

Key Features

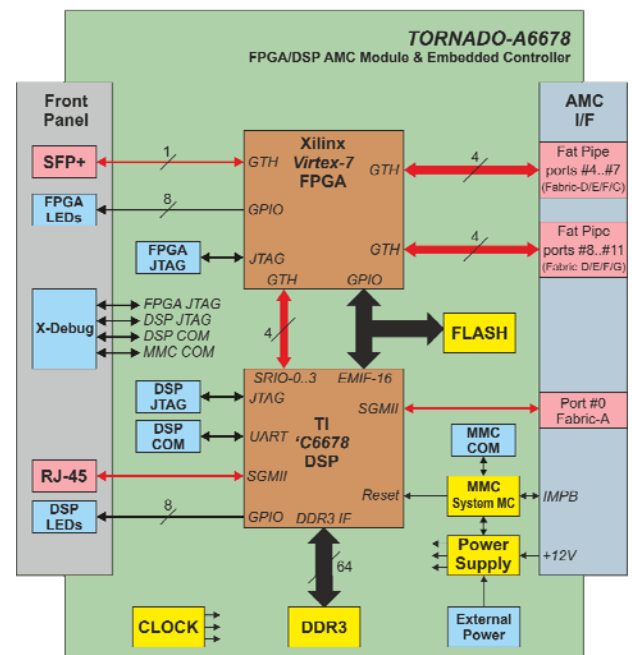
- AMC-module with 8-core Texas Instruments TMS320C6678 DSP (1.25GHz 320GMAC/160GFLOPS) and Xilinx Virtex-7 FPGA (XC7VX330T/XC7VX415T/XC7VX690T)
- High-speed industry standard I/O AMC interfaces (10GbE, 1GbE, Serial RapidIO, PCIe) and 10Gbps+ SFP+
- Meets PICMG® 3.0 Rev.3.0 and AMC.0 R2.0 specifications
- Installs into MicroTCA® and AdvancedTCA® mainboards
- Stand-alone operation and embedded applications



TORNADO-A6678 AMC Module (M/S)

Details

- AMC high-speed multi-lane Fabric-D/E/F Fat Pipes ports #4..#7 and #8..#11 (10GBASE-BX4 (XAUI), 4x 5Gbps Serial RapidIO, 4x 5Gbps PCIe) from FPGA and AMC Fabric-A 1GbE SGMII port #0 from DSP for AMC management
- DSP-to-FPGA communication via 4x channel 5GBPS Serial RapidIO I/F for the total or 40GbPS throughput
- FPGA 10Gbps+ SFP+ port for external I/O
- Up to 8GB DDR3 DSP memory
- 1Gb FLASH for DSP bootloader, system monitor, user applications and FPGA bitstreams
- DSP EMIF16 bus (30MWPS) for access to FLASH and FPGA
- DSP 1GbE RJ45 and 155kbaud COM/RS232C ports for remote module management
- User controlled front-panel DSP and FPGA LEDs for indication of DSP/FPGA user application status
- Optional XDEBUG front-panel connector for DSP/FPGA JTAG emulators and DSP/MMC remote consoles
- Monitoring of on-board power supplies and multi-point temperature for reliable system operation and protection
- Stand-alone/embedded operation from external +12V power and external communication via 10Gbps+ SFP+, 1GbE RJ45 and COM/RS232C ports



TORNADO-A6678 Block Diagram

Development Tools

- MicroLAB Systems *MIRAGE-NC2/NE1* JTAG emulators and TI *Code Composer Studio* tools for TI DSP
- Xilinx *ISE/Vivado* tools and IP for FPGA
- multicore bootloader, user extendable system monitor, automatic FPGA configurator, API library and demo projects for DSP
- Remote user extendable monitor and API library for PC
- FPGA cores and demo projects
- System level demo projects

Applications

- Multichannel image processing
- Multichannel digital radio and cell telephony
- Telecommunication
- Industrial and instrumentation
- Astrophysics



Compact TORNADO-MTCA® DSP/FPGA modular system with four [TORNADO-A6678](#) DSP/FPGA M/S AMC-modules and two [T/AX-DSPX](#) network AMC-modules in 19" 1U 6-slot MicroTCA® chassis with 10GbE backplane switch



Mini TORNADO-mMTCA® DSP/FPGA modular system with [TORNADO-A6678](#) DSP/FPGA F/S AMC-module and [T/AX-DSPX](#) network AMC-module in dual-slot MicroTCA® mini chassis with passive backplane

Technical Specifications (*TORNADO-A6678 rev.1B*)

