☐ MN101E01J, MN101E01K, MN101E01L, MN101E01M

Type	MN101E01J	MN101E01K	MN101E01L	MN101E01M
ROM (×8-bit) External memory can be expanded	192 K	256 K	320 K	384 K
RAM (×8-bit) External memory can be expanded	10 K	10 K	14 K	20 K
Package	QFP100-P-1818B *Lead-free	QFP100-P-1818B *Lead-free	QFP100-P-1818B *Lead-free LQFP100-P-1414 *Lead-free	QFP100-P-1818B *Lead-free LQFP100-P-1414 *Lead-free (under development)

Minimum Instruction Execution Time

Standard: 0.0625 µs (at 3.0 V to 3.6 V, 32 MHz)
0.1 µs (at 3.0 V to 3.6 V, 20 MHz)
62.5 µs (at 3.0 V to 3.6 V, 32 kHz)
Double speed: 0.10 µs (at 3.0 V to 3.6 V, 10 MHz)

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 (2 systems) • Serial 1 (2 systems) • Serial 2 • Serial 3 • Serial 4 (2 systems) • Automatic transfer finish • A/D conversion finish • Key interrupts (8 lines)

Timer Counter

Timer counter 0 : 8-bit × 1
(square-wave/8-bit PWM output, event count, generation of remote control carrier, pulse width measurement, generation of real time)
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
Interrupt source ······ coincidence with compare register 0

Timer counter 1 : 8-bit × 1 (square-wave output, event count, synchronous output event)
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
Interrupt source ······ coincidence with compare register 1

Timer counter 0, 1 can be cascade-connected.

Timer counter 2 : 8-bit × 1 (square-wave/8-bit PWM output, event count, synchronous output event, pulse width measurement generation of real time, serial baud rate timer)
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
Interrupt source ······ coincidence with compare register 2

Timer counter 3 : 8-bit × 1 (square-wave output, event count, generation of remote control carrier, serial baud rate timer)
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
Interrupt source ······ coincidence with compare register 3

Timer counter 2, 3 can be cascade-connected.

Timer counter 4 : 8-bit × 1
(square-wave/8-bit PWM output, event count, pulse width measurement, serial baud rate timer)
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
Interrupt source ······ coincidence with compare register 4

Timer counter 5 : 8-bit × 1 (square-wave output, event count, serial baud rate timer)
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
Interrupt source ······ coincidence with compare register 5

Timer Counter (Continue)

Timer counter 4, 5 can be cascade-connected.

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/single-master 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/single-master I^2C × 1
- Clock source ········ 1/2, 1/4 of system clock frequency; pulse output of timer counter 3, 5; 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 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

ROM Correction

Correcting address designation : up to 3 addresses possible

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

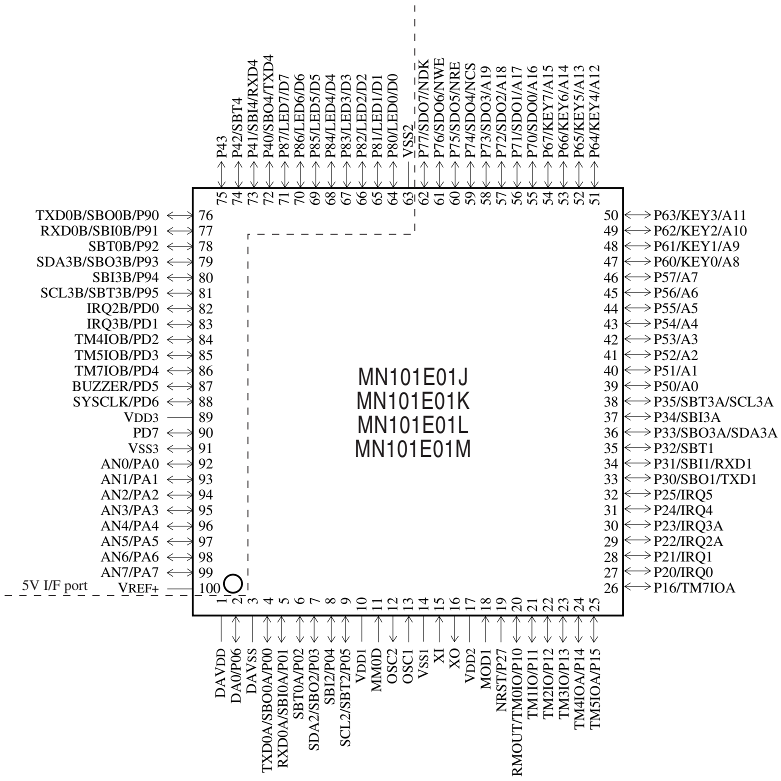
Electrical Characteristics

Supply current

Parameter	Symbol	Condition	Limit			Unit
			min	typ	max	
Operating supply current	IDD1	fosc = 4 MHz, VDD = 3 V		11(48)	30(80)	mA
	IDD2	fx = 32 kHz, VDD = 3 V		8(43)	22(75)	mA
	IDD3	fx = 32 kHz, VDD = 3 V, Ta = 25°C		30(60)	120(180)	µA
Supply current at HALT	IDD4	fx = 32 kHz, VDD = 3 V, Ta = −40°C to +85°C		12	30	µA
Supply current at STOP	IDD5	VDD = 3 V, Ta = 25°C		0.3	3.0	µA
	IDD6	VDD = 3 V, Ta = −40°C to +85°C			80	µA

( ) : Flash memory built-in type.

Pin Assignment



QFP100-P-1818B *Lead-free
LQFP100-P-1414 *Lead-free

Support Tool

In-circuit Emulator

PX-ICE101E9+PX-PRB101E01-QFP100-P-1818B
PX-ICE101E9+PX-PRB101E01-QFP100-P-1414

Flash Memory Built-in Type

Type	MN101EF01M
ROM (× 8-bit)	384 K
RAM (× 8-bit)	24 K
Minimum instruction execution time	Standard: 0.0625 µs (at 3.0 V to 3.6 V, 32 MHz) Double speed: 0.10 µs (at 3.0 V to 3.6 V, 10 MHz)
Package	QFP100-P-1818B *Lead-free, LQFP100-P-1414 *Lead-free

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.