

# □ MN101C28A , MN101C28C , MN101C28D , MN101C28F , MN101C28L

Type	MN101C28A	MN101C28C	MN101C28D	MN101C28F	MN101C28L
<b>ROM (x8-bit)</b> External memory can be expanded	32 K	48 K	64 K	96 K	96 K
<b>RAM (x8-bit)</b> External memory can be expanded	1.5 K	2 K	2 K	4 K	10 K
<b>Package (Conventional Package)</b>	[All lead-free] LQFP080-P-1414A, TQFP080-P-1212D, QFP084-P-1818E (TQFP080-P-1212C)			LQFP080-P-1414A *Lead-free	
<b>Minimum Instruction Execution Time</b>	0.10 μs (at 4.5 V to 5.5 V, 20 MHz) 0.238 μs (at 2.6 V to 5.5 V, 8.39 MHz) 0.333 μs (at 2.3 V to 5.5 V, 6 MHz) 1.00 μs (at 2.0 V to 5.5 V, 2 MHz)* 125 μs (at 2.0 V to 5.5 V, 32.768 kHz)* * The lower limit for operation guarantee for EPROM built-in type is 2.3 V.				
<b>Interrupts</b>	<ul style="list-style-type: none"> <li>• RESET • Watchdog • External 0 • External 1 • External 2 • External 3 • External 4 • Timer 0</li> <li>• Timer 1 • Timer 2 • Timer 3 • Timer 4 • Timer 5 • Time base • Serial 0 • Serial 1 • Serial 2</li> <li>• Automatic transfer finish • A/D conversion finish</li> </ul>				
<b>Timer Counter</b>	<p>Timer counter 0 : 8-bit × 1 (square-wave/8-bit PWM output, event count, generation of remote control carrier)            Clock source ..... 1/1, 1/4 of system clock frequency; 1/1 of OSC oscillation clock frequency; external clock input            Interrupt source ..... coincidence with compare register 0</p> <p>Timer counter 1 : 8-bit × 1 (square-wave output, event count, synchronous output event)            Clock source ..... 1/16, 1/64 of system clock frequency; 1/1 of XI oscillation clock frequency; external clock input            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)            Clock source ..... 1/1, 1/4 of system clock frequency; 1/1 of XI oscillation clock frequency; external clock input            Interrupt source ..... coincidence with compare register 2</p> <p>Timer counter 3 : 8-bit × 1            (square-wave output, event count, generation of remote control carrier, serial 0 baud rate timer)            Clock source ..... 1/4, 1/16 of system clock frequency; 1/1 of OSC oscillation clock frequency; external clock input            Interrupt source ..... coincidence with compare register 3</p> <p>Timer counter 2, 3 can be cascade-connected.</p> <p>Timer counter 4 : 16-bit × 1            (square-wave/16-bit PWM output, event count, synchronous output event, input capture)            Clock source ..... 1/4, 1/16 of system clock frequency; 1/1 of OSC oscillation clock frequency; external clock input            Interrupt source ..... coincidence with compare register 4</p> <p>Time base timer (one-minute count setting, independently operable 8-bit timer counter 5)            Clock source ..... 1/4 of system clock frequency; 1/1, 1/8192 of OSC oscillation clock frequency; 1/1, 1/8192 of XI oscillation clock frequency            Interrupt source ..... coincidence with compare register 5; 1/8192 prescaler overflow</p> <p>Watchdog timer            Interrupt source ..... 1/65536, 1/262144, 1/1048576 of system clock frequency (ROM option)</p>				

