

# **MN158851A1** [High Speed Version]

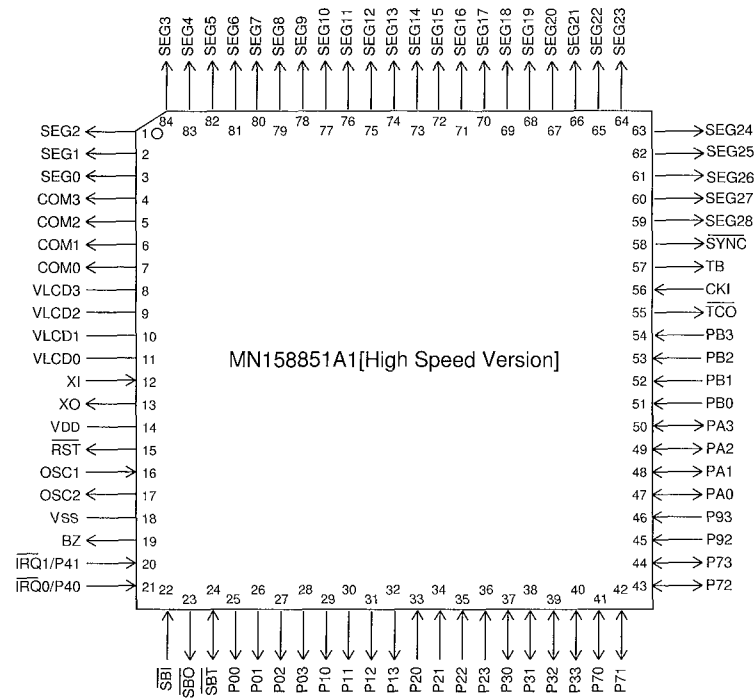
|                                           |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                  |
|-------------------------------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|
| <b>Type</b>                               |               | <b>MN158851A1 [High Speed Version]</b>                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                  |
| <b>ROM (x8-bit)</b>                       |               | 8K                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                  |
| <b>RAM (x4-bit)</b>                       |               | 432                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                  |
| <b>Number of Instructions</b>             |               | 99                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                  |
| <b>Minimum Instruction Execution Time</b> |               | 1 $\mu$ s (at 4.5 to 5.5V, 8MHz)<br>8 $\mu$ s (at 2.5 to 5.5V, 1MHz)                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                  |
| <b>Interrupts</b>                         |               | • RESET • External 0 • External 1 • Timer • Serial                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                  |
| <b>Timer Counter</b>                      |               | <b>Timer Counter 1 : 8-bit x 1</b> (Event Count, Timer Output)<br>Clock Source            1/2, 1/8, 1/32, 1/128 of System Clock, 1/1, 1/4, 1/16, 1/64 of XI Oscillation Clock<br>Interrupt Source        Overflow of Timer Counter<br><br><b>Timer Counter 2 : 16-bit x 1</b> (Event Count)<br>Clock Source            CKI Pin Input<br><br><b>Time Base Counter</b> (Time Base)<br>Clock Source            . . . . .XI Oscillation Clock, OSC Oscillation Clock |                                                                                  |
| <b>Serial Interface</b>                   |               | Serial   8-bit x 1 (Synchronous Type)<br>Clock Source            SBT Pin Input, System Clock                                                                                                                                                                                                                                                                                                                                                                     |                                                                                  |
| <b>I/O Pins</b>                           | <b>I/O</b>    | <b>12</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                  |
|                                           | <b>Input</b>  | <b>12</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                        | • Common use 2 • Specified pull-up Resistor available 10 (Software Programmable) |
|                                           | <b>Output</b> | <b>8</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                  |
| <b>LCD</b>                                |               | 29 Segments • 4 Common • 1/3, 1/4 Duty                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                  |
| <b>Special Ports</b>                      |               | Buzzer Output                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                  |
| <b>Package</b>                            |               | QFP084-P-1818E                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                  |

