Silicom FPGA SmartNIC FB2CDG1@AGM39D-2

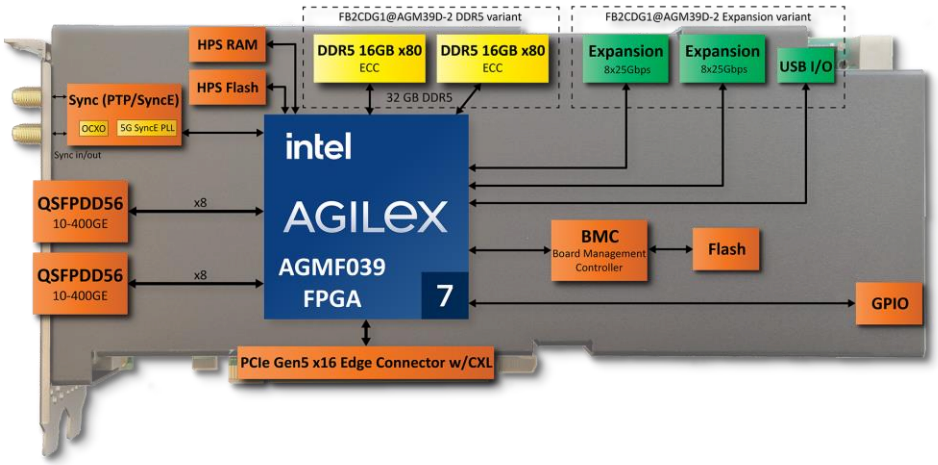
Dual port QSFPDD56, 2x400 GE, PCIe Gen5 x16, Intel® Agilex™ M-series FPGA Based, 32GB HBM2e with 2xARF6 connector (16x28 Gbps)

Product Description

The FB2CDG1@AGM39D-2 is a high-performance programmable PCIe Server adapter based on the Intel® Agilex™ M-series AGMF039 FPGA (option for AGMF032). The Agilex-M™ is an extremely powerful FPGA which also features up to on-chip 32GB HBM2e memory providing an unprecedented 2 x 2.6 Tbps HBMe2 bandwidth. The card is equipped with 2 x QSFPDD56 for supporting 2x 400GE (PAM8), as well as a wide range of other link speed combinations like 16x10/25GE or even 8x100G with the appropriate breakout modules and link partners.
The FB2CDG1@AGM39D-2 features 2 x ARF6 connectors with 16x28Gbps. The ARF6 connectors add unprecedented flexibility in host bandwidth and network connectivity. Via an adaptor cable, an additional PCIe Gen4 x16 connector can be employed for additional host bandwidth. The same connectors can alternatively be used with Firefly^{tm} cables for connecting an additional 2x 8xFSFP28 or 2x 2xFQSFP28 for higher Ethernet link capacity to the solution in appliances. The connectors can also be used for direct connection of two boards or to connect multiple cards in series.
The AGM FPGA series features CXL 1.1 and 2.0, providing heterogeneous processing and computing in performance-intensive workloads like AI, machine learning and analytics. And variant with DDR5 in place of the ARF6 connectors can be offered per request.

Key Use Cases

- **Network Security & Telemetry**
  - Virtual Firewall (vFW)
  - DDoS Mitigation
  - IP Security (IPsec)
  - Transport Layer Security (TLS)
  - Packet monitoring and analytics
- **Network Functions**
  - 5G/6G User Plane Function (UPF)
  - 5G Access Gateway Function (AGF)
  - Virtual Broadband Network Gateway (vBNG)
  - Virtual Application Delivery Controller
  - Traffic Management
  - Carrier Grade Network Address Translation (CGNAT)
  - Cloud Gateway
  - Application Access Gateway
- **Application acceleration**
  - Data analysis offload
  - Sensor aggregation and analysis
  - Sensor recording



Key Features

- Intel® Agilex™ AGMF039 FPGA
- 2 x QSFPDD56 ports
- HBM2e: 32GB
- 2 x ARF6 expansion connectors each with 8x28Gbps
- PCIe x16 Gen5 w/CXL
- 5G SyncE PLL with Silicom TimeSync Solution (STS)
- Dedicated DDR5 ECC RAM for HPS
- GPIO
- Intel® Max® 10 Board Management Controller
- Dual slot passive heat sink (single slot optionable)
- On-board power and temperature sensors
- FPGA controlled link and status LEDs

