

# ■ MN1021617 / F1617

■ <b>Type</b>	<b>MN1021617 / F1617</b>	
■ <b>ROM (×8-Bit)</b>	128 K / 128 K (Flash)	
■ <b>RAM (×8-Bit)</b>	4 K / 4 K	
■ <b>Minimum Instruction Execution Time</b>	With Main Clock operated	<b>MN1021617 : 50 ns (at 3.0 V to 3.6 V, 40 MHz)</b> <b>MN1021617 : 100 ns (at 2.0 V to 3.6 V, 20 MHz)</b> <b>MN102F1617 : 66.6 ns (at 2.7 V to 3.6 V, 30 MHz)</b>
■ <b>Interrupts</b>	<ul style="list-style-type: none"> <li>• <math>\overline{\text{RST}}</math> Pin • Watchdog • NMI Pin • Timer Counter 4 to 15 • Timer Counter 16, 17, 21</li> <li>• Timer Counter 16 to 20 Compare Capture A • Timer Counter 16 to 20 Compare Capture B</li> <li>• Timer Counter 21 Capture A • Timer Counter 21 Capture B • Timer Counter 21 Capture D</li> <li>• Timer Counter 21 Capture E • Timer Counter 21 Capture F • ATC ch 0 to 3 Transfer finish</li> <li>• External 0 to 7 • Serial ch 0 to 3 Transmission • Serial ch 0 to 3 Reception • <math>\overline{\text{KI}}</math> Pin (OR)</li> <li>• A/D Conversion finish</li> </ul>	
■ <b>Timer Counter</b>	<p><b>Timer Counter 0 : 8-Bit × 1 (Prescalers)</b>  Clock Source            1/2 of System Clock, Timer Counter 1 Output</p> <p><b>Timer Counter 1 : 8-Bit × 1 (Prescalers)</b>  Clock Source            1/2 of System Clock, Timer Counter 0 Output</p> <p><b>Timer Counter 2 : 8-Bit × 1 (UART Baud Rate Generator)</b>  Clock Source            1/2 of System Clock, External Clock Input, Timer Counter 0 Output</p> <p><b>Timer Counter 3 : 8-Bit × 1 (UART Baud Rate Generator)</b>  Clock Source            1/2 of System Clock, Timer Counter 0 Output</p> <p><b>Timer Counter 4 : 8-Bit × 1 (Timer Output, A/D Conversion Start up)</b>  Clock Source            1/2 of System Clock, Timer Counter 0 Output, Timer Counter 1 Output  Interrupt Source        . Underflow of Timer Counter 4</p> <p><b>Timer Counter 5, 9 : 8-Bit × 1 (UART Baud Rate Generator)</b>  Clock Source            1/2 of System Clock, Timer Counter 0 Output, Timer Counter 1 Output  Interrupt Source        Underflow of Timer Counter 5, 9</p> <p><b>Timer Counter 6, 10, 11 : 8-Bit × 1 (Timer Output)</b>  Clock Source            1/2 of System Clock, External Clock Input, Timer Counter 0 Output  Interrupt Source        . Underflow of Timer Counter 6, 10, 11</p> <p><b>Timer Counter 7 : 8-Bit × 1 (Timer Output)</b>  Clock Source            . 1/2 of System Clock, External Clock Input, Timer Counter 0 Output  Interrupt Source        Underflow of Timer Counter 7</p> <p><b>Timer Counter 8 : 8-Bit × 1 (Timer Output)</b>  Clock Source            1/2 of System Clock, External Clock Input, Timer Counter 0 Output,  Timer Counter 1 Output  Interrupt Source        Underflow of Timer Counter 8</p> <p><b>Timer Counter 12 : 8-Bit × 1 (Timer Output)</b>  Clock Source            . . . 1/2 of System Clock, External Clock Input with Edge, Timer Counter 0 Output,  Timer Counter 1 Output  Interrupt Source        Underflow of Timer Counter 12</p> <p><b>Timer Counter 13 : 8-Bit × 1 (Timer Output)</b>  Clock Source            1/2 of System Clock, Timer Counter 0 Output, Timer Counter 1 Output  Interrupt Source        Underflow of Timer Counter 13</p> <p><b>Timer Counter 14 : 8-Bit × 1 (Timer Output)</b>  Clock Source            1/2 of System Clock, External Clock Input with Edge, Timer Counter 0 Output  Interrupt Source        . . . Underflow of Timer Counter 14</p>	

