

LMT01 0.5°C Accurate 2-Pin Digital Output Temperature Sensor with Pulse Count Interface

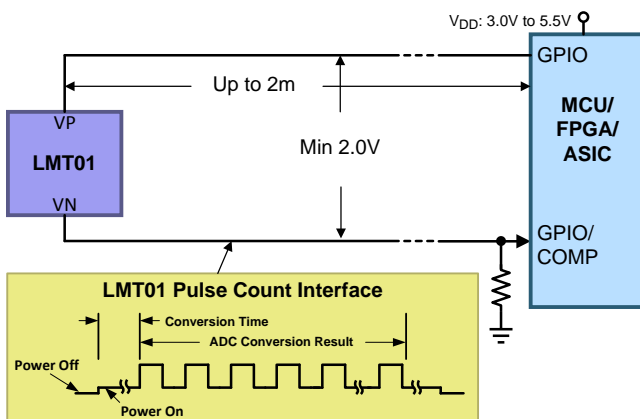
1 Features

- High Accuracy Over -50°C to 150°C Wide Temperature Range
 - -20°C to 90°C : $\pm 0.5^{\circ}\text{C}$ (max)
 - 90°C to 150°C : $< \pm 0.62^{\circ}\text{C}$ (max)
 - -50°C to -20°C : $< \pm 0.7^{\circ}\text{C}$ (max)
- Precision Digital Temperature Measurement Simplified in a 2-Pin Package
- Single-wire Pulse Count Digital Output Easily Read with Processor Timer Input
- Number of Output Pulses is Proportional to Temperature with 0.0625°C Resolution
- Communication Frequency: 88 kHz
- Continuous Conversion Plus Data-Transmission Period: 100 ms
- Conversion Current: 34 μA
- Floating 2V to 5.5V (VP–VN) Supply Operation with Integrated EMI Immunity
- 2-Pin Package Offering TO-92/LPG (3.1 mm \times 4 mm \times 1.5 mm) – $\frac{1}{2}$ the Size of Traditional TO-92

2 Applications

- Digital Output Wired Probes
- White Goods
- HVAC
- Power Supplies
- Industrial Internet of Things (IoT)
- Automotive
- Battery Management

2-Pin IC Temperature Sensor - Digital Thermistor Replacement



3 Description

The LMT01 is a high-accuracy, 2-pin temperature sensor with an easy-to-use pulse count interface which makes it an ideal digital replacement for PTC or NTC thermistors both on and off board in automotive, industrial, and consumer markets. The LMT01 digital pulse count output and high accuracy over a wide temperature range allow pairing with any MCU without concern for integrated ADC quality or availability while minimizing software overhead. TI's LMT01 achieves flat $\pm 0.5^{\circ}\text{C}$ accuracy with very fine resolution (0.0625°C) over a wide temperature range of -20°C to 90°C without system calibration or hardware/software compensation.

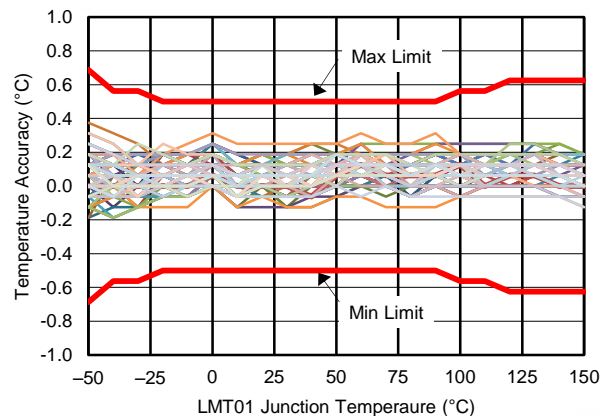
Unlike other digital IC temperature sensors, LMT01's single wire interface is designed to directly interface with a GPIO or comparator input, thereby simplifying hardware implementation. Similarly, the LMT01's integrated EMI suppression and simple 2-pin architecture makes it ideal for on-board and off-board temperature sensing. The LMT01 offers all the simplicity of analog NTC or PTC thermistors with the added benefits of a digital interface, wide specified performance, EMI immunity, and minimum processor resources.

Device Information

PART NUMBER	PACKAGE	BODY SIZE
LMT01	TO-92 / LPG (2)	3.10 mm \times 4.00 mm \times 1.50 mm

1. For all available packages, see the orderable addendum at the end of the data sheet.

LMT01 Accuracy



PRODUCT PREVIEW



4 Revision History

DATE	REVISION	NOTES
June 2015	*	Initial release.

