

□ MN101D06F , MN101D06G , MN101D06H

Type	MN101D06F	MN101D06G	MN101D06H
ROM (x8-bit)	96 K	128 K	160 K
RAM (x8-bit)	3 K	4 K	5 K
Package	QFP100-P-1818B *Lead-free		
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 3.0 V to 5.5 V fixed to 14.32 MHz internal frequency division)	
	When sub-clock operated	61 μs (at 2.2 V to 5.5 V, 32.768 kHz)	
Interrupts	<ul style="list-style-type: none"> • RESET • Runaway • External 0 • External 1 • External 2 • External 3 • External 4 • key input (P50 to 54) • Timer 0 • Timer 1 • Timer 2 • Timer 3 • Timer 4 • Timer 6 • Capstan FG • Control • HSW • Cylinder(Drum) FG • Servo V-sync • Synchronous output • OSD • XDS • Serial 0 • Serial 1 • Serial 2 • A/D (common with PWM 4 reference frequency) • OSD V-sync 		
Timer Counter	<p>Timer counter 0: 16-bit × 1 (timer function, clock function [max. 2 s or max. 36 h at cascade-connecting with timer 6]) Clock source 1/2, (1/4,) 1/8, (1/16) of system clock frequency; overflow of timer counter 6; 1/512 of XI oscillation clock or OSC oscillation clock frequency Interrupt source overflow of timer counter 0</p> <p>Timer counter 1: 16-bit × 1 (timer function, linear timer counter function) Clock source 1/2, (1/4,) 1/8, (1/16) of system clock frequency; CTL signal Interrupt source overflow of timer counter 1</p> <p>Timer counter 2: 16-bit × 1 (timer function, input capture, duty judgment of CTL signal(VISS/VASS detection function)) Clock source 1/2, (1/4,) 1/8, (1/16,) 1/12, (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</p> <p>Timer counter 3: 16-bit × 1 (timer function, detection of serial indexing, generation of remote control output carrier frequency) Clock source 1/2, (1/4,) 1/8, (1/16) of system clock frequency; XI oscillation clock Interrupt source overflow of timer counter 3</p> <p>Timer counter 4: 16-bit × 1 (timer function, event count [P15 input], generation of serial transmission clock) Clock source 1/8, (1/16) of system clock frequency; external clock input Interrupt source overflow of timer counter 4; coincidence of timer counter 4 with OCR4</p> <p>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)</p> <p>Timer counter 6: 16-bit × 1 (clock function [max. 2 s]) Clock source 1/512 of OSC oscillation clock frequency; XI oscillation clock; 1/4, (1/8,) 1/64, (1/128) of system clock frequency Interrupt source 1/2¹³, 1/2¹⁴, 1/2¹⁵ overflow of timer counter 6</p> <p>Timer counter 7: 8-bit × 1 or 4-bit × 2 (timer function, event count) Clock source 1/4, (1/8,) 1/16, (1/32) of system clock frequency; external clock input Interrupt source overflow of timer counter 7 (although when 4-bit × 2, there is one interrupt vector.)</p>		
Serial Interface	<p>Serial 0: 8-bit × 1 (synchronous type/start-stop synchronous type) (transfer direction of MSB/LSB selectable) Synchronous type clock source 1/8, 1/16, 1/32, 1/64, 1/128, 1/256 of system clock frequency; 2-division timer 4 output; NSBT0 pin input Clock for UART 8-division of above clock; 2-division timer 4 output; NSBT0 pin input</p>		

Serial Interface (Continue)	Serial 1: 8-bit × 1
	(synchronous type/remote control transmission/simple remote control receive) (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; 2-division timer 4 output; NSBT1 pin input
	Remote control clock 2-division timer 4 output
Serial 2: 8-bit × 1 (I ² C) (master transmission/reception, slave transmission/reception)	
Clock source 1/144 to 1/252 of system clock; SCK pin input	

