

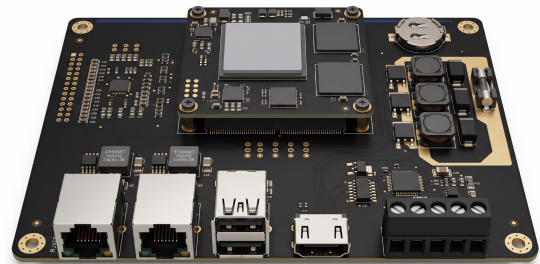
ForgeEdge

Configurable Compute Module

PRODUCT DATASHEET | FE-1 | August 2026 | Rev 1.0

ForgeEdge 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. It has four technical tiers: Spark, Gate, Prime and Max, with a shared field-I/O approach.

ForgeEdge combines a processing platform with an Alvexis-designed high-speed carrier board, field interfaces, thermal solution and rugged enclosure.



Illustrative product view. Configuration and component placement may vary.

KEY FEATURES

Variant-dependent NPU technology for edge AI acceleration

Variant-dependent PSRAM, DDR3, DDR4, LPDDR4X / LPDDR5, eMMC, microSD and NVMe storage options

9-36 V DC power architecture

Low power consumption

Secure-boot architecture

Integrated AI acceleration from 600 GOPS to 10 TOPS

APPLICATION AREAS

Edge AI and intelligent sensor fusion

Mission computing in UAV and counter-UAV systems

Autonomous systems

Machine vision and industrial automation

HMI, data acquisition and industrial gateways

Edge computing

Robotics and motion-control systems

TSN-enabled industrial gateways and real-time Ethernet applications

Final configuration and component placement may vary according to customer requirements.

COMPUTE VARIANTS OVERVIEW

VARIANT	PRIMARY APPLICATION
ForgeEdge Spark	Cost-effective, energy-efficient edge AI, machine vision and HMI applications
ForgeEdge Prime	Edge AI and real-time Linux-based machine-vision applications
ForgeEdge Max	High-performance edge AI, machine vision and advanced HMI applications
ForgeEdge Gate	Cost-effective basic AI applications, Linux gateways, protocol conversion and PLC-connected applications

SYSTEM INTERFACES

Gigabit Ethernet · TSN · CAN and CAN-FD · MIPI CSI-2 · DSI · LVDS · HDMI · 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.

MECHANICAL INTERFACE

FEATURE	Enclosed	Bare board (PCB)
Board dimensions	115 x 100 mm	105 x 90 mm
Overall height	50 mm	Approximately 20 mm including components, without enclosure
Mounting holes	35 mm DIN-rail mounting and wall mounting with optional mounting adapters	4 x M3 screw mounting holes at the corners, with standoffs
Weight	300 g	120-150 g
Enclosure material	Plastic body with aluminium heatsink cover	None: open PCB; enclosure optional
Board thickness	1.6 mm	1.6 mm
IP rating	IP20	-

Enclosed: ready-to-mount field / panel housing. Bare board: for integration with a carrier board.

Enclosure joints and connector areas are designed to allow the future addition of gaskets and sealed connectors.

ELECTRICAL ENVIRONMENTAL AND RUGGEDIZATION

Supply range	9-36 V DC	Operating temperature	-40 °C ... +80 °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 IEC 60068-2-6
Protection	Reverse polarity and overcurrent	Cooling	Passive cooling
EMC	IEC 61000-6-2	ESD	IEC 61000-4-2, ±8 kV Contact / ±15 kV Air
Isolation	Variant-dependent galvanic isolation for CAN and Ethernet		

SOFTWARE SUPPORT

VARIANT	SUPPORT
Spark	Bare-Metal, CMSIS, STM32Cube, FreeRTOS, Zephyr, Azure RTOS, TensorFlow Lite Micro, X-CUBE-AI, LVGL, MicroPython
Prime	Ubuntu and Debian Linux distributions
Max	Yocto Project, Buildroot, Ubuntu and Debian Linux distributions
Gate	Yocto, Buildroot, Debian depending on hardware and BSP support, FreeRTOS (M4), OpenCV, GStreamer, Docker with limitations, Node-RED and Qt

