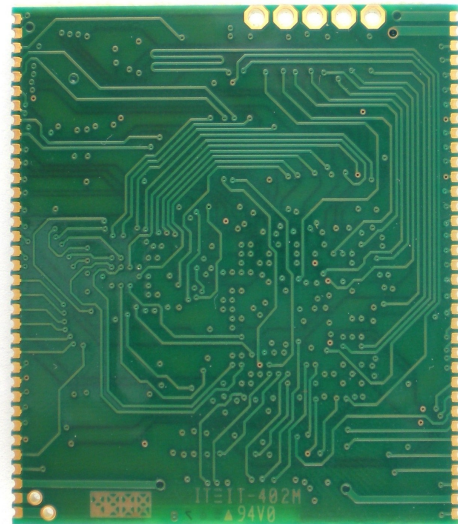
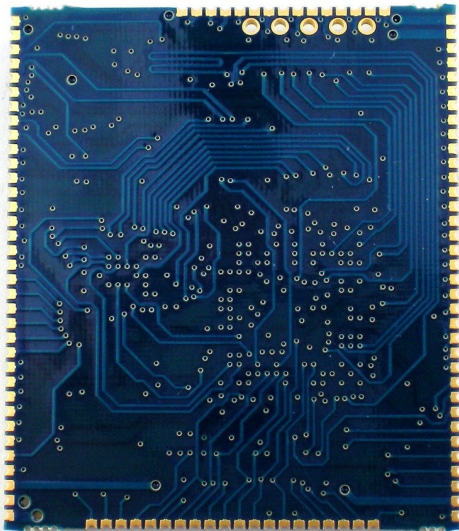
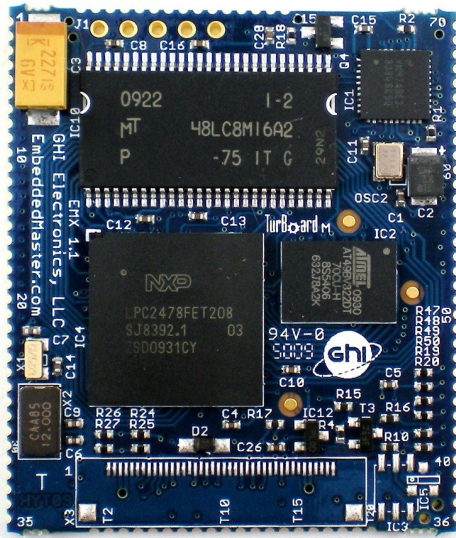


EMX vs. Embedded Master Module

September 14, 2011

Comparison Document



EMX Module

Embedded Master Module

GHI Electronics offers various .NET Micro Framework hardware solutions that fit a wide range of applications with the best prices. One of the main NETMF products is the Embedded Master Module which has been used in several products worldwide.

GHI is offering the exceptional EMX Module as the next generation Embedded Master Module. EMX and Embedded Master are essentially identical in features and dimensions.

Important note for current Embedded Master Module customers: Embedded Master Modules will continue to be produced and supported but the EMX Module is recommended for new designs.

Migrating from Embedded Master to EMX should be effortless. The following points highlight the differences:

