

# 74HC258

Quad 2-input multiplexer; 3-state; inverting

Rev. 04 — 14 April 2008

Product data sheet

## 1. General description

The 74HC258 is a high-speed Si-gate CMOS device and is pin compatible with low power Schottky TTL (LSTTL). The 74HC258 is specified in compliance with JEDEC standard no. 7A.

The 74HC258 has four identical 2-input multiplexers with 3-state outputs, which select 4 bits of data from two sources and is controlled by a common data select input (S).

The data inputs from source 0 (1I0 to 4I0) are selected when input S is LOW and the data inputs from source 1 (1I1 to 4I1) are selected when S is HIGH.

Data appears at the outputs (1 $\bar{Y}$  to 4 $\bar{Y}$ ) in inverted form from the select inputs.

The 74HC258 is the logic implementation of a 4-pole, 2-position switch, where the position of the switch is determined by the logic levels applied to S. The outputs are forced to a high-impedance OFF-state when  $\overline{OE}$  is HIGH.

The logic equations for the outputs are:

$$1\bar{Y} = \overline{\overline{OE} \times (1I1 \times S + 1I0 \times \bar{S})}$$

$$2\bar{Y} = \overline{\overline{OE} \times (2I1 \times S + 2I0 \times \bar{S})}$$

$$3\bar{Y} = \overline{\overline{OE} \times (3I1 \times S + 3I0 \times \bar{S})}$$

$$4\bar{Y} = \overline{\overline{OE} \times (4I1 \times S + 4I0 \times \bar{S})}$$

The 74HC258 is identical to the 74HC257 but has inverting outputs.

## 2. Features

- 3-state outputs interface directly with system bus
- Low-power dissipation
- Inverting data path
- Complies with JEDEC standard no. 7A
- ESD protection:
  - ◆ HBM JESD22-A114E exceeds 2000 V
  - ◆ MM JESD22-A115-A exceeds 200 V
- Multiple package options
- Specified from -40 °C to +85 °C and from -40 °C to +125 °C.

### 3. Ordering information

Table 1. Ordering information

Type number	Package			Version
	Temperature range	Name	Description	
74HC258N	-40 °C to +125 °C	DIP16	plastic dual in-line package; 16 leads (300 mil)	SOT38-4
74HC258D	-40 °C to +125 °C	SO16	plastic small outline package; 16 leads; body width 3.9 mm	SOT109-1
74HC258DB	-40 °C to +125 °C	SSOP16	plastic shrink small outline package; 16 leads; body width 5.3 mm	SOT338-1

