

□ MN101D09E

Type	MN101D09E	MN101DF09G
Internal ROM type	Mask ROM	FLASH
ROM (byte)	80K	128K
RAM (byte)	2K	4K
Package (Lead-free)	QFP100-P-1818B	
Minimum Instruction Execution Time	[With main clock operated] 0.1397 μs (at 4.0 V to 5.5 V, 14.32 MHz) 71.5 μs (at 2.7 V to 5.5 V, 14.32 MHz internal frequency di Vision) [When sub-clock operated] 61 μs (at 2.5 V to 5.5 V, 32.768 kHz)	0.1397 μs (at 4.0 V to 5.5 V, 14.32 MHz) 71.5 μs (at 2.7 V to 5.5 V, 14.32 MHz internal frequency di Vision) 61 μs (at 2.5 V to 5.5 V, 32.768 kHz)

■ Interrupts

RESET, Runaway, External 0 to 4, Timer 0 to 3, Timer 6, Capstan FG, Control, HSW, Cylinder(Drum) FG, Servo V-sync, Synchronous output, OSD, XDS, Serial 1, Serial 2, PWM 4, OSD V-sync

■ Timer Counter

Timer counter 0 : 8-bit × 1 (timer function)

Clock source..... 1/4, 1/16 of system clock frequency
 Interrupt source overflow of timer counter 0

Timer counter 1 : 8-bit × 1 (timer function, linear timer counter function)

Clock source..... 1/4 of system clock frequency; CTL signal
 Interrupt source overflow of timer counter 1

Timer counter 2 : 16-bit × 1 (timer function, input capture (CTL specified edge), duty judgment of CTL signal)

Clock source..... 1/4, 1/16, 1/24 of system clock frequency
 Interrupt source overflow of timer counter 2; input of CTL specified edge; underflow of timer 2 shift register 4-bit counter; coincidence of timer 2 shift register with timer 2 shift register compare register

Timer counter 3 : 16-bit × 1 (timer function)

Clock source..... 1/4, 1/16 of system clock frequency
 Interrupt source overflow of timer counter 3

Timer counter 5 : 19-bit × 1 (watchdog, stable oscillation waiting function)

Clock source..... system clock
 Watchdog interrupt source... 1/2¹⁶, 1/2¹⁹ of timer counter 5 frequency
 Clear by stable oscillation ... after 256 counts by timer counter 5 (2¹⁸ counts of OSC oscillation clock)

Timer counter 6 : 16-bit × 1 (clock function [max. 2 s])

Clock source..... 1/512 of OSC oscillation clock frequency; XI oscillation clock; 1/8, 1/128 of system clock frequency
 Interrupt source 1/2¹³, 1/2¹⁴, 1/2¹⁵ overflow of timer counter 6

■ Serial interface

Serial 1 : 8-bit × 1 (synchronous type)

(transfer direction of MSB/LSB selectable, start condition function)

Clock source..... 1/8, 1/16, 1/32, 1/64, 1/128, 1/256 of system clock frequency; NSBT1 pin input

Serial 2 : 8-bit × 1 (I²C)

(master transmission/reception, slave transmission/reception)

Clock source..... 1/144 to 1/252 of system clock; SCK pin input

■ OSD

Display mode Menu(Internal synchronized) display, super impose(external synchronized) display
 Applicable broadcasting system.....NTSC, PAL, PAL-M, PAL-N
 Screen configuration24 characters × 2n rows (n = 1 to 6)
 Character typemax. 128 character types (variable, include special characters)
 Character size.....12 × 18 dots (Vertical direction : 1 dot for 2H at not enlargement)
 Enlarged characterseach × 2 settings in horizontal and vertical
 Character interpolation.....none
 Line background color8-hue settable in the row unit at menu display
 Line background intensity.....8 gradations settable in the row unit
 Screen background color.....8-hue settable at omenu display
 Character color.....white
 Character intensity8 gradations settable in the row unit
 Frame function1-dot frame in 4 directions
 Frame intensity.....4 gradations settable in the row unit
 Blinking.....none (covered by software)
 Inverted character.....settable in the character unit
 Halftone.....none
 Inputcomposite video signal input (output level : 1 V[p-p] / 2 V[p-p])
 Clamp methodsync tip clamp, clamp level in 4 levels
 Outputcomposite video output
 Measure against image fluctuation.....built-in AFC circuit
 Dot clock1/2 of OSC oscillation clock (automatic phase adjustment)

■ XDS

Built-in U.S. closed caption data slicer (optional 1 line data can be extracted.)

