

# Hardware

## Specifications:

- 32-bit architecture.
- 10/100Base-T auto-MDIX Ethernet port with RJ45/magnetics.
- Optional Wi-Fi interface (requires the [GA1000](#) add-on module).
- Can control a GPRS modem\* (such as the SIM900).
- Four high-speed serial ports (CMOS):
  - Baudrates of up to 460,800bps;
  - None\*\*/even/odd/mark/space parity modes;
  - 7\*\* or 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.
- 56 general-purpose I/O lines.
- Supports external 320x240 TFT LCD display\*.
- Supports matrix and binary output keypads\*.
- Programmable square-wave output for driving a buzzer\*.
- RTC with backup battery.
- 1MB flash for TIOS and application code.
- Additional 1MB flash for the hardened fault-tolerant file system.
- 2048-byte EEPROM for data storage.
- Three onboard LEDs:
  - Red and green status LEDs;
  - Yellow Ethernet status LED.
- Two control lines for connecting external status LEDs.
- Onboard MD (setup) button.
- Software-controlled PLL allows to select full, medium, or low speed.
- Reliable power-on/brown-out reset circuit.
- Powering options:
  - Through the switching regulator, 12VDC nominal (8 ~ 20V);
  - Using regulated 3.3V power (the regulator is bypassed).
- The regulator can provide up to 1.3A @ 3.3V to external devices.
- Power: 100mA @ 3.3V (100Base-T mode, full speed).
- Dimensions (LxWxH): 75x36x17.5mm\*\*\*.
- Operating temperature range: -40 ~ +80°C.
- Firmware is upgradeable through the serial port or network.

\**Must be connected externally.*

\*\**The EM2001 does not support the combination of the 7 bits/character mode and the "none" parity mode.*

\*\*\**Not including RJ45, power jack, GA1000.*

## See Also:

- [GA1000](#) Wi-Fi add-on module
- [EM2000](#) programmable IoT module

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# Programming

## Platform objects:

- [beep](#) — generates buzzer patterns.
- [button](#) — monitors the MD (setup) line.
- [fd](#) — manages flash memory file system and direct sector access.
- [io](#) — handles I/O lines, ports, and interrupts.
- [kp](#) — works with matrix and "binary" keypads.
- [lcd](#) — controls graphical display panels.
- [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).
- [rtc](#) — keeps track of date and time.
- [ser](#) — controls serial ports (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.
- [win](#) — handles the Wi-Fi interface.

**Function Groups:** String functions (27 in total), date/time conversion functions (8), encryption/hash calculation functions (RC4, MD5, SHA-1), and more.

**Variable Types:** Signed and unsigned 8-bit, 16-bit, and 32-bit types; floating point and string types; user-defined arrays and structures.

# Files and Documentation

TIOS Firmware [tios-em2000w-3\\_70\\_07.bin](#) (used for EM2001)

Documentation [EM2001 Hardware Manual](#)  
[EM2000 Programming Platform](#) (used for EM2001)