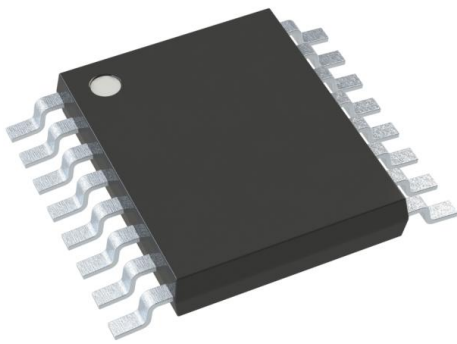


# 74AHCT257PW-Q100J Datasheet

[www.digi-electronics.com](http://www.digi-electronics.com)



<https://www.DiGi-Electronics.com>

DiGi Electronics Part Number	74AHCT257PW-Q100J-DG
Manufacturer	<a href="#">Nexperia USA Inc.</a>
Manufacturer Product Number	74AHCT257PW-Q100J
Description	IC MULTIPLEXER 4 X 2:1 16TSSOP
Detailed Description	Multiplexer 4 x 2:1 16-TSSOP



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RFQ Email: [Info@DiGi-Electronics.com](mailto:Info@DiGi-Electronics.com)

DiGi is a global authorized distributor of electronic components.



## Purchase and inquiry

Manufacturer Product Number:

74AHCT257PW-Q100J

Series:

74AHCT

Type:

Multiplexer

Independent Circuits:

1

Voltage Supply Source:

Single Supply

Operating Temperature:

-40°C ~ 125°C

Qualification:

AEC-Q100

Package / Case:

16-TSSOP (0.173", 4.40mm Width)

Base Product Number:

74AHCT257

Manufacturer:

Nexperia USA Inc.

Product Status:

Active

Circuit:

4 x 2:1

Current - Output High, Low:

8mA, 8mA

Voltage - Supply:

4.5V ~ 5.5V

Grade:

Automotive

Mounting Type:

Surface Mount

Supplier Device Package:

16-TSSOP

## Environmental & Export classification

RoHS Status:

ROHS3 Compliant

REACH Status:

REACH Unaffected

HTSUS:

8542.39.0001

Moisture Sensitivity Level (MSL):

1 (Unlimited)

ECCN:

EAR99

# 74AHC257-Q100; 74AHCT257-Q100

Quad 2-input multiplexer; 3-state

Rev. 3 — 7 March 2024

Product data sheet

## 1. General description

The 74AHC257-Q100 is a quad 2-input multiplexer with 3-state outputs. Inputs are overvoltage tolerant. This feature allows the use of these devices as translators in mixed voltage environments.

This product has been qualified to the Automotive Electronics Council (AEC) standard Q100 (Grade 1) and is suitable for use in automotive applications.

## 2. Features and benefits

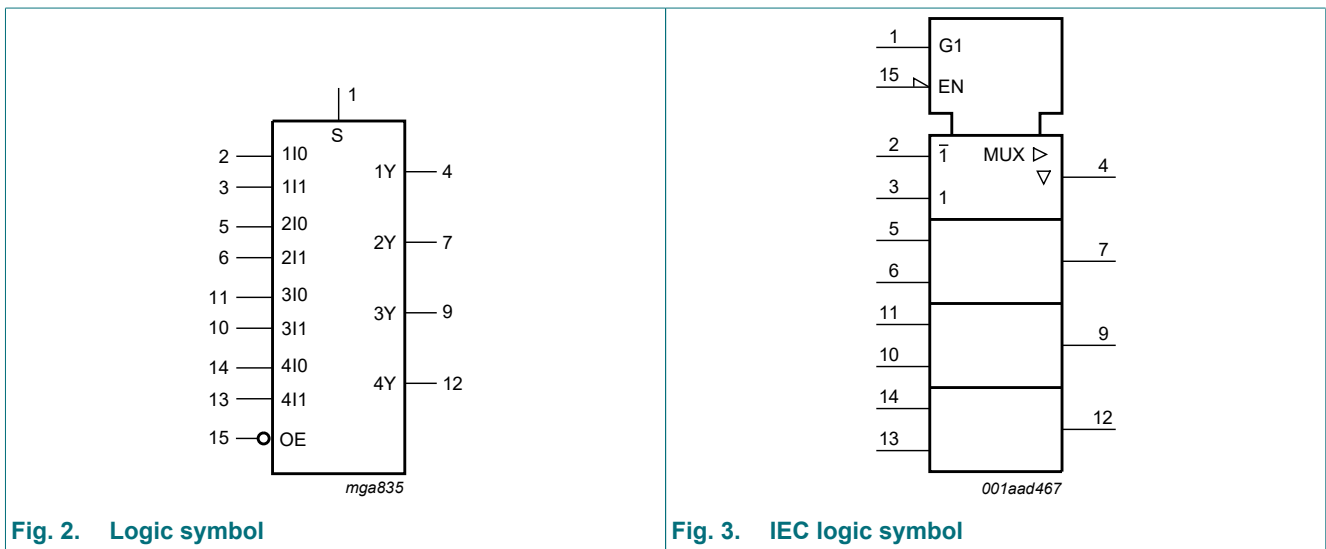
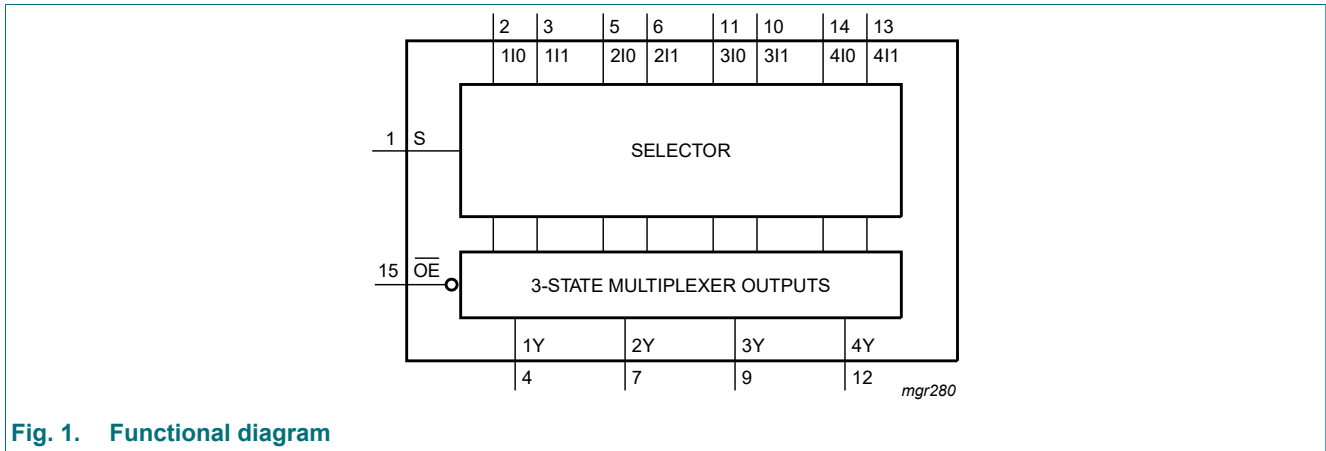
- Automotive product qualification in accordance with AEC-Q100 (Grade 1)
  - Specified from -40 °C to +85 °C and from -40 °C to +125 °C
- Balanced propagation delays
- All inputs have Schmitt-trigger actions
- Non-inverting data path
- Overvoltage tolerant inputs to 5.5 V
- Input levels:
  - For 74AHC257-Q100: CMOS level
  - For 74AHCT257-Q100: TTL level
- High noise immunity
- CMOS low power dissipation
- Latch-up performance exceeds 100 mA per JESD 78 Class II Level A
- ESD protection:
  - HBM: ANSI/ESDA/JEDEC JS-001 class 2 exceeds 2000 V
  - CDM: ANSI/ESDA/JEDEC JS-002 class C3 exceeds 1000 V

