

# □ MN102H74D, MN102H74F, MN102H74G

<b>Type</b>	MN102H74D	MN102H74F	MN102H74G
<b>ROM (x8-bit)</b>	64 K	96 K	128 K
<b>RAM (x8-bit)</b>	4 K	4 K	4 K
<b>Package</b>	LQFP100-P-1414 *Lead-free		
<b>Minimum Instruction Execution Time</b>	With main clock operated	83.3 ns (at 3.0 V to 3.6 V, 12 MHz)	
<b>Interrupts</b>	<ul style="list-style-type: none"> <li>• <math>\overline{RST}</math> pin • Watchdog • <math>\overline{NMI}</math> pin • Timer counter 0 to 9 underflow • Timer counter 10 to 13 under/overflow</li> <li>• Timer counter 10 to 13 compare capture A • Timer counter 10 to 13 compare capture B</li> <li>• ATC ch.0 to 3 transfer finish • External 0 to 5 • Serial ch.0 to 3 transmission • Serial ch.0 to 3 reception</li> <li>• A/D conversion finish • USB general-purpose • USBSOFF • USB end points 1 to 8</li> </ul>		
<b>USB Functions</b>	<p>Conforms to USB1.1.          USB transceiver built-in          Full-speed (12 Mbps) supported.          9 end points (FIFO built-in independently)          FIFO size          (EP0, 1, 2, 3, 4, 5, 6, 7, 8): 64, 128, 128, 128, 128, 128, 128, 128, 128 bytes</p> <ul style="list-style-type: none"> <li>• EP0              Control transfer              IN/OUT (two ways)</li> <li>• EP1 to EP8              Interrupt/Bulk/Isochronous transfer supported.              Settable to IN or OUT.              Double Buffering function supported.              When the MAXP size is set to a half or less of the MAXFIFO size for each EP, the Double Buffering function is made valid automatically.</li> </ul>		
<b>Timer Counter</b>	<p>Timer counter 0: 8-bit × 1 (timer output, event count, timer interrupt)          Clock source ..... SYSCLK; XI; prescaler 0; TM0IO pin          Interrupt source ..... Timer counter 0 underflow</p> <p>Timer counter 1: 8-bit × 1 (timer output, event count, timer interrupt)          Clock source ..... SYSCLK; prescaler 0; TM1IO pin          Interrupt source ..... Timer counter 1 underflow</p> <p><span style="border: 1px solid black; border-radius: 10px; padding: 2px;">Connectable</span> Timer counters 0 to 1</p> <p>Timer counter 2: 8-bit × 1 (timer output, event count, timer interrupt, A/D conversion start)          Clock source ..... SYSCLK; 1/8 of SYSCLK; 1/32 of SYSCLK; timer counter 3 underflow;          timer counter 4 underflow; TM2IO pin          Interrupt source ..... Timer counter 2 underflow</p> <p>Timer counter 3: 8-bit × 1 (timer output, event count, timer interrupt)          Clock source ..... SYSCLK; 1/8 of SYSCLK; 1/32 of SYSCLK; timer counter 2 underflow;          timer counter 4 underflow; TM3IO pin          Interrupt source ..... Timer counter 3 underflow</p> <p>Timer counter 4: 8-bit × 1 (timer output, event count, timer interrupt)          Clock source ..... SYSCLK; 1/8 of SYSCLK; 1/32 of SYSCLK; timer counter 2 underflow;          timer counter 3 underflow; TM4IO pin          Interrupt source ..... Timer counter 4 underflow</p>		

■ **Timer Counter (Continue)**

Timer counter 5: 8-bit × 1 (timer output, event count, timer interrupt)

Clock source ..... SYSCLK; 1/8 of SYSCLK; 1/32 of SYSCLK; timer counter 2 underflow;  
timer counter 3 underflow; timer counter 4 underflow; TM5IO pin

Interrupt source ..... Timer counter 5 underflow

**Connectable** Timer counters 2 to 5

Timer counter 6: 8-bit × 1 (timer output, event count, timer interrupt, serial clock generation)

Clock source ..... SYSCLK; 1/8 of SYSCLK; 1/32 of SYSCLK; timer counter 7 underflow;  
timer counter 8 underflow; TM6IO pin

Interrupt source ..... Timer counter 6 underflow

Timer counter 7: 8-bit × 1 (timer output, event count, timer interrupt, serial clock generation)

Clock source ..... SYSCLK; 1/8 of SYSCLK; 1/32 of SYSCLK; timer counter 6 underflow;  
timer counter 8 underflow; TM7IO pin

Interrupt source ..... Timer counter 7 underflow

Timer counter 8: 8-bit × 1 (timer output, event count, timer interrupt, serial clock generation)

