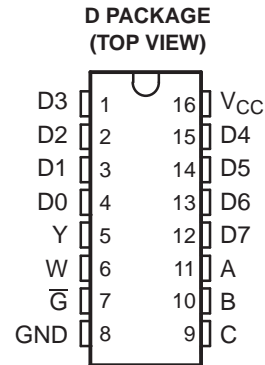


## 8-LINE TO 1-LINE DATA SELECTOR/MULTIPLEXER

### FEATURES

- Qualified for Automotive Applications
- Wide Operating Voltage Range of 2 V to 6 V
- Outputs Can Drive up to 10 LSTTL Loads
- $\pm 6$ -mA Output Drive at 5 V
- Low Input Current of 1  $\mu$ A Max
- 8-Line to 1-Line Multiplexers Can Perform as:
  - Boolean-Function Generators
  - Parallel-to-Serial Converters
  - Data Source Selectors



### DESCRIPTION/ORDERING INFORMATION

This data selector/multiplexer provides full binary decoding to select one of eight data sources. The strobe ( $\overline{G}$ ) input must be at a low logic level to enable the inputs. A high level at the strobe terminal forces the W output high and the Y output low.

#### ORDERING INFORMATION<sup>(1)</sup>

$T_A$	PACKAGE <sup>(2)</sup>		ORDERABLE PART NUMBER	TOP-SIDE MARKING
–40°C to 125°C	SOIC – D	Reel of 2500	SN74HC151QDRQ1	HC151Q

- (1) For the most current package and ordering information, see the Package Option Addendum at the end of this document, or see the TI web site at [www.ti.com](http://www.ti.com).
- (2) Package drawings, thermal data, and symbolization are available at [www.ti.com/packaging](http://www.ti.com/packaging).

#### FUNCTION TABLE

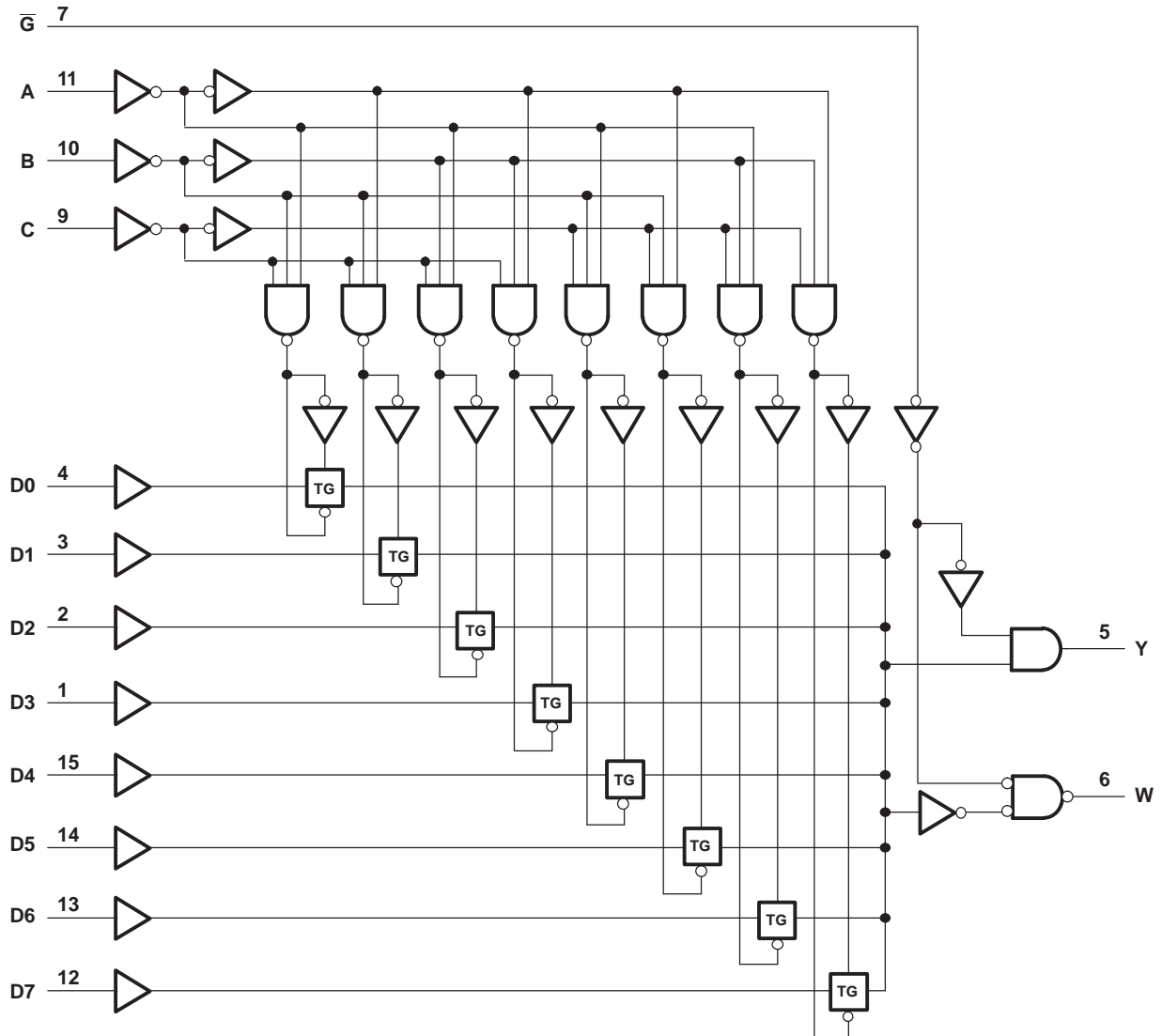
INPUTS				OUTPUTS <sup>(1)</sup>	
SELECT			STROBE $\overline{G}$	Y	W
C	B	A			
X	X	X	H	L	H
L	L	L	L	D0	$\overline{D0}$
L	L	H	L	D1	$\overline{D1}$
L	H	L	L	D2	$\overline{D2}$
L	H	H	L	D3	$\overline{D3}$
H	L	L	L	D4	$\overline{D4}$
H	L	H	L	D5	$\overline{D5}$
H	H	L	L	D6	$\overline{D6}$
H	H	H	L	D7	$\overline{D7}$

