- Member of the Texas Instruments Widebus™ Family
- 5-Ω Switch Connection Between Two Ports
- Rail-to-Rail Switching on Data I/O Ports
- I_{off} Supports Partial-Power-Down Mode Operation

description/ordering information

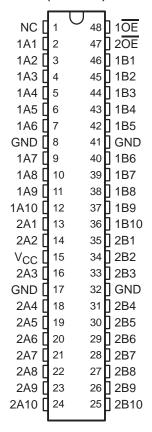
The SN74CBTLV16210 provides 20 bits of high-speed bus switching. The low on-state resistance of the switch allows connections to be made with minimal propagation delay.

The device is organized as dual 10-bit bus switches with separate output-enable (\overline{OE}) inputs. It can be used as two 10-bit bus switches or as one 20-bit bus switch. When \overline{OE} is low, the associated 10-bit bus switch is on, and port A is connected to port B. When \overline{OE} is high, the switch is open, and the high-impedance state exists between the two ports.

This device is fully specified for partial-power-down applications using I_{off}. The I_{off} feature ensures that damaging current will not backflow through the device when it is powered down. The device has isolation during power off.

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.

DGV OR DL PACKAGE (TOP VIEW)



NC - No internal connection

ORDERING INFORMATION

TA	PACKAGE [†]		ORDERABLE PART NUMBER	TOP-SIDE MARKING
	0000 01	Tube	SN74CBTLV16210DL	ODTI \
-40°C to 85°C	SSOP – DL	Tape and reel	SN74CBTLV16210DLR	CBTLV16210
	TVSOP - DGV	Tape and reel	SN74CBTLV16210VR	CN210

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

FUNCTION TABLE (each 10-bit bus switch)

INPUT OE	FUNCTION
L	A port = B port
Н	Disconnect

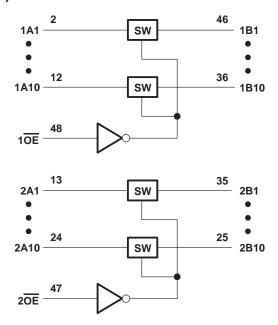


Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.

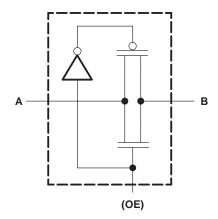
Widebus is a trademark of Texas Instruments.



logic diagram (positive logic)



simplified schematic, each FET switch



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

Supply voltage range, V _{CC}	-0.5 V to 4.6 V
Input voltage range, V _I (see Note 1)	-0.5 V to 4.6 V
Continuous channel current	128 mA
Input clamp current, I_{IK} ($V_I < 0$)	–50 mA
Package thermal impedance, θ _{JA} (see Note 2): DGV package	58°C/W
DL package	63°C/W
Storage temperature range, T _{eta}	-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.



SCDS042J - DECEMBER 1997 - REVISED JULY 2004

recommended operating conditions (see Note 3)

		MI	MAX	UNIT
Vcc	Supply voltage	2.	3 3.6	V
.,	$V_{CC} = 2.3 \text{ V to } 2.3 \text{ V}$	7 V 1.	7	.,
VIH	High-level control input voltage $V_{CC} = 2.7 \text{ V to } 3.$	6 V	2	V
.,	$V_{CC} = 2.3 \text{ V to } 2.3 \text{ V}$	7 V	0.7	
VIL	Low-level control input voltage $V_{CC} = 2.7 \text{ V to } 3.6 \text{ V}$			V
TA	Operating free-air temperature	-4	0 85	°C

NOTE 3: All unused control 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 recommended operating free-air temperature range (unless otherwise noted)

