

SNx4AHCT244 Octal Buffers/Drivers With 3-State Outputs

1 Features

- Inputs are TTL-voltage compatible
- Latch-up performance exceeds 250 mA Per JESD 17
- On products compliant to MIL-PRF-38535, All parameters are tested unless otherwise noted. On all other products, production processing does not necessarily include testing of all parameters.

2 Applications

- Network Switches
- Power Infrastructures
- PCs and Notebooks
- Wearable Health and Fitness Devices
- Tests and Measurements

3 Description

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

Package Information

PART NUMBER	PACKAGE ⁽¹⁾	BODY SIZE (NOM)
SNx4AHCT244	PDIP (20)	25.40 mm x 6.35 mm
	(SOIC, 20)	12.8 mm x 7.5 mm
	SOP (20)	12.60 mm x 5.30 mm
	SSOP (20)	7.50 mm x 5.30 mm
	TVSOP (20)	5.00 mm x 4.40 mm
	TSSOP (20)	6.50 mm x 4.40 mm

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

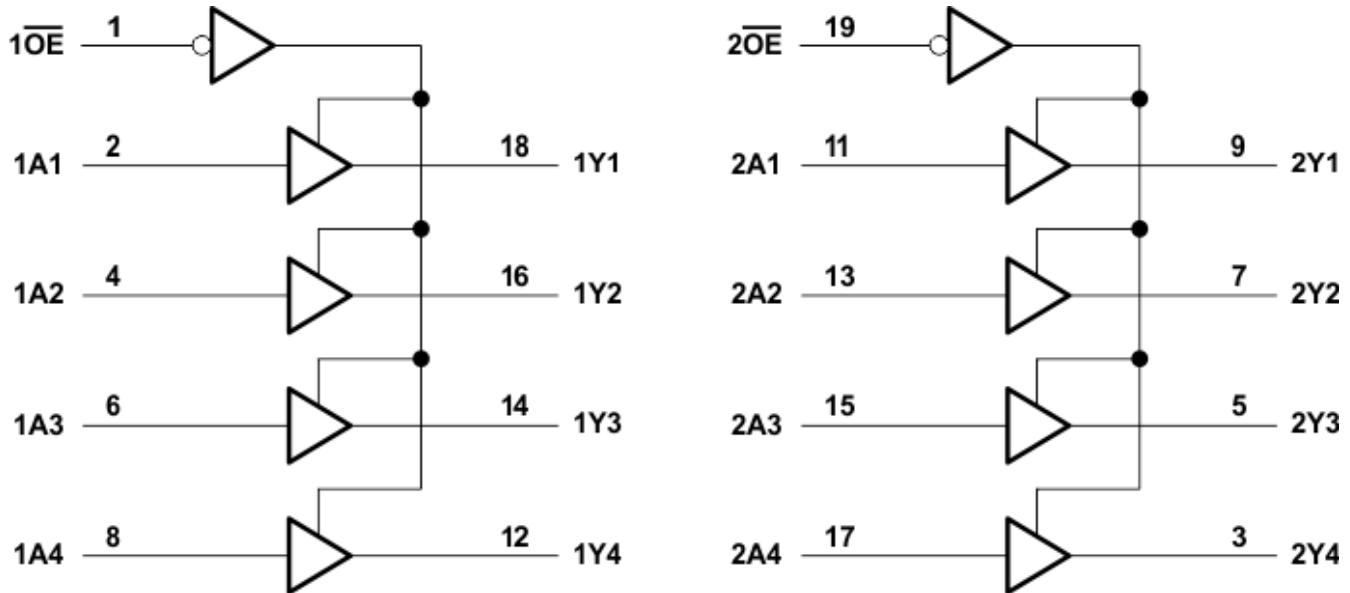


Figure 3-1. Simplified Schematic



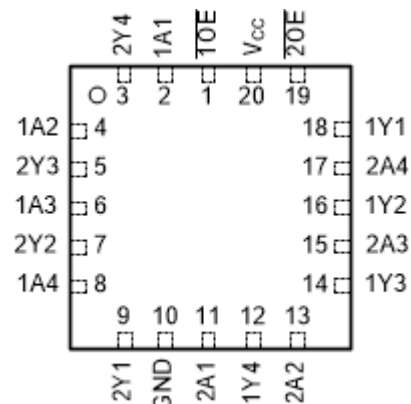
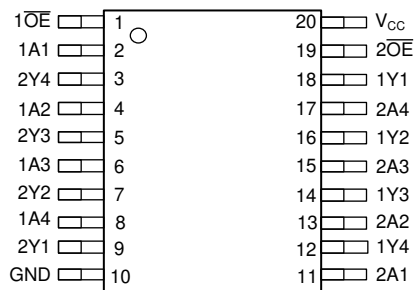
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4 Revision History

Changes from Revision M (July 2014) to Revision N (May 2023)	Page
• Updated <i>ESD Ratings</i> section, <i>Absolute Maximum Ratings</i> section, and <i>Package Information</i> table.....	1

5 Pin Configuration and Functions



**Figure 5-1. SN54AHCT244 J or W Package;
SN74AHCT244 DB, DGV, DW, N, NS, or PW Package
(Top View)**

Figure 5-2. SN54AHCT244 FK Package (Top View)

Table 5-1. Pin Functions

PIN		I/O	DESCRIPTION
NO.	NAME		
1	1 OE	I	Output Enable 1
2	1A1	I	Input 1A1
3	2Y4	O	Output 2Y4
4	1A2	I	Input 1A2
5	2Y3	O	Output 2Y3

Table 5-1. Pin Functions (continued)

PIN		I/O	DESCRIPTION
NO.	NAME		
6	1A3	I	Input 1A3
7	2Y2	O	Output 2Y2
8	1A4	I	Input 1A4
9	2Y1	O	Output 2Y1
10	GND	–	Ground Pin
11	2A1	I	Input 2A1
12	1Y4	O	Output 1Y4
13	2A2	I	Input 2A2
14	1Y3	O	Output 1Y3
15	2A3	I	Input 2A3
16	1Y2	O	Output 1Y2
17	2A4	I	Input 2A4
18	1Y1	O	Output 1Y1
19	2 OE	I	Output Enable 2
20	VCC	–	Power Pin

6 Specifications

6.1 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	Input voltage range ⁽²⁾	−0.5	7	V
V _O	Output voltage range ⁽²⁾	−0.5	V _{CC} + 0.5	V
I _{IK}	Input clamp current	V _I < 0		−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 to V _{CC}		±25 mA
	Continuous current through V _{CC} or GND			±75 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.

