

# » AM4020 «



## High-End Processor AMC based on Intel® Core™ i7 Technology

### Outstanding Performance

- » Intel® Core™ i7 with 2.0 GHz or 2.53 GHz

### Impressive Capacity

- » Up to 8 GB ECC Memory DDR3 1066 MHz
- » Up to 32 GB NAND Flash

### Comprehensive Connectivity

- » 4x GbE, 4x SATA, 2x PCIe x4, Graphic or COM and more

# AM4020

## Small, Fast, Robust

### » Performance

The AM4020 is a highly integrated CPU board implemented as a Single Mid-size or Full-size Advanced Mezzanine Card (AMC) for ATCA and MicroTCA applications. The design is based on the Intel® Core™ i7 processor platform combined with the mobile Intel® QM57 Express Chipset.

The board supports the Intel® Core™ i7-610E and the Intel® Core™ i7-620LE processors in 32 nm technology with 64 kB L1 cache, 256 kB L2 cache and 4 MB L3 cache in a BGA package with frequencies ranging from 2.0 GHz up to 2.53 GHz. The processor and the memory are soldered on the AM4020 which results in higher Mean Time Between Failures (MTBF) and a significant improvement in cooling.

### » Throughput

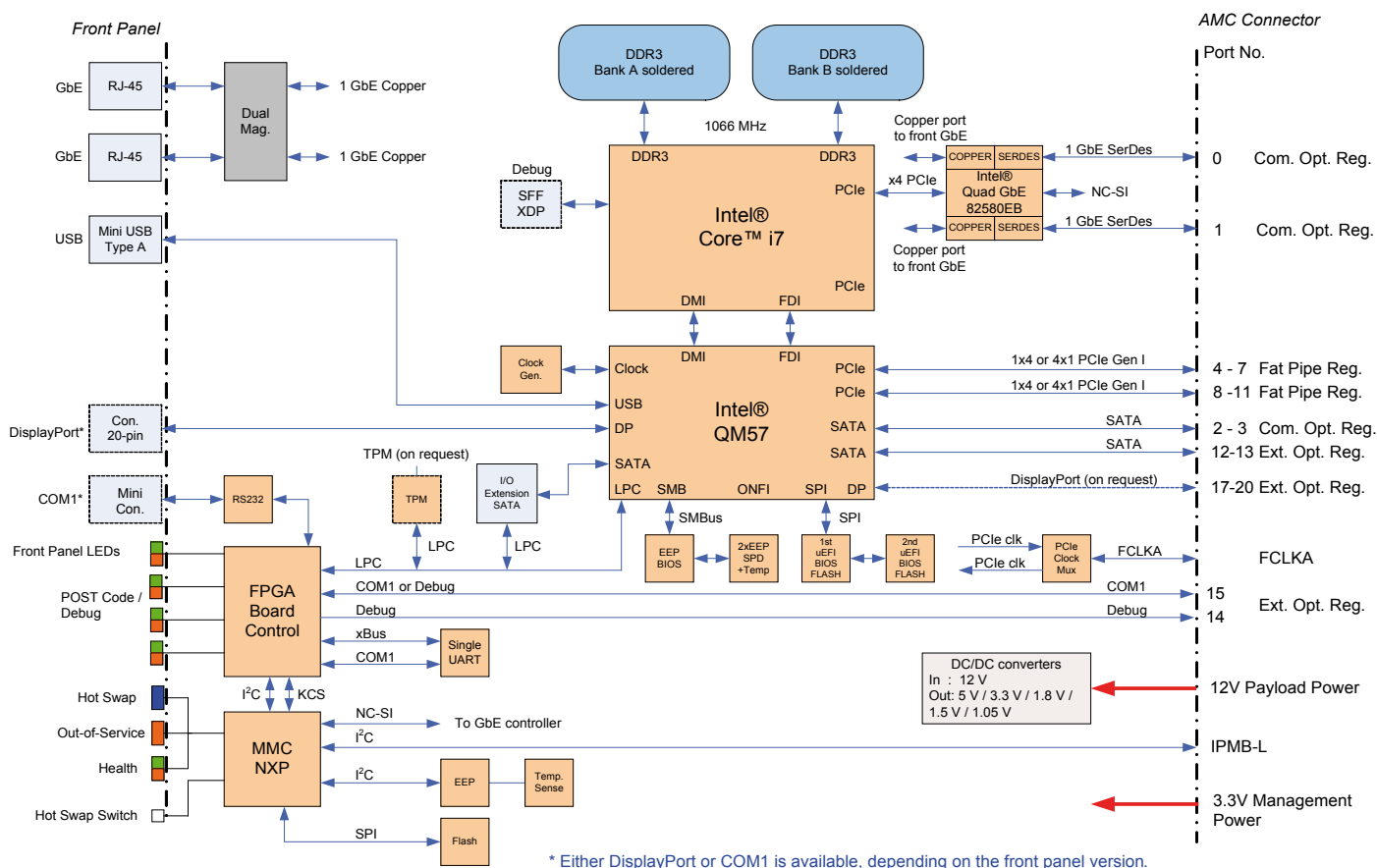
The AM4020 includes up to 8 GB, dual-channel Double Data Rate (DDR3) memory with Error Checking and Correcting (ECC) running at 1066 MHz. The graphics and memory controller is integrated in the processor. One quad Gigabit Ethernet controller directly connected to the processor ensures maximum data throughput between processor and memory. The AM4020 can be equipped optionally with an up to 32 GB NAND Flash memory module which can be screwed on the AM4020.

