

OCTAL BUFFERS/DRIVERS WITH 3-STATE OUTPUTS

Check for Samples: [SN54AHCT541](#), [SN74AHCT541](#)

FEATURES

- Inputs Are TTL-Voltage Compatible
- Latch-Up Performance Exceeds 250 mA Per JESD 17
- ESD Protection Exceeds JESD 22
 - 2000-V Human-Body Model (A114-A)
 - 200-V Machine Model (A115-A)
 - 1000-V Charged-Device Model (C101)

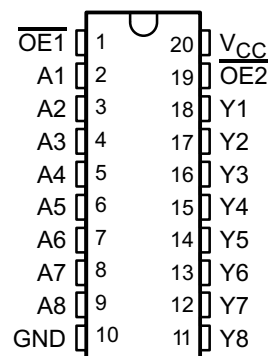
DESCRIPTION

The 'AHCT541 octal buffers/drivers are ideal for driving bus lines or buffer memory address registers. These devices feature inputs and outputs on opposite sides of the package to facilitate printed circuit board layout.

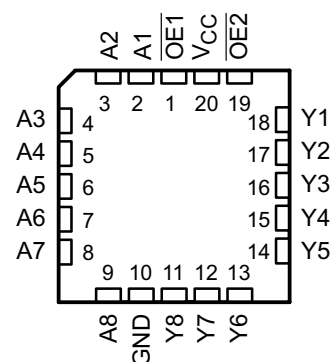
The 3-state control gate is a 2-input AND gate with active-low inputs so that if either output-enable ($\overline{OE1}$ or $\overline{OE2}$) input is high, all corresponding outputs are in the high-impedance state. The outputs provide non-inverted data when they are not in the high-impedance state.

To ensure 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.

SN54AHCT541 . . . J or W PACKAGE
SN74AHCT541 . . . DB, DGV, DW, N, NS, OR PW PACKAGE
(TOP VIEW)



SN54AHCT541 . . . FK PACKAGE
(TOP VIEW)



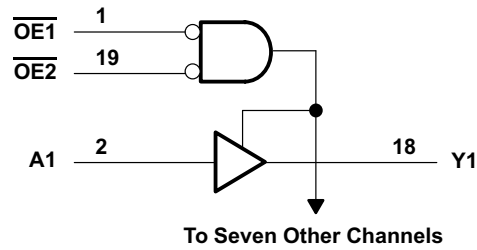
**FUNCTION TABLE
(EACH FLIP-FLOP)**

| INPUTS | | | OUTPUT Y |
|------------------|------------------|---|-------------|
| $\overline{OE1}$ | $\overline{OE2}$ | A | |
| L | L | L | L |
| L | L | H | H |
| H | X | X | Z |
| X | H | X | Z |



Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.

LOGIC DIAGRAM, EACH FLIP-FLOP (POSITIVE LOGIC)



ABSOLUTE MAXIMUM RATINGS

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

| | VALUE | UNIT |
|--|------------------------|------|
| Supply voltage range, V_{CC} | -0.5 to 7 | V |
| Input voltage range, V_I ⁽²⁾ | -0.5 to 7 | V |
| Output voltage range, V_O ⁽²⁾ | -0.5 to $V_{CC} + 0.5$ | V |
| Input clamp current, I_{IK} ($V_I < 0$) | -20 | mA |
| Output clamp current, I_{OK} ($V_O < 0$ or $V_O > V_{CC}$) | ± 20 | mA |
| Continuous output current, I_O ($V_O = 0$ to V_{CC}) | ± 25 | mA |
| Continuous current through V_{CC} or GND | ± 75 | mA |
| Package thermal impedance, θ_{JA} ⁽³⁾ | DB package | 70 |
| | DGV package | 92 |
| | DW package | 58 |
| | N package | 69 |
| | NS package | 60 |
| | PW package | 83 |
| Storage temperature range, T_{stg} | -65 to 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.
- (3) The package thermal impedance is calculated in accordance with JESD 51-7.

RECOMMENDED OPERATING CONDITIONS⁽¹⁾

| | | SN54AHCT541 | | SN74AHCT541 | | 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 |
| Δt/Δv | Input Transition rise or fall rate | | 20 | | 20 | ns/V |
| 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*, literature number [SCBA004](#).