### 4. Functional diagram

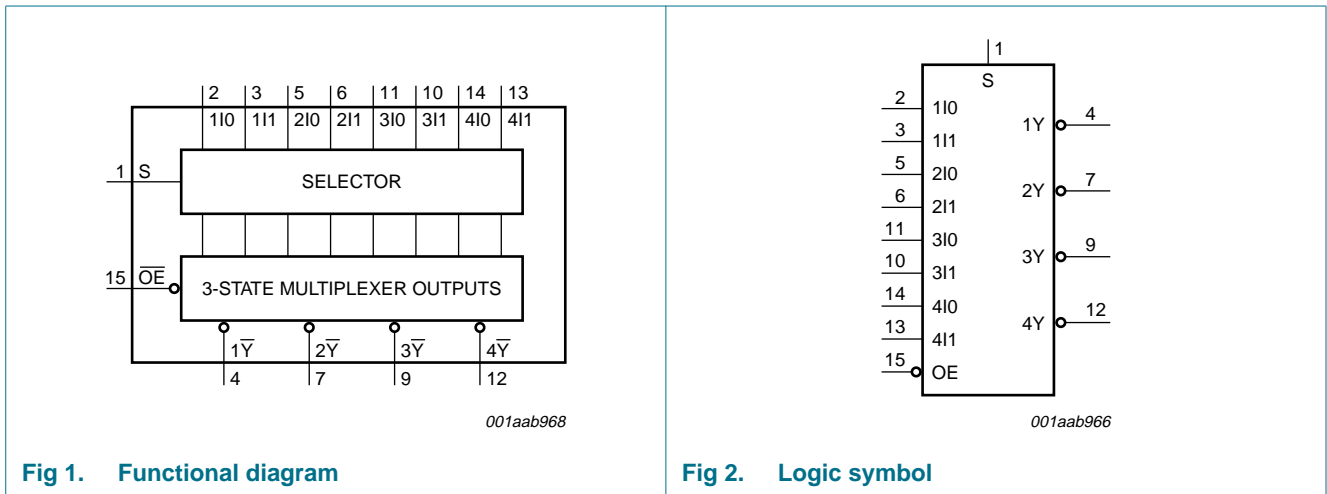


Fig 1. Functional diagram

Fig 2. Logic symbol

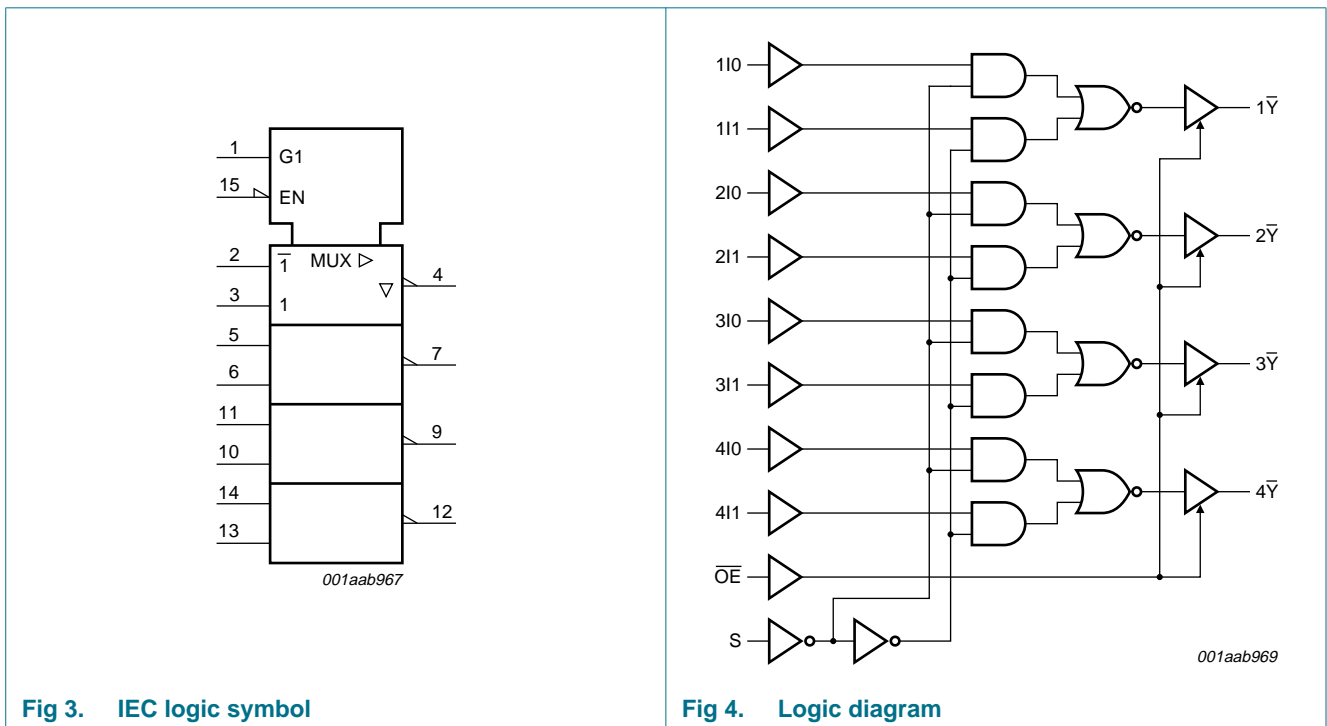
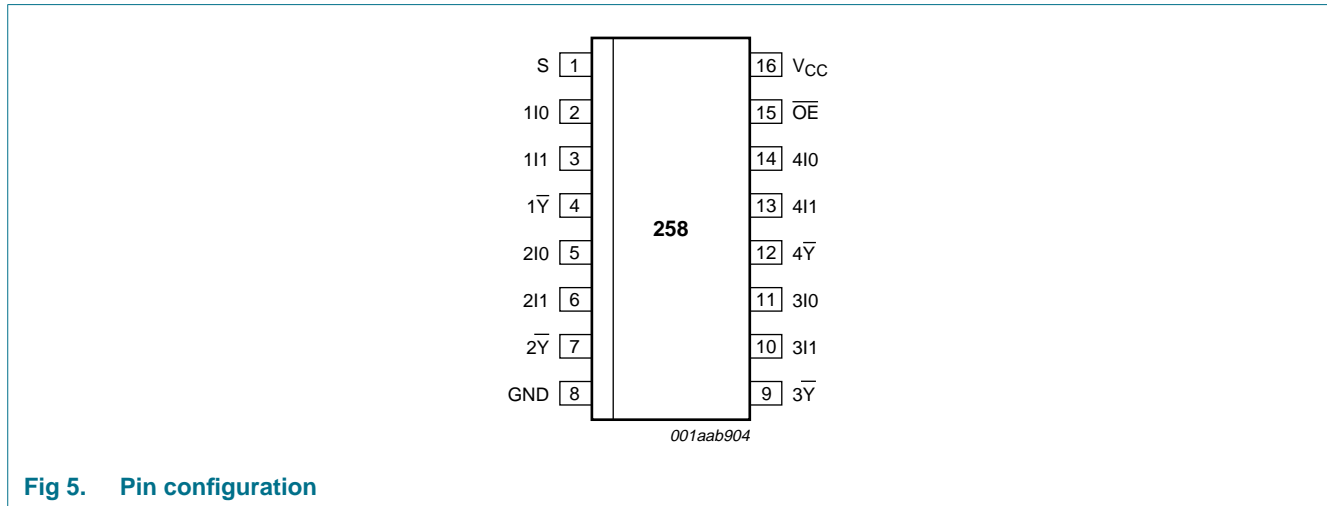


Fig 3. IEC logic symbol

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 1 from source 0
1I1	3	data input 1 from source 1
1Y $\bar{}$	4	3-state multiplexer output 1; inverted
2I0	5	data input 2 from source 0
2I1	6	data input 2 from source 1
2Y $\bar{}$	7	3-state multiplexer output 2; inverted
GND	8	ground (0 V)
3Y $\bar{}$	9	3-state multiplexer output 3; inverted
3I1	10	data input 3 from source 1
3I0	11	data input 3 from source 0
4Y $\bar{}$	12	3-state multiplexer output 4; inverted
4I1	13	data input 4 from source 1
4I0	14	data input 4 from source 0
OE $\bar{}$	15	output enable input (active LOW)
V <sub>CC</sub>	16	positive supply voltage

