



# Fan Unit

COOLING FOR COMPUTE BLADE



**Fan Units are designed to work seamlessly with up to two Compute Blades each, providing a comprehensive cooling solution even in packed Rack spaces.**

The smart fan unit enhances your Compute Blade setup by providing numerous functions, features, and the flexibility to customize the operating logic. It incorporates an additional Raspberry Pi, the RP2040, to expand the capabilities of your system.

## Key Features (Smart Fan Unit)

 Programmable Raspberry Pi RP2040	 Fan controller EMC2101	 Noctua NF-A4x20 5V PWM fan
 2 temperature sensors	 Precise Temperature Monitoring Unit - EMC2101	 2 UARTs for interfacing with Compute Blades
 2 LEDs for Compute Blade status indication	 2 User-Programmable Digital RGB LEDs	 1 User-Programmable LED to GPIO25
 Boot and Reset Buttons	 User-Programmable Button	 Smart Power MUX chip
 Serial Flash Memory 16M-Bit	 Integrates within Compute Blade Enclosures	 USB-C Port

# Compute Blade Platform Applications



## Home labs

An enterprise-level homelab experience that you can use to build, play with, and explore new technologies



## Hosting provider

Provide dedicated resources and isolate customer machines on a physical layer, to protect against modern CPU/hypervisor exploits.



## Edge servers

Reduce latency and extend compute power to make your processes leaner, more efficient, and more cost-effective.



## CI/CD systems and Automated tests

Perform performance tests on dedicated hardware for results far more stable than running tests on virtual machines.



## Stateless Computing

Seamlessly deploy specialized stateless computing platforms, such as OpenFaaS, onto the blades to enhance functionality and performance.



## High Availability Computing

Deploy robust, high-availability computing to maintain critical operations and services with minimal downtime.



## Smart Homes

Make your home server highly available and increase the possibilities e.g by adding more modules like the Uptime AI-Module.



## Private Cloud

Create your own secure, scalable private cloud for efficient data management and tailored IT services.

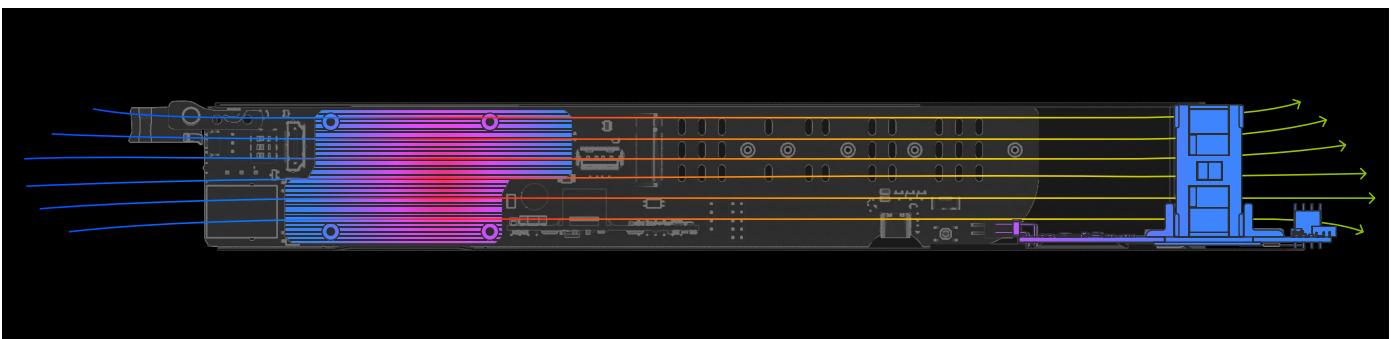


## Education

Enhance educational experiences with practical, hands-on tech learning, facilitating innovation and computing skills.

