



**THE DATASHEET OF  
74HCT2G125DC,125**





# 74HC2G125; 74HCT2G125

Dual buffer/line driver; 3-state

Rev. 7 — 16 November 2023

Product data sheet

## 1. General description

The 74HC2G125; 74HCT2G125 are dual buffer/line drivers with 3-state outputs controlled by the output enable inputs ( $\overline{nOE}$ ). Inputs include clamp diodes. This enables the use of current limiting resistors to interface inputs to voltages in excess of  $V_{CC}$ .

## 2. Features and benefits

- Wide supply voltage range from 2.0 V to 6.0 V
- Input levels:
  - For 74HC2G125: CMOS level
  - For 74HCT2G125: TTL level
- CMOS low power dissipation
- High noise immunity
- Latch-up performance exceeds 100 mA per JESD 78 Class II Level B
- Complies with JEDEC standard: JESD7A (4.5 V to 5.5 V)
- ESD protection:
  - HBM: ANSI/ESDA/JEDEC JS-001 class 2 exceeds 2000 V
  - CDM: ANSI/ESDA/JEDEC JS-002 class C3 exceeds 1000 V
- Specified from -40 °C to +85 °C and -40 °C to +125 °C

## 3. Ordering information

Table 1. Ordering information

Type number	Package			
	Temperature range	Name	Description	Version
<a href="#">74HC2G125DP</a> <a href="#">74HCT2G125DP</a>	-40 °C to +125 °C	TSSOP8	plastic thin shrink small outline package; 8 leads; body width 3 mm; lead length 0.5 mm	<a href="#">SOT505-2</a>
<a href="#">74HC2G125DC</a> <a href="#">74HCT2G125DC</a>	-40 °C to +125 °C	VSSOP8	plastic very thin shrink small outline package; 8 leads; body width 2.3 mm	<a href="#">SOT765-1</a>

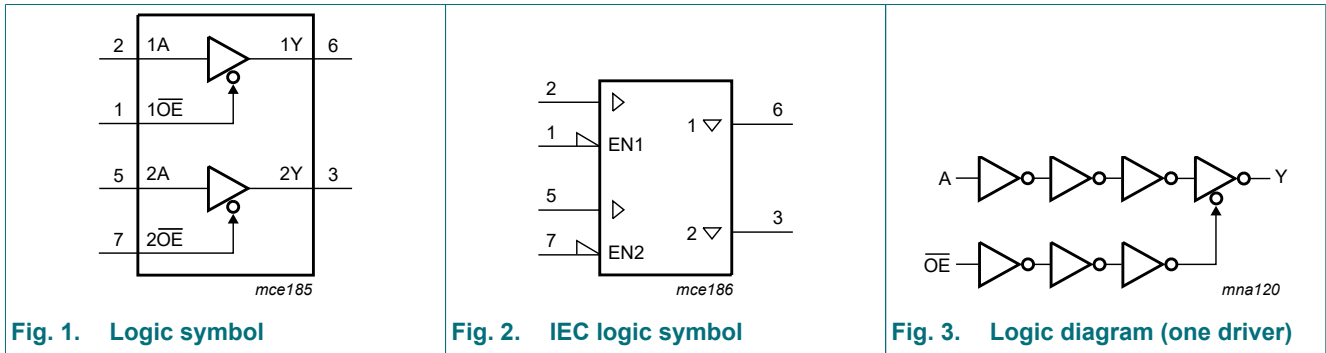
## 4. Marking

Table 2. Marking codes

Type number	Marking code[1]
74HC2G125DP	H25
74HCT2G125DP	T25
74HC2G125DC	H25
74HCT2G125DC	T25

