☐ MN102H460B

Type	MN102H460B
ROM (×8-bit)	External
RAM (×8-bit)	4 K
Package	LQFP128-P-1818C *Lead-free, TQFP128-P-1414B *Lead-free
Minimum Instruction Execution Time	With main clock operated 50 ns (at 3.0 V to 3.6 V, 40 MHz) 100 ns (at 2.0 V to 3.6 V, 20 MHz)

Interrupts

- $\overline{\text{RST}}$ pin • Watchdog • NMI pin • Timer counter 4 to15 • Timer counter 16, 17, 21
- Timer counter 16 to 20 compare capture A • Timer counter 16 to 20 compare capture B
- Timer counter 21 capture A • Timer counter 21 capture B • Timer counter 21 capture D
- Timer counter 21 compare E • Timer counter 21 compare F • ATC ch.0 to 3 transfer finish
- External 0 to 7 • Serial ch.0 to 3 transmission • Serial ch.0 to 3 reception • $\overline{\text{KI}}$ pin (OR)
- A/D conversion finish

Timer Counter

Timer counter 0 : 8-bit × 1 (prescalers)
    Clock source ···················· 1/2 of system clock frequency; timer counter 1 output

Timer counter 1 : 8-bit × 1 (prescalers)
    Clock source ···················· 1/2 of system clock frequency; timer counter 0 output

Timer counter 2, 3 : 8-bit × 1 (UART baud rate generator)
    Clock source ···················· 1/2 of system clock frequency; external clock input; timer counter 0 output

Timer counter 4 : 8-bit × 1 (timer output, A/D conversion start up)
    Clock source ···················· 1/2 of system clock frequency; external clock input; timer counter 0 output;
                           timer counter 1 output
    Interrupt source ·············· underflow of timer counter 4

Timer counter 5, 9 : 8-bit × 1 (UART baud rate generator)
    Clock source ···················· 1/2 of system clock frequency; timer counter 0 output; timer counter 1 output
    Interrupt source ·············· underflow of timer counter 5, 9

Timer counter 6, 10, 11 : 8-bit × 1 (timer output)
    Clock source ···················· 1/2 of system clock frequency; external clock input; timer counter 0 output
    Interrupt source ·············· underflow of timer counter 6, 10, 11

Timer counter 7 : 8-bit × 1 (timer output)
    Clock source ···················· 1/2 of system clock frequency; external clock input; timer counter 0 output
    Interrupt source ·············· underflow of timer counter 7

Timer counter 8 : 8-bit × 1 (timer output)
    Clock source ···················· 1/2 of system clock frequency; external clock input; timer counter 0 output;
                           timer counter 1 output
    Interrupt source ·············· underflow of timer counter 8

Timer counter 12 : 8-bit × 1 (timer output)
    Clock source ···················· 1/2 of system clock frequency; external clock input with edge;
                           timer counter 0 output; timer counter 1 output
    Interrupt source ·············· underflow of timer counter 12

Timer counter 13 : 8-bit × 1 (timer output)
    Clock source ···················· 1/2 of system clock frequency; timer counter 0 output; timer counter 1 output
    Interrupt source ·············· underflow of timer counter 13

Timer counter 14 : 8-bit × 1 (timer output)
    Clock source ···················· 1/2 of system clock; external clock input with edge; timer counter 0 output
    Interrupt source ·············· underflow of timer counter 14

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Timer Counter (Continue)		Timer counter 15 : 8-bit × 1 (timer output)	

Timer Counter (Continue)

Timer counter 15 : 8-bit × 1 (timer output)
    Clock source ···················· 1/2 of system clock frequency; external clock input with edge; timer counter 0
        output
    Interrupt source ·············· underflow of timer counter 15

(Connectable)   timer counter 0 to 3, 4 to 7, 8 to 11, 12 to 15

Timer counter 16, 17 : 16-bit × 1
  (timer output, event count, input capture, output compare, PWM output, 2-phase encorder input)
    Clock source ···················· 1/2 of system clock frequency; external clock input (with edge, timer counter 17
        only); timer counter 0 output; timer counter 1 output (timer counter 16 only)
    Interrupt source ·············· coincidence with compare capture A or at capture;
        coincidence with compare capture B or at capture;
        underflow of timer counter 16, 17

Timer counter 18, 19, 20: 16-bit × 1
  (timer output, event count, input capture, output compare, PWM output, 2-phase encorder input)
    Clock source ···················· 1/2 of system clock frequency; external clock input; timer counter 0 output;
        timer counter 1 output
    Interrupt source ·············· coincidence with compare capture A or at capture;
        coincidence with compare capture B or at capture;
        underflow of timer counter 18, 19, 20

