

SINGLE BOARD COMPUTER WITH AMD RYZEN EMBEDDED

- AMD Ryzen Embedded APU
- Up to 32 GB soldered DDR4 ECC RAM
- Board Management Controller
- Front I/O: 3x 1G Ethernet RJ45 or M12, 2x USB 3.2 Gen 1x1, 1x DisplayPort
- Rear I/O: 2x 1G Ethernet, 4x PCIe x1, 4x USB 2.0, 2x SATA
- Modular mass storage and I/O options
- -40 °C to +70 °C operating temperature (ambient)
- Conduction cooling also possible



SCALABLE AMD RYZEN EMBEDDED CPU

The F27P CompactPCI PlusIO CPU board is based on the AMD Ryzen Embedded APU family. A variety of pin-compatible processors allow scalable board performance. duagon designs support dual-core and quad-core CPUs with a TDP range of a moderate 12 W up to 53 W with high performance.

DESIGNED FOR COMPREHENSIVE REQUIREMENTS

Memory and mass storage on F27P match the needs of multi-core computing: up to 32 GB of soldered-down error-correcting DDR4 RAM and eMMC provide a solid base for data-intensive tasks. A non-volatile RAM can permanently store critical runtime data. 2.5" HDD/SSD and NVMe devices can be added on an extension card as needed.

The F27P comes with an advanced Board Management Controller (BMC) that monitors onboard voltages and temperatures and performs dedicated tasks like watchdog management, power supply control and reset handling. A Trusted Platform Module (TPM 2.0) provides support for remote device authentication, measured boot, and secure updates.

MODULAR CONCEPT

The F27P features up to three RJ45 or M12 Ethernet front connectors on 4 or 8 HP. Two USB 3.2 connectors and one DisplayPort round out the board's essential front I/O.

The efficient design includes an optional extension card for additional I/O. Aside from mass storage, a number of USB and UART interfaces can cover legacy tasks. This saves both costs and

space especially in retrofit applications. Even with the extension card, the F27P stays a compact CPU assembly in the system.

The processor and I/O options offered are backed by a tailored thermal design, making the F27P a truly modular CPU board.

COMPACTPCI PLUSIO (PICMG 2.30)

The F27P supports the CompactPCI PlusIO (PICMG 2.30) specification, making it usable in a hybrid system with both CompactPCI and CompactPCI Serial peripheral boards. Compliant to the standard, the J2 rear I/O connector features 2x 1G Ethernet, 4x PCI Express x1, 4x USB 2.0 as well as 2x SATA.

FOR EMBEDDED AND HARSH ENVIRONMENTS

The CPU board was designed to resist extreme temperatures as well as shock and vibration in applications where high reliability is essential. The F27P is suited for the rail market, industrial automation or the power and energy sector, for example. duagon offers passively cooled models, supporting a system ambient temperature of up to +70 °C, and high-performance models with forced air cooling for moderate temperature requirements.

The F27P operates in Linux and Windows environments as well as under real-time operating systems.