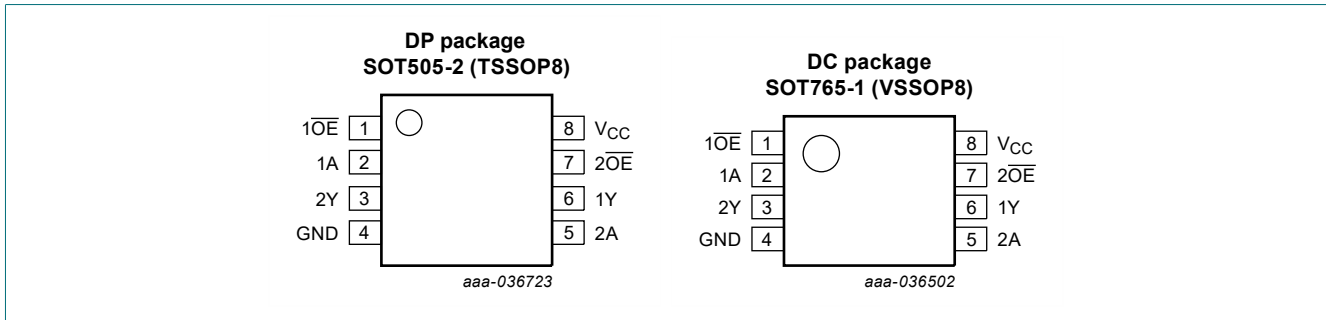
[1] The pin 1 indicator is located on the lower left corner of the device, below the marking code.

### 5. Functional diagram



### 6. Pinning information

#### 6.1. Pinning



#### 6.2. Pin description

Table 3. Pin description

Symbol	Pin	Description
1OE, 2OE	1, 7	output enable input (active LOW)
1A, 2A	2, 5	data input
GND	4	ground (0 V)
1Y, 2Y	6, 3	data output
V <sub>CC</sub>	8	supply voltage

### 7. Functional description

Table 4. Function table

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

Control	Input	Output
nOE	nA	nY
L	L	L
L	H	H
H	X	Z

## 8. Limiting values

**Table 5. 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 $(V_{CC} + 0.5\text{ V})$ [1]	-	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 $+125\text{ °C}$ [2]	-	250	mW

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

[2] For SOT505-2 (TSSOP8) package:  $P_{tot}$  derates linearly with 4.6 mW/K above 96 °C.  
For SOT765-1 (VSSOP8) package:  $P_{tot}$  derates linearly with 4.9 mW/K above 99 °C.

## 9. Recommended operating conditions

**Table 6. Recommended operating conditions**

Voltages are referenced to GND (ground = 0 V).

Symbol	Parameter	Conditions	74HC2G125			74HCT2G125			Unit
			Min	Typ	Max	Min	Typ	Max	
$V_{CC}$	supply voltage		2.0	5.0	6.0	4.5	5.0	5.5	V
$V_I$	input voltage		0	-	$V_{CC}$	0	-	$V_{CC}$	V
$V_O$	output voltage		0	-	$V_{CC}$	0	-	$V_{CC}$	V
$T_{amb}$	ambient temperature		-40	+25	+125	-40	+25	+125	°C
$\Delta t/\Delta V$	input transition rise and fall rate	$V_{CC} = 2.0\text{ V}$	-	-	625	-	-	-	ns/V
		$V_{CC} = 4.5\text{ V}$	-	1.67	139	-	1.67	139	ns/V
		$V_{CC} = 6.0\text{ V}$	-	-	83	-	-	-	ns/V

## 10. Static characteristics

**Table 7. Static characteristics**

Voltages are referenced to GND (ground = 0 V). All typical values are measured at  $T_{amb} = 25\text{ °C}$ .

Symbol	Parameter	Conditions	$T_{amb} = -40\text{ °C}$ to $+85\text{ °C}$			$T_{amb} = -40\text{ °C}$ to $+125\text{ °C}$		Unit
			Min	Typ	Max	Min	Max	
<b>74HC2G125</b>								
$V_{IH}$	HIGH-level input voltage	$V_{CC} = 2.0\text{ V}$	1.5	1.2	-	1.5	-	V
		$V_{CC} = 4.5\text{ V}$	3.15	2.4	-	3.15	-	V
		$V_{CC} = 6.0\text{ V}$	4.2	3.2	-	4.2	-	V
$V_{IL}$	LOW-level input voltage	$V_{CC} = 2.0\text{ V}$	-	0.8	0.5	-	0.5	V
		$V_{CC} = 4.5\text{ V}$	-	2.1	1.35	-	1.35	V
		$V_{CC} = 6.0\text{ V}$	-	2.8	1.8	-	1.8	V