## 6. Functional description

Table 3. Function table<sup>[1]</sup>

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

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

## 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
$I_{IK}$	input clamping current	$V_I < -0.5\text{ V}$ or $V_I > V_{CC} + 0.5\text{ V}$	[1] -	$\pm 20$	mA
$I_{OK}$	output clamping current	$V_O < -0.5\text{ V}$ or $V_O > V_{CC} + 0.5\text{ V}$	[1] -	$\pm 20$	mA
$I_O$	output current	$V_O = -0.5\text{ V}$ to $V_{CC} + 0.5\text{ V}$	-	$\pm 35$	mA
$I_{CC}$	supply current		-	70	mA
$I_{GND}$	ground current		-70	-	mA
$T_{stg}$	storage temperature		-65	+150	°C
$P_{tot}$	total power dissipation	$T_{amb} = -40\text{ °C}$ to $+125\text{ °C}$			
		DIP16 package	[2] -	750	mW
		SO16 package	[3] -	500	mW
		SSOP16 package	[4] -	500	mW

- [1] The input and output voltage ratings may be exceeded if the input and output current ratings are observed.  
 [2]  $P_{tot}$  derates linearly with 12 mW/K above 70 °C.  
 [3]  $P_{tot}$  derates linearly with 8 mW/K above 70 °C.  
 [4]  $P_{tot}$  derates linearly with 5.5 mW/K above 60 °C.

## 8. Recommended operating conditions

**Table 5. Recommended operating conditions**

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V <sub>CC</sub>	supply voltage		2.0	5.0	6.0	V
V <sub>I</sub>	input voltage		0	-	V <sub>CC</sub>	V
V <sub>O</sub>	output voltage		0	-	V <sub>CC</sub>	V
T <sub>amb</sub>	ambient temperature		-40	-	+125	°C
Δt/ΔV	input transition rise and fall rate	V <sub>CC</sub> = 2.0 V	-	-	625	ns
		V <sub>CC</sub> = 4.5 V	-	1.67	139	ns
		V <sub>CC</sub> = 6.0 V	-	-	83	ns

## 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	
V <sub>IH</sub>	HIGH-level input voltage	V <sub>CC</sub> = 2.0 V	1.5	1.2	-	1.5	-	1.5	-	V
		V <sub>CC</sub> = 4.5 V	3.15	2.4	-	3.15	-	3.15	-	V
		V <sub>CC</sub> = 6.0 V	4.2	3.2	-	4.2	-	4.2	-	V
V <sub>IL</sub>	LOW-level input voltage	V <sub>CC</sub> = 2.0 V	-	0.8	0.5	-	0.5	-	0.5	V
		V <sub>CC</sub> = 4.5 V	-	2.1	1.35	-	1.35	-	1.35	V
		V <sub>CC</sub> = 6.0 V	-	2.8	1.8	-	1.8	-	1.8	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> = -20 μA; V <sub>CC</sub> = 2.0 V	1.9	2.0	-	1.9	-	1.9	-	V
		I <sub>O</sub> = -20 μA; V <sub>CC</sub> = 4.5 V	4.4	4.5	-	4.4	-	4.4	-	V
		I <sub>O</sub> = -20 μA; V <sub>CC</sub> = 6.0 V	5.9	6.0	-	5.9	-	5.9	-	V
		I <sub>O</sub> = -6 mA; V <sub>CC</sub> = 4.5 V	3.98	4.32	-	3.84	-	3.7	-	V
		I <sub>O</sub> = -7.8 mA; V <sub>CC</sub> = 6.0 V	5.48	5.81	-	5.34	-	5.2	-	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> = 20 μA; V <sub>CC</sub> = 2.0 V	-	0	0.1	-	0.1	-	0.1	V
		I <sub>O</sub> = 20 μA; V <sub>CC</sub> = 4.5 V	-	0	0.1	-	0.1	-	0.1	V
		I <sub>O</sub> = 20 μA; V <sub>CC</sub> = 6.0 V	-	0	0.1	-	0.1	-	0.1	V
		I <sub>O</sub> = 6 mA; V <sub>CC</sub> = 4.5 V	-	0.15	0.26	-	0.33	-	0.4	V
		I <sub>O</sub> = 7.8 mA; V <sub>CC</sub> = 6.0 V	-	0.16	0.26	-	0.33	-	0.4	V
I <sub>I</sub>	input leakage current	V <sub>I</sub> = V <sub>CC</sub> or GND; V <sub>CC</sub> = 6.0 V	-	-	±0.1	-	±1.0	-	±1.0	μA
I <sub>OZ</sub>	OFF-state output current	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> ; V <sub>CC</sub> = 6.0 V; V <sub>O</sub> = V <sub>CC</sub> or GND; I <sub>O</sub> = 0 A	-	-	±0.5	-	±5.0	-	±10	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> = 6.0 V	-	-	8	-	80	-	160	μA
C <sub>I</sub>	input capacitance		-	3.5	-	-	-	-	-	pF