Technical Specifications

Network Interface	
IEEE standard	IEEE 802.3 400GbE, 200GbE, 100GbE, 25GbE, 10GbE
Interfaces	▪ Physical interface: 2 x QSFPDD56 slots ▪ Multimode SR4/SR8 (850nm), Single Mode LR4/LR8 (1310nm) or Direct Attached Copper (Twinax) ▪ Data rate: 2x400, 4x200, 2x200, 1x400, 4x100, 8x100G via CU DAC, 16x25, 16x10 GE ▪ Additional 8x10/25 or 4x100GE via ARF6 connectors and FSFP/FQSFP adaptors
Host Interface	
PCI bus	▪ PCIe 5.0 x16
General Technical Specifications	
FPGA Details	**Intel® Agilex™ AGMF039 (AGMF032 option)** ▪ R47A package, with 3 x F and 1 x R tile ▪ Speed grade -2 ▪ ARM HPS ▪ 32GB HBM2e (16GB option) ▪ 3 x 600GE HIPs (F-tiles)
Configuration	▪ Configuration flash can be made to support multiple boot images for automatic fallback to factory default image ▪ Upload of FPGA configuration to flash via PCIe – with supported image and tool
On-chip Memory	▪ HBM2e, 32GB in Agilex™ M-series FPGA
On-board Memory	▪ DDR5, 4GB ECC for HPS ▪ Option no request DDR5 variant: 2x16GB DDR5, with out ARF6 connecotrs
Expansion Connectors	▪ 2 x 32pin ARF6 for 2x 8x28Gbps ○ Allows an extra x16 PCIe Gen4 via adapter for extra Host PCI BW and resources ○ Allows connection for additional network ports
On-board Clock	▪ PCIe clock: 100 MHz ▪ DPLL ZL30793 ▪ Jitter cleaner ▪ 8 output reprogrammable clock generator (PLL) with SyncE support
Additional Board Support	▪ On-board power and temperature sensors (via SMBus/I2C) ▪ LEDs for board status and board management
Physical Dimensions	▪ Weight: ~1600 g ▪ Full height, 123.4 mm ▪ ¾ length, 254.0 mm (+bracket) ▪ Dual slot
Environment	▪ Storage temperature: TBD ▪ Operating temperature: TBD ▪ Hardware compliance: RoHS, FCC Class A, CE, UL

Thermal Design	▪ Passive dual heat sink ▪ Passive single slot heat sink maybe provided. Reduces thermal capacity, limiting processing capacity
Max Power	▪ Typical power 210 W ▪ Max: 410 W *) ▪ 65 W max from the PCIe slot, 345 W max from the 12V high power Aux connector *) (including optical modules) *) The combined server-PCIe card solution may be limited in average power consumption by thermal constraints. Power consumption is maximum supported. Typical use case is much lower and fully dependent on FPGA implementation.
Port LEDs	▪ 2 x Link/ ACT for the 2 x QSFPDD56, on bracket ▪ 1 x multi color status LED, on bracket
Time Synchronization	▪ Silicom TimeSync Solution (STS) ▪ IEEE 1588-2019, G8273.2, G8273.4 (T-BC/T-TSC), G8262(SyncE) ▪ 1PPS In/Out, 10Mhz In/Out (optional) ▪ OCXO ▪ PTP stack: LinuxPTP (ptp4l) on HPS or x86
Board Management	▪ Intel® Max® 10 FPGA Board Management Controller ▪ Voltage level monitoring ▪ Thermal shut-down protection ▪ Over current protection on 12V input
Supported frameworks	▪ Silicom Board support package ▪ Intel Application Stack Accelerator Function (ASAF) framework ▪ Intel OFS and OPAE (tbd) ▪ Silicom PacketMover ▪ DYNANIC from Brnologic

Ordering Information

Product name	Ordering P/N	Notes
FB2CDG0@AGM39D-2	**FB2CDG0@AGM39D-20XP2**	Engineering sample AGM 039, 2x 8x32Gbps connector, 32GB HBM Expansion connector: supporting 16x28Gbps for Ethernet or PCIe Gen4x16
FB2CDG1@AGM32D-2	**FB2CDG1@AGM32C-20XP2**	AGM 032, 2x 8x32Gbps connector, 16GB HBM Expansion connector: supporting 16x28Gbps for Ethernet or PCIe Gen4x16
FB2CDG1@AGM32D-2	**FB2CDG1@AGM32D-20XP2**	AGM 032, 2x 8x32Gbps connector, 32GB HBM Expansion connector: supporting 16x28Gbps for Ethernet or PCIe Gen4x16
FB2CDG1@AGM39C-2	**FB2CDG1@AGM39C-20XP2**	AGM 039, 2x 8x32Gbps connector, 16GB HBM Expansion connector: supporting 16x28Gbps for Ethernet or PCIe Gen4x16
FB2CDG1@AGM39D-2	**FB2CDG1@AGM39D-20XP2**	AGM 039, 2x 8x32Gbps connector, 32GB HBM Expansion connector: supporting 16x28Gbps for Ethernet or PCIe Gen4x16

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