❑ MN101D01F / G / Y

VTR Servo

Type	MN101D01F / G / Y
ROM (×8-Bit)	96 K / 128 K / 128 K
RAM (×8-Bit)	2 560 / 3 072 / 3 072
Minimum Instruction Execution Time	With Main Clock operated **0.1397 µs (at 4.5 V to 5.5 V, 14.32 MHz)** When Sub-Clock operated **71.5 µs (at 2.2 V to 5.5 V fixed to 14.32 MHz internal frequency division)** **61 µs (at 2.2 V to 5.5 V, 32.768 kHz)**
Interrupts	• RESET • Runaway • External 0, 1, 2, 3, 4/key input (P50 to 54) • Timer 0 • Timer 1 • Timer 2 • Timer 3 • Timer 4 • Timer 6 • Capstan FG • Control • HSW • Cylinder FG • VSYNC • Synchronous Output • OSD • XDS • Serial 0 • Serial 1 • Serial 2 • A/D (common with PWM 14 reference frequency)

Timer Counter

Timer Counter 0: 16-Bit × 1 (Timer Output, Clock Function [max 2 s])
- Clock Source: 1/2, 1/4, 1/8, 1/16 of System Clock, 1/512 of XI Oscillation Clock or OSC Oscillation Clock
- Interrupt Source: Overflow of Timer Counter 0

Timer Counter 1: 16-Bit × 1 (Timer Output, linear Timer Counter Function)
- Clock Source: 1/2, 1/4, 1/8, 1/16, CTL Signal of System Clock
- Interrupt Source: Overflow of Timer Counter 1

Timer Counter 2: 16-Bit × 1 (Timer Output, Input Capture (DCTL Specified Edge), Duty Judgment of DCTL Signal)
- Clock Source: 1/2, 1/4, 1/8, 1/12, 1/16, 1/24 of System Clock
- Interrupt Source: Overflow of Timer Counter 2, Input of DCTL 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 Output, Detection of Serial Indexing, Generation of Remote Control Output Carrier Frequency)
- Clock Source: 1/2, 1/4, 1/8, 1/16 of System Clock
- Interrupt Source: Overflow of Timer Counter 3

Timer Counter 4: 16-Bit × 1 (Timer Output, Event Count (P15 Input), Generation of Serial Transmission Clock)
- Clock Source: 1/8, 1/16 of System Clock, External Clock Input
- Interrupt Source: Overflow of Timer Counter 4, Coincidence of Timer Counter 4 with OCR4

Timer Counter 5: 17-Bit × 1 (Watchdog, Stable Oscillation Waiting Function)
- Clock Source: System Clock
- Watchdog Interrupt Source: $1/2^{16}$, $1/2^{19}$ of Timer Counter 5
- Clear by Stable Oscillation: After 256 Counts by Timer Counter 5 (2^{18} Counts of OSC Oscillation Clock)

Timer Counter 6: 16-Bit × 1 (Clock Function [max 2 s])
- Clock Source: 1/512 of OSC Oscillation Clock, XI Oscillation Clock, 1/4, 1/8, 1/64, 1/128 of System Clock
- Interrupt Source: $1/2^{13}$, $1/2^{14}$, $1/2^{15}$, Overflow of Timer Counter 6

Serial Interface

Serial 0: 8-Bit × 1 (Synchronous Type/Start-Stop Synchronous Type) (Transfer Direction of MSB/LSB Selectable)
- Synchronous Type Clock Source: 1/4, 1/8, 1/16, 1/32, 1/64, 1/128, 1/256 of System Clock, 2-Division Timer 4 Output, $\overline{SBT0}$ Pin Input
- Clock for UART: 8-Division of Above Clock, 2-Division Timer 4 Output, $\overline{SBT0}$ Pin Input

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: 1/4, 1/8, 1/16, 1/32, 1/64, 1/128, 1/256 of System Clock, 2-Division Timer 4 Output, $\overline{SBT1}$ Pin Input
- Remote Control Clock: 2-Division Timer Output

Serial 2: 8-Bit × 1 (I^2C) (Master Transmission/Reception, Slave Transmission/Reception)
- Clock Source: 1/72, 1/80, 1/84, 1/96, 1/102, 1/112, 1/128, 1/144, 1/160, 1/168, 1/192, 1/224, 1/256, 1/320, SCK Pin Input of System Clock

