

EMBEDDED SINGLE BOARD COMPUTER WITH 11TH GENERATION INTEL CORE AND XEON W-11000 PROCESSORS

- Intel Xeon W processor
- Up to 64 GB DDR4 RAM soldered, ECC
- Board management controller
- Two 10 GbE interfaces (optional)
- Front I/O: 2x 1Gb Ethernet M12, 1x USB 3.2 Gen 2x1, 1x DisplayPort
- Rear I/O: 1Gb Ethernet, PCIe, USB 3.2 Gen 2x1, SATA
- -40 °C to +70 °C (system ambient) operating temperature
- Long-term available



HIGH PERFORMANCE CPU FOR EMBEDDED APPLICATIONS

The duagon G28M is a 3U CompactPCI Serial CPU board featuring the 11th generation Intel Core and Intel Xeon W-11000E Series/ Tiger Lake-H (TGL-H) CPUs. With up to 8 cores and up to 64 GB dual channel DDR4 RAM the G28M is well suited for high-end embedded computing in onboard railway applications (rolling stock). The G28M can be used as central maintenance and virtualization platform and main computing unit for passenger Wi-Fi and internet access.

PERFORMANCE SCALABILITY

CPU scalability from 25 W to 45 W TDP and 4 to 8 cores allows operation in harsh ambient temperatures of up to +70 °C (+85 °C for 10 min.) system ambient temperature.

SYSTEM SECURITY AND BOARD MANAGEMENT

A board management controller provides thermal supervision of the processor, a watchdog for the operating system and monitoring of onboard voltages. For system security, a Trusted Platform Module is assembled on the board.

RUGGEDIZED MEMORY

The G28M includes a dual-channel 64 GB DDR4 DRAM with ECC and a transfer rate of up to 3200 MT/s which is soldered to the board to guarantee optimum shock and vibration resistance. An onboard 120 GB NVMe storage module is available on all models.

FLEXIBLE FRONT I/O

The G28M features two M12 (dual-slot) Ethernet front connectors making it more cost-effective by reducing the need for extra modules. Other front I/O include one USB 3.2 Gen 2x1 connector and one USB-C connector supporting up to USB 3.2 Gen2x1 speed and DP Alternate Mode. Two 10 Gb Ethernet interfaces are available on an 8 HP standard product version for high data throughput and direct connection to the network backbone.

FOR EMBEDDED AND HARSH ENVIRONMENTS

The G28M operates in Linux and Windows environments as well as under real-time operating systems that support Intel's multi-core architecture.

The G28M comes with a tailored heat sink. All components are soldered for protection against shock and vibration according to applicable DIN, EN or IEC industry standards. For added protection, all models are coated and underfilled by standard.

