# TLC69622-Q1 Automotive 60mA, 8-Channel LED Driver with Integrated Oscillatorand Advance Diagnostics

## 1 Features

- AEC-Q100 qualified for automotive applications
  - Grade 1: –40°C to 125°C ambient operating temperature
  - Device HBM classification level H1C
  - Device CDM classification level C4B
- Functional Safety-Compliant
  - Developed for functional safety applications
  - Documentation available to aid ISO 26262 system design up to ASIL B
- 8 integrated current sinks
  - Programmable 16-bit PWM / Hybrid dimming
  - Programmable 7-bit analog dot correction (DC)
  - Maximum output current / voltage: 60mA / 16V
- Integrated 33MHz oscillator
  - 16-bit PWM output in 500Hz
  - >20KHz refresh rate with enhanced spectrum (ES) PWM
- High speed communication
  - Serial peripheral interface (SPI)
  - Data rates up to 17Mbps
- Power efficiency optimization
  - Adaptive headroom voltage control (AHVC)
  - Device power save mode (PSM)
- EMI mitigation
  - Interface: programmable buffer driving capability
  - Current sinks: phase shifting / spread spectrum
- Protection and Diagnostic
  - LED: open / short detection / health check
  - Current sink: adjacent-pin short / health check
  - Interface: CRC / command error / time-out error / communication watchdog
  - Device: under voltage / ISET out of range / thermal shutdown / memory CRC / OTP CRC / OSC watchdog

## 2 Applications

- Automotive Central information Display
- Automotive Cluster Display
- Automotive Head-up Display

## 3 Description

The TLC69622-Q1 is a LED driver with 8 constant current sink channels which can provide up to 16-bit individual pixel-level LED PWM control. The additional 7-bit dot correction (DC) is also implemented to each channel to control peak current. Each device shares data stream by serial peripheral interface (SPI) which supports up to 511 devices connection. The interface is software compatible with LED drivers in the same group which can be applied to different application scenarios based on LED current and total LED number.

To optimize overall systematic power efficiency, the device is equipped with adaptive headroom voltage control (AHVC) scheme to optimize headroom voltage across each channel and device. Only the OUT7 pin from the last device of daisy chain is required to be programmed as FB pin to optimize LED supply voltage from DC/DC.

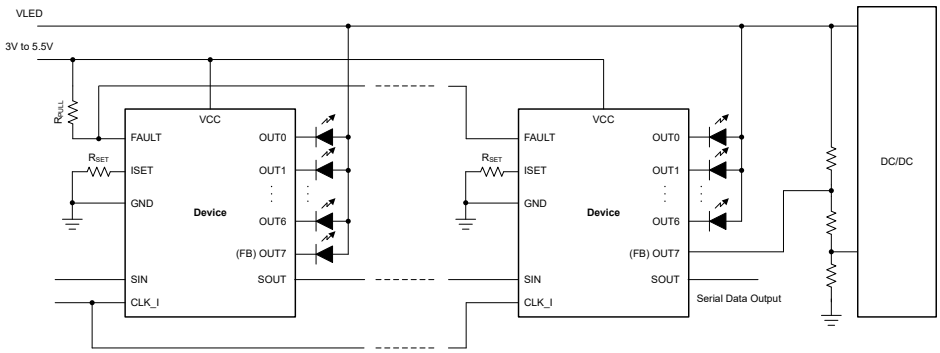
The TLC69622-Q1 is equipped diagnostics for LED, current sink, communication and device.

**Packaging Information**

| PART NUMBER | PACKAGE(1) | BODY SIZE (NOM) |
|---|---|---|
| TLC69622-Q1 | X2QFN (16) Wettable flank | 2.5mm × 2.5mm |
| | UQFN(16) Wettable flank | 2.5mm × 2.5mm |
| | SOT-23-THIN (16) | 4.2mm × 2mm |

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

An IMPORTANT NOTICE at the end of this data sheet addresses availability, warranty, changes, use in safety-critical applications, intellectual property matters and other important disclaimers. PRODUCTION DATA.




**Simplified Schematic**


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# 4 Device Comparison

| PART NUMBER | CHANNEL NUMBER | MAX. CHANNEL CURRENT | FUNCTIONAL SAFETY CLASSIFICATION | INTERFACE | SOFTWARE COMPATIBLE |
|---|---|---|---|---|---|
| TLC69621-Q1 | 8 | 60mA | Functional Safety-Capable | SPI | Group 1 |
| TLC69624-Q1 | 24 | | | | |
| TLC69627-Q1 | 48 | | | | |
| TLC69631-Q1 | 8 | 100mA | | | |
| TLC69634-Q1 | 24 | | | | |
| TLC69637-Q1 | 48 | | | | |
| TLC69622-Q1 | 8 | 60mA | Functional Safety-Compliant | SPI | Group 2 |
| TLC69625-Q1 | 24 | | | | |
| TLC69628-Q1 | 48 | | | | |
| TLC69632-Q1 | 8 | 100mA | | | |
| TLC69635-Q1 | 24 | | | | |
| TLC69638-Q1 | 48 | | | | |
| TLC69623-Q1 | 8 | 60mA | Functional Safety-Compliant | CSI | Group 3 |
| TLC69626-Q1 | 24 | | | | |
| TLC69629-Q1 | 48 | | | | |
| TLC69633-Q1 | 8 | 100mA | | | |
| TLC69636-Q1 | 24 | | | | |
| TLC69639-Q1 | 48 | | | | |


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# 5 Device and Documentation Support

TI offers an extensive line of development tools. Tools and software to evaluate the performance of the device, generate code, and develop solutions are listed below.

## 5.1 Receiving Notification of Documentation Updates

To receive notification of documentation updates, navigate to the device product folder on ti.com. Click on *Notifications* to register and receive a weekly digest of any product information that has changed. For change details, review the revision history included in any revised document.

## 5.2 Support Resources

TI E2E™ support forums are an engineer's go-to source for fast, verified answers and design help — straight from the experts. Search existing answers or ask your own question to get the quick design help you need.

Linked content is 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.

## 5.3 Trademarks

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

## 5.4 Electrostatic Discharge Caution



This integrated circuit can be damaged by ESD. Texas Instruments recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage.

ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications.

