

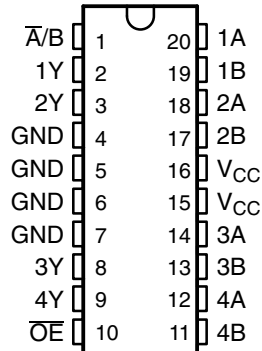
# 74AC11257

## QUADRUPLE 2-LINE TO 1-LINE DATA SELECTOR/MULTIPLEXER WITH 3-STATE OUTPUTS

SCAS049C – MARCH 1989 – REVISED MAY 2004

- 3-State Outputs Interface Directly With System Bus
- Flow-Through Architecture Optimizes PCB Layout
- Center-Pin  $V_{CC}$  and GND Configurations Minimize High-Speed Switching Noise
- 500-mA Typical Latch-Up Immunity at 125°C
- Provides Bus Interface From Multiple Sources in High-Performance Systems

DB, DW, N, OR PW PACKAGE  
(TOP VIEW)



### description/ordering information

This device is designed to multiplex signals from 4-bit data sources to four output data lines in bus-organized systems. The 3-state outputs do not load the data lines when the output-enable ( $\overline{OE}$ ) input is at a high logic level.

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.

### ORDERING INFORMATION

$T_A$	PACKAGE†		ORDERABLE PART NUMBER	TOP-SIDE MARKING
–40°C to 85°C	PDIP – N	Tube	74AC11257N	74AC11257N
	SOIC – DW	Tube	74AC11257DW	AC11257
		Tape and reel	74AC11257DWR	
	SSOP – DB	Tape and reel	74AC11257DBR	AE257
	TSSOP – PW	Tube	74AC11257PW	AE257
		Tape and reel	74AC11257PWR	

† 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).

### FUNCTION TABLE

$\overline{OE}$	INPUTS			OUTPUT Y
	SELECT $\overline{A/B}$	DATA		
		A	B	
H	X	X	X	Z
L	L	L	X	L
L	L	H	X	H
L	H	X	L	L
L	H	X	H	H



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**TEXAS  
INSTRUMENTS**

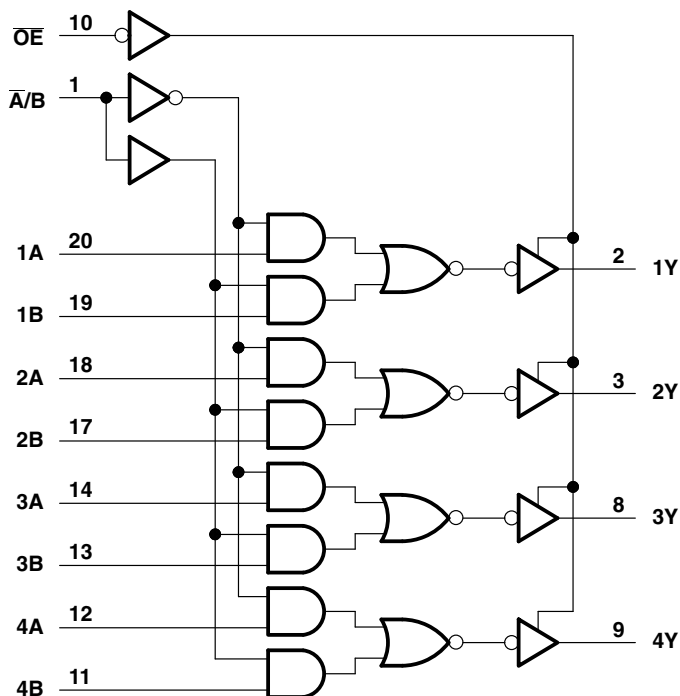
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**QUADRUPLE 2-LINE TO 1-LINE DATA SELECTOR/MULTIPLEXER WITH 3-STATE OUTPUTS**

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**logic diagram (positive logic)**