■ I/O Pins

I/O	56	Common use : 45
Input	1	Common use : 1

■ A/D converter

8-bit × 11-ch. (without S/H)

■ PWM

13-bit × 2-ch. (at repetition cycle 572 ms at 14.32 MHz),
 8-bit × 1-ch. (at repetition cycle 71.5 ms, 0.572 ms, 1.14 ms, 2.29 ms at 14.32 MHz)

■ ICR

16-bit × 2-ch.(Speed system),
 18-bit × 4-ch.(Phase system)

■ OCR

16-bit × 3 (Synchronous output × 2, Rec CTL × 1)

■ Special Ports

3-state output (PTO) VLP pin; CTL input; Capstan FG input; Cylinder(Drum) PG/FG inputs; HSW output; Head amp/ Rotary control outputs; output of 1/4 OSC oscillation clock (1 V[p-p])

■ ROM Correction

Correcting address designation : up to 3 addresses possible
 Correction method : correction program being saved in internal RAM

■ Electrical Characteristics (Supply current)

Parameter	Symbol	Condition	Limit			Unit
			min	typ	max	
Operating supply current	IDD1	14.32 MHz operation without load, VDD = 5 V		50	100	mA
	IDD2	1/1024 of 14.32 MHz operation without load, VDD = 2.7 V		2	5	mA
	IDD3	Stop of 14.32 MHz oscillation, VDD = 2.7 V 32 kHz oscillation operation without load		50	100	μA
Supply current at STOP	IDSP	Stop of oscillation without load, VDD = 5 V			10	μA
Supply current at HALT	IDHT0	14.32 MHz oscillation without load, VDD = 5 V		5	15	mA
	IDHT1	Stop of 14.32 MHz oscillation, VDD = 2.7 V 32 kHz oscillation operation without load		5	20	μA

(Ta = 25°C±2°C , VSS = 0 V)

■ Electrical Characteristics (A/D converter characteristics)

Parameter	Symbol	Condition	Limit			Unit
			min	typ	max	
Conversion relative error	ΔNLAD				±3	LSB
A/D Conversion Time	tAD	fosc = 14.32 MHz		8		μs
Analog Input Voltage					5	V

(Ta = 25°C±2°C , VDD = 5.0 V , VSS = 0 V)

■ Development tools

In-circuit Emulator

PX-ICE101C/D + PX-PRB101D08-QFP100-P-1818B-M

Request for your special attention and precautions semiconductors devices

- (1) If any of the products or technical information described in this book is intended for use in the regulations of the exporting country, especially, those with regulations of the importing country, please refer to the regulations of the importing country.
- (2) The technical information described in this book is intended for general reference only. No license is granted under any intellectual property rights of the products, and no responsibility is assumed by our company for any damage or loss of property which may arise as a result of the use of technical information.
- (3) The products described in this book are intended to be used for standard applications such as measuring instruments, equipment, communications equipment, measuring instruments, etc. Consult our sales staff in advance for information on the following special applications:
 - Special applications (such as for airplanes, aerospace, automotive, medical, etc.) in which exceptional quality and reliability are required.
 - Systems and safety devices in which exceptional quality and reliability are required.
 - Products which 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 improvement. At the final stage of your design, purchasing, or use, please refer to the latest Standards in advance to make sure that the latest specifications are used.
- (5) When designing your equipment, comply with the range of operating conditions (operating power supply voltage and operating environment etc.) and do not exceed the maximum rating on the transient state, such as power-on, power-off, etc. to prevent defect which may arise later in your equipment.
 - Even when the products are used within the guaranteed values, electrostatic discharge (ESD) mode, possible to occur to semiconductor products. Measures of electrostatic protection or preventing glitch are recommended in order to prevent physical damage.
- (6) Comply with the instructions for use in order to prevent breakdown (such as thermal stress and mechanical stress) at the time of handling, use, etc. If damp-proof packing is required, satisfy the conditions, such as storage, etc.
- (7) This book may be not reprinted or reproduced whether wholly or partially without the permission of Electric Industrial Co., Ltd. Industrial Co., Ltd.