ELECTRICAL CHARACTERISTICS

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

| PARAMETER | TEST CONDITIONS | V _{CC} | T _A = 25°C | | | T _A = -55°C TO 125°C | | T _A = -40°C TO 85°C | | T _A = -40°C TO 125°C | | UNIT |
|---------------------------------|---|-----------------|-----------------------|-----|-------|---------------------------------|-------------------|--------------------------------|------|---------------------------------|------|------|
| | | | MIN | TYP | MAX | Recommended | | Recommended | | Recommended | | |
| | | | | | | SN54AHCT541 | SN74AHCT541 | SN74AHCT541 | MIN | MAX | MIN | |
| V _{OH} | I _{OH} = -50 μA | 4.5 V | 4.4 | 4.5 | | 4.4 | | 4.4 | | 4.4 | | V |
| | I _{OH} = -8 mA | | 3.94 | | | 3.8 | | 3.8 | | 3.8 | | |
| V _{OL} | I _{OL} = 50 μA | 4.5 V | | | 0.1 | | | 0.1 | | | 0.1 | V |
| | I _{OH} = 8 mA | | | | 0.36 | | 0.44 | | 0.44 | | 0.44 | |
| I _I | V _I = 5.5 V or GND | 0 V to 5.5 V | | | ±0.1 | | ±1 ⁽¹⁾ | | ±1 | | ±1 | μA |
| I _{OZ} | V _O = V _{CC} or GND | 5.5 V | | | ±0.25 | | ±2.5 | | ±2.5 | | ±2.5 | |
| I _{CC} | V _I = V _{CC} or GND, I _O = 0 | 5.5 V | | | 4 | | 40 | | 20 | | 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 | | 1.5 | mA |
| C _i | V _I = V _{CC} or GND | 5 V | | 2 | 10 | | | | 10 | | | pF |
| C _O | V _O = V _{CC} or GND | 5V | | 4 | | | | | | | | |

(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}.

SWITCHING CHARACTERISTICS

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

| PARAMETER | FROM (INPUT) | TO (OUTPUT) | LOAD CAPACITANCE | $T_A = 25^\circ\text{C}$ | | $T_A = -55^\circ\text{C TO } 125^\circ\text{C}$ | | $T_A = -40^\circ\text{C TO } 85^\circ\text{C}$ | | $T_A = -40^\circ\text{C TO } 125^\circ\text{C}$ | | UNIT |
|-------------|-----------------|-------------|----------------------|--------------------------|--------------------|---|--------------------|--|-----|---|-----|------|
| | | | | | | Recommended | | SN54AHCT541 | | SN54AHCT541 | | |
| | | | | TYP | MAX | MIN | MAX | MIN | MAX | MIN | MAX | |
| t_{PLH} | A | Y | $C_L = 15\text{ pF}$ | 4.1 ⁽¹⁾ | 6.0 ⁽¹⁾ | 1 ⁽¹⁾ | 6.5 ⁽¹⁾ | 1 | 6.5 | 1 | 6.5 | ns |
| t_{PHL} | | | | 4.1 ⁽¹⁾ | 6.0 ⁽¹⁾ | 1 ⁽¹⁾ | 6.5 ⁽¹⁾ | 1 | 6.5 | 1 | 6.5 | |
| t_{PZH} | \overline{OE} | Y | $C_L = 15\text{ pF}$ | 5.0 ⁽¹⁾ | 7.0 ⁽¹⁾ | 1 ⁽¹⁾ | 8.0 ⁽¹⁾ | 1 | 8.0 | 1 | 8.0 | ns |
| t_{PZL} | | | | 5.0 ⁽¹⁾ | 7.0 ⁽¹⁾ | 1 ⁽¹⁾ | 8.0 ⁽¹⁾ | 1 | 8.0 | 1 | 8.0 | |
| t_{PHZ} | \overline{OE} | Y | $C_L = 15\text{ pF}$ | 4.5 ⁽¹⁾ | 7.0 ⁽¹⁾ | 1 ⁽¹⁾ | 8.0 ⁽¹⁾ | 1 | 8.0 | 1 | 8.0 | ns |
| t_{PLZ} | | | | 4.5 ⁽¹⁾ | 7.0 ⁽¹⁾ | 1 ⁽¹⁾ | 8.0 ⁽¹⁾ | 1 | 8.0 | 1 | 8.0 | |
| t_{PLH} | A | Y | $C_L = 50\text{ pF}$ | 6.2 | 8.5 | 1 | 9.5 | 1 | 9.5 | 1 | 9.5 | ns |
| t_{PHL} | | | | 6.2 | 8.5 | 1 | 9.5 | 1 | 9.5 | 1 | 9.5 | |
| t_{PZH} | \overline{OE} | Y | $C_L = 50\text{ pF}$ | 7.5 | 10.0 | 1 | 12 | 1 | 12 | 1 | 12 | ns |
| t_{PZL} | | | | 7.5 | 10.0 | 1 | 12 | 1 | 12 | 1 | 12 | |
| t_{PHZ} | \overline{OE} | Y | $C_L = 50\text{ pF}$ | 7.0 | 10.0 | 1 | 12 | 1 | 12 | 1 | 12 | ns |
| t_{PLZ} | | | | 7.0 | 10.0 | 1 | 12 | 1 | 12 | 1 | 12 | |
| $t_{sk(o)}$ | | | $C_L = 50\text{ pF}$ | | 1 ⁽²⁾ | | | | 1 | 1 | | |

