

## AM1 Series 8-bit Microcomputer MN101C32G

### Overview

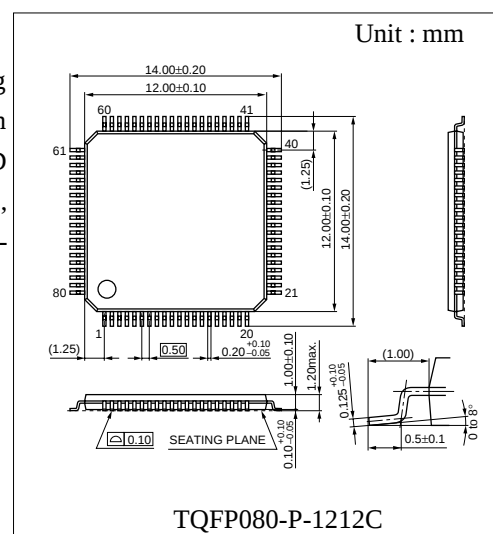
The MN101C32G is an 8-bit single-chip microcomputer for C programming language support. It incorporates a 128KB ROM and 4KB RAM, along with various peripherals including a serial input/output, timer counter, A/D converter and buzzer output. This microcomputer also features low-voltage, high-speed operation which is ideal for system controllers used in battery-driven portable MDs and other similar equipment.

### Features

- High-performance 8-bit for C-programming language.
- Low-voltage, high-speed operation due to low voltage wafer process.
- Thin, TQFP packaging, lead-free plating

### Specifications

| Parameter         |              | Part No. | MN101C32G                                           |
|-------------------|--------------|----------|-----------------------------------------------------|
| Operating voltage |              |          | 1.8V to 3.6V                                        |
| ROM               |              |          | 128Kbyte                                            |
| RAM               |              |          | 4Kbyte                                              |
| Speed             |              |          | 200ns(2.2V to 3.6V:10MHz), 500ns(1.8V to 3.6V:4MHz) |
| Timer             |              |          | 8                                                   |
| Serial interface  |              |          | 3                                                   |
| A/D converter     |              |          | 10 bit                                              |
| Interrupt         |              |          | 20 main factors (5 external)                        |
| I/O               | input/output |          | 57                                                  |
|                   | input        |          | 12 (combined use)                                   |
| Package           |              |          | TQFP080-P-1212C                                     |



### Applications

- MD ● CD ● mini component stereo ● cameras

! The products and specifications are subject to change without any notice. Please ask for the latest product standards to guarantee the satisfaction of your product requirements.

Semiconductor Company, Matsushita Electronics Corporation

|                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
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| ■ Type                               | MN101C32G                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| ■ ROM (×8-Bit)                       | 128 K                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| ■ RAM (×8-Bit)                       | 4 096                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| ■ Minimum Instruction Execution Time | Standard: 0.1 μs (at 2.7 V to 3.6 V, 20 MHz)<br>0.2 μs (at 2.3 V to 3.6 V, 10 MHz)<br>0.5 μs (at 1.8 V to 3.6 V, 4 MHz)<br>125 μs (at 1.8 V to 3.6 V, 32 kHz)<br>Double speed: 0.1 μs (at 2.7 V to 3.6 V, 10 MHz)<br>0.2 μs (at 2.3 V to 3.6 V, 5 MHz)<br>0.5 μs (at 1.8 V to 3.6 V, 2 MHz)<br>62.5 μs (at 1.8 V to 3.6 V, 32 kHz)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| ■ Interrupts                         | ·RESET·Watchdog·External 0·External 1·External 2·External 3· External 4· Timer 0<br>·Timer 1·Timer 2·Timer 3· Timer 4· Timer 6· Time Base· Serial 3· Serial 1· Serial 2<br>·Automatic Transfer finish· A/D Conversion finish· Timer 7 (2 systems)<br>·Key Interrupts (8 lines)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| ■ Timer Counter                      | <p>Timer Counter 0 : 8-Bit × 1 (Square-Wave/8-Bit PWM Output, Event Count, Generation of Remote Control Carrier, Pulse Width Measurement)<br/>           Clock Source -----1/2, 1/4 of System Clock, 1/1, 1/4, 1/16, 1/32, 1/64 of OSC Oscillation Clock, 1/1 of XI Oscillation Clock, External Clock Input<br/>           Interrupt Source ---Coincidence with Compare Register 0</p> <p>Timer Counter 1 : 8-Bit × 1 (Square-Wave Output, Event Count, Synchronous Output Event)<br/>           Clock Source-----1/2, 1/8 of System Clock, 1/1, 1/4, 1/16, 1/64, 1/128 of OSC Oscillation Clock, 1/1 of XI Oscillation Clock, External Clock Input<br/>           Interrupt Source---Coincidence with Compare Register 1</p> <p>Timer Counter 0, 1 can be cascade-connected.</p> <p>Timer Counter 2 : 8-Bit × 1 (Square-Wave/8-Bit PWM Output, Event Count, Synchronous Output Event, Pulse Width Measurement)<br/>           Clock Source -----1/2, 1/4 of System Clock, 1/1, 1/4, 1/16, 1/32, 1/64 of OSC Oscillation Clock, 1/1 of XI Oscillation Clock, External Clock Input<br/>           Interrupt Source---Coincidence with Compare Register 2</p> <p>Timer Counter 3 : 8-Bit × 1 (Square-Wave Output, Event Count, Generation of Remote Control Carrier)<br/>           Clock Source-----1/2, 1/8 of System Clock, 1/1, 1/4, 1/16, 1/64, 1/128 of OSC Oscillation Clock, 1/1 of XI Oscillation Clock, External Clock Input<br/>           Interrupt Source --Coincidence with Compare Register 3</p> <p>Timer Counter 2, 3 can be cascade-connected.</p> <p>Timer Counter 4 : 8-Bit × 1 (Square-Wave/8-Bit PWM Output, Event Count, Pulse Width Measurement, Serial 1 Baud Rate Timer)<br/>           Clock Source-----1/2, 1/4 of System Clock, 1/1, 1/4, 1/16, 1/32, 1/64 of OSC Oscillation Clock, 1/1 of XI Oscillation Clock, 1/1 of External Clock Input<br/>           Interrupt Source ---Coincidence with Compare Register 4</p> <p>Timer Counter 6 : 8-Bit Freerun Timer<br/>           Clock Source-----1/1 of System Clock, 1/1, 1/4096, 1/8192 of OSC Oscillation Clock, 1/1, 1/4096, 1/8192 of XI Oscillation Clock<br/>           Interrupt Source---Coincidence with Compare Register 6</p> |

