MM5483 Liquid Crystal Display Driver

Check for Samples: MM5483

FEATURES

• Serial Data Input
• Serial Data Output
• Wide Power Supply Operation
• TTL Compatibility
• 31 Segment Outputs
• Alphanumeric and Bar Graph Capability
• Cascade Capability

APPLICATIONS

• COPS™ or Microprocessor Displays
• Industrial Control Indicator
• Digital Clock, Thermometer, Counter, Voltmeter
• Instrumentation Readouts
• Remote Displays

DESCRIPTION

The MM5483 is a monolithic integrated circuit utilizing CMOS metal-gate low-threshold enhancement mode devices. It is available in a 40-pin PDIP package. The chip can drive up to 31 segments of LCD and can be cascaded to increase this number. This chip is capable of driving a 4½-digit 7-segment display with minimal interface between the display and the data source.

The MM5483 stores the display data in latches after it is latched in, and holds the data until another load pulse is received.

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Block Diagram

Figure 1. MM5483 Block Diagram
These devices have limited built-in ESD protection. The leads should be shorted together or the device placed in conductive foam during storage or handling to prevent electrostatic damage to the MOS gates.
Absolute Maximum Ratings

(1) “Absolute Maximum Ratings” are those values beyond which the safety of the device cannot be ensured. They are not meant to imply that the devices should be operated at these limits. The table of “Electrical Characteristics” specifies conditions of device operation.

(2) If Military/Aerospace specified devices are required, please contact the TI Sales Office/Distributors for availability and specifications.

DC Electrical Characteristics

T_A within operating range, V_DD = 3.0V to 10V, V_SS = 0V, unless otherwise specified

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Conditions</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Supply</td>
<td>V_DD = 3.0V, V_SS = 0V, Data Out = Open, Clock In = 0V, Osc In = 0V, BP_In = 32Hz</td>
<td>1.5</td>
<td>2.5</td>
<td>µA</td>
<td></td>
</tr>
<tr>
<td>Average Supply Current, I_DD</td>
<td>V_DD = 3.0V, 5.0V, 10.0V</td>
<td>10</td>
<td>20</td>
<td>µA</td>
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</table>

AC Electrical Characteristics

V_DD ≥ 4.7V, V_SS = 0V unless otherwise specified

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>f_C</td>
<td>Clock Frequency, V_DD = 3V</td>
<td>500</td>
<td>kHz</td>
<td></td>
<td></td>
</tr>
<tr>
<td>t_CH</td>
<td>Clock Period High</td>
<td>500</td>
<td>ns</td>
<td></td>
<td></td>
</tr>
<tr>
<td>t_CL</td>
<td>Clock Period Low</td>
<td>500</td>
<td>ns</td>
<td></td>
<td></td>
</tr>
<tr>
<td>t_DS</td>
<td>Data Set-Up before Clock</td>
<td>300</td>
<td>ns</td>
<td></td>
<td></td>
</tr>
<tr>
<td>t_DH</td>
<td>Data Hold Time after Clock</td>
<td>100</td>
<td>ns</td>
<td></td>
<td></td>
</tr>
<tr>
<td>t_LW</td>
<td>Minimum Load Pulse Width</td>
<td>500</td>
<td>ns</td>
<td></td>
<td></td>
</tr>
<tr>
<td>t_TC</td>
<td>Load to Clock</td>
<td>400</td>
<td>ns</td>
<td></td>
<td></td>
</tr>
<tr>
<td>t_DDO</td>
<td>Clock to Data Valid</td>
<td>400</td>
<td>750</td>
<td>ns</td>
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</table>

(1) AC input waveform specification for test purpose: t_r ≤ 20 ns, t_f ≤ 20 ns, f = 500 kHz, 50% ± 10% duty cycle.