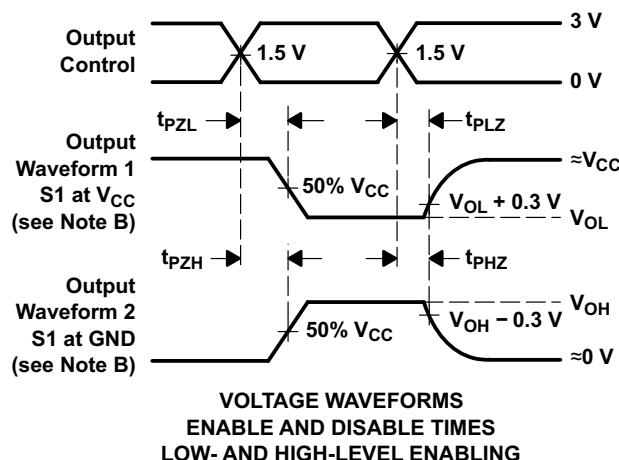
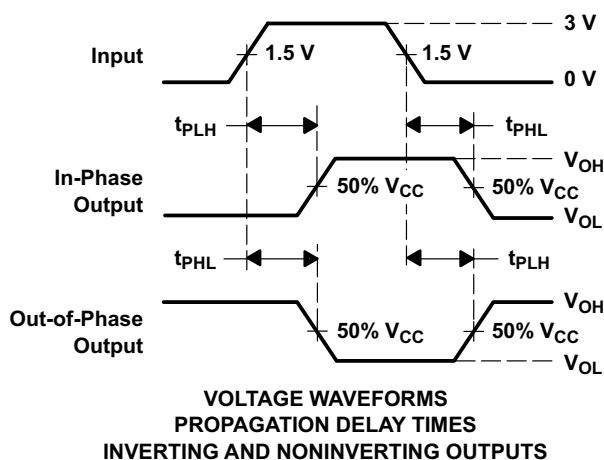
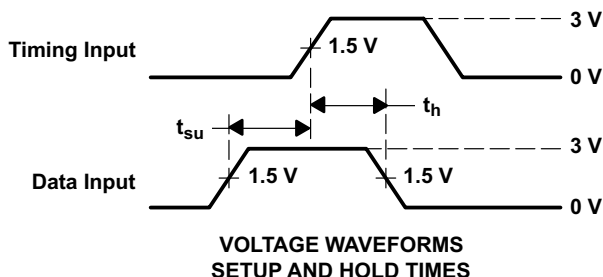
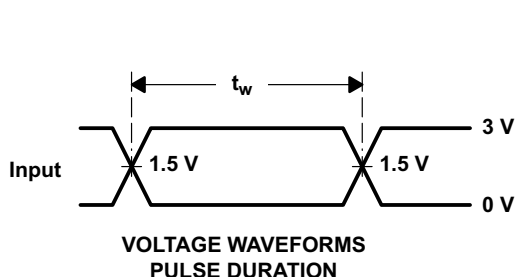
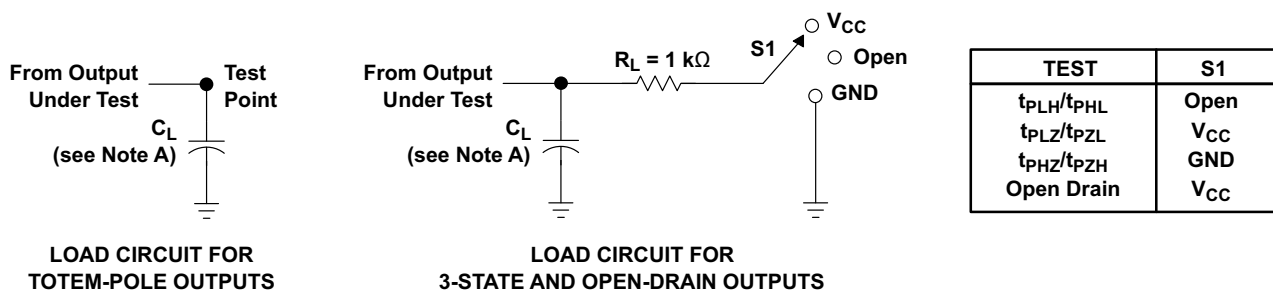
- (1) On products compliant to MIL-PRF-38535, this parameter is not production tested.
 (2) On products compliant to MIL-PRF-38535, this parameter does not apply

