

□ MN102H730F, MN102H73G, MN102H73K

Type	MN102H730F	MN102H73G (under development)	MN102H73K (under development)
ROM (x8-bit)	External	128 K	256 K
RAM (x8-bit)	10 K	10 K	12 K
Package	TQFP128-P-1414B *Lead-free	TQFP128-P-1414A *Lead-free	
Minimum Instruction Execution Time	With main clock operated	58 ns (at 3.0 V to 3.6 V, 34 MHz)	
Interrupts	<ul style="list-style-type: none"> • RST pin • Watchdog • NMI pin • Timer counter 0 to 9 underflow • Timer counter 10 to 14 underflow • Timer counter 10 to 14 compare capture A • Timer counter 10 to 14 compare capture B • ATC ch.0 to 1 transfer finish • ETC ch.0 to 1 transfer finish • External 0 to 7 • Serial ch.0 to 4 transmission • Serial ch.0 to 4 reception • A/D conversion finish 		
Timer Counter	<p>Timer counter 0 : 8-bit × 1</p> <p>Clock source 1/2 of system clock (BOSC) frequency; underflow of timer counter 8; TM0IO pin; system clock (BOSC)</p> <p>Interrupt source underflow of timer counter 0</p> <p>Timer counter 1 : 8-bit × 1</p> <p>Clock source 1/2 of system clock (BOSC) frequency; underflow of timer counter 8; TM1IO pin; timer counter 0 output</p> <p>Interrupt source underflow of timer counter 1</p> <p>Timer counter 2 : 8-bit × 1</p> <p>Clock source 1/2 of system clock (BOSC) frequency; underflow of timer counter 8; TM2IO pin; timer counter 1 output</p> <p>Interrupt source underflow of timer counter 2</p> <p>Timer counter 3 : 8-bit × 1</p> <p>Clock source 1/2 of system clock (BOSC) frequency; underflow of timer counter 8; TM3IO pin; timer counter 2 output</p> <p>Interrupt source underflow of timer counter 3</p> <p>Timer counter 4 : 8-bit × 1</p> <p>Clock source 1/2 of system clock (BOSC) frequency; underflow of timer counter 9; TM4IO pin; system clock (BOSC)</p> <p>Interrupt source underflow of timer counter 4</p> <p>Timer counter 5 : 8-bit × 1</p> <p>Clock source 1/2 of system clock (BOSC) frequency; underflow of timer counter 9; TM5IO pin; timer counter 4 output</p> <p>Interrupt source underflow of timer counter 5</p> <p>Timer counter 6 : 8-bit × 1</p> <p>Clock source 1/2 of system clock (BOSC) frequency; underflow of timer counter 9; TM6IO pin; timer counter 5 output</p> <p>Interrupt source underflow of timer counter 6</p> <p>Timer counter 7 : 8-bit × 1</p> <p>Clock source 1/2 of system clock (BOSC) frequency; underflow of timer counter 9; TM7IO pin; timer counter 6 output</p> <p>Interrupt source underflow of timer counter 7</p> <p>Timer counter 8 : 8-bit × 1</p> <p>Clock source 1/2 of system clock (BOSC) frequency; system clock (BOSC); 1/4 of system clock (XI) frequency; TM8IO pin</p> <p>Interrupt source underflow of timer counter 8</p>		

Timer Counter (Continue)	Timer counter 9 : 8-bit × 1
	Clock source 1/2 of system clock (BOSC) frequency; 1/64 of system clock (BOSC) frequency; TM9IO pin; timer counter 8 output
	Interrupt source underflow of timer counter 9
	Timer counter 10 : 16-bit × 1 (timer output, event count, input capture, PWM output, 2-phase encoder input)
	Clock source underflow of timer counter 8, 9; TM10IOB pin; 1/2 of system clock (BOSC) frequency; 2-phase encode of TM10IOA pin/TM10IOB pin (1 ×, 4 ×)
	Interrupt source underflow of timer counter 10; 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 underflow of timer counter 8, 9; TM11IOB pin; 1/2 of system clock (BOSC) frequency; 2-phase encode of TM11IOA pin/TM11IOB pin (1 ×, 4 ×)
	Interrupt source underflow of timer counter 11; 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 underflow of timer counter 8, 9; TM12IOB pin; 1/2 of system clock (BOSC) frequency; 2-phase encode of TM12IOA pin/TM12IOB pin (1 ×, 4 ×)
	Interrupt source underflow of timer counter 12; 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 underflow of timer counter 8, 9; TM13IOB pin; 1/2 of system clock (BOSC) frequency; 2-phase encode of TM13IOA pin/TM13IOB pin (1 ×, 4 ×)
Interrupt source underflow of timer counter 13; timer counter 13 compare capture A; timer counter 13 compare capture B	
Timer counter 14 : 16-bit × 1 (timer output, event count, input capture, PWM output, 2-phase encoder input)	
Clock source underflow of timer counter 8, 9; TM14IOB pin; 1/2 of system clock (BOSC) frequency; 2-phase encode of TM14IOA pin/TM14IOB pin (1 ×, 4 ×)	
Interrupt source underflow of timer counter 14; timer counter 14 compare capture A; timer counter 14 compare capture B	