(2) Clock input rise and fall times must not exceed 300 ms.
FUNCTIONAL DESCRIPTION

A block diagram for the MM5483 is shown in Figure 1 and a package pinout is shown in Figure 3. Figure 4 shows a possible 3-wire connection system with a typical signal format for Figure 4. Shown in Figure 5, the load input is an asynchronous input and lets data through from the shift register to the output buffers any time it is high. The load input can be connected to \( V_{DD} \) for 2-wire control as shown in Figure 6. In the 2-wire control mode, 31 bits (or less depending on the number of segments used) of data are clocked into the MM5483 in a short time frame (with less than 0.1 second there probably will be no noticeable flicker) with no more clocks until new information is to be displayed. If data was slowly clocked in, it can be seen to “walk” across the display in the 2-wire mode. An AC timing diagram can be seen in Figure 7. It should be noted that data out is not a TTL-compatible output.
Figure 7. Timing Diagram
## REVISION HISTORY

### Changes from Revision D (March 2013) to Revision E

<table>
<thead>
<tr>
<th>Change Description</th>
<th>Page</th>
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<tr>
<td>Changed layout of National Data Sheet to TI format</td>
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Submit Documentation Feedback

Product Folder Links: MM5483
## PACKAGING INFORMATION

<table>
<thead>
<tr>
<th>Orderable Device</th>
<th>Status</th>
<th>Package Type</th>
<th>Package Drawing</th>
<th>Pins</th>
<th>Package Qty</th>
<th>Eco Plan</th>
<th>Lead/Ball Finish</th>
<th>MSL Peak Temp</th>
<th>Op Temp (°C)</th>
<th>Device Marking</th>
<th>Samples</th>
</tr>
</thead>
<tbody>
<tr>
<td>MM5483V/NOPB</td>
<td>ACTIVE</td>
<td>PLCC</td>
<td>FN</td>
<td>44</td>
<td>25</td>
<td>Green (RoHS &amp; no Sb/Br)</td>
<td>CU SN</td>
<td>Level-3-245C-168 HR</td>
<td>-40 to 85</td>
<td>MM5483V</td>
<td></td>
</tr>
</tbody>
</table>

(1) The marketing status values are defined as follows:

**ACTIVE:** Product device recommended for new designs.

**LIFEBUY:** TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.

**NRND:** Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.

**PREVIEW:** Device has been announced but is not in production. Samples may or may not be available.

**OBSOLETE:** TI has discontinued the production of the device.

(2) **RoHS:** TI defines "RoHS" to mean semiconductor products that are compliant with the current EU RoHS requirements for all 10 RoHS substances, including the requirement that RoHS substance do not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, "RoHS" products are suitable for use in specified lead-free processes. TI may reference these types of products as "Pb-Free".

**RoHS Exempt:** TI defines "RoHS Exempt" to mean products that contain lead but are compliant with EU RoHS pursuant to a specific EU RoHS exemption.

**Green:** TI defines "Green" to mean the content of Chlorine (Cl) and Bromine (Br) based flame retardants meet JS709B low halogen requirements of <=1000ppm threshold. Antimony trioxide based flame retardants must also meet the <=1000ppm threshold requirement.

(3) **MSL, Peak Temp.** - The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

(4) There may be additional marking, which relates to the logo, the lot trace code information, or the environmental category on the device.

(5) Multiple Device Markings will be inside parentheses. Only one Device Marking contained in parentheses and separated by a "~" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Device Marking for that device.

(6) **Lead/Ball Finish** - Orderable Devices may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead/Ball Finish values may wrap to two lines if the finish value exceeds the maximum column width.

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Images above are just a representation of the package family, actual package may vary. Refer to the product data sheet for package details.
NOTES:

1. All linear dimensions are in inches. Any dimensions in brackets are in millimeters. Any dimensions in parenthesis are for reference only. Controlling dimensions are in inches. Dimensioning and tolerancing per ASME Y14.5M.

2. This drawing is subject to change without notice.

3. Dimension does not include mold protrusion. Maximum allowable mold protrusion .01 in [0.25 mm] per side.

4. Reference JEDEC registration MS-018.
NOTES: (continued)

5. Publication IPC-7351 may have alternate designs.
6. Solder mask tolerances between and around signal pads can vary based on board fabrication site.
NOTES: (continued)

7. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.
8. Board assembly site may have different recommendations for stencil design.
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