

# Technical Manual

---

## **AUG AMI DevKit for the .NET Micro Framework 3.0**

Rev 1.0, 20090128, AS

Please contact the product portal <http://www.aug-electronics.com/ami>  
For latest documentation, support, updates, downloads and to provide feedback.

© AUG Elektronik GmbH, AUSTRIA, Europe  
Kleinwoellmiss 53, A-8580 St. Martin a. W., <http://www.aug-electronics.com>

The content of this documentation is subject to change and improvement without prior information.  
This information is protected under copyright law and must not be reproduced, stored or given to third parties without written consent of AUG Elektronik GmbH.

All rights reserved.

## Table of Content

Quick Start .....	3
AMI DevKit Technical Manual .....	3
Components .....	3
Core .....	4
Display.....	4
Resistive touch screen.....	5
Ethernet.....	5
GPIOs.....	5
Busses .....	5
SPI.....	5
I2C.....	5
Extensions.....	6
Connector P4 .....	6
Connector P5 .....	6
Connector P6 .....	6
Connector P7 .....	7
Serial Ports.....	7
COM1 .....	7
COM2 .....	7
COM3 .....	8
DBGU .....	8
Power Supply .....	8
Micro SD-Card reader.....	8
USB host 1, 2 .....	8
USB device.....	8
Dimensions.....	9
Specifications.....	9
Footnote .....	9

## Quick Start

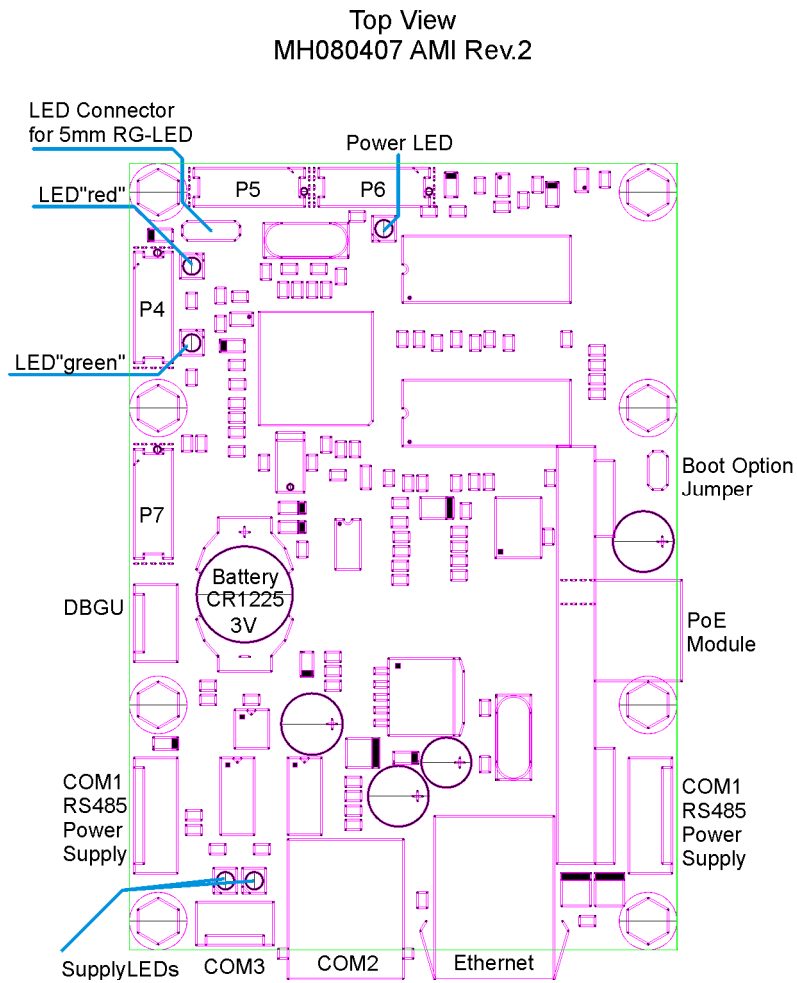
Please have a look at our Quick Start manual for your first contact with the DevKit.

