AdvancedMC™

# AM4002

## Intel® Pentium® M - based AdvancedMC Module



powered by Intel® Pentium® M

# AdvancedMC

AdvancedMC™

AdvancedTCA®

µTCA™

- **Ultra Performance**
  Up to **2.0 GHz** Intel® Pentium® M processor 760
- **Ultra Capacity**
  Up to **4 GB** memory DDR2 400 MHz
- **Ultra Flexibility**
  Flexible Gigabit and PCI Express fabric interface

intel Communications Alliance Premier

PICMG®

AMC™ everywhere

# First class performance AMC module

**Kontron's AdvancedMC processor module AM4002 provides outstanding performance in conjunction with comprehensive AMC interconnect capabilities designed according to the PICMG specifications AMC.0, AMC.1, AMC.2, AMC.3.**

### Ultra Performance

The AM4002 is a highly integrated CPU board implemented as a single, Full- or Mid-size processor Advanced Mezzanine Card (AMC) module.
The design is based on the low-power, high-performance Intel® Celeron® M or Pentium® M processors combined with the high-performance E7320 and 6300ESB server-class chipsets.
The board supports Intel® Celeron® M and Pentium® M processor versions in 90 nm technology and 479 µFCBGA package with frequencies ranging **from 1.0 GHz up to 2.0 GHz** providing front side bus speeds of 400 MHz and 533 MHz.

### Ultra Capacity

The board includes a dedicated memory module for up to **4 GByte** registered Double Data Rate (DDR2) memory with Error Checking and Correcting (ECC) running at 400 MHz. An onboard soldered Flash up to **2 GByte** ensures enough space for embedded application code.

### Ultra Flexibility

Supporting the PICMG sub-specifications AMC.1/.2/.3 the AM4002 ensures a comprehensive set of interconnecting capabilities to the AMC Carrier.
A x4 PCI Express lane according to AMC.1 guarantees high throughput for I/O intensive applications. The dual Gigabit Ethernet controller realizing the AMC.2 interconnect utilizes a x4 lane PCI Express interface to the E7320 chipset ensuring maximum packet performance.
Two SATA ports compliant to AMC.3 allow flexible usage models of the AM4002 depending on the application requirements.

### Professional Support

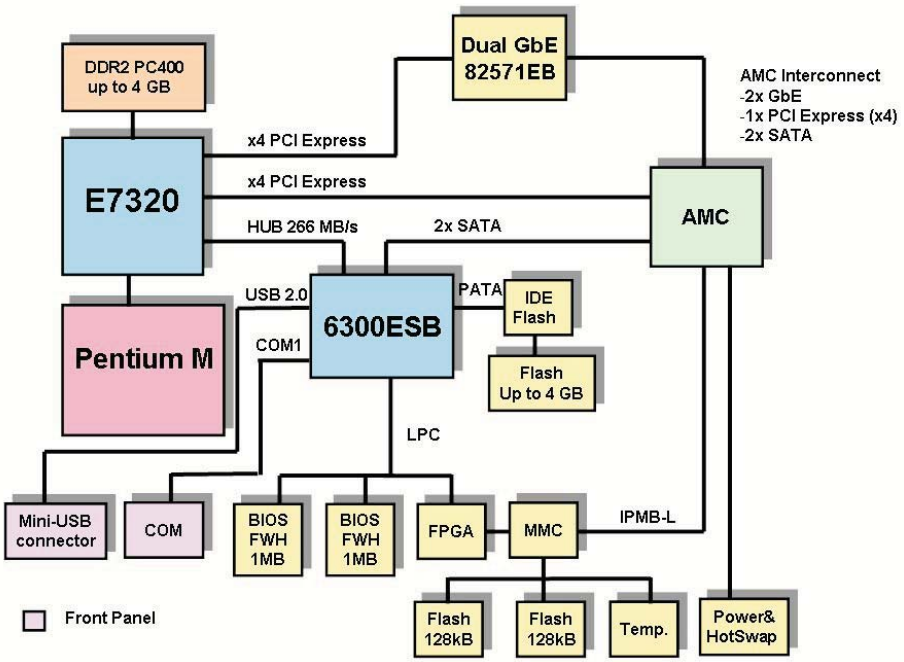
For test purposes and first evaluation steps Kontron offers a complete evaluation kit for the AM4002 the AM-EVAL1. The evaluation kit includes s/w support and all accessories needed to run the AM4002.

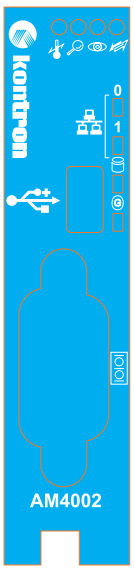
### AMC everywhere

A comprehensive range of 'AMC everywhere' ATCA boards, such as ATCA carrier boards, CPU and hub boards are complementing Kontron's AMC product portfolio including the AM4002 module.
Optimized for high-performance, packet-based telecom systems, the AM4002 is targeted towards, but not limited to telecom applications such as radio network controllers, storage control, routing and switching solutions in ATCA systems.
Beyond the usage in ATCA systems the AM4002 complies to the newly specified µTCA standard dedicated for cost optimized communication applications.

