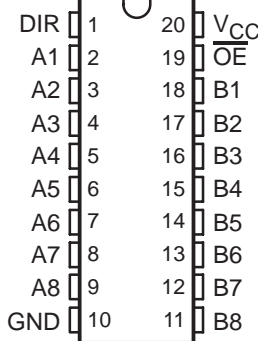


SN54ABT245A, SN74ABT245B OCTAL BUS TRANSCEIVERS WITH 3-STATE OUTPUTS

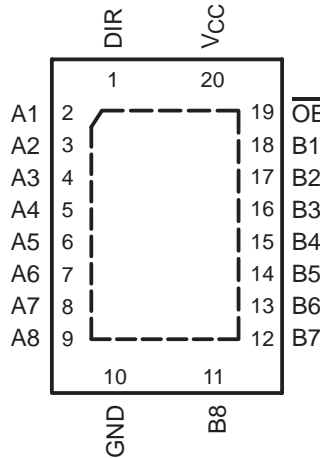
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- Typical V_{OLP} (Output Ground Bounce) <1 V at $V_{CC} = 5$ V, $T_A = 25^\circ\text{C}$
- I_{off} and Power-Up 3-State Support Hot Insertion
- High-Drive Outputs ($-32\text{-mA } I_{OH}$, $64\text{-mA } I_{OL}$)
- Latch-Up Performance Exceeds 500 mA Per JEDEC Standard JESD 17
- ESD Protection Exceeds JESD 22
 - 2000-V Human-Body Model (A114-A)
 - 200-V Machine Model (A115-A)

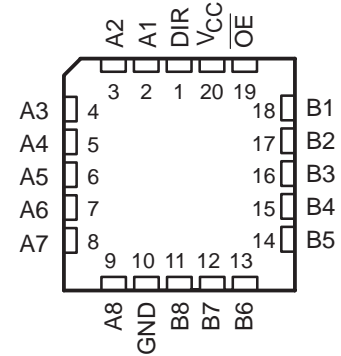
SN54ABT245A . . . J OR W PACKAGE
SN74ABT245B . . . DB, DGV, DW, N, NS,
OR PW PACKAGE
(TOP VIEW)



SN74ABT245B . . . RGY PACKAGE
(TOP VIEW)



SN54ABT245B . . . FK PACKAGE
(TOP VIEW)



description/ordering information

These octal bus transceivers are designed for asynchronous communication between data buses. The devices transmit data from the A bus to the B bus or from the B bus to the A bus, depending on the logic level at the direction-control (DIR) input. The output-enable (\overline{OE}) input can be used to disable the device so the buses are effectively isolated.

ORDERING INFORMATION

| T_A | PACKAGE† | | ORDERABLE PART NUMBER | TOP-SIDE MARKING |
|----------------|---------------|-----------------|-----------------------|------------------|
| -40°C to 85°C | PDIP – N | Tube | SN74ABT245BN | SN74ABT245BN |
| | QFN – RGY | Tape and reel | SN74ABT245BRGYR | AB245B |
| | SOIC – DW | Tube | SN74ABT245BDW | ABT245B |
| | | Tape and reel | SN74ABT245BDWR | |
| | SOP – NS | Tape and reel | SN74ABT245BNSR | ABT245B |
| | SSOP – DB | Tape and reel | SN74ABT245BDBR | AB245B |
| | TSSOP – PW | Tube | SN74ABT245BPW | AB245B |
| | | Tape and reel | SN74ABT245BPWR | |
| | TVSOP – DGV | Tape and reel | SN74ABT245BDGVR | AB245B |
| VFBGA – GQN | Tape and reel | SN74ABT245BGQNR | AB245B | |
| | | SN74ABT245BZQNR | | |
| -55°C to 125°C | CDIP – J | Tube | SNJ54ABT245AJ | SNJ54ABT245AJ |
| | CFP – W | Tube | SNJ54ABT245AW | SNJ54ABT245AW |
| | LCCC – FK | Tube | SNJ54ABT245AFK | SNJ54ABT245AFK |

† Package drawings, standard packing quantities, thermal data, symbolization, and PCB design guidelines are available at 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.

PRODUCTION DATA information is current as of publication date. Products conform to specifications per the terms of Texas Instruments standard warranty. Production processing does not necessarily include testing of all parameters.

 **TEXAS
INSTRUMENTS**

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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.

