

SNx4AC244 Octal Buffers or Drivers with 3-State Outputs

1 Features

- Operation of 2V to 6V V_{CC}
- Inputs accept voltages to 6V
- Max t_{pd} of 7.5ns at 5V

2 Applications

- Servers and network switches
- LED displays
- Telecom infrastructure
- Motor-drive control boards

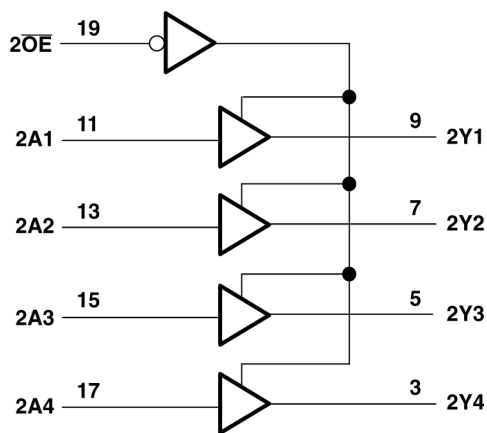
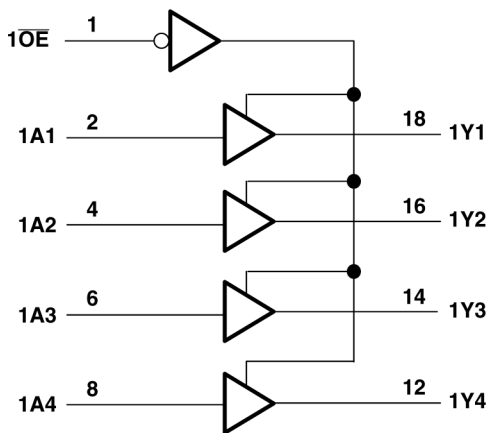
3 Description

These octal buffers and line drivers are designed specifically to improve the performance and density of 3-state memory address drivers, clock drivers, and bus-oriented receivers and transmitters.

Device Information

| PART NUMBER | PACKAGE ⁽¹⁾ | PACKAGE SIZE ⁽²⁾ | BODY SIZE ⁽³⁾ |
|-------------|------------------------|-----------------------------|--------------------------|
| SN74AC244 | DB (SSOP, 20) | 7.2mm × 7.8mm | 7.2mm × 5.3mm |
| | DGS (VSSOP, 20) | 5.1mm × 4.9mm | 5.1mm × 3mm |
| | DW (SOIC, 20) | 12.8mm × 10.3mm | 12.8mm × 7.5mm |
| | N (PDIP, 20) | 24.33mm × 9.4mm | 24.33mm × 6.35mm |
| | NS (SOP, 20) | 12.6mm × 7.8mm | 12.6mm × 5.3mm |
| | PW (TSSOP, 20) | 6.5mm × 4.4mm | 6.5mm × 4.4mm |
| | RKS (VQFN, 20) | 4.5mm × 2.5mm | 4.5mm × 2.5mm |
| SN54AC244 | J (CDIP, 20) | 24.2mm × 7.62mm | 24.2mm × 6.92mm |
| | W (CFP, 20) | 13.09mm × 8.13mm | 13.09mm × 6.92mm |
| | FK (LCCC, 20) | 8.89mm × 8.89mm | 8.89mm × 8.89mm |

- (1) For more information, see [Section 11](#).
- (2) The package size (length × width) is a nominal value and includes pins, where applicable.
- (3) The body size (length × width) is a nominal value and does not include pins.



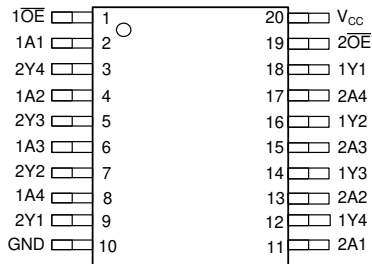
Logic Diagram (Positive Logic)



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4 Pin Configuration and Functions



**Figure 4-1. SN54AC244 J or W Package;
SN74AC244 DB, DGS, DW, N, NS, or PW Package
(Top View)**

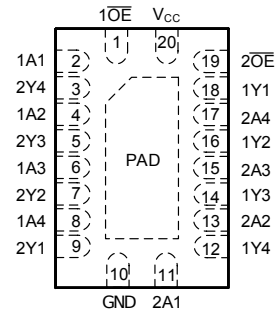


Figure 4-2. SN74AC244 RKS Package (Top View)

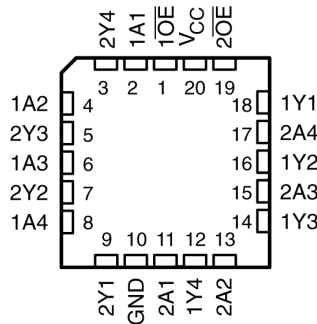


Figure 4-3. SN54AC244 FK Package (Top View)

Table 4-1. Pin Functions

| PIN | | TYPE ⁽¹⁾ | DESCRIPTION |
|----------------------------|-----|---------------------|---|
| NAME | NO. | | |
| 1A1 | 2 | I | Input |
| 1A2 | 4 | I | Input |
| 1A3 | 6 | I | Input |
| 1A4 | 8 | I | Input |
| 1OE | 1 | I | Output enable |
| 1Y1 | 18 | O | Output |
| 1Y2 | 16 | O | Output |
| 1Y3 | 14 | O | Output |
| 1Y4 | 12 | O | Output |
| 2A1 | 11 | I | Input |
| 2A2 | 13 | I | Input |
| 2A3 | 15 | I | Input |
| 2A4 | 17 | I | Input |
| 2OE | 19 | I | Output enable |
| 2Y1 | 9 | O | Output |
| 2Y2 | 7 | O | Output |
| 2Y3 | 5 | O | Output |
| 2Y4 | 3 | O | Output |
| GND | 10 | — | Ground |
| V _{CC} | 20 | — | Power pin |
| Thermal Pad ⁽²⁾ | | — | The thermal pad can be connected to GND or left floating. Do not connect to any other signal or supply. |

(1) Signal Types: I = Input, O = Output, I/O = Input or Output

(2) RKS package only

5 Specifications

5.1 Absolute Maximum Ratings

over operating free-air temperature range (unless otherwise noted) ⁽¹⁾

| | | MIN | MAX | UNIT |
|---|---------------------------|---|----------------------|------------|
| V _{CC} | Supply voltage range | -0.5 | 7 | V |
| V _I ¹ | Input voltage range | -0.5 | V _{CC} +0.5 | V |
| V _O ¹ | Output voltage range | -0.5 | V _{CC} +0.5 | V |
| I _{IK} | Input clamp current | (V _I < 0 or V _I > V _{CC}) | | ±20 mA |
| I _{OK} | Output clamp current, | (V _O < 0 or V _O > V _{CC}) | | ±20 mA |
| I _O | Continuous output current | (V _O = 0 or V _{CC}) | | ±50 mA |
| Continuous current through V _{CC} or GND | | | | ±200 mA |
| T _{stg} | Storage temperature range | -65 | 150 | °C |

- (1) Stresses beyond those listed under *Absolute Maximum Ratings* may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under *Recommended Operating Conditions* is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.
- (2) The input and output voltage ratings may be exceeded if the input and output current ratings are observed.