## 5.5 Glossary

| | |
|---|---|
| TI Glossary | This glossary lists and explains terms, acronyms, and definitions. |

# 6 Revision History

NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

| Changes from Revision * (March 2026) to Revision A (November 2026) | Page |
|---|---|

## 7 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.


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# 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) |
|---|---|---|---|---|---|---|---|---|---|
| TLC69622QDYYRQ1 | Active | Production | SOT-23-THIN (DYY) \| 16 | 3000 \| LARGE T&R | Yes | NIPDAU | Level-1-260C-UNLIM | -40 to 125 | 69622Q1 |
| TLC69622QRUJRQ1 | Active | Production | X2QFN (RUJ) \| 16 | 5000 \| LARGE T&R | Yes | SN | Level-1-260C-UNLIM | -40 to 125 | 22Q |
| TLC69622QRBVRQ1 | Active | Production | UQFN (RBV) \| 16 | 4000 \| LARGE T&R | Yes | SN | Level-1-260C-UNLIM | -40 to 125 | 22Q |

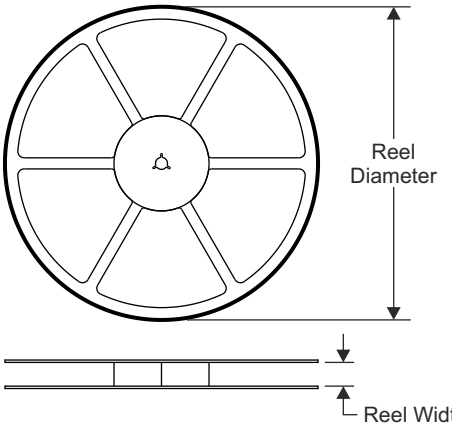
(1) **Status:** For more details on status, see our product life cycle.
(2) **Material type:** When designated, preproduction parts are prototypes/experimental devices, and are not yet approved or released for full production. Testing and final process, including without limitation quality assurance, 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.

**Important Information and Disclaimer:** The information provided on this page represents TI's knowledge and belief as of the date that it is provided. TI bases its knowledge and belief on information provided by third parties, and makes no representation or warranty as to the accuracy of such information. Efforts are underway to better integrate information from third parties. TI has taken and continues to take reasonable steps to provide representative and accurate information but may not have conducted destructive testing or chemical analysis on incoming materials and chemicals. TI and TI suppliers consider certain information to be proprietary, and thus CAS numbers and other limited information may not be available for release.

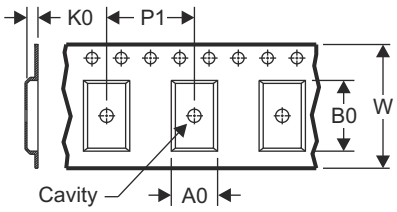
In no event shall TI's liability arising out of such information exceed the total purchase price of the TI part(s) at issue in this document sold by TI to Customer on an annual basis.

## 7.1 Tape and Reel Information

**REEL DIMENSIONS**

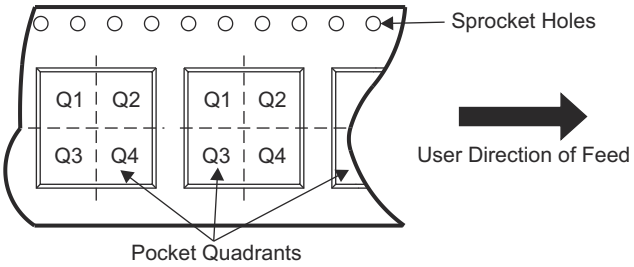



**TAPE DIMENSIONS**




| | |
|---|---|
| A0 | Dimension designed to accommodate the component width |
| B0 | Dimension designed to accommodate the component length |
| K0 | Dimension designed to accommodate the component thickness |
| W | Overall width of the carrier tape |
| P1 | Pitch between successive cavity centers |

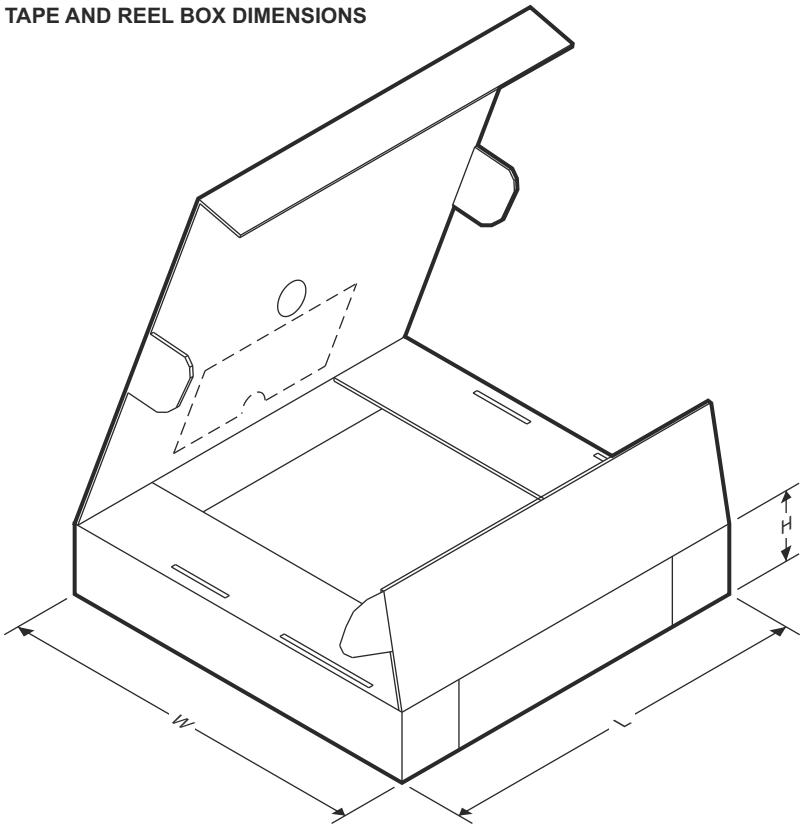
**QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE**




| Device | Package Type | Package Drawing | Pins | SPQ | Reel Diameter (mm) | Reel Width W1 (mm) | A0 (mm) | B0 (mm) | K0 (mm) | P1 (mm) | W (mm) | Pin1 Quadrant |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TLC69622QDYYRQ1 | SOT-23-THIN | DYY | 16 | 3000 | 330 | 12.4 | 4.8 | 3.6 | 1.6 | 8 | 12 | Q3 |
| TLC69622QRUJRQ1 | X2QFN | RUJ | 16 | 5000 | 180 | 8.4 | 2.7 | 2.7 | 0.5 | 4 | 8 | Q2 |
| TLC69622QRBVRQ1 | VQFN | RBV | 16 | 4000 | 180 | 8.4 | 2.7 | 2.7 | 0.75 | 4 | 8 | Q2 |


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**TAPE AND REEL BOX DIMENSIONS**




| Device | Package Type | Package Drawing | Pins | SPQ | Length (mm) | Width (mm) | Height (mm) |
|---|---|---|---|---|---|---|---|
| TLC69622QDYYRQ1 | SOT-23-THIN | DYY | 16 | 3000 | 336.6 | 336.6 | 31.8 |
| TLC69622QRUJRQ1 | X2QFN | RUJ | 16 | 5000 | 210 | 185 | 35 |
| TLC69622QRBVRQ1 | VQFN | RBV | 16 | 4000 | 210 | 185 | 35 |