## Advanced Cooling for Advanced Computing

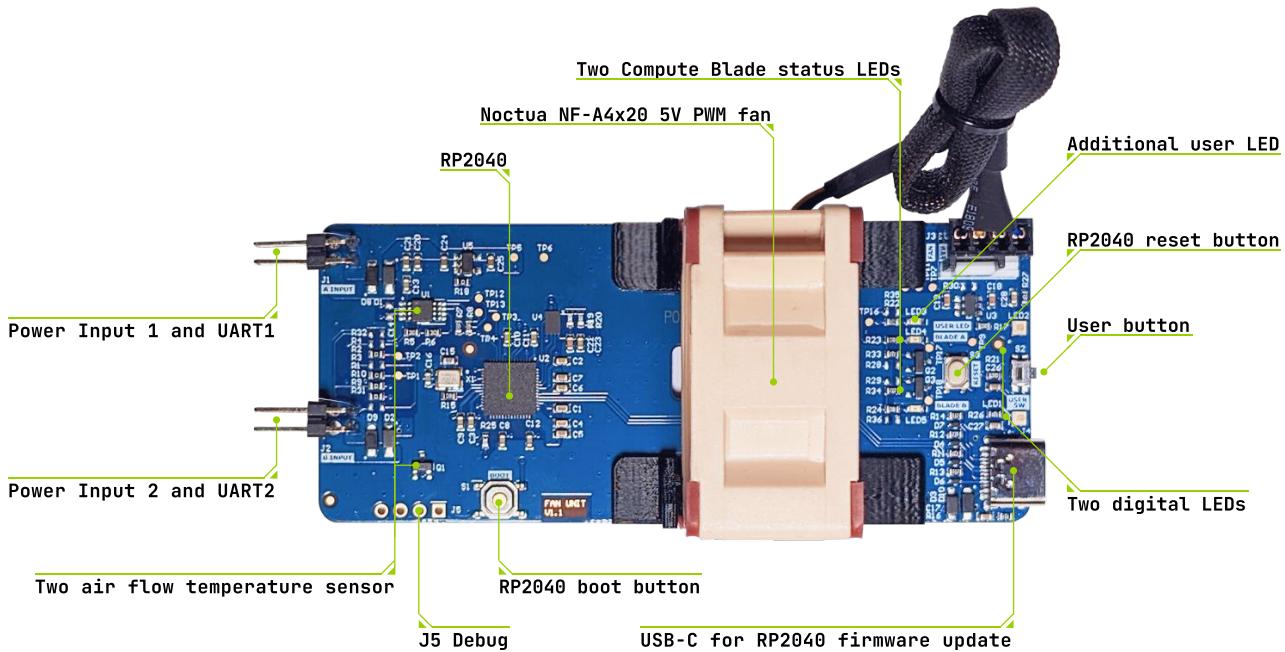
Interacting with your Compute Blades allows you full control over cooling and even adds another layer of possibilities by including the SMART fan unit, which incorporates an MCU, the RP2040, and additional sensors into your cluster.



Unlike conventional blade servers, our system eliminates a single point of failure as it doesn't rely on a server platform. While it still uses a PoE network switch (also necessary for blade servers), switches are simpler to replace or keep as spares compared to entire server platforms.

Individual blades can be rebooted or power-cycled by momentarily disabling their switch port power. Thanks to the CM4's network boot feature, re-provisioning and system rescue are straightforward. Each blade is compact, devoid of moving parts, and can be easily shipped without special handling.

# Specifications



<b>Compatibility</b>	Compute Blade V0.9 RC2, V1.0 mk1, V1.0 mk4-k, V1.0 mk4
	Compute Blade Enclosures
<b>Storage</b>	16M-Bit Serial Flash Memory
<b>Compute Blade Interface</b>	UART – Fan Unit Connector
<b>GPIO</b>	2 x UART (RP2040 – UART0, UART1) 4-Pin PWM Fan Header Boot Button User Button 2 x Digital RGB LEDs (19-C47/RSGHBHC-5V01/2T) 1x LED to GPIO25
<b>Operating Voltage</b>	5V - Fan Unit Port (provided by Compute Blade) 5V - USB-Type C Connector
<b>Input Power (max.)</b>	0.5W
<b>Airflow Control Unit</b>	EMC2101
<b>Temperature Monitoring Unit</b>	EMC2101
<b>Fan</b>	PWM Fan, 5V, 40x20mm (Noctua NF-A4x20 5V PWM)
<b>Dimensions</b>	40mm x 95mm x 43.2mm