**MN101C28A , MN101C28C , MN101C28D □**  
**MN101C28F , MN101C28L**

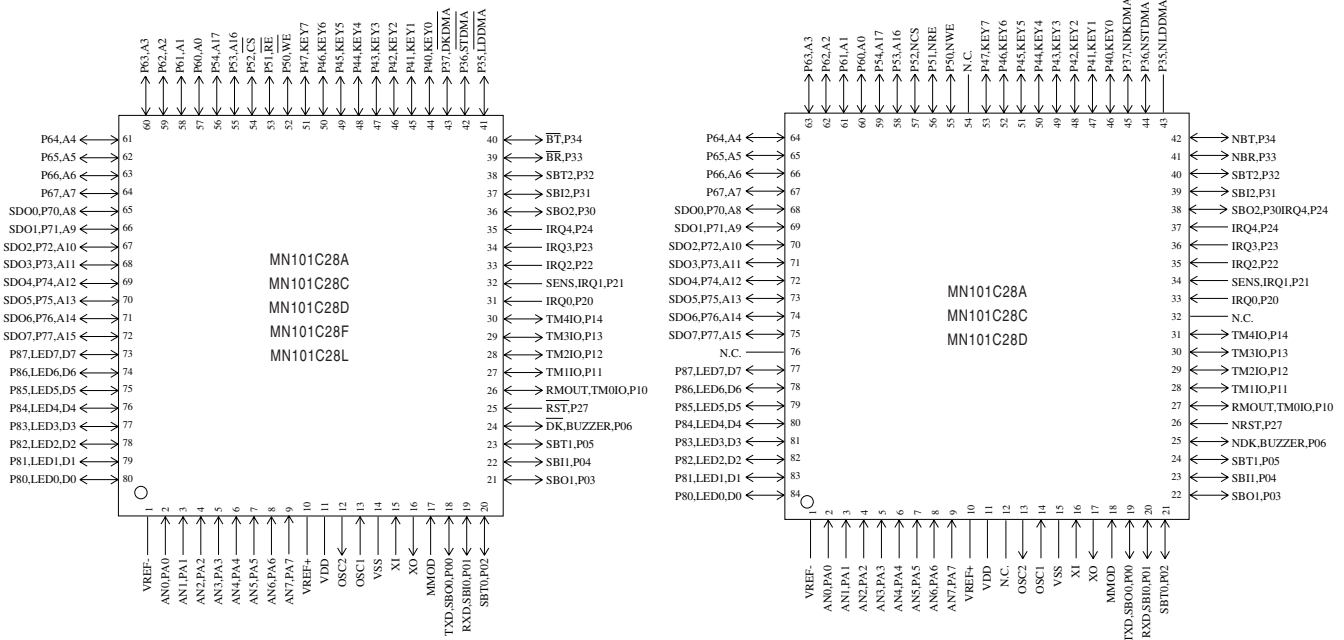
<b>Serial Interface</b>	Serial 0 : synchronous type/simple UART (half-duplex) × 1 Clock source ..... 1/2, 1/4, 1/16 of system clock frequency; output of timer counter 3  Serial 1 : synchronous type × 1 Clock source ..... 1/2, 1/8, 1/64 of system clock frequency; output of timer counter 3  Serial 2 : synchronous type/single-master I <sup>2</sup> C × 1 Clock source ..... 1/4, 1/8, 1/16, 1/32 of system clock frequency; 1/4 of timer counter 0 frequency		
<b>I/O Pins</b>	<b>I/O</b>	57	• Common use • Specified pull-up resistor available • Input/output selectable (bit unit)
	<b>Input</b>	13	• Common use • Specified pull-up resistor available
<b>A/D Inputs</b>	10-Bit × 8-ch. (with S/H)		
<b>Special Ports</b>	Buzzer output, remote control carrier signal output, high-current drive port		

<b>Electrical Characteristics</b>						
<b>Supply current</b>						
Parameter	Symbol	Condition	Limit			Unit
			min	typ	max	
Operating supply current	IDD1	fosc = 20 MHz, VDD = 5 V		25	50	mA
	IDD2	fx = 32.768 kHz, VDD = 3 V		40	120	μA
Supply current at HALT	IDD3	fx = 32.768 kHz, VDD = 3 V, Ta = 25°C		4	8	μA
		fx = 32.768 kHz, VDD = 3 V, Ta = 85°C			20	μA
Supply current at STOP	IDD4	VDD = 5 V, Ta = 25°C			1	μA
		VDD = 5 V, Ta = -40°C to +85°C			30	μA

See the next page for pin assignment and support tool.

## Pin Assignment

( ) : Conventional Package



LQFP080-P-1414A \*Lead-free

QFP084-P-1818E \*Lead-free

TQFP080-P-1212D \*Lead-free [MN101C28A/28C/28D]

(TQFP080-P-1212C)

## Support Tool

### In-circuit Emulator

PX-ICE101C/D+PX-PRB101C28-TQFP080-P-1212  
 PX-ICE101C/D+PX-PRB101C28-QFP084-P-1818E  
 PX-ICE101C/D+PX-PRB101C28-LQFP080-P-1414A

### EPROM Built-in Type

Type MN101CP28DBF, MN101CP28DAL, MN101CP28DHT,  
 MN101CP28LAL

ROM (× 8-bit) 64 K / 64 K / 64 K / 96 K

RAM (× 8-bit) 2 K / 2 K / 2 K / 10 K

Minimum instruction execution time 0.10 μs (at 4.5 V to 5.5 V, 20 MHz)

0.238 μs (at 2.6 V to 5.5 V, 8.39 MHz)

0.333 μs (at 2.3 V to 5.5 V, 6 MHz)

Package [All lead-free] LQFP080-P-1414A, TQFP080-P-1212D, QFP084-P-1818E

(Conventional Package) (TQFP080-P-1212C)