## 3. Ordering information

Table 1. Ordering information

Type number	Package			
	Temperature range	Name	Description	Version
<a href="#">74AHC257D-Q100</a> <a href="#">74AHCT257D-Q100</a>	-40 °C to +125 °C	SO16	plastic small outline package; 16 leads; body width 3.9 mm	<a href="#">SOT109-1</a>
<a href="#">74AHC257PW-Q100</a> <a href="#">74AHCT257PW-Q100</a>	-40 °C to +125 °C	TSSOP16	plastic thin shrink small outline package; 16 leads; body width 4.4 mm	<a href="#">SOT403-1</a>

## 4. Functional diagram



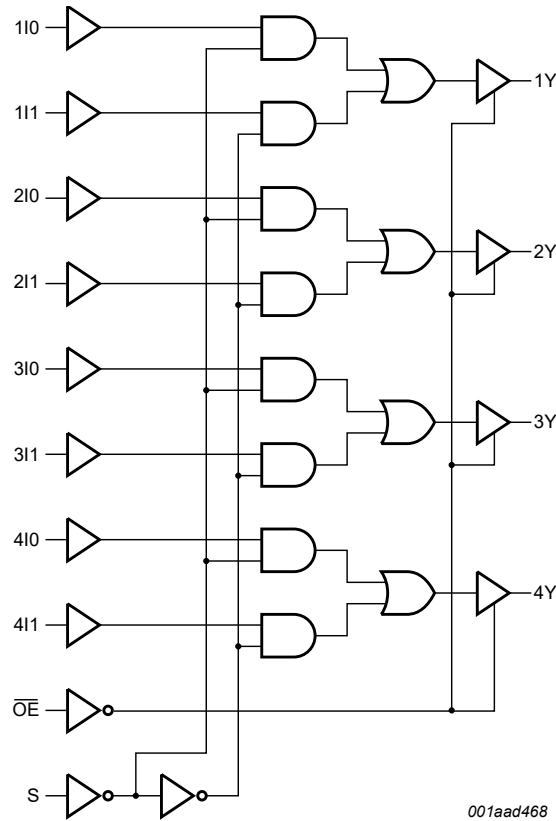
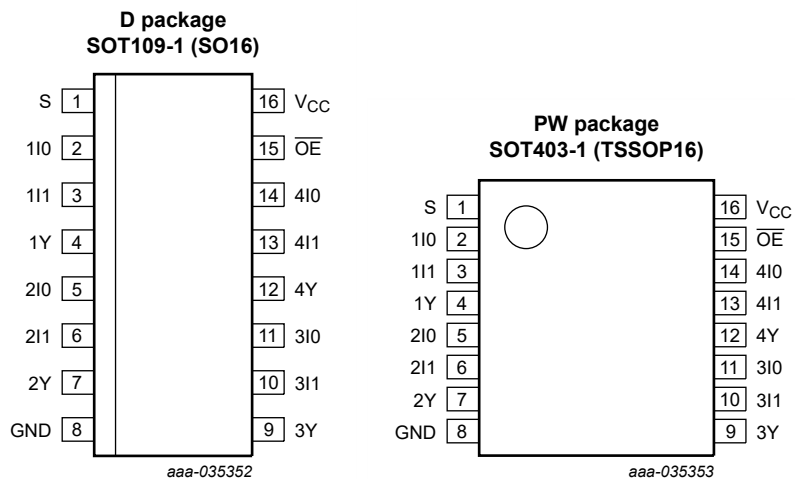