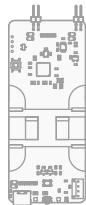
# Versions

## STA Fan Unit (Standard)



Simplified variant of the smart fan unit, featuring the same form factor and fan, but without the capability to execute or be controlled by custom applications.

The STA fan unit is powered and controlled directly by the compute blade, without the need for any additional wiring.



## Smart Fan Unit

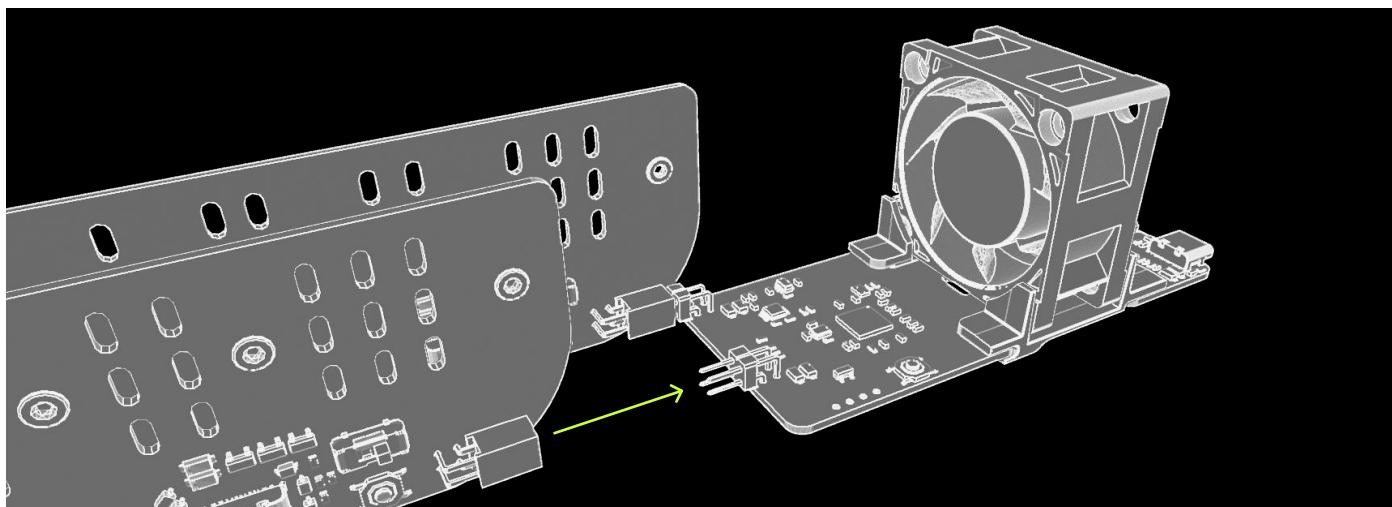
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	Smart Fan Unit	STA Fan Unit
UART Compute Blade Interface	✓	✗
PWM Compute Blade Interface	✗	✓
Fan Unit Connector	✓	✓
PWM Fan	✓	✓
Raspberry Pi RP2040	✓	✗
Reset Button	✓	✗
Boot Button	✓	✗
Programmable Button	✓	✗
Compute Blade Status LEDs	✓	✗
Temperature Sensors	✓	✗

