



### N5013/N5014 FPGA SmartNIC Intel® Stratix® based

100Gigabit Quad port Ethernet Intel® Stratix® 10DX FPGA Based

#### Product Description

Silicom's N5013/N5014 FPGA SmartNIC Intel® Stratix® based is a high-performance programmable PCI-Express card based on the Intel® Stratix® 10 DX 2100 FPGA. The Intel® Stratix® 10 DX 2100 FPGA is an extremely powerful FPGA technology which also features on-chip 8GB HBM2 memory providing an unprecedented 512 GByte/s of total aggregate bandwidth.

The N5014 additionally features two Intel E810-CAM1 devices connected to the FPGA and can function as the primary data path to and from the host system. This adds the full set of features of the E810 to the host interaction and its interface options in virtualized systems.

#### N5013/N5014 FPGA SmartNIC Intel® Stratix® based Use Cases:

- Network Function Virtualization (NFV)
- Multi-Access Edge Computing (MEC)
- Cyber security
- High-Performance Computing
- Finance
- Mobile Access and Core Network

#### FB4CG@S10D21 FPGA SmartNIC N5013/N5014:

- N5013: 4xQFSP, PCIe Gen4, FPGA, QDR, DDR4, Intel® Max® 10
- N5014: 4xQFSP, PCIe Gen4, FPGA, QDR, DDR4, 2xE810-CAM1, PEX88048, Intel® Max® 10

#### Key Features

- Intel® Stratix® 10 DX 2100 FPGA
- HBM2: 8GB (2x4 GB, internal)
- DDR4/ 32GByte+ECC (x18 devices)
- QDR-IV: 144Mbit
- Two Intel® e810-CAM1 NIC devices (N5014 only)
- Intel® Max® 10 Board Management Controller
- On-board power and temperature sensors
- FPGA controlled link and status LEDs
- Time Synchronization via IEEE 1588 (PTP) and SyncE
- Bracket mounted SMA for PPS/10MHz input and optional external Sync bracket with 4 x SMA for in/out of PPS and 10MHz



## Technical Specifications

General Technical Specifications Adapters:	
IEEE standard	IEEE 802.3 100GbE
Interfaces	<ul style="list-style-type: none"> <li>Physical interface: 4 x QSFP28 slots</li> <li>Multimode SR4 (850nm), Single Mode LR4 (1310nm) or Direct Attached Copper (Twinax)</li> <li>Supports 100G-SR4, 100G-LR4, 100G-Cu (Direct Attached)</li> </ul>
PCI bus	<ul style="list-style-type: none"> <li>PCIe 4.0 x16</li> <li>On N5014 the FPGA and both E810-CAM1's are connected to the PCIe connector via an on-board Broadcom 48x PCIe switch</li> </ul>
FPGA Details	<p>Intel® Stratix® 10 DX 2100</p> <ul style="list-style-type: none"> <li>2.073M Logic Element Fabric</li> <li>HBM2: 8GB (2x4 GB, internal)</li> <li>Connected to the PCIe connector via on-board Broadcom 48x PCIe switch (N5014 only)</li> </ul>
NIC details (N5014 only)	<p>Intel® Network Controller E810-CAM1</p> <ul style="list-style-type: none"> <li>Connected to the PCIe connector via on-board Broadcom 48x PCIe switch</li> <li>NIC provides a hardware compatible interface with Linux drivers</li> <li>Supports Data Plane Development Toolkit (DPDK)</li> </ul>
Configuration	<ul style="list-style-type: none"> <li>Configuration flash can be made to support multiple boot images for automatic fallback to factory default image</li> <li>Upload of FPGA configuration to flash via PCIe – with supported image and tool</li> </ul>
On-board Memory	<ul style="list-style-type: none"> <li>DDR4, 32GB +ECC (x18 devices), 2 banks of 16G + ECC.</li> <li>QDR-IV XP, 144Mbit</li> <li>HBM2, 8GB in Stratix 10 DX2100</li> </ul>
On-board Clock	<ul style="list-style-type: none"> <li>PCIe clock: 100 MHz</li> <li>8 output reprogrammable clock generator</li> <li>Supports network synchronization</li> </ul>
Additional Board Support	<ul style="list-style-type: none"> <li>On-board power and temperature sensors (via SMBus/I2C)</li> <li>LEDs for board status and board management</li> </ul>
Environment	<ul style="list-style-type: none"> <li>Full height, ¾ length, Dual Slot Passive</li> <li>Storage temperature: -40°C–65°C (-40°F–149°F)</li> <li>Operating temperature: 0°C – 45°C (32°F – 113°F)</li> <li>Hardware compliance: RoHS, FCC Class A, CE, UL</li> </ul>
Thermal Design	<ul style="list-style-type: none"> <li>Passive heat sink targeted to dual slot</li> <li>Built-in thermal protection</li> </ul>