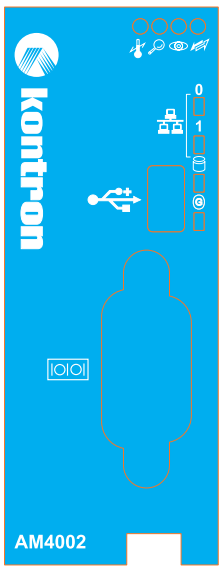
### Reliability

The careful design and selection of high temperature resistant components together with the elaborated heat sink construction ensures a high product availability. This, along with a high level of scalability, reliability, and stability, makes this state-of-the-art product a perfect core technology for long-life embedded applications.




Mid-size front panel




Full-size front panel

# Specification

## System Processor

Intel® Celeron® M and Pentium® M Processor (90 nm), 479-pin µFCBGA package, 2x 32 KB L1 cache and 1/2 MB L2 cache, 400 or 533 MHz processor system bus.
For Mid-size AM4002:
- Celeron M 373 UL, 1.0 GHz ultra low voltage, 1 MB L2 cache, FSB 400 MHz [1)]
- Pentium M 738 LV, 1.4 GHz (low voltage), 2 MB L2 cache, FSB 400 MHz
- Pentium M 745, 1.8 GHz, 2 MB L2 cache, FSB 400 MHz

For Full-size AM4002 with extended heat sink:
- Pentium M 760, 2.0 GHz, 2 MB L2 cache, FSB 533 MHz [1)]

The processor is passive cooled with a fanless heatsink. Forced air cooling at a specific flow rate is required.

[1)] available on project request only

## Memory

| | |
|---|---|
| System memory: | Up to 2 GByte registered DDR2 400 MHz memory with ECC on dedicated memory module (4 GByte when 1 Gbit memory chips available) |
| Flash: | Soldered, up to 2 GByte via onboard IDE Flash controller for application code |
| Flash (BIOS): | Two redundant 1 MB Firmware hubs (FWH) |
| EPROM: | Serial EEPROM (24LC64) 64 kbit for CMOS data storing (no battery backup) |

## Onboard Controller

Memory Controller Hub: Intel E7320 chipset
Two x4 PCI Express ports, DDR2 memory controller with RASUM features such as ECC, retry on uncorrectable error, integrated memory scrub engine, memory sparing function

I/O Controller Hub: Intel 6300ESB chipset
SATA 150, PATA 100, USB 2.0, UART, RTC, Interrupt Controller, Timer

| | |
|---|---|
| Gigabit Ethernet: | Intel 82571EB dual Gigabit Ethernet PCI Express bus controller |
| Watchdog: | FPGA based Software configurable two-stage Watchdog with programmable timeout ranging from 125 msec to 256 sec in 12 steps. |
| MMC: | Microcontroller with dual 128 kB Flash and 4 kB RAM |

## AMC System Interconnect

| | |
|---|---|
| PCI Express: | One x4 PCI Express interface<br>AMC fat pipes region port 4-7 (root complex) |
| Gigabit Ethernet: | Two Gigabit Ethernet 1000BASE-BX (SerDes) ports<br>AMC common options region port 0-1 |
| Serial ATA: | Two Serial ATA 150 ports<br>AMC common options region port 2-3 |

## Front Panel Interfaces

USB interface: One USB 2.0 host port on 5-pin MiniUSB type A/B connector
One COM port on 9-pin Dsub connector

LEDs: Light pipe:
- LED 0 (blue): hot swap
- LED 1 (red)
- LED 2 (green): general purpose or over temperature
- LED 3 (amber): general purpose or watchdog

Four general purpose LEDs (debug LEDs for POST code)
Alternatively used:
- LED 0/1: Ethernet port 0/1 link signal
- LED 2: SATA / Flash activity (application code)
- LED 3: MMC Debug LED

## MMC Module Management Controller

Microcontroller with 4 kB RAM:
- Two redundant 128 kB flash chips (one internal, one external)
- Communication capabilities:
  Keyboard Controller Style (KCS) interface to the onboard processor, local Intelligent Platform Management Bus (IPMB-L) to the carrier
  serial debug interface for test purposes
- Comprehensive MCC monitor/control support:
  Processor and chipset supervision such as:
  - Reset Board
  - Flash fail-over mechanism
  - Monitor BIOS POST code

  Onboard Power Supply Supervision such as:
  - AMC payload power
  - AMC management power
  - Various onboard supply voltages

