

# SN74CBT162292

## 12-BIT 1-OF-2 FET MULTIPLEXER/DEMULTIPLEXER WITH INTERNAL PULLDOWN RESISTORS

SCDS052E – MARCH 1998 – REVISED OCTOBER 2000

- Member of Texas Instruments' Widebus™ Family
- TTL-Compatible Control Input Levels
- Isolation Under Power-Off Conditions
- Make-Before-Break Feature
- Internal 500-Ω Pulldown Resistors to Ground
- A-Port Inputs/Outputs Have Equivalent 25-Ω Series Resistors, So No External Resistors Are Required
- Latch-Up Performance Exceeds 250 mA Per JESD 17

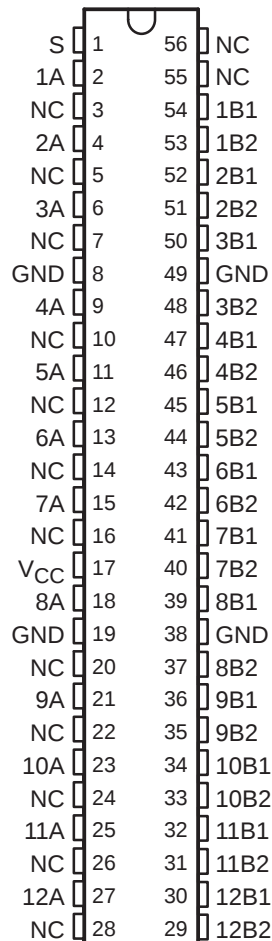
### description

The SN74CBT162292 is a 12-bit 1-of-2 high-speed TTL-compatible FET multiplexer/demultiplexer. The low on-state resistance of the switch allows connections to be made with minimal propagation delay.

When the select (S) input is low, port A is connected to port B1, and  $R_{INT}$  is connected to port B2. When S is high, port A is connected to port B2, and  $R_{INT}$  is connected to port B1.

The A-port inputs/outputs include equivalent 25-Ω series resistors to reduce overshoot and undershoot.

### DGG, DGV, OR DL PACKAGE (TOP VIEW)



NC – No internal connection

### ORDERING INFORMATION

| $T_A$         | PACKAGE†    |               | ORDERABLE PART NUMBER | TOP-SIDE MARKING |
|---------------|-------------|---------------|-----------------------|------------------|
| –40°C to 85°C | SSOP – DL   | Tube          | SN74CBT162292DL       | CBT162292        |
|               |             | Tape and reel | SN74CBT162292DLR      |                  |
|               | TSSOP – DGG | Tape and reel | SN74CBT162292DGGR     | CBT162292        |
|               | TVSOP – DGV | Tape and reel | SN74CBT162292DGVR     | CY2292           |

† 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).



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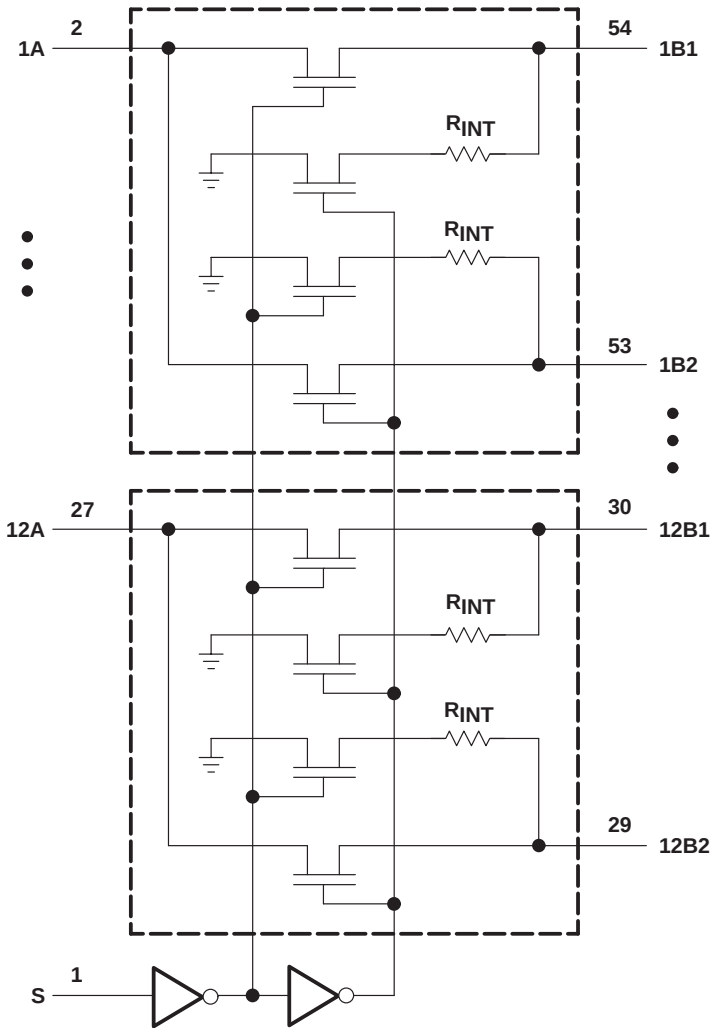
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FUNCTION TABLE

