# Environmental Specification

## Ruggedization Options for Embedded Products

Datasheet Revision: 3.4
June 5th, 2026

AD-SP-074

## Order Codes: [product_code]/(hs)(temp)(coat)/(PB)/(C#)

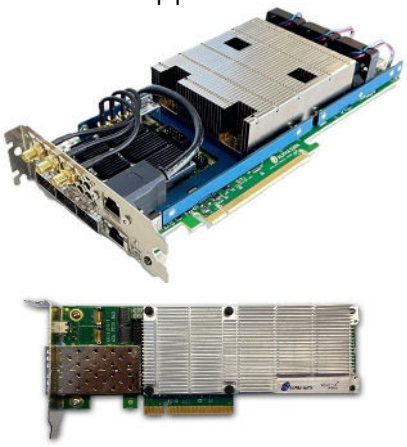
| | | | |
|---|---|---|---|
| [product_code] | Product specific part number code, see product datasheets for details. | | |
| (hs) = heat sink type | <Blank> or AC = Air Cooled | CC = Conduction Cooled | |
| (temp) = Temperature rating | <Blank> or 0 = Commercial<br>Operating 0 to +55 ºC<br>Storage -40 to +85 ºC | 1 = Industrial<br>Operating -40 to +85 ºC<br>Storage -55 to +100 ºC | 4 = Military<br>Operating -55 to +105 ºC<br>Storage -60 to +150 ºC |
| (coat) = Conformal coating | <Blank> = None | A = Acrylic: Humiseal 1B31 | P= Polyurethane: Humiseal 1A33 |
| (PB) = Tin lead solder | <Blank> = Lead-free | PB = Tin-lead solder process | |
| (C#) = Custom code (i.e. /C7) | Additional customer specific requirements: Including alternative conformal coating materials, staking/corner bonding, component underfill. environmental screening, image pre-load, etc. Please contact sales@alpha-data.com for details | | |

Example:
ADM-XA210/M18-2MSI/V88/CC1P/PB/C2 =
XMC, Versal VM1802 FPGA, VITA 88 connectors, conduction cooled, industrial, polyurethane, tin-lead solder, custom code C2

## Heat sink types:

Air Cooled (Commercial)

Skived/machined aluminum/copper or aluminum zipper fins above a copper heat pipe heat sink.



Air Cooled (Industrial)

**VPX**: Machined metal frame with fins, guide rails, and front panel.
**XMC**: Finned metal frame within XMC envelope space with standoffs + bezel.

Conduction Cooled

**VPX**: Flat thermal interfaces along card edge with secondary side wedge locks.
**XMC**: Muli-piece heat sink kit used with gap filler for thermal coupling to carrier.

## Environment Stress Ratings (VITA form factor, VPX and XMC)

| | | |
|---|---|---|
| Vibration | ANSI/VITA 47.1 Vibration Class V3 | 5 Hz to 100 H, PSD increasing at 3 dB/octave<br>100 Hz to 1000 Hz, PSD = 0.1 g2/Hz<br>1000 Hz to 2000 Hz, PSD decreasing at 6 dB/octave |
| Shock | ANSI/VITA 47.1 Operating Shock Class OS2 | 40g, 11 millisecond, shock half-sine or<br>40g, 11 millisecond, terminal sawtooth shock |
| Humidity | ANSI/VITA 47.2 | Up to 95% (non-condensing) |
| Altitude | ANSI/VITA 47.1 Altitude Class AV2 | Down to 1,500 feet (460 meters) below sea level<br>Up to 60,000 feet (18,300 meters) above sea level |



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