(1) D0, D1 . . . D7 = the level of the respective D input



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LOGIC DIAGRAM (POSITIVE LOGIC)



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

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

			MIN	MAX	UNIT
$V_{CC}$	Supply voltage range		-0.5	7	V
$I_{IK}$	Input clamp current	$V_I < 0$ or $V_I > V_{CC}$ <sup>(2)</sup>		±20	mA
$I_{OK}$	Output clamp current	$V_O < 0$ or $V_O > V_{CC}$ <sup>(2)</sup>		±20	mA
$I_O$	Continuous output current	$V_O = 0$ to $V_{CC}$		±35	mA
	Continuous current through $V_{CC}$ or GND			±70	mA
$\theta_{JA}$	Package thermal impedance <sup>(3)</sup>			73	°C/W
$T_{stg}$	Storage temperature range		-65	150	°C
ESD rating		Human-body model		2	kV
		Charged-device model		1	kV
		Machine model		200	V

- (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 voltage ratings may be exceeded if the input and output current ratings are observed.
- (3) The package thermal impedance is calculated in accordance with JESD 51-7.

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

			MIN	NOM	MAX	UNIT
$V_{CC}$	Supply voltage		2	5	6	V
$V_{IH}$	High-level input voltage	$V_{CC} = 2$ V	1.5			V
		$V_{CC} = 4.5$ V	3.15			
		$V_{CC} = 6$ V	4.2			
$V_{IL}$	Low-level input voltage	$V_{CC} = 2$ V			0.5	V
		$V_{CC} = 4.5$ V			1.35	
		$V_{CC} = 6$ V			1.8	
$V_I$	Input voltage		0		$V_{CC}$	V
$V_O$	Output voltage		0		$V_{CC}$	V
$\Delta t/\Delta v$	Input transition rise/fall time	$V_{CC} = 2$ V			1000	ns
		$V_{CC} = 4.5$ V			500	
		$V_{CC} = 6$ V			400	
$T_A$	Operating free-air temperature		-40		125	°C

- (1) All unused inputs of the device must be held at VCC 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	TEST CONDITIONS		V <sub>CC</sub>	T <sub>A</sub> = 25°C			MIN	MAX	UNIT
				MIN	TYP	MAX			
V <sub>OH</sub>	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>	I <sub>OH</sub> = –20 μA	2 V	1.9	1.998		1.9	V	
			4.5 V	4.4	4.499		4.4		
			6 V	5.9	5.999		5.9		
		I <sub>OH</sub> = –6 mA	4.5 V	3.98	4.3		3.7		
		I <sub>OH</sub> = –7.8 mA	6 V	5.48	5.8		5.2		
V <sub>OL</sub>	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>	I <sub>OL</sub> = 20 μA	2 V		0.002	0.1	0.1	V	
			4.5 V		0.001	0.1	0.1		
			6 V		0.001	0.1	0.1		
		I <sub>OL</sub> = 6 mA	4.5 V		0.17	0.26	0.4		
		I <sub>OL</sub> = 7.8 mA	6 V		0.15	0.26	0.4		
I <sub>I</sub>	V <sub>I</sub> = V <sub>CC</sub> or 0		6 V		±0.1	±100	±1000	nA	
I <sub>CC</sub>	V <sub>I</sub> = V <sub>CC</sub> or 0, I <sub>O</sub> = 0		6 V				8	160	μA
C <sub>i</sub>			2 V to 6 V		3	10		10	pF

