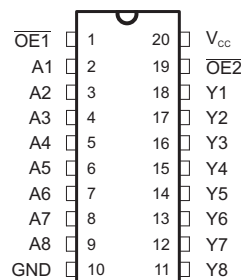


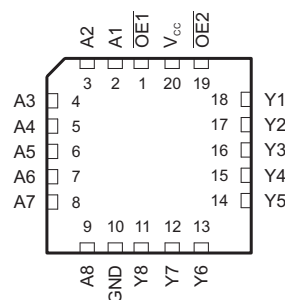
## FEATURES

- State-of-the-Art *EPIC-IIB™* BiCMOS Design Significantly Reduces Power Dissipation
- Latch-Up Performance Exceeds 500 mA Per JEDEC Standard JESD-17
- Typical  $V_{OLP}$  (Output Ground Bounce) < 1 V at  $V_{CC} = 5$  V,  $T_A = 25^\circ\text{C}$
- High-Impedance State During Power Up and Power Down
- High-Drive Outputs ( $-32\text{-mA } I_{OH}$ ,  $64\text{-mA } I_{OL}$ )
- Package Options Include Plastic Small-Outline (DW), Shrink Small-Outline (DB), and Thin Shrink Small-Outline (PW) Packages, Ceramic Chip Carriers (FK), Ceramic Flat (W) Package, and Plastic (N) and Ceramic (J) DIPs

SN54ABT541...J OR W PACKAGE  
SN74ABT541B...DB, DW, N, OR PW PACKAGE  
(TOP VIEW)



SN54ABT541...FK PACKAGE  
(TOP VIEW)



## DESCRIPTION/ORDERING INFORMATION

The SN54ABT541 and SN74ABT541B octal buffers and line drivers are ideal for driving bus lines or buffering memory address registers. The devices feature inputs and outputs on opposite sides of the package to facilitate printed circuit board layout.

### ORDERING INFORMATION

$T_A$	PACKAGE <sup>(1)</sup>		ORDERABLE PART NUMBER	TOP-SIDE MARKING
-40°C to 85°C	PDIP – N	Reel of 1000	SN74ABT541BN	SN74ABT541BN
		Tube of 25	SN74ABT541BDW	
	SOIC – DW	Reel of 2000	SN74ABT541BDWR	ABT541B
	SSOP – DB	Reel of 2000	SN74ABT541BDBR	AB541B
			SN74ABT541BDBRG4	
-55°C to 125°C	TSSOP – PW	Reel of 1050	SN74ABT541BPW	AB541B
		Reel of 2000	SN74ABT541BPWR	
	CDIP – J	Reel of 1000	SNJ54ABT541J	SNJ54ABT541J
	CFP – W	Reel of 510	SNJ54ABT541W	SNJ54ABT541W
	LCCC – FK	Reel of 2200	SNJ54ABT541FK	SNJ54ABT541FK

(1) Package drawings, standard packing quantities, thermal data, symbolization, and PCB design guidelines are available at [www.ti.com/sc/package](http://www.ti.com/sc/package).



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.

EPIC-IIB is a trademark of Texas Instruments.

SN54ABT541, SN74ABT541B  
OCTAL BUFFERS/DRIVERS  
WITH 3-STATE OUTPUTS

SCBS093L–DECEMBER 1993–REVISED DECEMBER 2006

**DESCRIPTION/ORDERING INFORMATION (CONTINUED)**

The 3-state control gate is a two-input AND gate with active-low inputs so that if either output-enable ( $\overline{OE1}$  or  $\overline{OE2}$ ) input is high, all eight outputs are in the high-impedance state.