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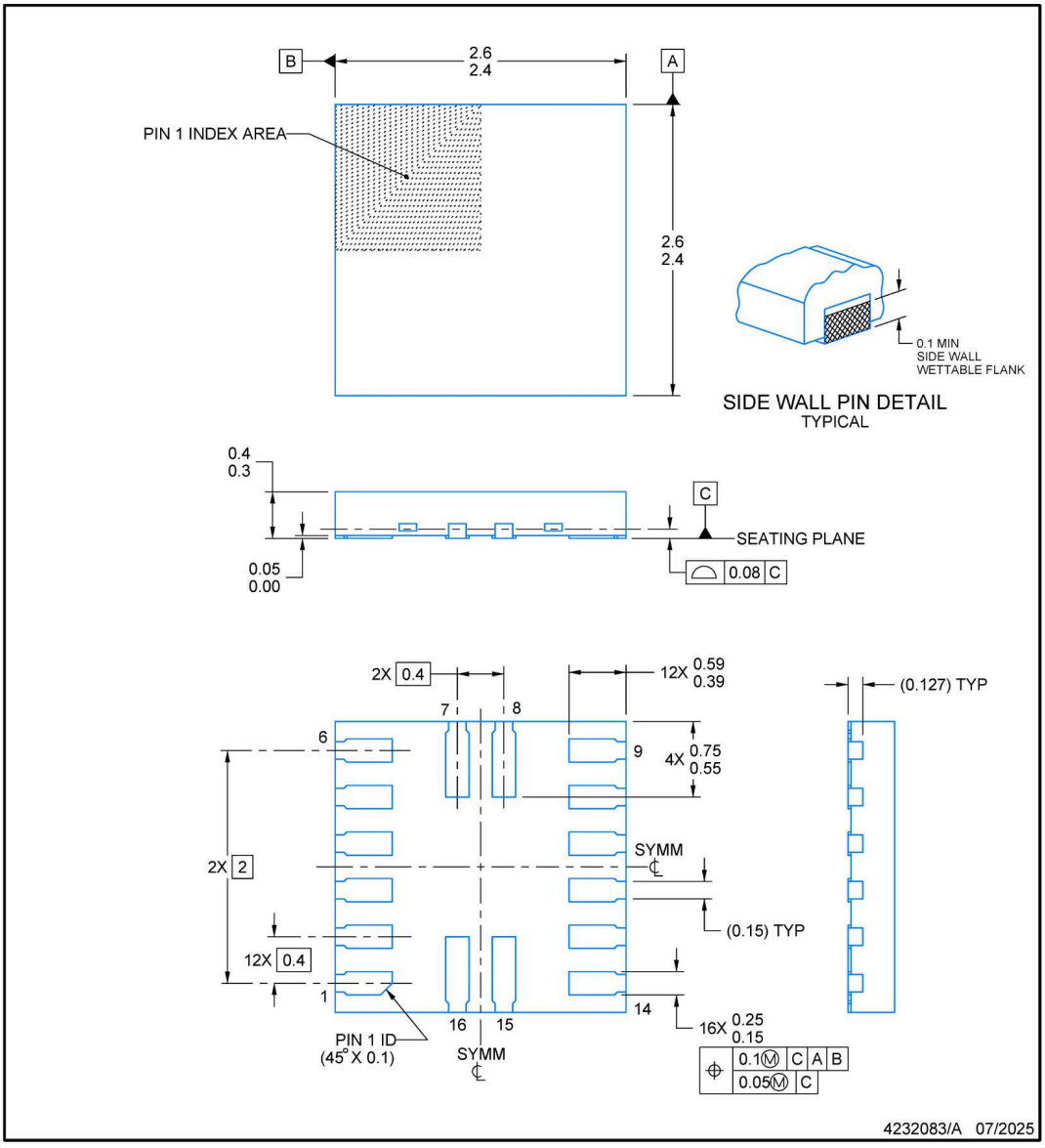
## RUJ0016B



## PACKAGE OUTLINE

### X2QFN - 0.4 mm max height

PLASTIC QUAD FLATPACK - NO LEAD




NOTES:

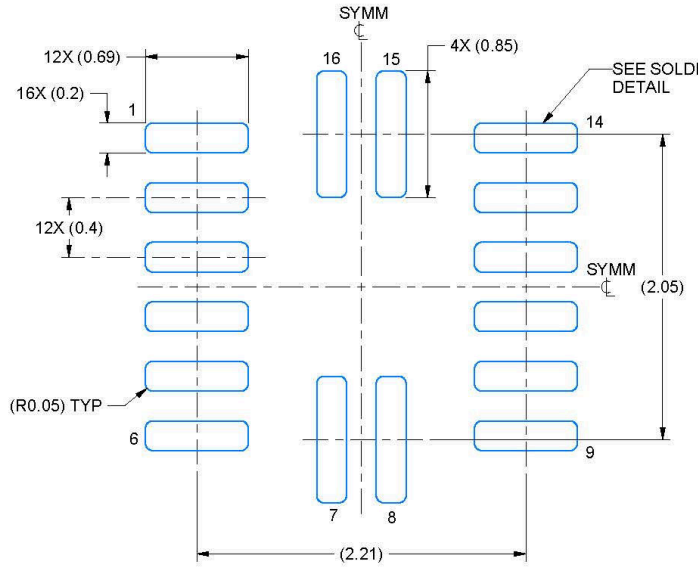
1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.


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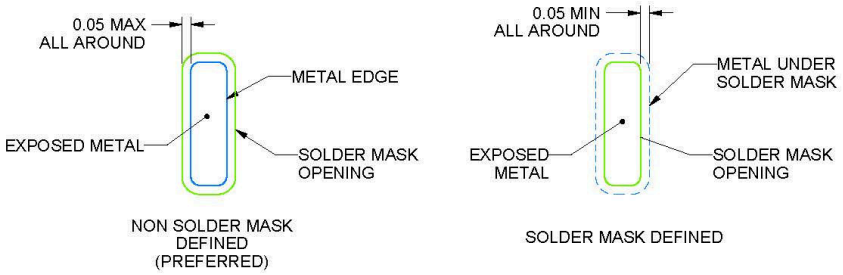
## EXAMPLE BOARD LAYOUT

**RUJ0016B** — **X2QFN - 0.4 mm max height**

PLASTIC QUAD FLATPACK - NO LEAD




LAND PATTERN EXAMPLE
EXPOSED METAL SHOWN
SCALE: 25X




SOLDER MASK DETAILS

4232083/A 07/2025

NOTES: (continued)