6.2 ESD Ratings

		VALUE	UNIT
V _(ESD)	Electrostatic discharge	Human body model (HBM), per ANSI/ESDA/JEDEC JS-001, all pins ⁽¹⁾	±2000
		Charged device model (CDM), per JEDEC specification JESD22-C101, all pins ⁽²⁾	±2000

- (1) JEDEC document JEP155 states that 500-V HBM allows safe manufacturing with a standard ESD control process.
- (2) JEDEC document JEP157 states that 250-V CDM allows safe manufacturing with a standard ESD control process.

6.3 Recommended Operating Conditions

see [note 1](#)

		SN54AHCT244		SN74AHCT244		UNIT
		MIN	MAX	MIN	MAX	
V _{CC}	Supply voltage	4.5	5.5	4.5	5.5	V
V _{IH}	High-level input voltage	2		2		V
V _{IL}	Low-level input voltage		0.8		0.8	V
V _I	Input voltage	0	5.5	0	5.5	V
V _O	Output voltage	0	V _{CC}	0	V _{CC}	V
I _{OH}	High-level output current		−8		−8	mA
I _{OL}	Low-level output current		8		8	mA
T _A	Operating free-air temperature	−55	125	−40	125	°C

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

6.4 Thermal Information

THERMAL METRIC ⁽¹⁾	SN74AHCT244						UNIT
	DB	DGV	DW	N	NS	PW	
	20 PINS	20 PINS	20 PINS	20 PINS	20 PINS	20 PINS	
R _{θJA} Junction-to-ambient thermal resistance	99.9	119.2	83.0	54.9	80.4	105.4	°C/W
R _{θJC(top)} Junction-to-case (top) thermal resistance	61.7	34.5	48.9	41.7	46.9	39.5	
R _{θJB} Junction-to-board thermal resistance	55.2	60.7	50.5	35.8	47.9	56.4	
ψ _{JT} Junction-to-top characterization parameter	22.6	1.2	21.1	27.9	19.9	3.1	
ψ _{JB} Junction-to-board characterization parameter	54.8	60.0	50.1	35.7	47.5	55.8	

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

6.5 Electrical Characteristics

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

PARAMETER	TEST CONDITIONS	V _{CC}	T _A = 25°C			SN54AHCT244		SN74AHCT244		UNIT
			MIN	TYP	MAX	MIN	MAX	MIN	MAX	
V _{OH}	I _{OH} = –50 μA	4.5 V	4.4	4.5		4.4		4.4		V
	I _{OH} = –8 mA		3.94			3.8		3.8		
V _{OL}	I _{OL} = 50 μA	4.5 V			0.1		0.1		0.1	V
	I _{OL} = 8 mA				0.36		0.44		0.44	
I _{OZ}	V _O = V _{CC} or GND	5.5 V			±0.25		±2.5		±2.5	μA
I _I	V _I = 5.5 V or GND	0 V to 5.5 V			±0.1		±1 ⁽¹⁾		±1	μA
I _{CC}	V _I = V _{CC} or GND, I _O = 0	5.5 V			4		40		40	μA
ΔI _{CC} ⁽²⁾	One input at 3.4 V, Other inputs at V _{CC} or GND	5.5 V			1.35		1.5		1.5	mA
C _i	V _I = V _{CC} or GND	5 V		2.5	10				10	pF
C _o	V _O = V _{CC} or GND	5 V		3						pF

(1) On products compliant to MIL-PRF-38535, this parameter is not production tested at V_{CC} = 0 V.

(2) This is the increase in supply current for each input at one of the specified TTL voltage levels, rather than 0 V or V_{CC}.

6.6 Switching Characteristics

over recommended operating free-air temperature range, V_{CC} = 5 V ± 0.5 V (unless otherwise noted) (see [Load Circuit and Voltage Waveforms](#))

PARAMETER	FROM (INPUT)	TO (OUTPUT)	LOAD CAPACITANCE	T _A = 25°C			SN54AHCT244		SN74AHCT244		UNIT
				MIN	TYP	MAX	MIN	MAX	MIN	MAX	
t _{PLH}	A	Y	C _L = 15 pF		5.4 ⁽¹⁾	7.4 ⁽¹⁾	1 ⁽¹⁾	8.5 ⁽¹⁾	1	8.5	ns
t _{PHL}					5.4 ⁽¹⁾	7.4 ⁽¹⁾	1 ⁽¹⁾	8.5 ⁽¹⁾	1	8.5	
t _{PZH}	$\overline{OE}$	Y	C _L = 15 pF		7.7 ⁽¹⁾	10.4 ⁽¹⁾	1 ⁽¹⁾	12 ⁽¹⁾	1	12	ns
t _{PZL}					7.7 ⁽¹⁾	10.4 ⁽¹⁾	1 ⁽¹⁾	12 ⁽¹⁾	1	12	
t _{PHZ}	$\overline{OE}$	Y	C _L = 15 pF		5 ⁽¹⁾	9.4 ⁽¹⁾	1 ⁽¹⁾	10 ⁽¹⁾	1	10	ns
t _{PLZ}					5 ⁽¹⁾	9.4 ⁽¹⁾	1 ⁽¹⁾	10 ⁽¹⁾	1	10	
t _{PLH}	A	Y	C _L = 50 pF		5.9	8.4	1	9.5	1	9.5	ns
t _{PHL}					5.9	8.4	1	9.5	1	9.5	
t _{PZH}	$\overline{OE}$	Y	C _L = 50 pF		8.2	11.4	1	13	1	13	ns
t _{PZL}					8.2	11.4	1	13	1	13	
t _{PHZ}	$\overline{OE}$	Y	C _L = 50 pF		8.8	11.4	1	13	1	13	ns
t _{PLZ}					8.8	11.4	1	13	1	13	

6.6 Switching Characteristics (continued)

over recommended operating free-air temperature range, $V_{CC} = 5\text{ V} \pm 0.5\text{ V}$ (unless otherwise noted) (see [Load Circuit and Voltage Waveforms](#))

PARAMETER	FROM (INPUT)	TO (OUTPUT)	LOAD CAPACITANCE	$T_A = 25^\circ\text{C}$			SN54AHCT244		SN74AHCT244		UNIT
				MIN	TYP	MAX	MIN	MAX	MIN	MAX	
$t_{sk(o)}$			$C_L = 50\text{ pF}$			1 ⁽²⁾				1	ns

(1) On products compliant to MIL-PRF-38535, this parameter is not production tested.