**Timer Counter (Continue)**

**Timer Counter 15 : 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 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 Encoder Input)  
 Clock Source 1/2 of System Clock, 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 : 16-Bit × 1** (Timer Output, Event Count, Input Capture, Output Compare, PWM Output, 2-Phase Encoder Input)  
 Clock Source 1/2 of System Clock, 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 19, 20 : 16-Bit × 1** (Timer Output, Event Count, Input Capture, Output Compare, PWM Output, 2-Phase Encoder Input)  
 Clock Source .. 1/2 of System Clock, 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, 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<sup>2</sup>C × 2** (Common use with Serial 1, 3, Single Master)

<b>I/O Pins</b>	<b>I/O</b>	<b>100</b>	• Common use 56 (Address Data Separate 8-Bit Mode) • Common use 73 (Address Data Multiplex 8-Bit Mode)
	<b>Input</b>	<b>8</b>	• Common use 8

**A/D** 10-Bit × 12ch (Maximum input is 16) (with S/H)

**PWM** 16-Bit × 5ch (Timer Counter 16 to 20)

**ICR** 16-Bit × 5ch, 24-Bit × 1ch (Timer Counter 16 to 21)

**OCR** 16-Bit × 5ch, 24-Bit × 1ch (Timer Counter 16 to 21)

**Notes** Address / Data Multiplex Bus Interface, Address / Data Separate Bus Interface, 8-Bit / 16-Bit Bus Width selectable, DRAM Refresh Controller built-in

**Package** LQFP128-P-1818C, FLGA165-C-1111

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

## Electrical Characteristics

### A/D Characteristics

Parameter	Symbol	Condition	Limit			Unit
			min	typ	max	
Non-Linear Error		10-Bit			±4	LSB
A/D Conversion Time		at 40 MHz	2.8			μs
Analog Input Voltage	VIA		VSS		VDD	V

(Ta = 25 °C, VDD = AVDD = 3.3 V, VSS = AVSS = 0 V)

### Supply Current

Parameter	Symbol	Condition	Limit			Unit
			min	typ	max	
Operating Supply Current	IDDOpr	VI = VDD or VSS, Output release 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 pins are simultaneously applied VDD or VSS level			50	μA
Supply Current at HALT	IDDH	f = 40 MHz, VDD = 3.3 V Output release			25	mA

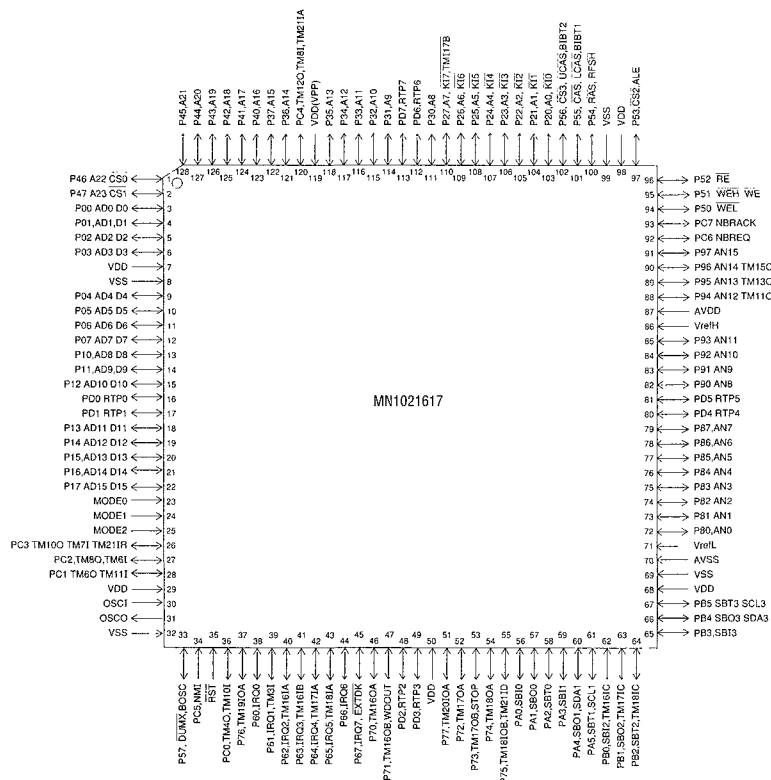
(Ta = -20 °C to +70 °C, VDD = AVDD = 3.3 V, VSS = AVSS = 0 V)