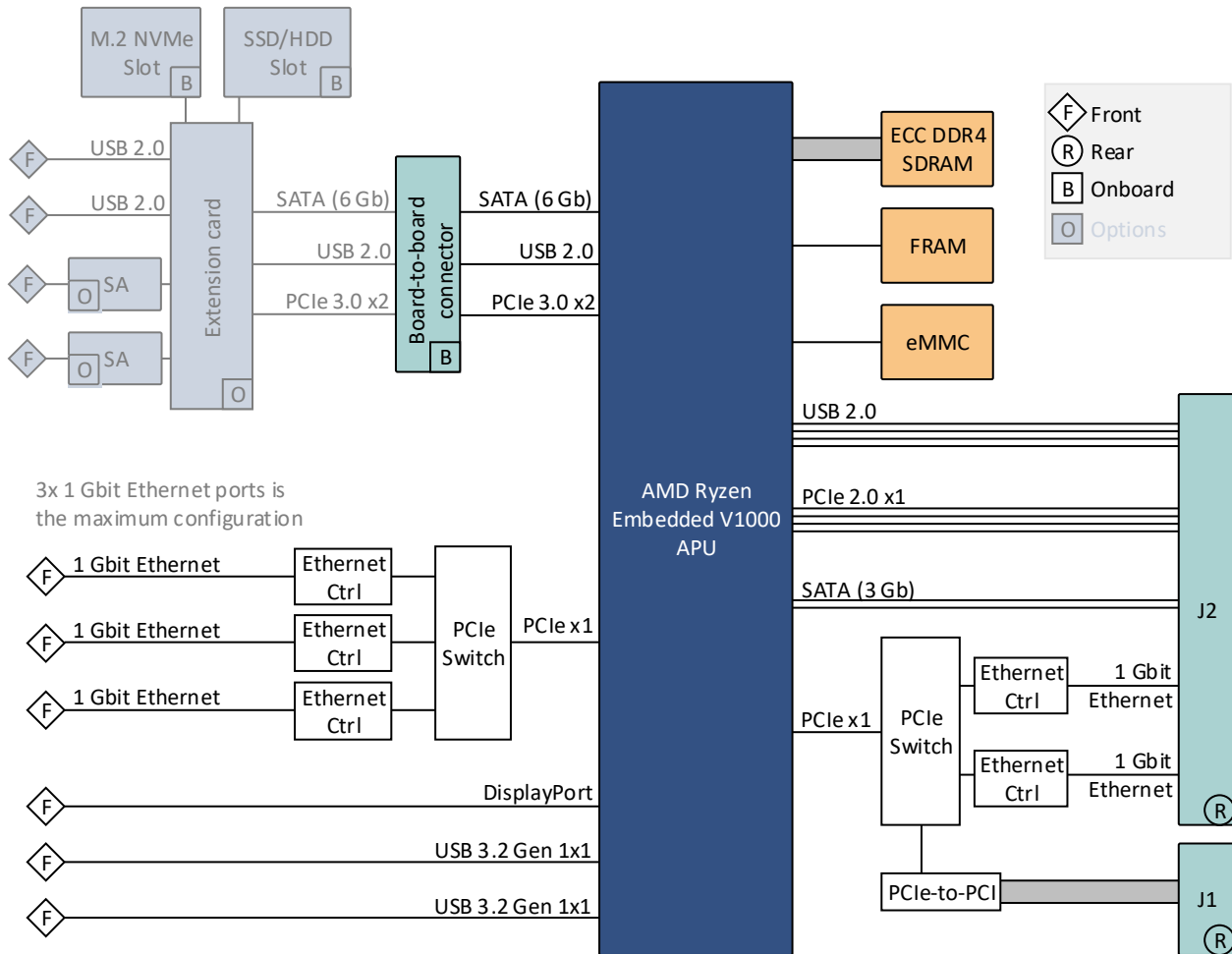
LONG-TERM AVAILABILITY

Long-term availability minimizes life cycle management and makes the F27P a long-lasting investment.



www.duagon.com/products/f27p/

F27P | DIAGRAM



F27P | TECHNICAL DATA

CPU

- The following CPU types are supported:
 - AMD V1404I, 4 cores, 8 threads, 2.0 GHz base, 12-25 W, 2 MB cache, Vega GPU with 8 CUs, iTemp
 - AMD V1807B, 4 cores, 8 threads, 3.35 GHz, 35-54 W, 2 MB cache, Vega GPU with 11 CUs
 - AMD V1202B, 2 cores, 4 threads, 2.3 GHz base, 12-25 W, 1 MB cache, Vega GPU with 3 CUs

MEMORY

- System RAM
 - Soldered DDR4, ECC
 - 32 GB max.
- Non-volatile RAM (NVRAM): 64 Kbit (8 K × 8) FRAM

MASS STORAGE

- eMMC (soldered); 32 GB
- The following mass storage devices can be assembled:
 - SSD M.2 (NVMe)
 - SSD/HDD 2.5" (SATA)



GRAPHICS

- Processor graphics
- Maximum resolution: 4096 × 2160 pixels @ 60 Hz, 24 bpp

INTERFACES

- This product includes interface options
 - Different front connectors
 - I/O expansion via add-on board
- SSD/HDD slot
 - 1 × M.2 2242/2260/2280 socket 3 Key M; NVMe (PCIe x2)
 - 1 × SATA 2.5"; 7 mm or 9.5 mm; SATA Revision 3.x; externally accessible (shuttle)
- SATA
 - 2 × SATA Revision 2.x, backplane
 - 1 × SATA Revision 3.x, board-to-board
- Video
 - 1 × DisplayPort 1.2
- USB
 - 2 × USB 3.2 Gen 1x1, Type-A
 - 2 × USB 2.0, Type-A
 - 4 × USB 2.0, backplane
 - 1 × USB 2.0, board-to-board
- Ethernet
 - 3 × 10/100/1000BASE-T, RJ45
 - 3 × 10/100/1000BASE-T, M12, A-coded, receptacle
 - 3 × 10/100BASE-T, M12, D-coded, receptacle
 - 3 × 10/100/1000BASE-T, M12, X-coded, receptacle
 - 2 × 10/100/1000BASE-T, M12, X-coded, receptacle
 - 2 × 10/100/1000BASE-T, backplane
 - Three front connectors (RJ45 or M12) and two backplane connectors is the maximum configuration.
- PCI Express
 - 4 × PCIe 2.0, x1, backplane
 - 1 × PCIe 3.0, x2, board to board
- Reset
 - Reset button
- LED
 - Status: board status (BMC)
 - Ethernet: activity, link