### » Connectivity

Supporting the PICMG sub-specifications AMC.1/.2/.3 the AM4020 ensures a comprehensive set of interconnecting capabilities. The AM4020 is available with two front panel versions, one with a high-resolution DisplayPort and one with a COM port. Further interfaces include one USB 2.0 host interface and two Gigabit Ethernet ports to the front as well as a variety of high-speed interconnect topologies to the system, such as Dual Gigabit SerDes connection and Dual Serial ATA storage interface in the Common Options Region, two x4 or eight x1 PCI Express in the Fat Pipes Region, and dual Serial ATA storage interface, a DisplayPort (on request), and a Debug port in the Extended Options Region.

### » Reliability

The careful design and selection of high temperature resistant components together with the elaborated heat sink construction ensures a high product reliability. A front panel design according MicroTCA.1 (on request) provides shock & vibration resistance in demanding environmental conditions.



## Technical Information

### Form Factor

Single mid-size or full-size AMC module (full-size on request)

### CPU and PCH

#### Processor

The AM4020 supports the following microprocessors:  
 » Intel® Core™ i7-610E (SV) processor with ECC, 2.53 GHz, 4 MB L3 cache  
 » Intel® Core™ i7-620LE (LV) processor with ECC, 2.0 GHz, 4 MB L3 cache

#### Cache Structure:

- » 64 kB L1 cache for each core
- » 32 kB instruction cache
- » 32 kB data cache
- » 256 kB L2 shared instruction/data cache for each core
- » 4 MB L3 shared instruction/data cache shared between both cores

#### Further processor features:

- » Two execution cores
- » Intel® Hyper-Threading Technology (Intel® HT Technology)
- » Intel® 64 Architecture
- » Intel® Turbo Boost Technology
- » Intel® Intelligent Power Sharing (IPS)

#### Platform Controller Hub

Mobile Intel® QM57 Express Chipset:  
 » Two x4 or eight x1 PCI Express 2.0 ports operating at 2.5 GT/s  
 » SATA host controller with six ports, 3 Gbit/s data transfer rate and RAID 0/1/5/10 support  
 » USB 2.0 host interface with up to 14 USB ports available (only one USB 2.0 port is used on the AM4020)

### Memory

#### System Memory

Dual channel DDR3 memory, up to 8 GB DDR3 SDRAM memory with ECC, running at 1066 MHz

#### NAND Flash

Up to 32 GB SLC NAND Flash on a dedicated SATA NAND Flash module

#### Flash (BIOS)

Two redundant 8 MB SPI Flash chips (2 x 8 MB) for uEFI BIOS controlled by the MMC

#### EEPROM

Serial EEPROM (24LC64) 64 kbit

### Onboard Controllers

#### VGA

Built-in Intel 3D Graphics accelerator for enhanced graphics performance:  
 » Supports resolutions up to 2560 x 1600 pixels @ 60 Hz  
 » DisplayPort hot plug support  
 » Dynamic Video Memory Technology  
 If the AM4020 is populated with a COM port on the front panel, the VGA controller is disabled.

#### Gigabit Ethernet

One Intel 82580EB Quad Gigabit Ethernet PCI Express bus controller  
 » Two interfaces routed to front I/O connectors  
 » Two interfaces routed to the AMC connector

#### UART

EXAR XR16L580IL single UART, 16550 compatible

#### TPM

Infineon SLB9635TT TPM 1.2 controller (on request)

#### MMC

NXP LPC2368 controller with on-chip 512 kB Flash and 56 kB RAM

#### Watchdog

FPGA-based, software-configurable, two-stage Watchdog w. programmable timeout ranging from 125 ms - 256 s in 12 steps

### System Interconnection

#### Gigabit Ethernet

Two 1000BASE-BX (SerDes) (Common Options Region ports 0-1)

#### Serial ATA

Two SATA ports (Common Options Region ports 2-3)  
 Two SATA ports (Extended Options Region ports 12-13)

#### PCI Express

Two x4 or eight x1 PCI Express interfaces on AMC ports 4-11 (Fat Pipes Region)

#### Debug Interface

One Debug port (Extended Options Region port 14)

#### Serial Port

COM1 (LVTTTL) (Extended Options Region port 15)

#### DisplayPort

One DisplayPort on request (Extended Options Region ports 17-20)