5 Device and Documentation Support

5.1 Documentation Support

5.2 Community Resources

The following links connect to TI community resources. Linked contents are provided "AS IS" by the respective contributors. They do not constitute TI specifications and do not necessarily reflect TI's views; see TI's [Terms of Use](#).

TI E2E™ Online Community *TI's Engineer-to-Engineer (E2E) Community*. Created to foster collaboration among engineers. At e2e.ti.com, you can ask questions, share knowledge, explore ideas and help solve problems with fellow engineers.

Design Support *TI's Design Support* Quickly find helpful E2E forums along with design support tools and contact information for technical support.

5.3 Trademarks

E2E is a trademark of Texas Instruments.
All other trademarks are the property of their respective owners.

5.4 Electrostatic Discharge Caution



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.

5.5 Glossary

[SLYZ022](#) — *TI Glossary*.

This glossary lists and explains terms, acronyms, and definitions.

6 Mechanical, Packaging, and Orderable Information

The following pages include mechanical, packaging, and orderable information. This information is the most current data available for the designated devices. This data is subject to change without notice and revision of this document. For browser-based versions of this data sheet, refer to the left-hand navigation.

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
LMT01DQXR	ACTIVE	WSO	DQX	2	3000	Green (RoHS & no Sb/Br)	SN	Level-1-260C-UNLIM	-50 to 150	13N	Samples
LMT01DQXT	ACTIVE	WSO	DQX	2	250	Green (RoHS & no Sb/Br)	Call TI	Level-1-260C-UNLIM	-50 to 150	13N	Samples
LMT01LPG	ACTIVE	TO-92	LPG	2	1000	Green (RoHS & no Sb/Br)	SN	N / A for Pkg Type	-50 to 150	LMT01	Samples
LMT01LPGM	ACTIVE	TO-92	LPG	2	3000	Green (RoHS & no Sb/Br)	SN	N / A for Pkg Type	-50 to 150	LMT01	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.

OBSELETE: 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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OTHER QUALIFIED VERSIONS OF LMT01 :

- Automotive: [LMT01-Q1](#)

NOTE: Qualified Version Definitions:

- Automotive - Q100 devices qualified for high-reliability automotive applications targeting zero defects

GENERIC PACKAGE VIEW

DQX 2

WSO - 0.8 mm max height

1.7 x 2.5, 0 mm pitch

PLASTIC SMALL OUTLINE - NO LEAD

This image is a representation of the package family, actual package may vary.
Refer to the product data sheet for package details.



