

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.

Block Diagram

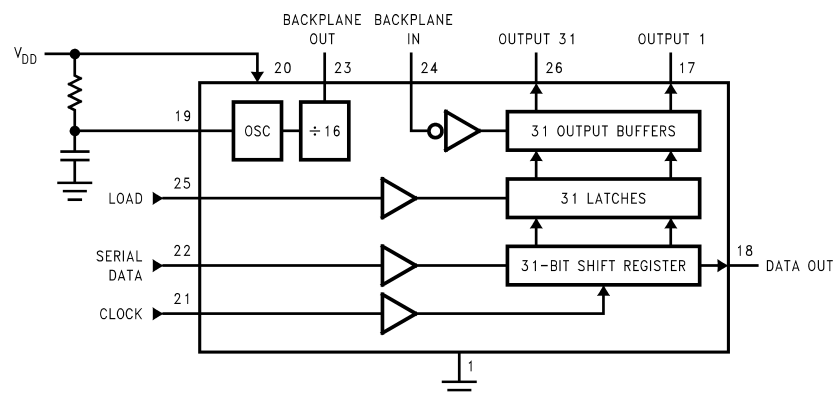


Figure 1. MM5483 Block Diagram



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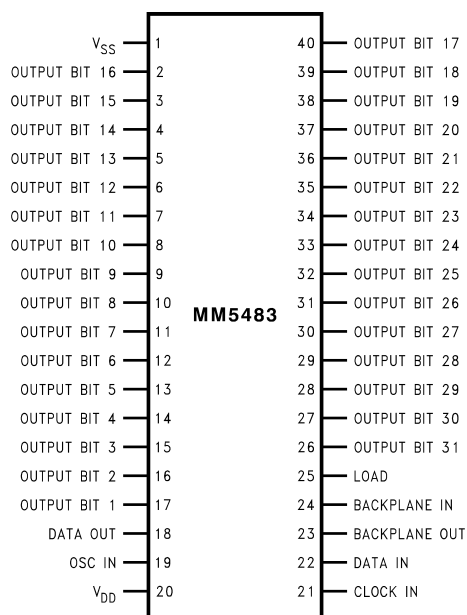
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Connection Diagrams



**Figure 2. Dual-In-Line Package
Top View
See Package Number NFJ0040A**

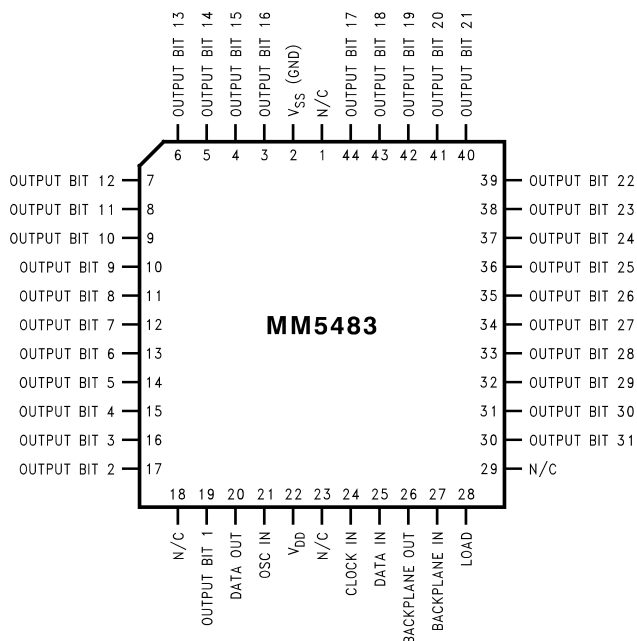


Figure 3. See Package Number FN0044A



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⁾⁽²⁾

Voltage at Any Pin	V_{SS} to $V_{SS} + 10V$
Operating Temperature	$-40^{\circ}C$ to $+85^{\circ}C$
Storage Temperature	$-65^{\circ}C$ to $+150^{\circ}C$
Power Dissipation	300 mW at $+85^{\circ}C$ 350 mW at $+25^{\circ}C$
Junction Temperature	$+150^{\circ}C$
Lead Temperature (Soldering, 10 seconds)	$300^{\circ}C$

- (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

Parameter	Conditions	Min	Typ	Max	Units
Power Supply		3.0		10	V
Average Supply Current, I_{DD}	All Outputs Bits = Open, Data Out = Open, BP_Out = Open, Clock In = 0V, Data In = 0V, Data Load = 0V, Osc In = 0V, BP_In = 32Hz				
	$V_{DD} = 3.0V$		1.5	2.5	μA
	$V_{DD} = 5.0V$			10	μA
	$V_{DD} = 10.0V$			40	μA
Input Voltage Levels	Load, Clock, Data				
Logic "0"	$V_{DD} = 5.0V$			0.9	V
Logic "1"	$V_{DD} = 5.0V$	2.4			V
Logic "0"	$V_{DD} = 3.0V$			0.4	V
Logic "1"	$V_{DD} = 3.0V$	2.0			V
Output Current Levels ⁽¹⁾					
Segments and Data Out					
Sink	$V_{DD} = 3.0V$, $V_{OUT} = 0.3V$	20			μA
Source	$V_{DD} = 3.0V$, $V_{OUT} = 2.7V$	20			μA
BP Out Sink	$V_{DD} = 3.0V$, $V_{OUT} = 0.3V$	320			μA
BP Out Source	$V_{DD} = 3.0V$, $V_{OUT} = 2.7V$	320			μA

- (1) Output offset voltage is ± 50 mV with $C_{SEGMENT} = 250$ pF, $C_{BP} = 8750$ pF.