**absolute maximum ratings over operating free-air temperature range (unless otherwise noted)<sup>†</sup>**

Supply voltage range, $V_{CC}$ .....	-0.5 V to 7 V
Input voltage range, $V_I$ (see Note 1) .....	-0.5 V to $V_{CC} + 0.5$ V
Output voltage range, $V_O$ (see Note 1) .....	-0.5 V to $V_{CC} + 0.5$ V
Input clamp current, $I_{IK}$ ( $V_I < 0$ or $V_I > V_{CC}$ ) .....	$\pm 20$ mA
Output clamp current, $I_{OK}$ ( $V_O < 0$ or $V_O > V_{CC}$ ) .....	$\pm 50$ mA
Continuous output current, $I_O$ ( $V_O = 0$ to $V_{CC}$ ) .....	$\pm 50$ mA
Continuous current through $V_{CC}$ or GND .....	$\pm 100$ mA
Package thermal impedance, $\theta_{JA}$ (see Note 2):	
DB package .....	70°C/W
DW package .....	58°C/W
N package .....	60°C/W
PW package .....	83°C/W

Storage temperature range,  $T_{stg}$  .....

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

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**recommended operating conditions (see Note 3)**

		MIN	NOM	MAX	UNIT
V <sub>CC</sub>	Supply voltage	3	5	5.5	V
V <sub>IH</sub>	High-level input voltage	V <sub>CC</sub> = 3 V	2.1		V
		V <sub>CC</sub> = 4.5 V	3.15		
		V <sub>CC</sub> = 5.5 V	3.85		
V <sub>IL</sub>	Low-level input voltage	V <sub>CC</sub> = 3 V	0.9		V
		V <sub>CC</sub> = 4.5 V	1.35		
		V <sub>CC</sub> = 5.5 V	1.65		
V <sub>I</sub>	Input voltage	0	V <sub>CC</sub>		V
V <sub>O</sub>	Output voltage	0	V <sub>CC</sub>		V
I <sub>OH</sub>	High-level output current	V <sub>CC</sub> = 3 V	-4		mA
		V <sub>CC</sub> = 4.5 V	-24		
		V <sub>CC</sub> = 5.5 V	-24		
I <sub>OL</sub>	Low-level output current	V <sub>CC</sub> = 3 V	12		mA
		V <sub>CC</sub> = 4.5 V	24		
		V <sub>CC</sub> = 5.5 V	24		
Δt/Δv	Input transition rise or fall rate	10		ns/V	
T <sub>A</sub>	Operating free-air temperature	-40	85		°C

NOTE 3: All unused 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)**

PARAMETER	TEST CONDITIONS	V <sub>CC</sub>	T <sub>A</sub> = 25°C			MIN	MAX	UNIT
			MIN	TYP	MAX			
V <sub>OH</sub>	I <sub>OH</sub> = -50 μA	3 V	2.9		2.9		V	
		4.5 V	4.4		4.4			
		5.5 V	5.4		5.4			
	I <sub>OH</sub> = -4 mA	3 V	2.58		2.48			
		4.5 V	3.94		3.8			
		5.5 V	4.94		4.8			
I <sub>OH</sub> = -75 mA <sup>†</sup>	5.5 V			3.85				
V <sub>OL</sub>	I <sub>OL</sub> = 50 μA	3 V	0.1		0.1		V	
		4.5 V	0.1		0.1			
		5.5 V	0.1		0.1			
	I <sub>OL</sub> = 12 mA	3 V	0.36		0.44			
		4.5 V	0.36		0.44			
		5.5 V	0.36		0.44			
I <sub>OL</sub> = 24 mA	5.5 V			1.65				
I <sub>OZ</sub>	V <sub>O</sub> = V <sub>CC</sub> or GND	5.5 V	±0.5		±5		μA	
I <sub>I</sub>	V <sub>I</sub> = V <sub>CC</sub> or GND	5.5 V	±0.1		±1		μA	
I <sub>CC</sub>	V <sub>I</sub> = V <sub>CC</sub> or GND, I <sub>O</sub> = 0	5.5 V	8		80		μA	
C <sub>i</sub>	V <sub>I</sub> = V <sub>CC</sub> or GND	5 V	3.5				pF	
C <sub>o</sub>	V <sub>O</sub> = V <sub>CC</sub> or GND	5.5 V	8				pF	

<sup>†</sup> Not more than one output should be tested at a time, and the duration of the test should not exceed 10 ms.