SUPERVISION AND MANAGEMENT

- Board management controller
- Temperature measurement
- Real-time clock, buffered by supercapacitor or battery
- Trusted Platform Module 2.0

PRODUCT STANDARD

- CompactPCI: CompactPCI Core Specification PICMG 2.0 R3.0
- CompactPCI PlusIO: CompactPCI PlusIO Specification PICMG 2.30
- 1PCI33/4PCIE2.0/2SATA/4USB2/2ETH1G
- System slot
- 32-bit/33-MHz CompactPCI bus
- V(I/O): +3.3 V (+5 V tolerant)

ELECTRICAL SPECIFICATIONS

- Supply voltage: +5 V (-3 % / +5 %)
- Power consumption: 52.5 W max. (02F027P00) / 45 W max. (02F027P01)

MECHANICAL SPECIFICATIONS

- Dimensions
 - 3U, 4 HP (with 3× RJ45 or 2× M12)
 - 3U, 8 HP (with 3× M12 or 2-slot heat sink)
- Weight
 - 52.5 g approx. (02F027P00) / 45 g approx. (02F027P01)
- Cooling
 - Air cooling
 - Conduction cooling

PRODUCT COMPLIANCE: RAIL - ROLLING STOCK

- Compliance level: This product is prepared for use in EN 50155 systems. Some parameters are system-dependent and are specified on system level.
- Operating temperature: -40 °C to +70 °C, +85 °C for 10 min (EN 50155:2021, class OT4, ST1)
- Rapid temperature variations: EN 50155:2021, class H1, no requirements
- Storage temperature: -40 °C (EN 50155:2017) to +85 °C (EN 60068-2-2, Bb)
- Altitude: +3000 m max. (EN 50125-1:2014, class AX)



- Humidity: +55 °C and +25 °C, 100 % RH max. (EN 50155:2017)
- Shock: 30 ms @ 100 m/s² (EN 61373:2010/AC:2017-09, vehicle body, cat. 1, class B, double acceleration)
- Vibration: 10 min @ 2.02 m/s² (functional) and 5 h @ 11.44 m/s² (long-life) (EN 61373:2010/AC:2017-09, vehicle body, cat. 1, class B, double acceleration)
- Electrical safety
 - EN 50155:2017
 - EN 50153:2014 + A1:2017
 - EN 50124-1:2017
 - EN ISO 13732-1:2008
- Fire protection: EN 45545-2:2013 + A1:2015, HL3
- EMC emission
 - EN 50121-3-2:2016 + A1:2019
 - Regelung Nr. EMV 06 :2019-05-09 (2.0), Anhang E: Messung an Geräten
- EMC immunity: EN 50121-3-2:2016 + A1:2019
- Useful life: 20 years (EN 50155:2017, class L4)

PRODUCT COMPLIANCE: RAIL - WAYSIDE SAFETY RELATED

- Operating temperature: -40 °C (EN 60068-2-1:2007, Ae) to +85 °C (EN 60068-2-2:2007, Be)
- Storage temperature: -40 °C (EN 60068-2-1:2007, Ab) to +85 °C (EN 60068-2-2:2007, Bb)
- Humidity: +55 °C and +25 °C, 90 % to 100 % RH (EN 60068-2-30:2005, Db)
- Shock: 11 ms @ 20 m/s² (EN 50125-3:2003, in a switch cabinet 1 m to 3 m from the track)
- Vibration: 2.3 m/s² (EN 50125-3:2003, in a switch cabinet 1 m to 3 m from the track)
- Electrical safety
 - EN 50124-1:2017
 - EN 62368-1:2014 + AC:2015
- EMC emission
 - EN 50121-4:2016
 - EN 61000-6-4:2007 + A1:2011
- EMC immunity: EN 50121-4:2016

PRODUCT COMPLIANCE: INFORMATION TECHNOLOGY EQUIPMENT

- Operating temperature: -40 °C (EN 60068-2-1:2007, Ae) to +85 °C (EN 60068-2-2:2007, Be)
- Storage temperature: -40 °C (EN 60068-2-1:2007, Ab) to +85 °C (EN 60068-2-2:2007, Bb)
- Humidity: +55 °C and +25 °C, 90 % to 100 % RH (EN 60068-2-30:2005, Db)
- Humidity - Condensation: Condensation may occur
- Electrical safety: EN 62368-1:2014 + AC:2015
- EMC emission: EN 55032:2015 (multimedia equipment), class B (residential environments)
- EMC immunity
 - EN 55035:2017 (multimedia equipment)
 - EN 61000-6-2:2005 (generic standard, industrial environments)