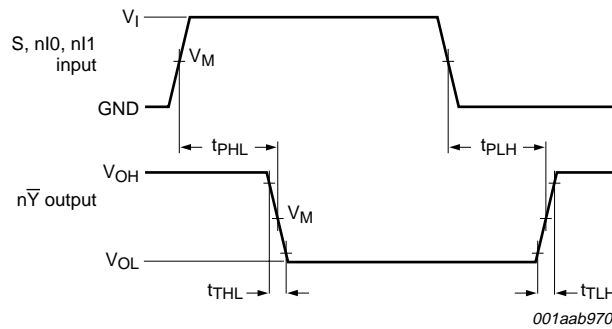
## 10. Dynamic characteristics

**Table 7. Dynamic characteristics**  
*GND = 0 V; for test circuit see Figure 8.*

Symbol	Parameter	Conditions	25 °C			-40 °C to +125 °C		Unit	
			Min	Typ	Max	Max (85 °C)	Max (125 °C)		
$t_{pd}$	propagation delay	nI0, nI1 to n $\bar{Y}$ ; see Figure 6 [1]							
		$V_{CC} = 2.0\text{ V}$	-	30	95	120	145	ns	
		$V_{CC} = 4.5\text{ V}$	-	11	19	24	29	ns	
		$V_{CC} = 6.0\text{ V}$	-	9	16	20	25	ns	
		$V_{CC} = 5.0\text{ V}; C_L = 15\text{ pF}$	-	9	-	-	-	ns	
		S to n $\bar{Y}$ ; see Figure 6							
		$V_{CC} = 2.0\text{ V}$	-	47	140	175	210	ns	
		$V_{CC} = 4.5\text{ V}$	-	17	28	35	42	ns	
		$V_{CC} = 6.0\text{ V}$	-	14	24	30	36	ns	
		$V_{CC} = 5.0\text{ V}; C_L = 15\text{ pF}$	-	14	-	-	-	ns	
$t_{en}$	enable time	$\overline{OE}$ to n $\bar{Y}$ ; see Figure 7 [2]							
		$V_{CC} = 2.0\text{ V}$	-	39	140	175	210	ns	
		$V_{CC} = 4.5\text{ V}$	-	14	28	35	42	ns	
		$V_{CC} = 6.0\text{ V}$	-	11	24	30	36	ns	
$t_{dis}$	disable time	$\overline{OE}$ to n $\bar{Y}$ ; see Figure 7 [3]							
		$V_{CC} = 2.0\text{ V}$	-	55	150	190	225	ns	
		$V_{CC} = 4.5\text{ V}$	-	20	30	38	45	ns	
		$V_{CC} = 6.0\text{ V}$	-	16	26	33	38	ns	
$t_t$	transition time	see Figure 6 [4]							
		$V_{CC} = 2.0\text{ V}$	-	14	60	75	90	ns	
		$V_{CC} = 4.5\text{ V}$	-	5	12	15	18	ns	
		$V_{CC} = 6.0\text{ V}$	-	4	10	13	15	ns	
$C_{PD}$	power dissipation capacitance	per multiplexer; $V_I = \text{GND to } V_{CC}$	[5]	-	55	-	-	-	pF

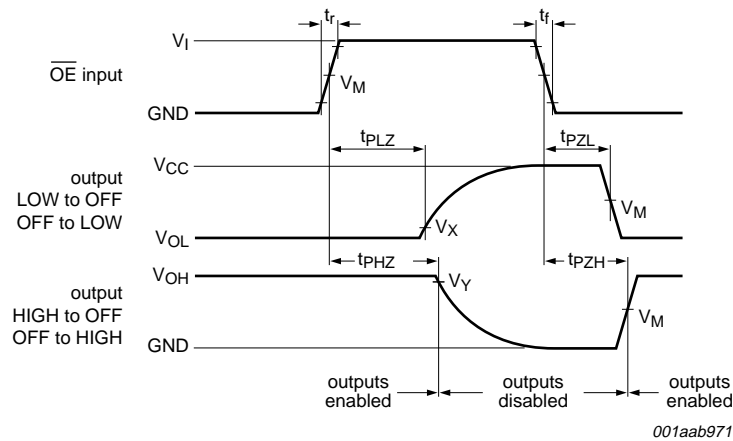
- [1]  $t_{pd}$  is the same as  $t_{PHL}$  and  $t_{PLH}$ .
- [2]  $t_{en}$  is the same as  $t_{PZH}$  and  $t_{PZL}$ .
- [3]  $t_{dis}$  is the same as  $t_{PHZ}$  and  $t_{PLZ}$ .
- [4]  $t_t$  is the same as  $t_{THL}$  and  $t_{TLH}$ .
- [5]  $C_{PD}$  is used to determine the dynamic power dissipation ( $P_D$  in  $\mu\text{W}$ ).  
 $P_D = C_{PD} \times V_{CC}^2 \times f_i \times N + \sum(C_L \times V_{CC}^2 \times f_o)$  where:  
 $f_i$  = input frequency in MHz;  
 $f_o$  = output frequency in MHz;  
 $C_L$  = output load capacitance in pF;  
 $V_{CC}$  = supply voltage in V;  
 $N$  = number of inputs switching;  
 $\sum(C_L \times V_{CC}^2 \times f_o)$  = sum of outputs.

11. Waveforms



Measurement points are given in [Table 8](#).  
 $V_{OL}$  and  $V_{OH}$  are typical output voltage levels that occur with the output load.