SN54ABT245A, SN74ABT245B OCTAL BUS TRANSCEIVERS WITH 3-STATE OUTPUTS

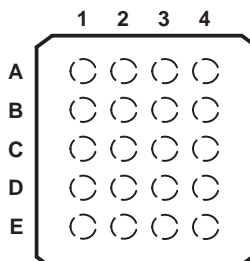
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description/ordering information (continued)

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.

This device is fully specified for hot-insertion applications using I_{off} and power-up 3-state. The I_{off} circuitry disables the outputs, preventing damaging current backflow through the device when it is powered down. The power-up 3-state circuitry places the outputs in the high-impedance state during power up and power down, which prevents driver conflict.

SN74ABT245B . . . GQN OR ZQN PACKAGE
(TOP VIEW)



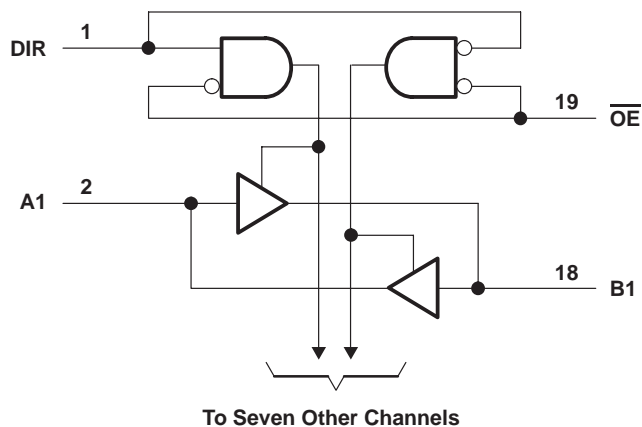
terminal assignments

| | 1 | 2 | 3 | 4 |
|---|-----|-----|----------|-----------------|
| A | A1 | DIR | V_{CC} | \overline{OE} |
| B | A3 | B2 | A2 | B1 |
| C | A5 | A4 | B4 | B3 |
| D | A7 | B6 | A6 | B5 |
| E | GND | A8 | B8 | B7 |

FUNCTION TABLE

| INPUTS | | OPERATION |
|-----------------|-----|-----------------|
| \overline{OE} | DIR | |
| L | L | B data to A bus |
| L | H | A data to B bus |
| H | X | Isolation |

logic diagram (positive logic)



Pin numbers shown are for the DB, DGV, DW, FK, J, N, NS, PW, RGY, and W packages.

SN54ABT245A, SN74ABT245B OCTAL BUS TRANSCEIVERS WITH 3-STATE OUTPUTS

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absolute maximum ratings over operating free-air temperature range (unless otherwise noted)†

| | |
|---|-----------------|
| Supply voltage range, V_{CC} | –0.5 V to 7 V |
| Input voltage range, V_I (except I/O ports) (see Note 1) | –0.5 V to 7 V |
| Voltage range applied to any output in the high or power-off state, V_O | –0.5 V to 5.5 V |
| Current into any output in the low state, I_O : SN54ABT245A | 96 mA |
| SN74ABT245B | 128 mA |
| Input clamp current, I_{IK} ($V_I < 0$) | –18 mA |
| Output clamp current, I_{OK} ($V_O < 0$) | –50 mA |
| Package thermal impedance, θ_{JA} (see Note 2): DB package | 70°C/W |
| (see Note 2): DGV package | 92°C/W |
| (see Note 2): DW package | 58°C/W |
| (see Note 2): GQN/ZQN package | 78°C/W |
| (see Note 2): N package | 69°C/W |
| (see Note 2): NS package | 60°C/W |
| (see Note 2): PW package | 83°C/W |
| (see Note 3): RGY package | 37°C/W |
| Storage temperature range, T_{stg} | –65°C to 150°C |

† 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.

- NOTES: 1. The input and output negative-voltage ratings may be exceeded if the input and output clamp-current ratings are observed.
 2. The package thermal impedance is calculated in accordance with JESD 51-7.
 3. The package thermal impedance is calculated in accordance with JESD 51-5.

recommended operating conditions (see Note 4)

| | SN54ABT245A | | SN74ABT245B | | 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 | V_{CC} | 0 | V_{CC} | 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 | μ s/V |
| T_A Operating free-air temperature | –55 | 125 | –40 | 85 | °C |

NOTE 4: 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.



