

# ForgeEdge-Core

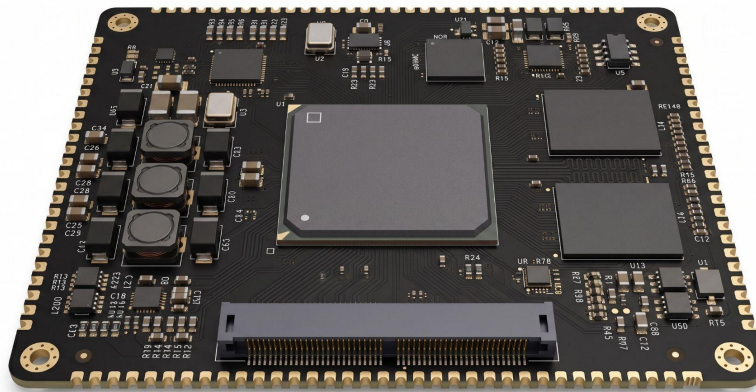
## Configurable Control Module

PRODUCT DATASHEET | FEC-1 | August 2026 | v1.0

ForgeEdge-Core is a compute and I/O platform family that scales from low-power smart sensors and AI preprocessing to Linux-based industrial gateways and high-performance image-processing systems. Its four technical tiers are Spark, Gate, Prime and Max. Across processor tiers, the field-I/O approach, secure-update architecture, service interfaces and software integration are standardized wherever practical.

Compute options: Spark, Max, Gate and Prime.

ForgeEdge is the product platform built around ForgeEdge-Core processing, with an Alvoxis-designed high-speed carrier, field interfaces, thermal solution and rugged enclosure.



*Illustrative product view. Configuration and component placement may vary.*

## KEY FEATURES

Four variants: Spark, Gate, Prime and Max

Edge AI acceleration through a variant-dependent NPU

Variant-dependent DDR3 / DDR3L, DDR4 and LPDDR4X / LPDDR5 memory; NOR / NAND flash, eMMC and microSD storage options

5 V DC supply and variant-specific power-efficient design

Secure Boot, hardware cryptography and variant-dependent Arm TrustZone support

RTOS / bare-metal support for Spark; embedded Linux support for Gate, Prime and Max

Compact System-on-Module (SOM) form factor for integration with application-specific carrier boards

-40 °C to +85 °C operating temperature and long-lifecycle industrial design

## APPLICATION AREAS

Edge AI and intelligent sensor fusion

Machine vision and industrial automation

HMI, data acquisition and industrial gateways

Images are illustrative. Final configuration, component placement and appearance may change during engineering development.

## COMPUTE VARIANTS OVERVIEW

| VARIANT              | PRIMARY APPLICATION                                                 | NPU        | AVERAGE POWER |
|----------------------|---------------------------------------------------------------------|------------|---------------|
| ForgeEdge-Core Spark | Low-power edge AI, machine vision and HMI applications              | ~600 GOPS  | 0.3-0.8 W     |
| ForgeEdge-Core Max   | High-performance edge AI, machine vision, robotics and advanced HMI | ~8 eTOPS   | 15 W          |
| ForgeEdge-Core Gate  | Streamlined Linux, industrial control and gateway applications      | None       | 0.5-1.5 W     |
| ForgeEdge-Core Prime | Compact Linux, real-time control and AI applications                | ~1.35 TOPS | 1.5-3 W       |

## COMMON PLATFORM FEATURES

|             |                                                                                           |                       |                                                                    |
|-------------|-------------------------------------------------------------------------------------------|-----------------------|--------------------------------------------------------------------|
| Form factor | System-on-Module (SOM)                                                                    | Operating temperature | -40 °C to +85 °C                                                   |
| Mounting    | Standalone board, module / SOM or carrier-mounted, depending on variant                   | Storage temperature   | -60 °C ... +120 °C                                                 |
| Connector   | Terminal block / JST in Rev-A; M12 or locking rugged connectors as productization options | Dimensions            | 40 x 40, 50 x 50, 60 x 60, 70 x 70 mm; optional 68 x 40 mm SO-DIMM |

## SYSTEM INTERFACES

RGMII · MIPI CSI-2 · DSI · LVDS · USB 2.0 and 3.0 · PCIe · UART · SPI · I2C · I3C · SDIO · microSD · ADC

Available interfaces depend on the selected variant and carrier-board design. The comparison table lists interfaces by variant.