5.2 Recommended Operating Conditions

over recommended operating free-air temperature range (unless otherwise noted)¹

| | | SN54AC244 | | SN74AC244 | | UNIT |
|-----------------|------------------------------------|-------------------------|-----------------|-----------|-----------------|------|
| | | MIN | MAX | MIN | MAX | |
| V _{CC} | Supply voltage | 2 | 6 | 2 | 6 | V |
| V _{IH} | High-level input voltage | V _{CC} = 3 V | 2.1 | 2.1 | | V |
| | | V _{CC} = 4.5 V | 3.15 | 3.15 | | |
| | | V _{CC} = 5.5 V | 3.85 | 3.85 | | |
| V _{IL} | Low-level input voltage | V _{CC} = 3 V | 0.9 | | 0.9 | V |
| | | V _{CC} = 4.5 V | 1.35 | | 1.35 | |
| | | V _{CC} = 5.5 V | 1.65 | | 1.65 | |
| V _I | Input voltage | 0 | V _{CC} | 0 | V _{CC} | V |
| V _O | Output voltage | 0 | V _{CC} | 0 | V _{CC} | V |
| I _{OH} | High-level output current | V _{CC} = 3 V | -12 | | -12 | mA |
| | | V _{CC} = 4.5 V | -24 | | -24 | |
| | | V _{CC} = 5.5 V | -24 | | -24 | |
| I _{OL} | Low-level output current | V _{CC} = 3 V | 12 | | 12 | mA |
| | | V _{CC} = 4.5 V | 24 | | 24 | |
| | | V _{CC} = 5.5 V | 24 | | 24 | |
| Δt/Δv | Input transition rise or fall rate | 8 | | 8 | | ns/V |
| T _a | Operating free-air temperature | -55 | 125 | -40 | 85 | °C |

- (1) All unused inputs of the device must be held at V_{CC} or GND for proper device operation. Refer to the TI application report, *Implications of Slow or Floating CMOS Inputs*, literature number SCBA004.

5.3 Thermal Information

| THERMAL METRIC ⁽¹⁾ | | SNx4AC244 | | | | | | | UNIT |
|-------------------------------|--|--------------|----------------|--------------|-------------|-------------|---------------|---------------|------|
| | | DB (SSOP) | DGS (VSSOP) | DW (SOIC) | N (PDIP) | NS (SOP) | PW (TSSOP) | RKS (VQFN) | |
| | | 20 PINS | | | | | | | |
| R _{θJA} | Junction-to-ambient thermal resistance | 70 | 123.5 | 101.2 | 69 | 106.2 | 126.2 | 67.7 | °C/W |

(1) For more information about traditional and new thermal metrics, see the *Semiconductor and IC Package Thermal Metrics* application report, [SPRA953](#).

5.4 Electrical Characteristics

over recommended operating free-air temperature range (unless otherwise noted)

| PARAMETER | TEST CONDITIONS | V _{CC} | T _A = 25°C | | | SN54AC244 | | SN74AC244 | | UNIT | |
|---|---|---|-----------------------|-------|------|-----------|------|-----------|------|------|----|
| | | | MIN | TYP | MAX | MIN | MAX | MIN | MAX | | |
| V _{OH} | I _{OH} = -50 μA | 3 V | 2.9 | | | 2.9 | | 2.9 | | V | |
| | | 4.5 V | 4.4 | | | 4.4 | | 4.4 | | | |
| | | 5.5 V | 5.4 | | | 5.4 | | 5.4 | | | |
| | I _{OH} = -12 mA | 3 V | 2.56 | | | 2.4 | | 2.46 | | | |
| | | 4.5 V | 3.86 | | | 3.7 | | 3.76 | | | |
| | I _{OH} = -24 mA | 4.5 V | 3.86 | | | 3.7 | | 3.76 | | | |
| | | 5.5 V | 4.86 | | | 4.7 | | 4.76 | | | |
| I _{OH} = -50 mA ⁽¹⁾ | 5.5 V | | | | 3.85 | | | | | | |
| I _{OH} = -75 mA ⁽¹⁾ | 5.5 V | | | | | | 3.85 | | | | |
| V _{OL} | I _{OL} = 50 μA | 3 V | 0.1 | | | 0.1 | | 0.1 | | V | |
| | | 4.5 V | 0.1 | | | 0.1 | | 0.1 | | | |
| | | 5.5 V | 0.1 | | | 0.1 | | 0.1 | | | |
| | I _{OL} = 12 mA | 3 V | 0.36 | | | 0.5 | | 0.44 | | | |
| | | 4.5 V | 0.36 | | | 0.5 | | 0.44 | | | |
| | I _{OL} = 24 mA | 4.5 V | 0.36 | | | 0.5 | | 0.44 | | | |
| | | 5.5 V | 0.36 | | | 0.5 | | 0.44 | | | |
| I _{OL} = 50 mA ⁽¹⁾ | 5.5 V | | | | 1.65 | | | | | | |
| I _{OL} = 75 mA ⁽¹⁾ | 5.5 V | | | | | | 1.65 | | | | |
| I _I | Data inputs | V _I = V _{CC} or GND | ±0.1 | | | ±1 | | ±1 | | μA | |
| | Control inputs | V _I = V _{CC} or GND | ±0.1 | | | ±1 | | ±1 | | | |
| I _{oz} | V _O = V _{CC} or GND, V _I (OE) = V _{IL} or V _{IH} | | 5.5 V | ±0.25 | | | ±5 | | ±2.5 | | μA |
| I _{CC} | V _I = V _{CC} or GND, | I _O = 0 | 5.5 V | 4 | | | 80 | | 40 | | μA |
| C _i | V _I = V _{CC} or GND | | 5 V | 2.5 | | | | | | | pF |

(1) Not more than one output should be tested at a time, and the duration of the test should not exceed 10 ms.

5.5 Switching Characteristics, $V_{CC} = 3.3\text{ V} \pm 0.3\text{ V}$

over recommended operating free-air temperature range, $V_{CC} = 3.3\text{ V} \pm 0.3\text{ V}$ (unless otherwise noted) (see [Figure 6-1](#))

| PARAMETER | FROM (INPUT) | TO (OUTPUT) | $T_A = 25^\circ\text{C}$ | | | SN54AC244 | | SN74AC244 | | UNIT |
|-----------|-----------------|-------------|--------------------------|-----|------|-----------|------|-----------|------|------|
| | | | MIN | TYP | MAX | MIN | MAX | MIN | MAX | |
| t_{PLH} | A | Y | 2 | 6.5 | 9 | 1 | 12.5 | 1.5 | 10 | ns |
| t_{PHL} | | | 2 | 6.5 | 9 | 1 | 12 | 2 | 10 | |
| t_{PZH} | \overline{OE} | Y | 2 | 6 | 10.5 | 1 | 11.5 | 1.5 | 11 | ns |
| t_{PZL} | | | 2.5 | 7.5 | 10 | 1 | 13 | 2 | 11 | |
| t_{PHZ} | \overline{OE} | Y | 3 | 7 | 10 | 1 | 12.5 | 1.5 | 10.5 | ns |
| t_{PLZ} | | | 2.5 | 7.5 | 10.5 | 1 | 13 | 2.5 | 11.5 | |

5.6 Switching Characteristics, $V_{CC} = 5\text{ V} \pm 0.5\text{ V}$

over recommended operating free-air temperature range, $V_{CC} = 5\text{ V} \pm 0.5\text{ V}$ (unless otherwise noted) (see [Figure 6-1](#))

