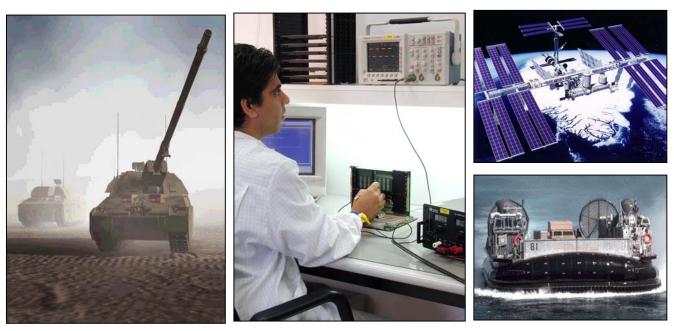- **Three Fully Compatible Ruggedization Levels:**
  - Military
  - Rugged
  - Commercial

- **Radiation tolerant boards and PMCs designed specifically for space applications**

- **Two mechanical formats:**
  - Air-Cooled
  - Conduction-Cooled

- **Wide range of applications, including:**
  - Ground Mobile
  - Airborne Fighters
  - Helicopters
  - Shipboards
  - Space (LEO)

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Overview

Every Aitech board and mezzanine is available in three levels of ruggedization and two mechanical formats. They are designed with 100% built-in hardware and software compatibility, which enables users to shift from one level to another using the identical application software. The characteristics of each level are summarized in Table 1.

Air-Cooled

Air-cooled rugged VME boards fully comply with ANSI/VITA 1-1994. These include a reinforced front panel, add-on stiffeners, and finned heatsinks for improved thermal and mechanical properties.

Air-cooled PMCs for installation on commercial and rugged air-cooled carrier boards fully comply with IEEE 1386-2001. They implement a finned aluminum heatsink for heat relieve for high power components.

A front panel is available with connectors providing some of the PMC's I/O signals.

Conduction-Cooled

Conduction-cooled rugged VME boards fully comply with IEEE 1101.2. These include a pressed on aluminum hard anodized 3D heatsink plate with built-in stiffening ribs, add-on wedgelocks and ejectors and heatsink covers. This mechanical structure is extremely durable and particularly suitable for boards with through hole packaged components on the top side and SMT components on the bottom side.

Conduction-cooled rugged PMCs meet the ANSI/VITA 20-2001 standard for assembly on top an IEEE 1101.2 compliant VME board. This mechanical version of the PMC implements a conduction type aluminum heatsink to conduct the heat off high power components to the carrier's board frame.

There is no front panel and all PMC I/O signals are directed to P4 I/O connector and through the carrier board to the rear panel.

Heat dissipation for boards and mezzanines with fine pitch SMT devices on both sides and BGA devices on the top side is based on internal heavy copper thermal layers inside the PCB with thermal vias through the top and bottom layers.

This VME board technology includes add-on machined hard anodized aluminum frame with heatsink covers, wedgelocks and ejectors.

Space Level Products

In addition to the military, industrial and commercial product lines described below, Aitech designs and manufactures products specifically designed for use in space environments. Space level product designs focus on:

- Radiation tolerance
- Latchup protection/circumvention
- Single event upset detection and protection
- Special conformal coating
- Parts and materials selection and control
- Environmental survivability under a wide range of customized conditions

Series-400 - Military

Available for VME and PMC board design, this ruggedization level meets full military temperature range requirements, using the highest grade components or equally screened components.

Designed to operate within the harshest environmental conditions and sustain extreme temperature changes, vibration and shocks, Series-400 products achieve the highest reliability at competitive prices.

Series-400 boards are tested in temperatures ranging from $-55\,^{\circ}$C to $+85\,^{\circ}$C.

The air-cooled version is equipped with stiffening bars and finned heatsinks. The conduction-cooled version has an integrated heatsink/stiffener or a stiffening frame..

Series-200 - Rugged

Using industrial grade components or equally screened, this level meets the rugged military and industrial standards. Series-200 boards are tested in temperatures ranging from $-40\,^{\circ}$C to $+71\,^{\circ}$C and meet the same vibration and shock conditions as series 400.

The air-cooled version has stiffening bars and finned heatsinks. The conduction-cooled version has an integrated heatsink/stiffener or a stiffening frame.

These boards are designed to operate in rugged applications with lower temperature extremes.

Series-100 - Commercial

Aitech's Series-100 uses commercial grade components. These air-cooled boards are designed for use in benign commercial or laboratory environments and operate at temperatures ranging from $0\,^{\circ}$C to $+55\,^{\circ}$C. These boards use a front panel with switches, connectors and LED indicators.

Table 1. Board Level Ruggedization Summary

Ruggedization Level	Series-100 Commercial	Series-200 Rugged		Series-400 Military	
Mechanical Format	Air-Cooled [1]	Conduction-Cooled [2]	Air-Cooled [1]	Conduction-Cooled [2]	Air-Cooled [1]
Temperature (°C)					
Storage	-40 to +85	-50 to +100	-50 to +100	-62 to +125	-62 to +125
Operating	0 to +55 [3]	-40 to +71 [4]	-40 to +71 [5]	-55 to +85 [4]	-55 to +85 [5]
Vibration (all axes)					
Random (g^2/Hz)	20-2000Hz/ 0.02 g^2/Hz	20-2000Hz/ 0.1 g^2/Hz	20-2000Hz/ 0.04 g^2/Hz	20-2000Hz/ 0.1 g^2/Hz	20-2000Hz/ 0.04 g^2/Hz
Sine (g PEAK)	10-100Hz/2g	50-500Hz/10g	50-100Hz/5.5g	50-500Hz/10g	50-500Hz/5.5g
Shock (all axes)					
Half Sine/Saw Tooth	20g/6mS	40g/11ms 100g/6mS	30g/11ms 75g/6mS	40g/11ms 100g/6mS	30g/11ms 75g/6mS
Altitude (ft)					
Operating Maximum	15,000	70,000	70,000	70,000	70,000
Relative Humidity					
Operating (non condensing)	0-90%	0-100% [6]	0-100% [6]	0-100% [6]	0-100% [6]
Conformal Coating					
Acrylic	N/A	Yes	Yes	Yes	Yes
Silicone	N/A	Optional	Optional	Optional	Optional

[1] Air-cooled VME boards, per ANSI/VITA 1-1994 - Air-cooled PMCs per IEEE 1386-2001

[2] Conduction-cooled per IEEE 1101.2 Mechanical Format Factor for conduction-cooled 6U Eurocards – Conduction-cooled PMCs: per ANSI/VITA 20-2001

[3] Operating ambient air temperature with airflow of 300 LFM

[4] Operating card edge temperatures

[5] Operating ambient air temperature with airflow of 600 LFM

[6] With optional silicone conformal coating (Limited to 95% with acrylic type of conformal coating)

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

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