# ❑ MN101E01K, MN101E01L, MN101E01M

| Type | MN101E01K (under development) | MN101E01L (under development) | MN101E01M (under development) |
|---|---|---|---|
| **ROM (×8-bit)**<br>External memory can be expanded | 256 K | 320 K | 384 K |
| **RAM (×8-bit)**<br>External memory can be expanded | 10 K | 14 K | 24 K |
| **Package** | QFP100-P-1818B *Lead-free | | |
| **Minimum Instruction Execution Time** | Standard: 0.0625 µs (at 3.0 V to 3.6 V, 32 MHz)<br>0.238 µs (at 3.0 V to 3.6 V, 8.39 MHz)<br>125 µs (at 3.0 V to 3.6 V, 32 kHz)<br>Double speed: 0.10 µs (at 3.0 V to 3.6 V, 10 MHz)<br>0.25 µs (at 3.0 V to 3.6 V, 4 MHz)<br>62.5 µs (at 3.0 V to 3.6 V, 32 kHz) | | |
| **Interrupts** | • RESET • Watchdog • External 0 • External 1 • External 2 • External 3 • External 4 • External 5 • Timer 0 • Timer 1 • Timer 2 • Timer 3 • Timer 4 • Timer 5 • Timer 6 • Timer 7 (2 systems) • Time base • Serial 0 • Serial 1 • Serial 2 • Serial 3 • Serial 4 • Automatic transfer finish • A/D conversion finish • Key interrupts (8 lines) | | |
| **Timer Counter** | Timer counter 0 : 8-bit × 1<br>(square-wave/8-bit PWM output, event count, generation of remote control carrier, pulse width measurement)<br>Clock source ····· 1/2, 1/4 of system clock frequency; 1/1, 1/4, 1/16, 1/32, 1/64 of OSC oscillation clock frequency; 1/1 of XI oscillation clock frequency; external clock input<br>Interrupt source ····· coincidence with compare register 0<br><br>Timer counter 1 : 8-bit × 1 (square-wave output, event count, synchronous output event)<br>Clock source ····· 1/2, 1/8 of system clock frequency; 1/1, 1/4, 1/16, 1/64, 1/128 of OSC oscillation clock frequency; 1/1 of XI oscillation clock frequency; external clock input<br>Interrupt source ····· coincidence with compare register 1<br><br>Timer counter 0, 1 can be cascade-connected.<br><br>Timer counter 2 : 8-bit × 1 (square-wave/8-bit PWM output, event count, synchronous output event, pulse width measurement, serial baud rate timer)<br>Clock source ····· 1/2, 1/4 of system clock frequency; 1/1, 1/4, 1/16, 1/32, 1/64 of OSC oscillation clock frequency; 1/1 of XI oscillation clock frequency; external clock input<br>Interrupt source ····· coincidence with compare register 2<br><br>Timer counter 3 : 8-bit × 1 (square-wave output, event count, generation of remote control carrier, serial baud rate timer)<br>Clock source ····· 1/2, 1/8 of system clock frequency; 1/1, 1/4, 1/16, 1/64, 1/128 of OSC oscillation clock frequency; 1/1 of XI oscillation clock frequency; external clock input<br>Interrupt source ····· coincidence with compare register 3<br><br>Timer counter 2, 3 can be cascade-connected.<br><br>Timer counter 4 : 8-bit × 1<br>(square-wave/8-bit PWM output, event count, pulse width measurement, serial baud rate timer)<br>Clock source ····· 1/2, 1/4 of system clock frequency; 1/1, 1/4, 1/16, 1/32, 1/64 of OSC oscillation clock frequency; 1/1 of XI oscillation clock frequency; external clock input frequency<br>Interrupt source ····· coincidence with compare register 4<br><br>Timer counter 5 : 8-bit × 1 (square-wave output, event count, serial baud rate timer)<br>Clock source ····· 1/2, 1/4 of system clock frequency; 1/1, 1/4, 1/16, 1/64, 1/128 of OSC oscillation clock frequency; 1/1 of XI oscillation clock frequency; external clock input<br>Interrupt source ····· coincidence with compare register 5<br><br>Timer counter 4, 5 can be cascade-connected. | | |

**Timer Counter (Continue)**

Timer counter 6 : 8-bit freerun timer
- Clock source ····· 1/1 of system clock frequency; 1/1, 1/4096, 1/8192 of OSC oscillation clock frequency; 1/1, 1/4096, 1/8192 of XI oscillation clock frequency
- Interrupt source ····· coincidence with compare register 6

Timer counter 7 : 16-bit × 1
(square-wave/16-bit PWM output, cycle / duty continuous variable, event count, synchronous output evevt, pulse width measurement, input capture)
- Clock source ····· 1/1, 1/2, 1/4, 1/16 of system clock frequency; 1/1, 1/2, 1/4, 1/16 of OSC oscillation clock frequency; 1/1, 1/2, 1/4, 1/16 of external clock input frequency
- Interrupt source ····· coincidence with compare register 7 (2 lines)