(2) On products compliant to MIL-PRF-38535, this parameter does not apply.

6.7 Noise Characteristics

$V_{CC} = 5\text{ V}$, $C_L = 50\text{ pF}$, $T_A = 25^\circ\text{C}$

PARAMETER ⁽¹⁾		SN74AHCT244			UNIT
		MIN	TYP	MAX	
$V_{OH(V)}$	Quiet output, minimum dynamic V_{OH}		4.1		V
$V_{IH(D)}$	High-level dynamic input voltage	2			V
$V_{IL(D)}$	Low-level dynamic input voltage			0.8	V

(1) Characteristics are for surface-mount packages only.

6.8 Operating Characteristics

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

PARAMETER		TEST CONDITIONS		TYP	UNIT
C_{pd}	Power dissipation capacitance	No load,	$f = 1\text{ MHz}$	8.2	pF

6.9 Typical Characteristics

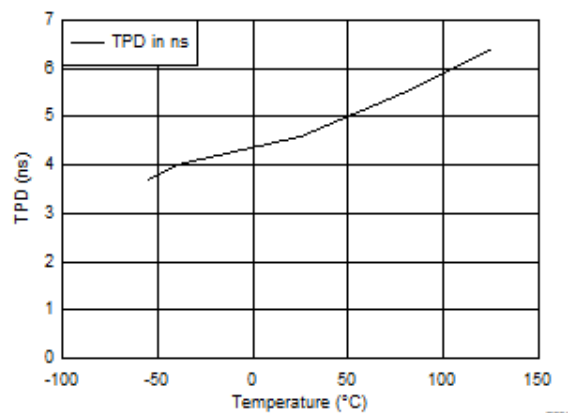
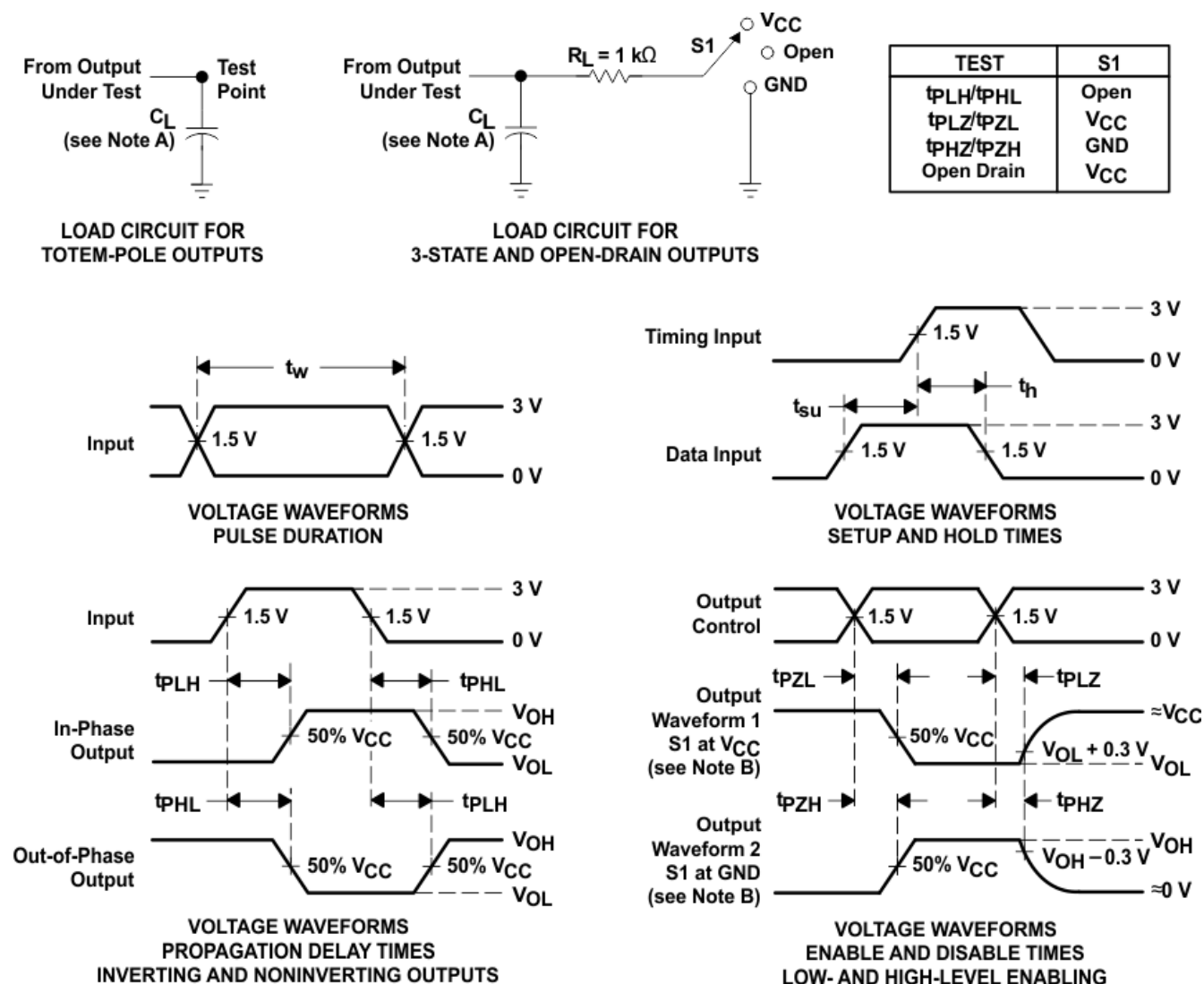


Figure 6-1. TPD vs Temperature, 15 pF Load

7 Parameter Measurement Information



- NOTES:
- 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, $Z_O = 50 \Omega$, $t_r \leq 3$ ns, $t_f \leq 3$ ns.
 - D. The outputs are measured one at a time with one input transition per measurement.
 - E. All parameters and waveforms are not applicable to all devices.