AC Electrical Characteristics

$V_{DD} \geq 4.7V$, $V_{SS} = 0V$ unless otherwise specified

Symbol	Parameter	Min	Typ	Max	Units
f_C	Clock Frequency, $V_{DD} = 3V$			500	kHz
t_{CH}	Clock Period High	⁽¹⁾⁽²⁾ 500			ns
t_{CL}	Clock Period Low	500			ns
t_{DS}	Data Set-Up before Clock	300			ns
t_{DH}	Data Hold Time after Clock	100			ns
t_{LW}	Minimum Load Pulse Width	500			ns
t_{LTC}	Load to Clock	400			ns
t_{CDO}	Clock to Data Valid		400	750	ns

- (1) AC input waveform specification for test purpose: $t_r \leq 20$ ns, $t_f \leq 20$ ns, $f = 500$ kHz, 50% $\pm$ 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.

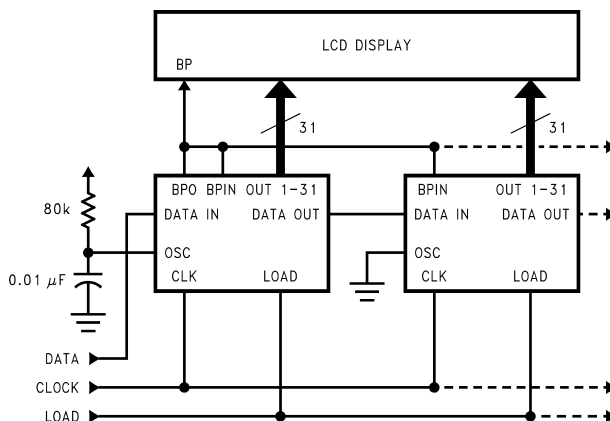


Figure 4. Three-Wire Control Mode

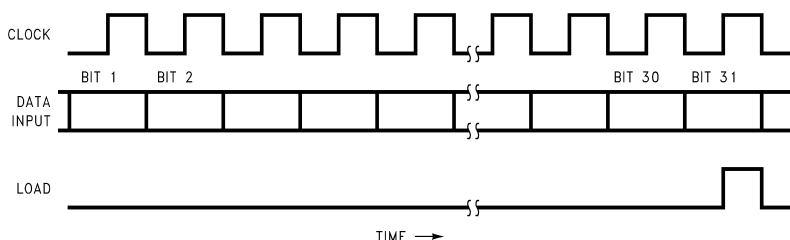


Figure 5. Data Format Diagram

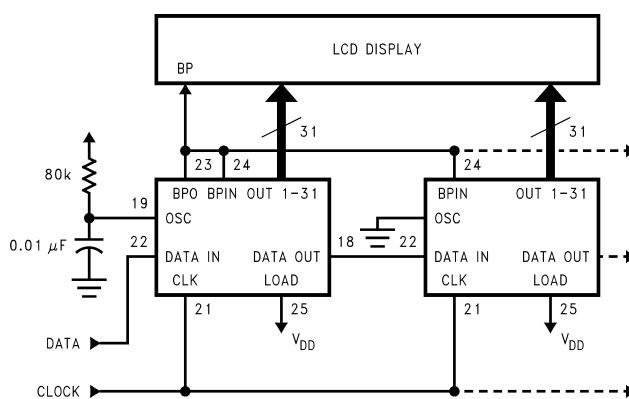


Figure 6. Two-Wire Control Mode

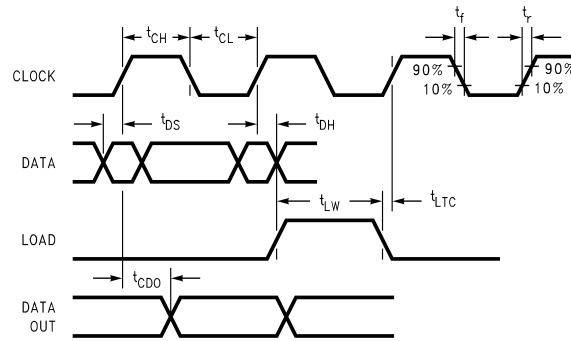


Figure 7. Timing Diagram

REVISION HISTORY

Changes from Revision D (March 2013) to Revision E	Page
• Changed layout of National Data Sheet to TI format	5

PACKAGING INFORMATION

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
MM5483N/NOPB	ACTIVE	PDIP	NFJ	40	9	Green (RoHS & no Sb/Br)	CU SN	Level-1-NA-UNLIM	-40 to 85	MM5483N	Samples
MM5483V/NOPB	ACTIVE	PLCC	FN	44	25	Green (RoHS & no Sb/Br)	CU SN	Level-3-245C-168 HR	-40 to 85	MM5483V	Samples

(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) Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check <http://www.ti.com/productcontent> for the latest availability information and additional product content details.

