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# ■ MN1880024 / 4824 / 3224 / 2424

<b>Type</b>		<b>MN1880024 / 4824 / 3224 / 2424</b>	
<b>ROM (x8-bit)</b>		External / 48K / 32K / 24K	
<b>RAM (x8-bit)</b>		704 / 928 / 928	
<b>Minimum Instruction Execution Time</b>	With Main Clock operated	<b>0.200µs (at 4.5 to 5.5V, 20MHz)</b>	
	With Sub-clock operated	<b>0.400µs (at 3.0 to 5.5V, 10MHz) : MN1884824 only</b> <b>122µs (at 2.7 to 4.0V, 32.768kHz)</b>	
<b>Interrupts</b>		<ul style="list-style-type: none"> <li>• RESET • External 0 / Key Input • External 1 • External 2 / External 3 / External 4 / External 5</li> <li>• Timer 0 • Timer 1 / PWM • Timer 2 • Timer 3 / A/D • Timer 4 • Serial 0 • Serial 1 / UART</li> <li>• Runaway</li> </ul>	
<b>Timer Counter</b>		<p><b>Timer Counter 0 : 16-bit x 1</b> (Synchronous Output [4-bit x 1ch])  Clock Source .....1/2 of System Clock, 1/16 of OSC Oscillation Clock  Interrupt Source .....Overflow of Timer Counter 0,  Coincidence of Output Compare Register 0 and Timer Counter 0</p> <p><b>Timer Counter 1 : 16-bit x 1</b> (Timer Output, Event Count)  Clock Source .....1/2 of System Clock, 1/16 of OSC Oscillation Clock, External Clock  Interrupt Source .....Overflow of Timer Counter 1</p> <p><b>Timer Counter 2 : 16-bit x 1</b> (Input Capture, PWM Output)  Clock Source .....1/2 of System Clock, 1/16, 1/24 of OSC Oscillation Clock  Interrupt Source .....Overflow of Timer Counter 2, Specified Edge of TC102</p> <p><b>Timer Counter 3 : 16-bit x 1</b> (Generation of A/D converter trigger, Serial Index Search)  Clock Source .....1/2 of System Clock, 1/16 of OSC Oscillation Clock  Interrupt Source .....Overflow of Timer Counter 3</p> <p><b>Timer Counter 4 : 16-bit x 1</b> (Event Count, Synchronous Serial Clock Generator)  Clock Source .....1/16 of OSC Oscillation , External Clock Input  Interrupt Source .....Overflow of Timer Counter 4 (Switch to Timer Counter 5)</p> <p><b>Timer Counter 5 : 16-bit x 1</b> (Watchdog, Time Base, Clock function)  Clock Source .....1/4 of OSC Oscillation Clock, XI Oscillation Clock  Interrupt Source .....1/2048, 1/4096, 1/8192 of Timer Counter 5 (Switch to Timer Counter 4)</p>	
<b>Serial Interface</b>		<p><b>Serial : 8-bit x 2</b> (Synchronous Type) (Transfer direction of MSB/LSB selectable, Start Condition function, Serial transfer Index Search)  Clock Source .....1/4, 1/16, 1/32 of System Clock, External Clock, 1/2 of Timer Counter 4</p> <p><b>UART x 1</b> (8-bit Baud Rate Timer built-in)</p>	
<b>I/O Pins</b>	<b>I/O</b>	<b>58</b>	• Common use : 27 • Input/Output selectable (P0, P1, P4 to 6, P9 : by-bit, P3, P7 : by-byte)
	<b>Input</b>	<b>15</b>	• Common use : 15 • A/D Input selectable (P8 : by-bit)
<b>A/D Inputs</b>		8-bit x 8ch (without S/H)	
<b>PWM</b>		16-bit x 1ch (at Repetition Cycle 0.80µs to 26.2ms, 20MHz), 10-bit x 1ch (at Repetition Cycle 0.4 to 204.8µs, 20MHz)	
<b>ICR</b>		16-bit x 1ch	
<b>OCR</b>		16-bit x 1ch	

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<b>Special Ports</b>	Synchronous Output (4-bit x 1ch)
<b>Expanded Memory Access Mode</b>	High-speed bus mode/standard bus mode function * A memory-wait addition function is available during the high-speed mode on the MN1884824 / 3224 / 2424 MN18P86424 only.
<b>Package</b>	MN1880024 / 4824 / 3224 / 2424: QFP084-P-1818E MN1880024 / 4824: QFH084-P-1212

**Electrical Characteristics**

**Supply Current**

Parameter	Symbol	Condition	Limit			Unit
			min	typ	max	
Operating Supply Current	IDD1	At 20MHz Operation			70	mA
	IDD2	At 32kHz Operation			5	mA
Supply Current at STOP	IDD3	Oscillation halt			50	µA
Supply Current at HALT	IDD4	20MHz Oscillation halt			500	µA

(Ta = -20 to +70°C, VDD=5.0V, VSS=0V)

**A/D Converter Characteristics**

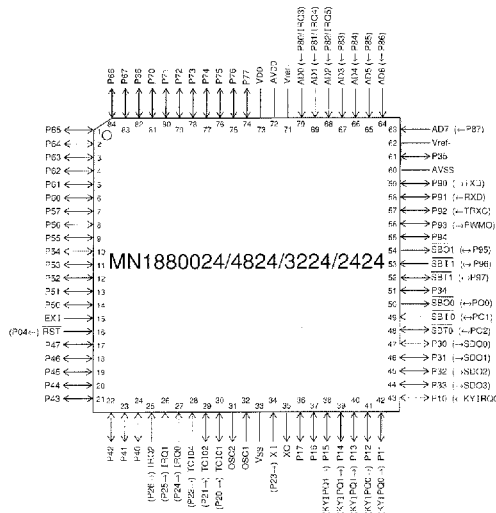
Parameter	Symbol	Condition	Limit			Unit
			min	typ	max	
A/D Conversion Linearity Error					±2	LSB
Zero Transition Voltage	VOT				500	mV
Full-scale Transition Voltage	VFT		4500			mV
A/D Conversion Time		fosc=20MHz, at High Speed A/D Conversion			2.60	µs
Analog Input Voltage	VIA		Vref-		Vref+	V

(Ta=25°C, VDD=5.0V, VSS=0V)

**Support Tool**

<b>In-Circuit Emulator</b>	Mr. ICE / 1880 (made by Computex Co. Ltd.) For 18mm x 18mm package only PX-ICE1880-2
<b>EPROM built-in Type</b>	Use MN18P86424

**Pin Assignment**



QFP084-P-1818E (MN1880024 / 4824 / 3224 / 2424)  
QFH084-P-1212 (MN1880024/4824)