Fig. 4. Logic diagram

## 5. Pinning information

### 5.1. Pinning



## 5.2. Pin description

Table 2. Pin description

Symbol	Pin	Description
S	1	common data select input
1I0	2	data input from source 0
1I1	3	data input from source 1
1Y	4	multiplexer output
2I0	5	data input from source 0
2I1	6	data input from source 1
2Y	7	multiplexer output
GND	8	ground (0 V)
3Y	9	multiplexer output
3I1	10	data input from source 1
3I0	11	data input from source 0
4Y	12	multiplexer output
4I1	13	data input from source 1
4I0	14	data input from source 0
$\overline{OE}$	15	output enable input (active LOW)
V <sub>CC</sub>	16	supply voltage

## 6. Functional description

Table 3. Function table

H = HIGH voltage level; L = LOW voltage level; X = don't care; Z = high-impedance OFF-state.

Control		Input		Output
$\overline{OE}$	S	nI0	nI1	nY
H	X	X	X	Z
L	H	X	L	L
		X	H	H
	L	L	X	L
		H	X	H

## 7. Limiting values

**Table 4. Limiting values**

In accordance with the Absolute Maximum Rating System (IEC 60134). Voltages are referenced to GND (ground = 0 V).

Symbol	Parameter	Conditions	Min	Max	Unit
$V_{CC}$	supply voltage		-0.5	+7.0	V
$V_I$	input voltage		-0.5	+7.0	V
$I_{IK}$	input clamping current	$V_I < -0.5$ V [1]	-20	-	mA
$I_{OK}$	output clamping current	$V_O < -0.5$ V or $V_O > V_{CC} + 0.5$ V [1]	-20	+20	mA
$I_O$	output current	$V_O = -0.5$ V to $(V_{CC} + 0.5$ V)	-25	+25	mA
$I_{CC}$	supply current		-	+75	mA
$I_{GND}$	ground current		-75	-	mA
$T_{stg}$	storage temperature		-65	+150	°C
$P_{tot}$	total power dissipation	$T_{amb} = -40$ °C to $+125$ °C [2]	-	500	mW

[1] The input and output voltage ratings may be exceeded if the input and output current ratings are observed.

[2] For SOT109-1 (SO16) package:  $P_{tot}$  derates linearly with 12.4 mW/K above 110 °C.

For SOT403-1 (TSSOP16) package:  $P_{tot}$  derates linearly with 8.5 mW/K above 91 °C.

## 8. Recommended operating conditions

**Table 5. Operating conditions**

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>74AHC257-Q100</b>						
$V_{CC}$	supply voltage		2.0	5.0	5.5	V
$V_I$	input voltage		0	-	5.5	V
$V_O$	output voltage		0	-	$V_{CC}$	V
$T_{amb}$	ambient temperature		-40	+25	+125	°C
$\Delta t/\Delta V$	input transition rise and fall rate	$V_{CC} = 3.0$ V to $3.6$ V	-	-	100	ns/V
		$V_{CC} = 4.5$ V to $5.5$ V	-	-	20	ns/V
<b>74AHCT257-Q100</b>						
$V_{CC}$	supply voltage		4.5	5.0	5.5	V
$V_I$	input voltage		0	-	5.5	V
$V_O$	output voltage		0	-	$V_{CC}$	V
$T_{amb}$	ambient temperature		-40	+25	+125	°C
$\Delta t/\Delta V$	input transition rise and fall rate	$V_{CC} = 4.5$ V to $5.5$ V	-	-	20	ns/V

## 9. Static characteristics

**Table 6. Static characteristics**

At recommended operating conditions; voltages are referenced to GND (ground = 0 V).