## Switching Characteristics

over recommended operating free-air temperature range, C<sub>L</sub> = 50 pF (unless otherwise noted) (see [Figure 1](#))

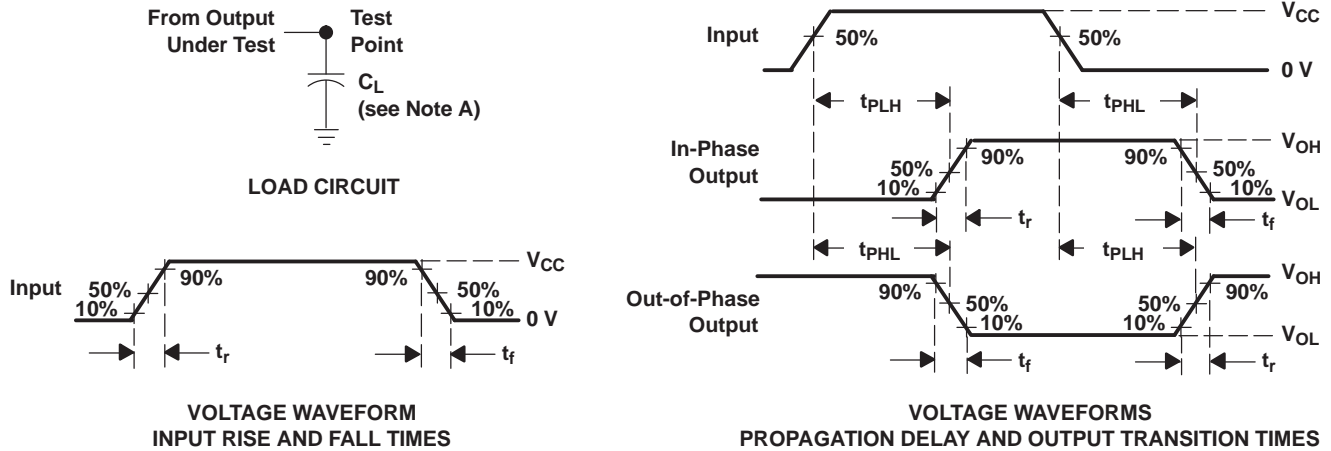
PARAMETER	FROM (INPUT)	TO (OUTPUT)	V <sub>CC</sub>	T <sub>A</sub> = 25°C			MIN	MAX	UNIT
				MIN	TYP	MAX			
t <sub>pd</sub>	A, B, or C	Y or W	2 V		94	250		360	ns
			4.5 V		30	50		73	
			6 V		25	43		62	
	Any D	Y or W	2 V		74	195		283	
			4.5 V		23	39		57	
			6 V		20	33		48	
	G̅	Y or W	2 V		49	127		185	
			4.5 V		15	25		37	
			6 V		13	22		32	
t <sub>t</sub>		Y or W	2 V		22	75		110	ns
			4.5 V		9	15		22	
			6 V		8	13		19	

## Operating Characteristics

T<sub>A</sub> = 25°C

PARAMETER	TEST CONDITIONS	TYP	UNIT
C <sub>pd</sub> Power dissipation capacitance	No load	70	pF

PARAMETER MEASUREMENT INFORMATION



- NOTES: A.  $C_L$  includes probe and test-fixture capacitance.  
 B. Phase relationships between waveforms were chosen arbitrarily. All input pulses are supplied by generators having the following characteristics:  $PRR \leq 1$  MHz,  $Z_O = 50 \Omega$ ,  $t_r = 6$  ns,  $t_f = 6$  ns.  
 C. The outputs are measured one at a time, with one input transition per measurement.  
 D.  $t_{PLH}$  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>
SN74HC151QDRG4Q1	ACTIVE	SOIC	D	16	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74HC151QDRQ1	ACTIVE	SOIC	D	16	2500	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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**OTHER QUALIFIED VERSIONS OF SN74HC151-Q1 :**