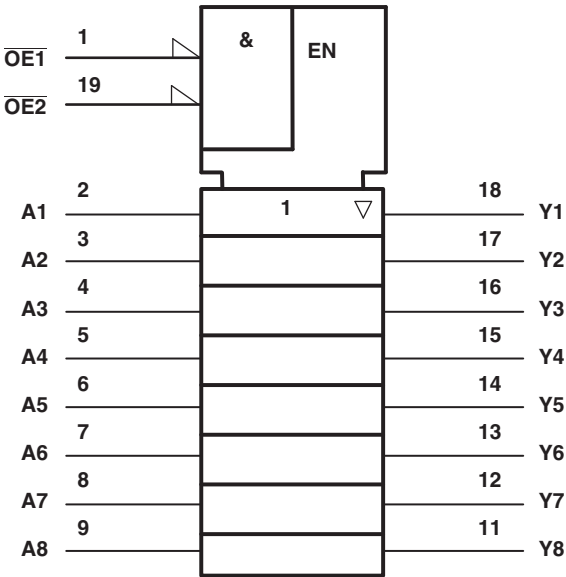
When VCC is between 0 and 2.1 V, the device is in the high-impedance state during power up or power down. However, to ensure the high-impedance state above 2.1 V,  $\overline{OE}$  should be tied to VCC through a pullup resistor; the minimum value of the resistor is determined by the current-sinking capability of the driver.

The SN54ABT541 is characterized for operation over the full military temperature range of  $-55^{\circ}\text{C}$  to  $125^{\circ}\text{C}$ . The SN74ABT541B is characterized for operation from  $-40^{\circ}\text{C}$  to  $85^{\circ}\text{C}$ .

**FUNCTION TABLE**

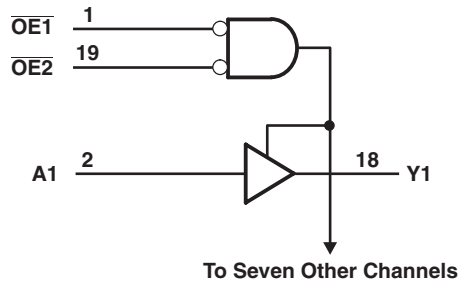
INPUTS			OUTPUTS Y
$\overline{OE1}$	$\overline{OE2}$	A	
L	L	L	L
L	L	H	H
H	X	X	Z
X	H	X	Z

**LOGIC SYMBOL<sup>(1)</sup>**



(1) This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

**LOGIC DIAGRAM (POSITIVE LOGIC)**



## Absolute Maximum Ratings<sup>(1)</sup>

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

		MIN	MAX	UNIT
$V_{CC}$	Supply voltage range	–0.5	7	V
$V_I$	Input voltage range <sup>(2)</sup>	–0.5	7	V
$V_O$	Voltage range applied to any output in the high or power-off state	–0.5	5.5	V
$I_O$	Current into any output in the low state	SN54ABT541	96	mA
		SN74ABT541B	128	
$I_{IK}$	Input clamp current	$V_I < 0$	–18	mA
$I_{OK}$	Output clamp current	$V_O < 0$	–50	mA
$\theta_{JA}$	Package thermal impedance <sup>(3)</sup>	DB package	115	°C/W
		DW package	97	
		N package	67	
		PW package	128	
$T_{stg}$	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 negative-voltage ratings may be exceeded if the input and output clamp-current ratings are observed.
- (3) The package thermal impedance is calculated in accordance with JESD 51, except for through-hole packages, which use a trace length of zero.

## Recommended Operating Conditions<sup>(1)</sup>

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

		SN54ABT541		SN74ABT541B		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
$I_{OH}$	High-level output current		–24		–32	mA
$I_{OL}$	Low-level output current		48		64	mA
$\Delta t/\Delta v$	Input transition rise or fall rate		5		5	ns/V
$\Delta t/\Delta V_{CC}$	Power-up ramp rate			200		μs/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 to ensure proper device operation. Refer to the TI application report, *Implications of Slow or Floating CMOS Inputs*, literature number SCBA004.

