# 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

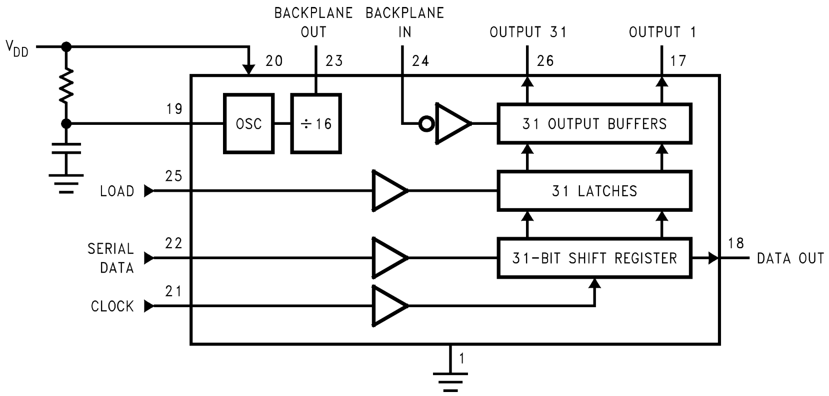

**Figure 1. MM5483 Block Diagram**

## Connection Diagrams

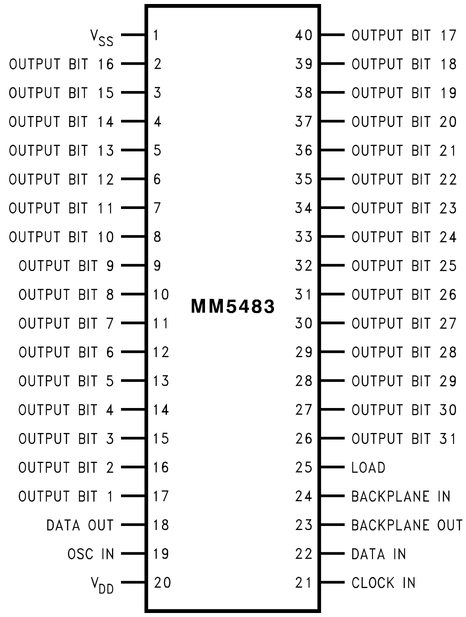

**Figure 2. Dual-In-Line Package**
**Top View**
**See Package Number NFJ0040A**

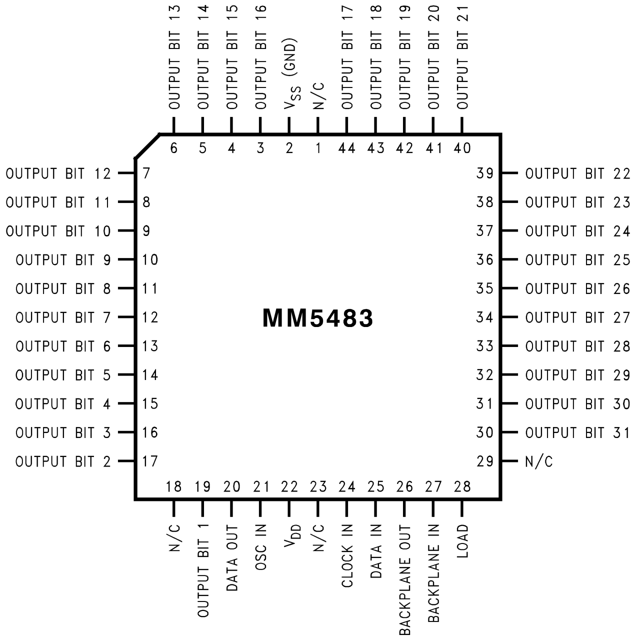

**Figure 3. See Package Number FN0044A**

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°C to +85°C |
| Storage Temperature | −65°C to +150°C |
| Power Dissipation | 300 mW at +85°C<br>350 mW at +25°C |
| Junction Temperature | +150°C |
| Lead Temperature<br>(Soldering, 10 seconds) | 300°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)<br>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

$V_{DD}$ ≥ 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: $t_r$ ≤ 20 ns, $t_f$ ≤ 20 ns, f = 500 kHz, 50% ± 10% duty cycle.
(2) Clock input rise and fall times must not excced 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.