PARAMETER			MIN	TYP [†]	MAX	UNIT		
VIK		$V_{CC} = 3 V$,	$I_{I} = -18 \text{ mA}$				-1.2	V
IĮ		$V_{CC} = 3.6 \text{ V},$	$V_I = V_{CC}$ or GND				±1	μΑ
loff		$V_{CC} = 0$,	V_{I} or $V_{O} = 0$ to 3.6	V			10	μΑ
Icc		$V_{CC} = 3.6 \text{ V},$	I _O = 0,	$V_I = V_{CC}$ or GND			10	μΑ
∆lcc [‡]	Control inputs	V _{CC} = 3.6 V,	One input at 3 V,	Other inputs at V _{CC} or GND			300	μΑ
Ci	Control inputs	V _I = 3 V or 0				4.5		pF
C _{io(OFF}	-)	$V_{O} = 3 \text{ V or } 0,$	OE = V _{CC}			6.5		pF
		.,	., .	I _I = 64 mA		5	8	
		$V_{CC} = 2.3 \text{ V},$ TYP at $V_{CC} = 2.5 \text{ V}$	V _I = 0	I _I = 24 mA		5	8	
8		111 at vcc = 2.0 v	V _I = 1.7 V,	I _I = 15 mA		27	40	0
r _{on} §			., .	I _I = 64 mA		5	7	Ω
		V _{CC} = 3 V	V _I = 0	I _I = 24 mA		5	7	
			V _I = 2.4 V,	I _I = 15 mA		10	15	

[†] All typical values are at $V_{CC} = 3.3 \text{ V}$ (unless otherwise noted), $T_A = 25^{\circ}\text{C}$.

switching characteristics over recommended operating free-air temperature range (unless otherwise noted) (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V _{CC} = ± 0.2	2.5 V 2 V	V _{CC} = ± 0.3	UNIT	
	(INPOT)	(001701)	MIN	MAX	MIN	MAX	.
t _{pd} ¶	A or B	B or A		0.15		0.25	ns
t _{en}	ŌE	A or B	1	6.8	1	6	ns
^t dis	ŌE	A or B	1	7.3	1	7.4	ns

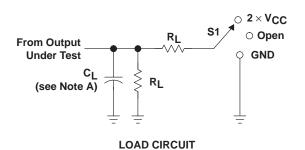
The propagation delay is the calculated RC time constant of the typical on-state resistance of the switch and the specified load capacitance, when driven by an ideal voltage source (zero output impedance).



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

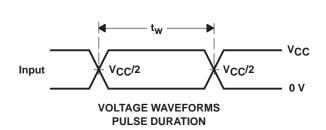
[§] Measured by the voltage drop between the A and B terminals at the indicated current through the switch. On-state resistance is determined by the lower of the voltages of the two (A or B) terminals.

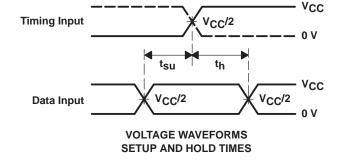
PARAMETER MEASUREMENT INFORMATION

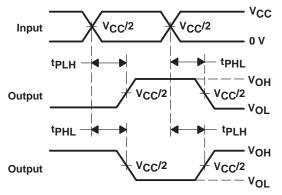


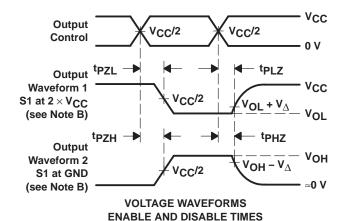
TEST	S1
tPLH/tPHL	Open
tPLZ/tPZL	2×V _{CC}
tPHZ/tPZH	GND

VCC	CL	RL	$v_{\scriptscriptstyle\Delta}$
2.5 V \pm 0.2 V	30 pF	500 Ω	0.15 V
3.3 V \pm 0.3 V	50 pF	500 Ω	0.3 V









LOW- AND HIGH-LEVEL ENABLING

VOLTAGE WAVEFORMS PROPAGATION DELAY TIMES **INVERTING AND NONINVERTING OUTPUTS**

NOTES: A. C_I 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, $Z_Q = 50 \ \Omega$, $t_f \leq$ 2 ns. $t_f \leq$ 2 ns.
- D. The outputs are measured one at a time, with one transition per measurement.
- E. tpLz and tpHz are the same as tdis.
- F. tpzL and tpzH are the same as ten.
- G. tpLH and tpHL are the same as tpd.
- H. All parameters and waveforms are not applicable to all devices.