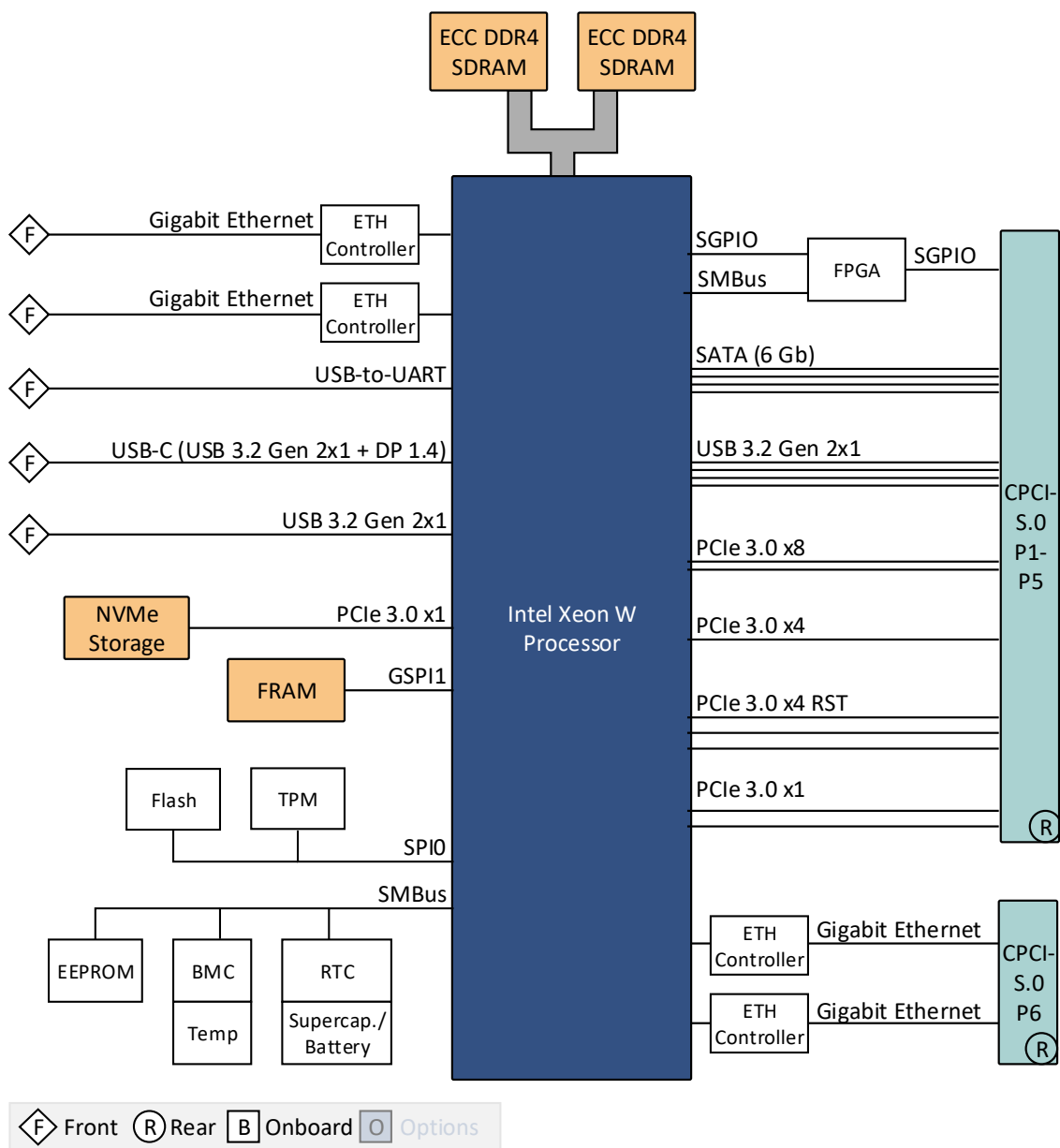
Long-term availability ensures an extended product life and future-safety. The G28M is backwards compatible to predecessors G25A (G28M 8 HP product version with 10 GbE interfaces), G23.



www.duagon.com/products/g28m/

DATA SHEET

G28M | DIAGRAM





G28M | TECHNICAL DATA

CPU

- The following CPU types are supported:
 - Intel Xeon W-11865MRE, 8 cores, 16 threads, 2.6 GHz, 45 W, -40 °C to +100 °C
 - Intel Xeon W-11865MRE, 8 cores, 16 threads, 2.1 GHz, 35 W, -40 °C to +100 °C
 - Intel Xeon W-11555MRE, 6 cores, 12 threads, 2.6 GHz, 45 W, -40 °C to +100 °C
 - Intel Xeon W-11555MRE, 6 cores, 12 threads, 2.1 GHz, 35 W, -40 °C to +100 °C
 - Intel Xeon W-11155MRE, 4 cores, 8 threads, 2.4 GHz, 45 W, -40 °C to +100 °C
 - Intel Xeon W-11155MRE, 4 cores, 8 threads, 1.9 GHz, 35 W, -40 °C to +100 °C
 - Intel Xeon W-11865MLE, 8 cores, 16 threads, 1.5 GHz, 25 W, 0 °C to +100 °C
 - Intel Xeon W-11555MLE, 6 cores, 12 threads, 1.9 GHz, 25 W, 0 °C to +100 °C
 - Intel Xeon W-11155MLE, 4 cores, 8 threads, 1.8 GHz, 25 W, 0 °C to +100 °C
 - Other processor types are available on request

