

□ MN101E46 Series

Type	MN101E46G	MN101E46N	MN101E46R	MN101EF46R
Internal ROM type	Mask ROM			FLASH
ROM (byte)	128K	508K	928K	
RAM (byte)	4K		6K	8K
Package (Lead-free)	TQFP128-P-1414C			TQFP128-P-1414A
Minimum Instruction Execution Time	0.1 μ s (at 2.2 V to 3.6 V, 10 MHz) 0.125 μ s (at 1.8 V to 3.6 V, 8 MHz) 61 μ s (at 1.8 V to 3.6 V, 32.768 kHz)			

■ Interrupts

RESET. Watchdog. External 0 to 3. Timer 0 to 3. Timer 6. Timer 7 (2 systems). Timer 8 (2 systems). Time base. Serial 0. Serial 1 (2 systems). A/D conversion finish. Automatic transfer finish. LCD frame finish

■ Timer Counter

8-bit timer \times 5

Timer 0Square-wave/8-bit PWM output. Event count. Remote control carrier output. Simple pulse width measurement

Timer 1Square-wave output. Event count. Serial transfer clock output

Timer 2Square-wave/8-bit PWM output. Serial transfer clock output. Event count. Simple pulse width measurement

Timer 3Square-wave output. Event count. Serial transfer clock output

Timer 68-bit freerun timer

Timer 0, 1 can be cascade-connected

Timer 2, 3 can be cascade-connected

16-bit timer \times 2

Timer 7, 8Square-wave output. 16-bit PWM output (cycle/duty continuous variable). Event count. Pulse width measurement.

Input capture

Time base timer: One-minute count setting

Watchdog timer \times 1

■ Serial interface

Synchronous type/Single-master I²C \times 1: Serial 0

Synchronous type/UART (full-duplex) \times 1: Serial 1

■ DMA controller

Maximum transfer cycles: 255

Starting factor: External request. Various types of interrupt. Software

Transfer mode: 1-byte transfer. Word transfer. Burst transfer

■ I/O Pins

I/O 67 : Common use

Output 40 : LCD drive output exclusive use

■ A/D converter

10-bit \times 3 channels (External input 2 channels, Internal 1.8 V input 1 channel)

■ Display control function

Dot Matrix type LCD control function

Display size up to 2048 pixels (32 COM \times 64 SEG)

LCD drivers: COM output maximum 32 pins / SEG output maximum 67 pins (3 pins has dual function for COM/SEG)

1/8, 1/16, 1/24, 1/32 duty

1/5, 1/6 bias

LCD panel drive voltage maximum 5.5 V

Built-in LCD voltage booster and LCD voltage dividing resistor

16-level contrast control

Bright and dark 2-step level display function

Monochrome inversion function

■ Special Ports

Buzzer output. Remote control carrier output

Request for your special attention and precautions in using the technical information and semiconductors described in this book

- (1) If any of the products or technical information described in this book is to be exported or provided to non-residents, the laws and regulations of the exporting country, especially, those with regard to security export control, must be observed.
- (2) The technical information described in this book is intended only to show the main characteristics and application circuit examples of the products. No license is granted in and to any intellectual property right or other right owned by Panasonic Corporation or any other company. Therefore, no responsibility is assumed by our company as to the infringement upon any such right owned by any other company which may arise as a result of the use of technical information described in this book.
- (3) The products described in this book are intended to be used for standard applications or general electronic equipment (such as office equipment, communications equipment, measuring instruments and household appliances).
Consult our sales staff in advance for information on the following applications:
 - Special applications (such as for airplanes, aerospace, automobiles, traffic control equipment, combustion equipment, life support systems and safety devices) in which exceptional quality and reliability are required, or if the failure or malfunction of the products may directly jeopardize life or harm the human body.
 - Any applications other than the standard applications intended.
- (4) The products and product specifications described in this book are subject to change without notice for modification and/or improvement. At the final stage of your design, purchasing, or use of the products, therefore, ask for the most up-to-date Product Standards in advance to make sure that the latest specifications satisfy your requirements.
- (5) When designing your equipment, comply with the range of absolute maximum rating and the guaranteed operating conditions (operating power supply voltage and operating environment etc.). Especially, please be careful not to exceed the range of absolute maximum rating on the transient state, such as power-on, power-off and mode-switching. Otherwise, we will not be liable for any defect which may arise later in your equipment.
 - Even when the products are used within the guaranteed values, take into the consideration of incidence of break down and failure mode, possible to occur to semiconductor products. Measures on the systems such as redundant design, arresting the spread of fire or preventing glitch are recommended in order to prevent physical injury, fire, social damages, for example, by using the products.
- (6) Comply with the instructions for use in order to prevent breakdown and characteristics change due to external factors (ESD, EOS, thermal stress and mechanical stress) at the time of handling, mounting or at customer's process. When using products for which damp-proof packing is required, satisfy the conditions, such as shelf life and the elapsed time since first opening the packages.
- (7) This book may be not reprinted or reproduced whether wholly or partially, without the prior written permission of our company.