E106

1/2-ATR Short Fan-cooled High Power VME Enclosure

- **Rugged Chassis for Mobile Military Applications**
- **Designed for Harsh Mechanical, Climatic, Chemical and Electrical Stresses**
- **Environmentally Sealed**
- **Compact and Lightweight with 3 Standard VME Slots**
- **High Power Dissipation**
- **Internally Conduction-Cooled; Externally Forced Air-Cooled with Integral Temperature Controlled Fan Unit**
- **Fully Sealed Faraday Cage and Complete EMI/RFI Power Line Filtering**
- **Multi-Output Integral 28 Vdc Input VME Power Supply**
- **Backplane I^2C Temperature Sensors, Voltage Monitors, and Electronic ETR**

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Overview

Aitech's E106 Fan-cooled VME computer enclosure is built to be rugged and reliable as well as lightweight and compact. EMI/RFI protected and environmentally sealed, the E106 is capable of withstanding extreme environmental conditions of altitude, temperature, humidity, shock, vibration, EMI and chemical exposure. This makes it ideal for use in all military environments.

Sturdy Mechanical Design

The E106 is constructed of durable CNC machined 6061-T6 aluminum. Fasteners are stainless steel and often-used threads have self-locking stainless steel helicoils to withstand severe vibration and shock. All connectors are located on the front panel of the enclosure for easy access. Side and back walls are internally finned (to create air tunnels), for cooling by the forced air from the integral fan.

Designed with a built-in handle, the E106 is also equipped with hooks and mounting holes to facilitate installation in standard 1/2-ATR short mounting trays.

The enclosure is also available with optional mounting brackets for base plate hard mounting.

Board Capacity

The E106 accommodates 3 standard VME boards with 0.8 inch pitch, including:

- IEEE 1101.2 conduction-cooled VME cards
- Commercial VME boards without front panels

VME Backplane

The 3-slot backplane is VME64x compliant with 160-pin, 5-row J1/J2 connectors and 95-pin PO connectors in all slots and automatic Daisy Chain.

Any of the pins in rows A and C, and user defined pins in rows Z and D of the J2 connectors, as well as the 95 I/O pins from each of the P0 connectors (up to a maximum of 512), can be routed to front panel I/O connectors.

The backplane also contains two I^2C devices with integral temperature sensors and voltage monitors. An additional I^2C device is an Elapsed Time Recorder (ETR) that stores cumulative operating time of the enclosure. System temperature, backplane voltages, and total elapsed operating time of the enclosure can be read by the system SBC via its I^2C bus, if available.

Front Panel

The front panel features a MIL-STD input power connector, and optional MIL-STD I/O connectors per customer requirements. Other optional front panel features include: LED indicator to track system operation, On/Off switch, and external grounding screw.

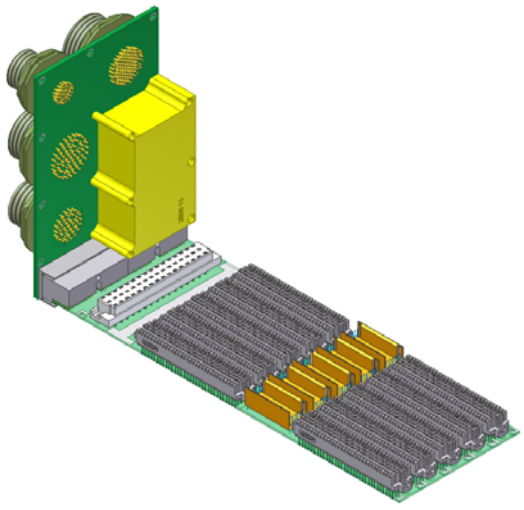
Front Panel I/O Transition Module

I/O signals are routed between the backplane slots and the front panel connectors via a solid state I/O transition module.

This design approach ensures maximum signal integrity as the I/O transition module is custom designed for each customer and application, with controlled impedance traces, fenced signals, etc. to meet specific system requirements.

The front panel connectors are integral to the transition module, and the entire transition module mounts to the enclosure front panel. The 28 V input power connector, along with an input power line filter, are also integral to the transition module. To minimize EMI/RFI, the power connector and line filter are encased in a metal faraday cage.

The I/O transition module can also include any required EMI/RFI filtering circuitry adjacent to the various I/O connectors, increasing the effectiveness of the filtering. Lightning protection or other required protection devices can also be installed on the transition module.



