

# □ MN101E16K, MN101E16M

Type	MN101E16K (under planning)	MN101E16M (under development)
<b>ROM (×8-bit)</b> External memory can be expanded	256 K	384 K
<b>RAM (×8-bit)</b> External memory can be expanded	12 K	20 K
<b>Package</b>	QFP100-P-1818B *Lead-free (under development), LQFP100-P-1414 *Lead-free (under planning)	
<b>Minimum Instruction Execution Time</b>	0.0588 μs (at 2.7 V to 3.6 V, 17 MHz at internal 2,4,8 times oscillation used) 0.1 μs (at 2.7 V to 3.6 V, 20 MHz) 30.6 μs (at 2.7 V to 3.6 V, 32.768 kHz)	
<b>Interrupts</b>	<ul style="list-style-type: none"> <li>• RESET • Watchdog • External 0 • External 1 • External 2 • External 3 • External 4 • External 5 • Timer 0</li> <li>• Timer 1 • Timer 2 • Timer 3 • Timer 4 • Timer 5 • Timer 6 • Timer 7 (2 systems) • Timer A, B, C, D, E</li> <li>• Time base • Serial 0 (2 systems) • Serial 1 (2 systems) • Serial 2 • Serial 3 (2 systems) • Serial 4 (2 systems)</li> <li>• Automatic transfer finish (2 systems) • A/D conversion finish • Key interrupts</li> </ul>	
<b>Timer Counter</b>	<p>Timer counter 0 : 8-bit × 1 (square-wave/8-bit PWM output, event count, simple pulse width measurement, real time output control)</p> <p>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</p> <p>Interrupt source ..... coincidence with compare register 0</p> <p>Timer counter 1 : 8-bit × 1 (square-wave output, event count, synchronous output event, 16-bit timer with cascade connection (Timer 0 and connection), serial clock output)</p> <p>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</p> <p>Interrupt source ..... coincidence with compare register 1</p> <p>Timer counter 0, 1 can be cascade-connected.</p> <p>Timer counter 2 : 8-bit × 1 (square-wave/8-bit PWM output, event count, synchronous output event, pulse width measurement, real time output control, serial baud rate timer)</p> <p>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</p> <p>Interrupt source ..... coincidence with compare register 2</p> <p>Timer counter 0, 1, 2 can be cascade-connected.</p> <p>Timer counter 3 : 8-bit × 1 (square-wave output, event count, serial baud rate timer)</p> <p>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</p> <p>Interrupt source ..... coincidence with compare register 3</p> <p>Timer counter 2, 3 can be cascade-connected.</p> <p>Timer counter 0, 1, 2, 3 can be cascade-connected.</p> <p>Timer counter 6 : 8-bit freerun timer, time base timer</p> <p>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</p> <p>Interrupt generating cycle ... 1/128, 1/256, 1/512, 1/1024, 1/8192 1/32768 of OSC oscillation clock frequency 1/128, 1/256, 1/512, 1/1024, 1/8192, 1/32768 of XI oscillation clock frequency</p> <p>Interrupt source ..... coincidence with compare register 6</p>	

<b>Timer Counter (Continue)</b>	Timer counter 7 : 16-bit × 1 (square-wave/16-bit PWM output, cycle / duty continuous variable, event count, synchronous output event, 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)
	Timer counter A, B, C, D, E : 8-bit × 5 Clock source ..... 1/2, 1/4 of system clock frequency; 1/1, 1/2, 1/4, 1/8, 1/16, 1/32 of OSC oscillation clock frequency Interrupt source ..... coincidence with compare register A, B, C, D, E
	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

<b>DMA Controller (Automatic Data Transfer)</b>	Number of channels : 2 Max. Transfer cycles : 255 Starting factor : external request, various types of interrupt, software Transfer mode : 1-byte transfer, word transfer, burst transfer
---	--

<b>Serial Interface</b>	Serial 0 : synchronous type/UART (full-duplex) × 1 Clock source ..... 1/2, 1/4 of system clock frequency; pulse output of timer counter 2, A; 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 3, B; 1/2, 1/4, 1/8, 1/16, 1/64 of OSC oscillation clock frequency
	Serial 2 : synchronous type/single-master I <sup>2</sup> C × 1 Clock source ..... 1/2, 1/4 of system clock frequency; pulse output of timer counter 3, C; 1/2, 1/4, 1/16, 1/32 of OSC oscillation clock frequency
	Serial 3 : synchronous type/I <sup>2</sup> C × 1 Clock source ..... 1/2, 1/4 of system clock frequency; pulse output of timer counter 2, D; 1/2, 1/4, 1/16, 1/32 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, E; 1/2, 1/4, 1/16, 1/64 of OSC oscillation clock frequency

<b>I/O Pins</b>	<b>I/O</b>	22	• (5 V IF port) Common use • Specified pull-up resistor available • Input/output selectable (bit unit)
		62	• (3 V IF port) Common use • Specified pull-up resistor available • Input/output selectable (bit unit)
		1	• (3 V IF port) Common use

<b>A/D Inputs</b>	10-bit × 8-ch. (with S/H)
-------------------	---------------------------