Serial Interface	Serial 0, 1 : 8-bit × 1 (transfer direction of MSB / LSB selectable, transmission / reception of 7, 8-bit length)
	Clock source 1/8 of timer counter 6 underflow frequency; 1/8, 1/2 of timer counter 0 underflow frequency; external pin
	Serial 2, 3 : 8-bit × 1 (transfer direction of MSB / LSB selectable, transmission / reception of 7, 8-bit length)
	Clock source 1/8 of timer counter 2 underflow frequency; 1/8, 1/2 of timer counter 4 underflow frequency; external pin
	UART × 4 (common use with serial 0 to 3)
	I ² C × 2 (common use with serial 1,3; single master)

Multiply-and-Accumulate	16-bit sign × 16-bit sign + 40-bit sign		
I/O Pins	I/O	104	<ul style="list-style-type: none"> • Common use : 59 (use of full address, address data separate 16-bit mode) • Common use : 76 (use of address 16-bit, address data separate 8-bit mode)
A/D Inputs	10-bit × 12-ch. (with S/H)		
D/A Outputs	8-bit × 4-ch.		
PWM	16-bit × 5-ch. (timer counter 10 to 14)		
ICR	16-bit × 5-ch. (timer counter 10 to 14)		
OCR	16-bit × 5-ch. (timer counter 10 to 14)		
Notes	Address / data separate bus interface; 8 / 16-bit bus width selectable; SRAM interface		

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	IDDopr	VI = VDD or VSS, output open f = 34 MHz, VDD = 3.3 V			60+10 α *	mA
Supply current at STOP	IDDS	Pin with pull-up resistor is open all other input pins and Hi-Z state input/output			70	μ A
Supply current at HALT	IDDH	pins are simultaneously applied VDD or VSS level f = 34 MHz, VDD = 3.3 V, output open			30+10 α *	mA

(Ta = -40°C to +85°C, VDD = AVDD = 3.3 V, VSS = AVSS = 0 V)

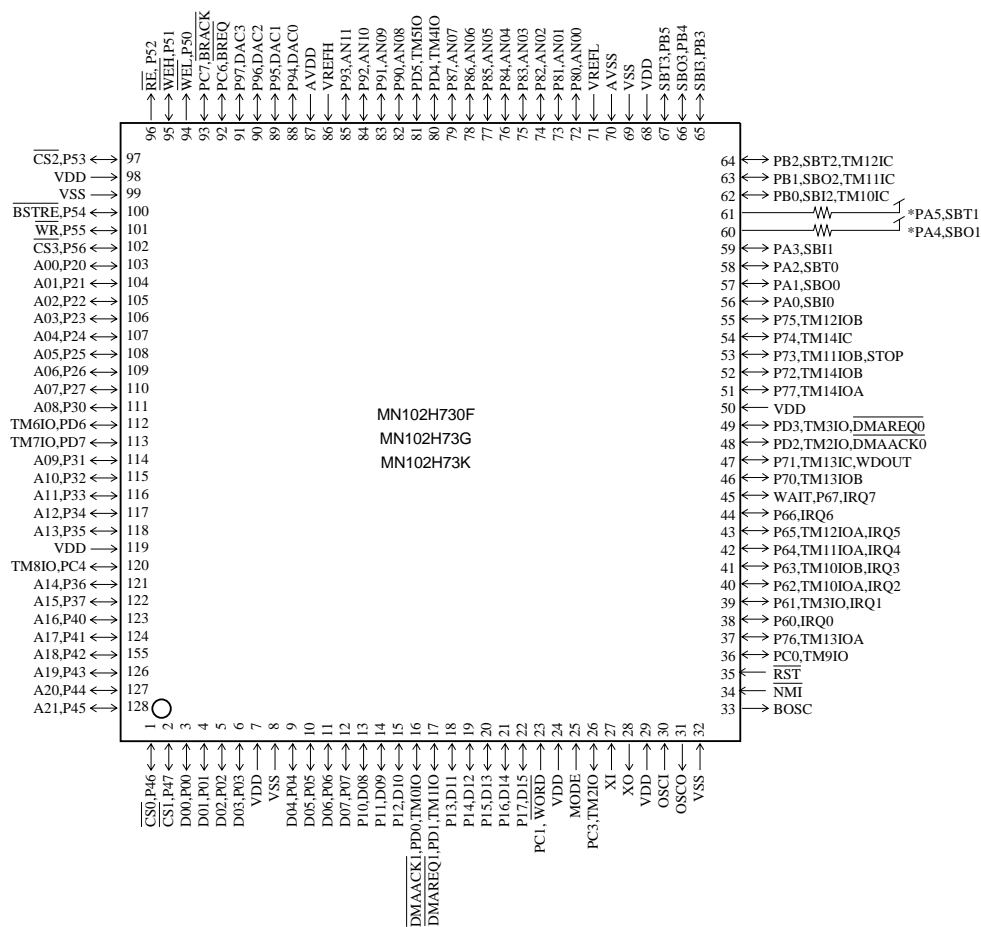
* " α " depends on products .