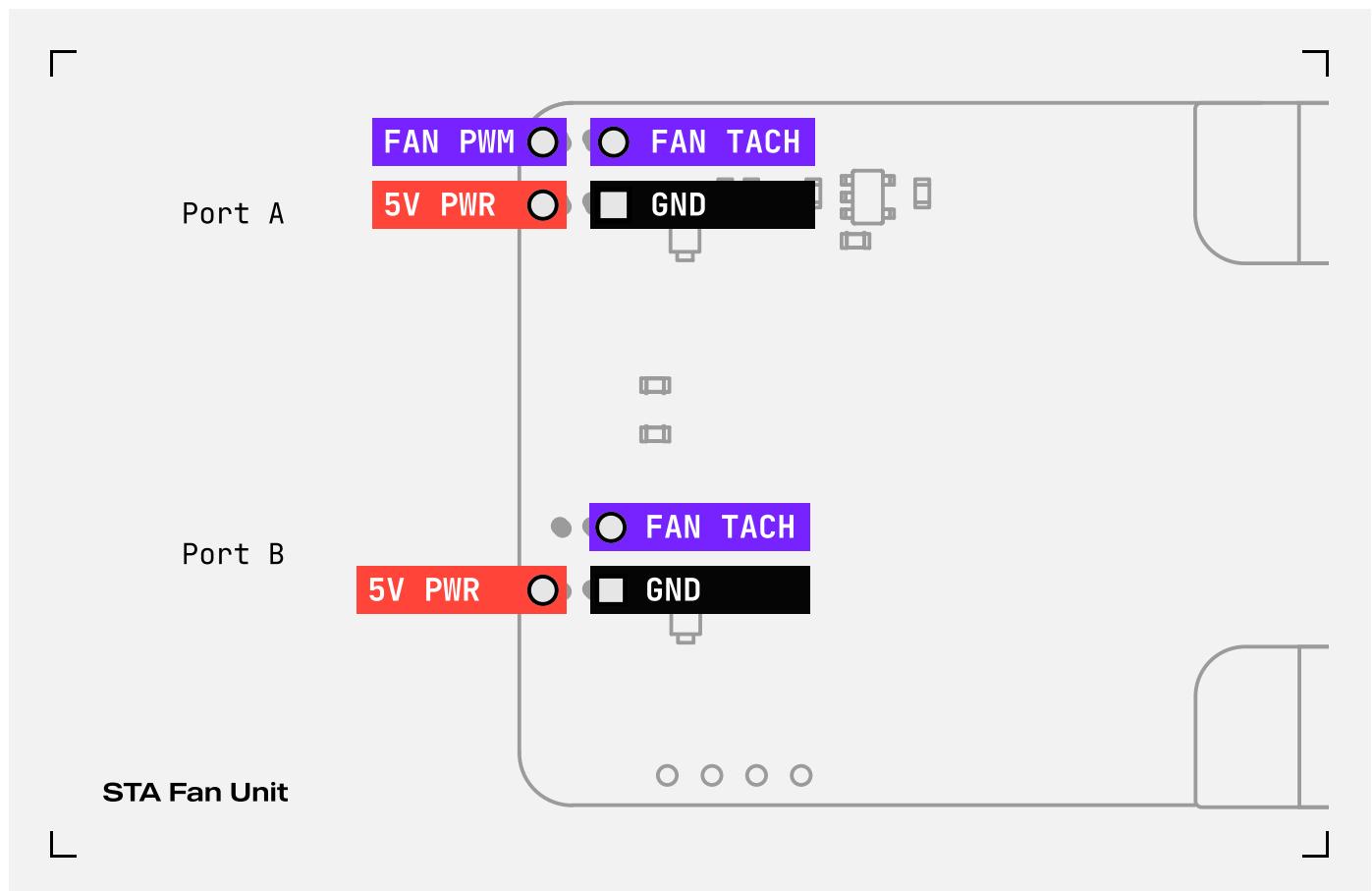