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, $f = 1\text{ MHz}$ | 12 | pF |

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: $PRR \leq 1\text{ MHz}$, $Z_O = 50\ \Omega$, $t_r \leq 3\text{ ns}$, $t_f \leq 3\text{ ns}$.
- 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 1. Load Circuit and Voltage Waveforms

REVISION HISTORY

| Changes from Revision O (July 2003) to Revision P | Page |
|---|------|
| • Changed document format from Quicksilver to DocZone. | 1 |
| • Extended operating temperature range to 125°C | 3 |

PACKAGING INFORMATION

| Orderable Device | Status (1) | Package Type | Package Drawing | Pins | Package Qty | Eco Plan (2) | Lead/Ball Finish (6) | MSL Peak Temp (3) | Op Temp (°C) | Device Marking (4/5) | Samples |
|------------------|---------------|--------------|--------------------|------|----------------|----------------------------|-------------------------|----------------------|--------------|---|-------------------------|
| 5962-9685801Q2A | ACTIVE | LCCC | FK | 20 | 1 | TBD | POST-PLATE | N / A for Pkg Type | -55 to 125 | 5962- 9685801Q2A SNJ54AHCT 541FK | Samples |
| 5962-9685801QRA | ACTIVE | CDIP | J | 20 | 1 | TBD | A42 | N / A for Pkg Type | -55 to 125 | 5962-9685801QR A SNJ54AHCT541J | Samples |
| 5962-9685801QSA | ACTIVE | CFP | W | 20 | 1 | TBD | A42 | N / A for Pkg Type | -55 to 125 | 5962-9685801QS A SNJ54AHCT541W | Samples |
| SN74AHCT541DBLE | OBSOLETE | SSOP | DB | 20 | | TBD | Call TI | Call TI | -40 to 125 | | |
| SN74AHCT541DBR | ACTIVE | SSOP | DB | 20 | 2000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM | -40 to 125 | HB541 | Samples |
| SN74AHCT541DBRE4 | ACTIVE | SSOP | DB | 20 | 2000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM | -40 to 125 | HB541 | Samples |
| SN74AHCT541DW | ACTIVE | SOIC | DW | 20 | 25 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM | -40 to 125 | AHCT541 | Samples |
| SN74AHCT541DWG4 | ACTIVE | SOIC | DW | 20 | 25 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM | -40 to 125 | AHCT541 | Samples |
| SN74AHCT541DWR | ACTIVE | SOIC | DW | 20 | 2000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM | -40 to 125 | AHCT541 | Samples |
| SN74AHCT541DWRE4 | ACTIVE | SOIC | DW | 20 | 2000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM | -40 to 125 | AHCT541 | Samples |
| SN74AHCT541N | ACTIVE | PDIP | N | 20 | 20 | Pb-Free (RoHS) | CU NIPDAU | N / A for Pkg Type | -40 to 125 | SN74AHCT541N | Samples |
| SN74AHCT541NSR | ACTIVE | SO | NS | 20 | 2000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM | -40 to 125 | AHCT541 | Samples |
| SN74AHCT541PW | ACTIVE | TSSOP | PW | 20 | 70 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM | -40 to 125 | HB541 | Samples |
| SN74AHCT541PWE4 | ACTIVE | TSSOP | PW | 20 | 70 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM | -40 to 125 | HB541 | Samples |
| SN74AHCT541PWG4 | ACTIVE | TSSOP | PW | 20 | 70 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM | -40 to 125 | HB541 | Samples |
| SN74AHCT541PWLE | OBSOLETE | TSSOP | PW | 20 | | TBD | Call TI | Call TI | -40 to 125 | | |