MN102H73G/73K/730F α = 0

MN102HF73G α = 1

MN102HF73K α = 2

Pin Assignment



TQFP128-P-1414A *Lead-free

TQFP128-P-1414B *Lead-free

* Use 4.7 kΩ to 10 kΩ.

Support Tool

In-circuit Emulator	PX-ICE102H73-128P1414	
Flash Memory Built-in Type	Type	MN102HF73G, MN102HF73K
	ROM (× 8-bit)	128 K / 256 K
	RAM (× 8-bit)	10 K / 12 K
	Minimum instruction execution time	58 ns (at 3.0 V to 3.6 V, 34 MHz)
	Package	TQFP128-P-1414B *Lead-free

Request for your special attention and precautions in using the technical information and semiconductors described in this book

- (1) An export permit needs to be obtained from the competent authorities of the Japanese Government if any of the products or technologies described in this book and controlled under the "Foreign Exchange and Foreign Trade Law" is to be exported or taken out of Japan.
- (2) The technical information described in this book is limited to showing representative characteristics and applied circuits examples of the products. It neither warrants non-infringement of intellectual property right or any other rights owned by our company or a third party, nor grants any license.
- (3) We are not liable for the infringement of rights owned by a third party arising out of the use of the product or technologies as described in this book.
- (4) The products described in this book are intended to be used for standard applications or general electronic equipment (such as office equipment, communications equipment, measuring instruments and household appliances).
Consult our sales staff in advance for information on the following applications:
 - Special applications (such as for airplanes, aerospace, automobiles, traffic control equipment, combustion equipment, life support systems and safety devices) in which exceptional quality and reliability are required, or if the failure or malfunction of the products may directly jeopardize life or harm the human body.
 - Any applications other than the standard applications intended.
- (5) The products and product specifications described in this book are subject to change without notice for modification and/or improvement. At the final stage of your design, purchasing, or use of the products, therefore, ask for the most up-to-date Product Standards in advance to make sure that the latest specifications satisfy your requirements.
- (6) When designing your equipment, comply with the guaranteed values, in particular those of maximum rating, the range of operating power supply voltage, and heat radiation characteristics. Otherwise, we will not be liable for any defect which may arise later in your equipment.
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.
- (7) When using products for which moisture-proof packaging is required, observe the conditions (including shelf life and amount of time let standing of unsealed items) agreed upon when specification sheets are individually exchanged.
- (8) This book may be not reprinted or reproduced whether wholly or partially, without the prior written permission of Matsushita Electric Industrial Co., Ltd.

If you have any inquiries or questions about this book or our semiconductor products, please contact one of our sales offices listed on the back or semiconductor company's sales department.

Windows is a registered trademark of Microsoft Corporation.
MS-DOS is a registered trademark of Microsoft Corporation.
Sun and Solaris are registered trademarks of Sun Microsystems, Inc.
PC-9801 is a registered trademark of NEC.
PC/AT is a registered trademark of International Business Machines Corporation.
TRON is an abbreviation of "The Real-time Operating system Nucleus."
ITRON is an abbreviation of "Industrial TRON."
 μ ITRON is an abbreviation of "Micro Industrial TRON."
TRON, ITRON, and μ ITRON do not refer to any specific product or products.
Other company names and product names are registered trademarks.