# SN54ABT541, SN74ABT541B

## OCTAL BUFFERS/DRIVERS

### WITH 3-STATE OUTPUTS

SCBS093L–DECEMBER 1993–REVISED DECEMBER 2006

## Electrical Characteristics

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

PARAMETER	TEST CONDITIONS		T <sub>A</sub> = 25°C			SN54ABT51		SN74ABT541B		UNIT
			MIN	TYP <sup>(1)</sup>	MAX	MIN	MAX	MIN	MAX	
V <sub>IK</sub>	V <sub>CC</sub> = 4.5 V,	I <sub>I</sub> = –18 mA			–1.2		–1.2		–1.2	V
V <sub>OH</sub>	V <sub>CC</sub> = 4.5 V,	I <sub>OH</sub> = –3 mA	2.5			2.5		2.5		V
	V <sub>CC</sub> = 5 V,	I <sub>OH</sub> = –3 mA	3			3		3		
	V <sub>CC</sub> = 4.5 V,	I <sub>OH</sub> = –24 mA	2			2				
		I <sub>OH</sub> = –32 mA	2 <sup>(2)</sup>					2		
V <sub>OL</sub>	V <sub>CC</sub> = 4.5 V,	I <sub>OL</sub> = 48 mA			0.55		0.55			VV
		I <sub>OL</sub> = 64 mA			0.55 <sup>(2)</sup>				0.55	
V <sub>hys</sub>				100						mV
I <sub>I</sub>	V <sub>CC</sub> = 5.5 V,	V <sub>I</sub> = V <sub>CC</sub> or GND			±1		±1		±1	μA
I <sub>OZPU</sub>	V <sub>CC</sub> = 0 to 2.1 V, V <sub>O</sub> = 0.5 V to 2.7 V, $\overline{OE} = X$				±50 <sup>(3)</sup>		±50 <sup>(3)</sup>		±50	μA
I <sub>OZPD</sub>	V <sub>CC</sub> = 2.1 V to 0, V <sub>O</sub> = 0.5 V to 2.7 V, $\overline{OE} = X$				±50 <sup>(3)</sup>		±50 <sup>(3)</sup>		±50	μA
I <sub>OZH</sub>	V <sub>CC</sub> = 5.5 V,	V <sub>O</sub> = 2.7 V			10		10		10	μA
I <sub>OZL</sub>	V <sub>CC</sub> = 5.5 V,	V <sub>O</sub> = 0.5 V			–10		–10		–10	μA
I <sub>off</sub>	V <sub>CC</sub> = 0 V,	V <sub>I</sub> or V <sub>O</sub> ≤ 4.5 V			±100				±100	μA
I <sub>CEX</sub>	V <sub>CC</sub> = 5.5 V, V <sub>O</sub> = 5.5 V,	Outputs high			50				50	μA
I <sub>O</sub>	V <sub>CC</sub> = 5.5 V <sup>(4)</sup> ,	V <sub>O</sub> = 2.5 V	–50	–140	–180	–50	–180	–50	–180	mA
I <sub>CC</sub>	V <sub>CC</sub> = 5.5 V, I <sub>O</sub> = 0 V, V <sub>I</sub> = V <sub>CC</sub> or GND	Outputs high		5	250		250		250	μA
		Outputs low		22	30		30		30	mA
		Outputs disabled		1	250		250		250	μA
ΔI <sub>CC</sub>	V <sub>CC</sub> = 5.5 V, One input at 3.4 V, Other inputs at V <sub>CC</sub> or GND <sup>(5)</sup>	Outputs enabled			1.5		1.5		1.5	mA
		Outputs disabled			50		50		50	μA
		Control Inputs			1.5		1.2		1.5	mA
C <sub>i</sub>	V <sub>I</sub> = 2.5 V or 0.5 V			3						pF
C <sub>o</sub>	V <sub>O</sub> = 2.5 V or 0.5 V			6						pF

(1) All typical values are at V<sub>CC</sub> = 5 V.

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

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

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

(5) This is the increase in supply current for each input that is at the specified TTL voltage level rather than V<sub>CC</sub> or GND.