Timer counter 21 : 24-bit × 1 (servo control)
    Clock source ···················· 1/2 of system clock frequency; timer counter 1 output
    Interrupt source ·············· when capturing to capture A;
        when capturing to capture B;
        when capturing to capture D;
        when coinciding to compare E;
        when coinciding to compare F

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 2; 1/8, 1/2 of timer counter 5; external clock

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 3; 1/8, 1/2 of timer counter 9; external clock

UART × 4 (common use with serial 0 to 3)

I^{2}C × 2 (common use with serial 1, 3; single master)

| **I/O Pins** | **I/O** | 55 | • Common use : 55 (use of full address, address data separate 16-bit mode)
• Common use : 72 (use of address 16-bit, address data multiplex 16-bit mode) |
| | **Input** | 8 | • Common use : 8 |

A/D Inputs — 10-bit × 12-ch. (maximum input is 16) (with S/H)

PWM — 16-bit × 5-ch. (timer counter 16 to 20)

ICR — 16-bit × 5-ch., 24-bit × 1-ch. (timer counter 16 to 21)

OCR — 16-bit × 5-ch., 24-bit × 1-ch. (timer counter 16 to 21)

Notes — Address / data multiplex bus interface, address / data separate bus interface,
8-bit / 16-bit bus width selectable

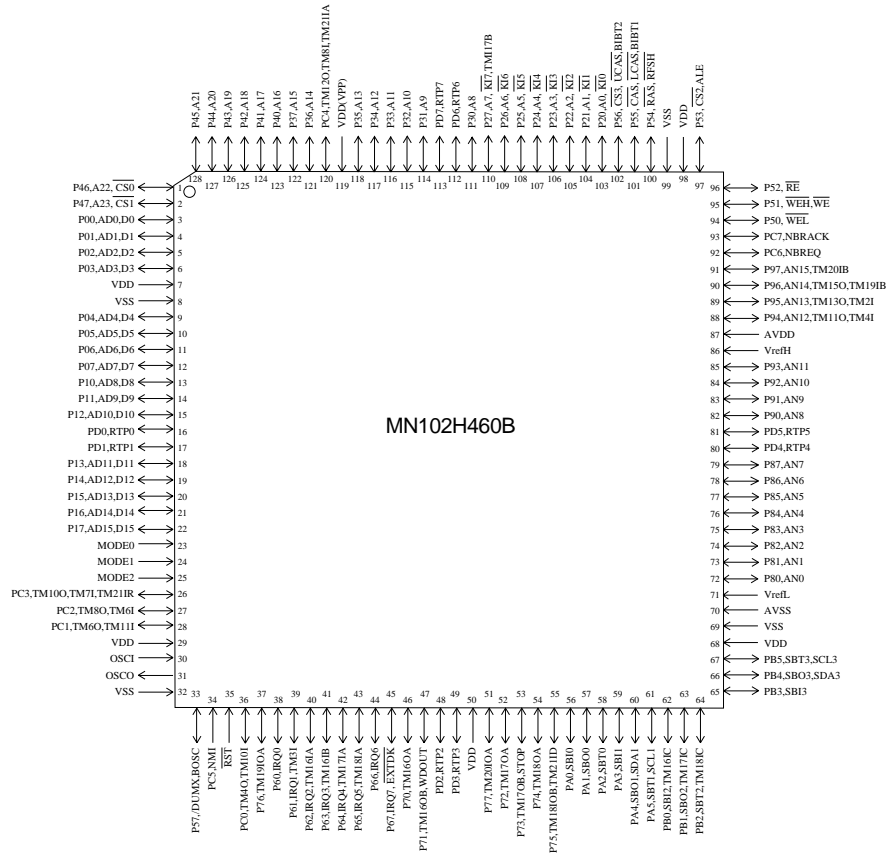**See the next page for electrical characteristics, pin assignment and support tool.**

Electrical Characteristics

Supply current

Parameter	Symbol	Condition	Limit			Unit
			min	typ	max	
Operating supply current	IDDopr	VI = VDD or VSS, output open f = 40 MHz , VDD = 3.3 V			50	mA
Supply current at STOP	IDDS	Pin with pull-up resistor is open all other input pins and Hi-Z state input/output			50	µA
Supply current at HALT	IDDH	pins are simultaneously applied VDD or VSS level f = 40 MHz , VDD = 3.3 V, output open			25	mA