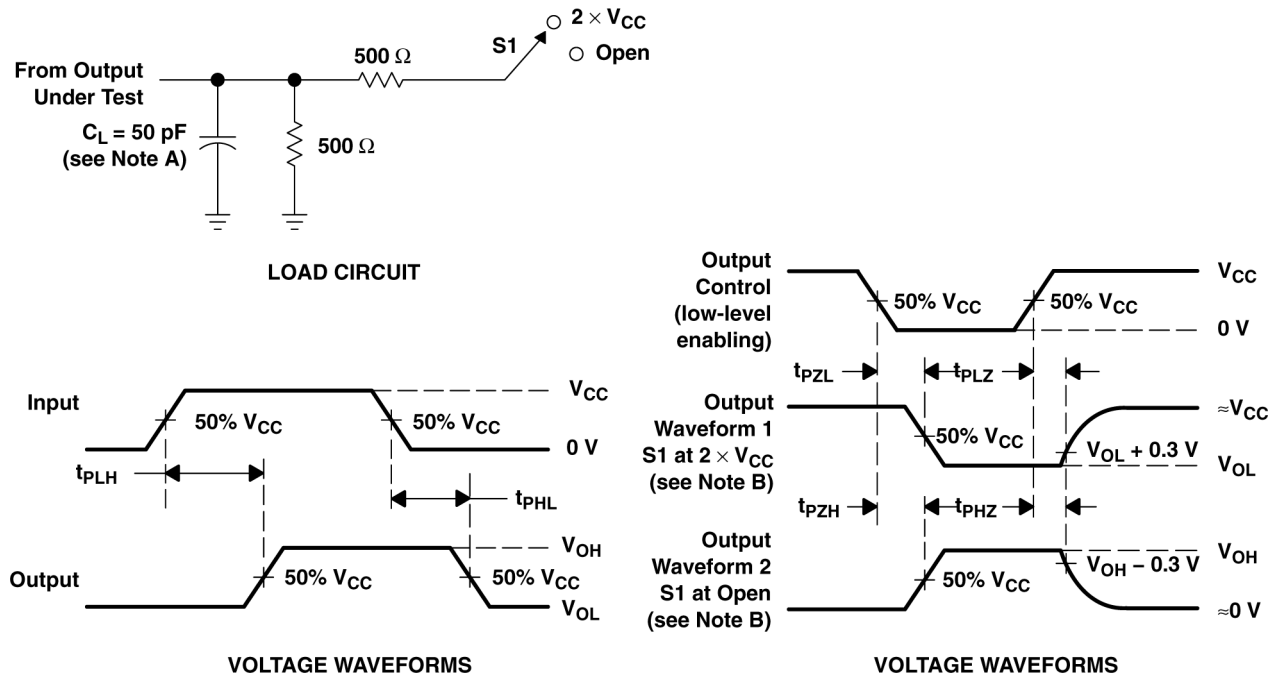
| PARAMETER | FROM (INPUT) | TO (OUTPUT) | $T_A = 25^\circ\text{C}$ | | | SN54AC244 | | SN74AC244 | | UNIT |
|-----------|-----------------|-------------|--------------------------|-----|-----|-----------|------|-----------|-----|------|
| | | | MIN | TYP | MAX | MIN | MAX | MIN | MAX | |
| t_{PLH} | A | Y | 1.5 | 5 | 7 | 7 | 9.5 | 1 | 7.5 | ns |
| t_{PHL} | | | 1.5 | 5 | 7 | 7 | 9 | 1 | 7.5 | |
| t_{PZH} | \overline{OE} | Y | 1.5 | 5 | 7 | 7 | 9 | 1.5 | 8 | ns |
| t_{PZL} | | | 1.5 | 5.5 | 8 | 8 | 10.5 | 1.5 | 8.5 | |
| t_{PHZ} | \overline{OE} | Y | 2.5 | 6.5 | 9 | 9 | 10.5 | 1 | 9.5 | ns |
| t_{PLZ} | | | 2 | 6.5 | 9 | 9 | 11 | 2 | 9.5 | |

5.7 Operating Characteristics

$V_{CC} = 5\text{ V}$, $T_A = 25^\circ\text{C}$

| PARAMETER | TEST CONDITIONS | TYP | UNIT |
|--|---|-----|------|
| C_{pd} Power dissipation capacitance per buffer/driver | $C_1 = 50\text{ pF}$, $f = 1\text{ MHz}$ | 45 | pF |

6 Parameter Measurement Information



- A. C_L includes probe and jig capacitance.
- B. Waveform 1 is for an output with internal conditions such that the output is low except when disabled by the output control. Waveform 2 is for an output with internal conditions such that the output is high except when disabled by the output control.
- C. All input pulses are supplied by generators having the following characteristics: $PRR \leq 1$ MHz, $Z_O = 50 \Omega$, $t_r \leq 2.5$ ns, $t_f \leq 2.5$ ns.
- D. The outputs are measured one at a time with one input transition per measurement.

Figure 6-1. Load Circuit and Voltage Waveforms

| TEST | S1 |
|-------------------|-------------------|
| t_{PLH}/t_{PHL} | Open |
| t_{PLZ}/t_{PZL} | $2 \times V_{CC}$ |
| t_{PHZ}/t_{PZH} | Open |

7 Detailed Description

7.1 Overview

The 'AC244 devices are organized as two 4-bit buffers or drivers with separate output-enable (\overline{OE}) inputs. When \overline{OE} is low, the device passes non-inverted data from the A inputs to the Y outputs. When \overline{OE} is high, the outputs are in the high-impedance state.

For the high-impedance state during power up or power down, \overline{OE} should be tied to V_{CC} through a pullup resistor; the minimum value of the resistor is determined by the current-sinking capability of the driver.

7.2 Functional Block Diagram

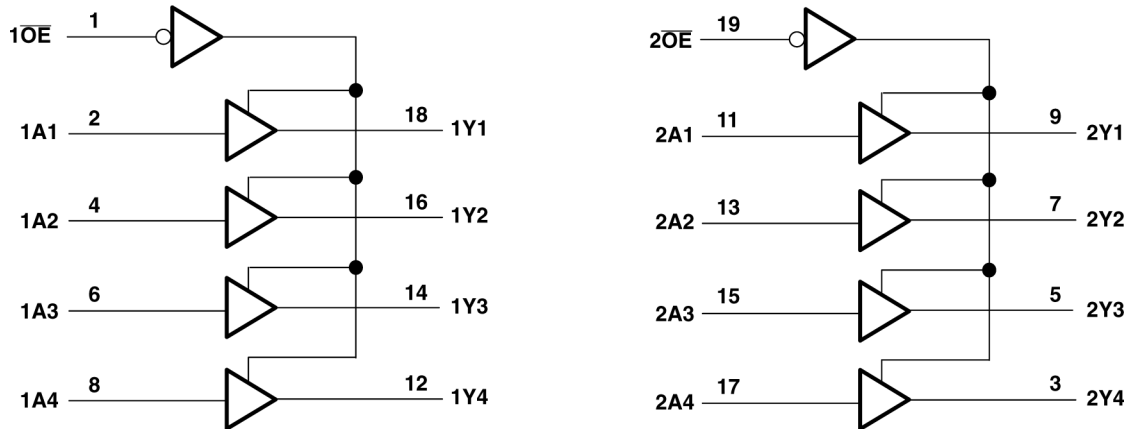


Figure 7-1. Logic Diagram (Positive Logic)

7.3 Device Functional Modes

Table 7-1. Function Table (Each Buffer)

| INPUTS | | OUTPUT |
|-----------------|---|--------|
| \overline{OE} | A | Y |
| L | H | H |
| L | L | L |
| H | X | Z |

8 Application and Implementation

Note

Information in the following applications sections is not part of the TI component specification, and TI does not warrant its accuracy or completeness. TI's customers are responsible for determining suitability of components for their purposes, as well as validating and testing their design implementation to confirm system functionality.