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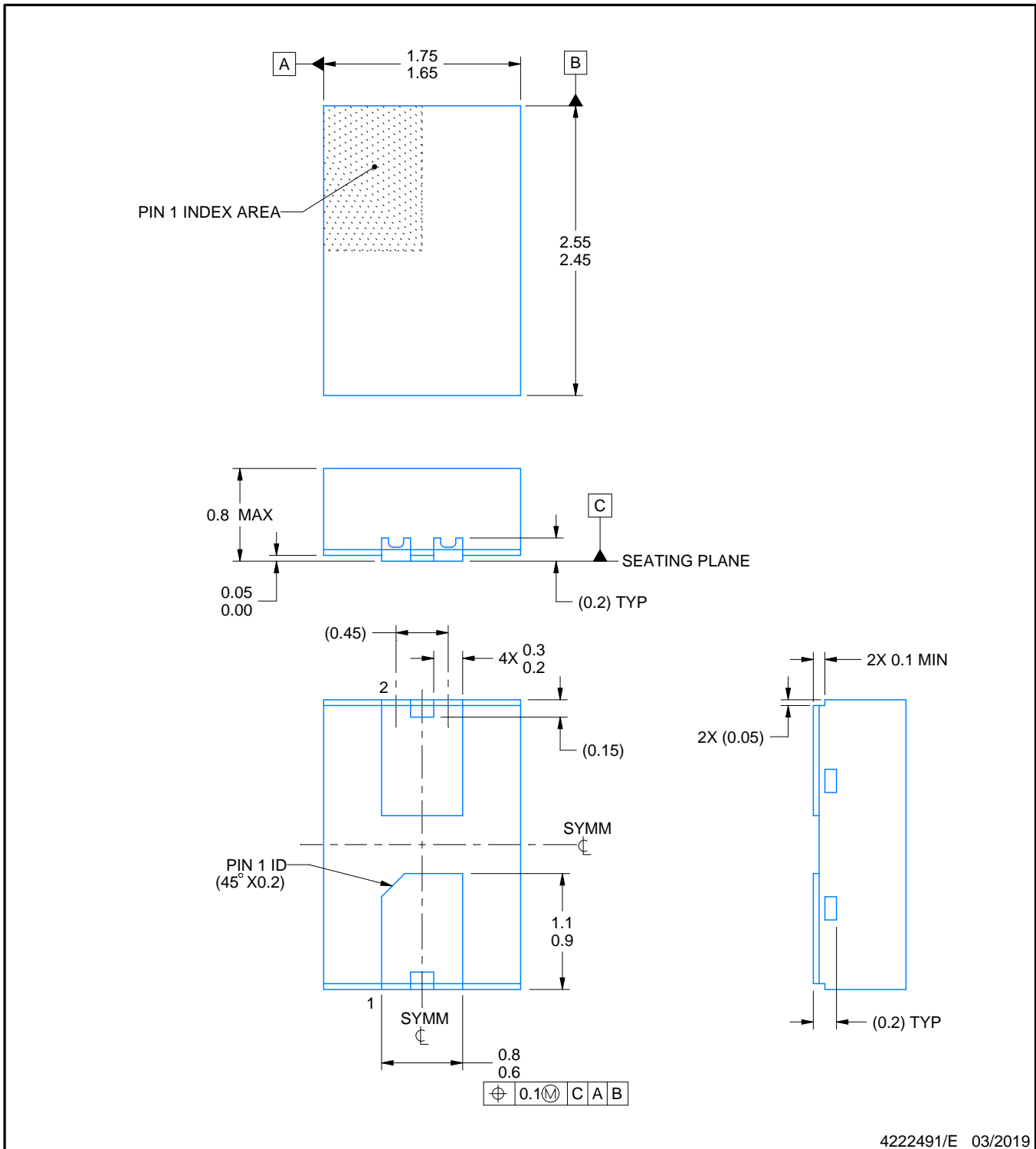
DQX0002A



PACKAGE OUTLINE

WSN - 0.8 mm max height

PLASTIC SMALL OUTLINE - NO LEAD



4222491/E 03/2019

NOTES:

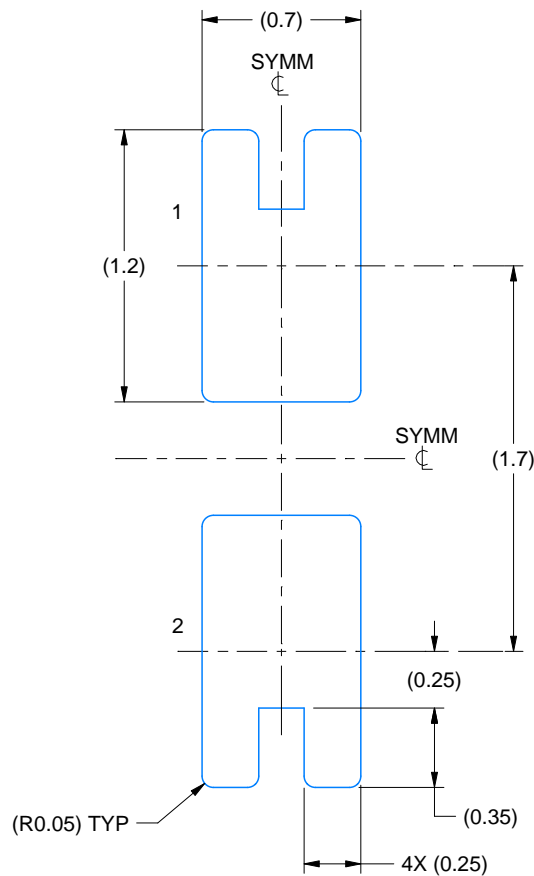
1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M
2. This drawing is subject to change without notice.