Symbol	Parameter	Conditions	25 °C			-40 °C to +85 °C		-40 °C to +125 °C		Unit
			Min	Typ	Max	Min	Max	Min	Max	
<b>74AHC257-Q100</b>										
V <sub>IH</sub>	HIGH-level input voltage	V <sub>CC</sub> = 2.0 V	1.5	-	-	1.5	-	1.5	-	V
		V <sub>CC</sub> = 3.0 V	2.1	-	-	2.1	-	2.1	-	V
		V <sub>CC</sub> = 5.5 V	3.85	-	-	3.85	-	3.85	-	V
V <sub>IL</sub>	LOW-level input voltage	V <sub>CC</sub> = 2.0 V	-	-	0.5	-	0.5	-	0.5	V
		V <sub>CC</sub> = 3.0 V	-	-	0.9	-	0.9	-	0.9	V
		V <sub>CC</sub> = 5.5 V	-	-	1.65	-	1.65	-	1.65	V
V <sub>OH</sub>	HIGH-level output voltage	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>								
		I <sub>O</sub> = -50 μA; V <sub>CC</sub> = 2.0 V	1.9	2.0	-	1.9	-	1.9	-	V
		I <sub>O</sub> = -50 μA; V <sub>CC</sub> = 3.0 V	2.9	3.0	-	2.9	-	2.9	-	V
		I <sub>O</sub> = -50 μA; V <sub>CC</sub> = 4.5 V	4.4	4.5	-	4.4	-	4.4	-	V
		I <sub>O</sub> = -4.0 mA; V <sub>CC</sub> = 3.0 V	2.58	-	-	2.48	-	2.40	-	V
I <sub>O</sub> = -8.0 mA; V <sub>CC</sub> = 4.5 V	3.94	-	-	3.80	-	3.70	-	V		
V <sub>OL</sub>	LOW-level output voltage	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>								
		I <sub>O</sub> = 50 μA; V <sub>CC</sub> = 2.0 V	-	0	0.1	-	0.1	-	0.1	V
		I <sub>O</sub> = 50 μA; V <sub>CC</sub> = 3.0 V	-	0	0.1	-	0.1	-	0.1	V
		I <sub>O</sub> = 50 μA; V <sub>CC</sub> = 4.5 V	-	0	0.1	-	0.1	-	0.1	V
		I <sub>O</sub> = 4.0 mA; V <sub>CC</sub> = 3.0 V	-	-	0.36	-	0.44	-	0.55	V
I <sub>O</sub> = 8.0 mA; V <sub>CC</sub> = 4.5 V	-	-	0.36	-	0.44	-	0.55	V		
I <sub>I</sub>	input leakage current	V <sub>I</sub> = 5.5 V or GND; V <sub>CC</sub> = 0 V to 5.5 V	-	-	0.1	-	1.0	-	2.0	μA
I <sub>OZ</sub>	OFF-state output current	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> ; V <sub>O</sub> = V <sub>CC</sub> or GND; V <sub>CC</sub> = 5.5 V	-	-	±0.25	-	±2.5	-	±10.0	μA
I <sub>CC</sub>	supply current	V <sub>I</sub> = V <sub>CC</sub> or GND; I <sub>O</sub> = 0 A; V <sub>CC</sub> = 5.5 V	-	-	4.0	-	40	-	80	μA
C <sub>I</sub>	input capacitance	V <sub>I</sub> = V <sub>CC</sub> or GND	-	3	10	-	10	-	10	pF
C <sub>O</sub>	output capacitance		-	4	-	-	-	-	-	pF
<b>74AHCT257-Q100</b>										
V <sub>IH</sub>	HIGH-level input voltage	V <sub>CC</sub> = 4.5 V to 5.5 V	2.0	-	-	2.0	-	2.0	-	V
V <sub>IL</sub>	LOW-level input voltage	V <sub>CC</sub> = 4.5 V to 5.5 V	-	-	0.8	-	0.8	-	0.8	V
V <sub>OH</sub>	HIGH-level output voltage	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> ; V <sub>CC</sub> = 4.5 V								
		I <sub>O</sub> = -50 μA	4.4	4.5	-	4.4	-	4.4	-	V
		I <sub>O</sub> = -8.0 mA	3.94	-	-	3.80	-	3.70	-	V
V <sub>OL</sub>	LOW-level output voltage	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> ; V <sub>CC</sub> = 4.5 V								
		I <sub>O</sub> = 50 μA	-	0	0.1	-	0.1	-	0.1	V
		I <sub>O</sub> = 8.0 mA	-	-	0.36	-	0.44	-	0.55	V



Symbol	Parameter	Conditions	25 °C			-40 °C to +85 °C		-40 °C to +125 °C		Unit
			Min	Typ	Max	Min	Max	Min	Max	
$I_I$	input leakage current	$V_I = 5.5 \text{ V}$ or GND; $V_{CC} = 0 \text{ V}$ to 5.5 V	-	-	0.1	-	1.0	-	2.0	$\mu\text{A}$
$I_{OZ}$	OFF-state output current	$V_I = V_{IH}$ or $V_{IL}$ ; $V_O = V_{CC}$ or GND; $V_{CC} = 5.5 \text{ V}$	-	-	$\pm 0.25$	-	$\pm 2.5$	-	$\pm 10.0$	$\mu\text{A}$
$I_{CC}$	supply current	$V_I = V_{CC}$ or GND; $I_O = 0 \text{ A}$ ; $V_{CC} = 5.5 \text{ V}$	-	-	4.0	-	40	-	80	$\mu\text{A}$
$\Delta I_{CC}$	additional supply current	per input pin; $V_I = V_{CC} - 2.1 \text{ V}$ ; other pins at $V_{CC}$ or GND; $I_O = 0 \text{ A}$ ; $V_{CC} = 4.5 \text{ V}$ to 5.5 V	-	-	1.35	-	1.5	-	1.5	$\text{mA}$
$C_I$	input capacitance	$V_I = V_{CC}$ or GND	-	3	10	-	10	-	10	$\text{pF}$
$C_O$	output capacitance		-	4	-	-	-	-	-	$\text{pF}$

## 10. Dynamic characteristics

**Table 7. Dynamic characteristics**

Voltages are referenced to GND (ground = 0 V); for test circuit see Fig. 7.