**Fig 6. Input (nI0, nI1 and S) to output (nY) propagation delays and output transition times**

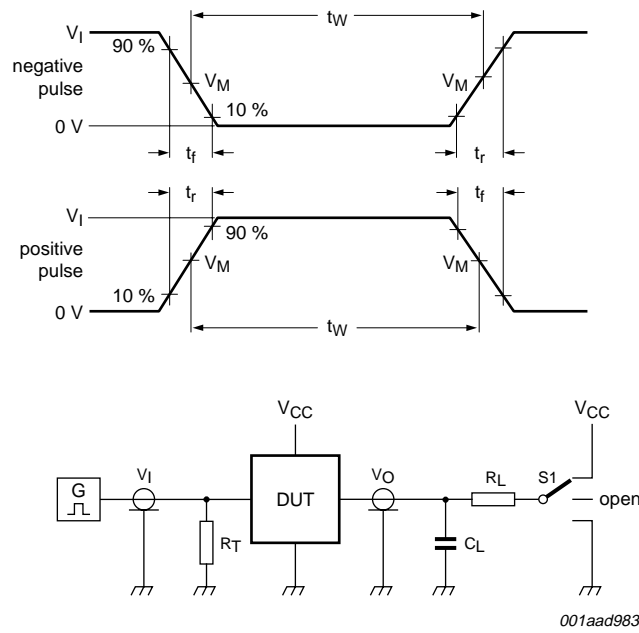


Measurement points are given in [Table 8](#).  
 $V_{OL}$  and  $V_{OH}$  are typical output voltage levels that occur with the output load.

**Fig 7. Enable and disable times**

**Table 8. Measurement points**

Input	Output		
$V_M$	$V_M$	$V_X$	$V_Y$
$0.5 \times V_{CC}$	$0.5 \times V_{CC}$	$0.1 \times V_{CC}$	$0.9 \times V_{CC}$



Test data is given in [Table 9](#).

Definitions test circuit:

$R_T$  = Termination resistance should be equal to output impedance  $Z_o$  of the pulse generator.

$C_L$  = Load capacitance including jig and probe capacitance.

$R_L$  = Load resistance.

S1 = Test selection switch.

**Fig 8. Test circuit for measuring switching times**

**Table 9. Test data**

Supply voltage	Input		Load		S1		
$V_{CC}$	$V_I$	$t_r = t_f$	$C_L$	$R_L$	$t_{PZL}, t_{PLZ}$	$t_{PZH}, t_{PHZ}$	$t_{PHL}, t_{PLH}$
2.0 V	$V_{CC}$	6 ns	50 pF	1 k $\Omega$	$V_{CC}$	GND	open
4.5 V	$V_{CC}$	6 ns	50 pF	1 k $\Omega$	$V_{CC}$	GND	open
6.0 V	$V_{CC}$	6 ns	50 pF	1 k $\Omega$	$V_{CC}$	GND	open
5.0 V	$V_{CC}$	6 ns	15 pF	1 k $\Omega$	$V_{CC}$	GND	open



12. Package outline

DIP16: plastic dual in-line package; 16 leads (300 mil)

