

# □ MN101D10F , MN101D10G

| Type   | MN101D10F   | MN101D10G  |
|--|---|--|
| ROM (x8-bit)   | 96 K  | 128 K  |
| RAM (x8-bit)   | 2.5 K   | 3.5 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)<br>71.5 μs (at 2.7 V to 5.5 V fixed to 14.32 MHz internal frequency division) |
|  | When sub-clock operated   | 61 μs (at 2.5 V to 5.5 V, 32.768 kHz)  |
| Interrupts   | <ul style="list-style-type: none"> <li>• RESET • Runaway • External 0 • External 1 • External 2 • External 3 • External 4</li> <li>• Timer 0 • Timer 1 • Timer 2 • Timer 3 • Timer 6 • Capstan FG • Control • HSW</li> <li>• Cylinder(Drum) FG • Servo V-sync • Synchronous output • OSD • XDS • Serial 0</li> <li>• Serial 1 • Serial 2 • PWM 4 • OSDV-sync</li> </ul> |  |
| 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, duty judgment of CTL signal(VISS/VASS detection function), generation of remote control output carrier frequency)   |  |
| 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, generation of serial transmission clock)                |   |  |
| 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  | 1/2 <sup>16</sup> , 1/2 <sup>19</sup> of timer counter 5 frequency  |  |
| Clear by stable oscillation  | after 256 counts by timer counter 5 (2 <sup>18</sup> 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;<br>1/8, 1/128 of system clock frequency   |  |
| Interrupt source   | 1/2 <sup>13</sup> , 1/2 <sup>14</sup> , 1/2 <sup>15</sup> overflow of timer counter 6   |  |
| Serial Interface   | Serial 0: 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; NSBT0 pin input   |
|  | Serial 1: 8-bit × 1 (synchronous type/remote control transmission)  |  |
|  | (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 3 output; NSBT1 pin input   |  |
| Remote control clock   | 2-division timer 3 output   |  |
| Serial 2: 8-bit × 1 (I <sup>2</sup> C) (master transmission/reception, slave transmission/reception) |   |  |
| Clock source   | 1/144 to 1/252 of system clock; SCK pin input   |  |

|                       |              |   |                  |   |
|-----------------------|--------------|---|------------------|---|
| <b>OSD</b>            |              | Display mode  | :                | menu(internal synchronized) display, superimpose(externally synchronized) display |
|                       |              | Applicable broadcasting system  | :                | NTSC, PAL, PAL-M, PAL-N   |
|                       |              | Screen configuration  | :                | 24 characters × 2n rows (n = 1 to 6)  |
|                       |              | Character type  | :                | max. 256 character types (variable, include special characters)                   |
|                       |              | Character size  | :                | 12 × 18 dots (vertical direction: 1 dot for 2H at not enlargement)                |
|                       |              | Enlarged characters   | :                | each × 2 settings in horizontal and vertical                                      |
|                       |              | Character interpolation   | :                | none  |
|                       |              | Line background color   | :                | 8-hue settable in the row unit at menu display                                    |
|                       |              | Line background intensity   | :                | 8 gradations settable in the row unit   |
|                       |              | Screen background color :   | :                | 8-huesettable at menu display   |
|                       |              | Character color   | :                | white   |
|                       |              | Character intensity   | :                | 8 gradations settable in the row unit   |
|                       |              | Border function   | :                | 1-dot border in 8 directions  |
|                       |              | Border brightness   | :                | 4 gradations settable in the row unit   |
|                       |              | Blinking  | :                | none (covered by software)  |
|                       |              | Inverted character  | :                | settable in the character unit  |
|                       |              | Halftone  | :                | none  |
|                       |              | 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  |
|                       |              | Measure against image fluctuation   | :                | built-in AFC circuit  |
|                       |              | Dot clock   | :                | 1/2 of OSC oscillation clock (automatic phase adjustment)                         |
|                       |              | MESECAM compatibility   | :                | Subcarrier leak function for superimpose display                                  |
| <b>XDS</b>            |              | Built-in U.S. closed caption data slicer (optional 1 line data can be extracted.)   |                  |   |
| <b>ROM Correction</b> |              | Correcting address designation: up to 3 addresses possible<br>Correction method: correction program being saved in internal RAM   |                  |   |
| <b>I/O Pins</b>       | <b>I/O</b>   | 76  | • Common use: 56 |   |
|                       | <b>Input</b> | 1   | • Common use: 1  |   |
| <b>A/D Inputs</b>     |              | 8-bit × 12-ch. (without S/H)  |                  |   |
| <b>PWM</b>            |              | 13-bit × 2-ch. (at repetition cycle 572 μs at 14.32 MHz),<br>8-bit × 1-ch. (at repetition cycle 35.7 μs, 0.572 ms, 1.14 ms, 2.29 ms at 14.32 MHz)   |                  |   |
| <b>ICR</b>            |              | 16-bit × 2-ch.(Speed system),<br>18-bit × 4-ch.(Phase system)   |                  |   |
| <b>OCR</b>            |              | 16-bit × 3 (Synchronous output × 2, Rec CTL × 1 )   |                  |   |
| <b>Special Ports</b>  |              | 3-state output (PTO) VLP pin; CTL input;Capstan FG input; Cylinder(Drum) PG/FG inputs; HSW output;<br>Head amp/ Rotary outputs; built-in FG amp; output of 1/4 OSC oscillation clock (1 V[p-p]) |                  |   |
| <b>Notes</b>          |              |   |                  |   |