Symbol	Parameter	Conditions	25 °C			-40 °C to +85 °C		-40 °C to +125 °C		Unit
			Min	Typ [1]	Max	Min	Max	Min	Max	
<b>74AHC257-Q100</b>										
$t_{pd}$	propagation delay	$nI_0, nI_1$ to $nY$ ; see Fig. 5 [2]								
		$V_{CC} = 3.0 \text{ V}$ to 3.6 V								
		$C_L = 15 \text{ pF}$	-	4.2	9.3	1.0	11.0	1.0	12.0	ns
		$C_L = 50 \text{ pF}$	-	6.0	12.8	1.0	14.5	1.0	16.0	ns
		$V_{CC} = 4.5 \text{ V}$ to 5.5 V								
		$C_L = 15 \text{ pF}$	-	2.9	5.9	1.0	7.0	1.0	7.5	ns
		$C_L = 50 \text{ pF}$	-	4.2	7.9	1.0	9.0	1.0	11.5	ns
		$S$ to $nY$ ; see Fig. 5 [2]								
		$V_{CC} = 3.0 \text{ V}$ to 3.6 V								
		$C_L = 15 \text{ pF}$	-	5.2	11.0	1.0	13.0	1.0	14.0	ns
		$C_L = 50 \text{ pF}$	-	7.4	14.5	1.0	16.5	1.0	18.5	ns
		$V_{CC} = 4.5 \text{ V}$ to 5.5 V								
$C_L = 15 \text{ pF}$	-	3.5	6.8	1.0	8.0	1.0	8.5	ns		
$C_L = 50 \text{ pF}$	-	5.0	8.8	1.0	10.0	1.0	12.5	ns		
$t_{en}$	enable time	$\overline{OE}$ to $nY$ ; see Fig. 6 [3]								
		$V_{CC} = 3.0 \text{ V}$ to 3.6 V								
		$C_L = 15 \text{ pF}$	-	4.5	10.5	1.0	12.5	1.0	13.5	ns
		$C_L = 50 \text{ pF}$	-	6.4	14.0	1.0	16.0	1.0	17.5	ns
		$V_{CC} = 4.5 \text{ V}$ to 5.5 V								
		$C_L = 15 \text{ pF}$	-	3.2	6.8	1.0	8.0	1.0	8.5	ns
$C_L = 50 \text{ pF}$	-	4.5	8.8	1.0	10.0	1.0	12.5	ns		

Symbol	Parameter	Conditions	25 °C			-40 °C to +85 °C		-40 °C to +125 °C		Unit
			Min	Typ [1]	Max	Min	Max	Min	Max	
t <sub>dis</sub>	disable time	OE to nY; see Fig. 6 [4]								
		V <sub>CC</sub> = 3.0 V to 3.6 V								
		C <sub>L</sub> = 15 pF	-	5.1	9.5	1.0	11.0	1.0	11.5	ns
		C <sub>L</sub> = 50 pF	-	7.2	12.0	1.0	13.5	1.0	14.5	ns
		V <sub>CC</sub> = 4.5 V to 5.5 V								
		C <sub>L</sub> = 15 pF	-	3.4	6.5	1.0	7.0	1.0	8.5	ns
		C <sub>L</sub> = 50 pF	-	4.9	7.9	1.0	9.0	1.0	9.5	ns
C <sub>PD</sub>	power dissipation capacitance	f <sub>i</sub> = 1 MHz; V <sub>I</sub> = GND to V <sub>CC</sub> [5]								
		4 outputs switching via input S	-	45	-	-	-	-	-	pF
		1 output switching via input I	-	15	-	-	-	-	-	pF
<b>74AHCT257-Q100; V<sub>CC</sub> = 4.5 V to 5.5 V</b>										
t <sub>pd</sub>	propagation delay	nI0, nI1 to nY; see Fig. 5 [2]								
		C <sub>L</sub> = 15 pF	-	3.7	6.5	1.0	8.0	1.0	9.0	ns
		C <sub>L</sub> = 50 pF	-	4.9	8.5	1.0	10.0	1.0	11.0	ns
		S to nY; see Fig. 5 [2]								
		C <sub>L</sub> = 15 pF	-	5.1	9.0	1.0	10.5	1.0	11.5	ns
		C <sub>L</sub> = 50 pF	-	6.4	10.5	1.0	12.5	1.0	13.5	ns
t <sub>en</sub>	enable time	OE to nY; see Fig. 6 [3]								
		C <sub>L</sub> = 15 pF	-	3.9	8.0	1.0	9.0	1.0	10.0	ns
		C <sub>L</sub> = 50 pF	-	5.1	10.0	1.0	11.0	1.0	12.0	ns
t <sub>dis</sub>	disable time	OE to nY; see Fig. 6 [4]								
		C <sub>L</sub> = 15 pF	-	4.5	7.5	1.0	8.0	1.0	8.5	ns
		C <sub>L</sub> = 50 pF	-	6.5	9.5	1.0	10.5	1.0	11.5	ns
C <sub>PD</sub>	power dissipation capacitance	f <sub>i</sub> = 1 MHz; V <sub>I</sub> = GND to V <sub>CC</sub> [5]								
		4 outputs switching via input S	-	51	-	-	-	-	-	pF
		1 output switching via input I	-	15	-	-	-	-	-	pF

[1] Typical values are measured at nominal supply voltage (V<sub>CC</sub> = 3.3 V and V<sub>CC</sub> = 5.0 V).

[2] t<sub>pd</sub> is the same as t<sub>PLH</sub> and t<sub>PHL</sub>.

[3] t<sub>en</sub> is the same as t<sub>PZL</sub> and t<sub>PZH</sub>.

[4] t<sub>dis</sub> is the same as t<sub>PLZ</sub> and t<sub>PHZ</sub>.

[5] C<sub>PD</sub> is used to determine the dynamic power dissipation (P<sub>D</sub> in μW).

$$P_D = C_{PD} \times V_{CC}^2 \times f_i \times N + \sum(C_L \times V_{CC}^2 \times f_o) \text{ where:}$$

f<sub>i</sub> = input frequency in MHz;

f<sub>o</sub> = output frequency in MHz;

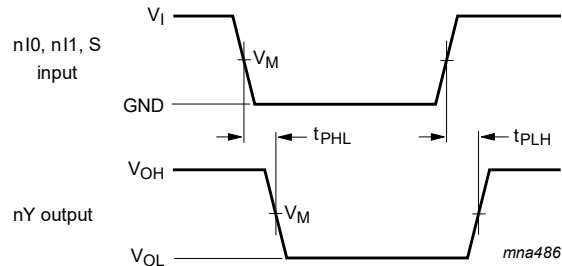
C<sub>L</sub> = output load capacitance in pF;

V<sub>CC</sub> = supply voltage in V;

N = number of inputs switching;

$\sum(C_L \times V_{CC}^2 \times f_o)$  = sum of the outputs.