8.1 Power Supply Recommendations

The power supply can be any voltage between the minimum and maximum supply voltage rating located in the *Absolute Maximum Ratings* section. Each V_{CC} terminal must have a good bypass capacitor to prevent power disturbance. For devices with a single supply, TI recommends a 0.1- μF capacitor; if there are multiple V_{CC} terminals, then TI recommends a 0.01- μF or 0.022- μF capacitor for each power terminal. Multiple bypass capacitors can be paralleled to reject different frequencies of noise. Frequencies of 0.1 μF and 1 μF are commonly used in parallel. The bypass capacitor must be installed as close as possible to the power terminal for best results.

8.2 Layout

8.2.1 Layout Guidelines

Reflections and matching are closely related to the loop antenna theory but are different enough to be discussed separately from the theory. When a PCB trace turns a corner at a 90° angle, a reflection can occur. A reflection occurs primarily because of the change of width of the trace. At the apex of the turn, the trace width increases to 1.414 times the width. This increase upsets the transmission-line characteristics, especially the distributed capacitance and self-inductance of the trace, which results in the reflection. Not all PCB traces can be straight; therefore, some traces must turn corners. [Layout example for SNx4AC244](#) shows progressively better techniques of rounding corners. Only the last example (BEST) maintains constant trace width and minimizes reflections.

8.2.1.1 Layout Example

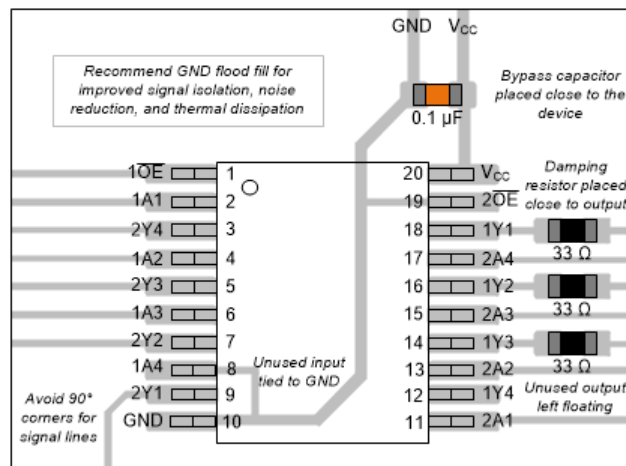


Figure 8-1. Layout Example for the SNx4AC244 in the PW Package

9 Device and Documentation Support

9.1 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.

9.2 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](#).

9.3 Trademarks

TI E2E™ is a trademark of Texas Instruments.

All trademarks are the property of their respective owners.

9.4 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.

9.5 Glossary

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

10 Revision History

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

| Changes from Revision G (August 2023) to Revision H (March 2024) | Page |
|--|------|
| • Added DGS package to <i>Device Information</i> table, <i>Pin Configuration and Functions</i> section and <i>Thermal Information</i> table; Updated J and W package sizes in <i>Device Information</i> table..... | 1 |
| • Updated RθJA values: DW = 58 to 101.2, NS = 60 to 106.2, PW = 83 to 126.2, all values in °C/W | 5 |
| • Added <i>Application and Implementation</i> section..... | 9 |

| Changes from Revision F (May 2023) to Revision G (August 2023) | Page |
|--|------|
| • Updated the <i>Device Information</i> table to include package lead size | 1 |
| • Added <i>RKS</i> package information | 1 |
| • Updated high-level input voltage values in <i>Recommended Operating Conditions</i> table | 4 |

11 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 finish/ Ball material (6) | MSL Peak Temp (3) | Op Temp (°C) | Device Marking (4/5) | Samples |
|------------------|---------------|--------------|-----------------|------|-------------|------------------|--------------------------------------|----------------------|--------------|------------------------------------|-------------------------|
| 5962-87552012A | ACTIVE | LCCC | FK | 20 | 55 | Non-RoHS & Green | SNPB | N / A for Pkg Type | -55 to 125 | 5962-87552012A SNJ54AC 244FK | Samples |
| 5962-8755201RA | ACTIVE | CDIP | J | 20 | 20 | Non-RoHS & Green | SNPB | N / A for Pkg Type | -55 to 125 | 5962-8755201RA SNJ54AC244J | Samples |
| 5962-8755201SA | ACTIVE | CFP | W | 20 | 25 | Non-RoHS & Green | SNPB | N / A for Pkg Type | -55 to 125 | 5962-8755201SA SNJ54AC244W | Samples |
| 5962-8755201VRA | ACTIVE | CDIP | J | 20 | 20 | Non-RoHS & Green | SNPB | N / A for Pkg Type | -55 to 125 | 5962-8755201VR A SNV54AC244J | Samples |
| 5962-8755201VSA | ACTIVE | CFP | W | 20 | 25 | Non-RoHS & Green | SNPB | N / A for Pkg Type | -55 to 125 | 5962-8755201VS A SNV54AC244W | Samples |
| SN74AC244DBR | ACTIVE | SSOP | DB | 20 | 2000 | RoHS & Green | NIPDAU | Level-1-260C-UNLIM | -40 to 85 | AC244 | Samples |
| SN74AC244DGSR | ACTIVE | VSSOP | DGS | 20 | 5000 | RoHS & Green | NIPDAU | Level-1-260C-UNLIM | | AC244 | Samples |
| SN74AC244DW | OBSOLETE | SOIC | DW | 20 | | TBD | Call TI | Call TI | -40 to 85 | AC244 | |
| SN74AC244DWR | ACTIVE | SOIC | DW | 20 | 2000 | RoHS & Green | NIPDAU | Level-1-260C-UNLIM | -40 to 85 | AC244 | Samples |
| SN74AC244N | ACTIVE | PDIP | N | 20 | 20 | RoHS & Non-Green | NIPDAU | N / A for Pkg Type | -40 to 85 | SN74AC244N | Samples |
| SN74AC244NE4 | ACTIVE | PDIP | N | 20 | 20 | RoHS & Non-Green | NIPDAU | N / A for Pkg Type | -40 to 85 | SN74AC244N | Samples |
| SN74AC244NSR | ACTIVE | SO | NS | 20 | 2000 | RoHS & Green | NIPDAU | Level-1-260C-UNLIM | -40 to 85 | AC244 | Samples |
| SN74AC244PW | OBSOLETE | TSSOP | PW | 20 | | TBD | Call TI | Call TI | -40 to 85 | AC244 | |
| SN74AC244PWR | ACTIVE | TSSOP | PW | 20 | 2000 | RoHS & Green | NIPDAU | Level-1-260C-UNLIM | -40 to 85 | AC244 | Samples |
| SN74AC244RKSR | ACTIVE | VQFN | RKS | 20 | 3000 | RoHS & Green | NIPDAU | Level-1-260C-UNLIM | -40 to 125 | AC244 | Samples |
| SNJ54AC244FK | ACTIVE | LCCC | FK | 20 | 55 | Non-RoHS & Green | SNPB | N / A for Pkg Type | -55 to 125 | 5962-87552012A SNJ54AC 244FK | Samples |

| Orderable Device | Status (1) | Package Type | Package Drawing | Pins | Package Qty | Eco Plan (2) | Lead finish/ Ball material (6) | MSL Peak Temp (3) | Op Temp (°C) | Device Marking (4/5) | Samples |
|------------------|---------------|--------------|-----------------|------|-------------|---------------------|--------------------------------------|----------------------|--------------|-------------------------------|---------|
| SNJ54AC244J | ACTIVE | CDIP | J | 20 | 20 | Non-RoHS & Green | SNPB | N / A for Pkg Type | -55 to 125 | 5962-8755201RA SNJ54AC244J | Samples |
| SNJ54AC244W | ACTIVE | CFP | W | 20 | 25 | Non-RoHS & Green | SNPB | N / A for Pkg Type | -55 to 125 | 5962-8755201SA SNJ54AC244W | 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) **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 finish/Ball material - Orderable Devices 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.

