

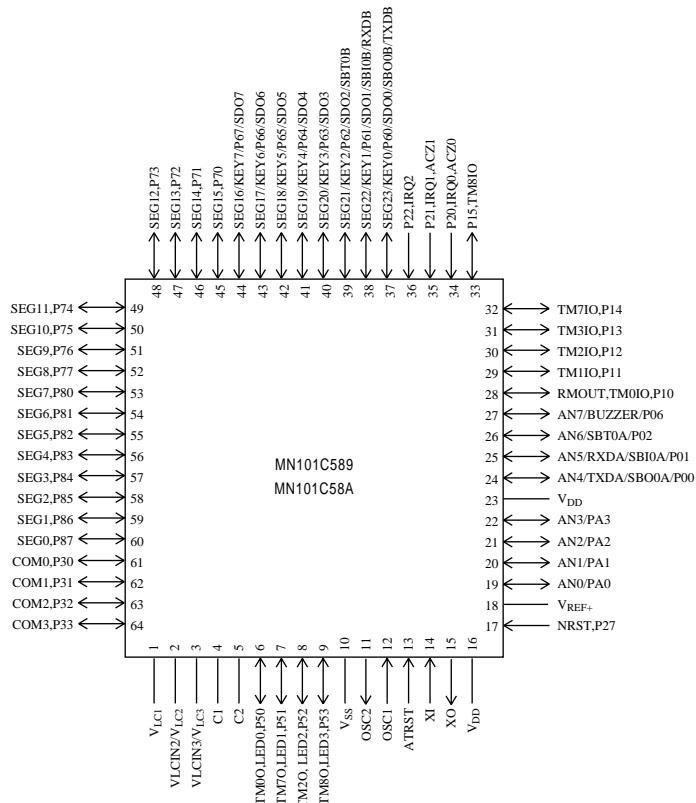
# □ MN101C589, MN101C58A

Type	MN101C589	MN101C58A		
ROM (x8-bit)	24 K	32 K		
RAM (x8-bit)	1.5 K	1.5 K		
Package	LQFP064-P-1414 *Lead-free			
Minimum Instruction Execution Time	0.1 $\mu$ s (at 4.5 V to 5.5 V, 20 MHz) 0.25 $\mu$ s (at 2.7 V to 5.5 V, 8 MHz) <sup>*1</sup> 62.5 $\mu$ s (at 2.0 V to 5.5 V, 32 kHz) <sup>*1,2</sup>			
* <sup>1</sup> The lower limit for operation guarantee for flash memory built-in type is 4.5 V.				
* <sup>2</sup> The lower limit for operation guarantee for EPROM built-in type is 2.3 V.				
Interrupts	<ul style="list-style-type: none"> <li>• RESET • Watchdog • External 0 • External 1 • External 2</li> <li>• External 4 (key interrupt dedicated) • Timer 0 • Timer 1 • Timer 2 • Timer 3 • Timer 6 • Time base</li> <li>• Timer 7 (2 systems) • Timer 8 (2 systems) • Serial 0 (2 systems) • A/D conversion finish</li> </ul>			
Timer Counter	Timer counter 0 : 8-bit $\times$ 1 (square-wave/8-bit PWM output, event count, generation of remote control carrier, simple pulse width measurement) (square-wave/PWM output to large current terminal P50 possible) 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, 1/8192, 1/32768 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 output, additional pulse type 10-bit PWM output, event count, synchronous output event, simple pulse width measurement) (square-wave/PWM output to large current terminal P52 possible) 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, serial 0 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 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 $\times$ 1 (square-wave output, IGBT/16-bit PWM output (cycle / duty continuous variable), event count, synchronous output event, pulse width measurement, input capture) (square-wave/PWM output to large current terminal P51 possible) 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)  Timer counter 8: 16 bit $\times$ 1 (square-wave/16-bit PWM output [duty continuous variable], event count, pulse width measurement, input capture) (square-wave/PWM output to large current terminal P53 possible)			