| Orderable Device | Status (1) | Package Type | Package Drawing | Pins | Package Qty | Eco Plan (2) | Lead/Ball Finish (6) | MSL Peak Temp (3) | Op Temp (°C) | Device Marking (4/5) | Samples |
|------------------|---------------|--------------|-----------------|------|-------------|-------------------------|-------------------------|----------------------|--------------|--------------------------------------|-------------------------|
| SN74AHCT541PWR | ACTIVE | TSSOP | PW | 20 | 2000 | Green (RoHS & no Sb/Br) | CU NIPDAU CU SN | Level-1-260C-UNLIM | -40 to 125 | HB541 | Samples |
| SN74AHCT541PWRE4 | ACTIVE | TSSOP | PW | 20 | 2000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM | -40 to 125 | HB541 | Samples |
| SN74AHCT541PWRG3 | ACTIVE | TSSOP | PW | 20 | 2000 | Green (RoHS & no Sb/Br) | CU SN | Level-1-260C-UNLIM | -40 to 125 | HB541 | Samples |
| SN74AHCT541PWRG4 | ACTIVE | TSSOP | PW | 20 | 2000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM | -40 to 125 | HB541 | Samples |
| SNJ54AHCT541FK | ACTIVE | LCCC | FK | 20 | 1 | TBD | POST-PLATE | N / A for Pkg Type | -55 to 125 | 5962-9685801Q2A SNJ54AHCT541FK | Samples |
| SNJ54AHCT541J | ACTIVE | CDIP | J | 20 | 1 | TBD | A42 | N / A for Pkg Type | -55 to 125 | 5962-9685801QR A SNJ54AHCT541J | Samples |
| SNJ54AHCT541W | ACTIVE | CFP | W | 20 | 1 | TBD | A42 | N / A for Pkg Type | -55 to 125 | 5962-9685801QS A SNJ54AHCT541W | 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) Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check <http://www.ti.com/productcontent> for the latest availability information and additional product content details.

TBD: The Pb-Free/Green conversion plan has not been defined.

Pb-Free (RoHS): TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.

Pb-Free (RoHS Exempt): This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.

Green (RoHS & no Sb/Br): TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

(3) MSL, Peak Temp. - The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

(4) There may be additional marking, which relates to the logo, the lot trace code information, or the environmental category on the device.

(5) Multiple Device Markings will be inside parentheses. Only one Device Marking contained in parentheses and separated by a "~" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Device Marking for that device.

(6) Lead/Ball Finish - Orderable Devices may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead/Ball Finish values may wrap to two lines if the finish value exceeds the maximum column width.

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OTHER QUALIFIED VERSIONS OF SN54AHCT541, SN74AHCT541 :

- Catalog: [SN74AHCT541](#)
- Enhanced Product: [SN74AHCT541-EP](#), [SN74AHCT541-EP](#)
- Military: [SN54AHCT541](#)

NOTE: Qualified Version Definitions:

- Catalog - TI's standard catalog product
- Enhanced Product - Supports Defense, Aerospace and Medical Applications
- Military - QML certified for Military and Defense Applications

