

# TLC696x2/4/8 16-Channel, 2/4/8 Time-Multiplexing, Local Dimming Backlight LED Driver

## 1 Features

- Operating voltage  $V_{CC}$  range: 3V to 5.5V
- 16 constant current sinks with high precision:
  - Maximum output current / voltage:
    - 30mA / 20V: TLC69602/4/8
    - 60mA / 20V: TLC69612/4/8
    - 30mA / 50V: TLC69652/4/8
    - 60mA / 50V: TLC69662/4/8
  - Device-to-device error:  $\pm 2\%$  (typ.)
  - Channel-to-channel error:  $\pm 2\%$  (typ.)
- Flexible dimming control:
  - Global 8-bit Maximum Current (MC) setting
  - Brightness resolution: up to 15-bit
  - PWM / Hybrid control mode
- High speed daisy chain interface:
  - I/O voltage compatible with: 1.8V / 3.3V
  - Data transfer rate: up to 20MHz
- High system efficiency:
  - Adaptive headroom voltage control (AHVC)
  - Ultra-low device power consumption:
    - Standby mode:  $I_{CC} \leq 200\mu A$
    - Normal mode:  $I_{CC} \leq 3.5mA$
- EMI enhancement:
  - Programmable interface driving capability
  - Integrated 4-phase-shifting schemes
- Display quality improvement:
  - Minimum brightness update latency
  - Programmable black insertion
  - Variable refresh rate (VRR) without flickering
- Diagnostics:
  - LED open / short detection for each zone
  - Device thermal shutdown detection
  - Report interface option:
    - UART and interrupt pin (INT)
    - Two-wire output: CLK\_O and SOUT

## 2 Applications

- LCD local dimming backlight:
  - TV
  - Monitor
  - Notebook
  - Tablet

## 3 Description

TLC696x2/4/8 devices are a family of LCD local dimming back-light driver compatible with TLC696x0 which is a scan MOSFET controller to achieve 2/4/8 time-multiplexing control. Each device integrates 16 constant current sinks with corresponding size of SRAM for brightness storage. The device connects to each other by two-wire serial interface in daisy chain topology and supports up to 1024 devices for more than 32,000 local dimming zones.

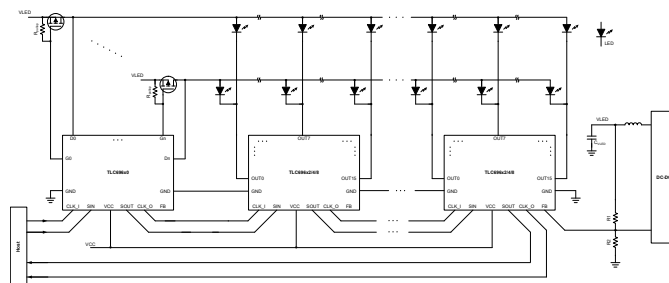
To optimize system efficiency, the device equips with adaptive headroom voltage control scheme to directly control DC/DC. Only the FB pin from last device in serial chain should be connected to DC/DC to achieve simplified system layout. The device also integrates minimum brightness update latency, black insertion and VRR features to improve display quality.

TLC696x2/4/8 has three error flags: LED open detection (LOD), LED short detection (LSD) and thermal shutdown detection (TSD) for diagnostic. The device implements two options for readback including UART/INT and SOUT/CLK\_O which is programmable by register.

### Device Information

PART NUMBER	PACKAGE <sup>(1)</sup>	BODY SIZE (NOM)
TLC696x2/4/8	DSBGA (24)	1.58mm × 2.43mm
	WQFN (24)	4mm × 4mm

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



Simplified Schematic



## Table of Contents

<b>1 Features</b> .....	1	4.3 Trademarks.....	3
<b>2 Applications</b> .....	1	4.4 Electrostatic Discharge Caution.....	3
<b>3 Description</b> .....	1	4.5 Glossary.....	3
<b>4 Device and Documentation Support</b> .....	3	<b>5 Revision History</b> .....	3
4.1 Receiving Notification of Documentation Updates.....	3	<b>6 Mechanical, Packaging, and Orderable Information</b> ....	4
4.2 Support Resources.....	3		

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## 4 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.

### 4.1 Receiving Notification of Documentation Updates

To receive notification of documentation updates, navigate to the device product folder on [ti.com](https://www.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.

### 4.2 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](#).

### 4.3 Trademarks

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

### 4.4 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.

### 4.5 Glossary

[TI Glossary](#) This glossary lists and explains terms, acronyms, and definitions.