3. For more information, see Texas Instruments literature number SLUA271 (www.ti.com/lit/slua271).

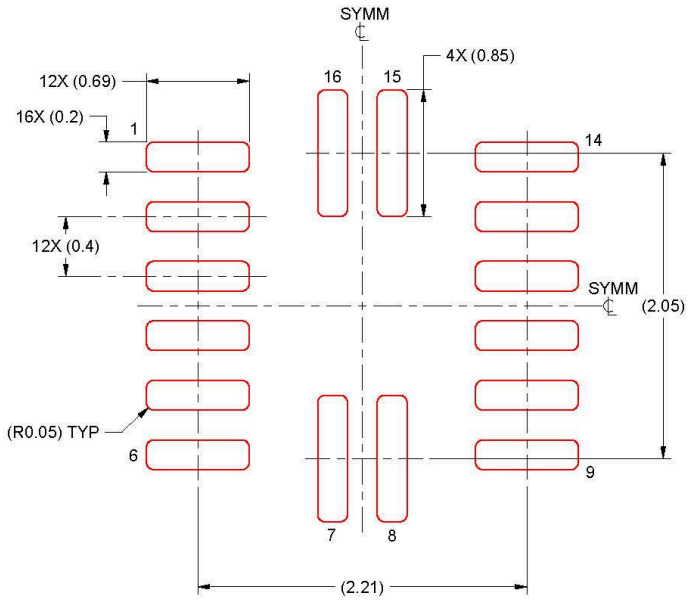


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## EXAMPLE STENCIL DESIGN

**RUJ0016B** — **X2QFN - 0.4 mm max height**

PLASTIC QUAD FLATPACK - NO LEAD




SOLDER PASTE EXAMPLE
BASED ON 0.125 MM THICK STENCIL
SCALE: 25X

4232083/A 07/2025

NOTES: (continued)

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

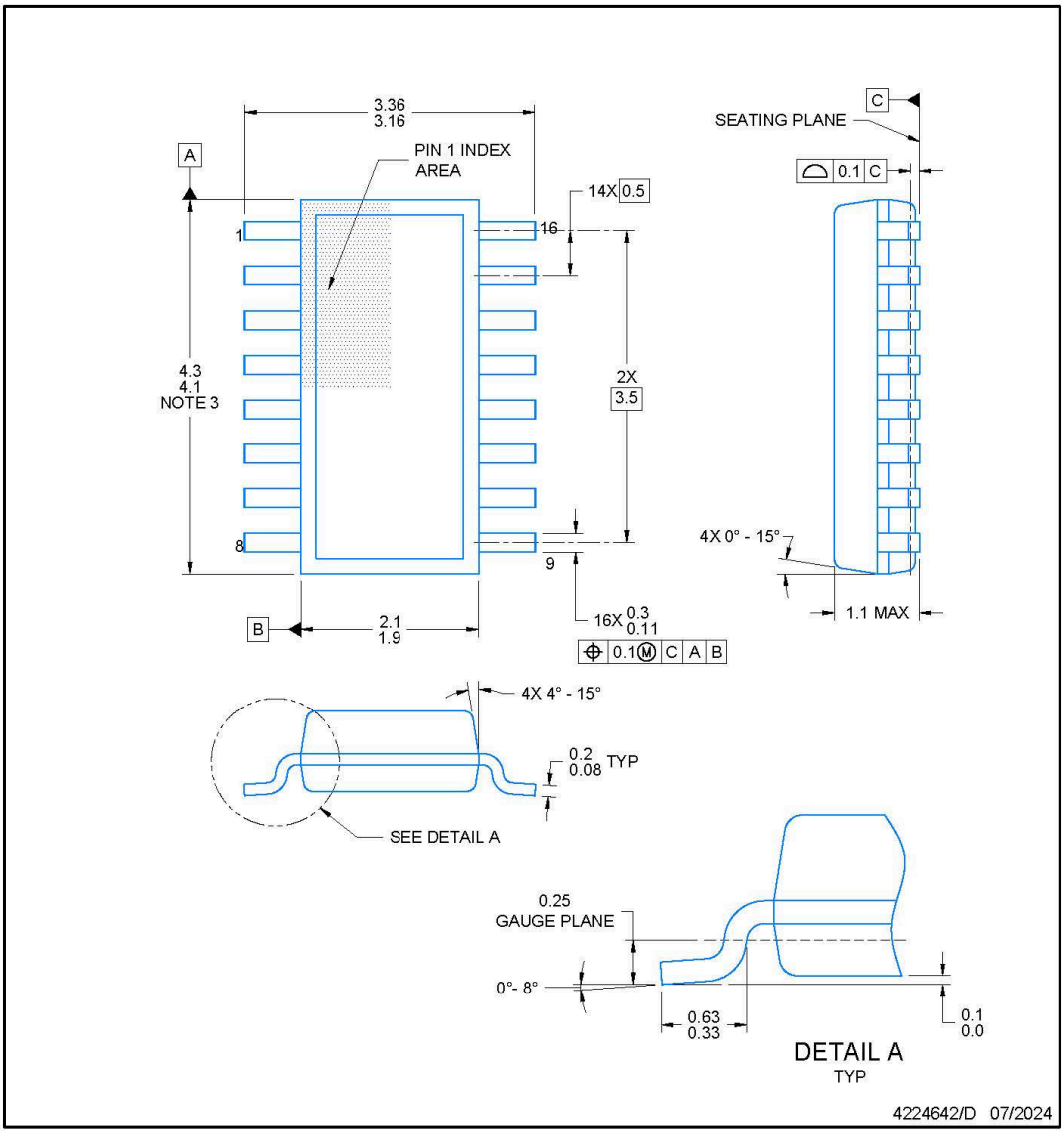

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# PACKAGE OUTLINE

## DYY0016A

## SOT-23-THIN - 1.1 mm max height

PLASTIC SMALL OUTLINE




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.
3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.15 per side.
4. This dimension does not include interlead flash. Interlead flash shall not exceed 0.50 per side.
5. Reference JEDEC Registration MO-345, Variation AA

