TAKEME2SPACE

AICube

Technical Specifications



Description:

AICube is a high-performance AI processing unit optimized for the space environment, enabling real-time data processing and autonomous decision-making for CubeSats and small satellites. Powered by the NVIDIA Jetson Orin NX series, it delivers advanced AI inference and complex computing capabilities, reducing dependence on ground-based processing. Designed for efficiency and resilience, AICube operates reliably in harsh space conditions, making it ideal for applications such as Earth observation, deep-space exploration, and autonomous satellite operations.

Compute Specifications:

Parameter	Value
Processor Type	Nvidia Jetson Orin NX - 16GB SOM
Compute Performance	Up to 117 TOPS
Non-volatile Memory	2TB Application Storage Configurable up-to 4TB

Electrical Specifications:

	Parameter	Value
Power	Power Consumption (Idle)	20W
	Power Consumption (Nominal)	25W
	Power Consumption (Peak)	55W
	System Input Voltage	12V
	Peripheral Voltage Range	3.18V - 3.45V
Interfaces	Interfaces Supported	1x CAN 1x USB C Super Speed 1x Micro USB 1x Ethernet

Mechanical Specifications:

Parameter	Value
Dimensions	95.5mm×95.5mm×52mm
Material	Hard anodized Al 6061 T6
Connectors	2 X USB C 1 X Micro HDMI Connector 2 x 6 pin Harwin Gecko screw lock 1x 10 pin Harwin Gecko latching
Operating Temperature	-40°C - 85°C
Mass	400gm

Testing Specifications:

Testing & compliance	T-Vac	2 Cycles with temperature range of +60℃ to -25℃
	Vibration	Random vibration acceptance test levels 20 - 2000 Hz at 4.47grms for 60 seconds
	Shock	100 Hz at 30g 1000 Hz at 1500g 5000 Hz at 1500g
	Mission Life Expectancy	5 Years
	Radiation Tolerance	Radshield protection with proprietary Ta-tape for up to 10x reduction in TID for LEO

Thermal management:

Thermal management for the AI-Cube is being done using a passive management system consisting of split clamp type heat-spreaders and copper heat pipes. A split clamp captures the heat generated by Orin SoC (31.3 W), transferring the heat via pipes to another split clamp. For the best performance the clamp should be mounted on the side plate with minimum dimension of 366 mm x 226.3 mm x 2 mm (6U CubeSat side plate).
A unique thermal interface material with high thermal conductivity is used between the Orin processor and copper block ensuring fast heat removal.

The thermal management system is modular in design, leading to easy assembly and customization based on the mission requirement.

Thermal test simulations:
When tested at ambient conditions (22 ℃) and peak load (31.3 W), the AI-Cube recorded a maximum temperature of 85.2 ℃. The system has been designed in a way so that other components in the system are isolated from the heat produced by the Orin processor, which is how we maintained the temperature of the PCBs in the system at a maximum of 46 ℃.

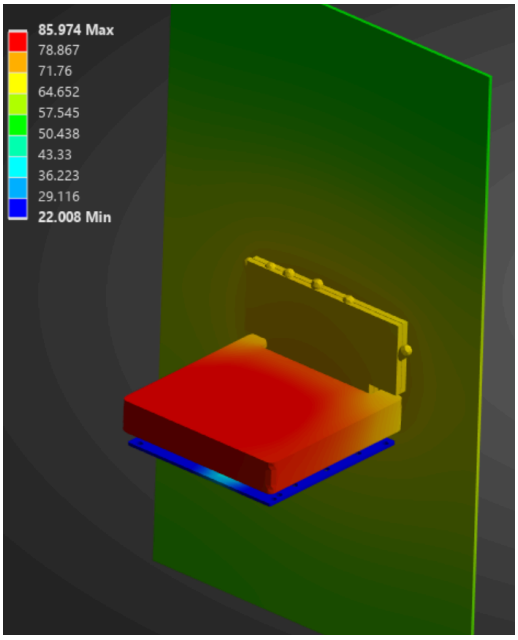

Fig: Thermal analysis of AI-cube for a 6U satellite bus

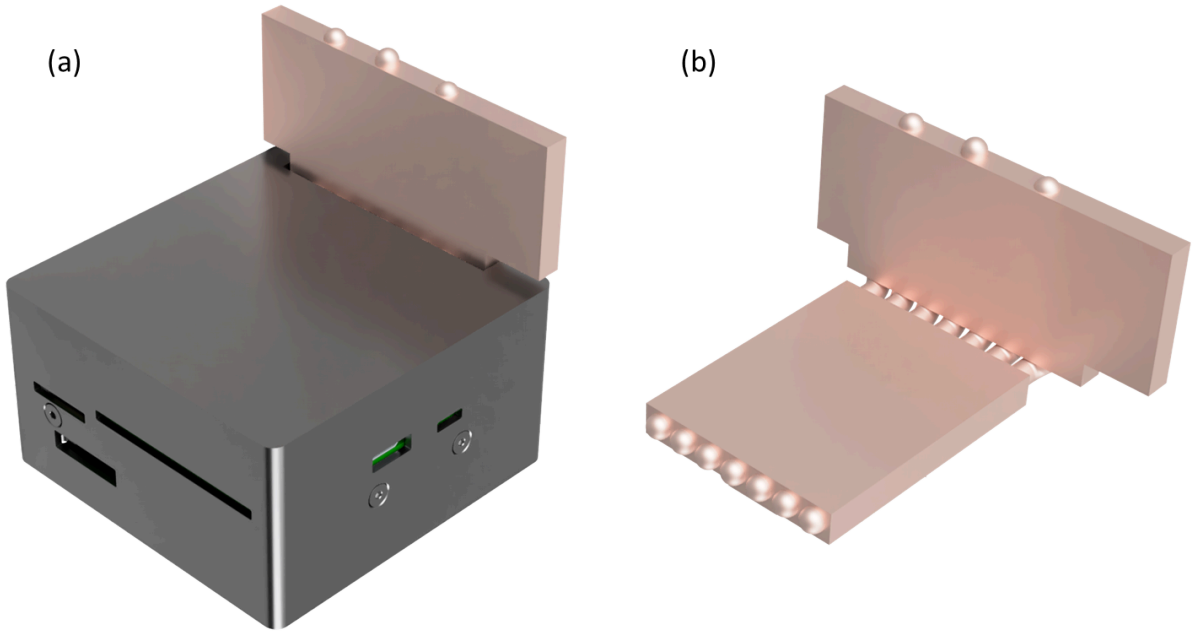

Fig: (a) AI-cube assembly, (b) Modular thermal system

Questions? Queries? Contact us at info@tm2.space