SECURITY FEATURES

Secure Boot	Arm TrustZone support
Hardware cryptography accelerator (AES, SHA, RSA, ECC)	Secure key storage (Secure Key Provisioning)
Encrypted storage (Encrypted Storage)	Digitally signed firmware updates OTA signed updates, variant-dependent
PKI support (Public Key Infrastructure)	Secure authentication and certificate management
TPM 2.0 support Optional, with an external TPM module	Secure Element support Optional, carrier-board-dependent
Anti-tamper and debug protection	

ORDERING INFORMATION

The ForgeEdge order code consists of three segments: product family, compute variant and mechanical package (enclosed or bare board).

SEGMENT	DESCRIPTION	VALUES
Product family	Fixed product-family code	FE-1
Variant	Compute tier	SPK · PRM · MAX · GTE
Packaging	Mechanical format	BOX (enclosed) · PCB (bare board)

General format: FE-1-[VARIANT]-[PACKAGE]

VARIANT	ENCLOSED CODE	BARE-BOARD (PCB) CODE
ForgeEdge Spark	FE-1-SPK-BOX	FE-1-SPK-PCB
ForgeEdge Prime	FE-1-PRM-BOX	FE-1-PRM-PCB
ForgeEdge Max	FE-1-MAX-BOX	FE-1-MAX-PCB
ForgeEdge Gate	FE-1-GTE-BOX	FE-1-GTE-PCB

Contact the Alvexis sales team for memory / storage-specific order codes.

Compute Variant Comparison

GENERAL AND PROCESSOR

FEATURE	Spark	Prime	Max	Gate
Primary application	Low-power edge AI, machine vision and HMI	Industrial Linux, real-time control and AI	High-performance edge AI, machine vision, robotics, industrial automation and advanced HMI applications	Streamlined Linux integration
Processor	Arm Cortex-M55	2x Cortex-A35 + 1x Cortex-M33 + 1x Cortex-M0+	6x Arm Cortex-A55 + 1x Cortex-M7 + 1x Cortex-M33	2x Cortex-A7 + 1x Cortex-M4
Processor speed	M55 800 MHz	A35 1.5 GHz + M33 400 MHz + M0+ 48 MHz	Cortex-A55 1.8 GHz + Cortex-M7 800 MHz + Cortex-M33 333 MHz	A7 approximately 650 to 800 MHz; M4 approximately 209 MHz
RAM	PSRAM 32MB	DDR3L 2 GB DDR4 4 GB LPDDR4 4GB	LPDDR4X 16GB LPDDR5 16GB	DDR3L 512MB
Core features and cache	Helium MVE, DSP, FPU 32 KB L1 I-Cache, 32 KB L1 D-Cache 128 KB TCM RAM (ECC) 64 KB Instruction TCM RAM (ECC)	Per core 32 KB L1 instruction and data 512 KB L2 M0+: no L1 cache; power-management core	A55: 32 KB L1 instruction and data per core, with parity 64 KB L2 per core, with ECC 512 KB shared L3 with ECC M7: 256 KB TCM M33: 16 KB L1 I+D (ECC) + 64 KB TCM	Cortex-A7: 32 KB L1 instruction and data per core; 256 KB shared L2 Cortex-M4: FPU, MPU, no separate L1; 708 KB internal SRAM
RTC and watchdog timer	Internal battery-backed RTC and independent watchdog timer	Internal battery-backed RTC and watchdog timer in the M33 domain	Internal battery-backed RTC and multiple watchdog timers in the M7 / M33 domains	Internal battery-backed RTC and independent watchdog timer (IWDG)