# QUADRUPLE 2-LINE TO 1-LINE DATA SELECTOR/MULTIPLEXER WITH 3-STATE OUTPUTS

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switching characteristics over recommended operating free-air temperature range,  
 $V_{CC} = 3.3\text{ V} \pm 0.3\text{ V}$  (unless otherwise noted) (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	$T_A = 25^\circ\text{C}$			MIN	MAX	UNIT
			MIN	TYP	MAX			
$t_{PLH}$	A or B	Y	1.5	5.6	8.1	1.5	8.9	ns
$t_{PHL}$			1.5	6.2	9	1.5	10.1	
$t_{PLH}$	$\bar{A}/B$	Any Y	1.5	6.1	9.2	1.5	10.2	ns
$t_{PHL}$			1.5	6.6	10	1.5	11.2	
$t_{PZH}$	$\bar{O}E$	Any Y	1.5	5.6	8.2	1.5	9.1	ns
$t_{PZL}$			1.5	7.5	10.4	1.5	11.8	
$t_{PHZ}$	$\bar{O}E$	Any Y	1.5	5.6	7.6	1.5	8.3	ns
$t_{PLZ}$			1.5	6.2	8.8	1.5	9.6	

switching characteristics, over recommended operating free-air temperature range,  
 $V_{CC} = 5\text{ V} \pm 0.5\text{ V}$  (unless otherwise noted) (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	$T_A = 25^\circ\text{C}$			MIN	MAX	UNIT
			MIN	TYP	MAX			
$t_{PLH}$	A or B	Y	1.5	3.6	5.8	1.5	6.4	ns
$t_{PHL}$			1.5	4.1	6.5	1.5	7.2	
$t_{PLH}$	$\bar{A}/B$	Any Y	1.5	4	6.5	1.5	7.2	ns
$t_{PHL}$			1.5	4.4	7.1	1.5	7.9	
$t_{PZH}$	$\bar{O}E$	Any Y	1.5	3.8	5.9	1.5	6.5	ns
$t_{PZL}$			1.5	5	7.6	1.5	8.6	
$t_{PHZ}$	$\bar{O}E$	Any Y	1.5	4.5	6.4	1.5	7.6	ns
$t_{PLZ}$			1.5	4.8	6.9	1.5	7.6	

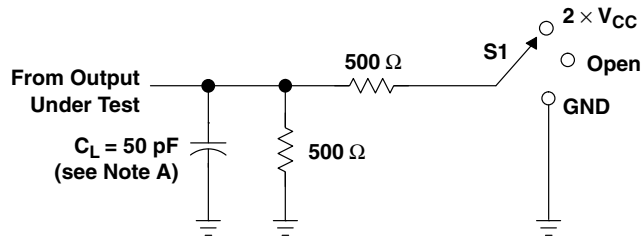
operating characteristics,  $V_{CC} = 5\text{ V}$ ,  $T_A = 25^\circ\text{C}$

PARAMETER		TEST CONDITIONS	TYP	UNIT
$C_{pd}$	Power dissipation capacitance	$C_L = 50\text{ pF}$ , $f = 1\text{ MHz}$	37	pF
			11	

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**WITH 3-STATE OUTPUTS**

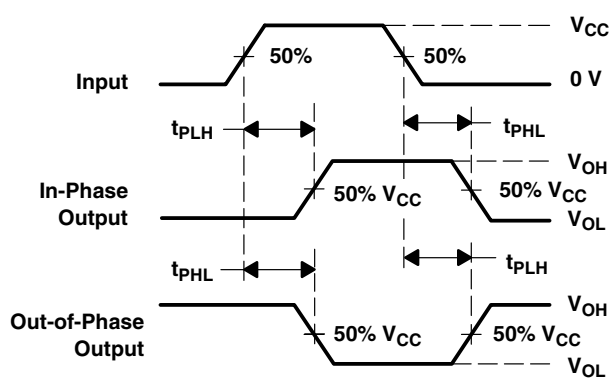
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**PARAMETER MEASUREMENT INFORMATION**