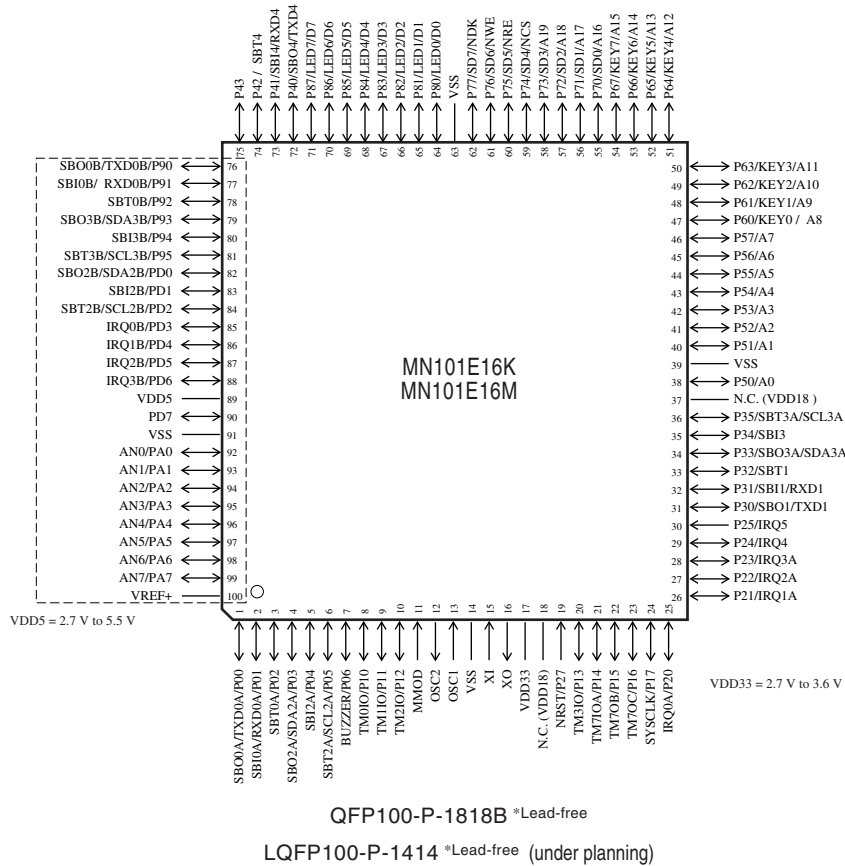
<b>Special Ports</b>	Buzzer output, high-current drive port
----------------------	--

<b>Electrical Characteristics</b>	T.B.D
<b>Supply current</b>	

<b>ROM Correction</b>	Correcting address designation: up to 7 addresses possible
-----------------------	--

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

## Pin Assignment



( ): Flash memory built-in type

## Support Tool

In-circuit Emulator	Under development	
Flash Memory Built-in Type	Type	MN101EF16N (under development)
	ROM (× 8-bit)	512 K
	RAM (× 8-bit)	30 K
	Minimum instruction execution time	0.0588 μs (at 2.7 V to 3.6 V, 17 MHz)
	Package	QFP100-P-1818B *Lead-free, LQFP100-P-1414 *Lead-free (under planning)

MN101E16K, MN101E16M □

## Request for your special attention and precautions in using the technical information and semiconductors described in this material

- (1) An export permit needs to be obtained from the competent authorities of the Japanese Government if any of the products or technical information described in this material and controlled under the "Foreign Exchange and Foreign Trade Law" is to be exported or taken out of Japan.
- (2) The technical information described in this material is limited to showing representative characteristics and applied circuits examples of the products. It neither warrants non-infringement of intellectual property right or any other rights owned by our company or a third party, nor grants any license.
- (3) We are not liable for the infringement of rights owned by a third party arising out of the use of the technical information as described in this material.
- (4) The products described in this material are intended to be used for standard applications or general electronic equipment (such as office equipment, communications equipment, measuring instruments and household appliances).  
Consult our sales staff in advance for information on the following applications:
  - Special applications (such as for airplanes, aerospace, automobiles, traffic control equipment, combustion equipment, life support systems and safety devices) in which exceptional quality and reliability are required, or if the failure or malfunction of the products may directly jeopardize life or harm the human body.
  - Any applications other than the standard applications intended.
- (5) The products and product specifications described in this material are subject to change without notice for modification and/or improvement. At the final stage of your design, purchasing, or use of the products, therefore, ask for the most up-to-date Product Standards in advance to make sure that the latest specifications satisfy your requirements.
- (6) When designing your equipment, comply with the guaranteed values, in particular those of maximum rating, the range of operating power supply voltage, and heat radiation characteristics. Otherwise, we will not be liable for any defect which may arise later in your equipment.  
Even when the products are used within the guaranteed values, take into the consideration of incidence of break down and failure mode, possible to occur to semiconductor products. Measures on the systems such as redundant design, arresting the spread of fire or preventing glitch are recommended in order to prevent physical injury, fire, social damages, for example, by using the products.
- (7) When using products for which damp-proof packing is required, observe the conditions (including shelf life and amount of time let standing of unsealed items) agreed upon when specification sheets are individually exchanged.
- (8) This material may be not reprinted or reproduced whether wholly or partially, without the prior written permission of Matsushita Electric Industrial Co., Ltd.