Clock source ..... SYSCLK; 1/8 of SYSCLK; 1/32 of SYSCLK; timer counter 6 underflow;  
timer counter 7 underflow; TM8IO pin

Interrupt source ..... Timer counter 8 underflow

Timer counter 9: 8-bit × 1 (timer output, event count, timer interrupt)

Clock source ..... SYSCLK; 1/8 of SYSCLK; 1/32 of SYSCLK; timer counter 6 underflow;  
timer counter 7 underflow; timer counter 8 underflow; TM9IO pin

Interrupt source ..... Timer counter 9 underflow

**Connectable** Timer counters 6 to 9

Timer counter 10: 16-bit × 1 (timer output, event count, input capture, PWM output, 2-phase encoder input)

Clock source ..... SYSCLK; 1/8 of SYSCLK; timer counter 2 or 3 underflow; 2-phase encoding of  
TM10IOA/TM10IOB pin (1×, 4×); TM10IOB pin

Interrupt source ..... Timer counter 10 under/overflow; timer counter 10 compare capture A;  
timer counter 10 compare capture B

Timer counter 11: 16-bit × 1 (timer output, event count, input capture, PWM output, 2-phase encoder input)

Clock source ..... SYSCLK; 1/8 of SYSCLK; timer counter 8 or 9 underflow; 2-phase encoding of  
TM11IOA/TM11IOB pin (1×, 4×); TM11IOB pin

Interrupt source ..... Timer counter 11 under/overflow; timer counter 11 compare capture A;  
timer counter 11 compare capture B

Timer counter 12: 16-bit × 1 (timer output, event count, input capture, PWM output, 2-phase encoder input)

Clock source ..... SYSCLK; 1/8 of SYSCLK; timer counter 4 or 5 underflow; 2-phase encoding of  
TM12IOA/TM12IOB pin (1×, 4×); TM12IOB pin

Interrupt source ..... Timer counter 12 under/overflow; timer counter 12 compare capture A;  
timer counter 12 compare capture B

Timer counter 13: 16-bit × 1 (timer output, event count, input capture, PWM output, 2-phase encoder input)

Clock source ..... SYSCLK; 1/8 of SYSCLK; timer counter 6 or 7 underflow; 2-phase encoding of  
TM13IOA/TM13IOB pin (1×, 4×); TM13IOB pin

Interrupt source ..... Timer counter 13 under/overflow; timer counter 13 compare capture A;  
timer counter 13 compare capture B

See the next page for electric characteristics, pin assignment, and support tool.

<b>Serial Interface</b>	Serial 0: 8-bit × 1 (transfer direction of MSB/LSB selectable; transmission / reception of 7, 8-bit length) Clock source ..... 1/2 or 1/16 of timer counter 6 underflow; external pin
	Serial 1: 8-bit × 1 (transfer direction of MSB/LSB selectable; transmission / reception of 7, 8-bit length) Clock source ..... 1/2 or 1/16 of timer counter 7 underflow; external pin
	Serial 2: 8-bit × 1 (transfer direction of MSB/LSB selectable; transmission / reception of 7, 8-bit length) Clock source ..... 1/2 or 1/16 of timer counter 8 underflow; external pin
	Serial 3: 8-bit × 1 (transfer direction of MSB/LSB selectable; transmission / reception of 7, 8-bit length) Clock source ..... 1/2 or 1/16 of timer counter 9 underflow; external pin
	UART × 2 (common use with serial 0 to 3) I <sup>2</sup> C × 2 (common use with serial 0, 1; single master)