- Catalog: [SN74HC151](#)
- Military: [SN54HC151](#)

NOTE: Qualified Version Definitions:

- Catalog - TI's standard catalog product
- Military - QML certified for Military and Defense Applications

D (R-PDSO-G16)

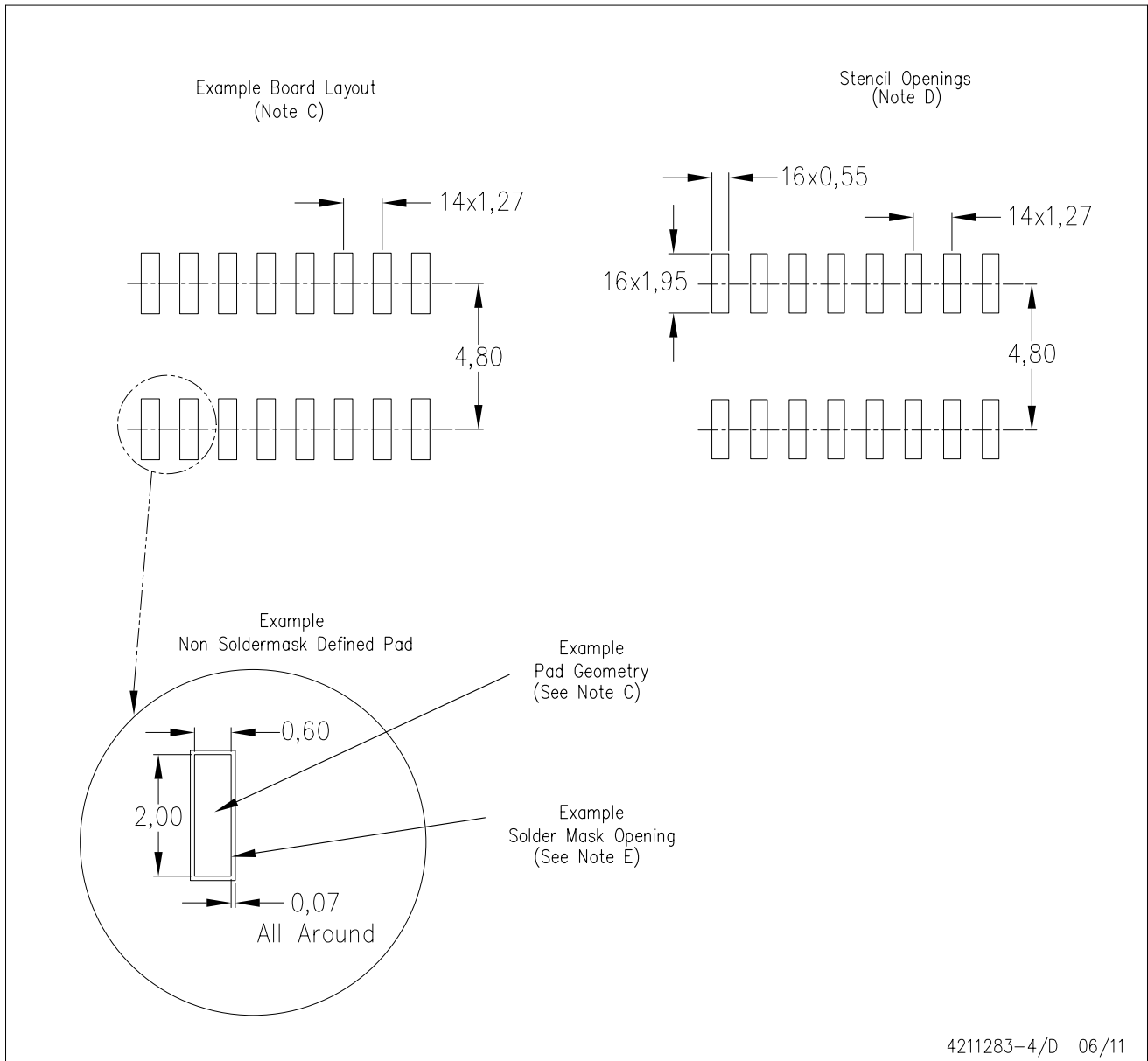
PLASTIC SMALL OUTLINE



- NOTES:
- A. All linear dimensions are in inches (millimeters).
  - 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 0.006 (0,15) each side.
  - D. 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



- NOTES:
- All linear dimensions are in millimeters.
  - This drawing is subject to change without notice.
  - Publication IPC-7351 is recommended for alternate designs.
  - 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.
  - Customers should contact their board fabrication site for solder mask tolerances between and around signal pads.



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