| INPUT<br>S | FUNCTION                                       |
|------------|------------------------------------------------|
| L          | A port = B1 port<br>R <sub>INT</sub> = B2 port |
| H          | A port = B2 port<br>R <sub>INT</sub> = B1 port |

logic diagram (positive logic)



## 3

**SN74CBT162292**  
**12-BIT 1-OF-2 FET MULTIPLEXER/DEMULTIPLEXER**  
**WITH INTERNAL PULLDOWN RESISTORS**

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**switching characteristics over recommended operating free-air temperature range,  $C_L = 50$  pF, (unless otherwise noted) (see Figure 1)**

| PARAMETER        | FROM<br>(INPUT) | TO<br>(OUTPUT) | $V_{CC} = 4$ V |      | $V_{CC} = 5$ V<br>$\pm 0.5$ V |      | UNIT |
|------------------|-----------------|----------------|----------------|------|-------------------------------|------|------|
|                  |                 |                | MIN            | MAX  | MIN                           | MAX  |      |
| $t_{pd}^\dagger$ | A or B          | B or A         |                | 1.9  |                               | 1.85 | ns   |
| $t_{en}$         | S               | A or B         | 1              | 10.7 | 1                             | 9.5  | ns   |
| $t_{dis}$        | S               | A or B         | 1              | 10.9 | 1                             | 9.7  | ns   |

<sup>†</sup> The propagation delay is the calculated RC time constant of the typical on-state resistance of the switch and the specified load capacitance, when driven by an ideal voltage source (zero output impedance).

**switching characteristics over recommended operating free-air temperature range,  $C_L = 50$  pF, (unless otherwise noted) (see Figure 1)**

| PARAMETER          | DESCRIPTION            | $V_{CC} = 4$ V |     | $V_{CC} = 5$ V<br>$\pm 0.5$ V |     | UNIT |
|--------------------|------------------------|----------------|-----|-------------------------------|-----|------|
|                    |                        | MIN            | MAX | MIN                           | MAX |      |
| $t_{mbb}^\ddagger$ | Make-before-break time | 0              | 2   | 0                             | 2   | ns   |

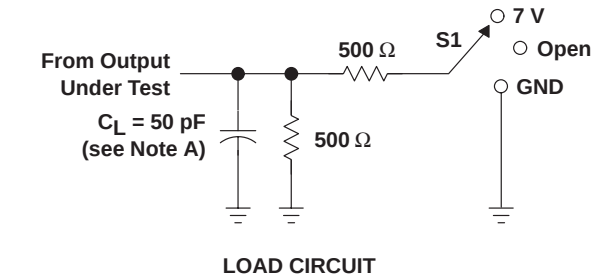
<sup>‡</sup> The make-before-break time is the time interval between make and break, during the transition from one selected port to the other.