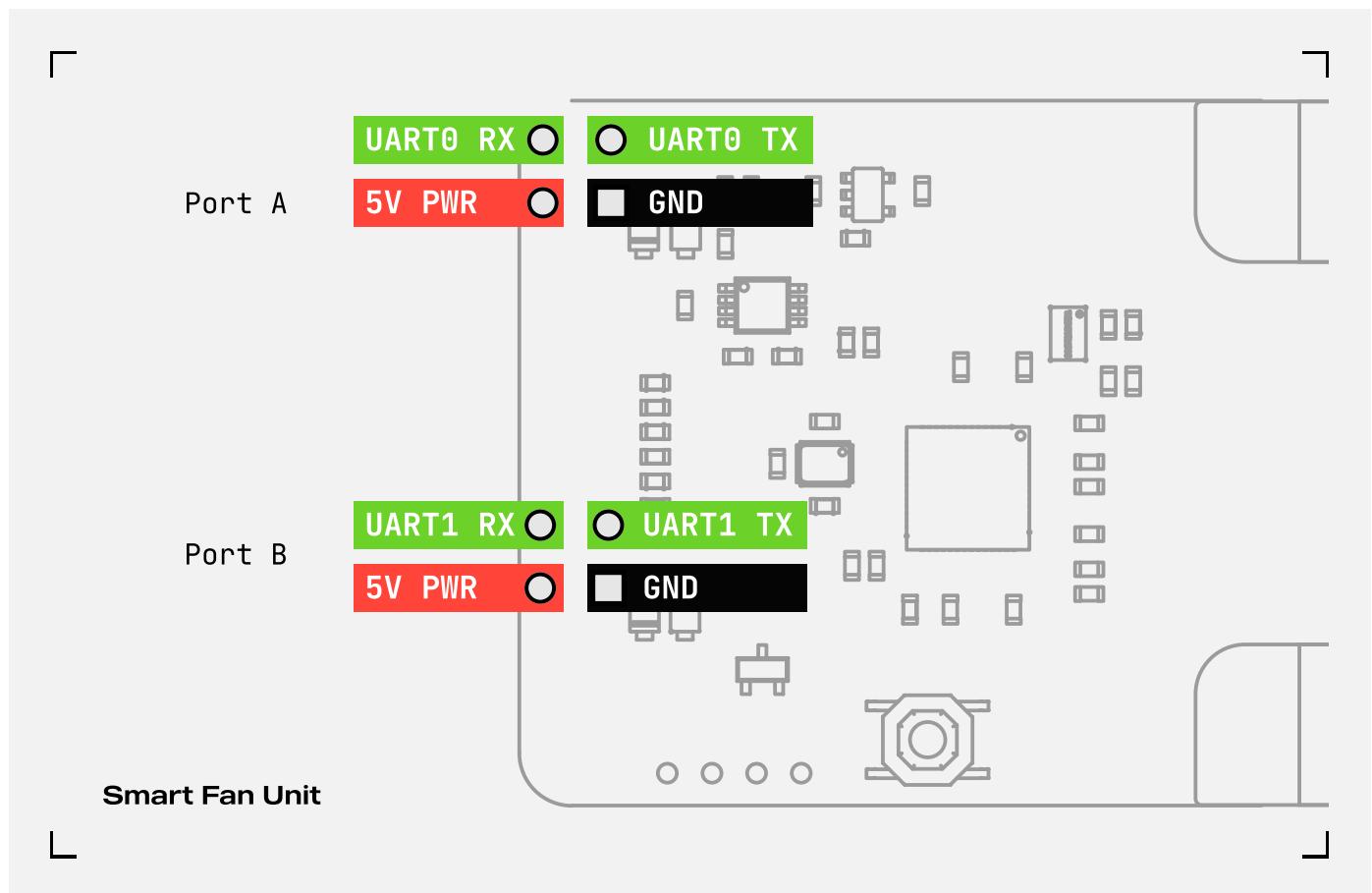
## One Fan Unit for two Compute Blades

