

M0E10XPX_Operation Description

MCU

The module integrates the Tensilica L106 32-bit microcontroller (MCU) and ultra-low-power 16-bit RSIC. The CPU clock speed is 80 MHz and can reach a maximum value of 160MHz. The system can readily run a Real Time Operating System (RTOS). Currently, the WiFi stack only takes up 20% of CPU time. The remaining CPU time (80% of total MIPS) can be used for user applications. The CPU can interface through:

- Programmable RAM/ROM interfaces (iBus) that connect to memory controller and can access the external flash.
- Data RAM interface (dBus) that connects to the memory controller.
- AHB interface that accesses the register.

Memory

Internal SRAM and ROM

ESP8266EX Wi-Fi SoC integrates the memory controller and memory units including ROM and SRAM. MCU can access the memory units through iBus, dBus, and AHB interfaces. All memory units can be accessed upon request. A memory arbiter determines the running sequence in the arrival order of requests. According to our current version of SDK, the SRAM space available to users is assigned as follows:

- RAM size < 50 kB, that is, when ESP8266EX is working in Station mode and connects to the router, available space in the Heap + Data sector is around 50 kB.
- There is no programmable ROM in ESP8266EX, therefore, the user program must be stored in an external SPI flash.

SPI Flash

ESP8266EX supports SPI flash. Theoretically speaking, ESP8266EX can support an up to 16-MB SPI flash. M0E10XPX currently integrates a 2-MB SPI flash. M0E10XPX supports these SPI modes: Standard SPI, DIO (Dual I/O), DOUT (Dual Output), QIO (Quad I/O) and QOUT (Quad Output).

Crystal Oscillator

M0E10XPX uses a 26-MHz crystal oscillator. The accuracy of the crystal oscillator should be ± 10 PPM. The operating temperature range is -20°C to 70°C; and the storage

temperature range is -40°C to 85°C.

When using the download tool, please select the right type of crystal oscillator. In circuitdesign, capacitors C1 and C2 which connect to the earth are added to the input and output terminals of the crystal oscillator respectively. The values of the two capacitors can be flexible, ranging from 6 pF to 22 pF, however, the specific capacitive values depend on further testing of, and adjustment to, the overall performance of the whole circuit. Normally, the capacitive values of C1 and C2 are within 10 pF for the 26-MHz crystal oscillator. The crystal oscillator should be placed as close to the XTAL pins as possible (without the traces being too long). It is good practice to add high density ground vias around the clock trace for great insulation. There should be no vias on the input and output traces, which means the traces cannot cross layers. Place the input and output bypass capacitors on the near left or right side of the chip. Do not place them on the traces. Do not route high-frequency digital signal lines in the four-layer board. It is best not to route any signal line under the crystal oscillator. The larger the copper area on the top layer is, the better. As crystal oscillator is a sensitive component, do not place magnetic components such as high current inductor nearby.

Frequency Range:

2412~2462MHz