SOT38-4

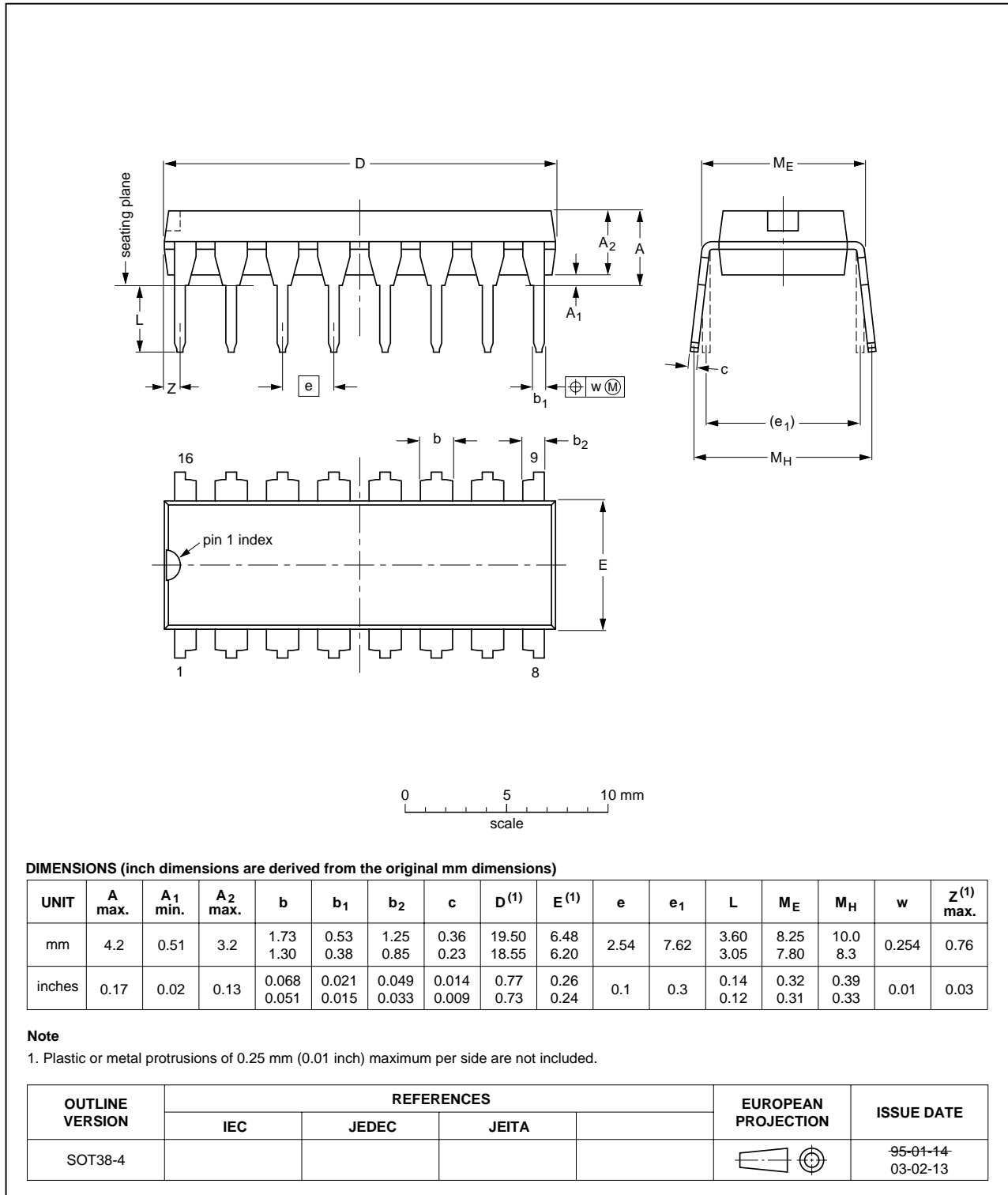


Fig 9. Package outline SOT38-4 (DIP16)

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

SOT109-1

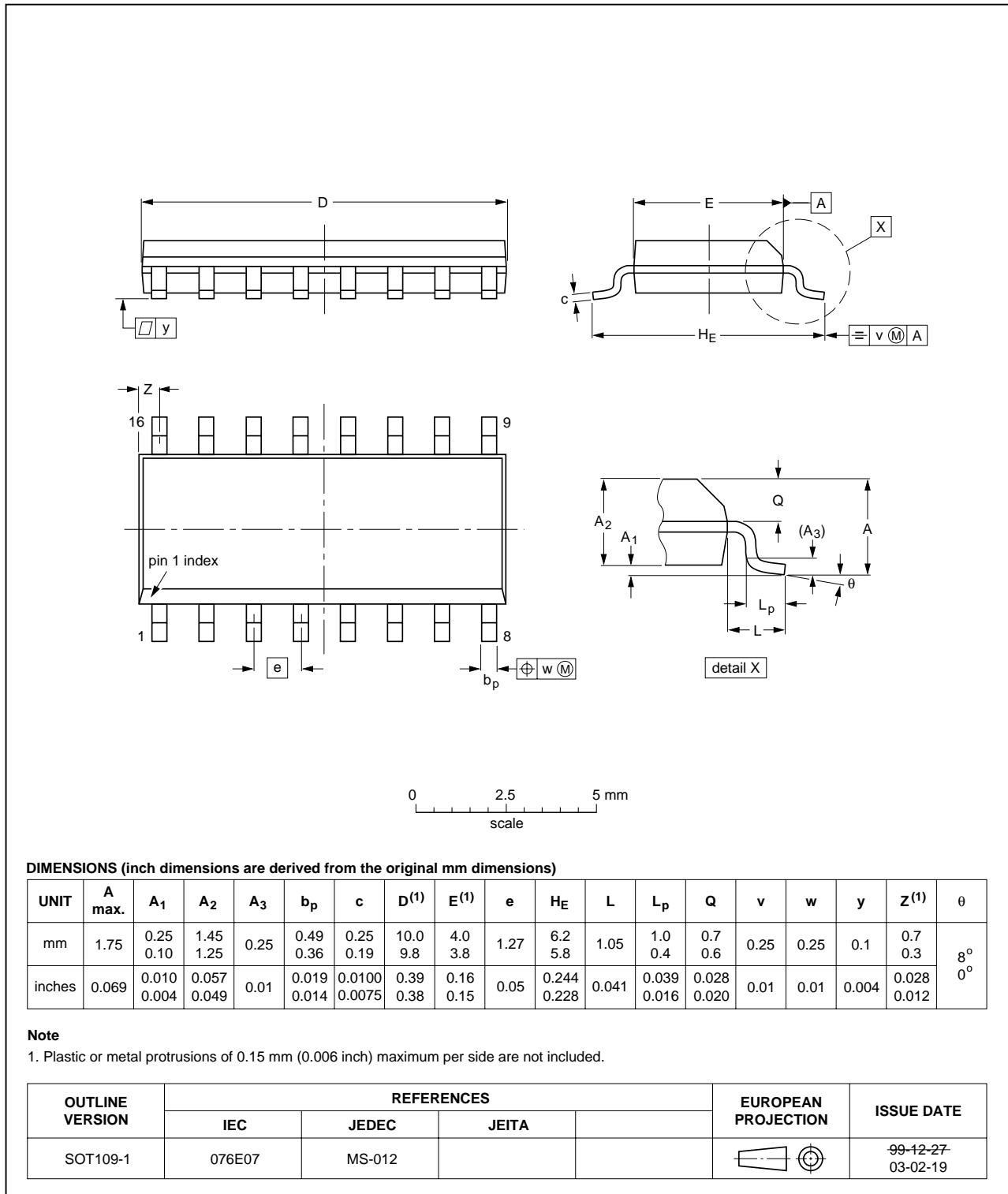


Fig 10. Package outline SOT109-1 (SO16)