Figure 1. Load Circuit and Voltage Waveforms



www.ti.com 11-Nov-2025

PACKAGING INFORMATION

Orderable part number	Status	Material type	Package Pins	Package qty Carrier	RoHS	Lead finish/ Ball material	MSL rating/ Peak reflow	Op temp (°C)	Part marking
	(1)	(2)			(3)	(4)	(5)		(0)
SN74CBTLV16210DL	Active	Production	SSOP (DL) 48	25 TUBE	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	CBTLV16210
SN74CBTLV16210DL.B	Active	Production	SSOP (DL) 48	25 TUBE	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	CBTLV16210
SN74CBTLV16210DLR	Active	Production	SSOP (DL) 48	1000 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	CBTLV16210
SN74CBTLV16210DLR.B	Active	Production	SSOP (DL) 48	1000 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	CBTLV16210
SN74CBTLV16210GR	Active	Production	TSSOP (DGG) 48	2000 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	CBTLV16210
SN74CBTLV16210GR.B	Active	Production	TSSOP (DGG) 48	2000 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	CBTLV16210
SN74CBTLV16210GRG4	Active	Production	TSSOP (DGG) 48	2000 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	CBTLV16210
SN74CBTLV16210GRG4.B	Active	Production	TSSOP (DGG) 48	2000 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	CBTLV16210
SN74CBTLV16210VR	Active	Production	TVSOP (DGV) 48	2000 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	CN210
SN74CBTLV16210VR.B	Active	Production	TVSOP (DGV) 48	2000 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	CN210

⁽¹⁾ Status: For more details on status, see our product life cycle.

Multiple part markings will be inside parentheses. Only one part marking contained in parentheses and separated by a "~" will appear on a part. If a line is indented then it is a continuation of the previous line and the two combined represent the entire part marking for that device.

Important Information and Disclaimer: The information provided on this page represents TI's knowledge and belief as of the date that it is provided. TI bases its knowledge and belief on information provided by third parties, and makes no representation or warranty as to the accuracy of such information. Efforts are underway to better integrate information from third parties. TI has taken and continues to take reasonable steps to provide representative

⁽²⁾ Material type: When designated, preproduction parts are prototypes/experimental devices, and are not yet approved or released for full production. Testing and final process, including without limitation quality assurance, reliability performance testing, and/or process qualification, may not yet be complete, and this item is subject to further changes or possible discontinuation. If available for ordering, purchases will be subject to an additional waiver at checkout, and are intended for early internal evaluation purposes only. These items are sold without warranties of any kind.

⁽³⁾ RoHS values: Yes, No, RoHS Exempt. See the TI RoHS Statement for additional information and value definition.

⁽⁴⁾ Lead finish/Ball material: Parts 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.

⁽⁵⁾ **MSL rating/Peak reflow:** The moisture sensitivity level ratings and peak solder (reflow) temperatures. In the event that a part has multiple moisture sensitivity ratings, only the lowest level per JEDEC standards is shown. Refer to the shipping label for the actual reflow temperature that will be used to mount the part to the printed circuit board.

⁽⁶⁾ Part marking: There may be an additional marking, which relates to the logo, the lot trace code information, or the environmental category of the part.



PACKAGE OPTION ADDENDUM

www.ti.com 11-Nov-2025

and accurate information but may not have conducted destructive testing or chemical analysis on incoming materials and chemicals. TI and TI suppliers consider certain information to be proprietary, and thus CAS numbers and other limited information may not be available for release.

In no event shall TI's liability arising out of such information exceed the total purchase price of the TI part(s) at issue in this document sold by TI to Customer on an annual basis.

