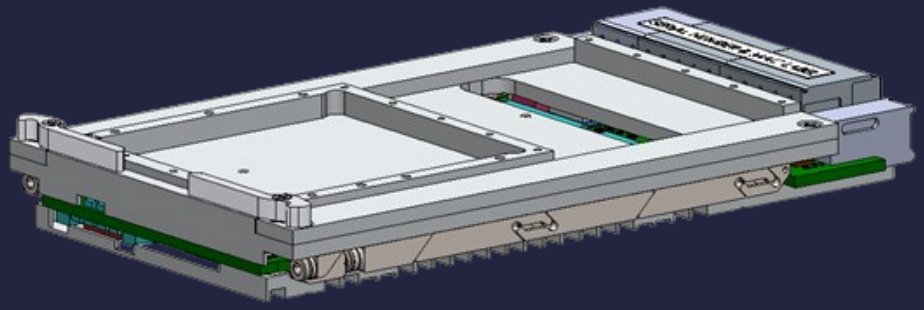


# VITA 48.2

# Conduction

# Cooled Tiger Lake Module



Intel Xeon W-11865MRE "Tiger Lake"

3U VPX

45W Thermal Design Power

85°C

Cold wall temperature

2.6GHz

Clock speed at maximum temperature

FULL

Thermal Design Power Available

## About Our Partner

Our customer is a multimillion-dollar international corporation that combines more than 50+ years of process and control experience with high-tech computer design. They design and manufacture high-performance embedded computing products for CPCI, VME and VPX systems, as well as SWAP-optimized customisable computers for deployable missions.

## Growth in the Industry

In order to expand in the Rugged Embedded Market, our customer recognised that their product **portfolio must include the latest generation of CPU architecture** functioning at the highest level of performance.

They are continuously looking to grow in the rugged market by developing competitively rugged products, which naturally require high levels of expertise to develop.

To make waves in the rugged market, our customer recognised that the most effective solution was to engage with trusted and proven partners who could rapidly elevate their products to a production ready state.

## Improving Capability

Our customer already deliver a wide range of high performance industrial embedded products to a wide market and have identified the Defence VPX sector as space to grow into and share their expertise.

Any plans on technical growth is simpler in theory than in practise and, with a complete orderbook and engineering delivery schedule, **allocating specialist time to develop these high-performance VPX products was difficult** to come by.

Our customer approached Entropy looking to secure trusted partners that could compliment and enhance their existing capability set. **Their design department is already at full capacity supporting their existing customer base**, and so minimal onboarding and support was required from these partners to ensure their engineers were not disrupted.

To make real impact in the rugged embedded space, our customer intended to refresh their product line with world class functionality and environmental performance using Intel's latest 11<sup>th</sup> gen Xeon Architecture, known as "Tiger Lake".



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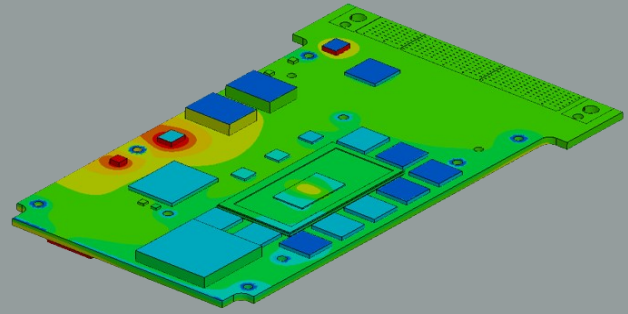
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## Hands-Off Support

Entropy were able to support our customer in the definition of product environmental specifications and helped make the **delivery of work as hands free as possible** to our customer so they could focus on delivering to their existing customers.

Entropy helped **evaluate the existing manufacturing supply chain** for production readiness and capability, and were able to identify areas of critical risk that prevented concerns later in the program. Using our quality network, we were able to **readily introduce our customer to a certified & trusted MilAero manufacturing partner** based in the US

who could comfortably support their supply chain needs. This relationship has been followed through to fruition.



Surface plot showing temperature variations across the PCB. The CPU temperature has been reduced significantly below other devices using tried and tested engineering techniques to extract maximum performance.

**STEP 1: Advise layout position of critical components** for ideal solution. Correctly positioning the CPU alone can save as much as 20% of your thermal budget. With a board as dense as this, the earlier the feedback for the layout team the better to get an ideal solution.

**STEP 2: Develop a cooling solution that works for the assembly team.** It was important that new and innovative thermal solutions could be implemented with the skills that our customer already have in house. A good-looking solution is useless if it can be put into practise.

**STEP 3: Harmonise our customer stock items with new mechanical accessories.** We strived to ensure fittings and fasteners aligned with existing stock, and that any new accessories were readily available for purchase and clearly documented.

**STEP 4: Identify Suitable Supply Chain.** Achieving world-class thermal performance requires small improvements in areas from Thermal Interface Material to correct plating choices. We reviewed the processes our customer used for their existing product stream, and facilitated new relationships that could deliver the highest quality for extreme rugged.

**STEP 5: Perform High Accuracy Analysis.** With the solution nearly at completion, a final high-accuracy thermal analysis validates the design decisions made and informs the product team of the options they can expect to see on their product.

**STEP 6: Deliver the Manufacturing Pack.** Our manufacturing pack includes all information a customer will need to independently purchase and assemble all items required within the module. It also contains design reviews and rationale at each critical stage.

## Market Leading Performance

We were able to deliver a two-stage production solution that allowed our customer to **begin development and bring up of the module with a temperature ceiling of +80°C @45W TDP**. This operating range gave a significant margin with which to start development and testing early. The design was created specifically to allow for a **high-performance two-phase version** which would be interchangeable at a later date once our customer had debugged the initial board revision, and **provide full performance beyond the +85°C limit** required by VITA standards. This decision was made with product roadmap foresight and is anticipated to reduce excessive mechanical design costs for new metalwork redesigns on the more complex two-phase section.

With our guidance and input, our customer have a highly-capable thermal solution which is readily workable with their existing internal assembly processes, and a reliable manufacturing supply chain ready to develop it for them as necessary.



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