## AMI DevKit Technical Manual

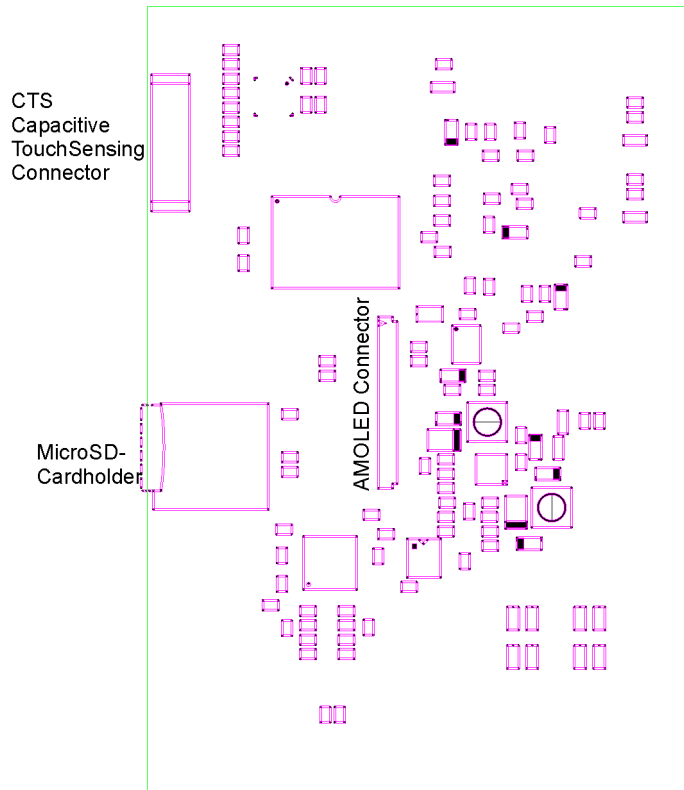
This document contains detailed information about the hardware and possible extensions to the hardware.

## Components

The AUG AMI DevKit mainboard is internally known as MH080407 AMI Rev. 2. The pictures below outline the board and name important components and connectors.



BottomView  
MH080407 AMI Rev.2



## Core

The AT91SAM9261 ARM CPU @ 200 MHz is the heart of the board. It is surrounded by 64 MByte SDRAM and 256 MByte NAND Flash.

This core is driven by the .NET Micro Framework 3.0 RTM.

This core would also be able to run Windows Embedded CE 6.0 R2 but we do currently have no plans for a Windows CE BSP.

## Display

The AUG AMI uses the AT91SAM9261 built in LCD controller. The 3.4" AMOLED display is connected to an 18-bit interface (262 400 colors) to save port pins. The software internally uses 24 Bits.

Resolution is 480 x 272 pixels, landscape.

The hardware is able to drive a 4.3" AMOLED display with same resolution and timing.

The display has a HX5116 SPI display controller that is used to tell the controller the display options, gamma correction and timing.

## Resistive touch screen

The AUG AMI has full support for resistive touch screen (SPI) and this function is also supported by the port and the .NET Micro Framework itself.

## Ethernet

The AUG AMI has a 10/100 MBit Ethernet controller (DM9000AE) with Auto-MDI (automatic cross over cabling detection) and PoE (poer over ethernet) capability on board.

The Auto-MDI function allows you to always connect standard straight through patch lines.

The PoE power supply itself is an add-on (option) to plug (or solder) into the board.

## GPIOs

The AUG AMI has 16 GPIOs that can be freely used. Some of them have alternative functions as documented below. The GPIOs are placed on the four red micromatch headers. Please find Pin description in the extensions section of this document.

## Busses

### *SPI*

The AUG AMI features the full set of SAM9261 two channel eight chip select SPI controller. Some of the channels are in use as you can see below.

<b>SPIO</b>	Device	Info
CS0	Serial DataFlash	Native use
CS1	Free	Free
CS2	Resistive Touch Screen controller	Native use
CS3	Free	Free

<b>SPI1</b>	Device	Info
CS0	Free	Free
CS1	OLED display controller	Managed use
CS2	Free	Free
CS3	Free	Free

### *I2C*

The AUG AMI has three peripherals connected to the I2C bus supported by managed drivers. You can add more as you wish to using connector P7.

I2C address	Device	Info
0x75	QT60160	QMatrix processor, capacitive key sensor
0x51*	RTC8564	Realtime clock
0x48	TMP100	Temperature sensor

The real bus address of the RTC is 0xA2. The MF needs 0x51 (A2 >> 1) because it only accepts 7 bit addressing.

## Extensions

There are four micromatch headers for extensions that contain GPIOs, I2C, SPI and power.

### **Connector P4**

Pin	Info	Description
1	3V3	3,3 V power supply (output)
2	GND	
3	VCC	5 V power supply
4	PA14	Card detect SD-card
5	PA18	LED red
6	PA19	LED green
7	PA20	Acoustic feedback option
8	PA21	Free GPIO
9	PA22	Free GPIO
10	PA27	Free GPIO

### **Connector P5**

Pin	Info	Description
1	3V3	3,3 V power supply (output)
2	GND	
3	PB30	MISO, SPI1
4	PB31	MOSI, SPI1
5	PB29	SPCK, SPI1
6	PA25	NPCS2, SPI1
7	PA26	NPCS3, SPI1
8	PA29	Free GPIO
9	PA30	Free GPIO
10	PA31	Free GPIO

### **Connector P6**

Pin	Info	Description
1	3V3	3,3 V power supply (output)
2	GND	
3	PA0	MISO, SPI0
4	PA1	MOSI, SPI0
5	PA2	SPCK, SPI0
6	PA4	NPCS1, SPI0
7	PA5	NPCS2, SPI0
8	PC5	Free GPIO
9	PC6	Free GPIO
10	PC7	Free GPIO

### Connector P7

Pin	Info	Description
1	VCC	5 V power supply
2	GND	
3	DDP	USB device
4	DDM	USB device
5	HDMA	USB host A
6	HDPA	USB host A
7	HDMB	USB host B
8	HDPB	USB host B
9	PA7	I2C Data
10	PA8	I2C Clock

### Serial Ports

There are four serial ports on the AUG AMI DevKit.