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

Pin Assignment

MN102H460B

Left side pins:
- 1 P46,A22,CS0
- 2 P47,A23,CS1
- 3 P00,AD0,D0
- 4 P01,AD1,D1
- 5 P02,AD2,D2
- 6 P03,AD3,D3
- 7 VDD
- 8 VSS
- 9 P04,AD4,D4
- 10 P05,AD5,D5
- 11 P06,AD6,D6
- 12 P07,AD7,D7
- 13 P10,AD8,D8
- 14 P11,AD9,D9
- 15 P12,AD10,D10
- 16 PD0,RTP0
- 17 PD1,RTP1
- 18 P13,AD11,D11
- 19 P14,AD12,D12
- 20 P15,AD13,D13
- 21 P16,AD14,D14
- 22 P17,AD15,D15
- 23 MODE0
- 24 MODE1
- 25 MODE2
- 26 PC3,TM10O,TM7I,TM21IR
- 27 PC2,TM8O,TM6I
- 28 PC1,TM6O,TM11I
- 29 VDD
- 30 OSCI
- 31 OSCO
- 32 VSS

Top side pins:
- 128 P45,A21
- 127 P44,A20
- 126 P43,A19
- 125 P42,A18
- 124 P41,A17
- 123 P40,A16
- 122 P37,A15
- 121 P36,A14
- 120 PC4,TM12O,TM8I,TM21IA
- 119 VDD(VPP)
- 118 P35,A13
- 117 P34,A12
- 116 P33,A11
- 115 P32,A10
- 114 P31,A9
- 113 PD7,RTP7
- 112 P30,A8
- 111 PD6,RTP6
- 110 P27,A7,KI7,TMI7B
- 109 P26,A6,KI6
- 108 P25,A5,KI5
- 107 P24,A4,KI4
- 106 P23,A3,KI3
- 105 P22,A2,KI2
- 104 P21,A1,KI1
- 103 P20,A0,KI0
- 102 P56,CS3,UCAS,BIBT2
- 101 P55,CAS,LCAS,BIBT1
- 100 P54,RAS,RFSH
- 99 VSS
- 98 VDD
- 97 P53,CS2,ALE

Right side pins:
- 96 P52,RE
- 95 P51,WEH,WE
- 94 P50,WEL
- 93 PC7,NBRACK
- 92 PC6,NBREQ
- 91 P97,AN15,TM20IB
- 90 P96,AN14,TM15O,TM19IB
- 89 P95,AN13,TM13O,TM2I
- 88 P94,AN12,TM11O,TM4I
- 87 AVDD
- 86 VrefH
- 85 P93,AN11
- 84 P92,AN10
- 83 P91,AN9
- 82 P90,AN8
- 81 PD5,RTP5
- 80 PD4,RTP4
- 79 P87,AN7
- 78 P86,AN6
- 77 P85,AN5
- 76 P84,AN4
- 75 P83,AN3
- 74 P82,AN2
- 73 P81,AN1
- 72 P80,AN0
- 71 VrefL
- 70 AVSS
- 69 VSS
- 68 VDD
- 67 PB5,SBT3,SCL3
- 66 PB4,SBO3,SDA3
- 65 PB3,SBI3

Bottom side pins:
- 33 P57,/DUMX,BOSC
- 34 PC5,NMI
- 35 RST
- 36 PC0,TM4O,TM19IOI
- 37 P76,TM19IQOA
- 38 P60,IRQ0
- 39 P61,IRQ1,TM3I
- 40 P62,IRQ2,TM16OA
- 41 P63,IRQ3,TM16IB
- 42 P64,IRQ4,TM17IA
- 43 P65,TM18IA
- 44 P66,IRQ6
- 45 P67,IRQ7,EXTDK
- 46 P70,TM16OA
- 47 P71,TM16OB,WDOUT
- 48 PD2,RTP2
- 49 PD3,RTP3
- 50 VDD
- 51 P77,TM20IOA
- 52 P72,TM17OA
- 53 P73,TM17OB,STOP
- 54 P74,TM18OA
- 55 P75,TM18IOB,TM21ID
- 56 PA0,SBI0
- 57 PA1,SBO0
- 58 PA2,SBT0
- 59 PA3,SBI1
- 60 PA4,SBO1,SDA1
- 61 PA5,SBT1,SCL1
- 62 PB0,SBI2,TM16IC
- 63 PB1,SBO2,TM17IC
- 64 PB2,SBT2,TM18IC

LQFP128-P-1818C *Lead-free

TQFP128-P-1414B *Lead-free

Support Tool

■ **In-circuit Emulator**	PX-ICE102H46-LQFP128-P-1818C
	PX-ICE102H46-TQFP128-P-1414B

Minimum instruction execution time	57.1 ns (at 30 MHz)