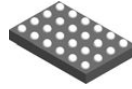
## 5 Revision History

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

DATE	REVISION	NOTES
April 2023	*	Initial Release

## 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.

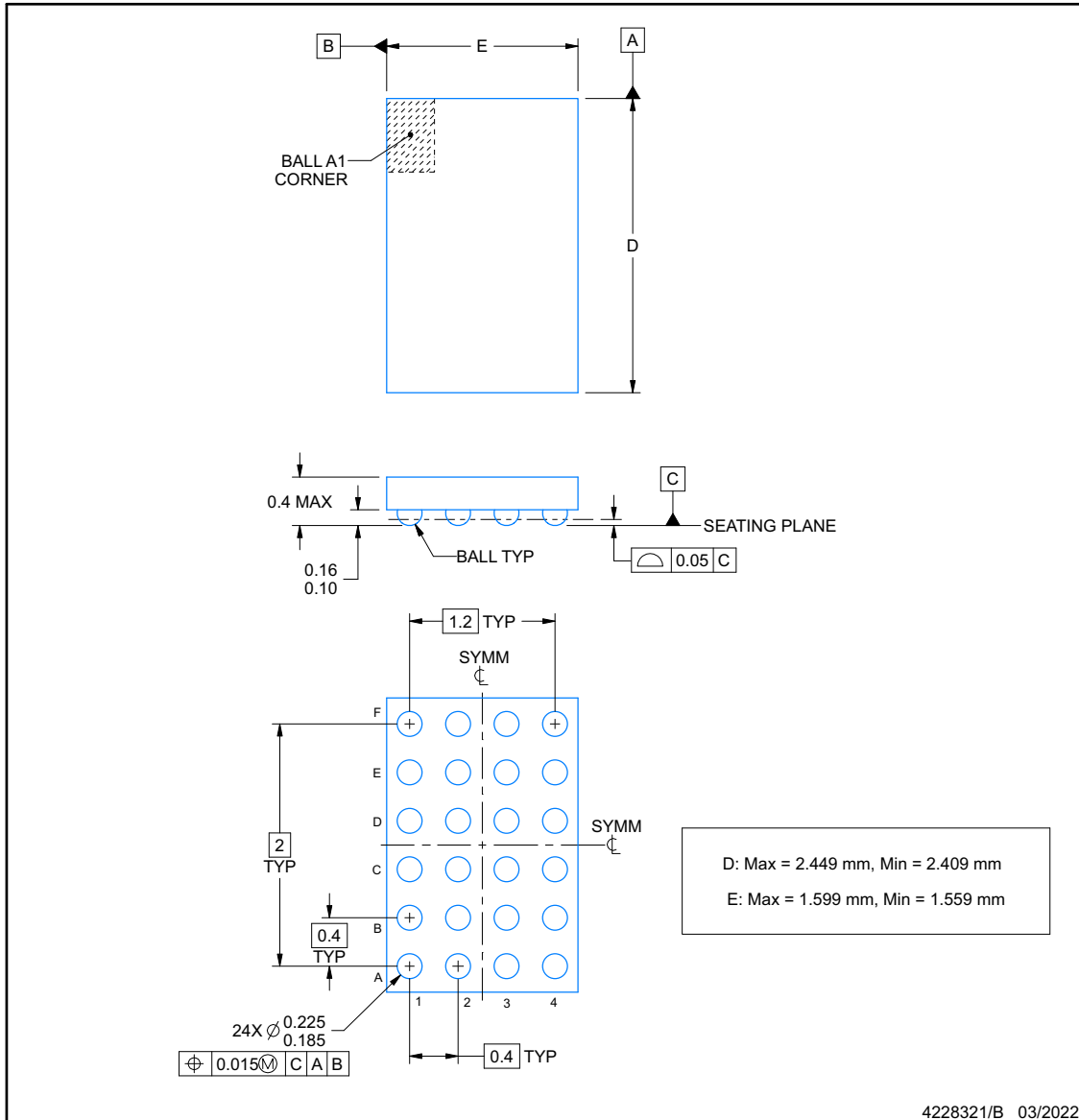


# PACKAGE OUTLINE

**YBH0024-C01**

**DSBGA - 0.4 mm max height**

DIE SIZE BALL GRID ARRAY



**NOTES:**

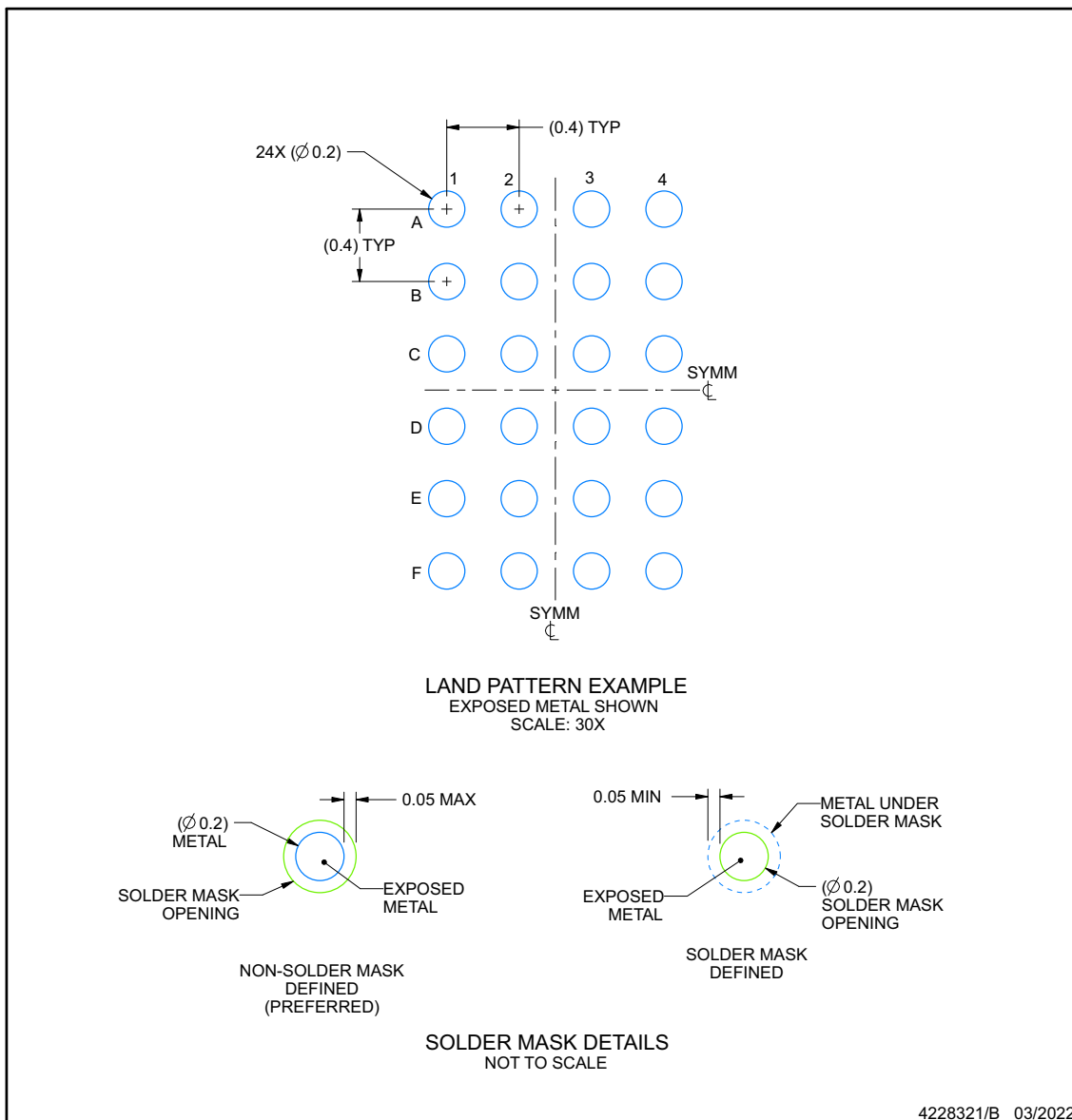
1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.

## EXAMPLE BOARD LAYOUT

**YBH0024-C01**

**DSBGA - 0.4 mm max height**

DIE SIZE BALL GRID ARRAY



NOTES: (continued)

