❑ MN102H74D, MN102H74F, MN102H74G

Type	MN102H74D	MN102H74F	MN102H74G
ROM (×8-bit)	64 K	96 K	128 K
RAM (×8-bit)	4 K	4 K	4 K
Package	LQFP100-P-1414 *Lead-free		
Minimum Instruction Execution Time	With main clock operated	83.3 ns (at 3.0 V to 3.6 V, 12 MHz)	
Interrupts	• $\overline{\text{RST}}$ pin • Watchdog • $\overline{\text{NMI}}$ pin • Timer counter 0 to 9 underflow • Timer counter 10 to 13 under/overflow • Timer counter 10 to 13 compare capture A • Timer counter 10 to 13 compare capture B • ATC ch.0 to 3 transfer finish • External 0 to 5 • Serial ch.0 to 3 transmission • Serial ch.0 to 3 reception • A/D conversion finish • USB general-purpose • USBSOF • USB end points 1 to 8		
USB Functions	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 • EP0 Control transfer IN/OUT (two ways) • 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.		
Timer Counter	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 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 (Connectable) Timer counters 0 to 1 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 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 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		

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.

Serial Interface	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^2C × 2 (common use with serial 0, 1; single master)
ATC	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
I/O Pins **I/O**	77 • Common use : 77 (pull-up resistance specifiable)
A/D Inputs	10-bit × 8-ch. (with S/H)
Special Ports	USB ports (D+, D-)
Notes	4 multiply PLL built-in, generation of internal 48 MHz at external oscillation 12 MHz

Electrical Characteristics

Supply current

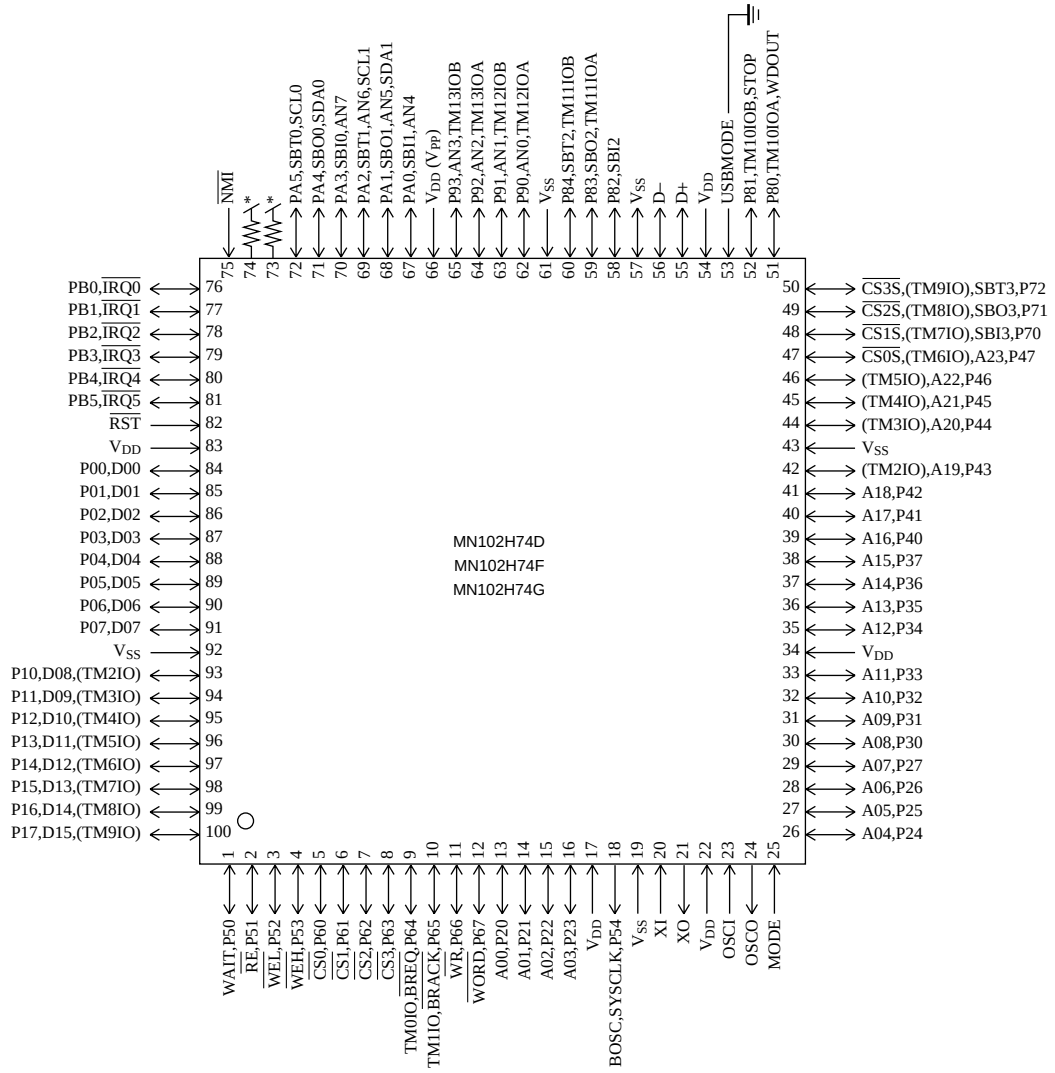
Parameter	Symbol	Condition	Limit			Unit
			min	typ	max	
Operating supply current	IDDopr	VI = VDD or VSS, output open f = 12 MHz , VDD = 3.3 V			65+10α*	mA
Supply current at STOP	IDDS	Pin with pull-up resistor is open all other input pins and Hi-Z state input/output pins are simultaneously applied VDD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

In-circuit Emulator	PX-ICE102H74-LQFP100-P-1414	
Flash Memory Built-in Type	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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