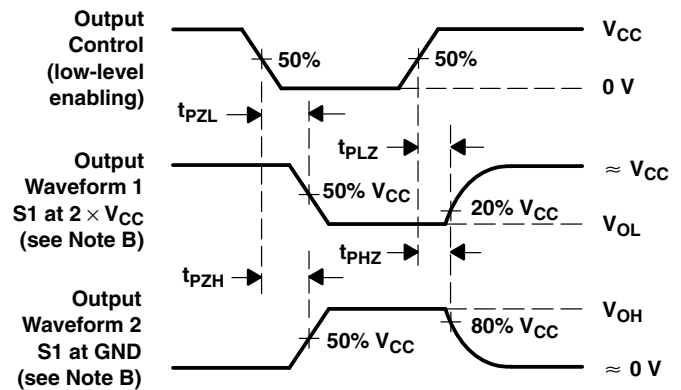


**LOAD CIRCUIT**

TEST	S1
$t_{PLH}/t_{PHL}$	Open
$t_{PLZ}/t_{PZL}$	$2 \times V_{CC}$
$t_{PHZ}/t_{PZH}$	GND



**VOLTAGE WAVEFORMS**



**VOLTAGE WAVEFORMS**

- 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  $\leq 1 \text{ MHz}$ ,  $Z_O = 50 \Omega$ ,  $t_r = 3 \text{ ns}$ ,  $t_f = 3 \text{ ns}$ .
  - D. The outputs are measured one at a time, with one input transition per measurement.

**Figure 1. Load Circuit and Voltage Waveforms**

## PACKAGING INFORMATION

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead finish/ Ball material (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
74AC11257DW	ACTIVE	SOIC	DW	20	25	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 85	AC11257	<a href="#">Samples</a>
74AC11257N	ACTIVE	PDIP	N	20	20	RoHS & Green	NIPDAU	N / A for Pkg Type	-40 to 85	74AC11257N	<a href="#">Samples</a>
74AC11257PW	ACTIVE	TSSOP	PW	20	70	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 85	AE257	<a href="#">Samples</a>

(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) **RoHS:** TI defines "RoHS" to mean semiconductor products that are compliant with the current EU RoHS requirements for all 10 RoHS substances, including the requirement that RoHS substance do not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, "RoHS" products are suitable for use in specified lead-free processes. TI may reference these types of products as "Pb-Free".

**RoHS Exempt:** TI defines "RoHS Exempt" to mean products that contain lead but are compliant with EU RoHS pursuant to a specific EU RoHS exemption.

**Green:** TI defines "Green" to mean the content of Chlorine (Cl) and Bromine (Br) based flame retardants meet JS709B low halogen requirements of <=1000ppm threshold. Antimony trioxide based flame retardants must also meet the <=1000ppm threshold requirement.

(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 finish/Ball material - Orderable Devices 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.

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**TUBE**


\*All dimensions are nominal

Device	Package Name	Package Type	Pins	SPQ	L (mm)	W (mm)	T (μm)	B (mm)
74AC11257DW	DW	SOIC	20	25	507	12.83	5080	6.6
74AC11257N	N	PDIP	20	20	506	13.97	11230	4.32
74AC11257PW	PW	TSSOP	20	70	530	10.2	3600	3.5



N (R-PDIP-T\*\*)

PLASTIC DUAL-IN-LINE PACKAGE

16 PINS SHOWN



- NOTES:
- A. All linear dimensions are in inches (millimeters).
  - B. This drawing is subject to change without notice.
  - Falls within JEDEC MS-001, except 18 and 20 pin minimum body length (Dim A).
  - The 20 pin end lead shoulder width is a vendor option, either half or full width.