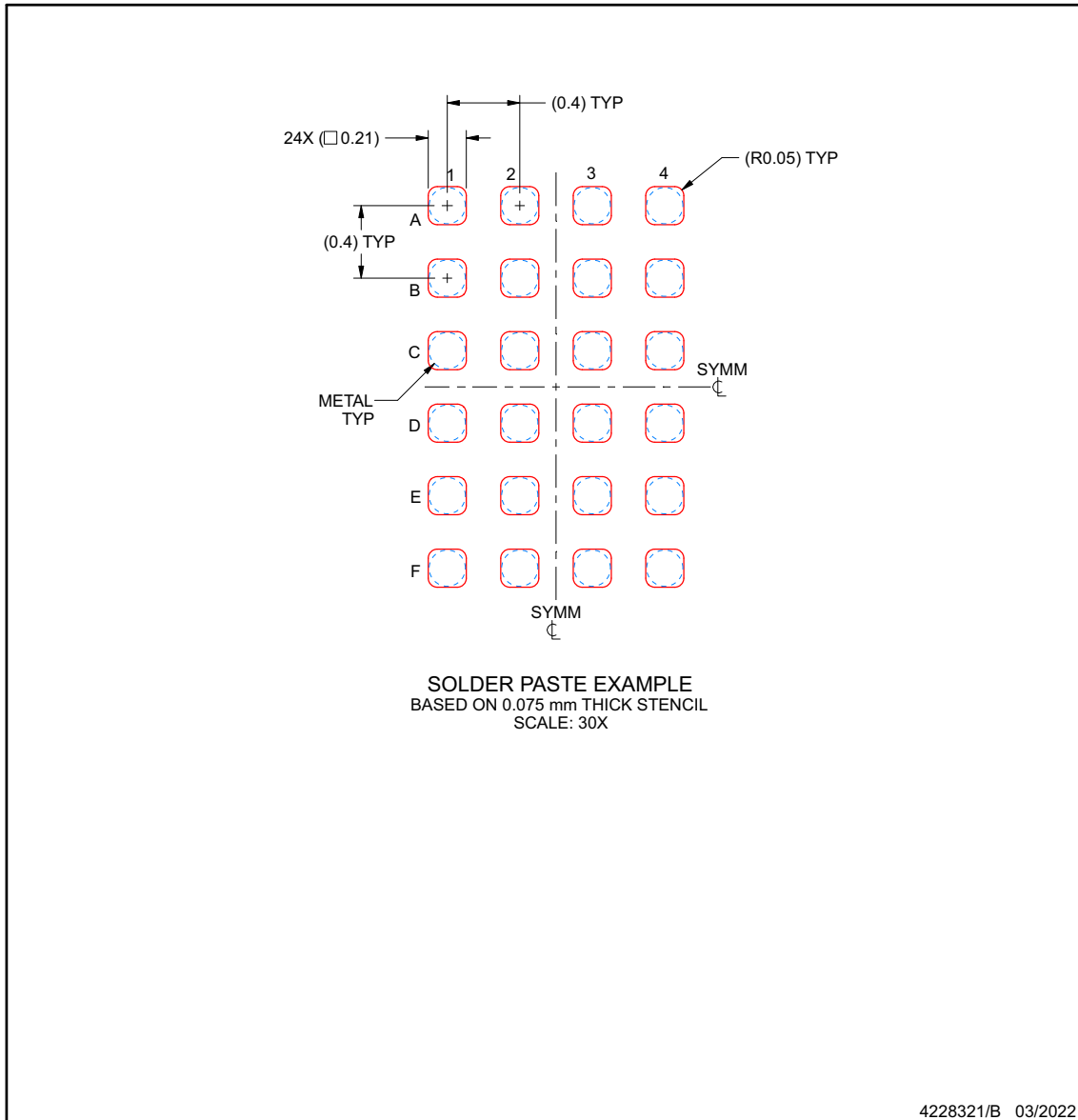
- Final dimensions may vary due to manufacturing tolerance considerations and also routing constraints. See Texas Instruments Literature No. SNVA009 ([www.ti.com/lit/snva009](http://www.ti.com/lit/snva009)).

## EXAMPLE STENCIL DESIGN

**YBH0024-C01**

**DSBGA - 0.4 mm max height**

DIE SIZE BALL GRID ARRAY



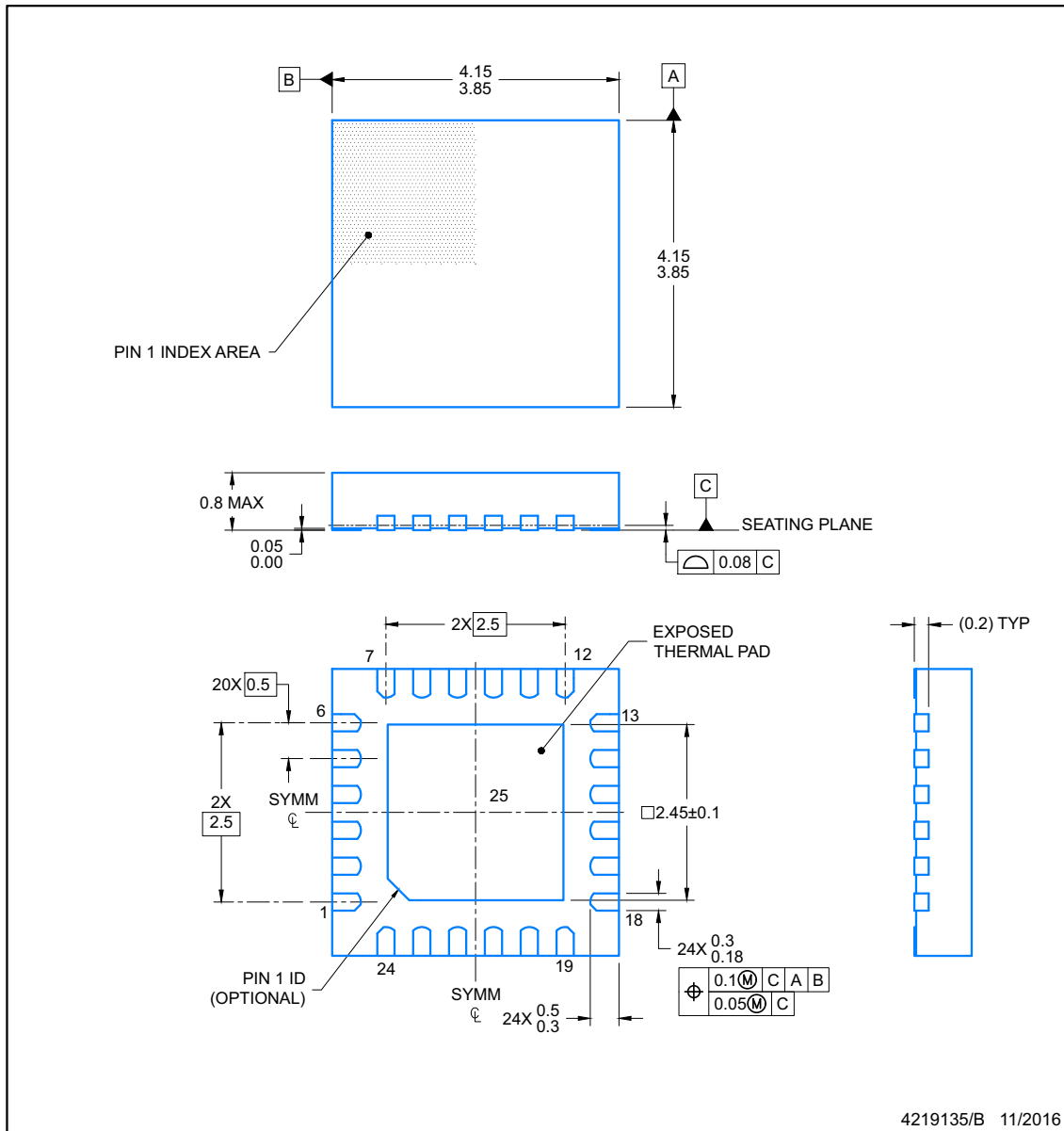
NOTES: (continued)

4. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release.