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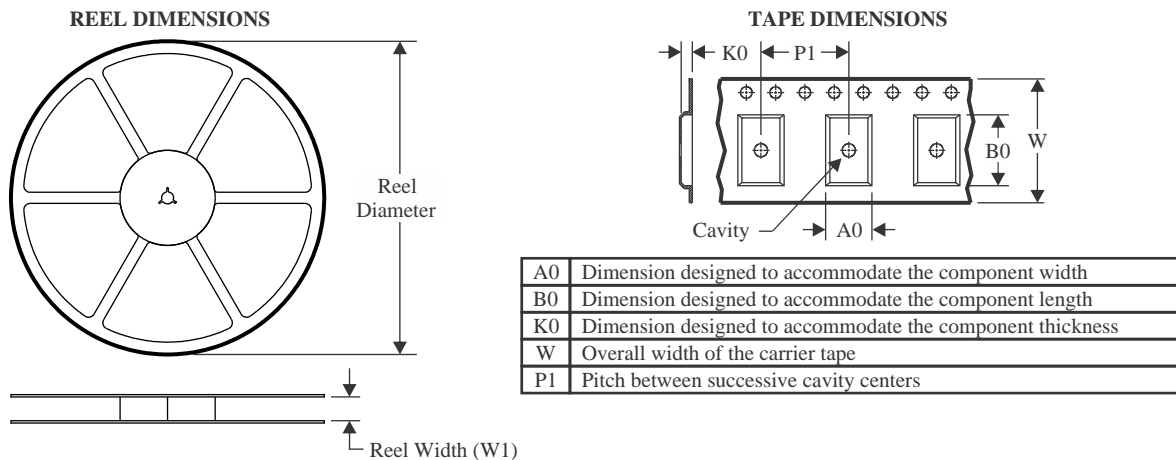
In no event shall TI's liability arising out of such information exceed the total purchase price of the TI part(s) at issue in this document sold by TI to Customer on an annual basis.

OTHER QUALIFIED VERSIONS OF SN54AC244, SN54AC244-SP, SN74AC244 :

- Catalog : [SN74AC244](#), [SN54AC244](#)
- Automotive : [SN74AC244-Q1](#), [SN74AC244-Q1](#)
- Enhanced Product : [SN74AC244-EP](#), [SN74AC244-EP](#)
- Military : [SN54AC244](#)
- Space : [SN54AC244-SP](#)

NOTE: Qualified Version Definitions:

- Catalog - TI's standard catalog product
- Automotive - Q100 devices qualified for high-reliability automotive applications targeting zero defects
- Enhanced Product - Supports Defense, Aerospace and Medical Applications
- Military - QML certified for Military and Defense Applications
- Space - Radiation tolerant, ceramic packaging and qualified for use in Space-based application

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 |
|---------------|--------------|-----------------|------|------|--------------------|--------------------|---------|---------|---------|---------|--------|---------------|
| SN74AC244DBR | SSOP | DB | 20 | 2000 | 330.0 | 16.4 | 8.2 | 7.5 | 2.5 | 12.0 | 16.0 | Q1 |
| SN74AC244DGSR | VSSOP | DGS | 20 | 5000 | 330.0 | 16.4 | 5.4 | 5.4 | 1.45 | 8.0 | 16.0 | Q1 |
| SN74AC244DWR | SOIC | DW | 20 | 2000 | 330.0 | 24.4 | 10.8 | 13.3 | 2.7 | 12.0 | 24.0 | Q1 |
| SN74AC244DWR | SOIC | DW | 20 | 2000 | 330.0 | 24.4 | 10.9 | 13.3 | 2.7 | 12.0 | 24.0 | Q1 |
| SN74AC244NSR | SO | NS | 20 | 2000 | 330.0 | 24.4 | 8.4 | 13.0 | 2.5 | 12.0 | 24.0 | Q1 |
| SN74AC244NSR | SO | NS | 20 | 2000 | 330.0 | 24.4 | 8.4 | 13.0 | 2.5 | 12.0 | 24.0 | Q1 |
| SN74AC244PWR | TSSOP | PW | 20 | 2000 | 330.0 | 16.4 | 6.95 | 7.1 | 1.6 | 8.0 | 16.0 | Q1 |
| SN74AC244PWR | TSSOP | PW | 20 | 2000 | 330.0 | 16.4 | 6.95 | 7.0 | 1.4 | 8.0 | 16.0 | Q1 |
| SN74AC244RKSR | VQFN | RKS | 20 | 3000 | 180.0 | 12.4 | 2.8 | 4.8 | 1.2 | 4.0 | 12.0 | Q1 |

TAPE AND REEL BOX DIMENSIONS


*All dimensions are nominal

| Device | Package Type | Package Drawing | Pins | SPQ | Length (mm) | Width (mm) | Height (mm) |
|---------------|--------------|-----------------|------|------|-------------|------------|-------------|
| SN74AC244DBR | SSOP | DB | 20 | 2000 | 356.0 | 356.0 | 35.0 |
| SN74AC244DGSR | VSSOP | DGS | 20 | 5000 | 353.0 | 353.0 | 32.0 |
| SN74AC244DWR | SOIC | DW | 20 | 2000 | 367.0 | 367.0 | 45.0 |
| SN74AC244DWR | SOIC | DW | 20 | 2000 | 356.0 | 356.0 | 45.0 |
| SN74AC244NSR | SO | NS | 20 | 2000 | 356.0 | 356.0 | 45.0 |
| SN74AC244NSR | SO | NS | 20 | 2000 | 367.0 | 367.0 | 45.0 |
| SN74AC244PWR | TSSOP | PW | 20 | 2000 | 356.0 | 356.0 | 35.0 |
| SN74AC244PWR | TSSOP | PW | 20 | 2000 | 353.0 | 353.0 | 32.0 |
| SN74AC244RKSR | VQFN | RKS | 20 | 3000 | 210.0 | 185.0 | 35.0 |

TUBE


*All dimensions are nominal

| Device | Package Name | Package Type | Pins | SPQ | L (mm) | W (mm) | T (μm) | B (mm) |
|-----------------|--------------|--------------|------|-----|--------|--------|--------|--------|
| 5962-87552012A | FK | LCCC | 20 | 55 | 506.98 | 12.06 | 2030 | NA |
| 5962-8755201SA | W | CFP | 20 | 25 | 506.98 | 26.16 | 6220 | NA |
| 5962-8755201VSA | W | CFP | 20 | 25 | 506.98 | 26.16 | 6220 | NA |
| SN74AC244N | N | PDIP | 20 | 20 | 506 | 13.97 | 11230 | 4.32 |
| SN74AC244NE4 | N | PDIP | 20 | 20 | 506 | 13.97 | 11230 | 4.32 |
| SNJ54AC244FK | FK | LCCC | 20 | 55 | 506.98 | 12.06 | 2030 | NA |
| SNJ54AC244W | W | CFP | 20 | 25 | 506.98 | 26.16 | 6220 | NA |

W (R-GDFP-F20)

CERAMIC DUAL FLATPACK



- NOTES:
- A. All linear dimensions are in inches (millimeters).
 - B. This drawing is subject to change without notice.
 - C. This package can be hermetically sealed with a ceramic lid using glass frit.
 - D. Index point is provided on cap for terminal identification only.
 - E. Falls within Mil-Std 1835 GDFP2-F20

PW0020A



PACKAGE OUTLINE

TSSOP - 1.2 mm max height

SMALL OUTLINE PACKAGE



4220206/A 02/2017

NOTES:

- All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
- This drawing is subject to change without notice.
- This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.15 mm per side.
- This dimension does not include interlead flash. Interlead flash shall not exceed 0.25 mm per side.
- Reference JEDEC registration MO-153.