Symbol	Parameter	Conditions	T <sub>amb</sub> = -40 °C to +85 °C			T <sub>amb</sub> = -40 °C to +125 °C		Unit
			Min	Typ	Max	Min	Max	
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	-	V
		I <sub>O</sub> = -20 µA; V <sub>CC</sub> = 4.5 V	4.4	4.5	-	4.4	-	V
		I <sub>O</sub> = -20 µA; V <sub>CC</sub> = 6.0 V	5.9	6.0	-	5.9	-	V
		I <sub>O</sub> = -6.0 mA; V <sub>CC</sub> = 4.5 V	3.84	4.32	-	3.7	-	V
		I <sub>O</sub> = -7.8 mA; V <sub>CC</sub> = 6.0 V	5.34	5.81	-	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	V
		I <sub>O</sub> = 20 µA; V <sub>CC</sub> = 4.5 V	-	0	0.1	-	0.1	V
		I <sub>O</sub> = 20 µA; V <sub>CC</sub> = 6.0 V	-	0	0.1	-	0.1	V
		I <sub>O</sub> = 6.0 mA; V <sub>CC</sub> = 4.5 V	-	0.15	0.33	-	0.4	V
		I <sub>O</sub> = 7.8 mA; V <sub>CC</sub> = 6.0 V	-	0.16	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	-	-	±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>O</sub> = V <sub>CC</sub> or GND; V <sub>CC</sub> = 6.0 V	-	-	±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	-	-	10	-	20	µA
C <sub>I</sub>	input capacitance		-	1.0	-	-	-	pF
C <sub>O</sub>	output capacitance		-	1.5	-	-	-	pF
<b>74HCT2G125</b>								
V <sub>IH</sub>	HIGH-level input voltage	V <sub>CC</sub> = 4.5 V to 5.5 V	2.0	1.6	-	2.0	-	V
V <sub>IL</sub>	LOW-level input voltage	V <sub>CC</sub> = 4.5 V to 5.5 V	-	1.2	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> = -20 µA	4.4	4.5	-	4.4	-	V
		I <sub>O</sub> = -6.0 mA	3.84	4.32	-	3.7	-	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> = 20 µA	-	0	0.1	-	0.1	V
		I <sub>O</sub> = 6.0 mA	-	0.16	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> = 5.5 V	-	-	±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>O</sub> = V <sub>CC</sub> or GND; V <sub>CC</sub> = 5.5 V	-	-	±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> = 5.5 V	-	-	10	-	20	µA
ΔI <sub>CC</sub>	additional supply current	per input; V <sub>CC</sub> = 4.5 V to 5.5 V; V <sub>I</sub> = V <sub>CC</sub> - 2.1 V; I <sub>O</sub> = 0 A	-	-	375	-	410	µA
C <sub>I</sub>	input capacitance		-	1.0	-	-	-	pF
C <sub>O</sub>	output capacitance		-	1.5	-	-	-	pF

## 11. Dynamic characteristics

**Table 8. Dynamic characteristics**

Voltages are referenced to GND (ground = 0 V);  $C_L = 50$  pF unless otherwise specified; for test circuit see Fig. 6.

Symbol	Parameter	Conditions	$T_{amb} = -40\text{ °C to }+85\text{ °C}$			$T_{amb} = -40\text{ °C to }+125\text{ °C}$		Unit
			Min	Typ [1]	Max	Min	Max	
<b>74HC2G125</b>								
$t_{pd}$	propagation delay	nA to nY; see Fig. 4 [2]						
		$V_{CC} = 2.0$ V	-	35	115	-	135	ns
		$V_{CC} = 4.5$ V	-	11	23	-	27	ns
		$V_{CC} = 5.0$ V; $C_L = 15$ pF	-	10	-	-	-	ns
		$V_{CC} = 6.0$ V	-	8	20	-	23	ns
$t_{en}$	enable time	nOE to nY; see Fig. 5 [2]						
		$V_{CC} = 2.0$ V	-	40	115	-	135	ns
		$V_{CC} = 4.5$ V	-	11	23	-	27	ns
		$V_{CC} = 6.0$ V	-	8	20	-	23	ns
$t_{dis}$	disable time	nOE to nY; see Fig. 5 [2]						
		$V_{CC} = 2.0$ V	-	24	125	-	150	ns
		$V_{CC} = 4.5$ V	-	12	25	-	30	ns
		$V_{CC} = 6.0$ V	-	10	21	-	26	ns
$t_t$	transition time	see Fig. 4 [2]						
		$V_{CC} = 2.0$ V	-	18	75	-	90	ns
		$V_{CC} = 4.5$ V	-	6	15	-	18	ns
		$V_{CC} = 6.0$ V	-	5	13	-	15	ns
$C_{PD}$	power dissipation capacitance	per buffer; $V_I = \text{GND to } V_{CC}$ [3]						
		output enabled	-	11	-	-	-	pF
		output disabled	-	1	-	-	-	pF
<b>74HCT2G125</b>								
$t_{pd}$	propagation delay	nA to nY; see Fig. 4 [2]						
		$V_{CC} = 4.5$ V	-	15	31	-	38	ns
		$V_{CC} = 5.0$ V; $C_L = 15$ pF	-	12	-	-	-	ns
$t_{en}$	enable time	nOE to nY; see Fig. 5; $V_{CC} = 4.5$ V [2]	-	15	35	-	42	ns
$t_{dis}$	disable time	nOE to nY; see Fig. 5; $V_{CC} = 4.5$ V [2]	-	15	31	-	38	ns
$t_t$	transition time	see Fig. 4; $V_{CC} = 4.5$ V [2]	-	6	15	-	18	ns
$C_{PD}$	power dissipation capacitance	per buffer; $V_I = \text{GND to } V_{CC} - 1.5$ V [3]						
		output enabled	-	11	-	-	-	pF
		output disabled	-	1	-	-	-	pF