TBD: The Pb-Free/Green conversion plan has not been defined.

Pb-Free (RoHS): TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.

Pb-Free (RoHS Exempt): This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.

Green (RoHS & no Sb/Br): TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

(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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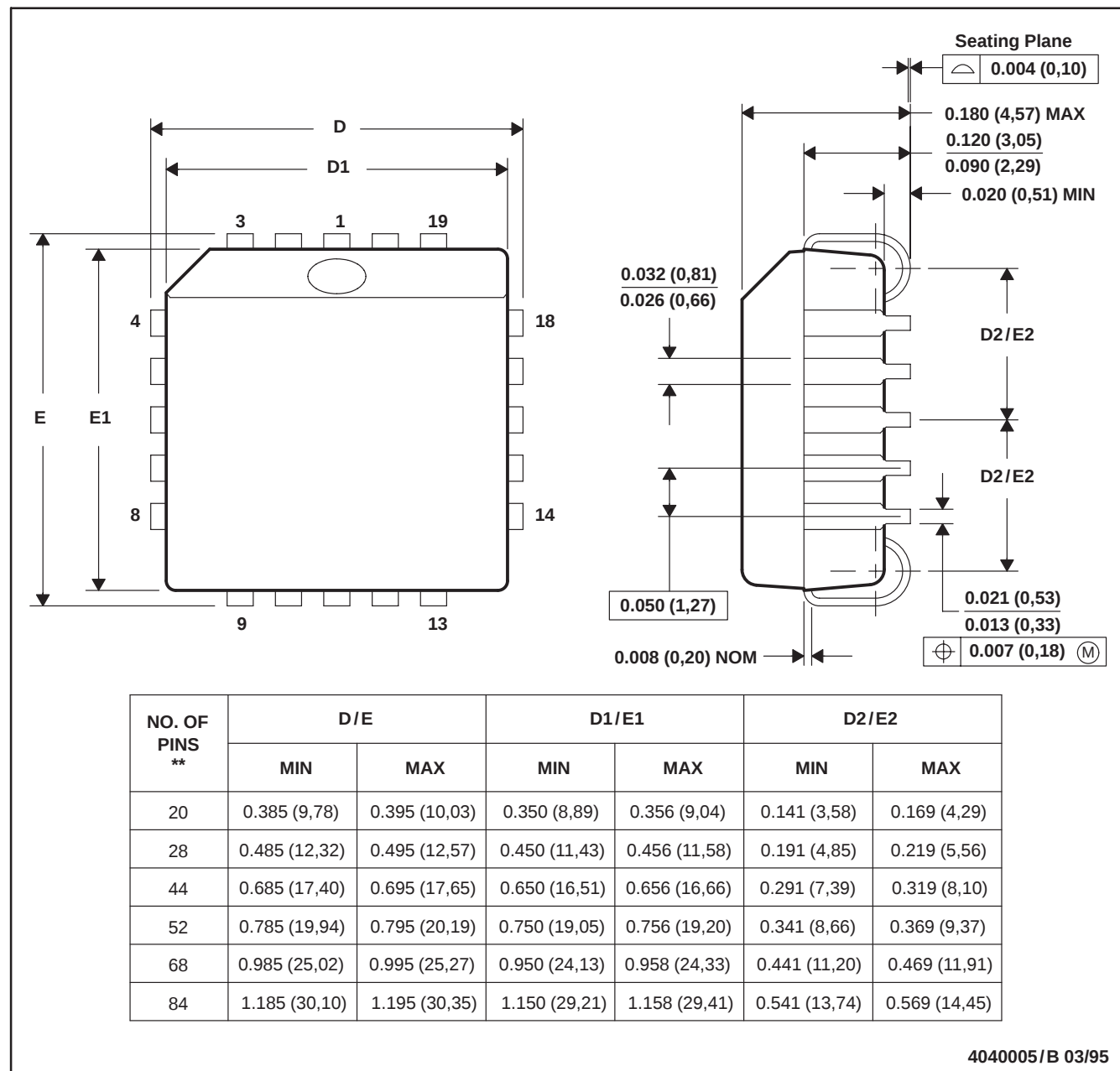
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FN (S-PQCC-J**)

PLASTIC J-LEADED CHIP CARRIER

20 PIN SHOWN



- NOTES: A. All linear dimensions are in inches (millimeters).
 B. This drawing is subject to change without notice.
 C. Falls within JEDEC MS-018

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