

# 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</b> (at 3.0 V to 3.6 V, 40 MHz) <b>MN1021617 : 100 ns</b> (at 2.0 V to 3.6 V, 20 MHz) <b>MN102F1617 : 66.6 ns</b> (at 2.7 V to 3.6 V, 30 MHz)
<b>Interrupts</b>	<ul style="list-style-type: none"> <li>• RST 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>\bar{K}I</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>	



<b>Timer Counter (Continue)</b>	<b>Timer Counter 15 : 8-Bit × 1</b> (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
	<b>Connectable</b> Timer Counter 0 to 3, 4 to 7, 8 to 11, 12 to 15
	<b>Timer Counter 16, 17 : 16-Bit × 1</b> (Timer Output, Event Count, Input Capture, Output Compare, PWM Output, 2-Phase Encorder 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	
<b>Timer Counter 18 : 16-Bit × 1</b> (Timer Output, Event Count, Input Capture, Output Compare, PWM Output, 2-Phase Encorder 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	
<b>Timer Counter 19, 20 : 16-Bit × 1</b> (Timer Output, Event Count, Input Capture, Output Compare, PWM Output, 2-Phase Encorder 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	
<b>Timer Counter 21 : 24-Bit × 1</b> (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	

<b>Serial Interface</b>	<b>Serial 0, 1 : 8-Bit × 1</b> (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
	<b>Serial 2, 3 : 8-Bit × 1</b> (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	
<b>UART × 4</b> (Common use with Serial 0 to 3)	
<b>I<sup>2</sup>C × 2</b> (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

<b>A/D</b>	10-Bit × 12ch (Maximum input is 16) (with S/H)
<b>PWM</b>	16-Bit × 5ch (Timer Counter 16 to 20)
<b>ICR</b>	16-Bit × 5ch, 24-Bit × 1ch (Timer Counter 16 to 21)
<b>OCR</b>	16-Bit × 5ch, 24-Bit × 1ch (Timer Counter 16 to 21)
<b>Notes</b>	Address / Data Multiplex Bus Interface, Address / Data Separate Bus Interface, 8-Bit / 16-Bit Bus Width selectable, DRAM Refresh Controller built-in
<b>Package</b>	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

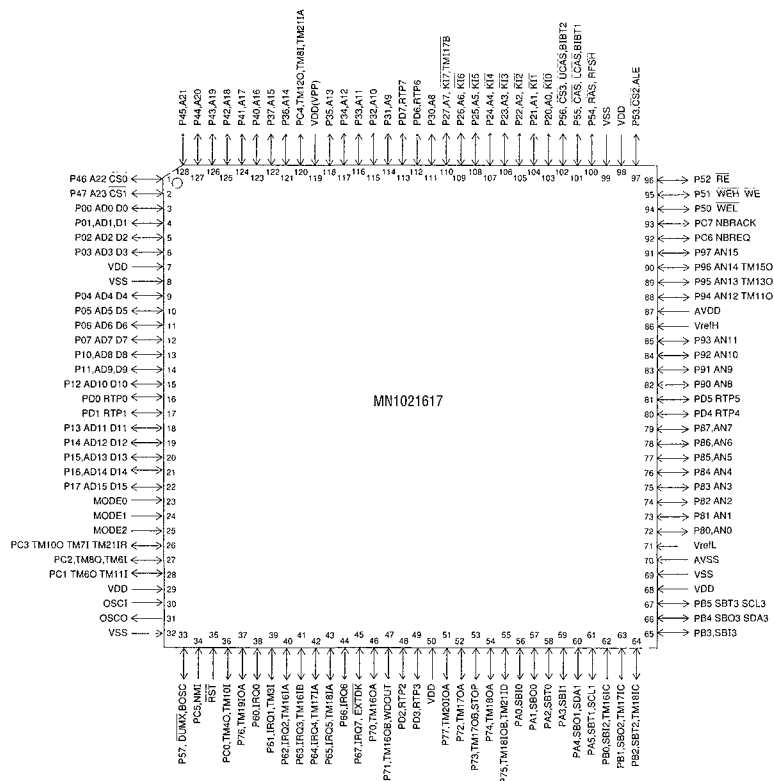
(Ta = -20 °C to +70 °C, VDD = AVDD = 3.3 V, VSS = AVSS = 0 V)

## Support Tool

### In Circuit Emulator

PX-ICE102H1617

### Pin Assignment



**Pin Assignment (Continue)**

Perspective



N/D	N/D	PB5, 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	PB3, SBI3	VSS	VrefL	P85, AN5	PD5, RTP5	P93, AN11	P96, AN14, TM150	PC6, NBREQ	P52, RE	N/D	N/D	M
VSS	PB2, SBT2, TM18IC	PB1, SBO2, TM17IC	PB4, SBO3, SDA3	P80, AN0	P84, AN4	AVSS	P91, AN9	P95, AN13, TM130	PC7, NBRACK	P51, WEH, /WE	VDD	P54, /RAS, /RFSH	L
PB0, SBI2 TM16IC	PA4, SBO1, 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, SBO0	PA3, SBI1	PA0, SBI0	PA2, SBT0	AVSS	P82, AN2	PD4, RTP4	VrefH	P55, /CAS, /LCAS, BIBT1	VPP	P20, A0, /K10	P21, A1, /K11	P23, A3, /K13	J
P75, TM18IOB, TM21HD	P73, TM17OB STOP	P77, TM20IOA	P72, TM17OA	P74, TM18OA	N/D	N/D	N/D	P22, A2, /K12	P26, A6, /K16	P24, A4, /K14	P27, A7, /K17, TM17B	P25, A5, /K15	H
P71, TM16OB, 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, TM18IA	P67, IRQ7, /EX TDK	P66, IRQ6	P70, TM16OA	P64, IRQ4, TM17IA	N/D	N/D	N/D	P34, A12	P32, A10	P33, A11	P35, A13	PC4, TM120, TM8I, TM21IA	F
P63, IRQ3, TM16IB	P61, IRQ1 TM3I	P62, IRQ2 TM16IA	VDD	P60, IRQ0	MODE0	PD0, RTP0	P08, AD5, D5	P03, AD3, D3	P36, A14	VPP	P41, A17	P37, A15	E
VSS	P76, TM19IOA	PC0, TM40, TM10I	VDD	PC2, TM80, TM6I	P15, AD13, D13	P13, AD11, D11	P11, AD9, D9	VSS	P01, AD1, D1	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, TM11I	PC3, TM100, TM7I, TM21IR	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