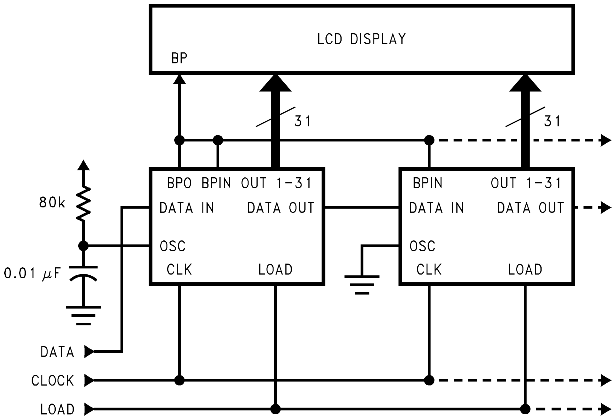

Figure 4. Three-Wire Control Mode

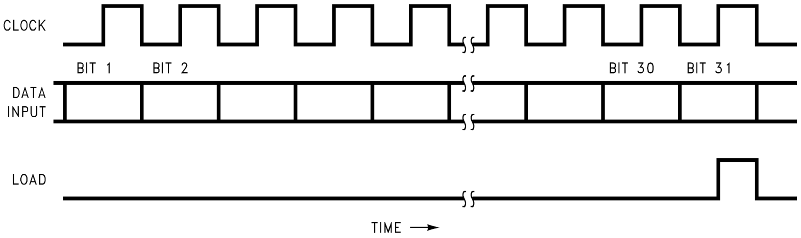

Figure 5. Data Format Diagram

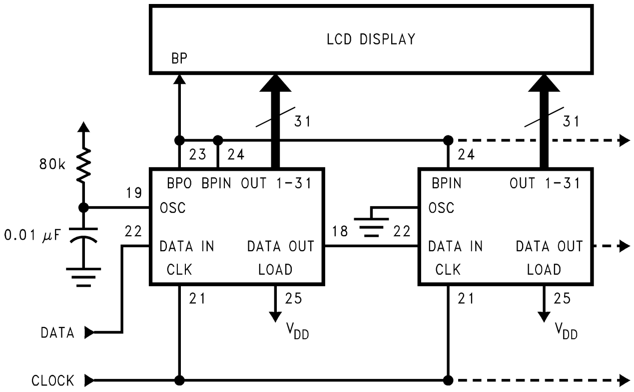

Figure 6. Two-Wire Control Mode

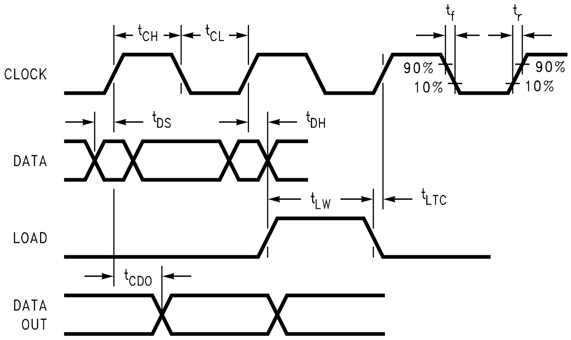

Figure 7. Timing Diagram

## REVISION HISTORY

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

# PACKAGE OPTION ADDENDUM

## PACKAGING INFORMATION

| Orderable part number | Status (1) | Material type (2) | Package \| Pins | Package qty \| Carrier | RoHS (3) | Lead finish/ Ball material (4) | MSL rating/ Peak reflow (5) | Op temp (°C) | Part marking (6) |
|---|---|---|---|---|---|---|---|---|---|
| MM5483V/NOPB | Obsolete | Production | PLCC (FN) \| 44 | - | - | Call TI | Call TI | -40 to 85 | MM5483V |

(1) **Status:** For more details on status, see our product life cycle.

(2) **Material type:** When designated, preproduction parts are prototypes/experimental devices, and are not yet approved or released for full production. Testing and final process, including without limitation quality assurance, reliability performance testing, and/or process qualification, may not yet be complete, and this item is subject to further changes or possible discontinuation. If available for ordering, purchases will be subject to an additional waiver at checkout, and are intended for early internal evaluation purposes only. These items are sold without warranties of any kind.