SSOP16: plastic shrink small outline package; 16 leads; body width 5.3 mm

SOT338-1

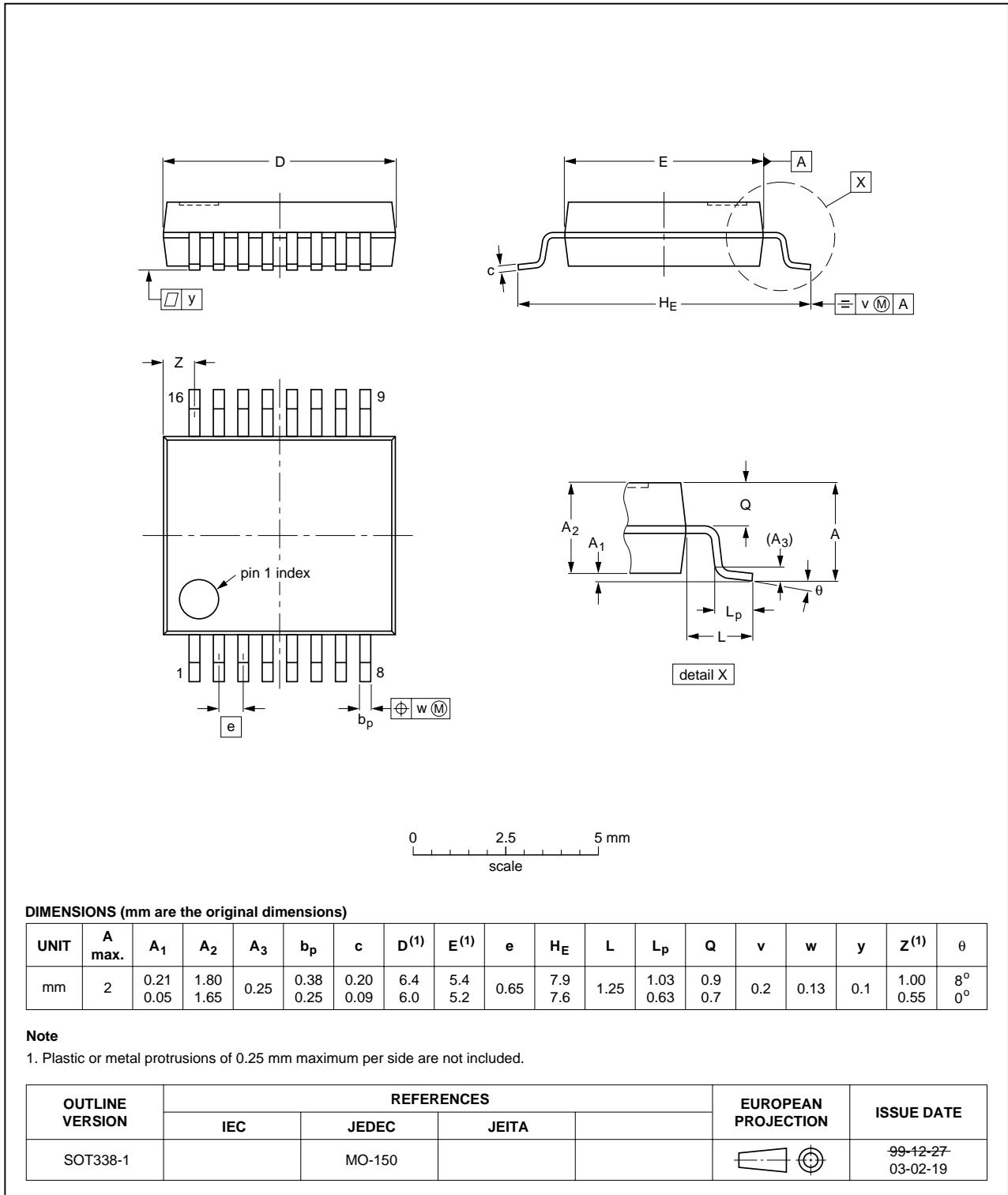


Fig 11. Package outline SOT338-1 (SSOP16)

## 13. Abbreviations

**Table 10. Abbreviations**

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

## 14. Revision history

**Table 11. Revision history**

Document ID	Release date	Data sheet status	Change notice	Supersedes
74HC258_4	20080414	Product data sheet	-	74HC258_3
Modifications:	<ul style="list-style-type: none"> <li>The format of this data sheet has been redesigned to comply with the new identity guidelines of NXP Semiconductors.</li> <li>Legal texts have been adapted to the new company name where appropriate.</li> <li>Pin assignment corrected for pins 10, 11, 13 and 14 in <a href="#">Figure 1</a>, <a href="#">Figure 2</a>, <a href="#">Figure 5</a> and <a href="#">Table 2</a>.</li> </ul>			
74HC258_3	20041112	Product data sheet	-	74HC_HCT258_CNV_2
74HC_HCT258_CNV_2	19990902	Product specification	-	74HC_HCT258_1
74HC_HCT258_1	19901201	Product specification	-	-

## 15. Legal information

### 15.1 Data sheet status

Document status <sup>[1][2]</sup>	Product status <sup>[3]</sup>	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 URL <http://www.nxp.com>.

### 15.2 Definitions

**Draft** — The document is a draft version only. The content is still under internal review and subject to formal approval, which may result in modifications or additions. NXP Semiconductors does not give any representations or warranties as to the accuracy or completeness of information included herein and shall have no liability for the consequences of use of such information.

**Short data sheet** — A short data sheet is an extract from a full data sheet with the same product type number(s) and title. A short data sheet is intended for quick reference only and should not be relied upon to contain detailed and full information. For detailed and full information see the relevant full data sheet, which is available on request via the local NXP Semiconductors sales office. In case of any inconsistency or conflict with the short data sheet, the full data sheet shall prevail.