| <b>Electrical Characteristics</b>    |        | <b>Supply Current</b><br><table> <tr> <th rowspan="2">Parameter</th><th rowspan="2">Symbol</th><th rowspan="2">Condition</th><th colspan="3">Limit</th><th rowspan="2">Unit</th></tr> <tr> <th>min</th><th>typ</th><th>max</th></tr> <tr> <td><b>Operating Supply Current</b></td><td>VDD1</td><td>fosc=8MHz, tc=1<math>\mu</math>s</td><td></td><td>6</td><td>12</td><td>mA</td></tr> <tr> <td><b>Supply Current at STOP</b></td><td>IDD3</td><td>XI=0V, VDD=5V</td><td></td><td></td><td>40</td><td><math>\mu</math>A</td></tr> <tr> <td><b>Supply Current at HALT</b></td><td>IDD2</td><td>fosc=8MHz, tc=1<math>\mu</math>s</td><td></td><td>3</td><td>6</td><td>mA</td></tr> </table> |       |     |     |         | Parameter | Symbol | Condition | Limit |  |  | Unit | min | typ | max | <b>Operating Supply Current</b> | VDD1 | fosc=8MHz, tc=1 $\mu$ s |  | 6 | 12 | mA | <b>Supply Current at STOP</b> | IDD3 | XI=0V, VDD=5V |  |  | 40 | $\mu$ A | <b>Supply Current at HALT</b> | IDD2 | fosc=8MHz, tc=1 $\mu$ s |  | 3 | 6 | mA |
|--------------------------------------|--------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-----|-----|---------|-----------|--------|-----------|-------|--|--|------|-----|-----|-----|---------------------------------|------|-------------------------|--|---|----|----|-------------------------------|------|---------------|--|--|----|---------|-------------------------------|------|-------------------------|--|---|---|----|
| Parameter                            | Symbol | Condition                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Limit |     |     | Unit    |           |        |           |       |  |  |      |     |     |     |                                 |      |                         |  |   |    |    |                               |      |               |  |  |    |         |                               |      |                         |  |   |   |    |
|                                      |        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | min   | typ | max |         |           |        |           |       |  |  |      |     |     |     |                                 |      |                         |  |   |    |    |                               |      |               |  |  |    |         |                               |      |                         |  |   |   |    |
| <b>Operating Supply Current</b>      | VDD1   | fosc=8MHz, tc=1 $\mu$ s                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |       | 6   | 12  | mA      |           |        |           |       |  |  |      |     |     |     |                                 |      |                         |  |   |    |    |                               |      |               |  |  |    |         |                               |      |                         |  |   |   |    |
| <b>Supply Current at STOP</b>        | IDD3   | XI=0V, VDD=5V                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |       |     | 40  | $\mu$ A |           |        |           |       |  |  |      |     |     |     |                                 |      |                         |  |   |    |    |                               |      |               |  |  |    |         |                               |      |                         |  |   |   |    |
| <b>Supply Current at HALT</b>        | IDD2   | fosc=8MHz, tc=1 $\mu$ s                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |       | 3   | 6   | mA      |           |        |           |       |  |  |      |     |     |     |                                 |      |                         |  |   |    |    |                               |      |               |  |  |    |         |                               |      |                         |  |   |   |    |
| (Ta= -20 to +70°C, VDD=5.0V, VSS=0V) |        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |       |     |     |         |           |        |           |       |  |  |      |     |     |     |                                 |      |                         |  |   |    |    |                               |      |               |  |  |    |         |                               |      |                         |  |   |   |    |

## Support Tool

|                            |                                                        |
|----------------------------|--------------------------------------------------------|
| <b>In-Circuit Emulator</b> | PX-ICE1500 + PX-PRB158851                              |
| <b>Piggyback</b>           | Use <b>EP158851</b> as piggy in QFP084-P-1818E package |

Pin Assignment



QFP084-P-1818E