## ELECTRICAL ENVIRONMENTAL AND RUGGEDIZATION

|                     |                                         |                       |                                                    |
|---------------------|-----------------------------------------|-----------------------|----------------------------------------------------|
| Power supply        | 5 V DC                                  | Operating temperature | -40 °C ... +85 °C                                  |
| Typical consumption | Variant-dependent; see comparison table | Humidity              | 5% to 95% RH, non-condensing                       |
| Peak consumption    | Variant-dependent; see comparison table | Vibration and shock   | IEC 60068-2-27<br>IEC 60068-2-6                    |
| EMC                 | IEC 61000-6-2 / IEC 61000-6-4 (target)  | ESD                   | IEC 61000-4-2, ±8 kV contact / ±15 kV air (target) |
| Cooling             | Passive cooling                         | Storage temperature   | -60 °C ... +120 °C                                 |
| Sleep mode          | YES                                     |                       |                                                    |

## MECHANICAL INTERFACE

|                        |                |
|------------------------|----------------|
| Board dimensions       | 55.0 x 50.0 mm |
| Mounting holes         | M2.5 x 4       |
| Mechanical keying hole | 2.2 mm x 1     |
| Connector type         | DF40-90POS     |
| Weight                 | -              |
| Board thickness        | 1.6 mm         |

## ORDERING INFORMATION

The ForgeEdge-Core ordering structure identifies the product family, compute variant and mechanical package (enclosed or bare board). The general module-code format is shown below.

General format: FEC-1-[VARIANT]

## Compute Variant Comparison

### GENERAL AND PROCESSOR

| FEATURE                 | Spark                   | Prime                                             | Max                                                                                                                                              | Gate                                                      |
|-------------------------|-------------------------|---------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------|
| Processor               | Arm Cortex-M55          | 2 x Cortex-A35, Cortex-M33 and Cortex-M0+         | 6× Arm Cortex-A55 + 1× Cortex-M7 + 1× Cortex-M33                                                                                                 | 2 x Cortex-A7 and Cortex-M4                               |
| Processor speed         | M55 800 MHz             | A35 1.5 GHz; M33 400 MHz                          | Cortex-A55: up to 1.8 GHz; Cortex-M7: 800 MHz; Cortex-M33: 333 MHz                                                                               | A7 approximately 650 to 800 MHz; M4 approximately 209 MHz |
| Core features and cache | Helium MVE, DSP and FPU | 32 KB L1 instruction and data per core; 512 KB L2 | 64-bit Cortex-A55 application cores; real-time Cortex-M7 and Cortex-M33 for security / low-power tasks; ECC-protected caches and internal memory | Heterogeneous Linux and real-time processing              |

## AI GRAPHICS AND IMAGING

| FEATURE                           | Spark                                                        | Prime                                                  | Max                                                                                                                                                                               | Gate                                     |
|-----------------------------------|--------------------------------------------------------------|--------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------|
| <b>NPU</b>                        | ST Neural-ART at 1 GHz; approximately 600 GOPS; 3 TOPS/W     | Approximately 1.35 TOPS                                | NXP eIQ Neutron NPU; 8 eTOPS AI performance at 1 GHz                                                                                                                              | No integrated NPU                        |
| <b>GPU</b>                        | NeoChrom 2.5D                                                | 3D GPU                                                 | Arm Mali-G310 3D GPU; 64 GFLOPS FP32; OpenGL ES 3.2, Vulkan 1.3 and OpenCL 3.0                                                                                                    | GPU support on selected STM32MP15x parts |
| <b>Video and image processing</b> | H.264 encoder, JPEG codec and integrated ISP; 5 MP at 30 fps | H.264 encoding and decoding; 1080p                     | 4K60 H.265 / H.264 hardware encoding and decoding; JPEG encoder / decoder; 500 Mpixel/s ISP; support for up to 8 cameras                                                          | Camera and HMI support                   |
| <b>External AI acceleration</b>   | None                                                         | Theoretically up to approximately 27 TOPS with Hailo-8 | The integrated 8 eTOPS NPU removes the need for an external accelerator in many edge AI applications; an additional accelerator can be connected over PCIe for higher performance | None                                     |