EXAMPLE BOARD LAYOUT

PW0020A

TSSOP - 1.2 mm max height

SMALL OUTLINE PACKAGE



LAND PATTERN EXAMPLE
EXPOSED METAL SHOWN
SCALE: 10X



SOLDER MASK DETAILS

4220206/A 02/2017

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

PW0020A

TSSOP - 1.2 mm max height

SMALL OUTLINE PACKAGE



SOLDER PASTE EXAMPLE
BASED ON 0.125 mm THICK STENCIL
SCALE: 10X

4220206/A 02/2017

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.

DB0020A



PACKAGE OUTLINE

SSOP - 2 mm max height

SMALL OUTLINE PACKAGE



4214851/B 08/2019

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.
3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.15 mm per side.
4. This dimension does not include interlead flash. Interlead flash shall not exceed 0.25 mm per side.
5. Reference JEDEC registration MO-150.

EXAMPLE BOARD LAYOUT

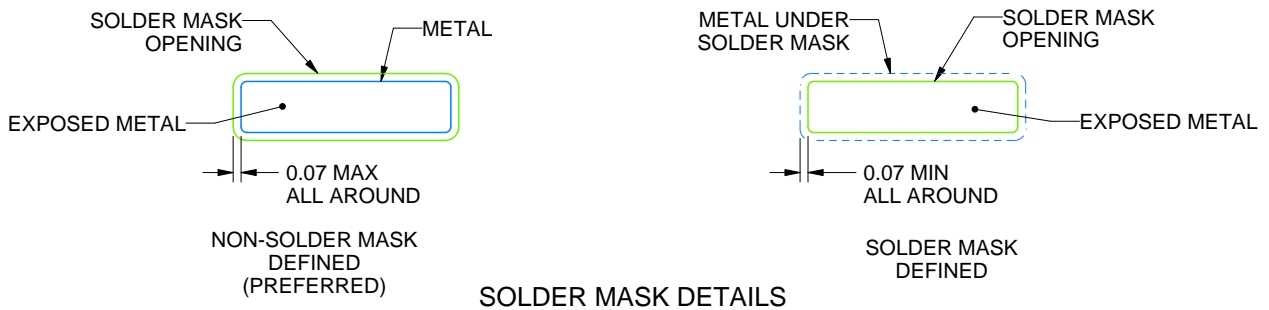
DB0020A

SSOP - 2 mm max height

SMALL OUTLINE PACKAGE



LAND PATTERN EXAMPLE
EXPOSED METAL SHOWN
SCALE: 10X



4214851/B 08/2019

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

DB0020A

SSOP - 2 mm max height

SMALL OUTLINE PACKAGE



SOLDER PASTE EXAMPLE
BASED ON 0.125 mm THICK STENCIL
SCALE: 10X

4214851/B 08/2019

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.

