❑ MN101C49G , MN101C49H , MN101C49K

Type	MN101C49G	MN101C49H	MN101C49K
ROM (×8-bit) External memory can be expanded	128 K	160 K	224 K
RAM (×8-bit) External memory can be expanded	4 K	6 K	10 K
Package	QFP100-P-1818B *Lead-free		

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 • External 1 • External 2 • External 3 • External 4 • External 5 • Timer 0 • Timer 1 • Timer 2 • Timer 3 • Timer 4 • Timer 6 • Timer 7 (2 systems) • Time base • Serial 0 • Serial 1 • Serial 2 • Serial 3 • 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)
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)
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)
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 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 (Continue)

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 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/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^2C × 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

I/O Pins	**I/O**	73 (72)	• Common use • Specified pull-up resistor available • Input/output selectable (bit unit) ( ) : Flash memory built-in type.
	Input	15 (14)	• Common use • Specified pull-up resistor available ( ) : Flash memory built-in type.
A/D Inputs			10-bit × 8-ch. (with S/H)
D/A Outputs			8-bit × 4-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.

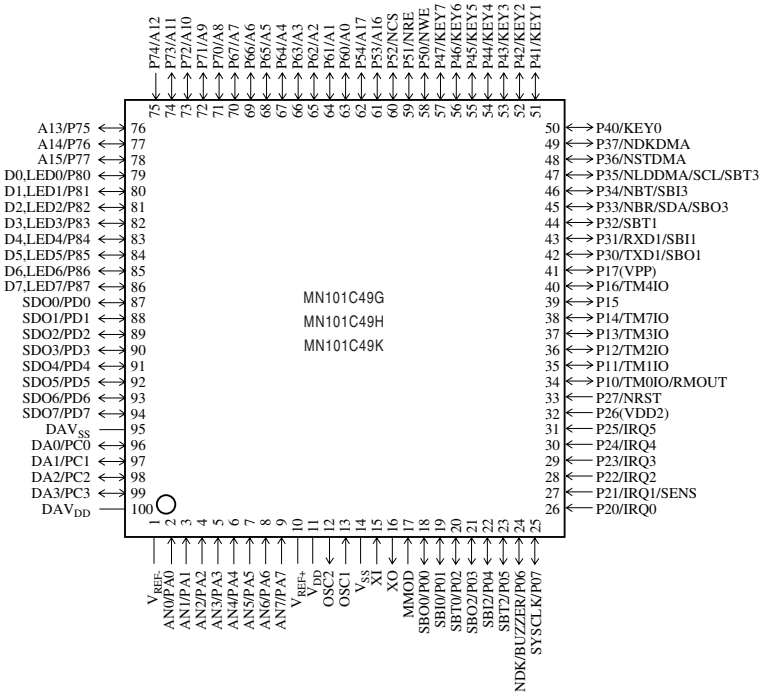
Electrical Characteristics

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 (70°C)			30 (90)	µA
Supply current at STOP	IDD6	VDD = 5 V, Ta = 25°C			3	µA
	IDD7	VDD = 5 V, Ta = 85°C (70°C)			60	µA

( ) : Flash memory built-in type.

Pin Assignment



QFP100-P-1818B *Lead-free

( ) : Flash memory built-in type.

Support Tool

In-circuit Emulator	PX-ICE101C / D + PX-PRB101C49-QFP100-P-1818B		
EPROM Built-in Type	Type	MN101CP49K	
	ROM (× 8-bit)	224 K	
	RAM (× 8-bit)	10 K	
	Minimum instruction execution time	Standard:	0.10 µs (at 4.5 V to 5.5 V, 20 MHz)
			0.25 µs (at 2.7 V to 5.5 V, 8.39 MHz)
		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)
	Package	QFP100-P-1818B *Lead-free	
Flash Memory Built-in Type	Type	MN101CF49K [ES (Engineering Sample) available]	
	ROM (× 8-bit)	224 K	
	RAM (× 8-bit)	10 K	
	Minimum instruction execution time	Standard:	0.10 µs (at 4.5 V to 5.5 V, 20 MHz)
		Double speed:	0.12 µs (at 4.5 V to 5.5 V, 8.39 MHz)
	Package	QFP100-P-1818B *Lead-free	

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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.

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