For larger production quantities, the I/O transition module is also lower in cost that harnessing.

As the I/O transition module is a plug-in unit, system main tenance is also greatly simplified, and

there are no wires that can break during maintenance operations.

The system backplane is designed with the same I/O signal characteristics as the I/O transition module, ensuring full matching of controlled impedances and signal integrity. Both the backplane and I/O transition module are fitted with high density connecters to conduct power and I/O signals from the front panel connectors to the backplane slots.

Thermally Efficient

The E106 does not require external forced air or base plate cooling. Thermal design of the enclosure is based on internal heat conduction and external forced convection. The boards and power supply in the enclosure are cooled by conducting their heat to the enclosure interior sidewalls. External cooling is accomplished by means of the system fan blowing cooling air through shrouded heat exchangers on the exterior sidewalls of the enclosure. Heat conducted from the boards and power supply inside the chassis is conducted through the aluminum sidewalls from which it is carried away by the cooling air.

The sidewall heat exchangers of the E106 are particularly wide enabling the enclosure to dissipate large amounts of heat, making the E106 suitable for high power boards.

The fan is temperature controlled and operates when enclosure temperature exceeds the point of self- sustained heat dissipation.

Electro-Magnetic Compatibility

Aitech's E106 minimizes emission and susceptibility interference with these features:

- Metal-to-metal clamping with conductive surfaces and fasteners
- Conductive O-ring seals
- Shielded power supply board
- Metallic partition between I/O and board sections of the backplane and enclosure
- Line feed through filters on the inner surface of the front panel for reduced EMI/RFI noise to/from power cable, additional line filter module on the power supply board.
- Isolated chassis ground with optional external grounding screw

Environmental Sealing

The E106 is sealed against humidity and splash. Enclosure mating surfaces are sealed with hollow fluorosilicone rubber seals. Connectors and other accessories are protected in the same manner.

Corrosion Resistant Finish

External surfaces of the E106 are hard anodizing coated for excellent corrosion resistance. As an option, epoxy paint in standard military colors is available with nonstandard colors upon request.

Internal surfaces are chemical conversion coated for corrosion resistance and electrical conductivity. All finishes and components are fungus resistant.

High Performance Power Supply

The removable power supply provides continuous high current, high efficiency operation, under the most adverse conditions. It is easily replaced by the user to avoid enclosure maintenance downtime.

Major features include:

- DC-DC converters, designed to operate even with irregular or noisy power sources
- MOSFET output switching technology
- Fully isolated inputs and outputs, eliminating the possibility of ground loops
- Outputs are protected against short-circuits, thermal breakdown, overvoltage and overshoot.
- Input protected against reverse polarity high voltages, ripple and spikes

Power Supply Specifications

- **Thermal Characteristics**

Thermal Shutdown	+100 to +110 °C

- **Input Power**

Voltage Range (DC)	18 to 36 V
Nominal Input Voltage	24 to 28 V

- **Transient Suppression**

  Meets requirements of:

  – MIL-STD-1275AT (except ignition, cranking and single fault conditions)

  – MIL-STD-704D

- **Isolation** Resistance
  500 V to output of enclosure
- **Output Power**

	Outputs			
	1	2	3	4
Voltage (VDC)	+5	+12	-12	+3.3
Current (A)	30	1	1	15
Line/Load Regulate (%)	0.5	0.5	0.5	0.5
Ripple/Noise (P-P mV)	50	50	50	50

- **Total Output Power** 220 W
- **General Parameters**

Power Fail Warning	>4 mS
Efficiency	>75%

Enclosure Environmental Specifications

- **Operating Temperature**
  Ser 200 level Enclosure: -40 to +71 °C*
  Ser 400 level Enclosure: -55 to +71 °C*
- **Non-operating Temperature**
  Ser 200 level Enclosure: -50 to +85 °C
  Ser 400 level Enclosure: -62 to +100 °C
- **Low Pressure**

Operating:	Up to 22,000 ft
Storage:	Up to 60,000 ft

  *Maximum operating temperature is a function of total power dissipation and altitude. The 71 °C temperature is for power dissipation of 200 Watts with card edge of 85 °C @ sea level.
- **Humidity**
  5%-95% relative humidity with condensation
- **Vibration**

Sine	Cycling of 5*/8** g (max) at 5 to 500 Hz
Random	10*/16** G_{rms} at 20 to 2k Hz
Transportation	Loose cargo vibration

- **Shock** - Single half-sine shocks:
  40*/65** g peak
  3 axes
  11 ms duration

* Hard mounted
** Mounted on isolators

- **Transit Drop*** ** 3 ft. drop on concrete
  *** Packed in its cargo box
- **Bench Handling**
  4-in unpackaged drop at a 45° angle to simulate conditions during servicing
- **Salt Fog** 5% salt spray
- **Dust** Wind and fine dust
- **EMI/RFI**
  Designed to meet the emanation and susceptibility limits of MIL-STD-461, as per MIL-STD-462 requirements, CE102, CS101, CS114, & RE102.