RELIABILITY

- MTBF: 264 000 (02F027P00) / 357 000 (02F027P01) h predicted @ 40 °C according to IEC/TR 62380 (RDF 2000)

BIOS/BOOT LOADER

- AMI Aptio UEFI Firmware

SOFTWARE SUPPORT

- Linux
 - Tested with: duagon Yocto BSP (Dunfell 3.1, Linux kernel 5.4), Ubuntu 20.04.2 LTS
- Windows
 - Windows 10 IoT Enterprise 64-bit
- Further Resources
 - See the product User Manual for details on software support: www.duagon.com/products/f27p/#doc
 - See section Software on the product web page for available packages: www.duagon.com/products/f27p/#downl
 - See also Application Note *Recommendations for a Robust Software Setup*



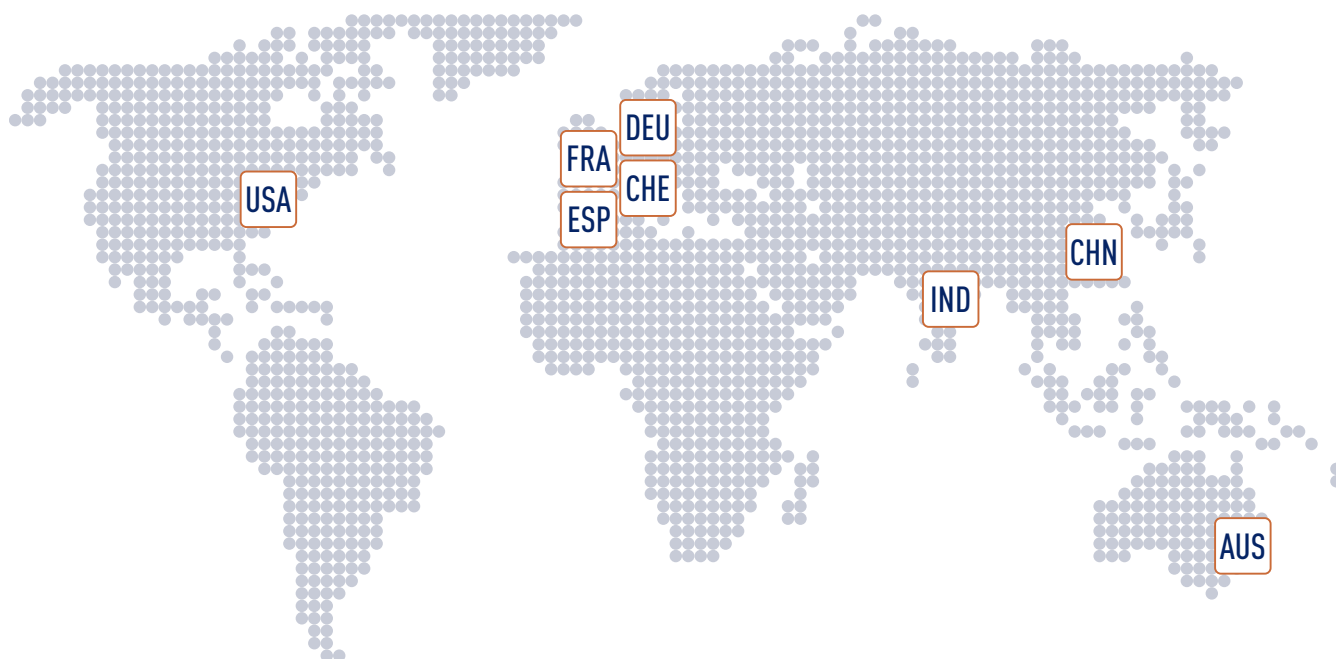
F27P | ORDERING INFORMATION

STANDARD MODELS

02F027P00	3U CPCI PlusIO, 4 HP, AMD V1807B APU, quad core, 3.35 GHz, 32 GB DDR4 (ECC) RAM, 32 GB eMMC, 3x 1G Ethernet RJ45, 0 °C to +40 °C (required air flow: 1.5 m/s)
02F027P01	3U CPCI PlusIO, 8 HP, AMD V1404I APU, quad core, 2.0 GHz, 8 GB DDR4 (ECC) RAM, 32 GB eMMC, 3x 1G Ethernet M12 X-coded, -40 °C to +70 °C (10 min. +85 °C), conformal coating



LEADING THE EMBEDDED FUTURE



duagon | WORLDWIDE

duagon has a global presence with support and sales representatives across 8 countries. With three decentralized engineering and production sites, our customers take advantage of the added competence and flexibility.

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