G28M

Embedded Single Board Computer with 11th Generation Intel Xeon W-11000 Processors

3U CompactPCI Serial

LEADING THE EMBEDDED FUTURE

- 11th Gen Intel Xeon W Processor (Tiger Lake)
- Up to 64 GB soldered DDR4-3200 ECC RAM
- 120 GB NVMe on-board storage
- Dual 10G Ethernet (optional)
- Board Management Controller, TPM 2.0
- Front I/O: 2× 1G Ethernet M12, 10Gbps USB-A & USB-C with DP Alt Mode
- Rear I/O: 1G Ethernet, PCIe, USB 10Gbps, SATA
- -40 °C to +70 °C operating temp. (system ambient)
- Long-term availability

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: 64 GB max., soldered DDR4, ECC ■ Non-volatile RAM (NVRAM): 64 kB FRAM
Mass Storage	■ NVMe (soldered); 120 GB (standard)

Data Sheet

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 1.4a, USB Type-C, for service ■ USB ■ 1 × USB 3.2 Gen 2x1, Type-A, for service ■ 1 × USB 3.2 Gen 2x1, Type-C, 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 ■ Serial ■ 1 × RS232/RS422/RS485, isolated, D-Sub, 9-pin, plug ■ 1 × USB-to-UART, USB Type-A ■ I2C ■ 1 × backplane ■ LED ■ Status: board status (BMC) ■ Ethernet: link, activity ■ Hot-swap
Supervision and Management	■ Board management controller ■ Temperature measurement ■ System watchdog (BMC) ■ Real-time clock, buffered by supercapacitor (up to 4 days) or battery (1 year) ■ 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) ■ Power consumption: 79 W max.
Mechanical Specifications	■ Dimensions: 3U, 8 HP ■ Weight: 540 g ■ 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)

- Equipment location
  - EN 50155:2021, location 1, closed electrical operating area
  - EN 50155:2021, location 2, cabin and interiors
- 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 45545-2:2020, EL9, HL3
- EMC emission
  - EN 50121-3-2:2016 + A1:2019
  - Regelung Nr. EMV 06 :2019-05-09 (2.0), Anhang E: Messung an Geräten, Schutzklasse S1
  - Regelwerk 50.02.01 :2021-12-01, 12.3.2. EMV - Funk, prequalified according to electronic equipment tests defined by Deutsche Bahn EMV 06 standard, class S1, for risk minimization in finished vehicle test
- 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)