General Specifications

- **Dimensions**
  Standard 1/2-ATR short mounting footprint:
  4.88 x 12.62 in (W x D)

  Maximum external dimensions with fan housing and handle:
  5.91 x 16.78 x 7.7 in (W x D x H)

  Note: For proper air intake of the fan, the back of the enclosure should be at least 2” away from any adjacent wall.
- **Weight**
  Less than 18.5 lbs. (without boards)
- **Power Dissipation Capability**
  More than 200 W at 71 °C ambient air temperature, with maximum 85 °C at card edge, at sea level.

Optional Accessories

- External brackets for hard mounting to base plate
- Complete set of front panel mating connectors
- Special noise–suppression fan housing

Development System Compatibility

To provide for a smooth transition between development and deployment, Aitech offers an equivalent, low-cost commercial integrated system with standard VME boards and an AC-operated, fan-cooled enclosure.

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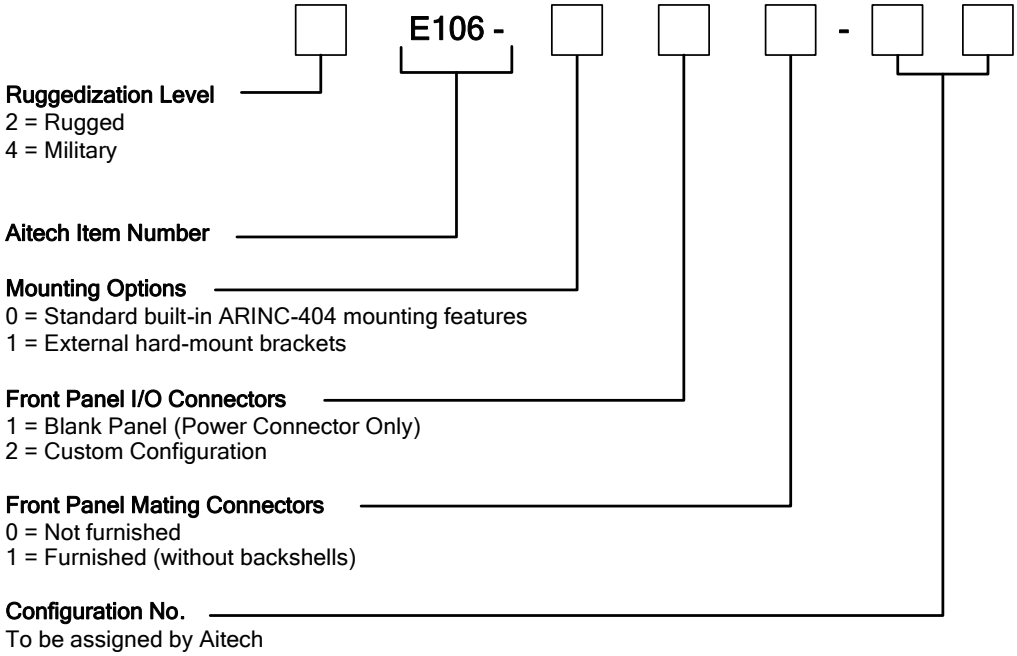
Ordering Information for the E106



Ruggedization Level
2 = Rugged
4 = Military

Aitech Item Number

Mounting Options
0 = Standard built-in ARINC-404 mounting features
1 = External hard-mount brackets

Front Panel I/O Connectors
1 = Blank Panel (Power Connector Only)
2 = Custom Configuration

Front Panel Mating Connectors
0 = Not furnished
1 = Furnished (without backshells)

Configuration No.
To be assigned by Aitech

Example: 4E106-010-00

For more information about the E106 or any Aitech product, please contact Aitech Defense Systems sales department at (888) Aitech-8 (248-3248).

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