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

## 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<br>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<br>32 kHz oscillation operation without load |       | 5   | 20  | μA   |

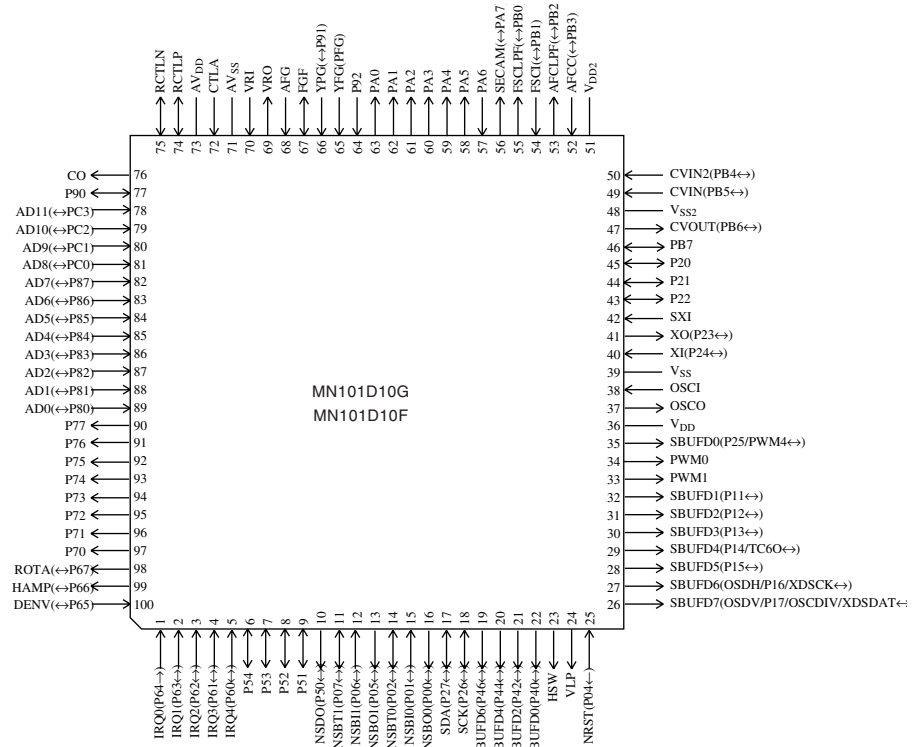
(Ta = 25 °C ± 2 °C, VSS = 0 V)

### 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



QFP100-P-1818B \*Lead-free

Support Tool

|                                   |   |  |
|-----------------------------------|---|--|
| <b>In-circuit Emulator</b>        | PX-ICE101C / D + PX-PRB101D10-QFP100-P-1818B-CN-M |  |
| <b>Flash Memory Built-in Type</b> | Type  | MN101DF10GAF   |
|                                   | ROM (× 8-bit)                                     | 128 K  |
|                                   | RAM (× 8-bit)                                     | 4 K  |
|                                   | Minimum instruction execution time                | 0.1397 μs (at 4.0 V to 5.5 V, 14.32 MHz)<br>71.5 μs (at 2.7 V to 5.5 V, fixed to 14.32 MHz internal division)<br>61 μs (at 2.5 V to 5.5 V, 32.768 kHz) |
|                                   | Package   | QFP100-P-1818B *Lead-free  |

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