(3) **RoHS values:** Yes, No, RoHS Exempt. See the TI RoHS Statement for additional information and value definition.

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

(5) **MSL rating/Peak reflow:** The moisture sensitivity level ratings and peak solder (reflow) temperatures. In the event that a part has multiple moisture sensitivity ratings, only the lowest level per JEDEC standards is shown. Refer to the shipping label for the actual reflow temperature that will be used to mount the part to the printed circuit board.

(6) **Part marking:** There may be an additional marking, which relates to the logo, the lot trace code information, or the environmental category of the part.

Multiple part markings will be inside parentheses. Only one part marking contained in parentheses and separated by a "~" will appear on a part. If a line is indented then it is a continuation of the previous line and the two combined represent the entire part marking for that device.

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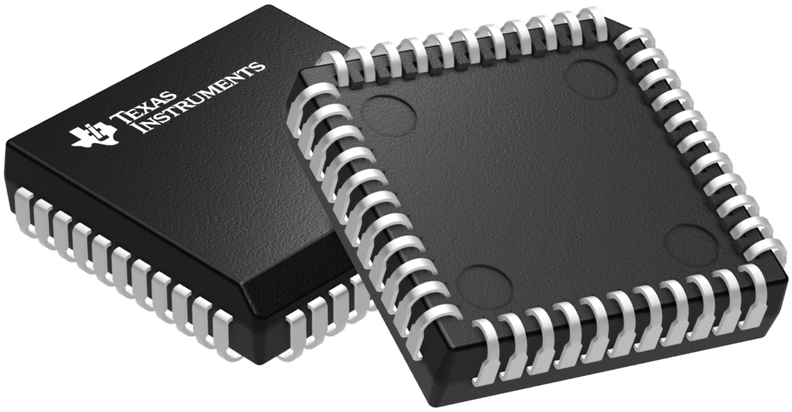
# GENERIC PACKAGE VIEW