<b>Power</b>	<ul style="list-style-type: none"> <li>• Max 225W</li> <li>• 75W max from the PCIe Slot</li> <li>• 150W max from the 12V Aux 2x4 Connector</li> <li>• Passive cooling</li> </ul>
<b>Port LEDs</b>	<ul style="list-style-type: none"> <li>• 4 x Link/ ACT for the 4 x QSFP28, on bracket</li> <li>• 1 x multi color status LED, on bracket</li> </ul>
<b>Time Synchronization</b>	<ul style="list-style-type: none"> <li>• Support Sync-E/ 1588 standard (optional feature depending on FPGA image)</li> <li>• Bracket mounted SMA connector, optional</li> <li>• Support for external Sync bracket with 4 x SMA for in/out of PPS and 10MHz</li> </ul>
<b>Board Management</b>	<ul style="list-style-type: none"> <li>• Intel® Max® 10 FPGA Board Management Controller</li> <li>• Voltage level monitoring</li> <li>• Thermal shut-down protection</li> <li>• Over current protection on 12V input</li> </ul>

## Order Information

P/N	Description	Notes:	Intel name
<b>FB4CGG2@S10D21-D00P0</b>	Programmable PCI Express Server Adapter Based on Intel FPGA S10DX21	PCIe x16 Gen 4, 4x QSFP28, S10DX21, HBM 8GB D: 144MbitQDRIV (iTemp/933Mhz) +DDR4 2x16GBDDR4 (32GB) 0: (0) E810-CAM1 0: ¾ Length, 10" P: Passive heat sink, dual slot 0: No SMA	N5013
<b>FB4CGG2@S10D21-D00P1</b>	Programmable PCI Express Server Adapter Based on Intel FPGA S10DX21	PCIe x16 Gen 4, 4x QSFP28, S10DX21, HBM 8GB D: 144MbitQDRIV (iTemp/933Mhz) +DDR4 2x16GBDDR4 (32GB) 0: 0 x E810-CAM1 0: ¾ Length, 10" P: Passive heat sink, dual slot 1: 1x SMA/PPS + extra 4x SMA bracket	N5013

<p><b>FB4CGG2@S10D21-D20P0</b></p>	<p>Programmable PCI Express Server Adapter Based on Intel FPGA S10DX21</p>	<p>PCIe x16 Gen 4, 4x QSFP28, S10DX21, HBM 8GB Broadcom 48x PCIe switch D: 144MbitQDRIV (iTemp/933Mhz) +DDR4 2x16GBDDR4 (32GB) 2: 2xE810-CAM1 0: ¾ Length, 10" P: Passive heat sink, dual slot 0: 1x SMA/PPS</p>	<p>N5014</p>
<p><b>FB4CGG2@S10D21-D20P1</b></p>	<p>Programmable PCI Express Server Adapter Based on Intel FPGA S10DX21</p>	<p>PCIe x16 Gen 4, 4x QSFP28, S10DX21, HBM 8GB Broadcom 48x PCIe switch D: 144MbitQDRIV (iTemp/933Mhz) +DDR4 2x16GBDDR4 (32GB) 2: 2x E810-CAM1 0: ¾ Length, 10" P: Passive heat sink, dual slot 1: 1x SMA/PPS + extra 4x SMA bracket</p>	<p>N5014</p>