

# **MN101C49G, MN101C49H, MN101C49K**

|                                    |                                                                                    |           |           |            |            |
|------------------------------------|------------------------------------------------------------------------------------|-----------|-----------|------------|------------|
| Type                               | MN101C49G                                                                          | MN101C49H | MN101C49K | MN101CF49K | MN101CP49K |
| Internal ROM type                  | Mask ROM                                                                           |           |           | FLASH      | EPROM      |
| ROM (byte)                         | 128K                                                                               | 160K      | 224K      |            |            |
| RAM (byte)                         | 4K                                                                                 | 6K        | 10K       |            |            |
| Package (Lead-free)                | LQFP100-P-1414, QFP100-P-1818B                                                     |           |           |            |            |
| Minimum Instruction Execution Time | [Standard]                                                                         |           |           |            |            |
|                                    | 0.10 μs (at 4.5 V to 5.5 V, 20 MHz)                                                |           |           |            |            |
|                                    | 0.238 μs (at 2.7 V to 5.5 V, 8.39 MHz)                                             |           |           |            |            |
|                                    | 125 μs (at 2.0 V to 5.5 V, 32 kHz)*                                                |           |           |            |            |
|                                    | [Double speed]                                                                     |           |           |            |            |
|                                    | 0.12 μs (at 4.5 V to 5.5 V, 8.39 MHz)                                              |           |           |            |            |
|                                    | 0.25 μs (at 3.0 V to 5.5 V, 4 MHz)                                                 |           |           |            |            |
|                                    | 62.5 μs (at 2.0 V to 5.5 V, 32 kHz)*                                               |           |           |            |            |
|                                    | * The lower limit for operation guarantee for EPROM built-in type is 2.7 V.        |           |           |            |            |
|                                    | * The lower limit for operation guarantee for flash memory built-in type is 4.5 V. |           |           |            |            |

## **Interrupts**

RESET, Watchdog, External 0 to 5, Timer 0 to 4, Timer 6, Timer 7 (2 systems), Time base, Serial 0 to 3, Automatic transfer finish, A/D conversion finish, Key interrupts (8 lines)

## **Timer Counter**

Timer counter 0 : 8-bit  $\times$  1

(square-wave/8-bit PWM output, event count, generation of remote control carrier, pulse width measurement)

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  $\times$  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  $\times$  1

(square-wave/8-bit PWM output, event count, synchronous output event, pulse width measurement)

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  $\times$  1 (square-wave output, event count, generation of remote control carrier)

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  $\times$  1

(square-wave/8-bit PWM output, event count, pulse width measurement, serial 1 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; 1/1 of external clock input frequency

Interrupt source ..... coincidence with compare register 4

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 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)

**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 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/simple UART (half-duplex) × 1**

Clock source..... 1/2, 1/4 of system clock frequency; pulse output of timer counter 4; 1/2, 1/4, 1/16, 1/64 of OSC oscillation clock frequency

**Serial 2 : synchronous type × 1**

Clock source..... 1/2, 1/4 of system clock frequency; pulse output of timer counter 3; 1/2, 1/4, 1/16, 1/32 of OSC oscillation clock frequency

**Serial 3 : 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; 1/2, 1/4, 1/16, 1/32 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   | 73<br>(72) | Common use , Specified pull-up resistor available, Input/output selectable (bit unit)<br>( ) : Flash memory built-in type. |
| Input | 15<br>(14) | Common use , Specified pull-up resistor available<br>( ) : Flash memory built-in type.                                     |

■ **A/D converter**

10-bit × 8-ch. (with S/H)