### Switching Characteristics, SN54ABT541

over recommended ranges of supply voltage and operating free-air temperature,  $C_L = 50$  pF (unless otherwise noted)  
(see [Figure 1](#))

PARAMETER	FROM (INPUT)	TO (OUTPUT)	VCC = 5 V, TA = 25°C					UNIT
			MIN	TYP	MAX	MIN	MAX	
$t_{PLH}$	A	Y	1	2.6	4.1	1	4.6	ns
$t_{PHL}$			1	2.9	4.2	1	4.7	
$t_{PZH}$	$\overline{OE}$	Y	1.1	3.1	4.8	1.1	5.4	ns
$t_{PZL}$			2.1	4.4	5.9	2.1	7	
$t_{PHZ}$	$\overline{OE}$	Y	2.1	5.1	6.6	2.1	7.5	ns
$t_{PLZ}$			1.7	4.7	6.2	1.7	6.7	

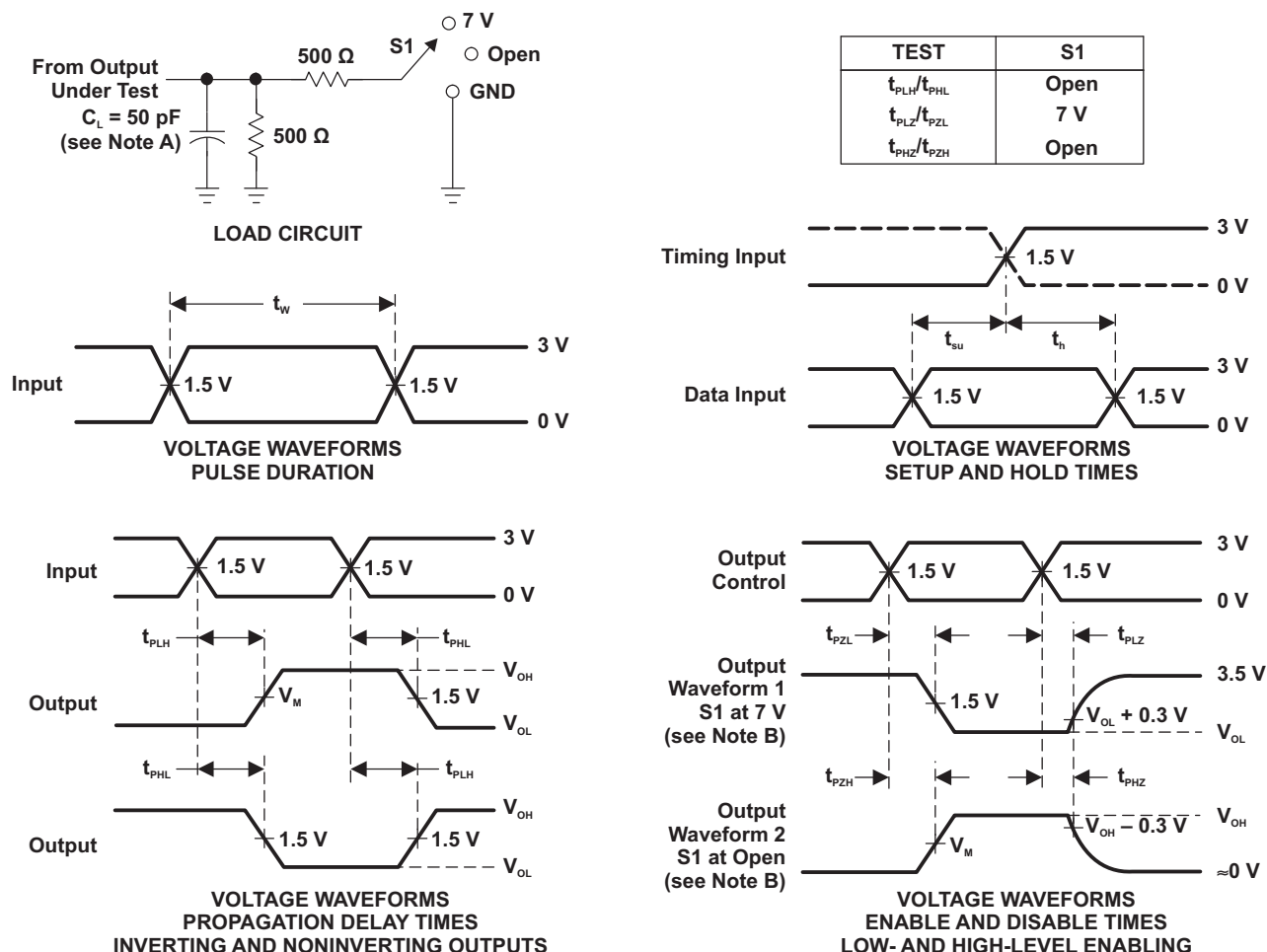
### Switching Characteristics, SN74ABT541B

over recommended ranges of supply voltage and operating free-air temperature,  $C_L = 50$  pF (unless otherwise noted)  
(see [Figure 1](#))