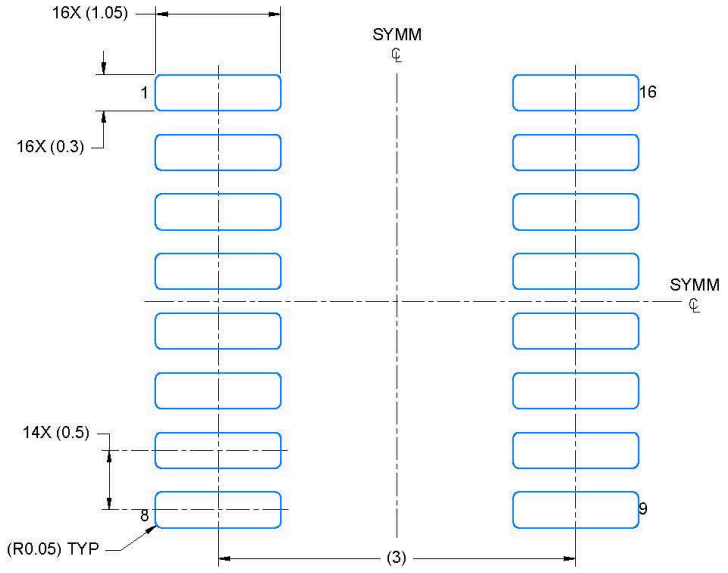


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## EXAMPLE BOARD LAYOUT

**DYY0016A** — **SOT-23-THIN - 1.1 mm max height**

PLASTIC SMALL OUTLINE




LAND PATTERN EXAMPLE
EXPOSED METAL SHOWN
SCALE: 20X




SOLDER MASK DETAILS

4224642/D 07/2024

NOTES: (continued)

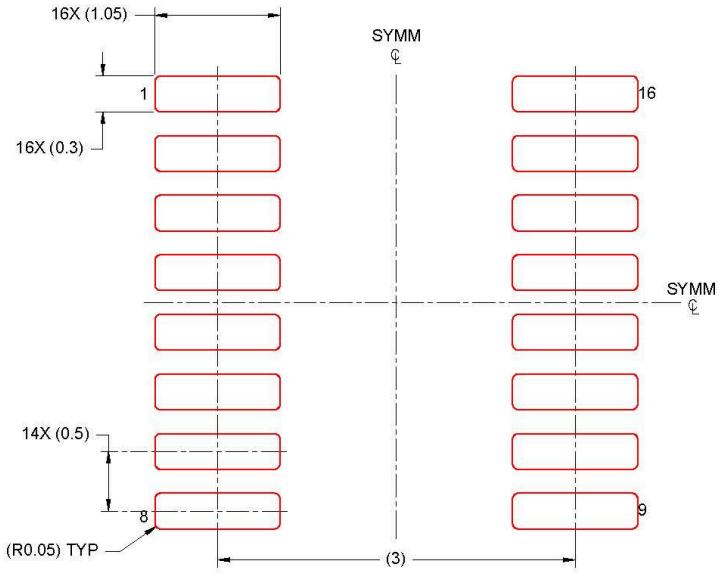
6. Publication IPC-7351 may have alternate designs.
7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.


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## EXAMPLE STENCIL DESIGN

**DYY0016A** — **SOT-23-THIN - 1.1 mm max height**

PLASTIC SMALL OUTLINE




SOLDER PASTE EXAMPLE
BASED ON 0.125 mm THICK STENCIL
SCALE: 20X

4224642/D 07/2024

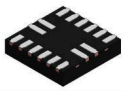
NOTES: (continued)

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



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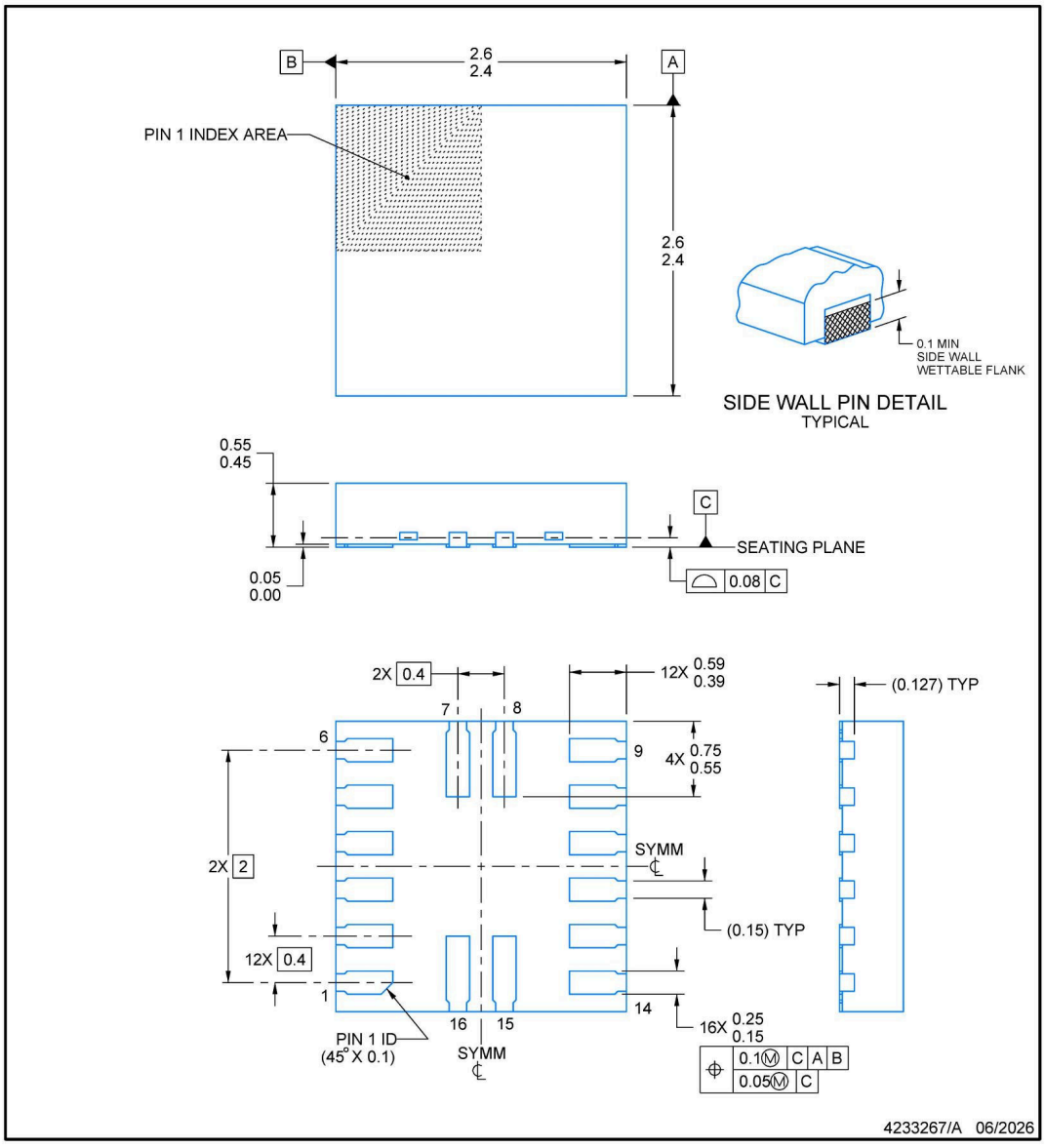
## RBV0016B