GENERIC PACKAGE VIEW

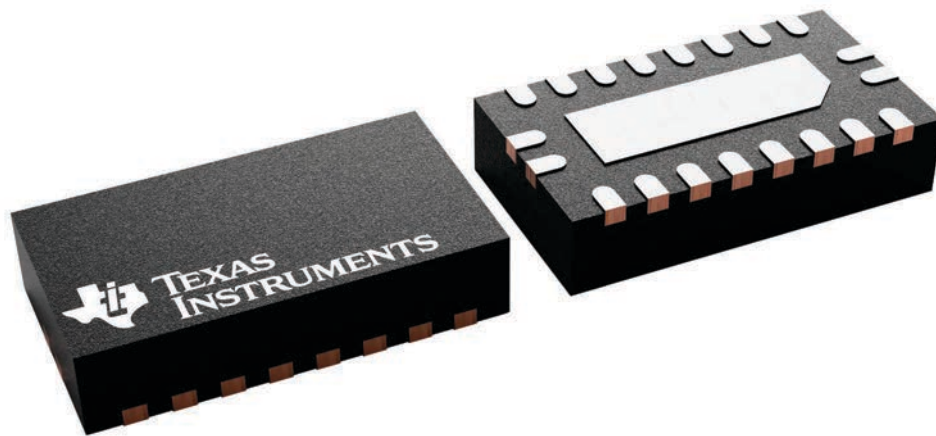
RKS 20

VQFN - 1 mm max height

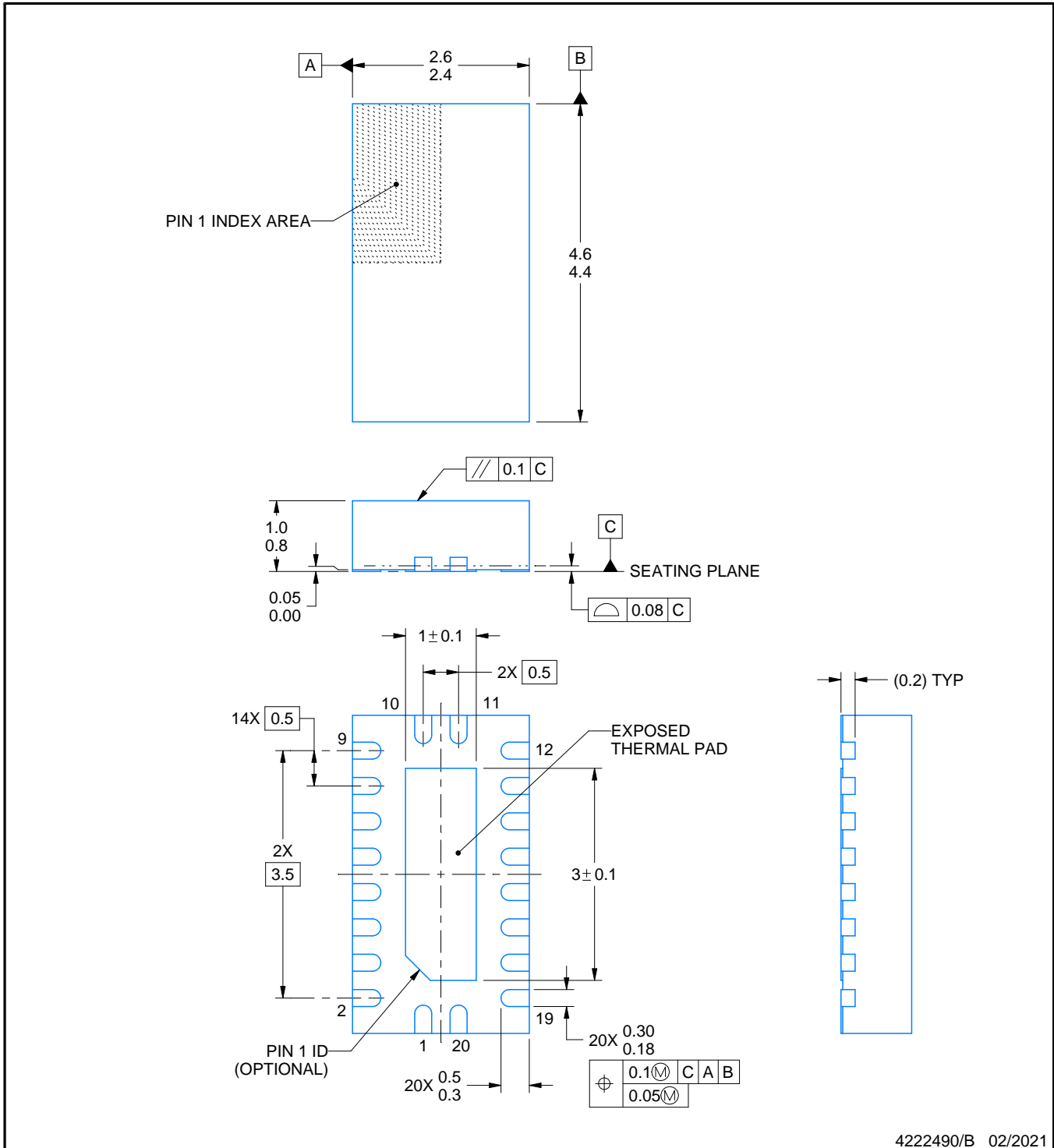
2.5 x 4.5, 0.5 mm pitch

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.



4226872/A



4222490/B 02/2021

NOTES:

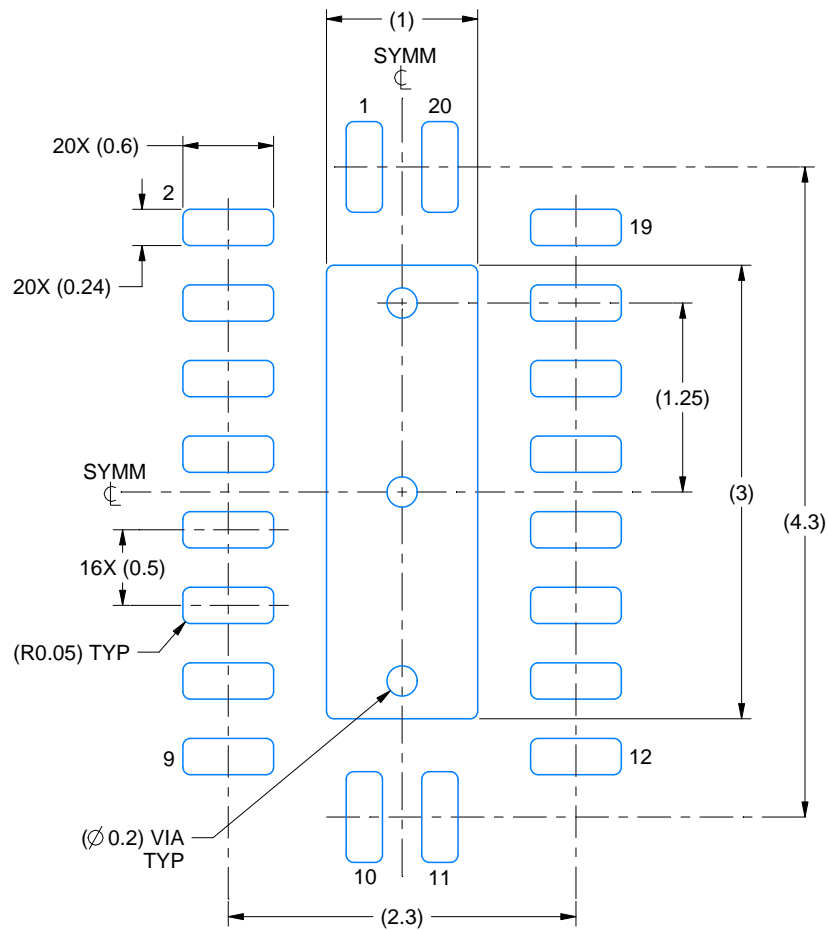
1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. The package thermal pad must be soldered to the printed circuit board for thermal and mechanical performance.

EXAMPLE BOARD LAYOUT

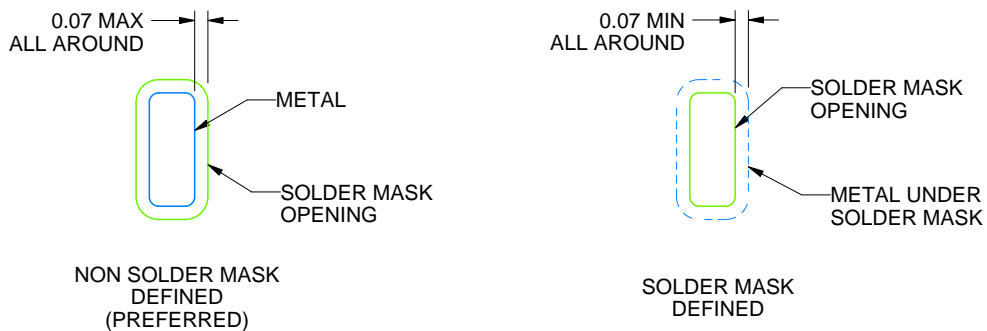
RKS0020A

VQFN - 1 mm max height

PLASTIC QUAD FLATPACK - NO LEAD



LAND PATTERN EXAMPLE
SCALE:20X



SOLDER MASK DETAILS

4222490/B 02/2021

NOTES: (continued)