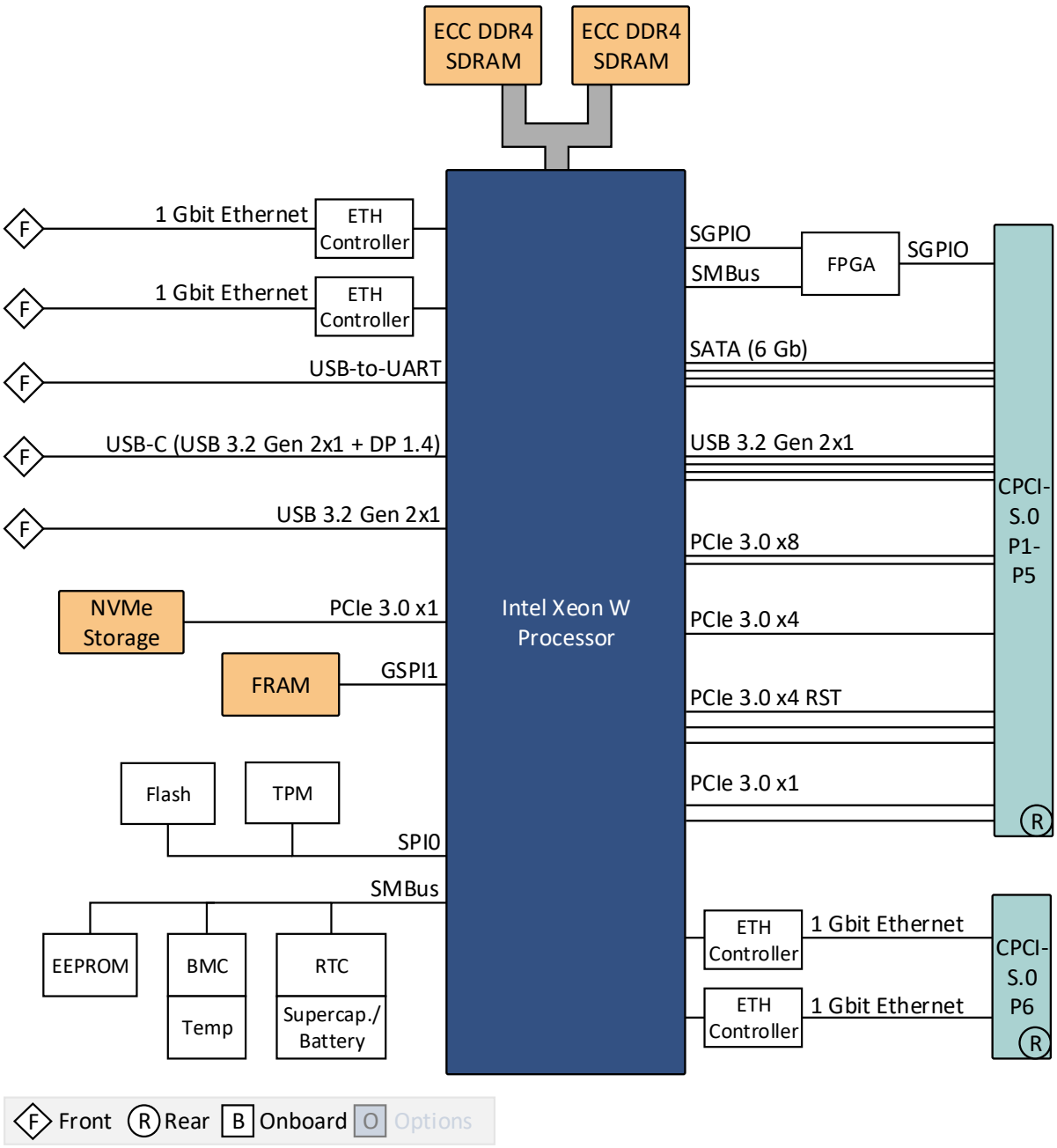
BIOS/Boot Loader

- AMI Aptio UEFI Firmware

Software Support

- Linux
  - Certified for Red Hat Enterprise Linux 9.2 - 9.x
  - Tested with: Ubuntu 22.04 LTS
- Windows
  - Windows 10 IoT Enterprise 64-bit
  - Not all functions are supported
- See the product User Manual for details on software support: **www.duagon.com/products/g28m/#doc**
- See section Software on the product web page for available packages: **www.duagon.com/products/g28m/#downl**
- See also Application Note ***Recommendations for a Robust Software Setup***

Diagram


ECC DDR4 SDRAM
ECC DDR4 SDRAM
Intel Xeon W Processor
1 Gbit Ethernet
ETH Controller
1 Gbit Ethernet
ETH Controller
USB-to-UART
USB-C (USB 3.2 Gen 2x1 + DP 1.4)
USB 3.2 Gen 2x1
NVMe Storage
PCIe 3.0 x1
FRAM
GSPI1
Flash
TPM
SPI0
SMBus
EEPROM
BMC
Temp
RTC
Supercap./ Battery
SGPIO
SMBus
FPGA
SGPIO
SATA (6 Gb)
USB 3.2 Gen 2x1
PCIe 3.0 x8
PCIe 3.0 x4
PCIe 3.0 x4 RST
PCIe 3.0 x1
CPCI-S.0 P1-P5
R
ETH Controller
1 Gbit Ethernet
ETH Controller
1 Gbit Ethernet
CPCI-S.0 P6
R
F Front
R Rear
B Onboard
O Options

Ordering Information

Standard Models

02G028M00	3U CPCI Serial, 8 HP, Intel Xeon W-11865MRE, 8 cores, 16 threads, 2.1 GHz, 35 W TDP, 64 GB DDR4 (ECC) RAM, 120 GB NVMe, 2x 1G Ethernet M12, 1x USB 3.2 Gen 2x1, 1x USB 3.2 Gen 2x1 and DisplayPort over USB-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, 2.1 GHz, 35 W TDP, 64 GB DDR4 (ECC) RAM, 120 GB NVMe, 2x 10G Ethernet M12, 2x 1G Ethernet M12, 1x USB 3.2 Gen 2x1, 1x USB 3.2 Gen 2x1 and DisplayPort over USB-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

▶ **Contact duagon** for availability and lead times for product models not listed above.