EXAMPLE BOARD LAYOUT

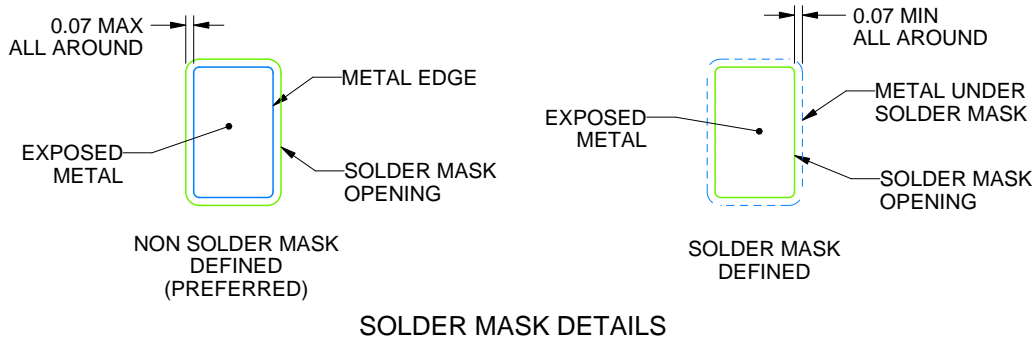
DQX0002A

WSON - 0.8 mm max height

PLASTIC SMALL OUTLINE - NO LEAD



LAND PATTERN EXAMPLE
EXPOSED METAL SHOWN
SCALE:30X



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NOTES: (continued)

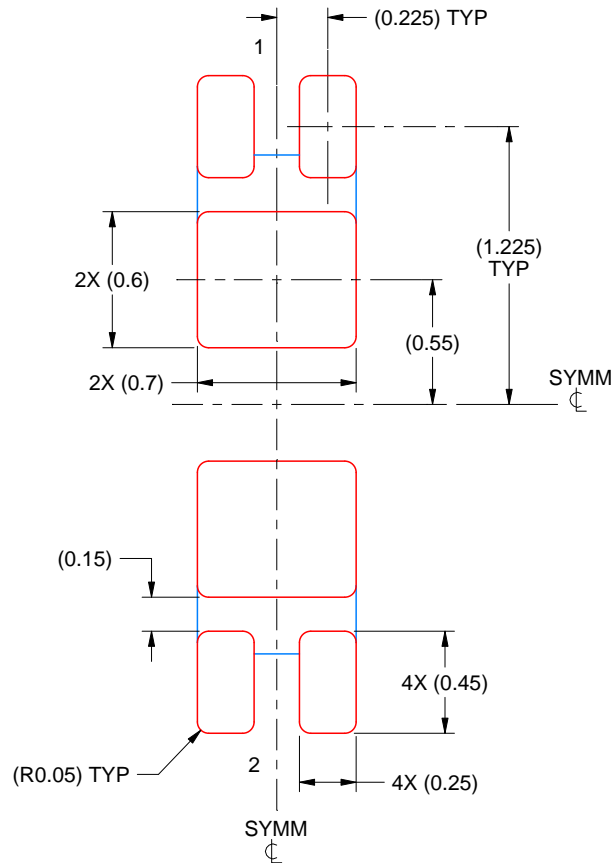
- For more information, see Texas Instruments literature number SLUA271 (www.ti.com/lit/sl原因271).
- Vias are optional depending on application, refer to device data sheet. If any vias are implemented, refer to their locations shown on this view. It is recommended that vias under paste be filled, plugged or tented.