MEMORY

- System RAM
 - Soldered DDR4, ECC
 - 64 GB max.
- Non-volatile RAM (NVRAM): 64 kB FRAM

MASS STORAGE

- NVMe (soldered); 120 GB (standard)

GRAPHICS

- Processor graphics

INTERFACES

- This product includes interface options
 - Different front connectors
 - I/O expansion via add-on board
- SATA
 - 4 × SATA Revision 3.x, backplane

Video

- 1 × DisplayPort 1.4, USB Type C, for service

USB

- 1 × USB 3.2 Gen 2x1, Type C, for service
- 1 × USB 3.2 Gen 2x1, Type A, for service
- 1 × USB-to-UART, Type A, client port, for service
- 4 × USB 3.2 Gen 2x1, backplane

Ethernet

- 2 × 10/100/1000BASE-T, M12, X-coded, receptacle
- 2 × 100/1000BASE-TX / 2.5/5/10GBASE-TX, M12, X-coded, receptacle
- 2 × 10/100/1000BASE-T, backplane

PCI Express

- 2 × PCIe 3.0, x8, backplane
- 1 × PCIe 3.0, x4, backplane
- 3 × PCIe 3.0, x4, backplane
- 2 × PCIe 3.0, x1, backplane

I2C

- 1 × backplane

LED

- Status: board status (BMC)
- Ethernet: link, activity
- CPCI hot-plug

SUPERVISION AND MANAGEMENT

- Board management controller
- Temperature measurement
- System watchdog (BMC)
- Real-time clock, buffered by supercapacitor or battery
- Trusted Platform Module 2.0

PRODUCT STANDARD

- CompactPCI Serial: CompactPCI Serial PICMG CPCI-S.0 Specification

ELECTRICAL SPECIFICATIONS

- Supply voltage: +12 V (9.5 V to 15.5 V)



MECHANICAL SPECIFICATIONS

- Dimensions: 3U, 8 HP
- Cooling: Air cooling, forced convection, airflow 2.5 m/s

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 50155:2021) to +85 °C (EN 60068-2-2, Bb)
- Altitude: +3000 m max. (EN 50125-1:2014, class AX)
- Pollution degree: EN 50124-1:2017, class PD2
- Humidity: +55 °C and +25 °C, 100 % RH max. (EN 50155:2021)
- Shock: 30 ms @ 50 m/s² (EN 61373:2010/AC:2017-09, vehicle body, cat. 1, class B)
- 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 50155:2021
 - EN 50153:2014 + A1:2017 + A2:2020
 - 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, Anhang E: Messung an Geräten
 - Regelwerk 50.02.01 :2021-12-01, 12.3.2. EMV - Funk
- EMC immunity: EN 50121-3-2:2016 + A1:2019
- Protective coatings: EN 50155:2021, class PC2 (Any PCB protected on both sides)
- Useful life: 20 years (EN 50155:2021, class L4)

RELIABILITY

- MTBF: 240 531 h predicted @ 40 °C according to IEC/TR 62380 (RDF 2000)

BIOS/BOOT LOADER

- AMI Aptio UEFI Firmware

SOFTWARE SUPPORT

- Linux
 - duagon Yocto BSP in preparation
 - Tested with Ubuntu 22.04, Yocto (Dunfell)
 - Supported kernel: 5.10 or higher
- Windows
 - Windows 10 IoT Enterprise 64-bit
- Further Resources
 - See the product User Manual for details on software support: www.duagon.com/products/g28m/#doc
 - See also Application Note *Recommendations for a Robust Software Setup*