#### FCLKA

Bidirectional PCI Express clock configuration

### Front Panel Interfaces

#### Gigabit Ethernet

Two 1000BASE-TX on RJ45 connector

#### DisplayPort

One DisplayPort on standard 20-pin DisplayPort connector

#### USB

One USB 2.0 port on 5-pin, type A Mini-USB connector

#### Serial Port

One RS232 UART interface on 10-pin mini connector

#### LEDs

Three Module Management LEDs  
 Four User-Specific LEDs  
 Ethernet LEDs

### Onboard Interfaces

#### Debug Interface

JTAG port for processor emulation probe connection  
 Serial POST Code (LVTTTL) interface on the AMC port 14

#### I/O Extension

The I/O extension holds the following interfaces:  
 SATA, USB, LPC interface and some power and control signals, battery input

### Compliance

#### ATCA

12 V payload power, 3.3 V management power

#### MicroTCA

PICMG MTCA.0 Micro Telecommunications Comp. Architecture R1.0  
 PCI Express: PCI Express Base Specification Revision 1.0a

## Technical Information

AMC	PICMG AMC.0: Advanced Mezzanine Card Specification R2.0 PICMG AMC.1: PCI Express and Advanced Switching R1.0 PICMG AMC.2: Gigabit Ethernet R1.0 PICMG AMC.3: Storage Interfaces R1.0
IPMI	IPMI Intelligent Platform Management Interface Spec. V2.0 IPMI - Platform Management FRU Information Definition V1.0
CE	EN55022, EN55024, EN61000-6-2/-6-3, EN300386, EN60950-1
Vibration/Shock	IEC60068-2-6 / IEC60068-2-27
Climatic Humidity	IEC60068-2-78
WEEE	Directive 2002/96/EC
RoHS	Directive 2002/95/EC
<b>General</b>	
Dimensions	Dimensions without retention screws on front panel: Mid-size: 181.5 mm x 73.5 mm x 18.96 mm
Board Weight	Mid-size: approx. 240 grams (with heat sink)
MTBF	209269 h Bellcore Issue 6 / 225907 h MIL-HDBK-217 FN2 Ground Benign 30°
Power Supply	12 V payload power, 3.3 V management power
Power Consumption	i7-620LE (LV) 2.0 GHz: max 30 W (graphics idle), max 38 W (with graphics load) i7-610E (SV) 2.53 GHz: max 36 W (graphics idle), max 49 W (with graphics load)
<b>Environmental</b>	
Temperature range	-5°C to +55°C (standard, depending on processor version and airflow in the system) -40°C to +70°C (extended, depending on processor version and airflow in the system) -40°C to +70°C (storage)  passive module heat sink, forced system airflow
Humidity	Operational: 5%-90% (non-condensing) Non-Operating: 5%-95% (non-condensing)
<b>Software</b>	
BIOS	AMI uEFI BIOS
IPMI	MMC (Module Management Controller) implementation compliant to PICMG AMC.0, Kontron own IP
Linux	Generic BSP to be used with various Linux derivatives; Verified for Redhat Fedora 12 (64 Bit)
Windows	Windows XP SP3 / XPembedded, Windows 7 (32/64 bit), Windows 2008 Server R2 for AM4020-versions with DisplayPort interface
WindRiver Linux	PNE 3.x

## Ordering Information

Article	Description
<b>Processor Modules</b>	
<a href="#">AM4020M-2.0D-4GS-COM</a>	Core™ i7-620LE LV 2.0 GHz, Dual Core, 4 GB soldered SDRAM DDR3 1066GHz with ECC, version with COM-port
<a href="#">AM4020M-2.0D-4GS-DP</a>	Core™ i7-620LE LV 2.0 GHz, Dual Core, 4 GB soldered SDRAM DDR3 1066GHz with ECC, version with DisplayPort
<a href="#">AM4020M-2.53D-4GS-COM</a>	Core™ i7-610E SV 2.53 GHz, Dual Core, 4 GB soldered SDRAM DDR3 1066GHz with ECC, version with COM-port
<a href="#">AM4020M-2.53D-4GS-DP</a>	Core™ i7-610E SV 2.53 GHz, Dual Core, 4 GB soldered SDRAM DDR3 1066GHz with ECC, version with DisplayPort
<b>Accessories</b>	
<a href="#">FLASH-SATA-16GB-AM4020</a>	16 GByte NAND-Flash SATA module
<a href="#">FLASH-SATA-32GB-AM4020</a>	32 GByte NAND-Flash SATA module
<a href="#">CABLE-MINI-USB-TA</a>	Adapter cable: MiniUSB-A to USB-A-Jack, 15 cm
<a href="#">CABLE-GRAPHIC-DP-TO-DVI</a>	Adapter cable: DisplayPort to DVI, 19 cm
<a href="#">CABLE-SERIAL-10-PIN-MINI-TO-9-PIN-DSUB</a>	Adapter cable: 10-pin Hirose to 9-pin DSub

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