EXAMPLE STENCIL DESIGN

DQX0002A

WSON - 0.8 mm max height

PLASTIC SMALL OUTLINE - NO LEAD



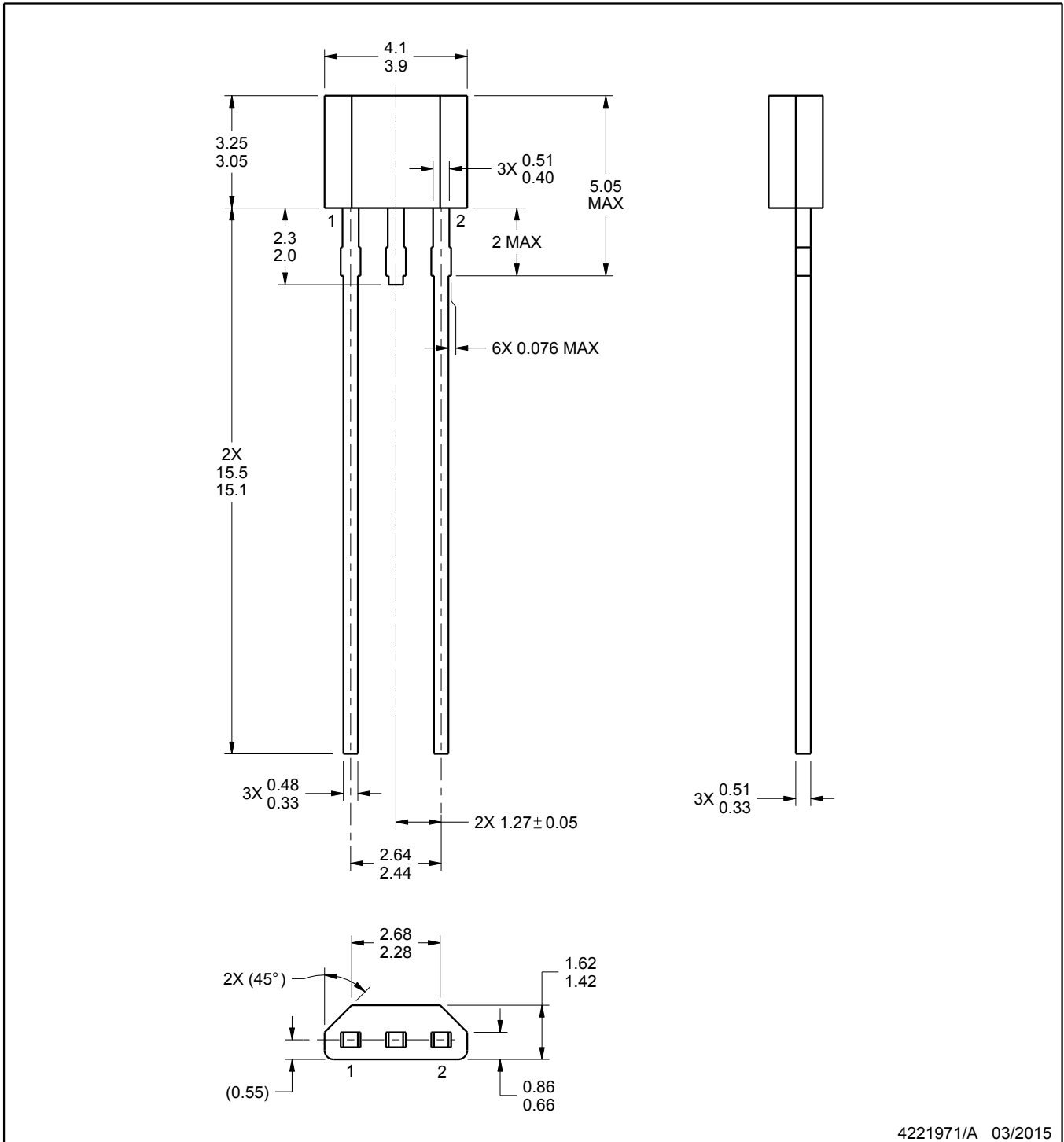
SOLDER PASTE EXAMPLE
BASED ON 0.1 mm THICK STENCIL

81% PRINTED SOLDER COVERAGE BY AREA UNDER PACKAGE
SCALE:30X

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NOTES: (continued)

5. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.



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NOTES:

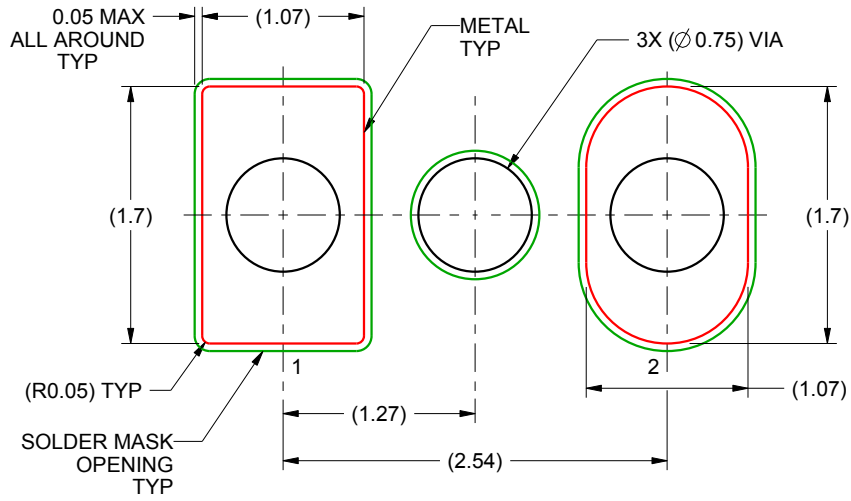
1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.

EXAMPLE BOARD LAYOUT

LPG0002A

TO-92 - 5.05 mm max height

TO-92



LAND PATTERN EXAMPLE
NON-SOLDER MASK DEFINED
SCALE:20X

4221971/A 03/2015

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