Figure 7-1. Load Circuit and Voltage Waveforms

9 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.

9.1 Application Information

The SN74AHCT244 is a low-drive CMOS device that can be used for a multitude of bus interface type applications where output ringing is a concern. The low drive and slow edge rates will minimize overshoot and undershoot on the outputs. The input switching levels have been lowered to accommodate TTL inputs of 0.8-V V_{IL} and 2-V V_{IH} . This feature makes it ideal for translating up from 3.3 V to 5 V. Figure 9-1 shows this type of translation.

9.1.1 Typical Application

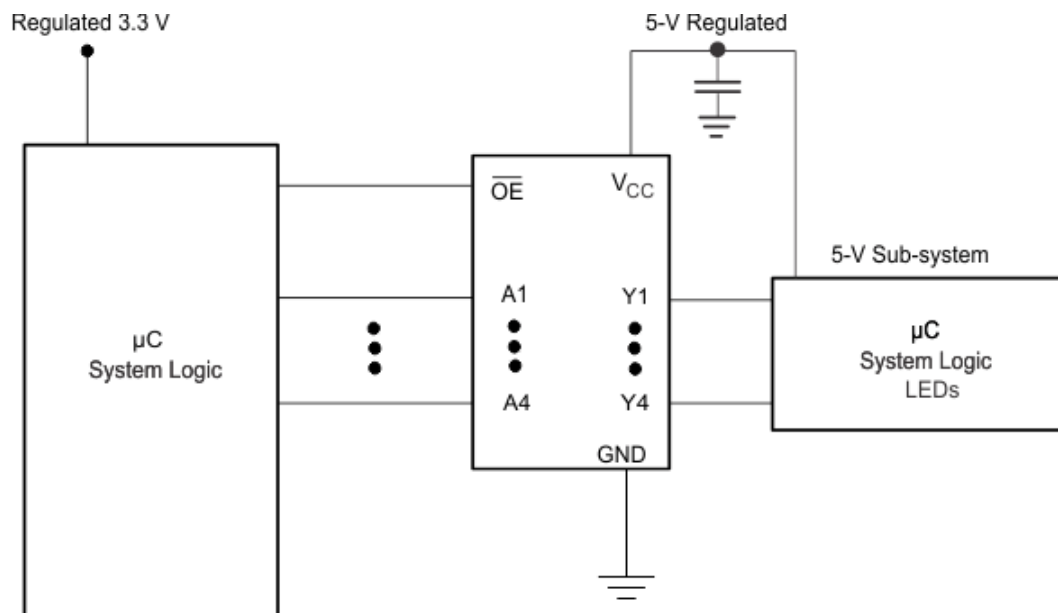


Figure 9-1. Specific Application Schematic

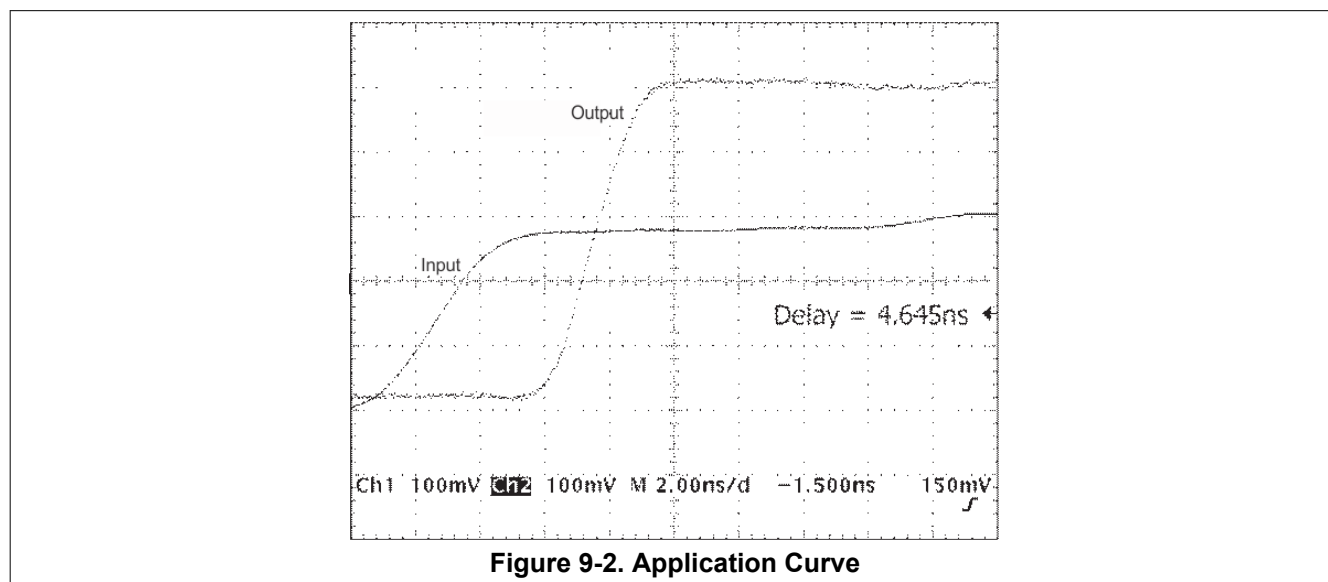
9.1.1.1 Design Requirements

This device uses CMOS technology and has balanced output drive. Care should be taken to avoid bus contention because it can drive currents that would exceed maximum limits. The high drive will also create fast edges into light loads so routing and load conditions should be considered to prevent ringing.

9.1.1.2 Detailed Design Procedure

- Recommended Input conditions
 - Rise time and fall time specs. See ($\Delta t/\Delta V$) in the [Recommended Operating Conditions](#) table.
 - Specified high and low levels. See (V_{IH} and V_{IL}) in the [Recommended Operating Conditions](#) table.
 - Inputs are overvoltage tolerant allowing them to go as high as 5.5 V at any valid V_{CC}
- Recommend output conditions
 - Load currents should not exceed 25 mA on the output and 50 mA total for the part
 - Outputs should not be pulled above V_{CC}

9.1.1.3 Application Curves



9.2 Power Supply Recommendations

The power supply can be any voltage between the Min and Max supply voltage rating located in the [Recommended Operating Conditions](#) table.

