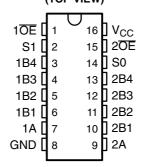
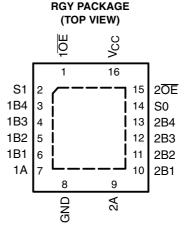
### TTL-Compatible Input Levels

D, DB, DBQ, OR PW PACKAGE (TOP VIEW)





### description/ordering information

The SN74CBT3253 is a dual 1-of-4 high-speed TTL-compatible FET multiplexer/demultiplexer. The low on-state resistance of the switch allows connections to be made with minimal propagation delay.

10E, 20E, S0, and S1 select the appropriate B output for the A-input data.

#### ORDERING INFORMATION

T <sub>A</sub>	PACKAGI	<u>=</u> †	ORDERABLE PART NUMBER	TOP-SIDE MARKING	
	QFN – RGY	Tape and reel	SN74CBT3253RGYR	CU253	
	colo D	Tube	SN74CBT3253D	CDTOOLO	
	SOIC - D	Tape and reel	SN74CBT3253DR	CBT3253	
-40°C to 85°C	SSOP – DB	Tape and reel	SN74CBT3253DBR	CU253	
	SSOP (QSOP) – DBQ	Tape and reel	SN74CBT3253DBQR	CU253	
	TOCOD DW	Tube	SN74CBT3253PW	OLIOFO	
	TSSOP – PW	Tape and reel	SN74CBT3253PWR	CU253	

<sup>&</sup>lt;sup>†</sup> Package drawings, standard packing quantities, thermal data, symbolization, and PCB design quidelines are available at www.ti.com/sc/package.

#### **FUNCTION TABLE**

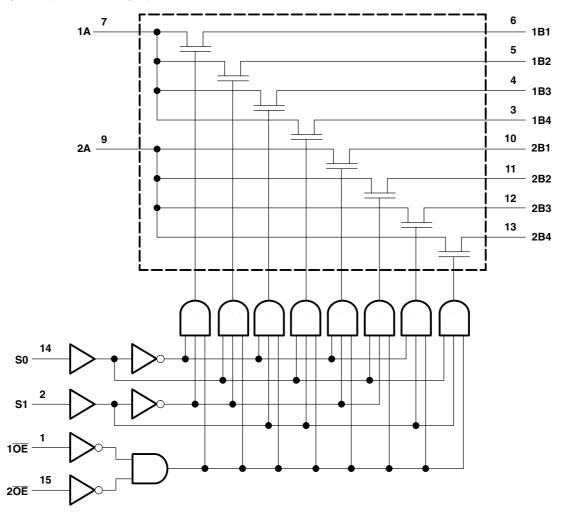
	INPU	JTS	FUNCTION	
10E	2 <mark>OE</mark>	S1	S0	FUNCTION
Χ	Н	Х	Х	Disconnect 1A and 2A
Н	X	Χ	X	Disconnect 1A and 2A
L	L	L	L	1A to 1B1 and 2A to 2B1
L	L	L	Н	1A to 1B2 and 2A to 2B2
L	L	Н	L	1A to 1B3 and 2A to 2B3
L	L	Н	Н	1A to 1B4 and 2A to 2B4



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 (positive logic)



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

Supply voltage range, V <sub>CC</sub>	–0.5 V to 7 V
Input voltage range, V <sub>I</sub> (see Note 1)	–0.5 V to 7 V
Continuous channel current	128 mA
Input clamp current, $I_K(V_{I/O} < 0)$	–50 mA
Package thermal impedance, $\theta_{JA}$ (see Note 2): D package	73°C/W
(see Note 2): DB package	82°C/W
(see Note 2): DBQ package	90°C/W
(see Note 2): PW package	108°C/W
(see Note 3): RGY package	39°C/W
Storage temperature range, T <sub>stg</sub> 6	5°C to 150°C

<sup>†</sup> 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.