# SN74CBT162292

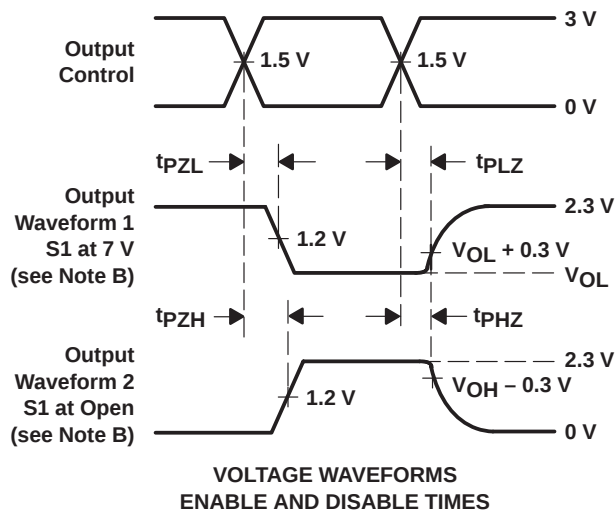
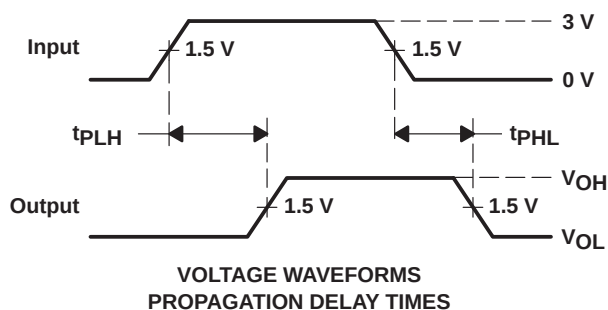
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### PARAMETER MEASUREMENT INFORMATION



| TEST              | S1   |
|-------------------|------|
| $t_{pd}$          | Open |
| $t_{pZL}/t_{pLZ}$ | 7 V  |
| $t_{pZH}/t_{pHZ}$ | Open |



- 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 connected to the internal 500- $\Omega$  pulldown resistor. Waveform 2 is for an output with internal conditions such that the output is high except when connected to the internal 500- $\Omega$  pulldown resistor.
  - All pulse inputs and DC inputs 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.
  - $t_{pLZ}$  and  $t_{pHZ}$  are the same as  $t_{dis}$ .  $Z = R_{INT} = 500 \Omega$ .
  - $t_{pZL}$  and  $t_{pZH}$  are the same as  $t_{en}$ .  $Z = R_{INT} = 500 \Omega$ .
  - $t_{PLH}$  and  $t_{PHL}$  are the same as  $t_{pd}$ .

Figure 1. Load Circuit and Voltage Waveforms

**PACKAGING INFORMATION**

| Orderable Device  | Status <sup>(1)</sup> | Package Type | Package Drawing | Pins | Package Qty | Eco Plan <sup>(2)</sup> | Lead/Ball Finish | MSL Peak Temp <sup>(3)</sup> |
|-------------------|-----------------------|--------------|-----------------|------|-------------|-------------------------|------------------|------------------------------|
| 74CBT162292DGGRE4 | ACTIVE                | TSSOP        | DGG             | 56   | 2000        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| 74CBT162292DGGRG4 | ACTIVE                | TSSOP        | DGG             | 56   | 2000        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| 74CBT162292DGVRE4 | ACTIVE                | TVSOP        | DGV             | 56   | 2000        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| 74CBT162292DGVRG4 | ACTIVE                | TVSOP        | DGV             | 56   | 2000        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| 74CBT162292DLRG4  | ACTIVE                | SSOP         | DL              | 56   |             | TBD                     | Call TI          | Call TI                      |
| SN74CBT162292DGGR | ACTIVE                | TSSOP        | DGG             | 56   | 2000        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| SN74CBT162292DGVR | ACTIVE                | TVSOP        | DGV             | 56   | 2000        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| SN74CBT162292DL   | ACTIVE                | SSOP         | DL              | 56   | 20          | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| SN74CBT162292DLG4 | ACTIVE                | SSOP         | DL              | 56   | 20          | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |

<sup>(1)</sup> 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.

<sup>(2)</sup> 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.

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**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 |
|-------------------|--------------|-----------------|------|------|--------------------|--------------------|---------|---------|---------|---------|--------|---------------|
| SN74CBT162292DGGR | TSSOP        | DGG             | 56   | 2000 | 330.0              | 24.4               | 8.6     | 15.6    | 1.8     | 12.0    | 24.0   | Q1            |
| SN74CBT162292DGVR | TVSOP        | DGV             | 56   | 2000 | 330.0              | 24.4               | 6.8     | 11.7    | 1.6     | 12.0    | 24.0   | Q1            |