SN54ABT245A, SN74ABT245B

OCTAL BUS TRANSCEIVERS

WITH 3-STATE OUTPUTS

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

| PARAMETER | TEST CONDITIONS | T _A = 25°C | | | SN54ABT245A | | SN74ABT245B | | UNIT | |
|--------------------|--|--|------------------|-------|-------------|------|-------------|------|------|----|
| | | MIN | TYP† | MAX | MIN | MAX | MIN | MAX | | |
| V _{IK} | V _{CC} = 4.5 V, I _I = -18 mA | | | -1.2 | | -1.2 | | -1.2 | V | |
| V _{OH} | V _{CC} = 4.5 V, I _{OH} = -3 mA | | 2.5 | | 2.5 | | 2.5 | | V | |
| | V _{CC} = 5 V, I _{OH} = -3 mA | | 3 | | 3 | | 3 | | | |
| | V _{CC} = 4.5 V | I _{OH} = -24 mA | 2 | | 2 | | | | | |
| | | I _{OH} = -32 mA | 2* | | | | 2 | | | |
| V _{OL} | V _{CC} = 4.5 V | I _{OL} = 48 mA | | 0.55 | | 0.55 | | | V | |
| | | I _{OL} = 64 mA | | 0.55* | | | 0.55 | | | |
| V _{hys} | | | 100 | | | | | | mV | |
| I _I | Control inputs | V _{CC} = 0 to 5.5 V, V _I = V _{CC} or GND | | ±1 | | ±1 | | ±1 | μA | |
| | A or B ports | V _{CC} = 2.1 V to 5.5 V, V _I = V _{CC} or GND | | ±20 | | ±100 | | ±20 | | |
| I _{OZPU} | V _{CC} = 0 to 2.1 V, V _O = 0.5 V to 2.7 V, $\overline{OE} = X$ | | | ±50 | | ±50 | | ±50 | μA | |
| I _{OZPD} | V _{CC} = 2.1 V to 0, V _O = 0.5 V to 2.7 V, $\overline{OE} = X$ | | | ±50 | | ±50 | | ±50 | μA | |
| I _{OZH} ‡ | V _{CC} = 2.1 V to 5.5 V, V _O = 2.7 V, $\overline{OE} \geq 2$ V | | | 10 | | 10 | | 10 | μA | |
| I _{OZL} ‡ | V _{CC} = 2.1 V to 5.5 V, V _O = 0.5 V, $\overline{OE} \geq 2$ V | | | -10 | | -10 | | -10 | μA | |
| I _{off} | V _{CC} = 0, V _I or V _O ≤ 5.5 V | | | ±100 | | | | ±100 | μA | |
| I _{CEX} | V _{CC} = 5.5 V, V _O = 5.5 V | Outputs high | | 50 | | 50 | | 50 | μA | |
| I _O § | V _{CC} = 5.5 V, V _O = 2.5 V | | -50 | -140 | -180 | -50 | -180 | -50 | -180 | mA |
| I _{CC} | A or B ports | V _{CC} = 5.5 V, I _O = 0, V _I = V _{CC} or GND | Outputs high | | 5 | 250 | 250 | 250 | μA | |
| | | | Outputs low | | 22 | 30 | 30 | 30 | mA | |
| | | | Outputs disabled | | 1 | 250 | 250 | 250 | μA | |
| ΔI _{CC} ¶ | Data inputs | V _{CC} = 5.5 V, One input at 3.4 V, Other inputs at V _{CC} or GND | Outputs enabled | | 1.5 | | 1.5 | | 1.5 | mA |
| | | | Outputs disabled | | 50 | | 50 | | 50 | μA |
| | Control inputs | V _{CC} = 5.5 V, One input at 3.4 V, Other inputs at V _{CC} or GND | | 1.5 | | 1.5 | | 1.5 | mA | |
| C _i | Control inputs | V _I = 2.5 V or 0.5 V | | 4 | | | | | pF | |
| C _{io} | A or B ports | V _O = 2.5 V or 0.5 V | | 8 | | | | | pF | |

* On products compliant to MIL-PRF-38535, this parameter does not apply.

† All typical values are at V_{CC} = 5 V.

‡ The parameters I_{OZH} and I_{OZL} include the input leakage current.

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

¶ This is the increase in supply current for each input that is at the specified TTL voltage level, rather than V_{CC} or GND.