To interface with the Compute Blades, the smart fan unit utilizes two separate UART interfaces, one for each blade. Furthermore, the smart fan unit is powered directly through the Compute Blade, eliminating the need for any additional wiring.



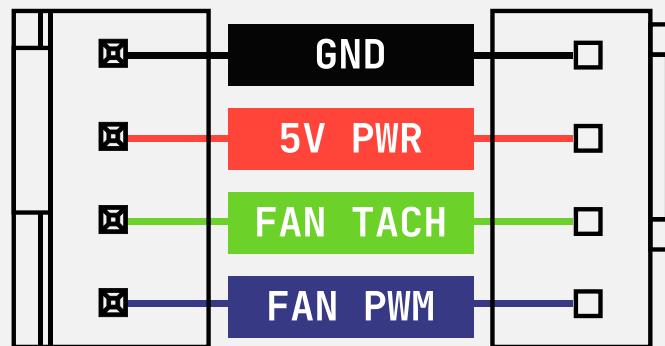
# GPIO

In STA version the Port B can read the fan speed.



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Fan Control

Fan NF-A4x20 5V PWM

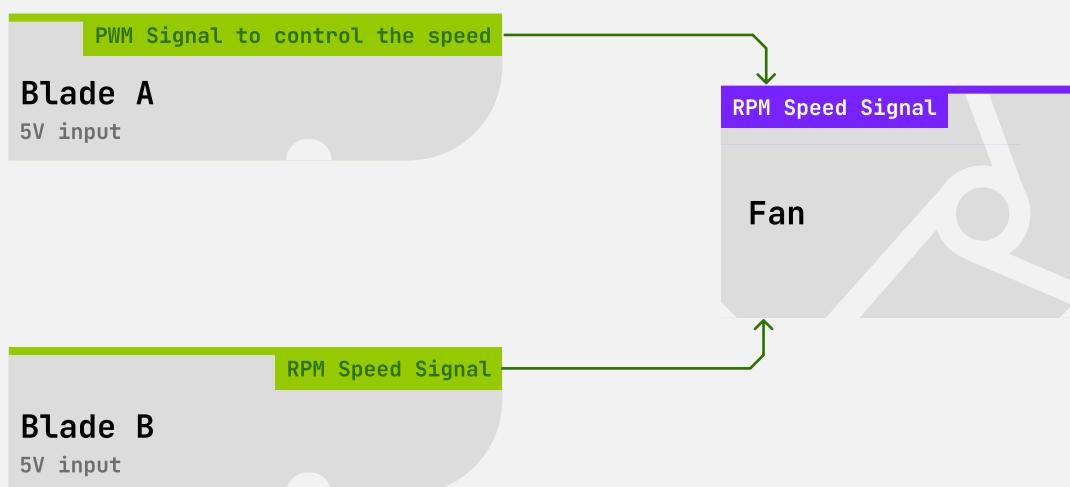
## J5 Debug



# Block Scheme – STA Fan Unit (Standard)

## Dumb Fan Unit

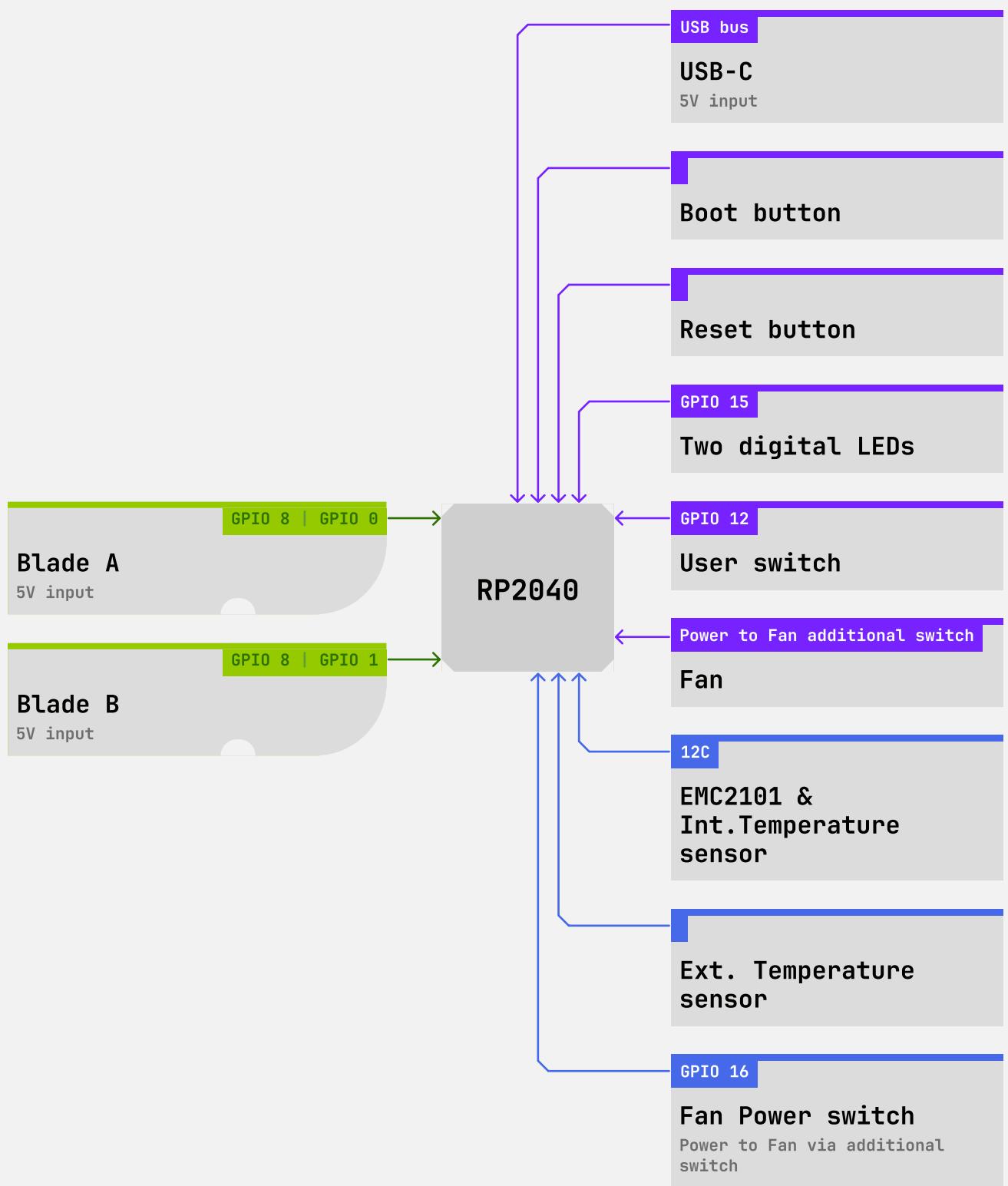
This is the top part of the Raspberry Pi's GPIO connector. On the Compute Blade, PIN 1 corresponds to 3.3V, while on the Raspberry Pi's standard connector, it is labeled as 3.3V PWR.