PARAMETER	FROM (INPUT)	TO (OUTPUT)	VCC = 5 V, TA = 25°C					UNIT
			MIN	TYP	MAX	MIN	MAX	
$t_{PLH}$	A	Y	1	2	3.2	1	3.9	ns
$t_{PHL}$			1	2.6	3.5	1	3.9	
$t_{PZH}$	$\overline{OE}$	Y	2	3.5	4.5	2	4	ns
$t_{PZL}$			1.9	4	5.1	1.9	5.9	
$t_{PHZ}$	$\overline{OE}$	Y	2.2	4.4	5.4	2.2	5.8	ns
$t_{PLZ}$			1.5	3	4	1.5	4.4	
$t_{sk(o)}^{(1)}$					0.5		0.5	ns

(1) Skew between any two outputs of the same package switching in the same direction.

## PARAMETER MEASUREMENT INFORMATION



- NOTES:
- $C_L$  includes probe and jig capacitance.
  - 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.
  - All input pulses are supplied by generators having the following characteristics:  $PRR \leq 10 \text{ MHz}$ ,  $Z_o = 50 \Omega$ ,  $t_r \leq 2.5 \text{ ns}$ ,  $t_f \leq 2.5 \text{ ns}$ .
  - The outputs are measured one at a time, with one transition per measurement.

Figure 1. Load Circuit and Voltage Waveforms

**PACKAGING INFORMATION**

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
5962-9471801Q2A	ACTIVE	LCCC	FK	20	1	TBD	POST-PLATE	N / A for Pkg Type	-55 to 125	5962- 9471801Q2A SNJ54 ABT541FK	<a href="#">Samples</a>
5962-9471801QRA	ACTIVE	CDIP	J	20	1	TBD	A42	N / A for Pkg Type	-55 to 125	5962-9471801QR A SNJ54ABT541J	<a href="#">Samples</a>
5962-9471801QSA	ACTIVE	CFP	W	20	1	TBD	Call TI	N / A for Pkg Type	-55 to 125	5962-9471801QS A SNJ54ABT541W	<a href="#">Samples</a>
SN74ABT541BDBLE	OBSOLETE	SSOP	DB	20		TBD	Call TI	Call TI	-40 to 85		
SN74ABT541BDBR	ACTIVE	SSOP	DB	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	AB541B	<a href="#">Samples</a>
SN74ABT541BDBRE4	ACTIVE	SSOP	DB	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	AB541B	<a href="#">Samples</a>
SN74ABT541BDBRG4	ACTIVE	SSOP	DB	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	AB541B	<a href="#">Samples</a>
SN74ABT541BDW	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	ABT541B	<a href="#">Samples</a>
SN74ABT541BDWE4	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	ABT541B	<a href="#">Samples</a>
SN74ABT541BDWG4	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	ABT541B	<a href="#">Samples</a>
SN74ABT541BDWR	ACTIVE	SOIC	DW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	ABT541B	<a href="#">Samples</a>
SN74ABT541BDWRE4	ACTIVE	SOIC	DW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	ABT541B	<a href="#">Samples</a>
SN74ABT541BDWRG4	ACTIVE	SOIC	DW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	ABT541B	<a href="#">Samples</a>
SN74ABT541BN	ACTIVE	PDIP	N	20	20	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	-40 to 85	SN74ABT541BN	<a href="#">Samples</a>
SN74ABT541BNE4	ACTIVE	PDIP	N	20	20	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	-40 to 85	SN74ABT541BN	<a href="#">Samples</a>
SN74ABT541BNSR	ACTIVE	SO	NS	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	ABT541B	<a href="#">Samples</a>