**RTW0024B**

**PACKAGE OUTLINE**  
**WQFN - 0.8 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.

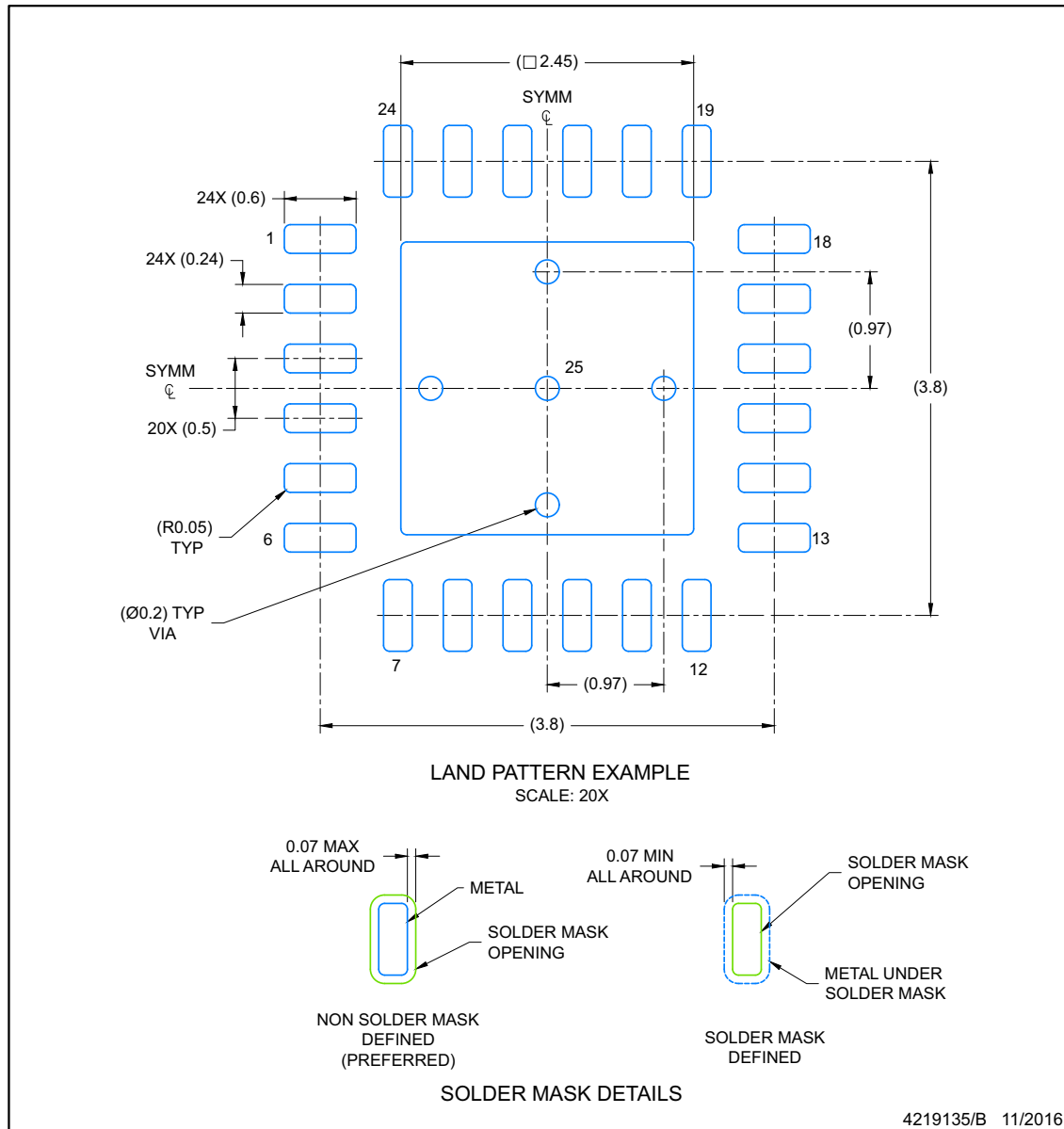


## EXAMPLE BOARD LAYOUT

**RTW0024B**

**WQFN - 0.8 mm max height**

PLASTIC QUAD FLATPACK-NO LEAD



NOTES: (continued)

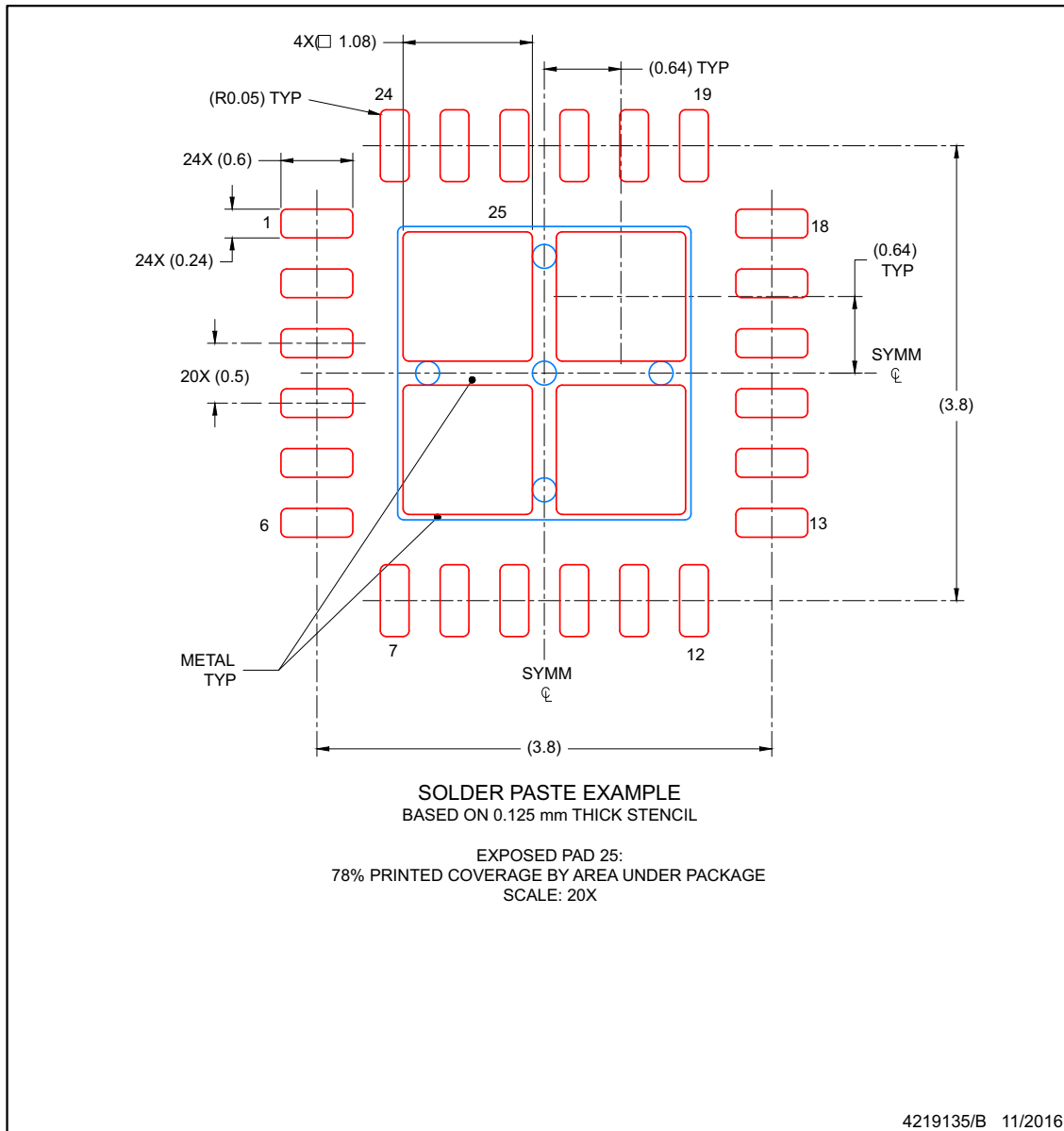
- For more information, see Texas Instruments literature number SLUA271 ([www.ti.com/lit/slua271](http://www.ti.com/lit/slua271)).