OSD	OSD mode: Accommodation with menu(internal synchronous) or super impose(external synchronous) display
	Applicable broadcasting system:NTSC, PAL, PAL-M, PAL-N
	Screen configuration : 24 characters × 2n rows (n = 1 to 6)
	Character type : max. 512 character types (variable, include special characters)
	Character size : 12 × 18 dots (Vertical direction: 1 dot for 2H at not enlargement)
	Enlarged characters : each × 2, × 3 or × 4 settings in horizontal and vertical
	Character interpolation : none
	Line background color : 8-hue settable (settable in the row unit at menu display)
	Line background intensity : 8 gradations settable in the row unit (at output of composite video signal)
	Screen background color : 8-hue settable (at output of composite video signal)
	Character color : white (at output of composite video signal)
	Character intensity : 8 gradations settable in the row unit (at output of composite video signal)
	Frame function : 1-dot frame in 4 or 8 directions
	Frame intensity : 4 gradations settable in the row unit (at output of composite video signal)
	Box shade function : settable in the character unit (at output of composite video signal with 129 or more characters (character types))
	Blinking : none (covered by software)
	Inverted character : settable in the character unit
	Halftone : settable in the row unit in 2 intensity gradations (at output of external synchronous composite video signal)
	CCD mode: Supports Closed Caption in the U.S.A.
	Screen configuration : 32 characters × 16 rows
	Character type : max. 128 character types (variable)
	Character size : 12 × 26 dots (Vertical direction: 1 dot for 1H, including 8 dots in the underlined area)
	Enlarged characters : none
	Character interpolation : none
	Line background color : 8-hue settable
	Line background intensity : 8 gradations settable in the screen unit (at output of composite video signal)
	Screen background color : 8-hue settable (at output of composite video signal)
	Character color : 8 colors (at RGB output)
	: White (at output of composite video signal)
	Character intensity : 8 gradations settable in the screen unit (at output of composite video signal)
	Frame function : none
	Box shade function : none
	Inverted character : none
	Halftone : settable in the row unit in 2 intensity gradations (at output of external synchronous composite video signal)
	Others : Underline, italic, blinking function and scroll
	Input : composite video signal input (output level: 1 V _[p-p] / 2 V _[p-p])
	Clamp method : sync tip clamp, clamp level in 4 levels
	Output : composite video output
	: digital output (6 pins)
	Measure against image fluctuation : built-in AFC circuit
	Dot clock : 1/2 of OSC oscillation clock (automatic phase adjustment)

See the next page for electrical characteristics, pin assignment and support tool.

XDS	Built-in U.S. closed caption data slicer (optional 2 line data can be extracted.)		
ROM Correction	Correcting address designation: up to 3 addresses possible Correction method: correction program being saved in internal RAM		
I/O Pins	I/O	75	• Common use: 66
	Input	2	• Common use: 2
A/D Inputs	8-bit × 13-ch. (without S/H)		
PWM	13-bit × 2-ch. (at repetition cycle 572 μs at 14.32 MHz), 10-bit × 2-ch. (at repetition cycle 71.5 μs at 14.32 MHz), 8-bit × 1-ch. (at repetition cycle 71.5 μs, 0.572 ms, 1.14 ms, 2.29 ms at 14.32 MHz)		
ICR	18-bit × 6-ch.		
OCR	16-bit × 2 (8-bit synchronous output; 4-bit 3-state synchronous output), 16-bit × 1 (weak electric field V-sync backup), 16-bit × 1 (Rec CTL)		
Special Ports	Buzzer output; 3-state output VLP pin; remote control receive; CTL signal input terminal; Capstan FG input terminal; Sylinder(Durm) PG/FG input terminals; HSW output terminal; Head Amp/Rortary control output terminals; output of 1/2 OSC oscillation clock (2 V[p-p]); output of 1/4 OSC oscillation clock (1 V[p-p])		

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		60	100	mA
	IDD2	1/1024 of 14.32 MHz operation without load, VDD = 3.0 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, Ta = 55 °C			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