## PACKAGE OUTLINE

### UQFN - 0.55 mm max height

PLASTIC QUAD FLATPACK - NO LEAD




NOTES:

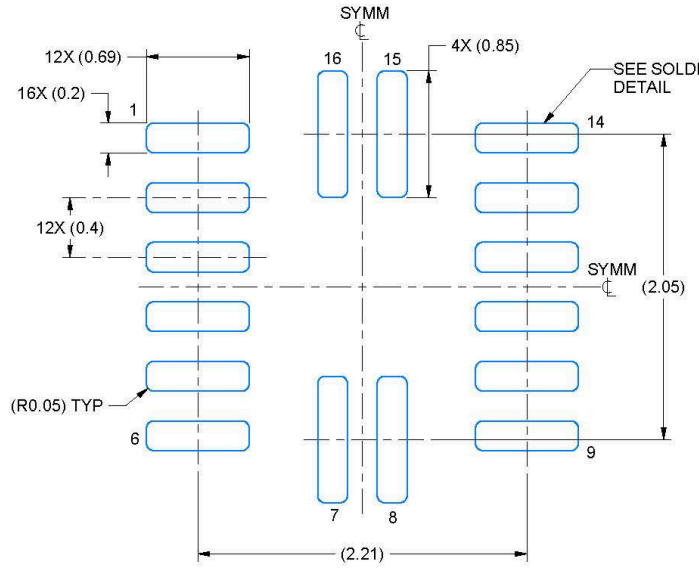
1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
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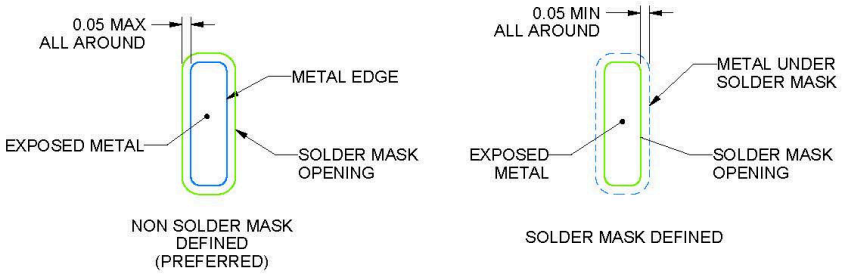
## EXAMPLE BOARD LAYOUT

**RBV0016B** — **UQFN - 0.55 mm max height**

PLASTIC QUAD FLATPACK - NO LEAD




LAND PATTERN EXAMPLE
EXPOSED METAL SHOWN
SCALE: 25X




SOLDER MASK DETAILS

4233267/A 06/2026

NOTES: (continued)

3. For more information, see Texas Instruments literature number SLUA271 (www.ti.com/lit/slua271).

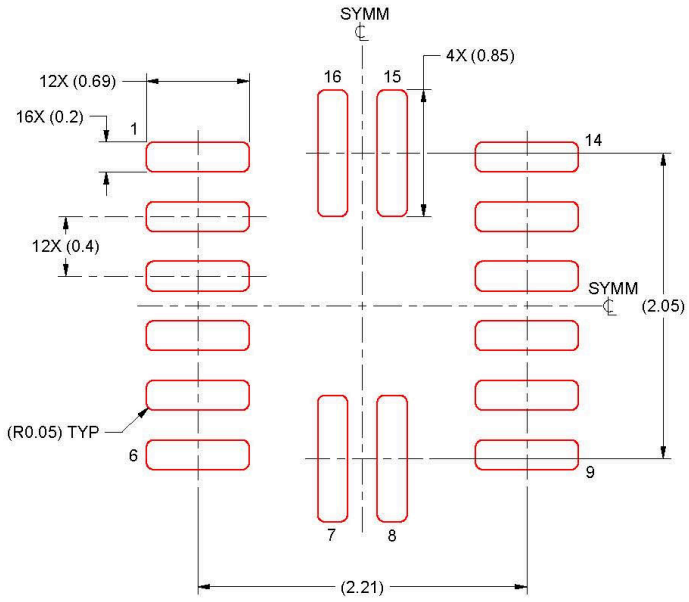


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## EXAMPLE STENCIL DESIGN

**RBV0016B** — **UQFN - 0.55 mm max height**

PLASTIC QUAD FLATPACK - NO LEAD




SOLDER PASTE EXAMPLE
BASED ON 0.125 MM THICK STENCIL
SCALE: 25X

4233267/A 06/2026

NOTES: (continued)

4. 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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## 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) |
|---|---|---|---|---|---|---|---|---|---|
| TLC69622QDYYRQ1 | Active | Production | SOT-23-THIN (DYY) \| 16 | 3000 \| LARGE T&R | Yes | NIPDAU | Level-1-260C-UNLIM | -40 to 125 | 69622Q1 |
| TLC69622QRBVRQ1 | Active | Production | UQFN (RBV) \| 16 | 4000 \| LARGE T&R | Yes | SN | Level-1-260C-UNLIM | -40 to 125 | 22Q |

(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.

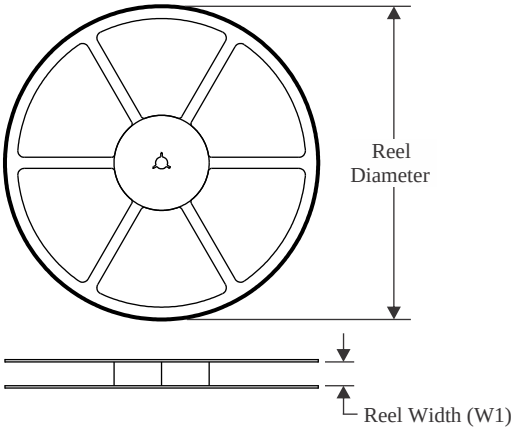
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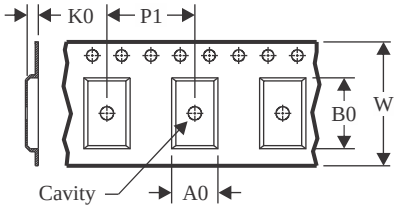
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## TAPE AND REEL INFORMATION

**REEL DIMENSIONS**

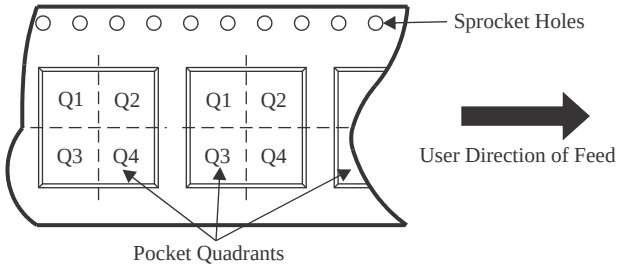



**TAPE DIMENSIONS**




| | |
|---|---|
| A0 | Dimension designed to accommodate the component width |
| B0 | Dimension designed to accommodate the component length |
| K0 | Dimension designed to accommodate the component thickness |
| W | Overall width of the carrier tape |
| P1 | Pitch between successive cavity centers |