## EXAMPLE STENCIL DESIGN

**RTW0024B**

**WQFN - 0.8 mm max height**

PLASTIC QUAD FLATPACK-NO LEAD



NOTES: (continued)

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

**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)
<a href="#">TLC69602RTWR</a>	Active	Production	WQFN (RTW)   24	3000   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	69602
TLC69602RTWR.A	Active	Production	WQFN (RTW)   24	3000   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	69602
<a href="#">TLC69602YBHR</a>	Active	Production	DSBGA (YBH)   24	3000   LARGE T&R	Yes	SNAGCU	Level-1-260C-UNLIM	-40 to 85	TLC69602
TLC69602YBHR.A	Active	Production	DSBGA (YBH)   24	3000   LARGE T&R	Yes	SNAGCU	Level-1-260C-UNLIM	-40 to 85	TLC69602
<a href="#">TLC69604RTWR</a>	Active	Production	WQFN (RTW)   24	3000   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	69604
TLC69604RTWR.A	Active	Production	WQFN (RTW)   24	3000   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	69604
<a href="#">TLC69604YBHR</a>	Active	Production	DSBGA (YBH)   24	3000   LARGE T&R	Yes	SNAGCU	Level-1-260C-UNLIM	-40 to 85	TLC69604
TLC69604YBHR.A	Active	Production	DSBGA (YBH)   24	3000   LARGE T&R	Yes	SNAGCU	Level-1-260C-UNLIM	-40 to 85	TLC69604
<a href="#">TLC69608RTWR</a>	Active	Production	WQFN (RTW)   24	3000   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	69608
TLC69608RTWR.A	Active	Production	WQFN (RTW)   24	3000   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	69608
<a href="#">TLC69608YBHR</a>	Active	Production	DSBGA (YBH)   24	3000   LARGE T&R	Yes	SNAGCU	Level-1-260C-UNLIM	-40 to 85	TLC69608
TLC69608YBHR.A	Active	Production	DSBGA (YBH)   24	3000   LARGE T&R	Yes	SNAGCU	Level-1-260C-UNLIM	-40 to 85	TLC69608
<a href="#">TLC69612RTWR</a>	Active	Production	WQFN (RTW)   24	3000   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	69612
TLC69612RTWR.A	Active	Production	WQFN (RTW)   24	3000   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	69612
<a href="#">TLC69612YBHR</a>	Active	Production	DSBGA (YBH)   24	3000   LARGE T&R	Yes	SNAGCU	Level-1-260C-UNLIM	-40 to 85	TLC69612
TLC69612YBHR.A	Active	Production	DSBGA (YBH)   24	3000   LARGE T&R	Yes	SNAGCU	Level-1-260C-UNLIM	-40 to 85	TLC69612
<a href="#">TLC69614RTWR</a>	Active	Production	WQFN (RTW)   24	3000   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	69614
TLC69614RTWR.A	Active	Production	WQFN (RTW)   24	3000   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	69614
<a href="#">TLC69614YBHR</a>	Active	Production	DSBGA (YBH)   24	3000   LARGE T&R	Yes	SNAGCU	Level-1-260C-UNLIM	-40 to 85	TLC69614
TLC69614YBHR.A	Active	Production	DSBGA (YBH)   24	3000   LARGE T&R	Yes	SNAGCU	Level-1-260C-UNLIM	-40 to 85	TLC69614
<a href="#">TLC69618RTWR</a>	Active	Production	WQFN (RTW)   24	3000   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	69618
TLC69618RTWR.A	Active	Production	WQFN (RTW)   24	3000   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	69618
<a href="#">TLC69618YBHR</a>	Active	Production	DSBGA (YBH)   24	3000   LARGE T&R	Yes	SNAGCU	Level-1-260C-UNLIM	-40 to 85	TLC69618
TLC69618YBHR.A	Active	Production	DSBGA (YBH)   24	3000   LARGE T&R	Yes	SNAGCU	Level-1-260C-UNLIM	-40 to 85	TLC69618
<a href="#">TLC69652RTWR</a>	Active	Production	WQFN (RTW)   24	3000   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	69652
TLC69652RTWR.A	Active	Production	WQFN (RTW)   24	3000   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	69652
<a href="#">TLC69652YBHR</a>	Active	Production	DSBGA (YBH)   24	3000   LARGE T&R	Yes	SNAGCU	Level-1-260C-UNLIM	-40 to 85	TLC69652
TLC69652YBHR.A	Active	Production	DSBGA (YBH)   24	3000   LARGE T&R	Yes	SNAGCU	Level-1-260C-UNLIM	-40 to 85	TLC69652
<a href="#">TLC69654RTWR</a>	Active	Production	WQFN (RTW)   24	3000   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	69654

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)
TLC69654RTWR.A	Active	Production	WQFN (RTW)   24	3000   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	69654
<a href="#">TLC69654YBHR</a>	Active	Production	DSBGA (YBH)   24	3000   LARGE T&R	Yes	SNAGCU	Level-1-260C-UNLIM	-40 to 85	TLC69654
TLC69654YBHR.A	Active	Production	DSBGA (YBH)   24	3000   LARGE T&R	Yes	SNAGCU	Level-1-260C-UNLIM	-40 to 85	TLC69654
<a href="#">TLC69658RTWR</a>	Active	Production	WQFN (RTW)   24	3000   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	69658
TLC69658RTWR.A	Active	Production	WQFN (RTW)   24	3000   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	69658
<a href="#">TLC69658YBHR</a>	Active	Production	DSBGA (YBH)   24	3000   LARGE T&R	Yes	SNAGCU	Level-1-260C-UNLIM	-40 to 85	TLC69658
TLC69658YBHR.A	Active	Production	DSBGA (YBH)   24	3000   LARGE T&R	Yes	SNAGCU	Level-1-260C-UNLIM	-40 to 85	TLC69658
<a href="#">TLC69662RTWR</a>	Active	Production	WQFN (RTW)   24	3000   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	69662
TLC69662RTWR.A	Active	Production	WQFN (RTW)   24	3000   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	69662
<a href="#">TLC69662YBHR</a>	Active	Production	DSBGA (YBH)   24	3000   LARGE T&R	Yes	SNAGCU	Level-1-260C-UNLIM	-40 to 85	TLC69662
TLC69662YBHR.A	Active	Production	DSBGA (YBH)   24	3000   LARGE T&R	Yes	SNAGCU	Level-1-260C-UNLIM	-40 to 85	TLC69662
<a href="#">TLC69664RTWR</a>	Active	Production	WQFN (RTW)   24	3000   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	69664
TLC69664RTWR.A	Active	Production	WQFN (RTW)   24	3000   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	69664
<a href="#">TLC69664YBHR</a>	Active	Production	DSBGA (YBH)   24	3000   LARGE T&R	Yes	SNAGCU	Level-1-260C-UNLIM	-40 to 85	TLC69664
TLC69664YBHR.A	Active	Production	DSBGA (YBH)   24	3000   LARGE T&R	Yes	SNAGCU	Level-1-260C-UNLIM	-40 to 85	TLC69664
<a href="#">TLC69668RTWR</a>	Active	Production	WQFN (RTW)   24	3000   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	69668
TLC69668RTWR.A	Active	Production	WQFN (RTW)   24	3000   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	69668
<a href="#">TLC69668YBHR</a>	Active	Production	DSBGA (YBH)   24	3000   LARGE T&R	Yes	SNAGCU	Level-1-260C-UNLIM	-40 to 85	TLC69668
TLC69668YBHR.A	Active	Production	DSBGA (YBH)   24	3000   LARGE T&R	Yes	SNAGCU	Level-1-260C-UNLIM	-40 to 85	TLC69668