■ **Timer Counter**

Timer Counter 7 : 16-Bit × 1 (Square-Wave/16-Bit PWM Output, Cycle / Duty continuous variable, Event Count, Synchronous Output Event, Pulse Width Measurement, Input Capture)  
Clock Source-----1/1, 1/2, 1/4, 1/16 of System Clock, 1/1, 1/2, 1/4, 1/16 of OSC Oscillation Clock, 1/1, 1/2, 1/4, 1/16 of External Clock Input  
Interrupt Source---Coincidence with Compare Register 7 (2 lines)

Time Base Timer (One-Minute Count Setting)  
Clock Source-----1/1 of OSC Oscillation Clock,  
1/1 of XI Oscillation Clock  
Interrupt Source---1/128, 1/256, 1/512, 1/1024, 1/8192, 1/32768, of Clock Source

Watchdog Timer  
Interrupt Source---1/65536, 1/262144, 1/1048576 of System Clock

DMA Controller (Automatic data transfer)  
Max. Transfer Cycles----255  
Starting Factor-----External Request, Various Types of Interrupt, Software  
Transfer Mode-----1-Byte Transfer, Word Transfer, Burst Transfer

■ **Serial Interface**

Serial 1 : 8-Bit × 1 (Synchronous Type/Simple UART[Half-Duplex])  
Clock Source-----1/2, 1/4 of System Clock  
Pulse Output of Timer Counter 4  
1/2, 1/4, 1/16, 1/64 of OSC Oscillation Clock

Serial 2 : 8-Bit × 1 (Synchronous Type)  
Clock Source-----1/2, 1/4 of System Clock  
Pulse Output of Timer Counter 3  
1/2, 1/4, 1/16, 1/32 of OSC Oscillation Clock

Serial 3 : 8-Bit × 1 (Synchronous Type/Simple I2C)  
Clock Source-----1/2, 1/4 of System Clock  
Pulse Output of Timer Counter 3  
1/2, 1/4, 1/16, 1/32 of OSC Oscillation Clock

|            |          |                                                                                            |
|------------|----------|--------------------------------------------------------------------------------------------|
| ■ I/O Pins | I/O 57   | · Common use · Specified pull-up Resistor available · Input / Output selectable (bit unit) |
|            | Input 12 | · Common use · Specified pull-up Resistor available                                        |

■ **A/D Inputs** 10-Bit× 7ch (with S/H)

■ **Special Ports** Buzzer Output, Remote Control Carrier Signal Output, High-Current Drive Port

■ **Package** TQFP080-P-1212C \*Pb Free

■ **Electrical Characteristics**

| Parameter                | Symbol | Condition                | Limit |     |     | Unit |
|--------------------------|--------|--------------------------|-------|-----|-----|------|
|                          |        |                          | min   | typ | max |      |
| Operating Supply Current | IDD1   | fosc=10MHz , VDD=3V      | -     | -   | 10  | mA   |
|                          | IDD2   | fosc=4 MHz , VDD=3V      | -     | -   | 4   | mA   |
| Supply Current at STOP   | IDD6   | VDD=3V , Ta=25°C         | -     | -   | 2   | μA   |
|                          | IDD7   | VDD=3V , Ta=-40 to +85°C | -     | -   | 20  | μA   |

## ■ Support Tool

## ■ In-Circuit Emulator

PX-ICE101C/D+PX-PRB101C32-MBB

## ■ Pin Assignment