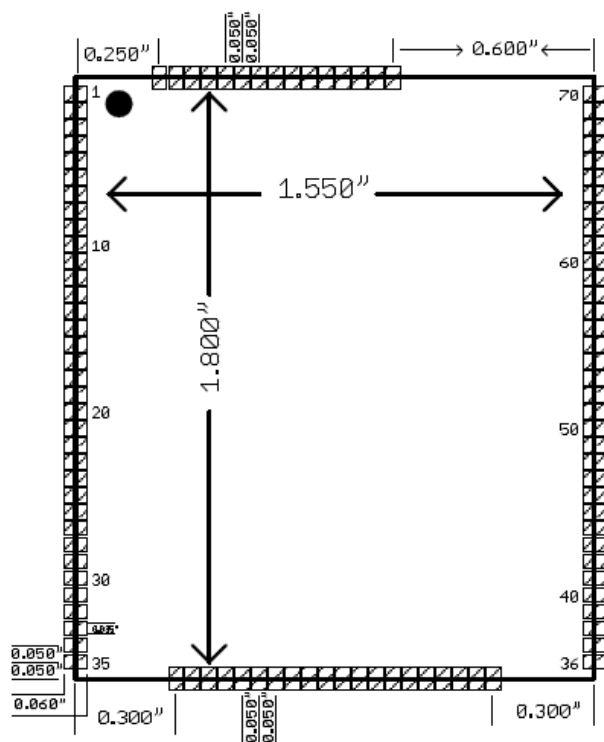
1. **Pads:** While having the same physical size, the new EMX adds new pads for LCD signals. These signals are available on an FFC cable on Embedded Master. This lowers the production cost by eliminating the need to add an FFC cable. EMX also adds other pads for JTAG signals, new IOs and signals for Ethernet activity. All other pads are still the same.
2. **Embedded Master and EMX Firmware compatibility:**
 - The Embedded Master firmware with NETMF V3.0 does not work on an EMX Module and users should not try to use it on an EMX Module or physical damage might occur to the EMX hardware.
 - Embedded Master and EMX share the same firmware with NETMF 4.0 or higher. In other words, Embedded Master users willing to upgrade to NETMF 4.0 or higher must use the EMX firmware available in the GHI NETMF SDK. But it must be considered that the EMX firmware does not natively support SPI-based Displays.
3. **SPI-Based Displays:** Except for CANxtra, the EMX firmware does not natively support SPI-based LCDs (the ones used with the old non-TFT Embedded Master Module based devices such as the non-TFT Embedded Master Development System), but users can still use the graphics feature and refresh the LCD from the managed code over SPI bus. GHI is providing a simple example how to accomplish this process. CANxtra SPI LCD is natively supported.
4. **Touch Screen signals:** The four touch screen signals are on different pins on EMX from the Embedded Master Module. The EMX firmware automatically detects the hardware (EMX or Embedded Master Module) and sets the touch screen signal assignment accordingly.
5. **Default LCD resolution:** The default resolution is 320x240 which matches Sharp 3.5" PT0353224T-A802 TFT display available on the EMX Development System. The EMX firmware automatically detects the hardware and sets the correct default resolution accordingly (320x240 on EMX and 480x272 on Embedded Master).
6. **GHI Boot Loader and debugging interface (access interface):** The EMX boot loader supports serial just like the Embedded Master loader but it also supports USB. A new pin (LMODE) is introduced which will be used to select if the boot

loader will run in USB or serial mode. LMODE pin also selects the debugging interface. The EMX manual provides more information. Also, by pressing the Center and Down buttons upon startup, EMX always uses the LMODE pin to choose USB or COM1 (overriding software settings), however, on Embedded Master this will force COM1 debugging only.

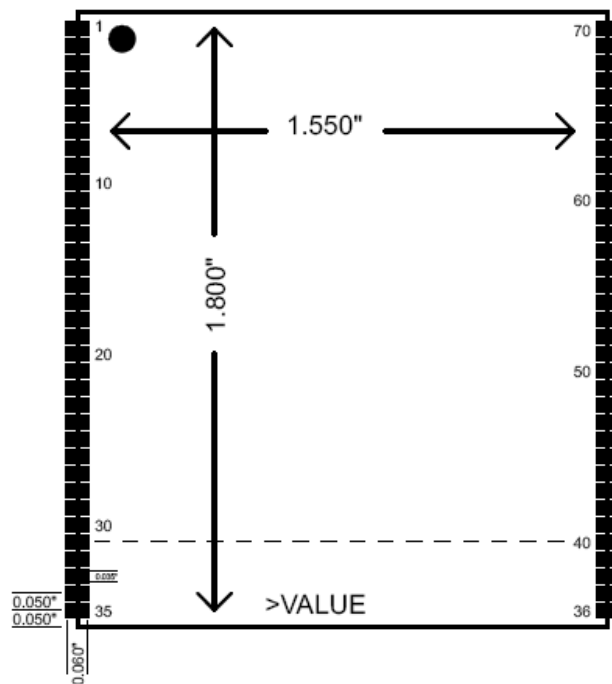
7. **RLP:** With RLP support on EMX, users can now write real-time code and handle tasks with higher efficiency using C or Assembly.
8. **RAM:** Memory on EMX has been doubled to 16MB.
9. **MAC address:** EMX does not store a serial number for Ethernet MAC address assignment like Embedded Master. On the other hand, the MAC address is printed out on a ROHS static Dissipative Polyimide label, compatible with Surface Mount Technology.
10. **Ethernet Oscillator:** EMX's Ethernet oscillator is controlled by the processor allowing the user to control it's power consumption. Disabling the oscillator will reduce the power draw by about 20mA.
11. **Ethernet Speed and activity signals:** EMX's new pads include signals for Ethernet speed and activity.
12. **Design Cost:** With new LCD pads, EMX allows for savings on integration costs. LCDs can also be wired directly to the module's pads without the need for extra connectors/cables. In conjunction with the doubled RAM size, capabilities are further expanded without a steep price increase.