# DW0020A



# PACKAGE OUTLINE

## SOIC - 2.65 mm max height

SOIC



4220724/A 05/2016

**NOTES:**

1. All linear dimensions are in millimeters. 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. This dimension does not include interlead flash. Interlead flash shall not exceed 0.43 mm per side.
5. Reference JEDEC registration MS-013.

# EXAMPLE BOARD LAYOUT

DW0020A

SOIC - 2.65 mm max height

SOIC



LAND PATTERN EXAMPLE  
SCALE:6X



SOLDER MASK DETAILS

4220724/A 05/2016

NOTES: (continued)

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

# EXAMPLE STENCIL DESIGN

DW0020A

SOIC - 2.65 mm max height

SOIC



SOLDER PASTE EXAMPLE  
BASED ON 0.125 mm THICK STENCIL  
SCALE:6X

4220724/A 05/2016

NOTES: (continued)

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

# PW0020A



# PACKAGE OUTLINE

## TSSOP - 1.2 mm max height

SMALL OUTLINE PACKAGE



4220206/A 02/2017

### 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. This dimension does not include interlead flash. Interlead flash shall not exceed 0.25 mm per side.
5. Reference JEDEC registration MO-153.

# EXAMPLE BOARD LAYOUT

PW0020A

TSSOP - 1.2 mm max height

SMALL OUTLINE PACKAGE



LAND PATTERN EXAMPLE  
EXPOSED METAL SHOWN  
SCALE: 10X



SOLDER MASK DETAILS

4220206/A 02/2017

NOTES: (continued)

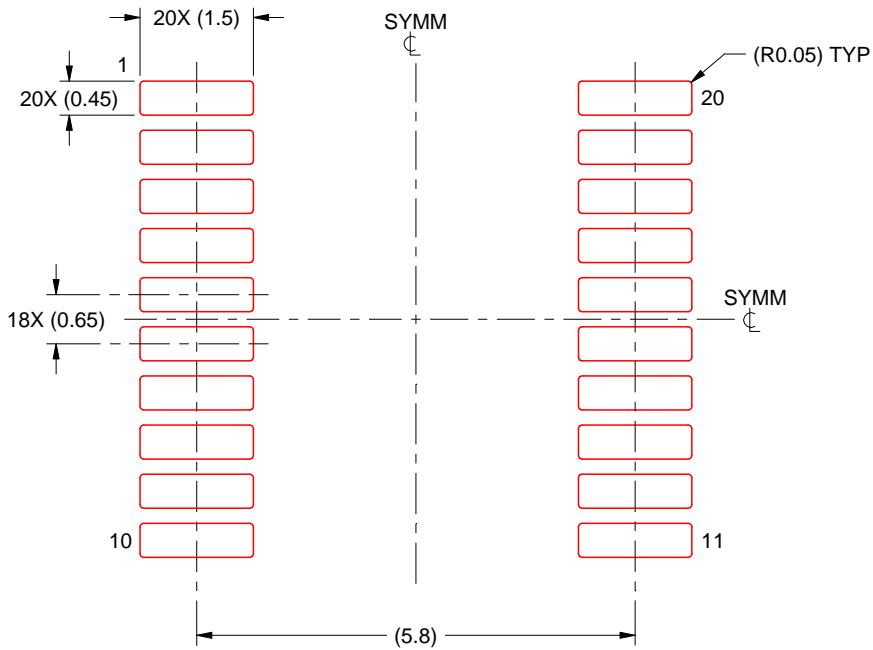
- 6. Publication IPC-7351 may have alternate designs.
- 7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

# EXAMPLE STENCIL DESIGN

PW0020A

TSSOP - 1.2 mm max height

SMALL OUTLINE PACKAGE



SOLDER PASTE EXAMPLE  
BASED ON 0.125 mm THICK STENCIL  
SCALE: 10X

4220206/A 02/2017

NOTES: (continued)

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

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