**SN54ABT245A, SN74ABT245B
OCTAL BUS TRANSCEIVERS
WITH 3-STATE OUTPUTS**

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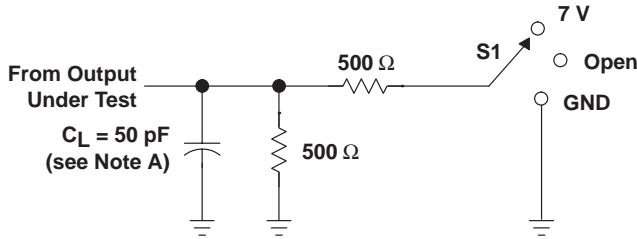
switching characteristics over recommended ranges of supply voltage and operating free-air temperature, $C_L = 50$ pF (unless otherwise noted) (see Figure 1)

| PARAMETER | FROM (INPUT) | TO (OUTPUT) | $V_{CC} = 5$ V, $T_A = 25^\circ$ C | | | SN54ABT245A | | SN74ABT245B | | UNIT |
|-------------|-----------------|----------------|---------------------------------------|-----|-----|-------------|-----|-------------|-----|------|
| | | | MIN | TYP | MAX | MIN | MAX | MIN | MAX | |
| t_{PLH} | A or B | B or A | 1 | 2 | 3.2 | 0.8 | 3.8 | 1 | 3.6 | ns |
| t_{PHL} | | | 1 | 2.6 | 3.5 | 1 | 4.2 | 1 | 3.9 | |
| t_{PZH} | \overline{OE} | A or B | 2 | 3.5 | 4.5 | 1.2 | 6.2 | 2 | 5.6 | ns |
| t_{PZL} | | | 1.9 | 4 | 5.3 | 1.3 | 6.8 | 1.9 | 6.2 | |
| t_{PHZ} | \overline{OE} | A or B | 2.2 | 4.4 | 5.4 | 2.2 | 6.1 | 2.2 | 5.9 | ns |
| t_{PLZ} | | | 1.5 | 3 | 4 | 1.0 | 4.9 | 1.5 | 4.5 | |
| $t_{sk(o)}$ | | | | | 0.5 | | | 0.5 | ns | |

SN54ABT245A, SN74ABT245B
OCTAL BUS TRANSCEIVERS
WITH 3-STATE OUTPUTS

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PARAMETER MEASUREMENT INFORMATION

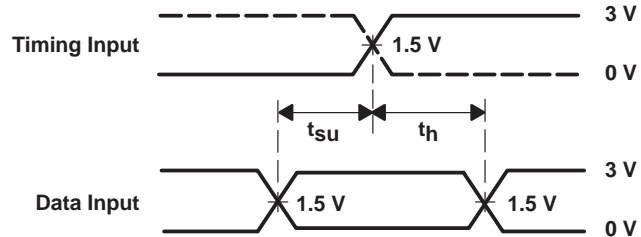


LOAD CIRCUIT

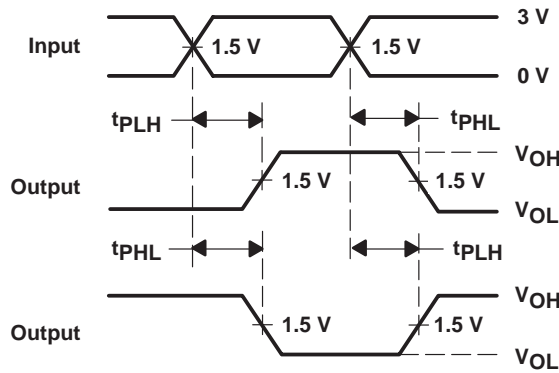
| TEST | S1 |
|-------------------|------|
| t_{PLH}/t_{PHL} | Open |
| t_{PLZ}/t_{PZL} | 7 V |
| t_{PHZ}/t_{PZH} | Open |



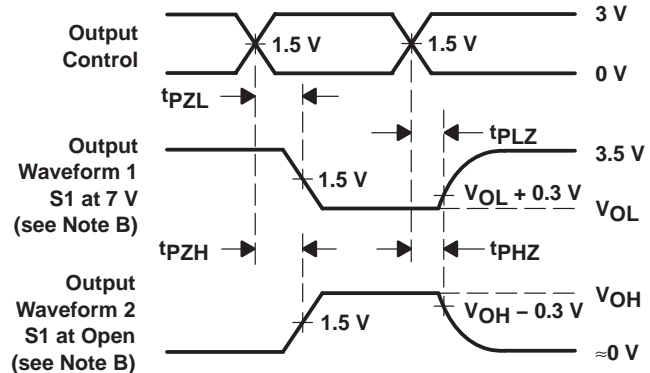
VOLTAGE WAVEFORMS
PULSE DURATION



VOLTAGE WAVEFORMS
SETUP AND HOLD TIMES



VOLTAGE WAVEFORMS
PROPAGATION DELAY TIMES
INVERTING AND NONINVERTING OUTPUTS



VOLTAGE WAVEFORMS
ENABLE AND DISABLE TIMES
LOW- AND HIGH-LEVEL ENABLING

- 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: $PRR \leq 10$ 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 transition per measurement.
 E. All parameters and waveforms are not applicable to all devices.