## TAPE AND REEL BOX DIMENSIONS



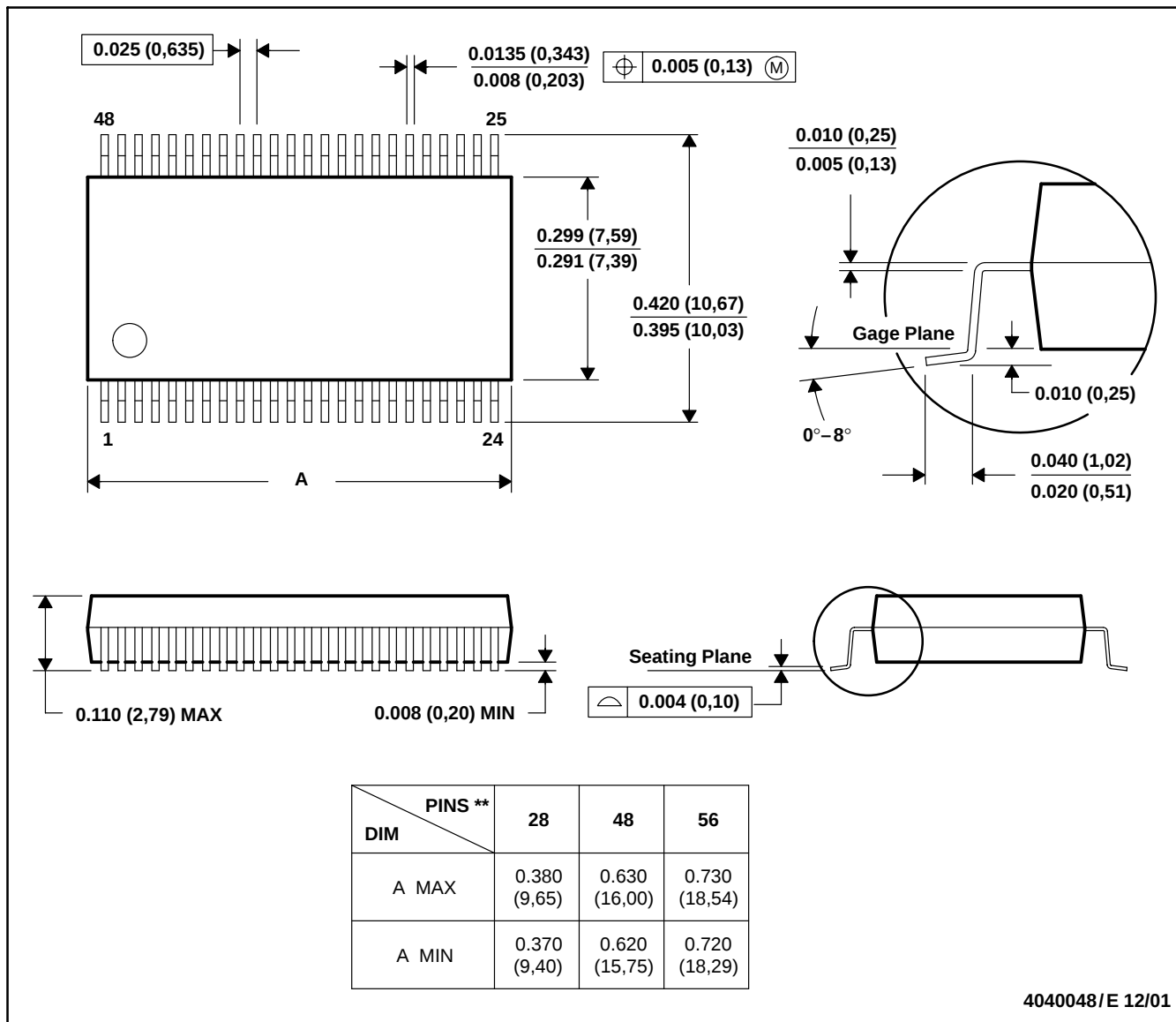
\*All dimensions are nominal

| Device            | Package Type | Package Drawing | Pins | SPQ  | Length (mm) | Width (mm) | Height (mm) |
|-------------------|--------------|-----------------|------|------|-------------|------------|-------------|
| SN74CBT162292DGGR | TSSOP        | DGG             | 56   | 2000 | 346.0       | 346.0      | 41.0        |
| SN74CBT162292DGVR | TVSOP        | DGV             | 56   | 2000 | 346.0       | 346.0      | 41.0        |

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

PLASTIC SMALL-OUTLINE PACKAGE

48 PINS SHOWN



- NOTES: A. All linear dimensions are in inches (millimeters).  
 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 MO-118

## DGG (R-PDSO-G\*\*)

## PLASTIC SMALL-OUTLINE PACKAGE

48 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 protrusion not to exceed 0,15.  
 D. Falls within JEDEC MO-153

## 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

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