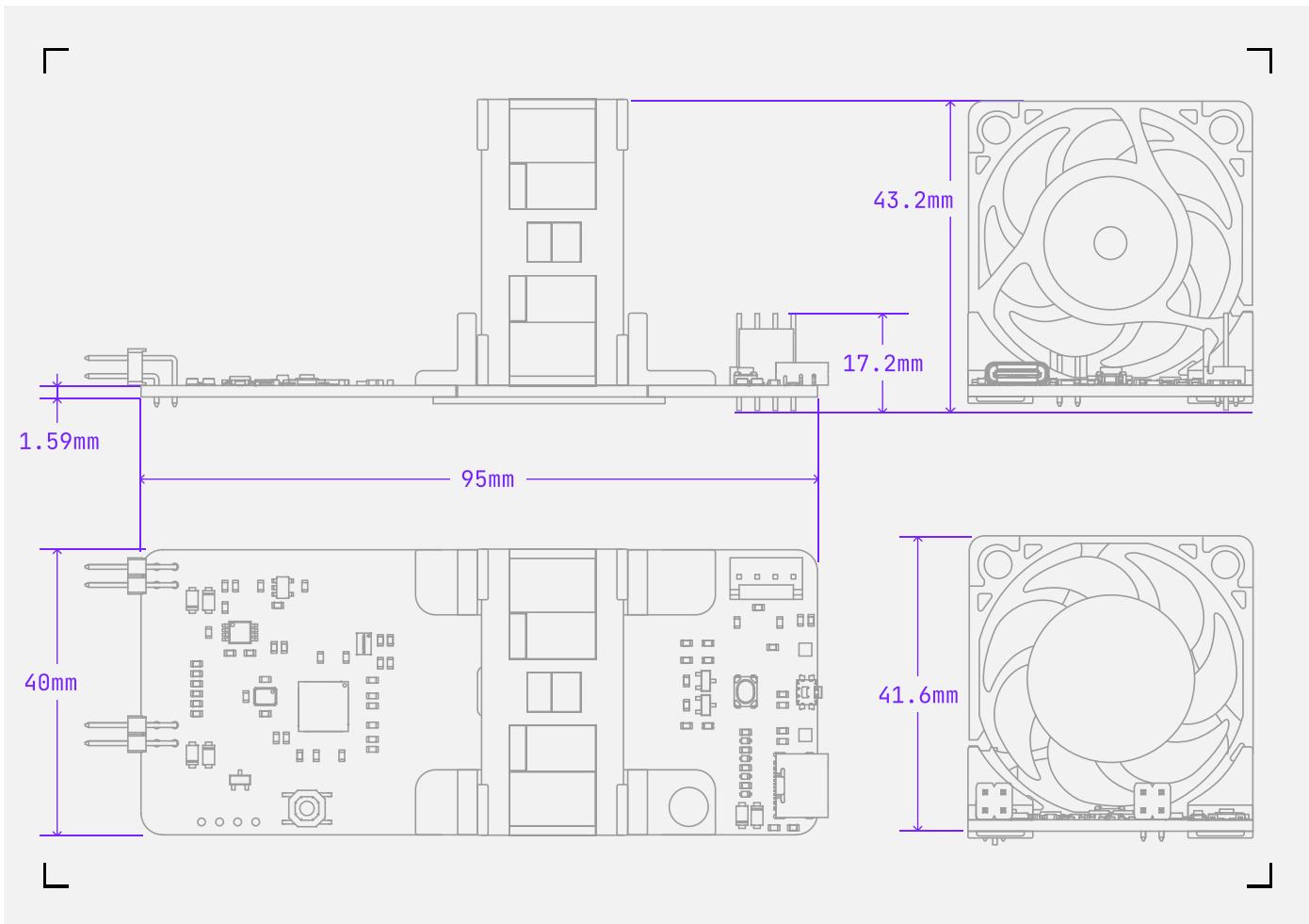
# Block Scheme – Smart Fan Unit

## Smart Fan Unit

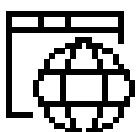
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# Mechanical

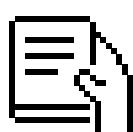


# Documentation

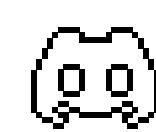


## DOCUMENTATION

[docs.computeblade.com](https://docs.computeblade.com)

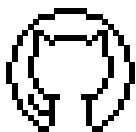


## GET STARTED



## DISCORD

[uplab.pro/discord](https://uplab.pro/discord)



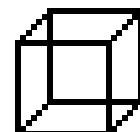
## GITHUB

[github.com/uptime-industries](https://github.com/uptime-industries)



## DATA SHEETS

<https://docs.computeblade.com/data-sheets>



## 3D MODELS

[docs.computeblade.com/models](https://docs.computeblade.com/models)