■ **D/A converter**

8-bit × 4-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 Characteristics (Supply current)

| Parameter                | Symbol | Condition                                     | Limit |        |         | Unit |
|--------------------------|--------|-----------------------------------------------|-------|--------|---------|------|
|                          |        |                                               | min   | typ    | max     |      |
| Operating supply current | IDD1   | fosc = 20 MHz , VDD = 5 V                     |       | 30     | 70      | mA   |
|                          | IDD2   | fosc = 8.39 MHz , VDD = 5 V                   |       | 15     | 30      | mA   |
|                          | IDD3   | fx = 32.768 kHz , VDD = 3 V                   |       | 40     | 120     | μA   |
| Supply current at HALT   | IDD4   | fx = 32 kHz , VDD = 3 V (5 V), Ta = 25°C      |       | 5 (13) | 11 (30) | μA   |
|                          | IDD5   | fx = 32.768 kHz , VDD = 3 V (5 V) , Ta = 85°C |       |        | 30 (90) | μA   |
| Supply current at STOP   | IDD6   | VDD = 5 V , Ta = 25°C                         |       |        | 3       | μA   |
| Supply current at STOP   | IDD7   | VDD = 5 V , Ta = 85°C                         |       |        | 60      | μA   |

( ) : Flash memory built-in type

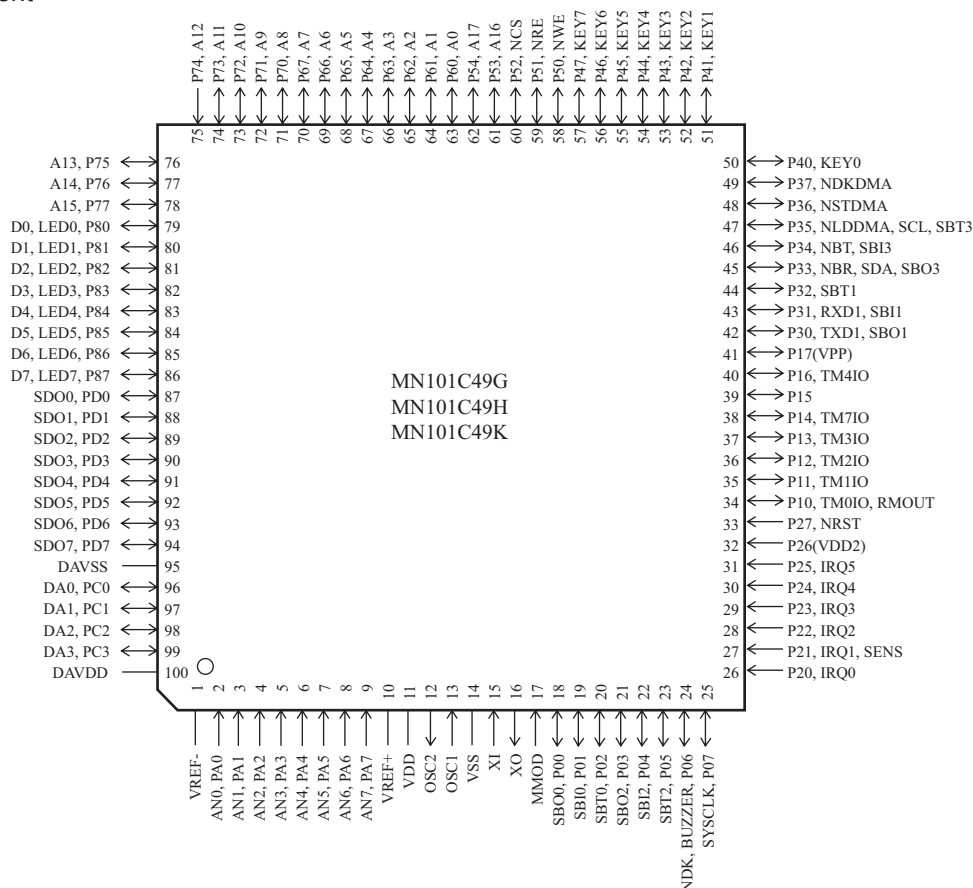
## ■ Development tools

In-circuit Emulator

PX-ICE101C/D+PX-PRB101C49-QFP100-P-1818B

PX-ICE101C/D+PX-PRB101C49-LQFP100-P-1414

## ■ Pin Assignment



QFP100-P-1818B

LQFP100-P-1414

Note) ( ) : Flash memory built-in type.

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