SCDS018O - MAY 1995 - REVISED JANUARY 2004

### recommended operating conditions (see Note 4)

		MIN	MAX	UNIT
V <sub>CC</sub>	Supply voltage	4	5.5	V
V <sub>IH</sub>	High-level control input voltage	2		V
V <sub>IL</sub>	Low-level control input voltage		0.8	V
T <sub>A</sub>	Operating free-air temperature	-40	85	°C

NOTE 4: All unused control inputs of the device must be held at V<sub>CC</sub> 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)

PA	RAMETER		TEST CONDIT	MIN	TYP†	MAX	UNIT	
$V_{IK}$		$V_{CC} = 4.5 \text{ V},$	I <sub>I</sub> = -18 mA				-1.2	V
II		$V_{CC} = 5 V$ ,	$V_I = 5.5 \text{ V or GND}$	V <sub>I</sub> = 5.5 V or GND			±1	μΑ
I <sub>CC</sub>		$V_{CC} = 5.5 V$ ,	$I_O = 0$ ,	$V_I = V_{CC}$ or GND			3	μΑ
$\Delta I_{CC}^{\ddagger}$	Control inputs	$V_{CC} = 5.5 V$ ,	One input at 3.4 V,	Other inputs at V <sub>CC</sub> or GND			2.5	mA
C <sub>i</sub>	Control inputs	$V_I = 3 V \text{ or } 0$				3.5		pF
•	A port	V 0.V 0	<u> </u>			10		
C <sub>io(OFF)</sub>	B port	$V_{O} = 3 \text{ V or } 0,$	$\overline{OE} = V_{CC}$			4		pF
			V 0	I <sub>I</sub> = 64 mA		5	7	
r <sub>on</sub> §		$V_{CC} = 4.5 \text{ V}$	V <sub>I</sub> = 0	I <sub>I</sub> = 30 mA		5	7	Ω
			$V_1 = 2.4 V$ ,	I <sub>I</sub> = 15 mA		10	15	

 $<sup>^{\</sup>dagger}$  All typical values are at VCC = 5 V (unless otherwise noted), TA = 25  $^{\circ}$ C.

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

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V <sub>CC</sub> = 4 V	V <sub>CC</sub> =	UNIT	
	(INPOT)	(001701)	MIN MAX	MIN	MAX	
t <sub>pd</sub> ¶	A or B	B or A	0.35		0.25	ns
t <sub>pd</sub>	S	A or B	6.6	1.6	6.2	ns
	S	A D	7.1	1.3	6.3	
t <sub>en</sub>	ŌĒ	A or B	7.3	1.4	6.4	ns
t <sub>dis</sub>	S	A or D	7.9	1.1	7.4	
	ŌĒ	A or B	7.3	2.3	7	ns

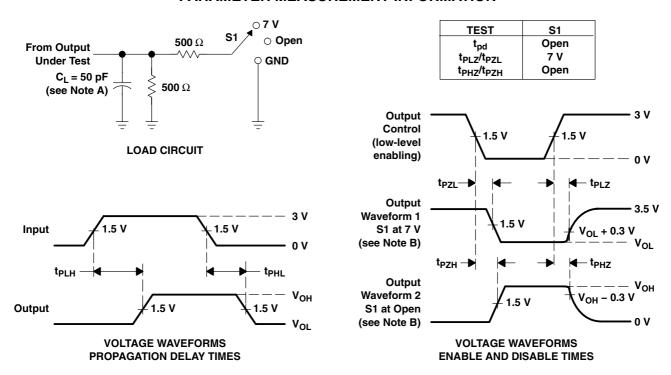
The propagation delay is the calculated RC time constant of the typical on-state resistance of the switch and the specified load capacitance, when driven by an ideal voltage source (zero output impedance).

<sup>&</sup>lt;sup>‡</sup> 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.

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

SCDS018O - MAY 1995 - REVISED JANUARY 2004

#### PARAMETER MEASUREMENT INFORMATION



NOTES: A. C<sub>L</sub> 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,  $Z_O = 50 \Omega$ ,  $t_f \leq$  2.5 ns,  $t_f \leq$  2.5 ns.
- D. The outputs are measured one at a time with one transition per measurement.
- E.  $t_{PLZ}$  and  $t_{PHZ}$  are the same as  $t_{dis}$ .
- F. t<sub>PZL</sub> and t<sub>PZH</sub> are the same as t<sub>en</sub>.
- G.  $t_{PHL}$  and  $t_{PLH}$  are the same as  $t_{pd}$ .
- H. All parameters and waveforms are not applicable to all devices.

