

# NAT-AMC-ZYNQUP- FMC

## Carrier Board - Advanced Information

Fact Sheet

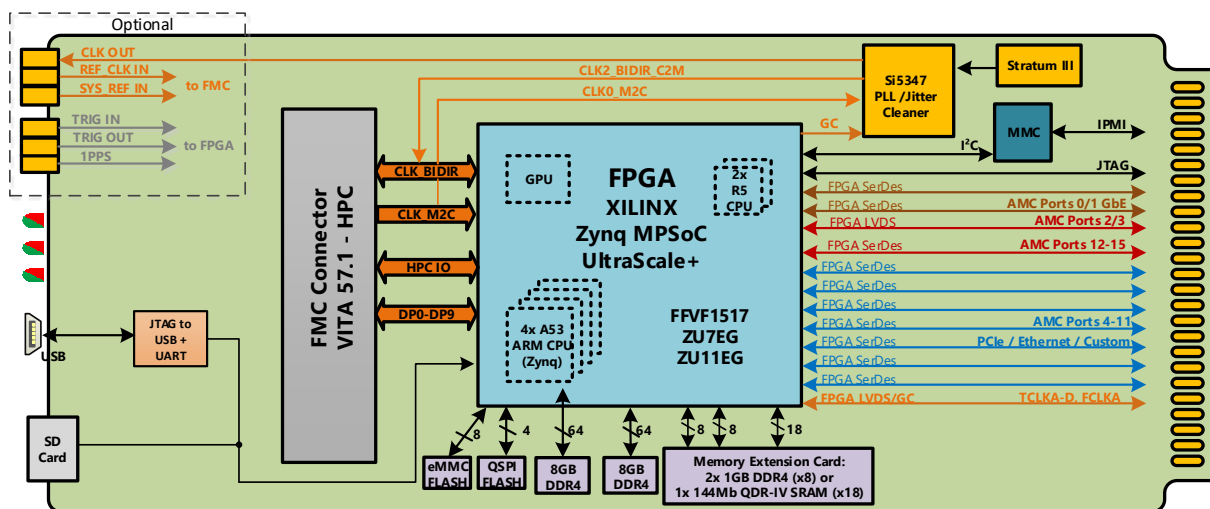
The **NAT-AMC-ZYNQUP-FMC** (Zynq Ultrascale+) is an FMC carrier board in the AdvancedMC (AMC) form factor, with integrated hardware elements that make it the ideal platform for sophisticated wireless, software defined radio (SDR) and machine vision applications. Using FMC mezzanine modules gives this AMC the flexibility to address a broad range of applications. The onboard Xilinx® Zynq® UltraScale+™ FPGA provides a powerful general-purpose ARM-CPU, field-programmable hardware accelerators (FPGA, DSP, and GPU) and flexible I/O.

### Image Processing Application

For machine vision applications, the NAT-AMC-ZYNQUP-FMC is equipped with specialized hardware elements that speed up the execution of vision algorithm and neural networks for deep learning applications.

### Wireless Application

The NAT-AMC-ZYNQUP-FMC is ideal for software defined radio modules thank to its powerful FPGA for baseband processing and flexible RF- frontend on FMC. The onboard JESD204B clocking simplifies the integration of high-speed ADC/DAC FMCs. Inputs for reference clock, sync, trigger and 1pps signals enable multi-board baseband and RF-phase synchronization for massive MIMO and phased antenna arrays.



### Applications

- Software defined radio (SDR)
- Image/video processing
- Machine vision
- Machine/deep learning
- Cellular base station
- Custom applications

### Interconnect

The SoC interfaces directly to the FMC slot via a VITA 57.1 compliant High Pin Count (HPC) connector and to the MTCA backplane via its high speed SERDES lanes. Prepared for up to four chips (e.g. ADC/DAC) with JESD204B interface.