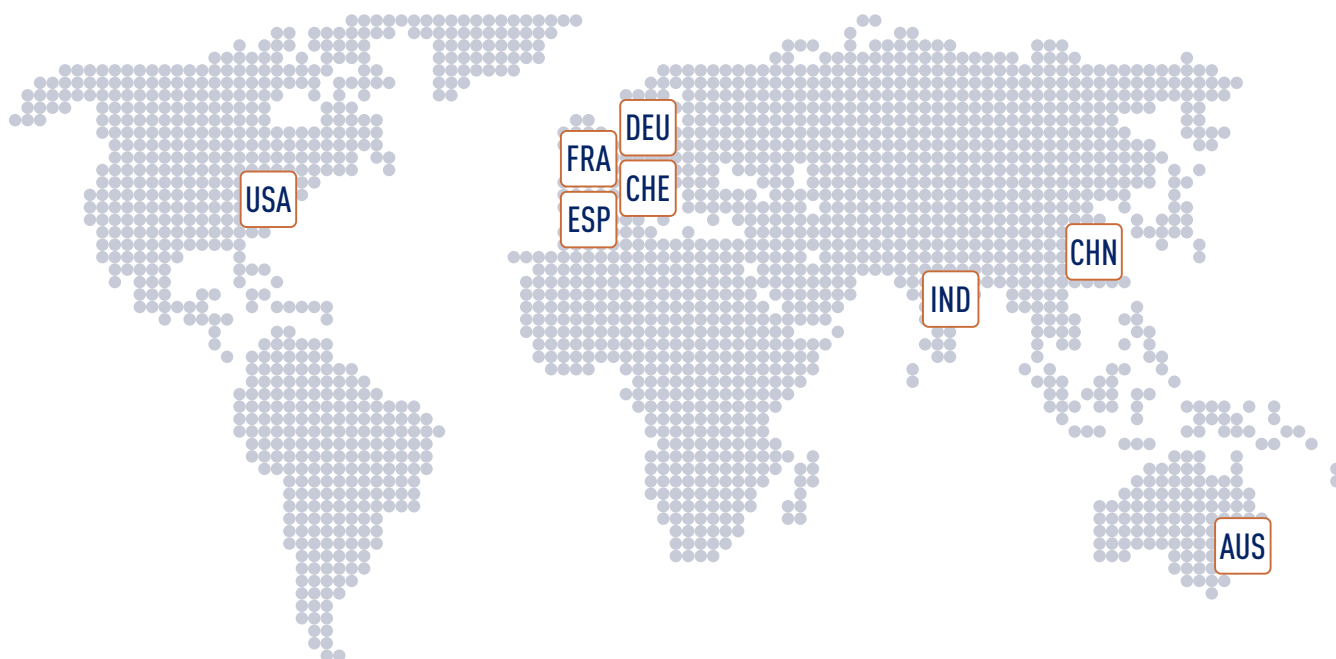
G28M | ORDERING INFORMATION

STANDARD MODELS

02G028M00	3U CPCI Serial, 8 HP, Intel Xeon W-11865MRE, 8 cores, 16 threads, 2.6 GHz, 45 W TDP, 64 GB DDR4 (ECC) RAM, 120 GB NVMe, 2x 1Gb Ethernet M12, 1x USB 3.2 Gen 2x1, 1x USB 3.2 Gen 2x1 and DisplayPort combined on USB type C, 1x console redirection via USB, -40°C to +70°C, conformal coating
02G028M01	3U CPCI Serial, 8 HP, Intel Xeon W-11865MRE, 8 cores, 16 threads, 2.6 GHz, 45 W TDP, 64 GB DDR4 (ECC) RAM, 120 GB NVMe, 2x 10 Gb Ethernet M12, 2x 1 Gb Ethernet M12, 1x USB 3.2 Gen 2x1 , 1x USB 3.2 Gen 2x1 and DisplayPort combined on USB type C, 1x Console Redirection via USB, 1x RS232 isolated and 1x RS422/485 isolated on shared 9-pin D-Sub, -40°C to +70°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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