DSP

- Texas Instruments TMS320C6678 Fixed/Floating-point DSP, 8-cores, 1.25GHz (320GMAC/160GFLOPS)
- 1GB/2GB/4GB/8GB 1333MTPS on-board DDR3 memory (specify on ordering)
- 64Mx16 on-board FLASH memory
- 4x 5Gbps Serial Rapid ports (connected to FPGA)
- 2x 1GbE SGMII ports (connected to AMC I/F port #0 and 1GbE RJ45 front-panel port)
- COM/RS232C 115kbaud UART port (available at front panel)
- I²C I/F (used for on-board communication, not available for user applications)
- EMIF-16 16D/24A I/F (used for access to FLASH, FPGA configuration, FPGA access according to user project, DSP external interrupt requests configuration)
- DSP Bootmodes: None/Debug, EMIF/FLASH
- Debug port: JTAG (14-pin, LVTTTL 3V-5V)

FPGA

- Xilinx Virtex-7 XC7VX330-2FFG1157C/XC7VX415-2FFG1157C/XC7VX690-2FFG1157C (specify on ordering)
- Debug port: JTAG (14-pin, LVTTTL 2.5V-5V)

Front-panel Interfaces and Indicators

- FPGA 10Gbps+ SFP+ port
- DSP 1GbE RJ45 port
- User FPGA application controlled LEDs: 2xGreen, 2xYellow, 2xRed, 1xBlue, 1xWhite
- User DSP application controlled LEDs: 2xGreen, 2xYellow, 2xRed, 1xBlue, 1xWhite
- AMC Blue LED, bi-color LED1 (power status indication), bi-color LED2 (temperature status indication)
- Optional XDEBUG front panel connector with adapter cable (used to debug DSP and FPGA applications with closed MicroTCA chassis or AdvancedTCA mainboard) (selected on product ordering):
 - DSP JTAG I/F (LVTTTL 3V-5V) and 'DSP RESET' knob
 - FPGA JTAG I/F (LVTTTL 2.5V-5V)
 - DSP 115kbaud COM/RS232C port for DSP bootloader control
 - MMC 115kbaud COM/RS232C port for MMC console

AMC I/F ports

- FPGA: AMC Fabric-D/E/F Fat Pipe #4..#7 и Fat Pipe #8..#11 ports (10GBASE-BX4 (XAUI), 4x 5Gbps Serial Rapid IO, 4x 5Gbps PCIe)
- DSP: AMC-Fabric-A 1GbE SGMII port #0
- MMC: IPMB-L port

MMC (AMC module management controller)

- F/W: based on MicroLAB Systems TAMMO® SDK
- Compatible with IPMI 1.5, IPMB CPS v1.0, PICMG® 3.0 rev.3.0 AMC.0 R2.0 specifications
- High-speed monitoring of payload power and all backend power supplies (voltage and current), tolerance control
- Power status indication via on-board dedicated bi-color LED and bi-color AMC LED1 (available at front panel)
- Multi-point monitoring of PCB, DSP and FPGA temperatures, tolerance control
- Temperature status indication (9) via on-board dedicated bi-color LED and bi-color AMC LED2 (available at front panel)
- Remote MMC console via MMC COM/RS232C 115kbaud port

Physical

- Single-width either Full-size (F/S, 181 x 74 x 29 mm) or Mid-size (M/S, 181 x 74 x 19 mm) AMC card (specify on ordering)
- Weight 0.35 kg
- Four mounting holes for stand-alone and embedded installations

Power and temperature

- AMC Payload Power: +12V @ 2.5A (typ) (30W), 5A (max) (60W)
- AMC Management Power: +3.3V @50mA (typ)
- External power for stand-alone/embedded applications: +12V @ 2.5A (typ) (30W), 5A (max) (60W)
- Operating temperature (ambient) without forced cooling: 0°C...+50°C
- Operating temperature (ambient) with forced cooling: 0°C...+65°C
- Storage temperature (ambient): -40°C...+80°C

Ordering information

TA6678/X330/D2G/F1G/FS	<i>TORNADO-A6678</i> Full size (F/S) AMC-module with 1.25GHz TMS320C6678 DSP, Xilinx Virtex-7 XC7VX330T-2FFG1157C FPGA, DDR3 2Gbyte memory, FLASH 1Gb memory
TA6678/X415/D2G/F1G/FS	<i>TORNADO-A6678</i> Full size (F/S) AMC-module with 1.25GHz TMS320C6678 DSP, Xilinx Virtex-7 XC7VX415T-2FFG1157C FPGA, DDR3 2Gbyte memory, FLASH 1Gb memory
TA6678/X690/D2G/F1G/FS	<i>TORNADO-A6678</i> Full size (F/S) AMC-module with 1.25GHz TMS320C6678 DSP, Xilinx Virtex-7 XC7VX690T-2FFG1157C FPGA, DDR3 2Gbyte memory, FLASH 1Gb memory



Compact *TORNADO-MTCA*® DSP/FPGA modular system with three [TORNADO-A6678](#) DSP/FPGA F/S AMC-modules in 19" 1U 6-slot MicroTCA® chassis with 10GbE backplane switch