  Temperature control for processor, board, chipset, GbE controller

## Compliancy

- 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.x
- PICMG AMC.3: Storage Interfaces R1.x
- IPMI Intelligent Platform Management Interface Specification, V1.5

- EMC Directive 89/336/EEC, EN 55022, EN 55024 (Europe)
- EN 300 386

Designed to meet:
- FCC 47 CFR Part 15, Subpart B (USA)
- CISPR22
- VCCI (Voluntary Japan Electromagnetic Compatibility requirement)
- UL 60950, 3rd edition (US and Canada)
- EN 60950-1 (Europe)
- LVD 73/23/EEC (Europe)
- Denan Law (Japan Safety)

## Power Consumption

| | | |
|---|---|---|
| 1.4 GHz, 1 GB mem: | typ. 24 W, | max. 28 W |
| 1.8 GHz, 2 GB mem: | typ. 34 W, | max. 40 W |

## General

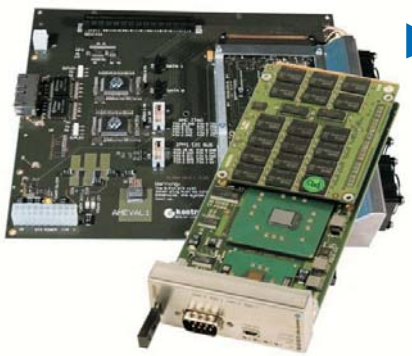
| | |
|---|---|
| Dimensions: | 181.5 mm x 73.5 mm<br>Single-width, full-height, extended full-height |
| MTBF: | 216,209 h acc. Bellcore Issue 6, Ground Benign, Controlled, 30°C |

## Software Support

AMI BIOS, BIOS parameters saved in EEPROM, Boot order defined via MMC
Serial over Lan, Support for Linux CGL

## Environmental

| | |
|---|---|
| Operating temp.: | -5°C to +55°C (depending on system environment) |
| Storage temp.: | -55°C to +85°C |
| Humidity: | Operational: 5%-90% (non-condensing)<br>Non-Operating: 5%-95% (non-condensing) |



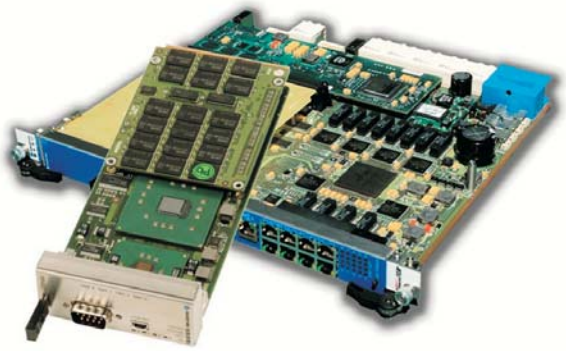
## AM-EVAL1 - Evaluation Kit for AM4002

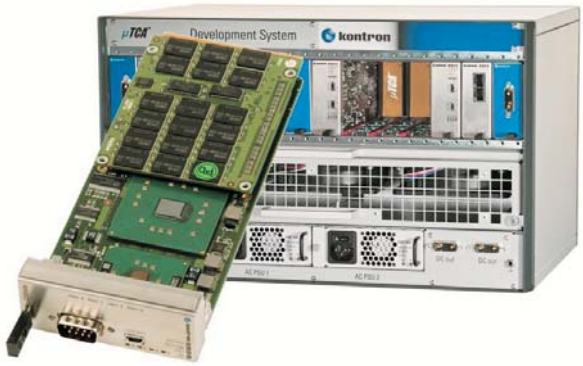
- Two copper RJ45 Gigabit Ethernet connectors for 1000 Base-TX support
- One standard PC PCI-Express x16 connector
- Two SATA connectors
- ATX power supply
- 3.5" SATA hard disk
- PCI-Express graphic board

# Ordering Information

| Product | Description | |
|---|---|---|
| | **Processor AMC** | |
| AM4002-1.4-1M-1F | AMC processor module, Pentium M 1.4 GHz, 1 GB memory, 1 GB MB flash | |
| AM4002-1.4-2M-1F | AMC processor module, Pentium M 1.4 GHz, 2 GB memory, 1 GB MB flash | |
| AM4002-1.8-2M-2F | AMC processor module, Pentium M 1.8 GHz, 2 GB memory, 2 GB MB flash | |
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| | **Software** | |
| KIT-AM4002 | User's Manual, Tool-Kit | |
| LIN-BSP-AM4002 | Linux Board Support Package | |
| | **Accessories** | |
| CABLE-MINI-USB-TA | Cable, MiniUSB-A-to-USB-A-Jack, 0.15m for AM4001 USB port to connect USB devices (included in AM-EVAL1) | |
| AM-EVAL1 | AM4002 Evaluation Kit, including graphic card, HDD, cables, installed Linux s/w on HDD | |
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| | | |
| | | |

# AM4002 Platforms






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