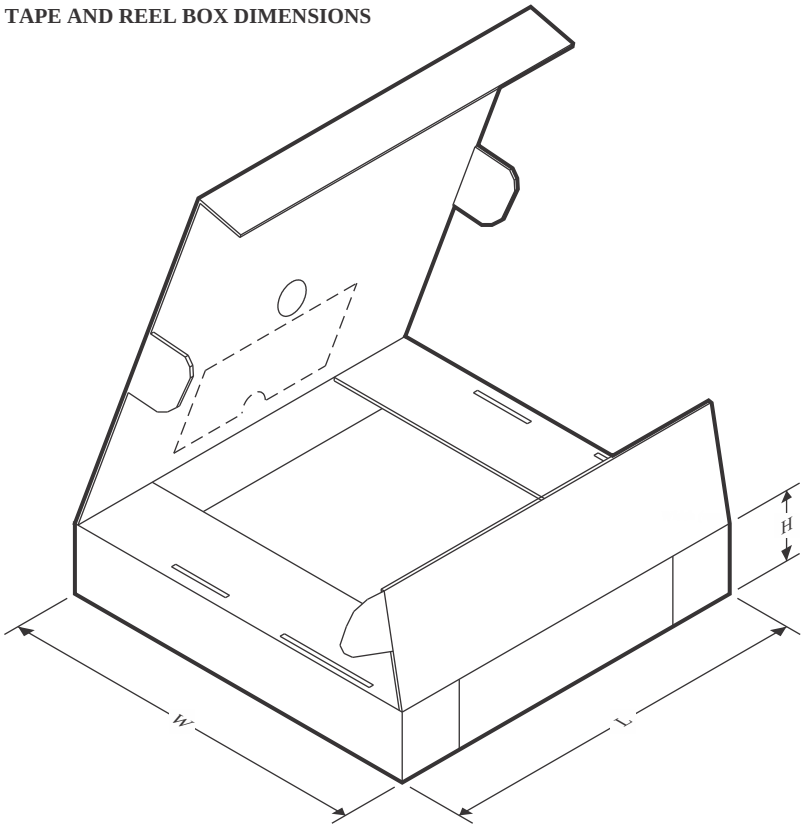
**QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE**




*All dimensions are nominal

| Device | Package Type | Package Drawing | Pins | SPQ | Reel Diameter (mm) | Reel Width W1 (mm) | A0 (mm) | B0 (mm) | K0 (mm) | P1 (mm) | W (mm) | Pin1 Quadrant |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TLC69622QDYYRQ1 | SOT-23-THIN | DYY | 16 | 3000 | 330.0 | 12.4 | 4.8 | 3.6 | 1.6 | 8.0 | 12.0 | Q3 |
| TLC69622QRBVRQ1 | UQFN | RBV | 16 | 4000 | 180.0 | 8.4 | 2.7 | 2.7 | 0.75 | 4.0 | 8.0 | Q2 |

TAPE AND REEL BOX DIMENSIONS




*All dimensions are nominal

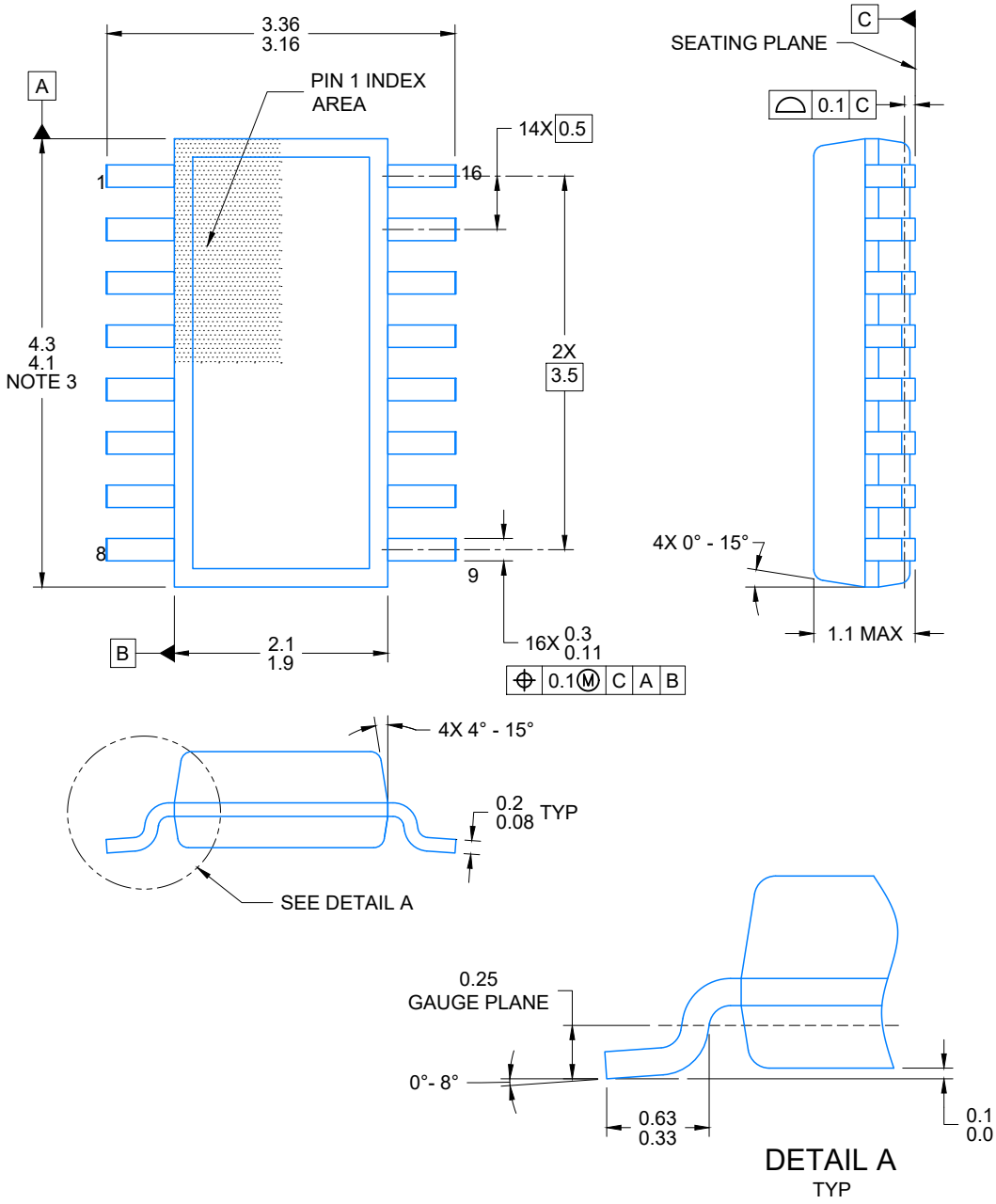
| Device | Package Type | Package Drawing | Pins | SPQ | Length (mm) | Width (mm) | Height (mm) |
|---|---|---|---|---|---|---|---|
| TLC69622QDYYRQ1 | SOT-23-THIN | DYY | 16 | 3000 | 336.6 | 336.6 | 31.8 |
| TLC69622QRBVRQ1 | UQFN | RBV | 16 | 4000 | 210.0 | 185.0 | 35.0 |