Each V_{CC} pin should have a good bypass capacitor to prevent power disturbance. For devices with a single supply, 0.1 μF is recommended; if there are multiple V_{CC} pins, then 0.01 μF or 0.022 μF is recommended for each power pin. It is acceptable to parallel multiple bypass caps to reject different frequencies of noise. A 0.1 μF and a 1 μF are commonly used in parallel. The bypass capacitor should be installed as close to the power pin as possible for best results.

9.3 Layout

9.3.1 Layout Guidelines

When using multiple-bit logic devices, inputs should never float.

In many cases, functions or parts of functions of digital logic devices are unused, for example, when only two inputs of a triple-input AND gate are used or only 3 of the 4 buffer gates are used. Such input pins should not be left unconnected because the undefined voltages at the outside connections result in undefined operational states. [Figure 9-3](#) specifies the rules that must be observed under all circumstances. All unused inputs of digital logic devices must be connected to a high or low bias to prevent them from floating. The logic level that should be applied to any particular unused input depends on the function of the device. Generally they will be tied to GND or V_{CC} , whichever makes more sense or is more convenient. It is generally acceptable to float outputs, unless the part is a transceiver. If the transceiver has an output enable pin, it will disable the output section of the part when asserted. This will not disable the input section of the I/Os, so they cannot float when disabled.

9.3.2 Layout Example

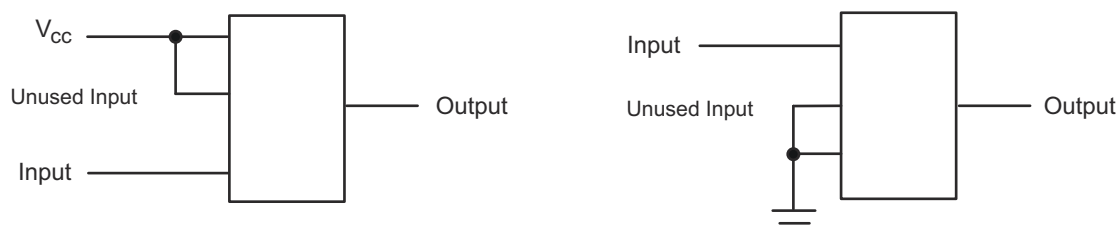


Figure 9-3. Layout Diagram

10 Device and Documentation Support

10.1 Documentation Support

10.1.1 Related Documentation

The table below lists quick access links. Categories include technical documents, support and community resources, tools and software, and quick access to sample or buy.

Table 10-1. Related Links

PARTS	PRODUCT FOLDER	SAMPLE & BUY	TECHNICAL DOCUMENTS	TOOLS & SOFTWARE	SUPPORT & COMMUNITY
SN54AHCT244	Click here	Click here	Click here	Click here	Click here
SN74AHCT244	Click here	Click here	Click here	Click here	Click here

10.2 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 *Subscribe to updates* 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.

10.3 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](#).

10.4 Trademarks

TI E2E™ is a trademark of Texas Instruments.

All trademarks are the property of their respective owners.

10.5 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.

10.6 Glossary

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

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
5962-9678301Q2A	ACTIVE	LCCC	FK	20	1	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	5962- 9678301Q2A SNJ54AHCT 244FK	Samples
5962-9678301QRA	ACTIVE	CDIP	J	20	1	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	5962-9678301QR A SNJ54AHCT244J	Samples
5962-9678301QSA	ACTIVE	CFP	W	20	1	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	5962-9678301QS A SNJ54AHCT244W	Samples
SN74AHCT244DBR	ACTIVE	SSOP	DB	20	2000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 85	HB244	Samples
SN74AHCT244DGVR	ACTIVE	TVSOP	DGV	20	2000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 85	HB244	Samples
SN74AHCT244DWR	ACTIVE	SOIC	DW	20	2000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 125	AHCT244	Samples
SN74AHCT244N	ACTIVE	PDIP	N	20	20	RoHS & Non-Green	NIPDAU	N / A for Pkg Type	-40 to 85	SN74AHCT244N	Samples
SN74AHCT244NSR	ACTIVE	SO	NS	20	2000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 85	AHCT244	Samples
SN74AHCT244PWR	ACTIVE	TSSOP	PW	20	2000	RoHS & Green	NIPDAU SN	Level-1-260C-UNLIM	-40 to 85	HB244	Samples
SN74AHCT244PWRG4	ACTIVE	TSSOP	PW	20	2000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 85	HB244	Samples
SNJ54AHCT244FK	ACTIVE	LCCC	FK	20	1	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	5962- 9678301Q2A SNJ54AHCT 244FK	Samples
SNJ54AHCT244J	ACTIVE	CDIP	J	20	1	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	5962-9678301QR A SNJ54AHCT244J	Samples
SNJ54AHCT244W	ACTIVE	CFP	W	20	1	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	5962-9678301QS A SNJ54AHCT244W	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 ≤ 1000 ppm threshold. Antimony trioxide based flame retardants must also meet the ≤ 1000 ppm 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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OTHER QUALIFIED VERSIONS OF SN54AHCT244, SN74AHCT244 :

- Catalog : [SN74AHCT244](#)
- Automotive : [SN74AHCT244-Q1](#), [SN74AHCT244-Q1](#)
- Enhanced Product : [SN74AHCT244-EP](#), [SN74AHCT244-EP](#)
- Military : [SN54AHCT244](#)

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

TAPE AND REEL INFORMATION


*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
SN74AHCT244DBR	SSOP	DB	20	2000	330.0	16.4	8.2	7.5	2.5	12.0	16.0	Q1
SN74AHCT244DGVR	TVSOP	DGV	20	2000	330.0	12.4	6.9	5.6	1.6	8.0	12.0	Q1
SN74AHCT244DWR	SOIC	DW	20	2000	330.0	24.4	10.9	13.3	2.7	12.0	24.0	Q1
SN74AHCT244NSR	SO	NS	20	2000	330.0	24.4	8.4	13.0	2.5	12.0	24.0	Q1
SN74AHCT244PWR	TSSOP	PW	20	2000	330.0	16.4	6.95	7.0	1.4	8.0	16.0	Q1
SN74AHCT244PWRG4	TSSOP	PW	20	2000	330.0	16.4	6.95	7.0	1.4	8.0	16.0	Q1

