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### What is "Embedded - Microcontrollers"?

"Embedded - Microcontrollers" refer to small, integrated circuits designed to perform specific tasks within larger systems. These microcontrollers are essentially compact computers on a single chip, containing a processor core, memory, and programmable input/output peripherals. They are called "embedded" because they are embedded within electronic devices to control various functions, rather than serving as standalone computers. Microcontrollers are crucial in modern electronics, providing the intelligence and control needed for a wide range of applications.

# Applications of "<u>Embedded -</u> <u>Microcontrollers</u>"

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Product Status	Obsolete
Core Processor	MN101C
Core Size	8-Bit
Speed	8MHz
Connectivity	I <sup>2</sup> C, UART/USART
Peripherals	LCD, PWM, WDT
Number of I/O	39
Program Memory Size	32KB (32K x 8)
Program Memory Type	FLASH
EEPROM Size	-
RAM Size	1.5K x 8
Voltage - Supply (Vcc/Vdd)	1.8V ~ 3.6V
Data Converters	A/D 7x10b
Oscillator Type	Internal
Operating Temperature	-40°C ~ 85°C (TA)
Mounting Type	Surface Mount
Package / Case	48-TQFP
Supplier Device Package	48-TQFP (7x7)
Purchase URL	https://www.e-xfl.com/product-detail/panasonic/mn101cf78axn

Email: info@E-XFL.COM

Address: Room A, 16/F, Full Win Commercial Centre, 573 Nathan Road, Mongkok, Hong Kong

# MN101C78 Series

Туре	MN101C78A	MN101CF78A		
Internal ROM type	Mask ROM	FLASH		
ROM (byte)	32К			
RAM (byte)	1.5K			
Package (Lead-free)	TQFP048-P-0707B			
Minimum Instruction Execution Time	0.100 μs (at 3.0 V to 3.6 V, 10 MHz) 0.118 μs (at 2.7 V to 3.6 V, 8.5 MHz) 0.235 μs (at 1.8 V to 3.6 V, 4.25 MHz)* 62.5 μs (at 1.8 V to 3.6 V, 32 kHz)* *: The lower limit for operation guarantee for flash memory built-in type is 2.2 V.			

# ■ Interrupts

RESET. Watchdog. External 0 to 2. External 4 (key interrupt dedicated). Timer 0 to 3. Timer 6. Timer 7 (2 systems). Timer 8 (2 systems). Time base. Serial 0 (2 systems). Serial 1 (2 systems). Serial 3. Serial 4. A/D conversion finish

# Timer Counter

8-bit timer  $\times$  5

Timer 0	Square-wave/8-bit PWM output. Event count. Remote control carrier output. Simple pulse width measurement. Added pulse (2-bit) type PWM output. Real time output control. Square-wave/PWM output to large current terminal P50 possible
Timer 1	Square-wave output. Event count. Synchronous output event
Timer 2	Square-wave output. Added pulse (2-bit) type PWM output. PWM output. Serial transfer clock output. Real time output control. Event count. Synchronous output event. Simple pulse width measurement. Square-wave/PWM output to large current terminal P52 possible
Timer 3	Square-wave output. Event count. Remote control carrier output. Serial 0 baud rate timer
Timer 6	8-bit freerun timer
Timer 0, 1 can be	cascade-connected
Timer 2, 3 can be	cascade-connected
16-bit timer $\times 2$	
Timer 7	Square-wave output. 16-bit PWM output (cycle/duty continuous variable). Event count. Synchronous output event. Pulse width measurement. Input capture. Real time output control. High performance IGBT output. Square-wave/PWM output to large current terminal P51 possible
Timer 8	Square-wave/16-bit PWM output (duty continuous variable). Event count. Pulse width measurement. Input capture. Square-wave/PWM output to large current terminal P53 possible
Timer 7, 8 can be	cascade-connected: Square-wave output, PWM, input capture, pulse width measurement is possible as a 32-bit

timer

Time base timer: One-minute count setting

Watchdog timer  $\times 1$ 

# Serial interface

Synchronous type/UART (full-duplex) × 2: Serial 0, 1 Synchronous type/Single-master I<sup>2</sup>C × 1: Serial 3 I<sup>2</sup>C slave × 1: Serial 4 Serial 4.....I<sup>2</sup>C high-speed transfer mode. 7-bit/10-bit address setting. General call

## ■ I/O Pins I/O

39: Common use. Specified pull-up resistor available. Input/output selectable (bit unit)

# A/D converter

10-bit  $\times$  7 channels (with S/H)

# Display control function

LCD: 12 segments × 4 commons (Static, 1/2, 1/3, or 1/4 duty) Usable if VLCD  $\leq$  VDD

# Special Ports

Buzzer output. Inverted buzzer output. Remote control carrier output. High-current drive port

Paramotor	Symbol	Condition		Limit		
Falameter	Symbol			typ	max	Unit
Operating supply current	IDD1	fosc = 4.25  MHz (fs = fosc/2).  VDD = 3  V		0.6(1.3)	1.1(2.2)	mA
	IDD2	fx = 32  kHz (fs = fx/2).  VDD = 3  V		4(46)	15(90)	μΑ
Supply current at HALT	IDD3	fx = 32 kHz. VDD = 3 V. Ta = 25 °C		2(3)	5(13)	μΑ
	IDD4	fx = 32 kHz. VDD = 3 V. Ta = -40 °C to +85 °C			10(40)	μΑ
Supply current at STOP	IDD5	VDD = 3 V. Ta = 25 °C			2(3)	μΑ
	IDD6	$VDD = 3 V. Ta = -40 \circ C to +85 \circ C$			8(30)	μΑ

# Electrical Charactreistics (Supply current)

Note) (): Flash memory built-in type

# Pin Assignment

TQFP048-P-0707B



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