### Backplane Connectivity

- Four clock lines TCLKA-D
- IPMI
- JTAG
- 2x GbE
- 8x PCIe / Ethernet / custom protocol
- Point-to-point links (low latency)
- Trigger lanes



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#### Memory

- Separate DDR4 (x64, 1200-2400Mb/s) for ARM-CPU and FPGA – up to 8 GB each
- Memory Extension Card for Supporting QDR-IV SRAM (144Mb) or 2 DDR4 x8 Banks 1 GB each
- QSPI flash
- 4GB eMMC / SD-card

#### Front Panel Elements

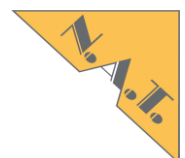
- Optional clock IN/OUT
- USB connector for both UART and JTAG access to FPGA
- SD card holder
- AMC front panel elements and application LEDs

#### AMC Formfactor:

- Single-width
- Mid/full-size (depending on number of FMCs)

### Technical Data

<b>Form Factor</b>	
	<ul style="list-style-type: none"> <li>• Single-width, mid/full-size AMC (depending on number of FMCs)</li> <li>• Width: 73.5 mm, depth: 180.6 mm</li> </ul>
<b>Processing Resources</b>	
FPGA	<ul style="list-style-type: none"> <li>• Xilinx Zynq Ultrascale+ FPGA MPSoC</li> <li>• Choice of ZU7EG, ZU11EG</li> <li>• 8 GB DDR4 (x64)</li> <li>• QSPI flash</li> <li>• Memory Extension Card (DDR4 or QDR-IV)</li> <li>• File flash configuration memory</li> </ul>
CPU	<ul style="list-style-type: none"> <li>• Quad-core ARM Cortex-A53 processor (application processing unit)</li> <li>• Dual-core ARM Cortex-R5 (real-time processing unit)</li> <li>• GPU</li> <li>• 8GB DDR4 (x64)</li> <li>• Boot flash memory</li> <li>• MicroSD card slot for operating system and storage</li> <li>• 4GB eMMC</li> </ul>
Software/firmware	<ul style="list-style-type: none"> <li>• IPMI 1.5 compliant</li> <li>• Reconfiguration of FPGA via IPMI</li> <li>• Linux boot – Linux drivers</li> <li>• API for all external/internal interfaces</li> </ul>
<b>FPGA Programming Interface</b>	
	<ul style="list-style-type: none"> <li>• Onboard Xilinx header connector</li> <li>• Front panel USB/JTAG connector</li> <li>• IPMI/HPM via onboard MMC controller</li> </ul>
<b>FMC slot</b>	
	<ul style="list-style-type: none"> <li>• Single HPC (High Pin Count) FMC (FPGA Mezzanine Card) slot for one or two stackable FMC modules</li> <li>• VITA 57.1 compliant</li> <li>• HPC differential pairs (LA/HA/HB) are routed to the FPGA</li> <li>• DP0 to DP9 are routed to the FPGA</li> </ul>



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<b>Backplane Interconnect</b>	
	<ul style="list-style-type: none"> <li>• Ports 0/1: Dual 1GbE connect</li> <li>• Ports 2/3: Custom protocol, e.g. SAS/SATA</li> <li>• Ports 4-11: PCIe/Ethernet/custom protocol</li> <li>• Ports 12-20: Custom protocol FPGA-LVDS-I/Os</li> <li>• Any combinations of PCIe, SRIO, 10/40GbE (on request)</li> <li>• Full AMC TCLKA-D and FCLKA connectivity (bidirectional)</li> </ul>
<b>Front Panel</b>	
	<ul style="list-style-type: none"> <li>• Optional clock IN/OUT and Trigger Signals</li> <li>• USB-Connector</li> <li>• SD card holder</li> <li>• AMC front panel elements and application LEDs</li> </ul>
<b>Compliance</b>	
	<ul style="list-style-type: none"> <li>• AMC.0 R2.0, AMC.1, AMC.2, AMC.3, AMC.4, IMPI V1.5, HPM.1</li> <li>• EN60950, UL1950, RoHS</li> </ul>
<b>Environmental</b>	
Operating environment	<ul style="list-style-type: none"> <li>• 0 to +55 degrees Celsius (extended temperature range on request)</li> <li>• Humidity: 5% to 95% (non-condensing)</li> </ul>
Storage environment	<ul style="list-style-type: none"> <li>• -40 to +100 degrees Celsius</li> <li>• Humidity: 5% to 95% (non-condensing)</li> </ul>