AI GRAPHICS AND IMAGING

FEATURE	Spark	Prime	Max	Gate
NPU	600 GOPS	1.35 TOPS	10 eTOPS	-
GPU	NeoChrom 2.5D	VeriSilicon GC8000UL 3D GPU	Arm Mali-G310 3D GPU 64 GFLOPS FP32 OpenGL ES 3.2 Vulkan 1.3 OpenCL 3.0	OSD32MP157C SiP with GPU-equipped STM32MP157C variant; Vivante 3D graphics engine up to 533 MHz; OpenGL ES 1.1 / 2.0 and OpenVG 1.1 support
Video and image processing	H.264 encoder JPEG ENCODER / DECODER ISP 1x 2-lane MIPI CSI-2	H.264 encode/decode 2x MIPI CSI-2 DSI/LVDS	4K60 H.265 / H.264 hardware encoding / decoding JPEG encoder/decoder 500 Mpixel/s ISP Support for 8 cameras 2x 4-lane MIPI CSI-2 DSI/LVDS HDMI	DCMI parallel camera interface
External AI acceleration	-	+250 TOPS	+250 TOPS	

MEMORY AND STORAGE

FEATURE	Spark	Prime	Max	Gate
Internal memory	4.2 MB SRAM	808 KB internal SRAM	256 KB M7 TCM 64 KB M33 TCM Approximately 1.49 MB shared OCRAM 1 MB SRAM within the NPU	Up to 1 GB DDR3 and DDR3L
External memory and storage	NOR/NAND flash 128 MB	eMMC + OSPI NOR flash 32GB	eMMC 5.1, SD 3.0 and internal SPI NOR / NAND flash, 64 GB	8-16 GB eMMC for the primary Linux system, plus microSD

INTERFACES

FEATURE	Spark	Prime	Max	Gate
System interfaces	Gigabit Ethernet FDCAN USB HS 6x SPI 2x I3C 2x 12-bit ADC 8 user I/O pins	Gigabit Ethernet 3x CAN-FD 1x TTCAN USB 2.0 and 3.0 8x SPI 8x I2C 4x I3C 8 user I/O pins	10 GbEthernet TSN 2x Gigabit Ethernet USB 2.0 and 3.0 5x CAN-FD x8 UART SPI I2C I3C SDIO 8 user I/O pins	Gigabit Ethernet CAN SPI I2C UART USB SDIO ADC 8 user I/O pins
PCIe	-	Gen2 x1 NVMe SSD, Wi-Fi / Bluetooth, AI accelerator	2x Gen3 x1 NVMe SSD, Wi-Fi / Bluetooth, 5G module, FPGA, AI accelerator	-
Camera interface	MIPI CSI-2 and DCMIPP	MIPI CSI-2	2 x 4-lane MIPI CSI-2, supporting up to 8 simultaneous cameras	DCMI Parallel
Display interfaces	Parallel RGB LTDC and DSI support	DSI or LVDS; HDMI through a bridge	4-lane MIPI-DSI and dual LVDS; HDMI through a bridge; support for up to three simultaneous displays	LVDS, DSI or RGB; HDMI through a bridge

SOFTWARE SECURITY AND POWER

FEATURE	Spark	Prime	Max	Gate
Operating system and software	RTOS / Bare-metal	Linux + RT	Linux / Yocto + AI (eIQ)	Linux
Peak power consumption (W)	4	15	25	8

NOTES

External AI acceleration

Max and Prime variants can be expanded with external NPU modules over PCIe or through an M.2 slot provided on the carrier board. Actual performance depends on the accelerator, connection interface and software workload.

System interfaces

Depending on the variant, supported interfaces include Gigabit Ethernet, CAN / CAN-FD, MIPI CSI-2, DSI, LVDS, HDMI, USB 2.0 / 3.0, PCIe, UART, SPI, I2C, I3C, SDIO, microSD and ADC. Available interfaces depend on the selected variant and carrier-board design.

Detailed system specifications

See the Compute Variant Comparison Table for complete system specifications.

Customization and flexibility

Some memory, storage and interface configurations can be customized to project requirements. Contact the Alvexis engineering team for alternative variants or module combinations.