Dimensions

Dimensions are identical except for the new added pads.



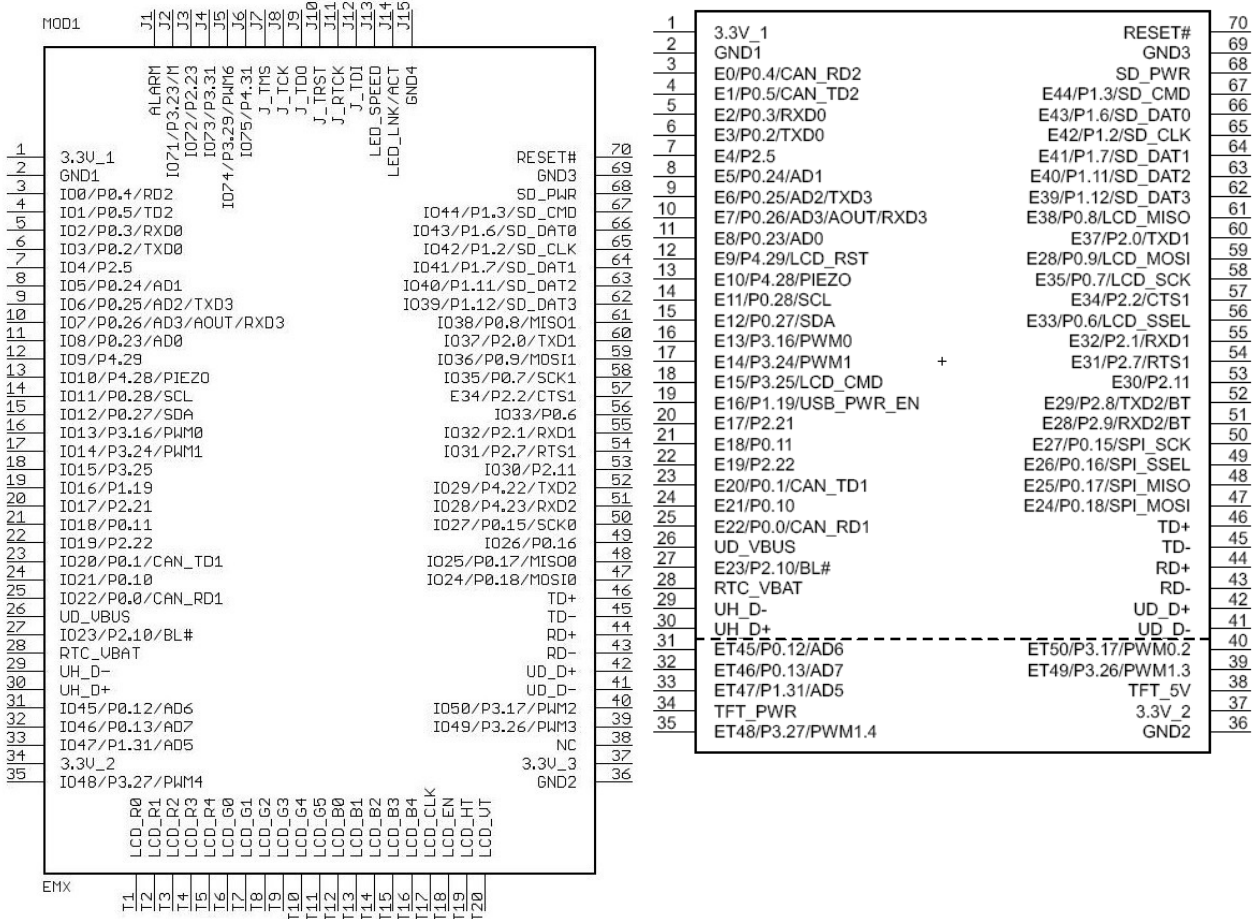
EMX Module



Embedded Master

Pin-out

Original pin-out is still the same except new pins are added for LCD, JTAG and additional IOs.



EMX Module

Embedded Master Module

For further Information:

Related Documents:

- [EMX Brochure and Pin-out](#)
- [EMX Module User Manual](#)
- [Embedded Master Module Brochure and Pin-out](#)
- [Embedded Master Module User Manual](#)

Links:

<http://www.ghielectronics.com>

Customer Support:

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