<b>ATC</b>	4-ch DMA transfer enabled between memory and memory or memory and peripheral register by set interrupt factor and software activation setting Transfer unit: bytes/word Transfer mode: 1 word/burst (max. 128 K bytes) Transfer addressing: source/destination pointer fix/increment High-speed transfer enabled between USB-FIFO and internal RAM in single address mode
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<b>I/O Pins</b>	<b>I/O</b>	77	• Common use : 77 (pull-up resistance specifiable)
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<b>A/D Inputs</b>	10-bit × 8-ch. (with S/H)
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<b>Special Ports</b>	USB ports (D+, D-)
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<b>Notes</b>	4 multiply PLL built-in, generation of internal 48 MHz at external oscillation 12 MHz
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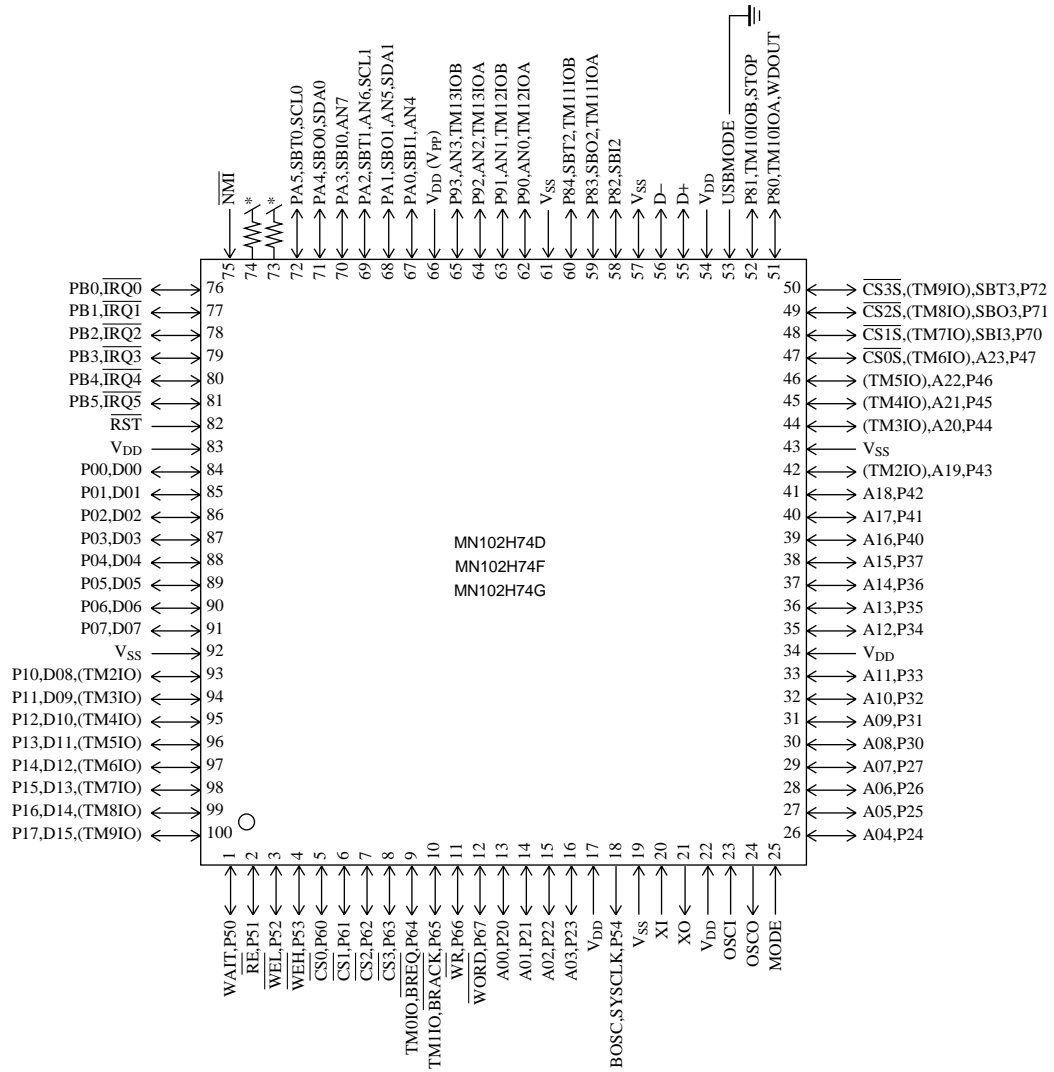
**Electrical Characteristics**  
**Supply current**

Parameter	Symbol	Condition	Limit			Unit
			min	typ	max	
Operating supply current	IDDOpr	VI = VDD or VSS, output open f = 12 MHz, VDD = 3.3 V			65+10α*	mA
Supply current at STOP	IDDS	Pin with pull-up resistor is open all other input pins and Hi-Z state input/output			70	μA
Supply current at HALT	IDDH	pins are simultaneously applied VDD or VSS level f = 12 MHz, VDD = 3.3 V, output open			30+10α*	mA

(Ta = -20°C to +70°C, VDD = 3.3 V, VSS = 0 V)

\* "α" depends on products. MN102H74D, MN102H74F, MN102H74G: α = 0  
MN102HF74G: α = 1

Pin Assignment



LQFP100-P-1414 \*Lead-free

\* Use 4.7 kΩ to 10 kΩ.

Support Tool

<b>In-circuit Emulator</b>	PX-ICE102H74-LQFP100-P-1414	
<b>Flash Memory Built-in Type</b>	Type	MN102HF74G [ES (Engineering Sample) available]
	ROM (× 8-bit)	128 K
	RAM (× 8-bit)	4 K
	Minimum instruction execution time	83.3 ns (at 3.0 V to 3.6 V, 12 MHz)
	Package	LQFP100-P-1414 *Lead-free

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