#### COM1

This Port is using RS485 levels and has a GPIO that drives the bus (write mode). Transmission speed can be up to 115200 Baud.

Pin	Info	Description
1	VCC	5 V power supply
2	VCC	5 V power supply
3	B_RS485	
4	A_RS485	
5	GND	
6	GND	

#### COM2

The COM2 is a RS232 standard serial port with (manual) handshake pins RTS / CTS. Transmission speed can be up to 115200 Baud. The port has a RJ-45 connector (AUG RS2323 RJ45 standard).

Pin	Info	Description
1	GND	
2	TxD	Standard RS 232 serial interface
3	GND	
4	RTS	
5	n.c.	
6	RxD	
7	CTS	
8	VCC	5 V power supply

### COM3

The COM3 is a RS232 standard serial port without handshake pins. Transmission speed can be up to 115200 Baud.

Pin	Info	Description
1	VCC	5 V power supply
2	TxD	Standard RS 232 serial interface
3	RxD	
4	GND	

### DBGU

The DBGU is a RS232 standard serial port without handshake pins. Primary use is to show debug output from the .NET Micro Framework 3.0 kernel (boot sequence, GC status, ...) and user code calling `Debug.Print()` from managed code. Settings are 115200 Baud, N , 8, 1.

Pin	Info	Description
1	VCC	5 V power supply
2	TxD	Standard RS 232 serial interface
3	RxD	
4	GND	

## Power Supply

- Single +5 V DC / 2 A (max. 10 Watts) regulated power supply
  - you can feed and take power from this supply on almost every connector
  - some connectors offer 3,3 V DC (output only)
- PoE (Power Over Ethernet) supply (optional)

## Micro SD-Card reader

The AUG AMI has a micro SD card reader (SPI mode) that you can use in your applications. The FAT file system is not yet implemented in the AUG AMI port of the .NET Micro Framework 3.0

## USB host 1, 2

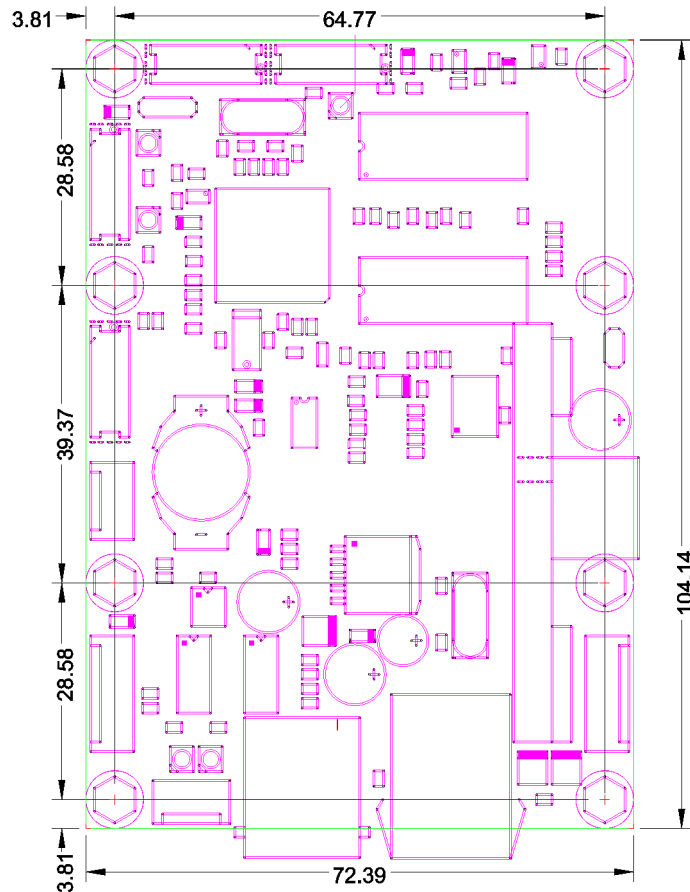
The AUG AMI has two USB host modules. The .NET Micro Framework 3.0 does not currently support USB host.

## USB device

The AUG AMI has a USB device module. This is being used by SAM-BA for flashing the Firmware into the device. Our .NET Micro Framework 3.0 port does not currently support USB device.

## Dimensions

- Board L 73 mm x B 105 mm x H 20 mm
- 3.4" display L 53 mm x B 85 mm x H 2 mm (H 3 mm with resistive touch screen)



All Dimension in mm (Millimeter). Picture M 1:1 (original Size)

## Specifications

- Operating temperature 0..65 °C
- Operating humidity 10 to 90% non condensing
- RoHS compliant

## Footnote

If you find this documentation is missing some information please do not hesitate to contact us by visiting our web-site <http://www.aug-electronics.com/ami> and providing feedback!