Figure 1. Load Circuit and Voltage Waveforms







10-Jun-2014

#### **PACKAGING INFORMATION**

Orderable Device	Status	Package Type	Package Drawing	Pins	Package Qty	Eco Plan	Lead/Ball Finish	MSL Peak Temp	Op Temp (°C)	Device Marking (4/5)	Samples
SN74CBT3253D	ACTIVE	SOIC	D	16	40	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	CBT3253	Samples
SN74CBT3253DBLE	OBSOLETE	SSOP	DB	16		TBD	Call TI	Call TI	-40 to 85		
SN74CBT3253DBQR	ACTIVE	SSOP	DBQ	16	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	-40 to 85	CU253	Samples
SN74CBT3253DBQRG4	ACTIVE	SSOP	DBQ	16	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	-40 to 85	CU253	Samples
SN74CBT3253DBR	ACTIVE	SSOP	DB	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	CU253	Samples
SN74CBT3253DBRG4	ACTIVE	SSOP	DB	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	CU253	Samples
SN74CBT3253DG4	ACTIVE	SOIC	D	16	40	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	CBT3253	Samples
SN74CBT3253DR	ACTIVE	SOIC	D	16	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	CBT3253	Samples
SN74CBT3253DRE4	ACTIVE	SOIC	D	16	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	CBT3253	Samples
SN74CBT3253PW	ACTIVE	TSSOP	PW	16	90	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	CU253	Samples
SN74CBT3253PWLE	OBSOLETE	TSSOP	PW	16		TBD	Call TI	Call TI	-40 to 85		
SN74CBT3253PWR	ACTIVE	TSSOP	PW	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	CU253	Samples
SN74CBT3253PWRG4	ACTIVE	TSSOP	PW	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	CU253	Samples
SN74CBT3253RGYR	ACTIVE	VQFN	RGY	16	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	-40 to 85	CU253	Samples

<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.



### PACKAGE OPTION ADDENDUM

10-Jun-2014

(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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## PACKAGE MATERIALS INFORMATION

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### TAPE AND REEL INFORMATION





	Dimension designed to accommodate the component width
	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

All difficusions are nominal												
Device		Package Drawing		SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
SN74CBT3253DBR	SSOP	DB	16	2000	330.0	16.4	8.2	6.6	2.5	12.0	16.0	Q1
SN74CBT3253DR	SOIC	D	16	2500	330.0	16.4	6.5	10.3	2.1	8.0	16.0	Q1
SN74CBT3253PWR	TSSOP	PW	16	2000	330.0	12.4	6.9	5.6	1.6	8.0	12.0	Q1
SN74CBT3253RGYR	VQFN	RGY	16	3000	330.0	12.4	3.8	4.3	1.5	8.0	12.0	Q1

www.ti.com 26-Jan-2013



\*All dimensions are nominal

7 III GITTIOTOTOTO GITO TTOTTIITIGI							
Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN74CBT3253DBR	SSOP	DB	16	2000	367.0	367.0	38.0
SN74CBT3253DR	SOIC	D	16	2500	333.2	345.9	28.6
SN74CBT3253PWR	TSSOP	PW	16	2000	367.0	367.0	35.0
SN74CBT3253RGYR	VQFN	RGY	16	3000	367.0	367.0	35.0

# D (R-PDS0-G16)

### PLASTIC SMALL OUTLINE



- A. All linear dimensions are in inches (millimeters).
- B. This drawing is subject to change without notice.
- Body length does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.006 (0,15) each side.
- Body width does not include interlead flash. Interlead flash shall not exceed 0.017 (0,43) each side.
- E. Reference JEDEC MS-012 variation AC.



# D (R-PDSO-G16)

## PLASTIC SMALL OUTLINE



- A. All linear dimensions are in millimeters.
- B. This drawing is subject to change without notice.
- C. Publication IPC-7351 is recommended for alternate designs.
- 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.



PW (R-PDSO-G16)

### PLASTIC SMALL OUTLINE



- A. All linear dimensions are in millimeters. Dimensioning and tolerancing per ASME Y14.5M—1994.
- B. This drawing is subject to change without notice.
- Body length does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0,15 each side.
- 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-G16)

# PLASTIC SMALL OUTLINE



- A. All linear dimensions are in millimeters.
- B. This drawing is subject to change without notice.
- C. Publication IPC-7351 is recommended for alternate designs.
- 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



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. QFN (Quad Flatpack No-Lead) package configuration.
- D. The package thermal pad must be soldered to the board for thermal and mechanical performance.
- E. See the additional figure in the Product Data Sheet for details regarding the exposed thermal pad features and dimensions.
- Pin 1 identifiers are located on both top and bottom of the package and within the zone indicated. The Pin 1 identifiers are either a molded, marked, or metal feature.
- G. Package complies to JEDEC MO-241 variation BA.