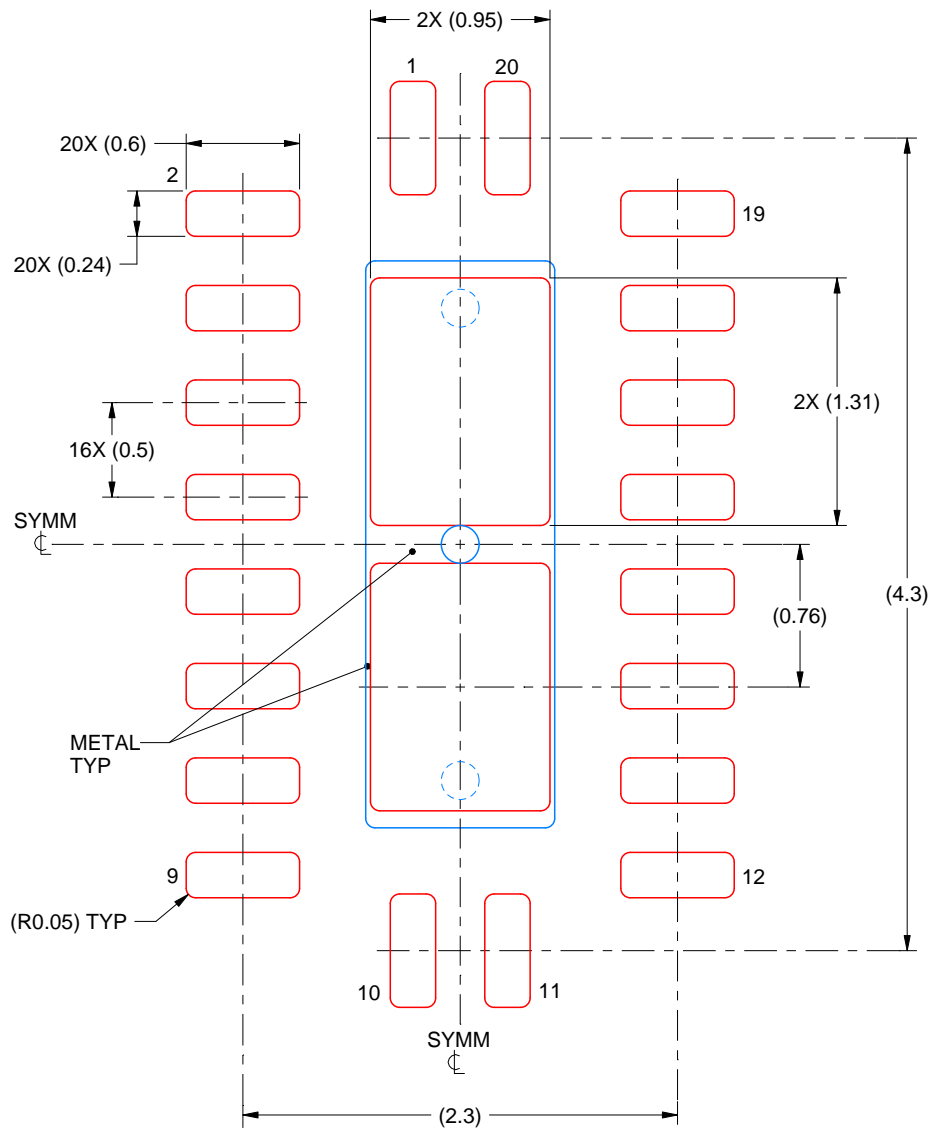
4. This package is designed to be soldered to a thermal pad on the board. For more information, see Texas Instruments literature number SLUA271 (www.ti.com/lit/slua271).
5. Vias are optional depending on application, refer to device data sheet. If some or all are implemented, recommended via locations are shown.

EXAMPLE STENCIL DESIGN

RKS0020A

VQFN - 1 mm max height

PLASTIC QUAD FLATPACK - NO LEAD



SOLDER PASTE EXAMPLE
 BASED ON 0.125 mm THICK STENCIL

EXPOSED PAD
 83% PRINTED SOLDER COVERAGE BY AREA
 SCALE:25X

4222490/B 02/2021

NOTES: (continued)

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

MECHANICAL DATA

NS (R-PDSO-G**)

PLASTIC SMALL-OUTLINE PACKAGE

14-PINS SHOWN



- NOTES:
- A. All linear dimensions are in millimeters.
 - B. This drawing is subject to change without notice.
 - C. Body dimensions do not include mold flash or protrusion, not to exceed 0,15.

J (R-GDIP-T**)

14 LEADS SHOWN

CERAMIC DUAL IN-LINE PACKAGE



| DIM \ PINS ** | 14 | 16 | 18 | 20 |
|---------------|------------------------|------------------------|------------------------|------------------------|
| A | 0.300 (7,62) BSC | 0.300 (7,62) BSC | 0.300 (7,62) BSC | 0.300 (7,62) BSC |
| B MAX | 0.785 (19,94) | .840 (21,34) | 0.960 (24,38) | 1.060 (26,92) |
| B MIN | — | — | — | — |
| C MAX | 0.300 (7,62) | 0.300 (7,62) | 0.310 (7,87) | 0.300 (7,62) |
| C MIN | 0.245 (6,22) | 0.245 (6,22) | 0.220 (5,59) | 0.245 (6,22) |



4040083/F 03/03

- NOTES:
- All linear dimensions are in inches (millimeters).
 - This drawing is subject to change without notice.
 - This package is hermetically sealed with a ceramic lid using glass frit.
 - Index point is provided on cap for terminal identification only on press ceramic glass frit seal only.
 - Falls within MIL STD 1835 GDIP1-T14, GDIP1-T16, GDIP1-T18 and GDIP1-T20.

GENERIC PACKAGE VIEW

FK 20

LCCC - 2.03 mm max height

8.89 x 8.89, 1.27 mm pitch

LEADLESS CERAMIC CHIP CARRIER

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



4229370VA\

N (R-PDIP-T**)

PLASTIC DUAL-IN-LINE PACKAGE

16 PINS SHOWN



- NOTES:
- A. All linear dimensions are in inches (millimeters).
 - B. This drawing is subject to change without notice.
 - C. Falls within JEDEC MS-001, except 18 and 20 pin minimum body length (Dim A).
 - D. The 20 pin end lead shoulder width is a vendor option, either half or full width.

DW0020A



PACKAGE OUTLINE

SOIC - 2.65 mm max height

SOIC



4220724/A 05/2016

NOTES:

1. All linear dimensions are in millimeters. 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 mm per side.
4. This dimension does not include interlead flash. Interlead flash shall not exceed 0.43 mm per side.
5. Reference JEDEC registration MS-013.

EXAMPLE BOARD LAYOUT

DW0020A

SOIC - 2.65 mm max height

SOIC



LAND PATTERN EXAMPLE
SCALE:6X



SOLDER MASK DETAILS

4220724/A 05/2016

NOTES: (continued)

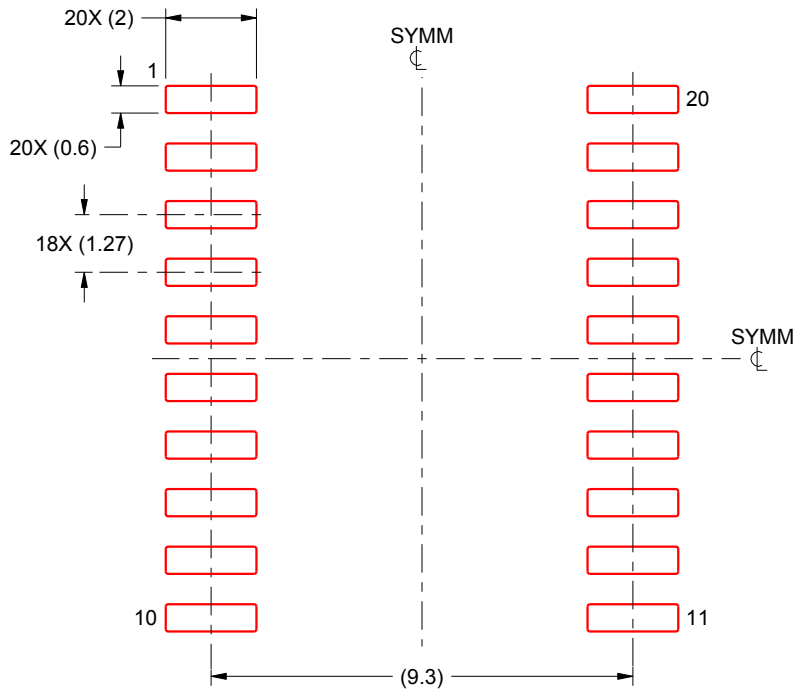
- 6. Publication IPC-7351 may have alternate designs.
- 7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

EXAMPLE STENCIL DESIGN

DW0020A

SOIC - 2.65 mm max height

SOIC



SOLDER PASTE EXAMPLE
BASED ON 0.125 mm THICK STENCIL
SCALE:6X

4220724/A 05/2016

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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