TAPE AND REEL BOX DIMENSIONS



*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN74AHCT244DBR	SSOP	DB	20	2000	356.0	356.0	35.0
SN74AHCT244DGVR	TVSOP	DGV	20	2000	356.0	356.0	35.0
SN74AHCT244DWR	SOIC	DW	20	2000	367.0	367.0	45.0
SN74AHCT244NSR	SO	NS	20	2000	367.0	367.0	45.0
SN74AHCT244PWR	TSSOP	PW	20	2000	356.0	356.0	35.0
SN74AHCT244PWRG4	TSSOP	PW	20	2000	356.0	356.0	35.0

TUBE



*All dimensions are nominal

Device	Package Name	Package Type	Pins	SPQ	L (mm)	W (mm)	T (μm)	B (mm)
5962-9678301Q2A	FK	LCCC	20	1	506.98	12.06	2030	NA
5962-9678301QSA	W	CFP	20	1	506.98	26.16	6220	NA
SN74AHCT244N	N	PDIP	20	20	506	13.97	11230	4.32
SNJ54AHCT244FK	FK	LCCC	20	1	506.98	12.06	2030	NA
SNJ54AHCT244W	W	CFP	20	1	506.98	26.16	6220	NA

J (R-GDIP-T**)

14 LEADS SHOWN

CERAMIC DUAL IN-LINE PACKAGE



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

DGV (R-PDSO-G**)

PLASTIC SMALL-OUTLINE

24 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 per side.
 D. Falls within JEDEC: 24/48 Pins – MO-153
 14/16/20/56 Pins – MO-194

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.

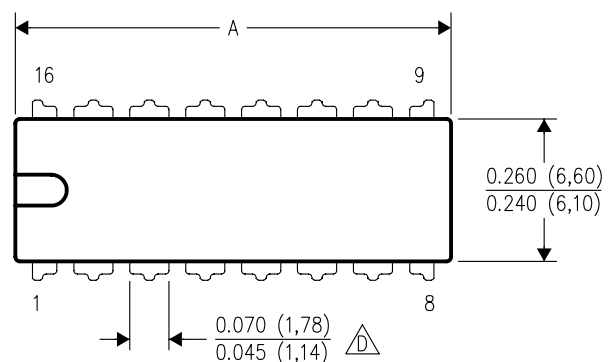


4229370VA\

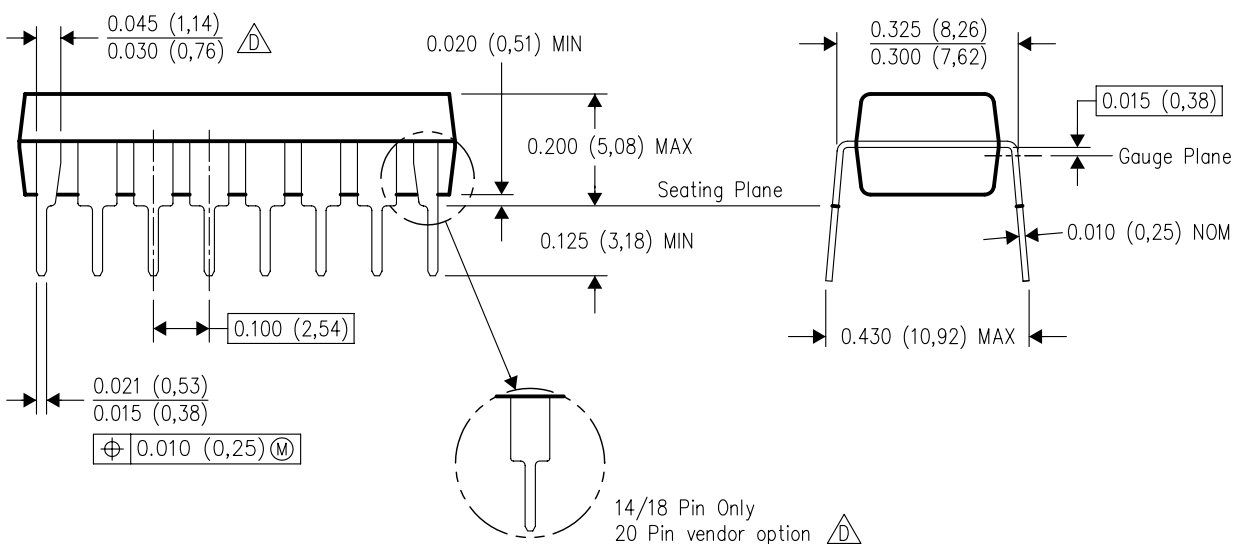
N (R-PDIP-T**)

