❑ MN101D02D / F / G / H

VTR Servo

Type	**MN101D02D / F / G / H**
ROM (×8-Bit)	72 K / 96 K / 128 K / 160 K
RAM (×8-Bit)	2 048 / 3 072 / 4 096 / 5 120
Minimum Instruction Execution Time	With Main Clock operated **0.1397 µs (at 4.0 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 • Servo VSYNC • Synchronous Output • OSD • XDS • Serial 0 • Serial 1 • Serial 2 • A/D (common with PWM 14 reference frequency) • OSDVSYNC
Timer Counter	**Timer Counter 0: 16-Bit × 1** (Timer Output, Clock Function [Max 2s or Max 36h at Cascade-Connecting with Timer 6]) Clock Source . 1/2, 1/4, 1/8, 1/16 of System Clock, Overflow of Timer Counter 6, 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 of System Clock, CTL Signal 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 Interface (Continue)			**Serial 2: 8-Bit × 1** (I²C) (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 of System Clock, SCK Pin Input
OSD			Accommodation with Menu or Super Impose Display Applicable Broadcasting System NTSC, PAL, PAL-M, PAL-N Screen Configuration 24 Characters x 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 1144 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			QFP-100-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)

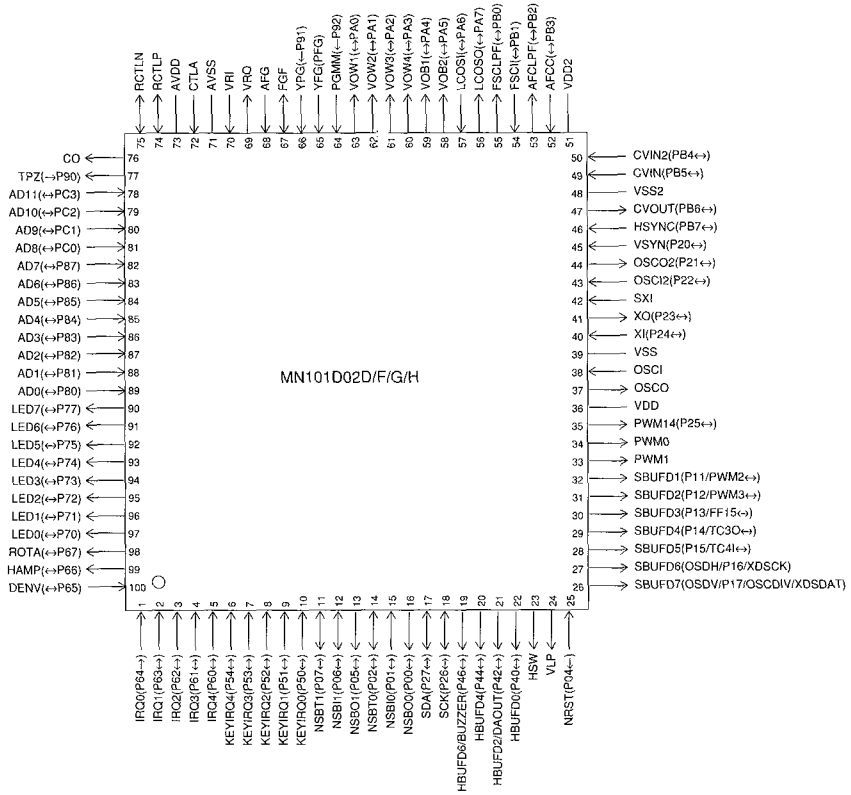
Support Tool

In-Circuit Emulator PX-ICE101C / D + PX-PRB101D02-C / D

EPROM built-in Type

Type	MN101DP02J [ES (Engineering Sample) available] OTP MN101DP02JAF [ES (Engineering Sample) available] ATP· MN101DP02JAC [ES (Engineering Sample) available]
ROM (× 8-Bit)	192 K
RAM (× 8-Bit)	5 120
Minimum Instruction Execution Time	0 1397 µs (at 4 0 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