Time base timer (one-minute count setting)
- Clock source ····· 1/1 of OSC oscillation clock frequency; 1/1 of XI oscillation clock frequency
- Interrupt source ····· 1/128, 1/256, 1/512, 1/1024, 1/8192, 1/32768 of clock source frequency

Watchdog timer
- Interrupt source ····· 1/65536, 1/262144, 1/1048576, 1/4194304 of system clock frequency

DMA controller (automatic data transfer)
- Max. Transfer cycles ····· 255
- Starting factor ····· external request, various types of interrupt, software
- Transfer mode ····· 1-byte transfer, word transfer, burst transfer

**Serial Interface**

Serial 0 : synchronous type/UART (full-duplex) × 1
- Clock source ····· 1/2, 1/4 of system clock frequency; pulse output of timer counter 2, 4; 1/2, 1/4, 1/16, 1/64 of OSC oscillation clock frequency

Serial 1 : synchronous type/UART (full-duplex) × 1
- Clock source ····· 1/2, 1/4 of system clock frequency; pulse output of timer counter 4, 5; 1/2, 1/4, 1/8, 1/16, 1/64 of OSC oscillation clock frequency

Serial 2 : synchronous type/simple $I^2C$× 1
- Clock source ····· 1/2, 1/4 of system clock frequency; pulse output of timer counter 2, 3; 1/2, 1/4, 1/8, 1/16, 1/32, 1/64, 1/128 of OSC oscillation clock frequency

Serial 3 : synchronous type/simple $I^2C$ × 1
- Clock source ····· 1/2, 1/4 of system clock frequency; pulse output of timer counter 3; 1/2, 1/4, 1/8, 1/16, 1/32, 1/64, 1/128 of OSC oscillation clock frequency

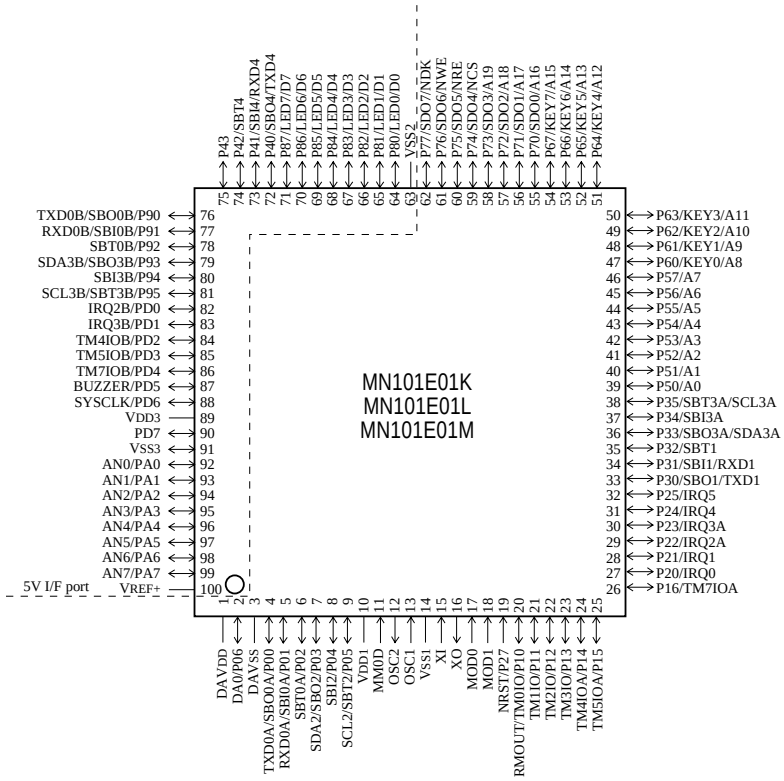
Serial 4 : synchronous type/UART (full-duplex) × 1
- Clock source ····· 1/2, 1/4 of system clock frequency; pulse output of timer counter 2, 5 ; 1/2, 1/4, 1/16, 1/64 of OSC oscillation clock frequency

| | | | |
|---|---|---|---|
| **I/O Pins** | **I/O** | 34 | • (5 V IF port) Common use • Specified pull-up resistor available • Input/output selectable (bit unit) |
| | | 50 | • (3 V IF port) Common use • Specified pull-up resistor available • Input/output selectable (bit unit) |

| | |
|---|---|
| **A/D Inputs** | 10-bit × 8-ch. (with S/H) |
| **D/A Outputs** | 8-bit × 1-ch. |
| **Special Ports** | Buzzer output, remote control carrier signal output, high-current drive port |

**See the next page for electrical characteristics, pin assignment and support tool.**

## Pin Assignment




QFP100-P-1818B *Lead-free

# Support Tool

| | | |
|---|---|---|
| **In-circuit Emulator** | Under development | |
| **Flash Memory Built-in Type** | Type | MN101EF01M (under development) |
| | ROM (× 8-bit) | 384 K |
| | RAM (× 8-bit) | 24 K |
| | Minimum instruction execution time | Standard: 0.625 µs (at 3.0 V to 3.6 V, 32 MHz)<br>Double speed: 0.10 µs (at 3.0 V to 3.6 V, 10 MHz) |
| | Package | QFP100-P-1818B *Lead-free |

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