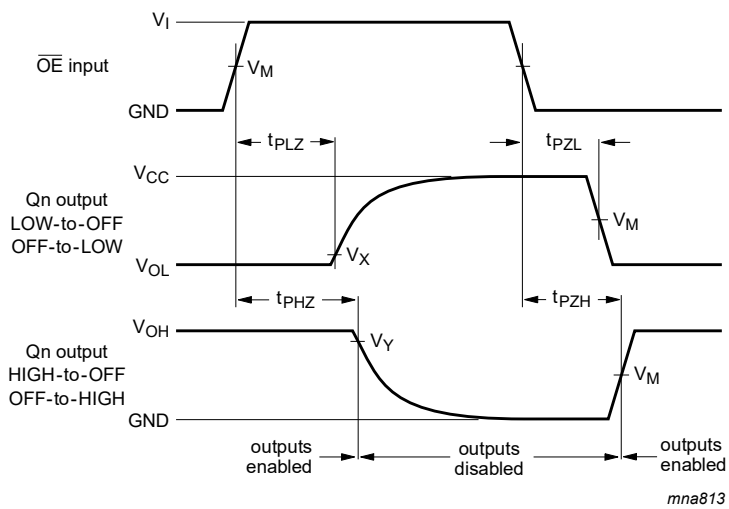
## 10.1. Waveforms and test circuit



Measurement points are given in [Table 8](#).

$V_{OL}$  and  $V_{OH}$  are typical voltage output levels that occur with the output load.

**Fig. 5. Data inputs and common data select input to output propagation delays**



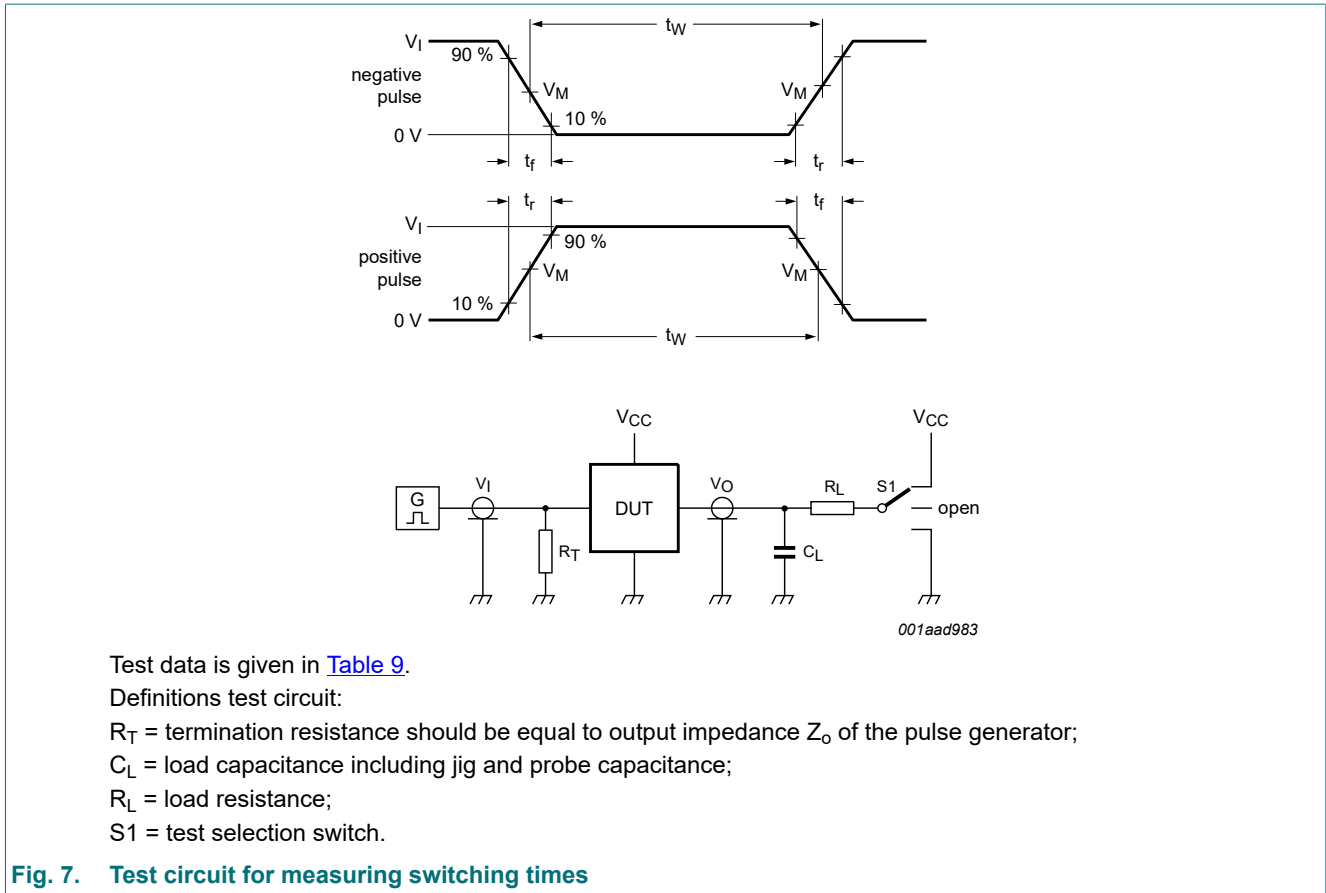
Measurement points are given in [Table 8](#).