## MEMORY AND STORAGE

| FEATURE                               | Spark                                                             | Prime                                            | Max                                                                             | Gate                                                     |
|---------------------------------------|-------------------------------------------------------------------|--------------------------------------------------|---------------------------------------------------------------------------------|----------------------------------------------------------|
| <b>Internal and integrated memory</b> | 4.2 MB contiguous SRAM; flashless architecture                    | Configurable DDR4 within the SiP                 | Approximately 1.5 MB TCM / SRAM; 1 MB SRAM within the NPU; ECC-protected caches | Up to 1 GB DDR3 and DDR3L within the SiP                 |
| <b>External memory and storage</b>    | PSRAM or SDRAM, and NOR / NAND, through Hexa-SPI, OCTOSPI and FMC | DDR4, PMIC and support components within the SiP | 32-bit LPDDR5 / LPDDR4X; eMMC 5.1, SD 3.0 and external SPI NOR / NAND support   | DDR3 / DDR3L, PMIC and support components within the SiP |

## INTERFACES

| FEATURE                   | Spark                                                             | Prime                                                                               | Max                                                                                        | Gate                                               |
|---------------------------|-------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|----------------------------------------------------|
| <b>System interfaces</b>  | 1x Gigabit Ethernet, FDCAN, USB HS, 6x SPI, 2x I3C, 2x 12-bit ADC | Gigabit Ethernet, 3 x CAN-FD, 1 x TTCAN, USB 2.0 and 3.0, 8 x SPI, 8 x I2C, 4 x I3C | 10 GbE + 2 x Gigabit Ethernet, USB 3.0 Type-C, USB 2.0, 5 x CAN-FD, UART, SPI, I2C and I3C | Gigabit Ethernet, CAN, SPI, I2C, UART, USB and ADC |
| <b>PCIe</b>               | None                                                              | Gen2 x1; 5 GT/s; approximately 500 MB/s effective                                   | 1 x or 2 x PCIe Gen 3.0 x1, depending on package selection                                 | None                                               |
| <b>PCIe applications</b>  | None                                                              | NVMe / SSD, Wi-Fi / Bluetooth and expansion                                         | NVMe SSD, Wi-Fi / Bluetooth or 5G module, FPGA and external AI accelerator                 | None                                               |
| <b>Camera interface</b>   | MIPI CSI-2 and DCMIPP                                             | MIPI CSI-2                                                                          | 2 x MIPI CSI-2; virtual-channel support for up to 8 cameras; integrated 500 Mpixel/s ISP   | Camera interface                                   |
| <b>Display interfaces</b> | Parallel RGB LTDC; DSI support to be confirmed                    | DSI or LVDS; HDMI through a bridge                                                  | 4-lane MIPI-DSI and dual LVDS; up to three simultaneous displays                           | LVDS, DSI or RGB; HDMI through a bridge            |

## SOFTWARE SECURITY PACKAGING AND POWER

| FEATURE                              | Spark                                         | Prime                     | Max                                                                    | Gate                               |
|--------------------------------------|-----------------------------------------------|---------------------------|------------------------------------------------------------------------|------------------------------------|
| <b>Operating system and software</b> | RTOS or bare-metal; STM32Cube.AI and STEdgeAI | Linux on A35; RTOS on M33 | Linux and Android; real-time Cortex-M7 / M33 domains; NXP eIQ AI tools | Linux on A7; RTOS on M4; STM32Cube |