16 PINS SHOWN

PLASTIC DUAL-IN-LINE PACKAGE

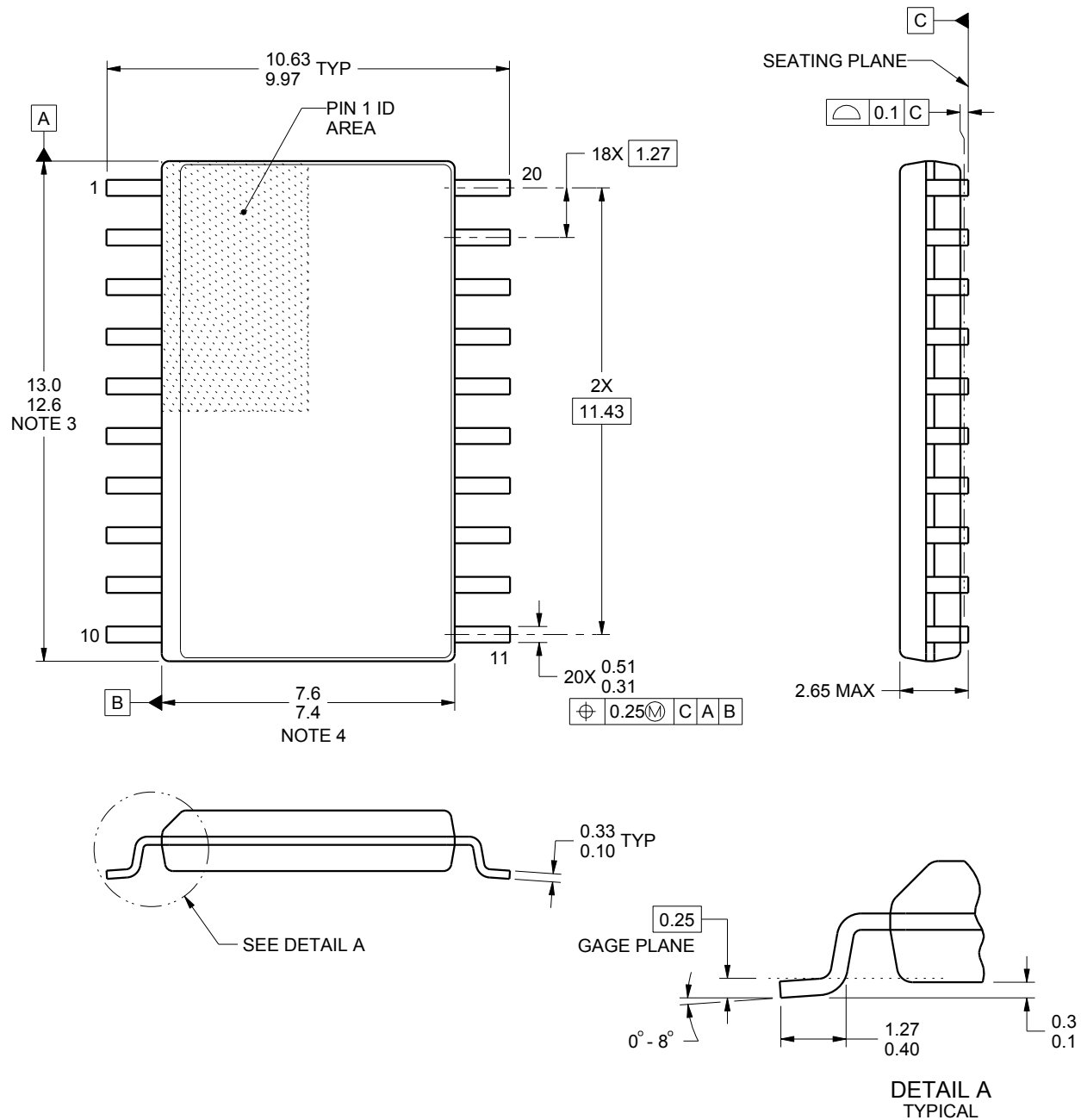


PINS ** DIM	14	16	18	20
A MAX	0.775 (19,69)	0.775 (19,69)	0.920 (23,37)	1.060 (26,92)
A MIN	0.745 (18,92)	0.745 (18,92)	0.850 (21,59)	0.940 (23,88)
MS-001 VARIATION	AA	BB	AC	AD



4040049/E 12/2002

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



4220724/A 05/2016

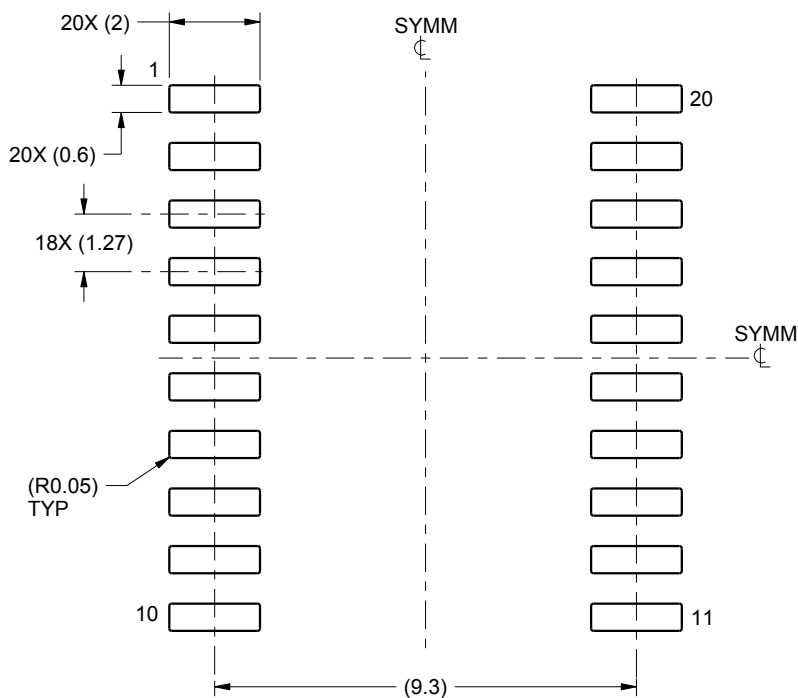
NOTES:

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.

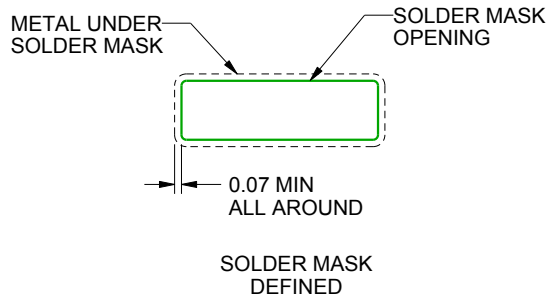
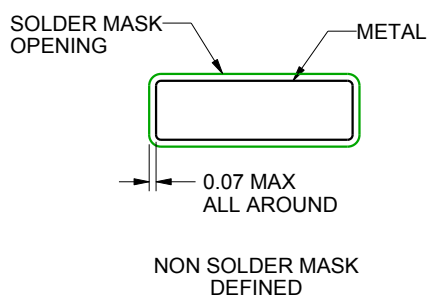
DW0020A

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.

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



4220206/A 02/2017

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-153.