$V_{OL}$  and  $V_{OH}$  are typical voltage output levels that occur with the output load.

**Fig. 6. Enable and disable times**

**Table 8. Measurement points**

Type	Input	Output		
	$V_M$	$V_M$	$V_X$	$V_Y$
74AHC257-Q100	$0.5 \times V_{CC}$	$0.5 \times V_{CC}$	$V_{OL} + 0.3 \text{ V}$	$V_{OH} - 0.3 \text{ V}$
74AHCT257-Q100	1.5 V	$0.5 \times V_{CC}$	$V_{OL} + 0.3 \text{ V}$	$V_{OH} - 0.3 \text{ V}$



**Fig. 7. Test circuit for measuring switching times**

**Table 9. Test data**

Type	Input		Load		S1 position		
	$V_I$	$t_r, t_f$	$C_L$	$R_L$	$t_{PHL}, t_{PLH}$	$t_{PZH}, t_{PHZ}$	$t_{PZL}, t_{PLZ}$
74AHC257-Q100	$V_{CC}$	$\leq 3.0$ ns	15 pF, 50 pF	1 k $\Omega$	open	GND	$V_{CC}$
74AHCT257-Q100	3.0 V	$\leq 3.0$ ns	15 pF, 50 pF	1 k $\Omega$	open	GND	$V_{CC}$

## 11. Package outline

SO16: plastic small outline package; 16 leads; body width 3.9 mm

SOT109-1

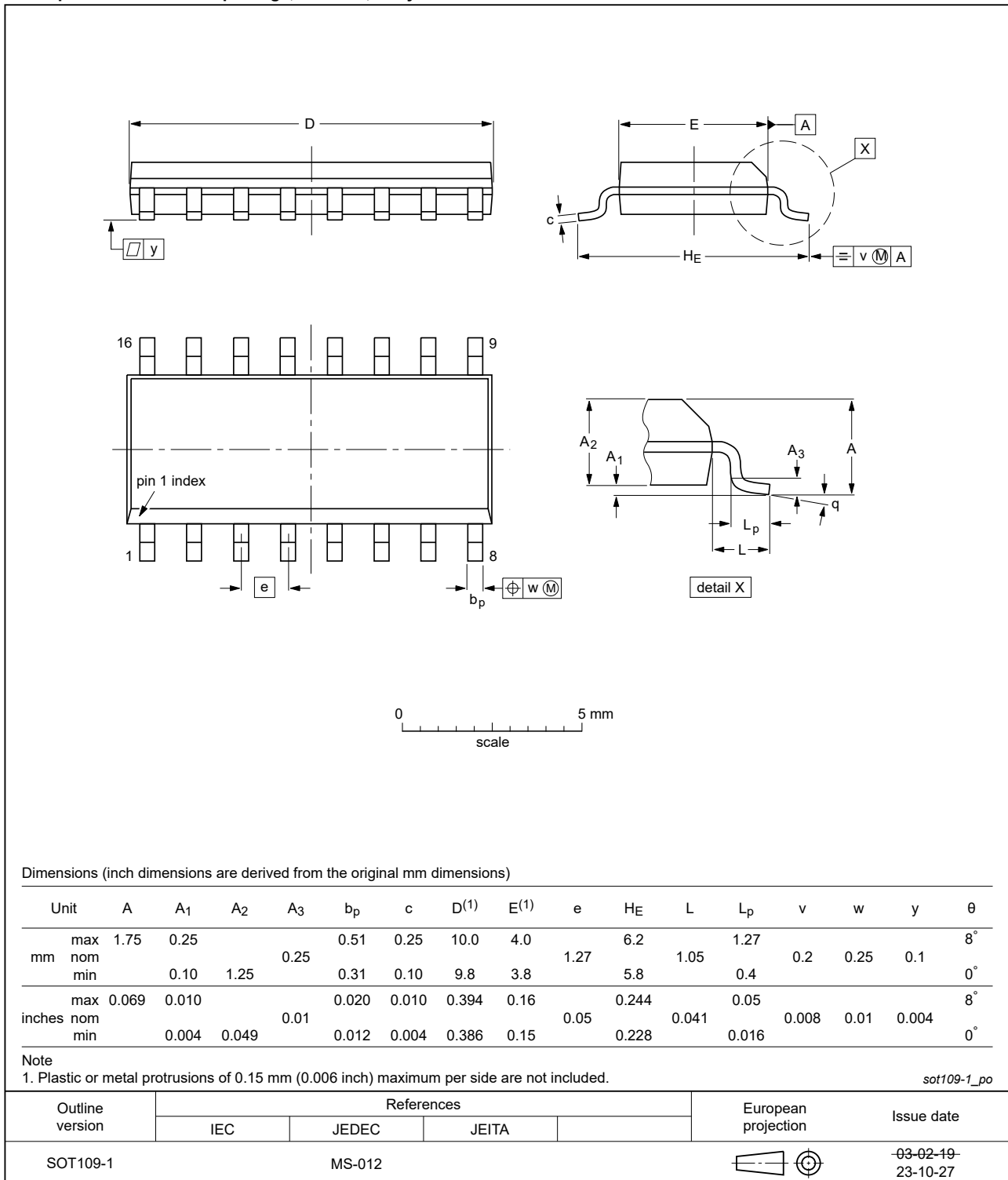


Fig. 8. Package outline SOT109-1 (SO16)