OSD			Accommodation with Menu or Super Impose 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) Character Size: 12 × 18 Dots Enlarged Characters: Each × 2, × 3 or × 4 Settings in Horizontal and Vertical Character Interpolation: None Background Color: 8-Hue Settable (Settable in The Row Unit at Menu Display) Background Intensity: 8 Gradations Settable in The Row Unit Character Color: White Character Intensity: 8 Gradations Settable in The Row Unit Frame Function: 1-Dot frame in 4 or 8 Directions Frame Intensity: 4 Gradations Settable in The Row Unit Box Shade Function: Settable in The Character Unit (Only at Composite Output with 128 Character Types or More) Blinking: None (Covered by Software) Inverted Character: Settable in The Character Unit Halftone: Settable in The Row Unit in 2 Intensity Gradations (Setting in The Row Unit) Input: Composite Video Signal Input (Output Level 1 V[p-p] / 2 V[p-p]) Clamp Method: Sync Chip Clamp, Clamp Level in 4 Levels Output: Composite Video Output Digital Output (6 pins) 8 Character and Background Colors Each Settable at Digital Output Measure Against Image Fluctuation: Built-In AFC Circuit Sync Signal Detection Function: Detection Functions for Horizontal and Vertical Sync Signals (Integral System) With Horizontal Sync Signal Interpolation Function
XDS			Built-In U S Closed Caption Data Slicer (Optional 2 Line Data can be Extracted)
ROM Correction			Correcting Address Designation: Up to 2 Addresses Possible Correction Method: Correction Program Being Saved in Internal RAM
I/O Pins	**I/O**	**73**	• Common use 73 ports 0, 1, 2, 4, 5, 6, 7, A, B, by-bit
	Input	**4**	• Common use 4
A/D			8-Bit × 12ch (Without S/H)
PWM			13-Bit × 2ch (at Repetition Cycle 572 µs, 14 32 MHz), 10-Bit × 2ch (at Repetition Cycle 71 5 µs, 14 32 MHz), 14-Bit × 1ch (at Repetition Cycle 1 144 µs, 14 32 MHz)
ICR			18-Bit × 6ch
OCR			16-Bit × 7ch, 8-Bit × 1ch
Special Ports			Buzzer Output, 3-State Output (PTO) VLP Pin, Synchronous Output 7, 3-State Synchronous Output 4, Remote Control Receive, CTL Amp, Built-In FG Amp, Output of 1/2 OSC Oscillation Clock (2 V[p-p]), Output of 1/4 OSC Oscillation Clock (1 V[p-p])
Notes			VISS/VASS Detection Function
Package			QFP100-P-1818

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

Electrical Characteristics

Supply Current

Parameter	Symbol	Condition	Limit min	Limit typ	Limit max	Unit
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 = 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		0	20	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, VDD = 5.0 V, VSS = 0 V)

A/D Converter Performance

Parameter	Symbol	Condition	Limit min	Limit typ	Limit max	Unit
Conversion Relative Error	ΔNLAD				±3	LSB
A/D Conversion Time	tAD	fosc = 14.32 MHz		8		µs
Analog Input Voltage			0		5	V

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

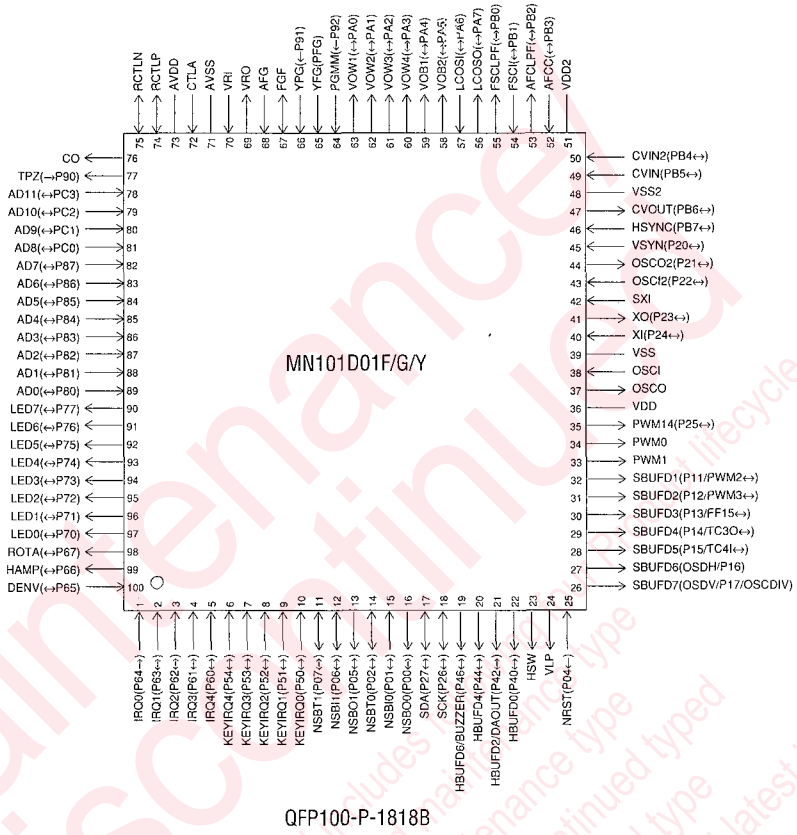
Support Tool

In-Circuit Emulator	PX-ICE101C / D + PX-PRB101D01-C / D

EPROM built-in Type

Type	MN101DP01G / 01Y OTP MN101DP01GFA / 01YAF ATP MN101DP01GAC / 01YAC [All ES (Engineering Sample) available]
ROM (× 8-Bit)	128 K
RAM (× 8-Bit)	3 072
Minimum Instruction Execution Time	0 1397 µs (at 4 5 V to 5 5 V, 14.32 MHz) 71 5 µs (at 2 2 V to 5 5 V fixed to 14 32 MHz internal division)
Package	QFP100-P-1818B OTP QFP100-P-1818B ATP With Ceramic Window

Pin Assignment



QFP100-P-1818B

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, and no license is granted under any intellectual property right or other right owned by our company 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.