EXAMPLE BOARD LAYOUT

PW0020A

TSSOP - 1.2 mm max height

SMALL OUTLINE PACKAGE



LAND PATTERN EXAMPLE
EXPOSED METAL SHOWN
SCALE: 10X



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

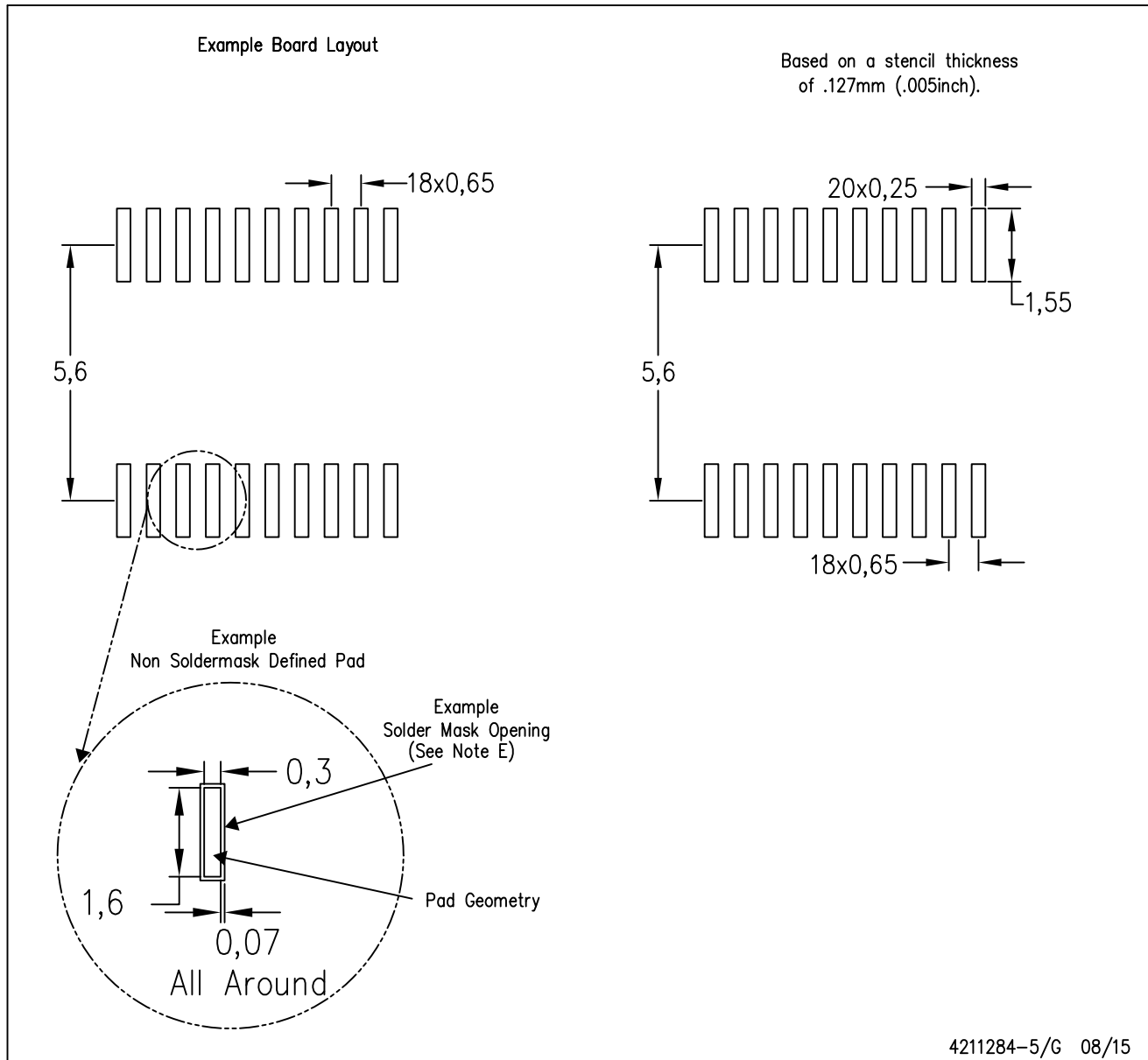
4220206/A 02/2017

NOTES: (continued)

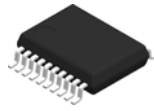
8. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.
9. Board assembly site may have different recommendations for stencil design.

PW (R-PDSO-G20)

PLASTIC SMALL OUTLINE



- NOTES:
- A. All linear dimensions are in millimeters.
 - B. This drawing is subject to change without notice.
 - C. Publication IPC-7351 is recommended for alternate design.
 - D. Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers should contact their board assembly site for stencil design recommendations. Refer to IPC-7525 for other stencil recommendations.
 - E. Customers should contact their board fabrication site for solder mask tolerances between and around signal pads.



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



SOLDER MASK DETAILS

4214851/B 08/2019

NOTES: (continued)

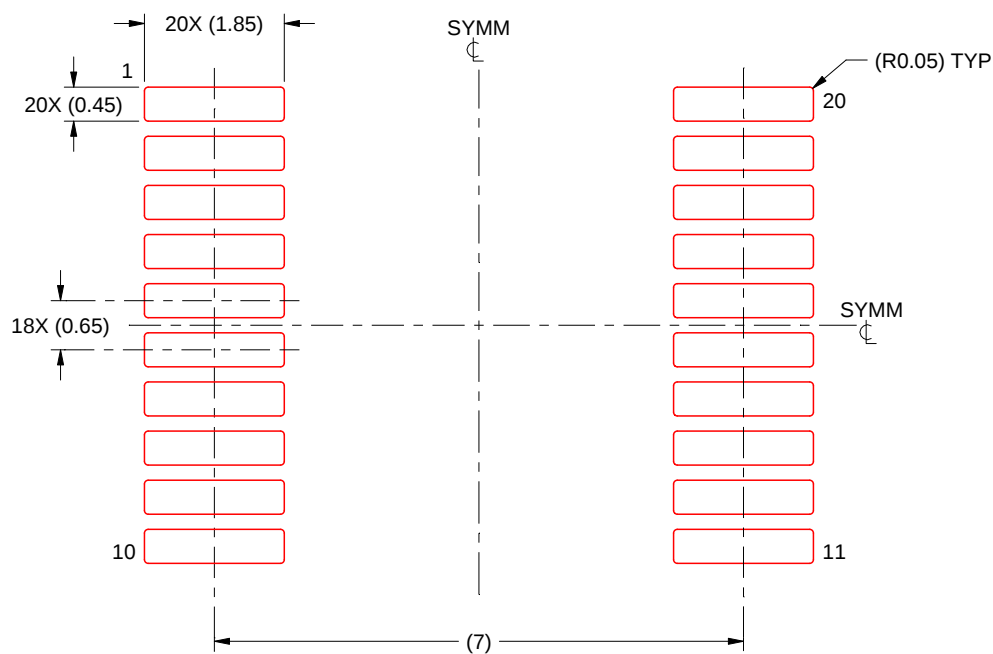
6. Publication IPC-7351 may have alternate designs.

7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

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.

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.

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