(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.

**OTHER QUALIFIED VERSIONS OF TLC69602, TLC69604, TLC69608, TLC69612, TLC69614, TLC69618, TLC69652, TLC69654, TLC69658, TLC69662, TLC69664, TLC69668 :**

- Automotive : [TLC69602-Q1](#), [TLC69604-Q1](#), [TLC69608-Q1](#), [TLC69612-Q1](#), [TLC69614-Q1](#), [TLC69618-Q1](#), [TLC69652-Q1](#), [TLC69654-Q1](#), [TLC69658-Q1](#), [TLC69662-Q1](#), [TLC69664-Q1](#), [TLC69668-Q1](#)

NOTE: Qualified Version Definitions:

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

**TAPE AND REEL INFORMATION**

**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
TLC69602RTWR	WQFN	RTW	24	3000	330.0	12.4	4.25	4.25	1.15	8.0	12.0	Q2
TLC69602YBHR	DSBGA	YBH	24	3000	180.0	8.4	1.74	2.6	0.55	4.0	8.0	Q1
TLC69604RTWR	WQFN	RTW	24	3000	330.0	12.4	4.25	4.25	1.15	8.0	12.0	Q2
TLC69604YBHR	DSBGA	YBH	24	3000	180.0	8.4	1.74	2.6	0.55	4.0	8.0	Q1
TLC69608RTWR	WQFN	RTW	24	3000	330.0	12.4	4.25	4.25	1.15	8.0	12.0	Q2
TLC69608YBHR	DSBGA	YBH	24	3000	180.0	8.4	1.74	2.6	0.55	4.0	8.0	Q1
TLC69612RTWR	WQFN	RTW	24	3000	330.0	12.4	4.25	4.25	1.15	8.0	12.0	Q2
TLC69612YBHR	DSBGA	YBH	24	3000	180.0	8.4	1.74	2.6	0.55	4.0	8.0	Q1
TLC69614RTWR	WQFN	RTW	24	3000	330.0	12.4	4.25	4.25	1.15	8.0	12.0	Q2
TLC69614YBHR	DSBGA	YBH	24	3000	180.0	8.4	1.74	2.6	0.55	4.0	8.0	Q1
TLC69618RTWR	WQFN	RTW	24	3000	330.0	12.4	4.25	4.25	1.15	8.0	12.0	Q2
TLC69618YBHR	DSBGA	YBH	24	3000	180.0	8.4	1.74	2.6	0.55	4.0	8.0	Q1
TLC69652RTWR	WQFN	RTW	24	3000	330.0	12.4	4.25	4.25	1.15	8.0	12.0	Q2
TLC69652YBHR	DSBGA	YBH	24	3000	180.0	8.4	1.74	2.6	0.55	4.0	8.0	Q1
TLC69654RTWR	WQFN	RTW	24	3000	330.0	12.4	4.25	4.25	1.15	8.0	12.0	Q2
TLC69654YBHR	DSBGA	YBH	24	3000	180.0	8.4	1.74	2.6	0.55	4.0	8.0	Q1

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
TLC69658RTWR	WQFN	RTW	24	3000	330.0	12.4	4.25	4.25	1.15	8.0	12.0	Q2
TLC69658YBHR	DSBGA	YBH	24	3000	180.0	8.4	1.74	2.6	0.55	4.0	8.0	Q1
TLC69662RTWR	WQFN	RTW	24	3000	330.0	12.4	4.25	4.25	1.15	8.0	12.0	Q2
TLC69662YBHR	DSBGA	YBH	24	3000	180.0	8.4	1.74	2.6	0.55	4.0	8.0	Q1
TLC69664RTWR	WQFN	RTW	24	3000	330.0	12.4	4.25	4.25	1.15	8.0	12.0	Q2
TLC69664YBHR	DSBGA	YBH	24	3000	180.0	8.4	1.74	2.6	0.55	4.0	8.0	Q1
TLC69668RTWR	WQFN	RTW	24	3000	330.0	12.4	4.25	4.25	1.15	8.0	12.0	Q2
TLC69668YBHR	DSBGA	YBH	24	3000	180.0	8.4	1.74	2.6	0.55	4.0	8.0	Q1

## TAPE AND REEL BOX DIMENSIONS



\*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
TLC69602RTWR	WQFN	RTW	24	3000	367.0	367.0	35.0
TLC69602YBHR	DSBGA	YBH	24	3000	182.0	182.0	20.0
TLC69604RTWR	WQFN	RTW	24	3000	367.0	367.0	35.0
TLC69604YBHR	DSBGA	YBH	24	3000	182.0	182.0	20.0
TLC69608RTWR	WQFN	RTW	24	3000	367.0	367.0	35.0
TLC69608YBHR	DSBGA	YBH	24	3000	182.0	182.0	20.0
TLC69612RTWR	WQFN	RTW	24	3000	367.0	367.0	35.0
TLC69612YBHR	DSBGA	YBH	24	3000	182.0	182.0	20.0
TLC69614RTWR	WQFN	RTW	24	3000	367.0	367.0	35.0
TLC69614YBHR	DSBGA	YBH	24	3000	182.0	182.0	20.0
TLC69618RTWR	WQFN	RTW	24	3000	367.0	367.0	35.0
TLC69618YBHR	DSBGA	YBH	24	3000	182.0	182.0	20.0
TLC69652RTWR	WQFN	RTW	24	3000	367.0	367.0	35.0
TLC69652YBHR	DSBGA	YBH	24	3000	182.0	182.0	20.0
TLC69654RTWR	WQFN	RTW	24	3000	367.0	367.0	35.0
TLC69654YBHR	DSBGA	YBH	24	3000	182.0	182.0	20.0
TLC69658RTWR	WQFN	RTW	24	3000	367.0	367.0	35.0
TLC69658YBHR	DSBGA	YBH	24	3000	182.0	182.0	20.0



