggers the holdup circuit.

SYSRST# is asserted for 200 ms at any power-on event.

SYSFAIL# is asserted during any power-on event until the EM-P328-CC reaches fully operational mode. During normal operation SYSFAIL# is asserted to indicate a power supply failure.

Mechanical and Thermal Construction

The EM-P328-CC is a 6U board, equipped with wedge-locks to hold it in place, and extractors for easy removal.

Cooling of the EM-P328-CC is by heat transfer through the surface of its heatsink directly to a cooled surface. Two mounting screws to seat the EM-P328-CC firmly against the cooling surface. In our enclosures, the EM-P328-CC is mounted with the entire surface of its heatsink in thermal contact with an enclosure wall that is fan cooled on the exterior of the enclosure.

Mounting screws (captive M3) and wedgelocks have metric allen heads.

EMI/RFI Design

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.

All high power and noisy components are cooled and shielded by a monolithic heatsink, and the heatsink of the optional capacitor bank module provides additional shielding.

Power Supply Connector

The power supply utilizes two power connectors located at the bottom of the board.

Specifications

Input

Outputs

Normal Steady State Operation	18 - 35 Vdc 16V for 3 Seconds
Overvoltage Protection	50 Vdc
Reverse Polarity Protection	Up to 50 Vdc
General Characteristics and transient suppression	Per MIL-STD 704A/D/E/F and 1275 (non damage with minimum voltage of 18 Vdc)

Output Specification	OUT1	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
Current (A), Max	60	25	5	5
Current Limit Point (A)	61-63	26-28	5.5-6.5	5.5-6.5
Ripple/Noise (mVP-P)	<50	<50	<50	<50
Short Circuit Protection	√	√	√	√

Fan Output Voltage

- Uses Filtered EM-P328-CC Input Voltage
- 30 V constant to the fan
- 32 V Overvoltage Protection (shutoff)
- 13 A Overcurrent Protection (shutoff)

Backplane Support

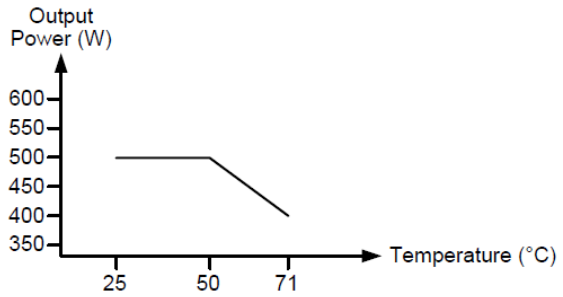
The power supply can be used with backplane B027 in order to fit a standard enclosure.

For more information about B027 backplane, please contact EMCOMO.

Efficiency

Typical efficiency of the power supply is greater than 85%, depending on operating load, input voltage, and operating temperature.

Derating



Thermal Shutdown

- 100°C ± 5°C

Isolation Resistance

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

ACFAIL and SYSRST

	Output [V]		Input [V]
ACFAIL State	3.3	5	28
Decreasing Voltage	2.9	4.5	17.7
Increasing Voltage	3.18	4.85	18.1

Input/ Output Under Voltage Sensing

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

Environmental

Temperature (MIL-STD-810E)

- Maximum Operating Temperatures (at heatsink surface): -40 to +71 °C
- Storage Temperature: -60 to + 100 °C

Altitude (MIL-STD-810E)

- Operating: Up to 50,000 ft.

Humidity (MIL-STD-810E)

- 0 - 95% relative humidity

Vibration (MIL-STD-810E)

- Random $8g_{rms}$ - maximum 0.1 g^2/Hz at 20 - 2 kHz

Shock (MIL-STD-810E)

- Single shocks, operating - Half sine, 40 g peak @ 11 ms, 3 axes
- Bench handling shock - 1" rotational drops

EMC Protection (MIL-STD-461D, Part IV) *

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

* With external input power line filter

Mechanical Specifications

Height	233.35 mm
Depth	160 mm (excluding connectors)
Width	23.2 mm
Weight	1690 g

Ordering Information

Configuration	Description	Order Code
EM-P328-CC	Rugged 6U VMEbus Power Supply Board, 500 Watt Output, 18 - 35 Vdc Input Range (16 Vdc for 3 seconds), conduction cooled, -40 to +71°C operating temperature, +5V and +3.3V sense inputs, metric screws for chassis wall (captive M3) and wedgelocks - non-RoHS	**A09215**
EM-P328-CC-R	RoHS II compliant variant (MOQ applies)	**A09216**

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