❑ MN101E01J, MN101E01K, MN101E01L, MN101E01M

Type	MN101E01J	MN101E01K	MN101E01L	MN101E01M	MN101EF01M
Internal ROM type	Mask ROM				FLASH
ROM (byte)	192K	256K	320K	384K	
RAM (byte)	10K		14K	20K	24K
Package (Lead-free)	QFP100-P-1818B		LQFP100-P-1414, QFP100-P-1818B		
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)				[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)

■ Interrupts

RESET, Watchdog, External 0 to 5, Timer 0 to 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 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

■ 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 I²C× 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 I²C × 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

■ DMA controller

Max. Transfer cycles : 255

Starting factor : external request, various types of interrupt, software

Transfer mode : 1-byte transfer, word transfer, burst transfer

■ 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 converter

10-bit × 8-ch. (with S/H)

■ D/A converter

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

■ Electrical Charactreistics (Supply current)

Parameter	Symbol	Condition	Limit			Unit
			min	typ	max	
Operating supply current	IDD1	fosc = 32.0 MHz , VDD1 = 3.3 V , (fs = fosc/2)		11 (48)	30 (80)	mA
	IDD2	fosc = 20.0 MHz , VDD1 = 3.3 V , (fs = fosc/2)		8 (43)	22 (75)	mA
	IDD3	fosc = 32.768 kHz , VDD1 = 3.3 V , (fs = fosc/2)		30 (60)	120 (180)	µA
Supply current at HALT	IDD4	fx = 32.768 kHz , VDD1 = 3.3 V		12	30	µA
Supply current at STOP	IDD5	VDD1 = 3.3 V , Ta = 25°C		0.3	3.0	µA
	IDD6	VDD1 = 3.3 V , Ta = 85°C			80	µA

( ) : Flash memory built-in type

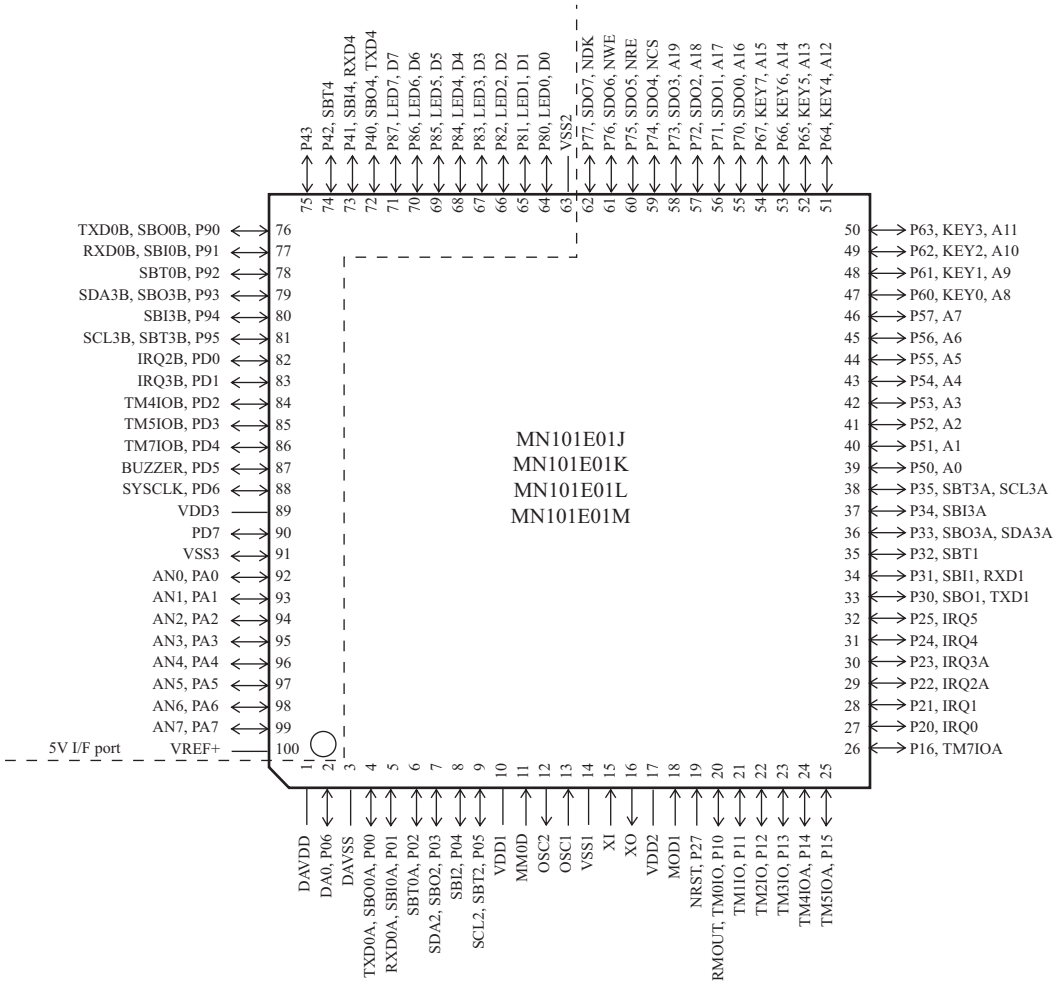
■ Development tools

In-circuit Emulator

PX-ICE101E+PRBV101E01-QFP100-P-1818B

PX-ICE101E+PRBV101E01-LQFP100-P-1414

■ Pin Assignment



QFP100-P-1818B
LQFP100-P-1414

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

(1) If any of the products or technical information described in this book is to be exported or provided to non-residents, the laws and regulations of the exporting country, especially, those with regard to security export control, must be observed.

(2) The technical information described in this book is intended only to show the main characteristics and application circuit examples of the products, and no license is granted under any intellectual property right or other right owned by our company or any other company. Therefore, no responsibility is assumed by our company as to the infringement upon any such right owned by any other company which may arise as a result of the use of technical information described in this book.

(3) The products described in this book 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.

(4) The products and product specifications described in this book 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.

(5) When designing your equipment, comply with the range of absolute maximum rating and the guaranteed operating conditions (operating power supply voltage and operating environment etc.). Especially, please be careful not to exceed the range of absolute maximum rating on the transient state, such as power-on, power-off and mode-switching. 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.

(6) Comply with the instructions for use in order to prevent breakdown and characteristics change due to external factors (ESD, EOS, thermal stress and mechanical stress) at the time of handling, mounting or at customer's process. When using products for which damp-proof packing is required, satisfy the conditions, such as shelf life and the elapsed time since first opening the packages.