### 15.3 Disclaimers

**General** — Information in this document is believed to be accurate and reliable. However, NXP Semiconductors does not give any representations or warranties, expressed or implied, as to the accuracy or completeness of such information and shall have no liability for the consequences of use of such information.

**Right to make changes** — NXP Semiconductors reserves the right to make changes to information published in this document, including without limitation specifications and product descriptions, at any time and without notice. This document supersedes and replaces all information supplied prior to the publication hereof.

**Suitability for use** — NXP Semiconductors products are not designed, authorized or warranted to be suitable for use in medical, military, aircraft, space or life support equipment, nor in applications where failure or

malfunction of an NXP Semiconductors product can reasonably be expected to result in personal injury, death or severe property or environmental damage. NXP Semiconductors accepts no liability for inclusion and/or use of NXP Semiconductors products in such equipment or applications and therefore such inclusion and/or use is at the customer's own risk.

**Applications** — Applications that are described herein for any of these products are for illustrative purposes only. NXP Semiconductors makes no representation or warranty that such applications will be suitable for the specified use without further testing or modification.

**Limiting values** — Stress above one or more limiting values (as defined in the Absolute Maximum Ratings System of IEC 60134) may cause permanent damage to the device. Limiting values are stress ratings only and operation of the device at these or any other conditions above those given in the Characteristics sections of this document is not implied. Exposure to limiting values for extended periods may affect device reliability.

**Terms and conditions of sale** — NXP Semiconductors products are sold subject to the general terms and conditions of commercial sale, as published at <http://www.nxp.com/profile/terms>, including those pertaining to warranty, intellectual property rights infringement and limitation of liability, unless explicitly otherwise agreed to in writing by NXP Semiconductors. In case of any inconsistency or conflict between information in this document and such terms and conditions, the latter will prevail.

**No offer to sell or license** — Nothing in this document may be interpreted or construed as an offer to sell products that is open for acceptance or the grant, conveyance or implication of any license under any copyrights, patents or other industrial or intellectual property rights.

### 15.4 Trademarks

Notice: All referenced brands, product names, service names and trademarks are the property of their respective owners.

## 16. Contact information

For more information, please visit: <http://www.nxp.com>

For sales office addresses, please send an email to: [salesaddresses@nxp.com](mailto:salesaddresses@nxp.com)

**17. Contents**

**1 General description . . . . . 1**

**2 Features . . . . . 1**

**3 Ordering information . . . . . 2**

**4 Functional diagram . . . . . 2**

**5 Pinning information . . . . . 3**

5.1 Pinning . . . . . 3

5.2 Pin description . . . . . 3

**6 Functional description . . . . . 4**

**7 Limiting values . . . . . 4**

**8 Recommended operating conditions . . . . . 5**

**9 Static characteristics . . . . . 5**

**10 Dynamic characteristics . . . . . 6**

**11 Waveforms . . . . . 7**

**12 Package outline . . . . . 9**

**13 Abbreviations . . . . . 12**

**14 Revision history . . . . . 12**

**15 Legal information . . . . . 13**

15.1 Data sheet status . . . . . 13

15.2 Definitions . . . . . 13

15.3 Disclaimers . . . . . 13

15.4 Trademarks . . . . . 13

**16 Contact information . . . . . 13**

**17 Contents . . . . . 14**

Please be aware that important notices concerning this document and the product(s) described herein, have been included in section 'Legal information'.



## X-ON Electronics

Largest Supplier of Electrical and Electronic Components

*Click to view similar products for [Encoders, Decoders, Multiplexers & Demultiplexers](#) category:*

*Click to view products by [NXP](#) manufacturer:*

Other Similar products are found below :

[M38510/01406BEA](#) [MC74HC163ADTG](#) [74HC253N](#) [HMC854LC5TR](#) [NLV74VHC1G01DFT1G](#) [NLVHC4851ADTR2G](#)  
[NLVHCT4851ADTR2G](#) [PI3B33X257BE](#) [M74HCT4052ADTR2G](#) [M74VHC1GT04DFT3G](#) [TC74AC138P\(F\)](#) [MC74LVX4051MNTWG](#)  
[HMC855LC5TR](#) [NLV14028BDR2G](#) [NLV14051BDR2G](#) [NLV74HC238ADTR2G](#) [715428X](#) [COMX-CAR-210](#) [5962-8607001EA](#) [5962-8756601EA](#) [MAX3783UCM+D](#) [PI5C3253QEX](#) [8CA3052APGGI8](#) [TC74HC4051AF\(EL,F\)](#) [TC74VHC138F\(EL,K,F\)](#) [PI3B3251LE](#)  
[PI5C3309UEX](#) [PI5C3251QEX](#) [PI3B3251QE](#) [74VHC4052AFT\(BJ\)](#) [PI3PCIE3415AZHEX](#) [NLV74HC4851AMNTWG](#) [MC74LVX257DG](#)  
[M74HC151YRM13TR](#) [M74HC151YTTR](#) [PI5USB31213XEAEX](#) [M74HCT4851ADWR2G](#) [XD74LS154](#) [AP4373AW5-7-01](#) [QS3VH251QG8](#)  
[QS4A201QG](#) [HCS301T-ISN](#) [HCS500-I/SM](#) [MC74HC151ADTG](#) [TC4066BP\(N,F\)](#) [74ACT11139PWR](#) [HMC728LC3CTR](#) [74VHC238FT\(BJ\)](#)  
[74VHC4066AFT\(BJ\)](#) [74VHCT138AFT\(BJ\)](#)