## Support Tool

### In Circuit Emulator

PX-ICE102H1617

### Pin Assignment



LQFP128-P-1818C

**Pin Assignment (Continue)**

Perspective



N/D	N/D	P85,SBT3 SCL3	AVDD	P81,AN1	P83,AN3	P87,AN7	AVDD	P94,AN12, TM110	AVDD	P50,WEL	N/D	N/D	N
N/D	N/D	P83,SB13	VSS	VrefL	P85,AN5	PD5,RTP5	P93,AN11	P96,AN14 TM150	PC6,NBREQ	P52,/RE	N/D	N/D	M
VSS	P82,SBT2, TM181C	P81,SB02, TM171C	P84,SB03, SDA3	P80,AN0	P84,AN4	AVSS	P91,AN9	P95,AN13, TM130	PC7, NBRACK	P51,/WEH, /WE	VDD	P54,/RAS, /RFSH	L
P80,SB12 TM161C	PA4,SB01, SDA1	PA5,SBT1, SCL1	VDD	AVSS	P86,AN6	P90,AN8	P92,AN10	P97,AN15	VSS	P53,/CS2, ALE	P56,/CS3, /UCAS, BIBT2	VDD	K
PA1,SB00	PA3,SB11	PA0,SB10	PA2,SBT0	AVSS	P82,AN2	PD4,RTP4	VrefH	P55,/CAS, /LCAS, BIBT1	VPP	P20,A0,/K10	P21,A1,/K11	P23,A3,/K13	J
P75, TM181OB, TM211D	P73, TM170B STOP	P77, TM201OA	P72, TM170A	P74, TM180A	N/D	N/D	N/D	P22,A2,/K12	P26,A6,/K16	P24,A4,/K14	P27,A7,/K17, TM117B	P25,A5,/K15	H
P71, TM160B, WDOU1	PD3,RTP3	VDD	VDD	PD2,RTP2	N/D	N/D	N/D	P30,A8	PD7,RTP7	VPP	P31,A9	PD6,RTP6	G
P65,IRQ5, TM 181A	P67,IRQ7,/EX TDK	P66,IRQ6	P70, TM160A	P64,IRQ4, TM171A	N/D	N/D	N/D	P34,A12	P32,A10	P33,A11	P35,A13	PC4, TM120, TM81, TM211A	F
P63,IRQ3, TM161B	P61,IRQ1 TM31	P62,IRQ2 TM161A	VDD	P60,IRQ0	MODE0	PD0,RTP0	P03,AD5,D5	P03,AD3,D3	P36,A14	VPP	P41,A17	P37,A15	E
VSS	P76, TM191OA	PC0, TM40, TM101	VDD	PC2, TM80, TM61	P15,AD13, D13	P13,AD11, D11	P11,AD9,D9	VSS	P01,AD7,D7	P42,A18	P40,A16	VDD	D
/RST	P57,/DUMX, BOSC	PC5,NMI	OSCO	MODE2	P14,AD12, D12	VSS	P07,AD7,D7	VSS	P47,A23, /CS1	P44,A20	P45,A21	P43,A19	C
N/D	N/D	VSS	PC1, TM60, TM111	PC3, TM100, TM71, TM211R	P16,AD14, D14	PD1,RTP1	P10,AD8,D8	VDD	P02,AD2,D2	P46,A22, /CS0	N/D	N/D	B
N/D	N/D	OSCI	VSS	MODE1	P17,AD15,D15	P12,AD10 D10	P06,AD6,D6	P04,AD4,D4	VDD	P00,AD0,D0	N/D	N/D	A
13	12	11	10	9	8	7	6	5	4	3	2	1	

FLGA165-C-1111  
MN1021617 / F1617

The MN102F1617 is manufactured and sold under license agreement with BULL CP8 Inc. Note that MN102F1617 cannot be used as the IC card.

\* A1 has no electrode (pin)

\* N D (not defined) has an electrode (pin) but not guaranteed for N C (not connected). Pay sufficient attention so as not to cause shorting with any other wiring on the user board.

\* VPP, VDD, VSS, AVDD and AVSS has multiple electrodes (pins). Electrodes having the same name are shorted internally.