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 |
|------------------|--------------|-----------------|------|------|--------------------|--------------------|---------|---------|---------|---------|--------|---------------|
| SN74AHCT541DBR | SSOP | DB | 20 | 2000 | 330.0 | 16.4 | 8.2 | 7.5 | 2.5 | 12.0 | 16.0 | Q1 |
| SN74AHCT541DWR | SOIC | DW | 20 | 2000 | 330.0 | 24.4 | 10.8 | 13.3 | 2.7 | 12.0 | 24.0 | Q1 |
| SN74AHCT541NSR | SO | NS | 20 | 2000 | 330.0 | 24.4 | 9.0 | 13.0 | 2.5 | 4.0 | 24.0 | Q1 |
| SN74AHCT541PWR | TSSOP | PW | 20 | 2000 | 330.0 | 16.4 | 6.95 | 7.1 | 1.6 | 8.0 | 16.0 | Q1 |
| SN74AHCT541PWR | TSSOP | PW | 20 | 2000 | 330.0 | 16.4 | 6.95 | 7.1 | 1.6 | 8.0 | 16.0 | Q1 |
| SN74AHCT541PWRG3 | TSSOP | PW | 20 | 2000 | 330.0 | 16.4 | 6.95 | 7.1 | 1.6 | 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) |
|------------------|--------------|-----------------|------|------|-------------|------------|-------------|
| SN74AHCT541DBR | SSOP | DB | 20 | 2000 | 367.0 | 367.0 | 38.0 |
| SN74AHCT541DWR | SOIC | DW | 20 | 2000 | 367.0 | 367.0 | 45.0 |
| SN74AHCT541NSR | SO | NS | 20 | 2000 | 367.0 | 367.0 | 45.0 |
| SN74AHCT541PWR | TSSOP | PW | 20 | 2000 | 364.0 | 364.0 | 27.0 |
| SN74AHCT541PWR | TSSOP | PW | 20 | 2000 | 367.0 | 367.0 | 38.0 |
| SN74AHCT541PWRG3 | TSSOP | PW | 20 | 2000 | 364.0 | 364.0 | 27.0 |

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.

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

FK (S-CQCC-N**)

LEADLESS CERAMIC CHIP CARRIER

28 TERMINAL SHOWN



| NO. OF TERMINALS ** | A | | B | |
|---------------------|------------------|------------------|------------------|------------------|
| | MIN | MAX | MIN | MAX |
| 20 | 0.342 (8,69) | 0.358 (9,09) | 0.307 (7,80) | 0.358 (9,09) |
| 28 | 0.442 (11,23) | 0.458 (11,63) | 0.406 (10,31) | 0.458 (11,63) |
| 44 | 0.640 (16,26) | 0.660 (16,76) | 0.495 (12,58) | 0.560 (14,22) |
| 52 | 0.740 (18,78) | 0.761 (19,32) | 0.495 (12,58) | 0.560 (14,22) |
| 68 | 0.938 (23,83) | 0.962 (24,43) | 0.850 (21,6) | 0.858 (21,8) |
| 84 | 1.141 (28,99) | 1.165 (29,59) | 1.047 (26,6) | 1.063 (27,0) |



4040140/D 01/11

- NOTES:
- All linear dimensions are in inches (millimeters).
 - This drawing is subject to change without notice.
 - This package can be hermetically sealed with a metal lid.
 - Falls within JEDEC MS-004

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.
 - $\triangle C$ Falls within JEDEC MS-001, except 18 and 20 pin minimum body length (Dim A).
 - $\triangle D$ The 20 pin end lead shoulder width is a vendor option, either half or full width.

DW (R-PDSO-G20)

PLASTIC SMALL OUTLINE



- NOTES:
- A. All linear dimensions are in inches (millimeters). Dimensioning and tolerancing per ASME Y14.5M-1994.
 - B. This drawing is subject to change without notice.
 - C. Body dimensions do not include mold flash or protrusion not to exceed 0.006 (0,15).
 - D. Falls within JEDEC MS-013 variation AC.

PW (R-PDSO-G20)

PLASTIC SMALL OUTLINE



4040064-5/G 02/11

- NOTES:
- A. All linear dimensions are in millimeters. Dimensioning and tolerancing per ASME Y14.5M-1994.
 - B. This drawing is subject to change without notice.
 - C. Body length does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0,15 each side.
 - D. Body width does not include interlead flash. Interlead flash shall not exceed 0,25 each side.
 - E. Falls within JEDEC MO-153

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.

DB (R-PDSO-G**)

PLASTIC SMALL-OUTLINE

28 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.
 D. Falls within JEDEC MO-150

4040065 /E 12/01

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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