# PACKAGE OUTLINE

## DYY0016A

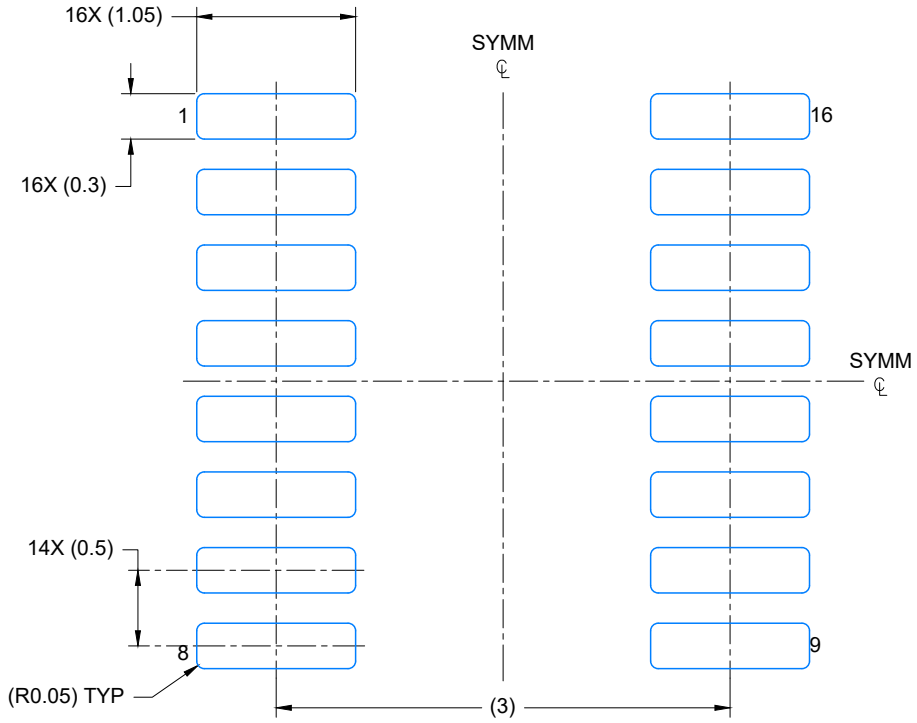
## SOT-23-THIN - 1.1 mm max height

PLASTIC SMALL OUTLINE

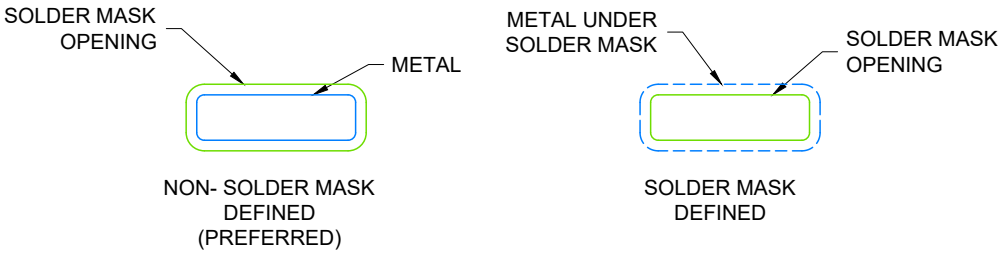



NOTES:

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.
3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.15 per side.
4. This dimension does not include interlead flash. Interlead flash shall not exceed 0.50 per side.
5. Reference JEDEC Registration MO-345, Variation AA




LAND PATTERN EXAMPLE
EXPOSED METAL SHOWN
SCALE: 20X




SOLDER MASK DETAILS

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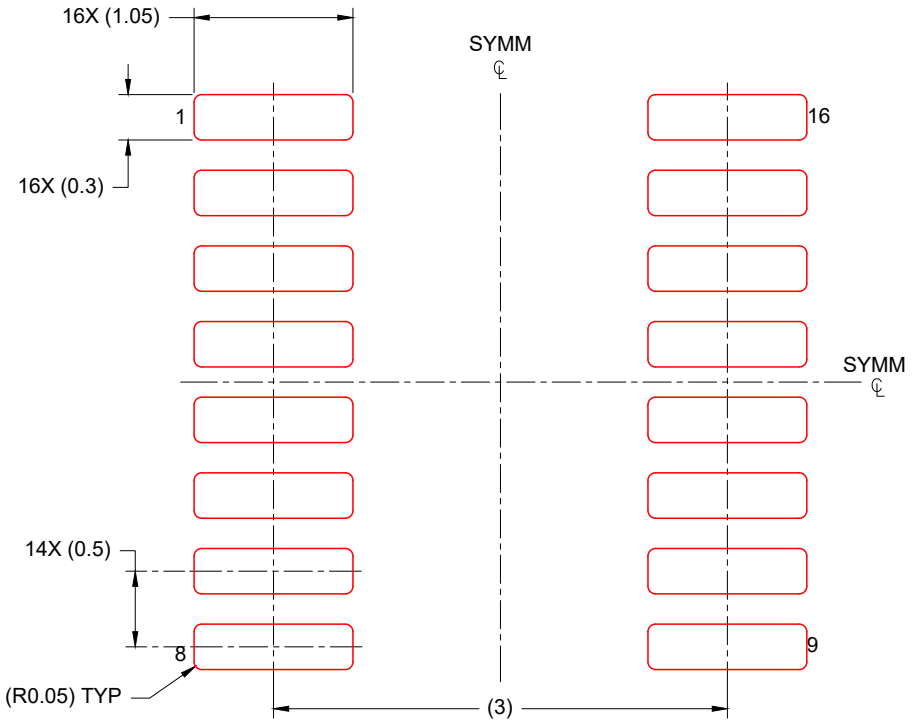
NOTES: (continued)

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

# EXAMPLE STENCIL DESIGN

## SOT-23-THIN - 1.1 mm max height

PLASTIC SMALL OUTLINE




SOLDER PASTE EXAMPLE
BASED ON 0.125 mm THICK STENCIL
SCALE: 20X

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NOTES: (continued)

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

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