**FN 44** **PLCC - 4.57 mm max height**

PLASTIC CHIP CARRIER



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

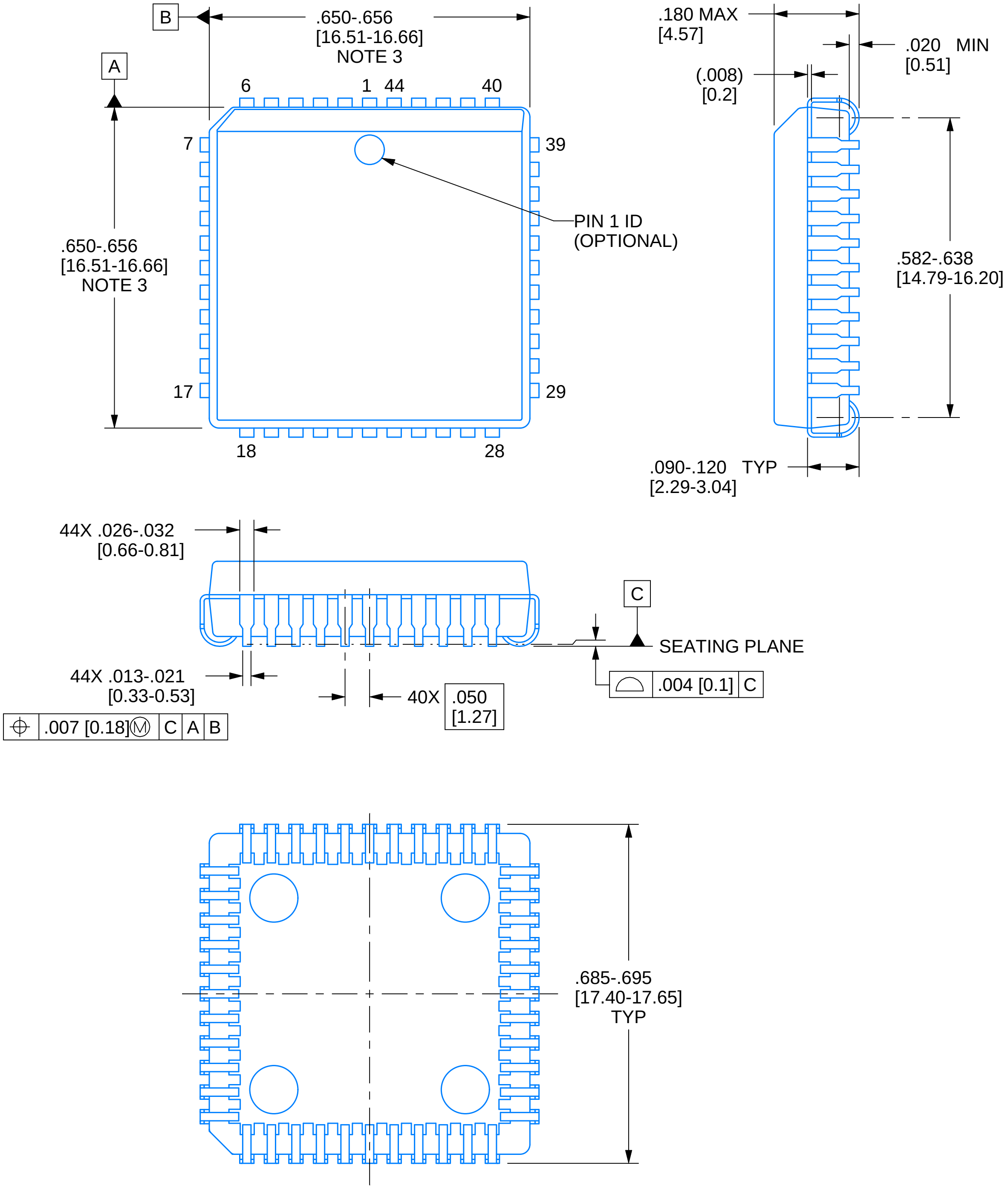
4040005-4/C

# PACKAGE OUTLINE

**FN0044A**

## PLCC - 4.57 mm max height

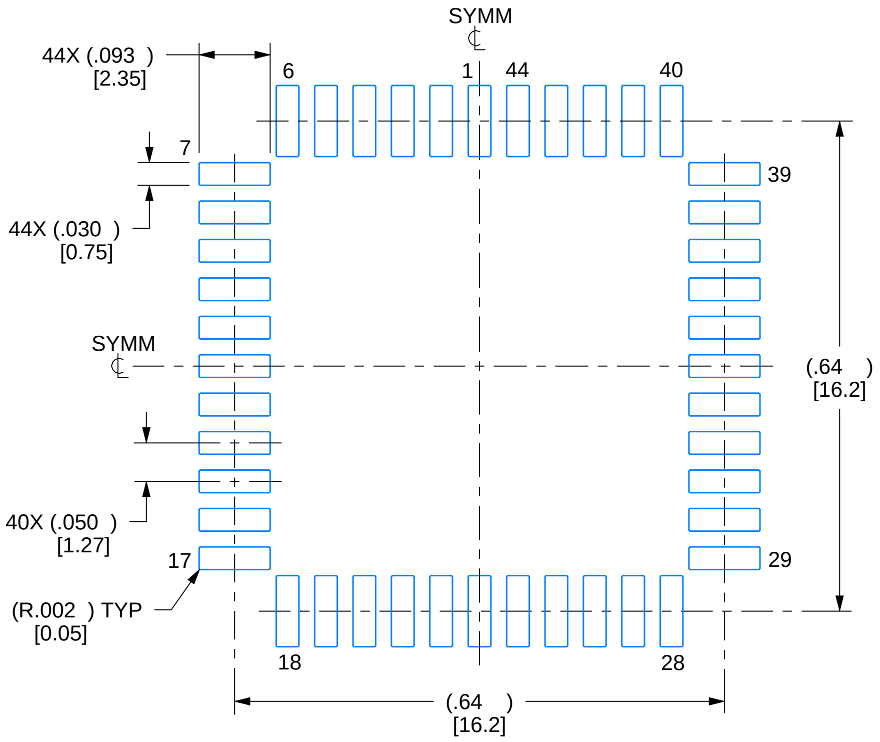
PLASTIC CHIP CARRIER



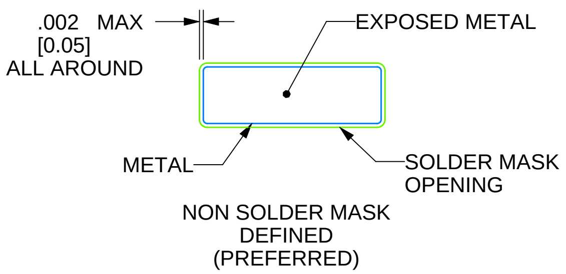
4215154/A 04/2017

NOTES:

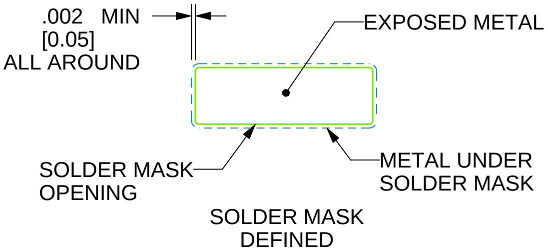
1. All linear dimensions are in inches. Any dimensions in brackets are in millimeters. Any dimensions in parenthesis are for reference only. Controlling dimensions are in inches. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. Dimension does not include mold protrusion. Maximum allowable mold protrusion .01 in [0.25 mm] per side.
4. Reference JEDEC registration MS-018.



LAND PATTERN EXAMPLE
EXPOSED METAL SHOWN
SCALE:4X



NON SOLDER MASK
DEFINED
(PREFERRED)



SOLDER MASK
DEFINED

SOLDER MASK DETAILS

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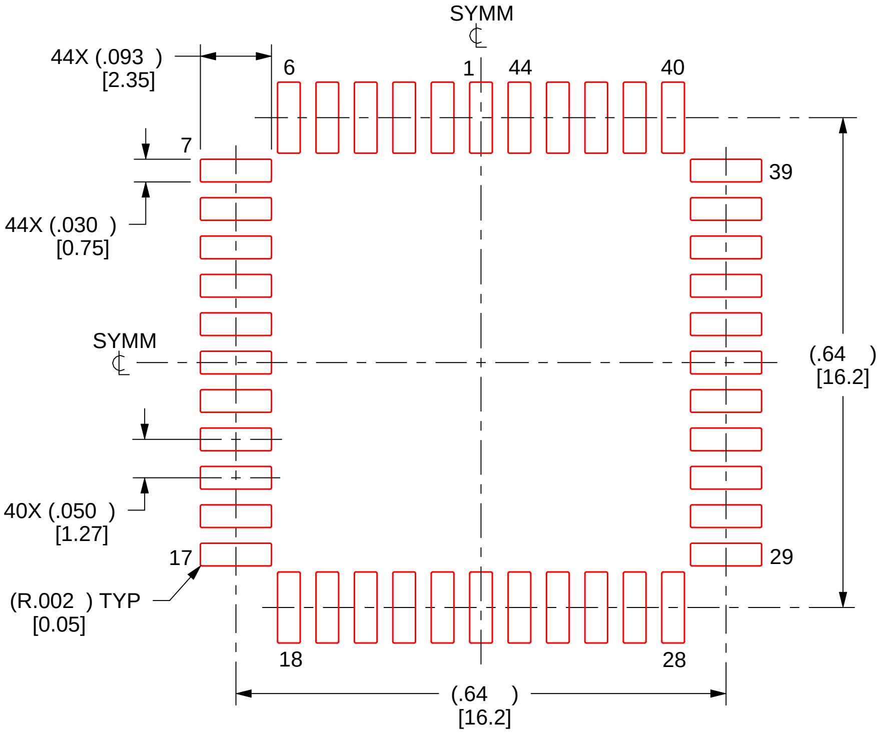
NOTES: (continued)

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



SOLDER PASTE EXAMPLE
BASED ON 0.125 mm THICK STENCIL
SCALE:4X

4215154/A 04/2017

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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