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<b>Device</b>	<b>Package Type</b>	<b>Package Drawing</b>	<b>Pins</b>	<b>SPQ</b>	<b>Length (mm)</b>	<b>Width (mm)</b>	<b>Height (mm)</b>
TLC69662RTWR	WQFN	RTW	24	3000	367.0	367.0	35.0
TLC69662YBHR	DSBGA	YBH	24	3000	182.0	182.0	20.0
TLC69664RTWR	WQFN	RTW	24	3000	367.0	367.0	35.0
TLC69664YBHR	DSBGA	YBH	24	3000	182.0	182.0	20.0
TLC69668RTWR	WQFN	RTW	24	3000	367.0	367.0	35.0
TLC69668YBHR	DSBGA	YBH	24	3000	182.0	182.0	20.0

## GENERIC PACKAGE VIEW

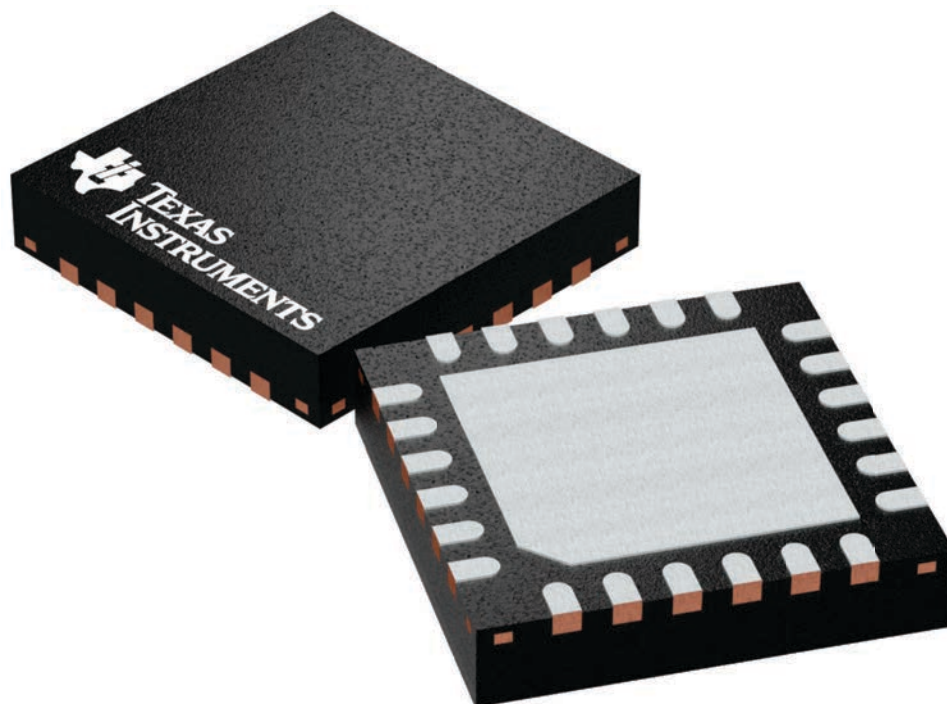
**RTW 24**

**WQFN - 0.8 mm max height**

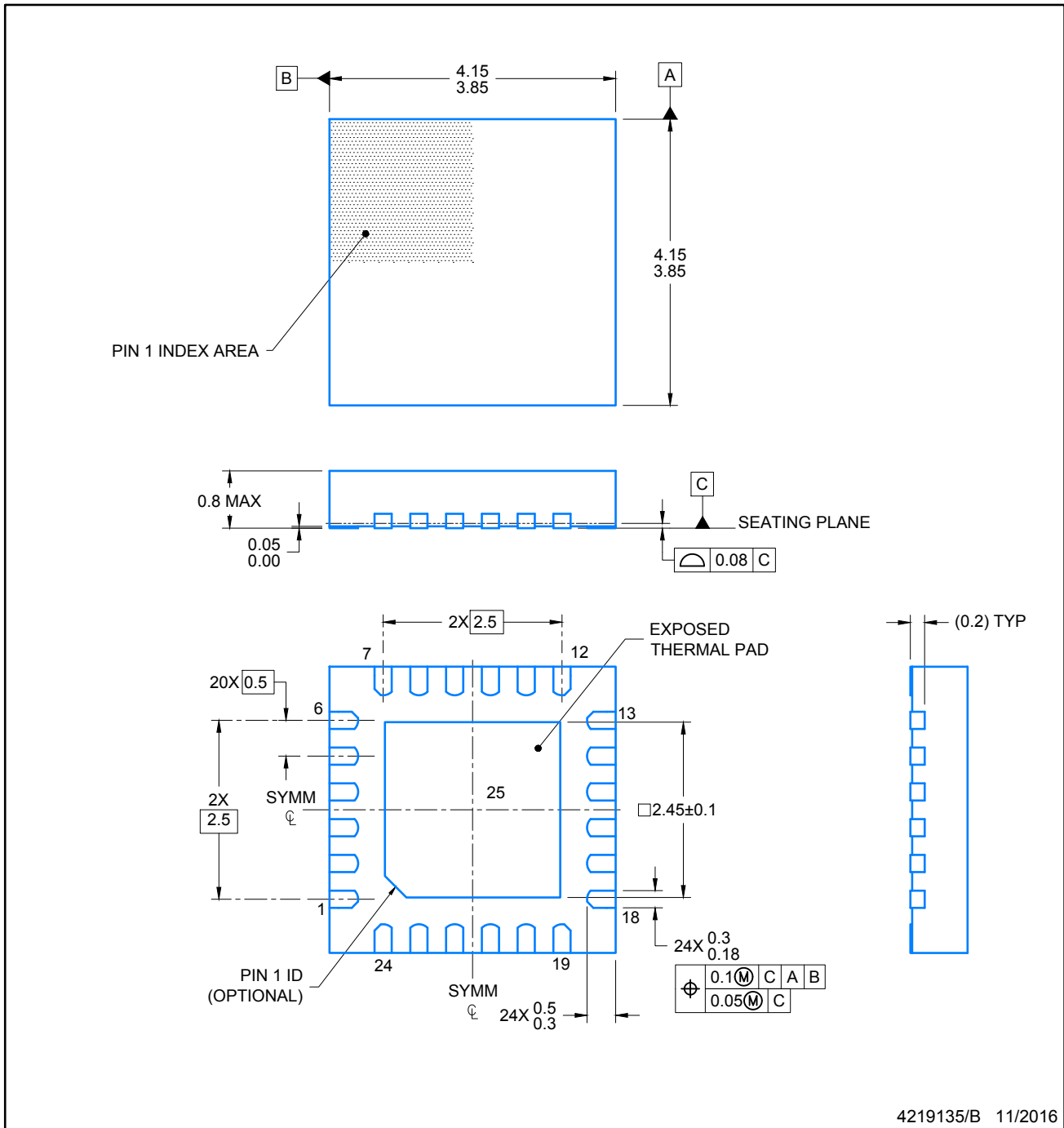
4 x 4, 0.5 mm pitch

PLASTIC QUAD FLATPACK - NO LEAD

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