PACKAGE MATERIALS INFORMATION

www.ti.com 24-Jul-2025

TAPE AND REEL INFORMATION





A0	Dimension designed to accommodate the component width
В0	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

QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



*All dimensions are nominal

Device	Package Type	Package Drawing		SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
SN74CBTLV16210DLR	SSOP	DL	48	1000	330.0	32.4	11.35	16.2	3.1	16.0	32.0	Q1
SN74CBTLV16210GR	TSSOP	DGG	48	2000	330.0	24.4	8.6	13.0	1.8	12.0	24.0	Q1
SN74CBTLV16210GRG4	TSSOP	DGG	48	2000	330.0	24.4	8.6	13.0	1.8	12.0	24.0	Q1
SN74CBTLV16210VR	TVSOP	DGV	48	2000	330.0	16.4	7.1	10.2	1.6	12.0	16.0	Q1



www.ti.com 24-Jul-2025



*All dimensions are nominal

7 til dillioliolollo dio Hollilla									
Device	Device Package Type		Package Type Package Drawing P		Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN74CBTLV16210DLR	SSOP	DL	48	1000	356.0	356.0	53.0		
SN74CBTLV16210GR	TSSOP	DGG	48	2000	356.0	356.0	45.0		
SN74CBTLV16210GRG4	TSSOP	DGG	48	2000	356.0	356.0	45.0		
SN74CBTLV16210VR	TVSOP	DGV	48	2000	353.0	353.0	32.0		

PACKAGE MATERIALS INFORMATION

www.ti.com 24-Jul-2025

TUBE



*All dimensions are nominal

Device	Package Name	Package Type	Pins	SPQ	L (mm)	W (mm)	T (µm)	B (mm)
SN74CBTLV16210DL	DL	SSOP	48	25	473.7	14.24	5110	7.87
SN74CBTLV16210DL.B	DL	SSOP	48	25	473.7	14.24	5110	7.87

DL (R-PDSO-G48)

PLASTIC SMALL-OUTLINE PACKAGE



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

PowerPAD is a trademark of Texas Instruments.



DGV (R-PDSO-G**)

24 PINS SHOWN

PLASTIC SMALL-OUTLINE



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





SMALL OUTLINE PACKAGE



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. Reference JEDEC registration MO-153.



SMALL OUTLINE PACKAGE



NOTES: (continued)

- 5. Publication IPC-7351 may have alternate designs.
- 6. Solder mask tolerances between and around signal pads can vary based on board fabrication site.



SMALL OUTLINE PACKAGE



NOTES: (continued)

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



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

IMPORTANT NOTICE AND DISCLAIMER

TI PROVIDES TECHNICAL AND RELIABILITY DATA (INCLUDING DATASHEETS), DESIGN RESOURCES (INCLUDING REFERENCE DESIGNS), APPLICATION OR OTHER DESIGN ADVICE, WEB TOOLS, SAFETY INFORMATION, AND OTHER RESOURCES "AS IS" AND WITH ALL FAULTS, AND DISCLAIMS ALL WARRANTIES, EXPRESS AND IMPLIED, INCLUDING WITHOUT LIMITATION ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT OF THIRD PARTY INTELLECTUAL PROPERTY RIGHTS.

These resources are intended for skilled developers designing with TI products. You are solely responsible for (1) selecting the appropriate TI products for your application, (2) designing, validating and testing your application, and (3) ensuring your application meets applicable standards, and any other safety, security, regulatory or other requirements.

These resources are subject to change without notice. TI grants you permission to use these resources only for development of an application that uses the TI products described in the resource. Other reproduction and display of these resources is prohibited. No license is granted to any other TI intellectual property right or to any third party intellectual property right. TI disclaims responsibility for, and you fully indemnify TI and its representatives against any claims, damages, costs, losses, and liabilities arising out of your use of these resources.

TI's products are provided subject to TI's Terms of Sale, TI's General Quality Guidelines, or other applicable terms available either on ti.com or provided in conjunction with such TI products. TI's provision of these resources does not expand or otherwise alter TI's applicable warranties or warranty disclaimers for TI products. Unless TI explicitly designates a product as custom or customer-specified, TI products are standard, catalog, general purpose devices.

TI objects to and rejects any additional or different terms you may propose.

Copyright © 2025, Texas Instruments Incorporated

Last updated 10/2025