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
SN74ABT541BNSRE4	ACTIVE	SO	NS	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	ABT541B	<a href="#">Samples</a>
SN74ABT541BNSRG4	ACTIVE	SO	NS	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	ABT541B	<a href="#">Samples</a>
SN74ABT541BPW	ACTIVE	TSSOP	PW	20	70	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	AB541B	<a href="#">Samples</a>
SN74ABT541BPWE4	ACTIVE	TSSOP	PW	20	70	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	AB541B	<a href="#">Samples</a>
SN74ABT541BPWG4	ACTIVE	TSSOP	PW	20	70	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	AB541B	<a href="#">Samples</a>
SN74ABT541BPWLE	OBSOLETE	TSSOP	PW	20		TBD	Call TI	Call TI	-40 to 85		
SN74ABT541BPWR	ACTIVE	TSSOP	PW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	AB541B	<a href="#">Samples</a>
SN74ABT541BPWRE4	ACTIVE	TSSOP	PW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	AB541B	<a href="#">Samples</a>
SN74ABT541BPWRG4	ACTIVE	TSSOP	PW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	AB541B	<a href="#">Samples</a>
SNJ54ABT541FK	ACTIVE	LCCC	FK	20	1	TBD	POST-PLATE	N / A for Pkg Type	-55 to 125	5962- 9471801Q2A SNJ54 ABT541FK	<a href="#">Samples</a>
SNJ54ABT541J	ACTIVE	CDIP	J	20	1	TBD	A42	N / A for Pkg Type	-55 to 125	5962-9471801QR A SNJ54ABT541J	<a href="#">Samples</a>
SNJ54ABT541W	ACTIVE	CFP	W	20	1	TBD	Call TI	N / A for Pkg Type	-55 to 125	5962-9471801QS A SNJ54ABT541W	<a href="#">Samples</a>

(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)

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

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

<sup>(5)</sup> 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.

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#### **OTHER QUALIFIED VERSIONS OF SN54ABT541, SN74ABT541B :**

- Catalog: [SN74ABT541](#)
- Automotive: [SN74ABT541B-Q1](#)
- Enhanced Product: [SN74ABT541B-EP](#)

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

**TAPE AND REEL INFORMATION**
**REEL DIMENSIONS**

**TAPE DIMENSIONS**


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

**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
SN74ABT541BDBR	SSOP	DB	20	2000	330.0	16.4	8.2	7.5	2.5	12.0	16.0	Q1
SN74ABT541BDWR	SOIC	DW	20	2000	330.0	24.4	10.8	13.0	2.7	12.0	24.0	Q1
SN74ABT541BNSR	SO	NS	20	2000	330.0	24.4	8.2	13.0	2.5	12.0	24.0	Q1
SN74ABT541BPWR	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)
SN74ABT541BDBR	SSOP	DB	20	2000	367.0	367.0	38.0
SN74ABT541BDWR	SOIC	DW	20	2000	367.0	367.0	45.0
SN74ABT541BNSR	SO	NS	20	2000	367.0	367.0	45.0
SN74ABT541BPWR	TSSOP	PW	20	2000	367.0	367.0	38.0

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.

W (R-GDFP-F20)

CERAMIC DUAL FLATPACK



- NOTES:
- All linear dimensions are in inches (millimeters).
  - This drawing is subject to change without notice.
  - This package can be hermetically sealed with a ceramic lid using glass frit.
  - Index point is provided on cap for terminal identification only.
  - 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\*\*)

16 PINS SHOWN

## PLASTIC DUAL-IN-LINE PACKAGE



PINS **	14	16	18	20
DIM				
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.
  - 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.

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

Example Board Layout

Based on a stencil thickness  
of .127mm (.005inch).



4211284-5/F 12/12

- 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.

# MECHANICAL DATA

NS (R-PDSO-G\*\*)

PLASTIC SMALL-OUTLINE PACKAGE

14-PINS SHOWN



DIM \ PINS **	14	16	20	24
A MAX	10,50	10,50	12,90	15,30
A MIN	9,90	9,90	12,30	14,70

4040062/C 03/03

- 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.

## 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

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