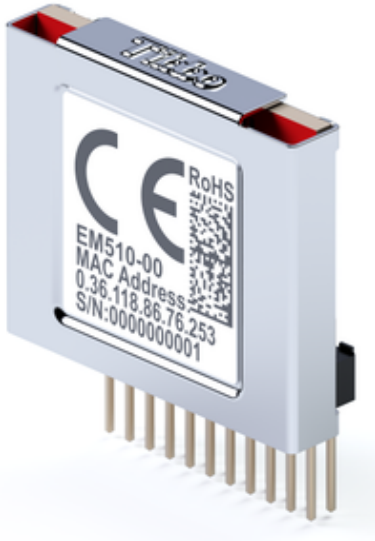


EM510 "MiniMo" BASIC/C-programmable IoT Module

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Introduction

The EM510 "MiniMo" (R) device is a miniature stand-alone BASIC-programmable embedded module, designed to be used in combination with a standard LED/magnetics RJ45 jack. The combined footprint of the EM510 and a standard RJ45 jack is only 28.5x18.5mm.

The module's hardware mix, which includes 10/100BaseT Ethernet port, a serial port, and 8 GPIO lines, has been carefully tailored to address the basic needs of lightweight IoT devices. If your application has a need to store data in files, an [external flash IC](#) can be connected to the EM510. By connecting the [WA2000](#) add-on module to the EM510 you can also enable Wi-Fi and BLE (Bluetooth Low Energy) communications.

Compact dimensions, innovative space-saving "vertical slice" mechanical design, low power consumption, and patented [dual-function LED control lines](#) make the module an excellent fit for miniature, cost-sensitive IoT designs.

The EM510 is fully supported by TIDE software and a dedicated EM510 platform that covers all hardware facilities of the device (see "TIDE and Tibbo BASIC Manual"). For convenient testing and evaluation Tibbo offers the [EM510EV](#) development system.

The EM510 can be ordered standalone or in combination with an industry-standard RJ45 jack and other discrete components required to complete a working circuit.

EM510 advantages over the EM500 module

The EM510 is a higher-performance upgrade to our [EM500 device](#). Here is a small list of important improvements:

- 32-bit architecture (vs. 8-bit architecture of the EM500).
- 17 to 33 times better performance, depending on the calculations and variable types.
- 8 times faster GPIO manipulation.
- 2.3 times lower power consumption (110mA vs. 260mA).
- Added support for BLE (Bluetooth Low Energy) communications (this requires the [WA2000](#) add-on).
- Added support for WPA and WPA2 Wi-Fi security modes (Wi-Fi communications rely on the [WA2000](#) add-on).
- SSI (SPI and I2C communications) object included.
- The ability to update TiOS firmware and compiled Tibbo BASIC/C app over-the-air (this requires the [WA2000](#) and an iOS or Android device).
- 20°C lower internal running temperature (52°C vs. 73°C).
- Industrial operating temperature range (-40 ~ +85C).

Hardware features

- 32-bit architecture.
- Powered by Tibbo OS (TiOS).
- 10/100BaseT auto-MDIX Ethernet port (automatic detection of "straight" and "cross" cables). Standard Ethernet magnetics are **NOT** integrated into the module.
- Optional Wi-Fi interface (requires the [WA2000](#) add-on module to be [connected](#)).
- Optional BLE (Bluetooth Low Energy) interface (requires the [WA2000](#) add-on module to be [connected](#)).
- One serial port (CMOS-level):
 - Baudrates of up to 460,800bps;
 - None*/even/odd/mark/space parity modes;
 - 7*/8 bits/character;
 - Full-duplex mode with RTS/CTS and XON/XOFF flow control;
 - Half-duplex mode with direction control;
 - Encoding and decoding of Wiegand and clock/data streams.
- 10 general-purpose I/O lines; 2 lines can work as interrupts.
- 16.1KB SRAM for Tibbo BASIC/C variables and data.
- 512KB flash memory for TiOS and application code (224KB for application code).
- Optional 1MB flash disk (requires an [external SPI flash IC](#)).
- 2048-byte EEPROM (2016 bytes are available for the application's data storage).
- Three control lines for status LEDs:
 - Control lines for two external [dual-function status LEDs](#).
 - A separate control line for the Ethernet link LED.
- Reliable power-on/brown-out reset circuit (external reset IC not required).
- Power: 110mA @ 3.3V (100BaseT mode).
- "Vertical slice" form factor.
- Dimensions (HxWxT): 16 x 18.5 x 6.5mm.
- Operating temperature range: -40 ~ +85C.
- Firmware and compiled Tibbo BASIC/C app can be updated through:
 - The serial port;
 - Ethernet LAN; or
 - Over-the-air (this requires the [WA2000](#) and an iOS or Android device).
- Tibbo BASIC/C application can be debugged through the Ethernet LAN (no additional debugging hardware is required).
- CE- and FCC-certified.

* *The EM510 does not support the combination of 7 bits/character mode and the "none" parity mode.*

Programming features

- Platform objects:
 - bt — in charge of the BLE (Bluetooth Low-Energy) interface.
 - button — monitors the MD (setup) line.
 - fd — manages the flash memory file system and direct sector access.
 - io — handles I/O lines, ports, and interrupts.
 - net — controls the Ethernet port.
 - pat — "plays" patterns on up to five LED pairs.
 - ppp — accesses the Internet over a serial modem (GPRS, etc.).
 - pppoe — accesses the Internet over an ADSL modem.
 - romfile — facilitates access to resource files (fixed data).
 - ser — controls the serial port (UART, Wiegand, clock/data modes).

- sock — socket comms (up to 16 UDP, TCP, and HTTP sessions).
 - ssi — controls serial synchronous interface channels (SPI, I2C).
 - stor — provides access to the EEPROM.
 - sys — in charge of general device functionality.
 - wln — handles the Wi-Fi interface.
- Variable Types: Byte, char, integer (word), short, dword, long, real, string, plus user-defined arrays and structures.
 - Function groups: String functions, date/time conversion functions, encryption/hash calculation functions, and more.