## RGY (R-PVQFN-N16)

### PLASTIC QUAD FLATPACK NO-LEAD

#### THERMAL INFORMATION

This package incorporates an exposed thermal pad that is designed to be attached directly to an external heatsink. The thermal pad must be soldered directly to the printed circuit board (PCB). After soldering, the PCB can be used as a heatsink. In addition, through the use of thermal vias, the thermal pad can be attached directly to the appropriate copper plane shown in the electrical schematic for the device, or alternatively, can be attached to a special heatsink structure designed into the PCB. This design optimizes the heat transfer from the integrated circuit (IC).

For information on the Quad Flatpack No—Lead (QFN) package and its advantages, refer to Application Report, QFN/SON PCB Attachment, Texas Instruments Literature No. SLUA271. This document is available at www.ti.com.

The exposed thermal pad dimensions for this package are shown in the following illustration.



Bottom View

Exposed Thermal Pad Dimensions

4206353-3/P 03/14

NOTE: All linear dimensions are in millimeters



# RGY (R-PVQFN-N16)

## PLASTIC QUAD FLATPACK NO-LEAD



- A. All linear dimensions are in millimeters.
- B. This drawing is subject to change without notice.
- C. Publication IPC-7351 is recommended for alternate designs.
- D. This package is designed to be soldered to a thermal pad on the board. Refer to Application Note, Quad Flat—Pack QFN/SON PCB Attachment, Texas Instruments Literature No. SLUA271, and also the Product Data Sheets for specific thermal information, via requirements, and recommended board layout. These documents are available at www.ti.com <a href="https://www.ti.com">http://www.ti.com</a>.
- E. 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 stencil design considerations.
- F. Customers should contact their board fabrication site for minimum solder mask web tolerances between signal pads.



# DBQ (R-PDSO-G16)

## PLASTIC SMALL-OUTLINE PACKAGE

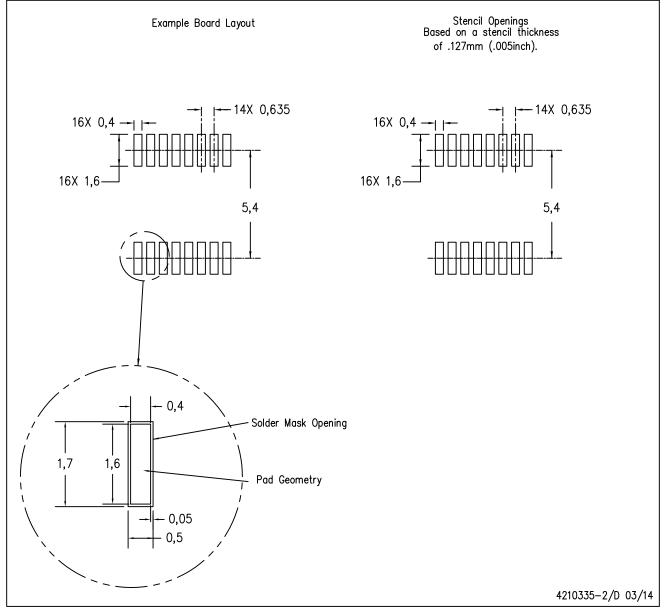


- A. All linear dimensions are in inches (millimeters).
- B. This drawing is subject to change without notice.
- C. Body dimensions do not include mold flash or protrusion not to exceed 0.006 (0,15) per side.
- D. Falls within JEDEC MO-137 variation AB.



DBQ (R-PDSO-G16)

# PLASTIC SMALL OUTLINE PACKAGE



- A. All linear dimensions are in millimeters.
- B. This drawing is subject to change without notice.
- C. Publication IPC-7351 is recommended for alternate designs.
- 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. Example stencil design based on a 50% volumetric metal load solder paste. Refer to IPC-7525 for other stencil recommendations.



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