TSSOP16: plastic thin shrink small outline package; 16 leads; body width 4.4 mm

SOT403-1

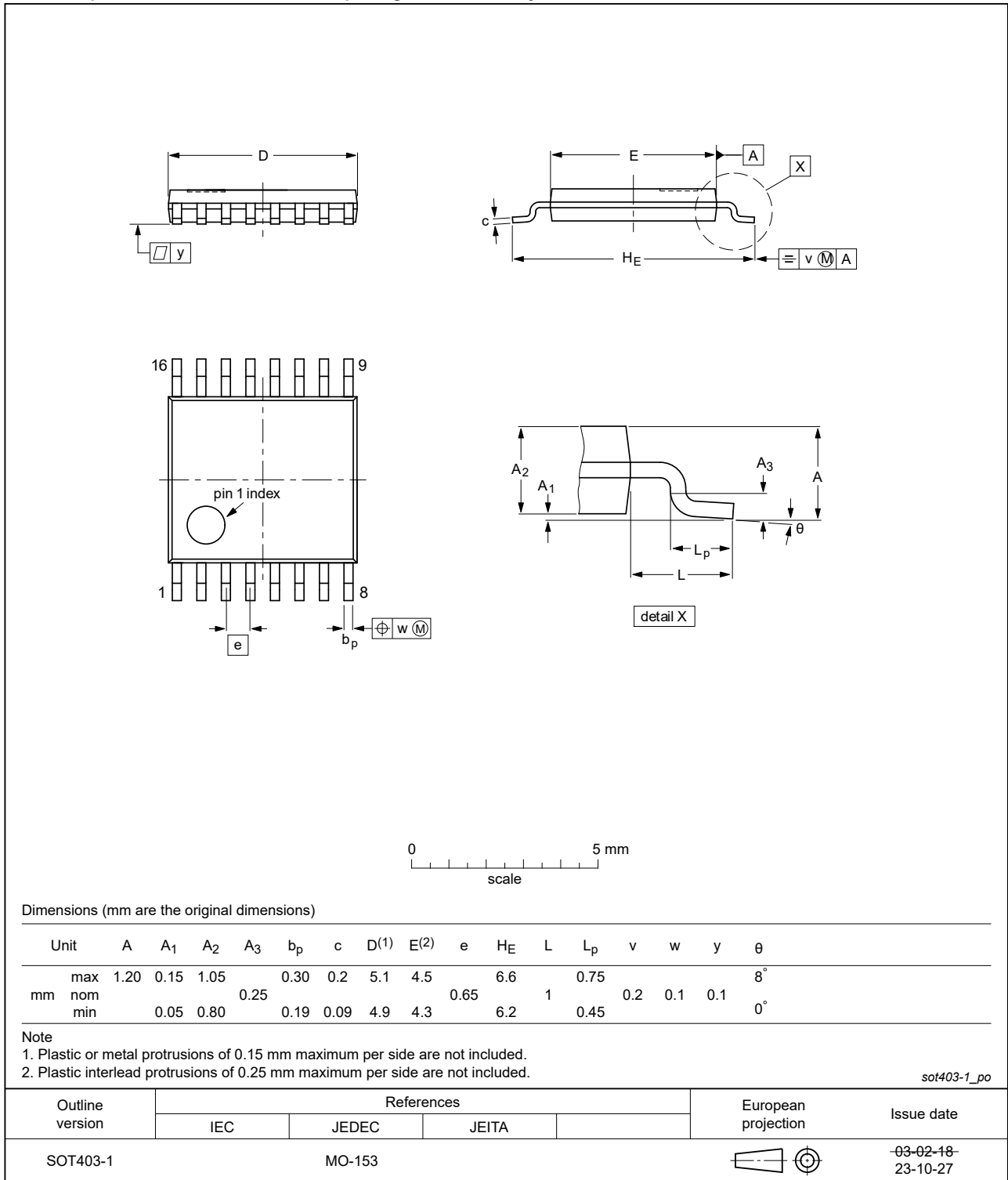


Fig. 9. Package outline SOT403-1 (TSSOP16)

## 12. Abbreviations

Table 10. Abbreviations

Acronym	Description
CDM	Charged Device Model
CMOS	Complementary Metal-Oxide Semiconductor
DUT	Device Under Test
ESD	ElectroStatic Discharge
HBM	Human Body Model
TTL	Transistor-Transistor Logic

## 13. Revision history

Table 11. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
74AHC_AHCT257_Q100 v.3	20240307	Product data sheet	-	74AHC_AHCT257_Q100 v.2
Modifications:	<ul style="list-style-type: none"> <li>• <a href="#">Fig. 8</a>, <a href="#">Fig. 9</a>: Aligned SO and TSSOP package outline drawings to JEDEC MS-012 and MO-153.</li> </ul>			
74AHC_AHCT257_Q100 v.2	20230830	Product data sheet	-	74AHC_AHCT257_Q100 v.1
Modifications	<ul style="list-style-type: none"> <li>• The format of this data sheet has been redesigned to comply with the identity guidelines of Nexperia.</li> <li>• Legal texts have been adapted to the new company name where appropriate.</li> <li>• <a href="#">Section 1</a> updated.</li> <li>• <a href="#">Section 2</a>: ESD specification updated according to the latest JEDEC standard.</li> <li>• <a href="#">Section 7</a>: Derating values for <math>P_{tot}</math> total power dissipation updated.</li> </ul>			
74AHC_AHCT257_Q100 v.1	20130722	Product data sheet	-	-

## 14. Legal information

### Data sheet status

Document status [1][2]	Product status [3]	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
Preliminary [short] data sheet	Qualification	This document contains data from the preliminary specification.
Product [short] data sheet	Production	This document contains the product specification.

- [1] Please consult the most recently issued document before initiating or completing a design.
- [2] The term 'short data sheet' is explained in section "Definitions".
- [3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the internet at <https://www.nexperia.com>.

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