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⁾ |
|-------------------|-----------------------|--------------|-----------------|------|-------------|-------------------------|------------------|--|
| 5962-9214802Q2A | ACTIVE | LCCC | FK | 20 | 1 | TBD | Call TI | Level-NC-NC-NC |
| 5962-9214802QRA | ACTIVE | CDIP | J | 20 | 1 | TBD | Call TI | Level-NC-NC-NC |
| 5962-9214802QSA | ACTIVE | CFP | W | 20 | 1 | TBD | Call TI | Level-NC-NC-NC |
| SN74ABT245BDBLE | OBSOLETE | SSOP | DB | 20 | | TBD | Call TI | Call TI |
| SN74ABT245BDBR | ACTIVE | SSOP | DB | 20 | 2000 | Pb-Free (RoHS) | CU NIPDAU | Level-2-260C-1 YEAR/ Level-1-235C-UNLIM |
| SN74ABT245BDGVR | ACTIVE | TVSOP | DGV | 20 | 2000 | Pb-Free (RoHS) | CU NIPDAU | Level-1-250C-UNLIM |
| SN74ABT245BDGVRE4 | ACTIVE | TVSOP | DGV | 20 | 2000 | TBD | Call TI | Call TI |
| SN74ABT245BDW | ACTIVE | SOIC | DW | 20 | 25 | Pb-Free (RoHS) | CU NIPDAU | Level-2-250C-1 YEAR/ Level-1-235C-UNLIM |
| SN74ABT245BDWR | ACTIVE | SOIC | DW | 20 | 2000 | Pb-Free (RoHS) | CU NIPDAU | Level-2-250C-1 YEAR/ Level-1-235C-UNLIM |
| SN74ABT245BGQNR | ACTIVE | VFBGA | GQN | 20 | 1000 | TBD | SNPB | Level-1-240C-UNLIM |
| SN74ABT245BN | ACTIVE | PDIP | N | 20 | 20 | Pb-Free (RoHS) | CU NIPDAU | Level-NC-NC-NC |
| SN74ABT245BNSR | ACTIVE | SO | NS | 20 | 2000 | Pb-Free (RoHS) | CU NIPDAU | Level-2-260C-1 YEAR/ Level-1-235C-UNLIM |
| SN74ABT245BPW | ACTIVE | TSSOP | PW | 20 | 70 | Pb-Free (RoHS) | CU NIPDAU | Level-1-250C-UNLIM |
| SN74ABT245BPWE4 | ACTIVE | TSSOP | PW | 20 | 70 | Pb-Free (RoHS) | CU NIPDAU | Level-1-250C-UNLIM |
| SN74ABT245BPWLE | OBSOLETE | TSSOP | PW | 20 | | TBD | Call TI | Call TI |
| SN74ABT245BPWR | ACTIVE | TSSOP | PW | 20 | 2000 | Pb-Free (RoHS) | CU NIPDAU | Level-1-250C-UNLIM |
| SN74ABT245BPWRE4 | ACTIVE | TSSOP | PW | 20 | 2000 | Pb-Free (RoHS) | CU NIPDAU | Level-1-250C-UNLIM |
| SN74ABT245BRGYR | ACTIVE | QFN | RGY | 20 | 1000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-2-260C-1YEAR |
| SN74ABT245BZQNR | ACTIVE | VFBGA | ZQN | 20 | 1000 | Pb-Free (RoHS) | SNAGCU | Level-1-260C-UNLIM |
| SNJ54ABT245AFK | ACTIVE | LCCC | FK | 20 | 1 | TBD | Call TI | Level-NC-NC-NC |
| SNJ54ABT245AJ | ACTIVE | CDIP | J | 20 | 1 | TBD | Call TI | Level-NC-NC-NC |
| SNJ54ABT245AW | ACTIVE | CFP | W | 20 | 1 | TBD | Call TI | Level-NC-NC-NC |

⁽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) 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.

Green (RoHS & no Sb/Br): TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame