☐ **MN1021617**

Type	MN1021617
ROM (×8-bit)	128 K
RAM (×8-bit)	4 K
Package	LQFP128-P-1818C *Lead-free*, FLGA165-C-1111 *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 to 15 • 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 : 8-bit × 1 (UART baud rate generator)
	      Clock source ···················· 1/2 of system clock frequency; timer counter 0 output
	
	 Timer counter 3 : 8-bit × 1 (UART baud rate generator)
	      Clock source ···················· 1/2 of system clock frequency; timer counter 0 output; external clock input
	
	 Timer counter 4 : 8-bit × 1 (timer output, A/D conversion start up)
	      Clock source ···················· 1/2 of system clock frequency; 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 frequency; 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) 　　　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 : 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 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; 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 frequency; 1/8, 1/2 of timer counter 5 frequency; 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 frequency; 1/8, 1/2 of timer counter 9 frequency; external clock UART × 4 (common use with serial 0 to 3) I²C × 2 (common use with serial 1, 3; single master)

I/O Pins	**I/O**	100	• Common use : 56 (address data separate 8-bit mode)　• Common use : 73 (address data multiplex 8-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.

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2

Electrical Characteristics

Supply current

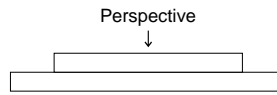| Parameter	Symbol	Condition	Limit			Unit
			min	typ	max	
Operating supply current	IDDopr	VI = VDD or VSS, output open f = 40 MHz , VDD = 3.3 V			50	mA
Supply current at STOP	IDDS	Pin with pull-up resistor is open all other input pins and Hi-Z state input/output			50	μA
Supply current at HALT	IDDH	pins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

LQFP128-P-1818C *Lead-free

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Pin Assignment (Continue)

Perspective
↓

13	12	11	10	9	8	7	6	5	4	3	2	1	
N.D.	N.D.	PB5,SBT3,SCL3	AVDD	P81,AN1	P83,AN3	P87,AN7	AVDD	P94,AN12,TM11O	AVDD	P50,/WEL	N.D.	N.D.	N
N.D.	N.D.	PB3,SBI3	VSS	VREFL	P85,AN5	PD5,RTP5	P93,AN11	P96,AN14,TM15O	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,TM13O	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,KI0	P21,A1,/KI1	P23,A3,/KI3	J
P75,TM18IOB,TM21ID	P73,TM17OB,STOP	P77,TM20IOA	P72,TM17OA	P74,TM18OA	N.D.	N.D.	N.D.	P22,A2,/KI2	P26,A6,/K16	P24,A4,/KI4	P27,A7,/KI7,TM117B	P25,A5,/KI5	H
P71,TM16OB,WDOUT	PD3,RTP3	VDD	VDD	PD2,RTP2	N.D.	N.D.		P30,A8	PD7,RTP7	VPP	P31,A9	PD6,RTP6	G
P65,IRQ5,TM18IA	P67,IRQ7,/EXTDK	P66,IRQ6	P70,TM16OA	P64,IRQ4,TM17IA	N.D.	N.D.	N.D.	P34,A12	P32,A10	P33,A11	P35,A13	PC4,TM12O,TM8I,TM21IA	F
P63,IRQ3,TM16IB	P61,IRQ1,TM3I	P62,IRQ2,TM16IA	VDD	P60,IRQ0	MODE0	PD0,RTP0	P05,AD5,D5	P03,AD3,D3	P36,A14	VPP	P41,A17	P37,A15	E
VSS	P76,TM19IOA	PC0,TM4O,TM10I	VDD	PC2,TM8O,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,TM6O,TM111	PC3,TM10O,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.		A

FLGA165-C-1111 *Lead-free

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.

Support Tool

In-circuit Emulator	PX-ICE102H1617-LQFP128-P-1818C	Not applicable to FLGA165-C-1111.
	Minimum instruction execution time	57.1 ns (at 35 MHz)
Flash Memory Built-in Type	Type	MN102F1617
	ROM (× 8-bit)	128 K
	RAM (× 8-bit)	4 K
	Minimum instruction execution time	62.5 ns (at 3.0 V to 3.6 V, 32 MHz)
		83.3 ns (at 2.7 V to 3.6 V, 24 MHz)
	Package	LQFP128-P-1818C *Lead-free, FLGA165-C-1111 *Lead-free

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