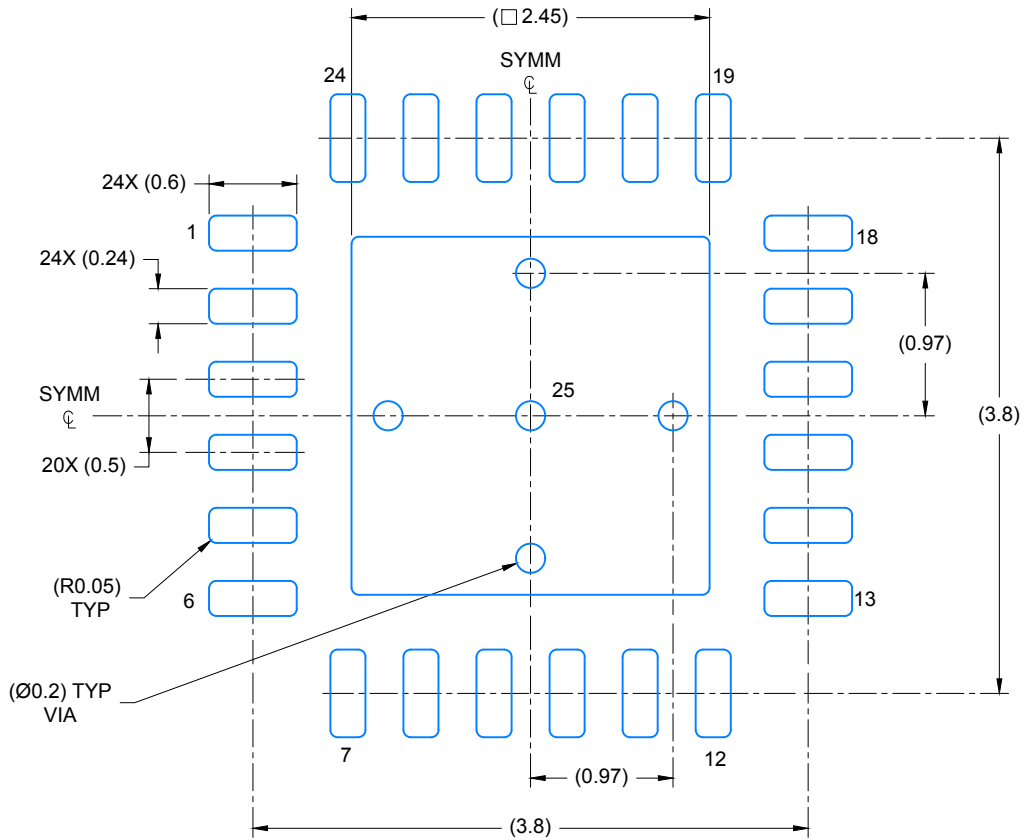


4224801/A

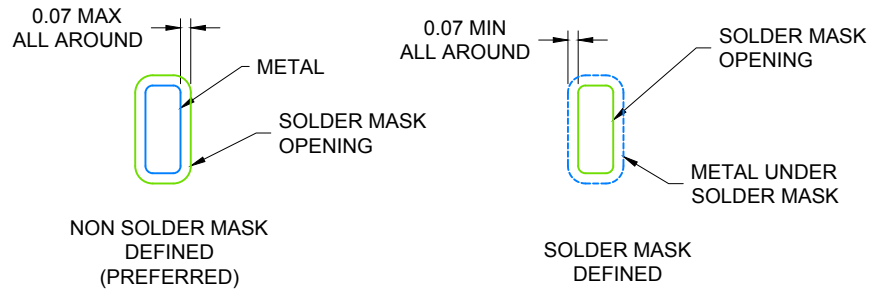


NOTES:

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.



LAND PATTERN EXAMPLE  
SCALE: 20X

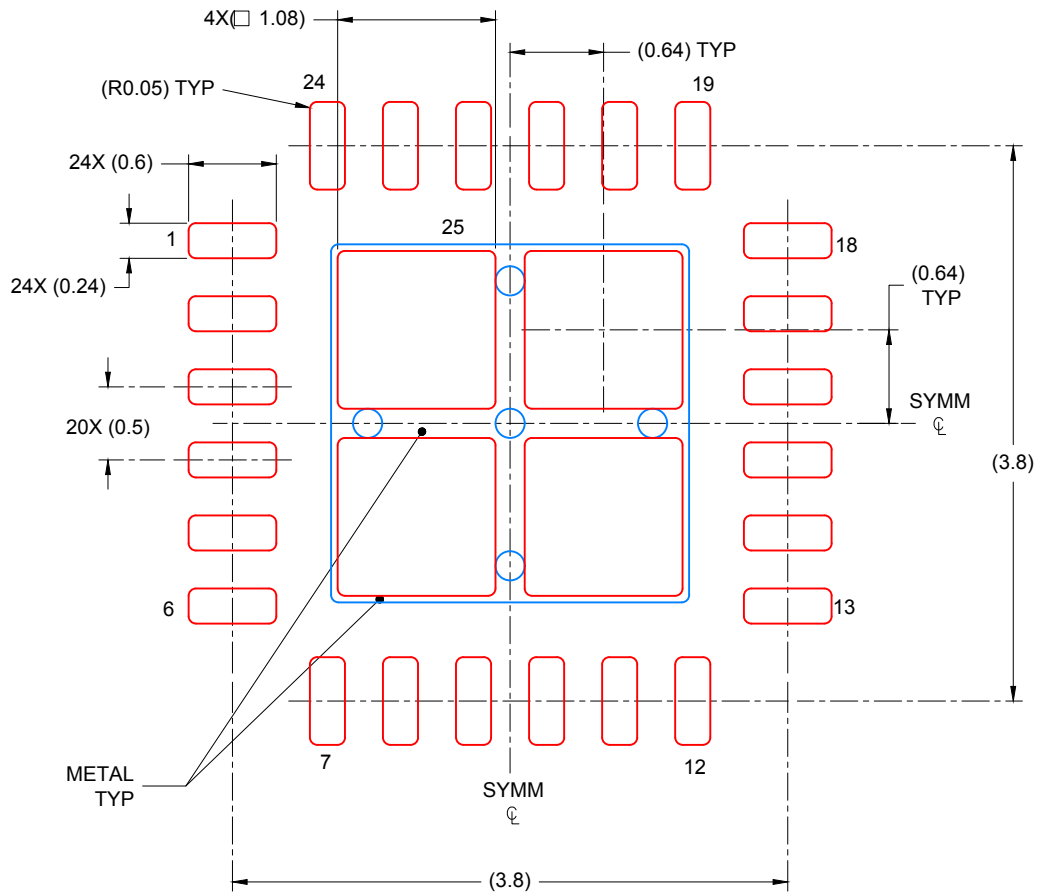


SOLDER MASK DETAILS

4219135/B 11/2016

NOTES: (continued)

- For more information, see Texas Instruments literature number SLUA271 ([www.ti.com/lit/sluea271](http://www.ti.com/lit/sluea271)).



SOLDER PASTE EXAMPLE  
 BASED ON 0.125 mm THICK STENCIL

EXPOSED PAD 25:  
 78% PRINTED COVERAGE BY AREA UNDER PACKAGE  
 SCALE: 20X

4219135/B 11/2016

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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