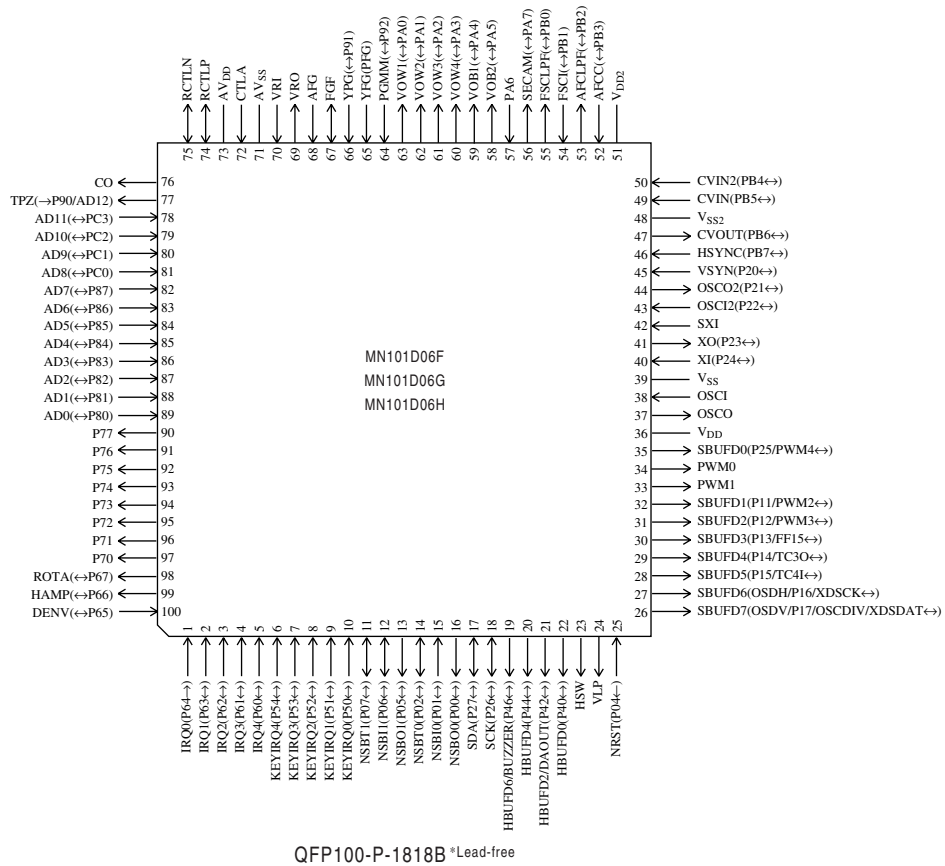
(Ta = 25 °C ± 2 °C, VSS = 0 V)

A/D Converter Performance

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)

Pin Assignment



Support Tool

In-circuit Emulator	PX-ICE101C / D + PX-PRB101D06-QFP100-P-1818B-M	
Flash Memory Built-in Type	Type	MN101DF06ZAF
	ROM (× 8-bit)	224 K
	RAM (× 8-bit)	6 K
	Minimum instruction execution time	0.1397 μs (at 4.0 V to 5.5 V, 14.32 MHz) 71.5 μs (at 3.0 V to 5.5 V, fixed to 14.32 MHz internal division) 61 μs (at 2.5 V to 5.5 V, 32.768 kHz)
	Package	QFP100-P-1818B *Lead-free

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

- (1) An export permit needs to be obtained from the competent authorities of the Japanese Government if any of the products or technical information described in this material and controlled under the "Foreign Exchange and Foreign Trade Law" is to be exported or taken out of Japan.
- (2) The technical information described in this material is limited to showing representative characteristics and applied circuits examples of the products. It neither warrants non-infringement of intellectual property right or any other rights owned by our company or a third party, nor grants any license.
- (3) We are not liable for the infringement of rights owned by a third party arising out of the use of the technical information as described in this material.
- (4) The products described in this material 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.
- (5) The products and product specifications described in this material 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.
- (6) When designing your equipment, comply with the guaranteed values, in particular those of maximum rating, the range of operating power supply voltage, and heat radiation characteristics. 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.
- (7) When using products for which damp-proof packing is required, observe the conditions (including shelf life and amount of time let standing of unsealed items) agreed upon when specification sheets are individually exchanged.
- (8) This material may be not reprinted or reproduced whether wholly or partially, without the prior written permission of Matsushita Electric Industrial Co., Ltd.