<b>Timer Counter (Continue)</b>		Clock source ..... 1/1, 1/2, 1/4, 1/16, 1/128 of system clock frequency; 1/1, 1/2, 1/4, 1/16, 1/128 of OSC oscillation clock frequency; 1/1, 1/2, 1/4, 1/16 of external clock input frequency Interrupt source ..... coincidence with compare register 8 (2 lines)										
		Timer counters 7, 8 can be cascade-connected. (square-wave output, PWM, input capture, pulse width measurement is possible as a 32-bit timer.)										
		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										
<b>Serial Interface</b>		Serial 0 : synchronous type/UART (full-duplex) × 1 Clock source ..... 1/2, 1/4 of system clock frequency; pulse output of timer counter 3; 1/2, 1/4, 1/16, 1/64 of OSC oscillation clock frequency										
<b>I/O Pins</b>	<b>I/O</b>	46	• Common use • Specified pull-up resistor available • Input/output selectable (bit unit)									
	<b>Input</b>	3	• Common use • Specified pull-up resistor available									
<b>A/D Inputs</b>		10-bit × 8-ch. (with S/H)										
<b>LCD</b>		24 segments × 4 commons (static, 1/2, 1/3, or 1/4 duty) LCD power supply separated from VDD (usable if $VDD \leq VLCD \leq 5.5$ V) LCD power step-up circuit contained (3/2, 2 and 3 times) LCD power shunt resistance contained										
<b>Special Ports</b>		Buzzer output, remote control carrier signal output, high-current drive port										
<b>Electrical Characteristics</b>												
<b>Supply current</b>												
<b>Parameter</b>	<b>Symbol</b>	<b>Condition</b>	<b>Limit</b>									
			<b>min</b>	<b>typ</b>	<b>max</b>							
<b>Operating supply current</b>	IDD1	fosc = 20 MHz, VDD = 5 V		25	60							
	IDD2	fosc = 8 MHz, VDD = 5 V		10	25							
	IDD3	fx = 32 kHz, VDD = 3 V		30	100							
<b>Supply current at HALT</b>	IDD4	fx = 32 kHz, VDD = 3 V, Ta = 25°C		4	8							
	IDD5	fx = 32 kHz, VDD = 3 V, Ta = -40°C to +85°C			30							
<b>Supply current at STOP</b>	IDD6	VDD = 5 V, Ta = 25°C			2							
	IDD7	VDD = 5 V, Ta = -40°C to +85°C			50							

See the next page for pin assignment and support tool.

## Pin Assignment



LQFP064-P-1414 \*Lead-free

## Support Tool

<b>In-circuit Emulator</b>	PX-ICE101C / D + PX-PRB101C58-LQFP064-P-1414-M
<b>EPROM Built-in Type</b>	<p>Type MN101CP58A</p> <p>ROM (x 8-bit) 32 K</p> <p>RAM (x 8-bit) 1.5 K</p> <p>Minimum instruction execution time 0.1 <math>\mu</math>s (at 4.5 V to 5.5 V, 20 MHz) 0.25 <math>\mu</math>s (at 2.7 V to 5.5 V, 8 MHz) 62.5 <math>\mu</math>s (at 2.3 V to 5.5 V, 32 kHz)</p>
Package	LQFP064-P-1414 *Lead-free
<b>Flash Memory Built-in Type</b>	<p>Type MN101CF58D [ES (Engineering Sample) available]</p> <p>ROM (x 8-bit) 64 K</p> <p>RAM (x 8-bit) 2 K</p> <p>Minimum instruction execution time 0.1 <math>\mu</math>s (at 4.5 V to 5.5 V, 20 MHz) 0.25 <math>\mu</math>s (at 4.5 V to 5.5 V, 8 MHz) 62.5 <math>\mu</math>s (at 4.5 V to 5.5 V, 32 kHz)</p>
Package	LQFP064-P-1414 *Lead-free

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