[1] All typical values are measured at  $T_{amb} = 25\text{ °C}$ .

[2]  $t_{pd}$  is the same as  $t_{PLH}$  and  $t_{PHL}$ ;  $t_{en}$  is the same as  $t_{PZL}$  and  $t_{PZH}$ ;  $t_{dis}$  is the same as  $t_{PLZ}$  and  $t_{PHZ}$ ;  $t_t$  is the same as  $t_{THL}$  and  $t_{TLH}$ .

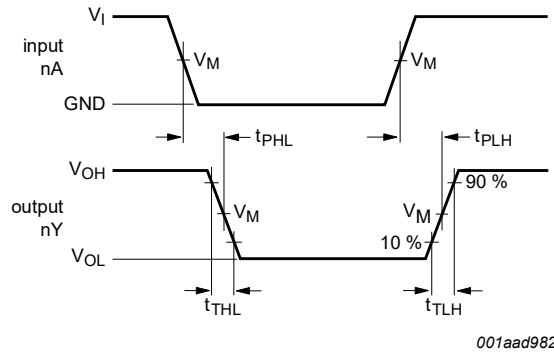
[3]  $C_{PD}$  is used to determine the dynamic power dissipation ( $P_D$  in  $\mu\text{W}$ ).  $P_D = C_{PD} \times V_{CC}^2 \times f_i \times N + \Sigma(C_L \times V_{CC}^2 \times f_o)$  where:

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

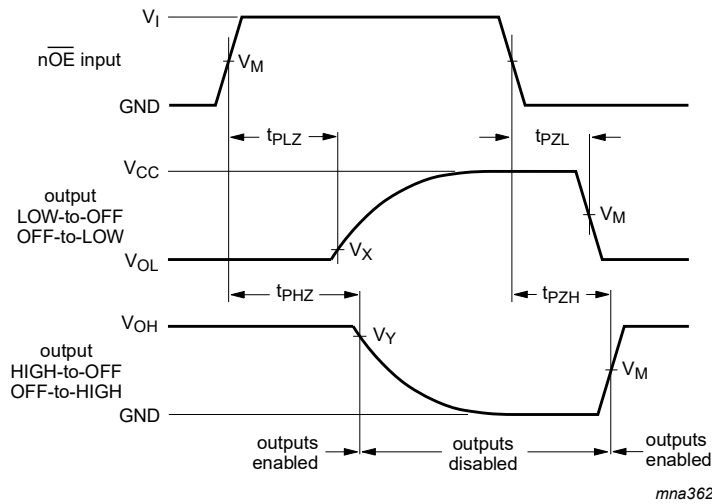
11.1. Waveforms and test circuit



Measurement points are given in [Table 9](#).

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

Fig. 4. Propagation delays data input (nA) to output (nY)



Measurement points are given in [Table 9](#).

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

Fig. 5. Enable and disable times

Table 9. Measurement points

Type	Input	Output		
	$V_M$	$V_M$	$V_X$	$V_Y$
74HC2G125	$0.5 \times V_{CC}$	$0.5 \times V_{CC}$	$V_{OL} + 0.3 \text{ V}$	$V_{OH} - 0.3 \text{ V}$
74HCT2G125	1.3 V	1.3 V	$V_{OL} + 0.3 \text{ V}$	$V_{OH} - 0.3 \text{ V}$

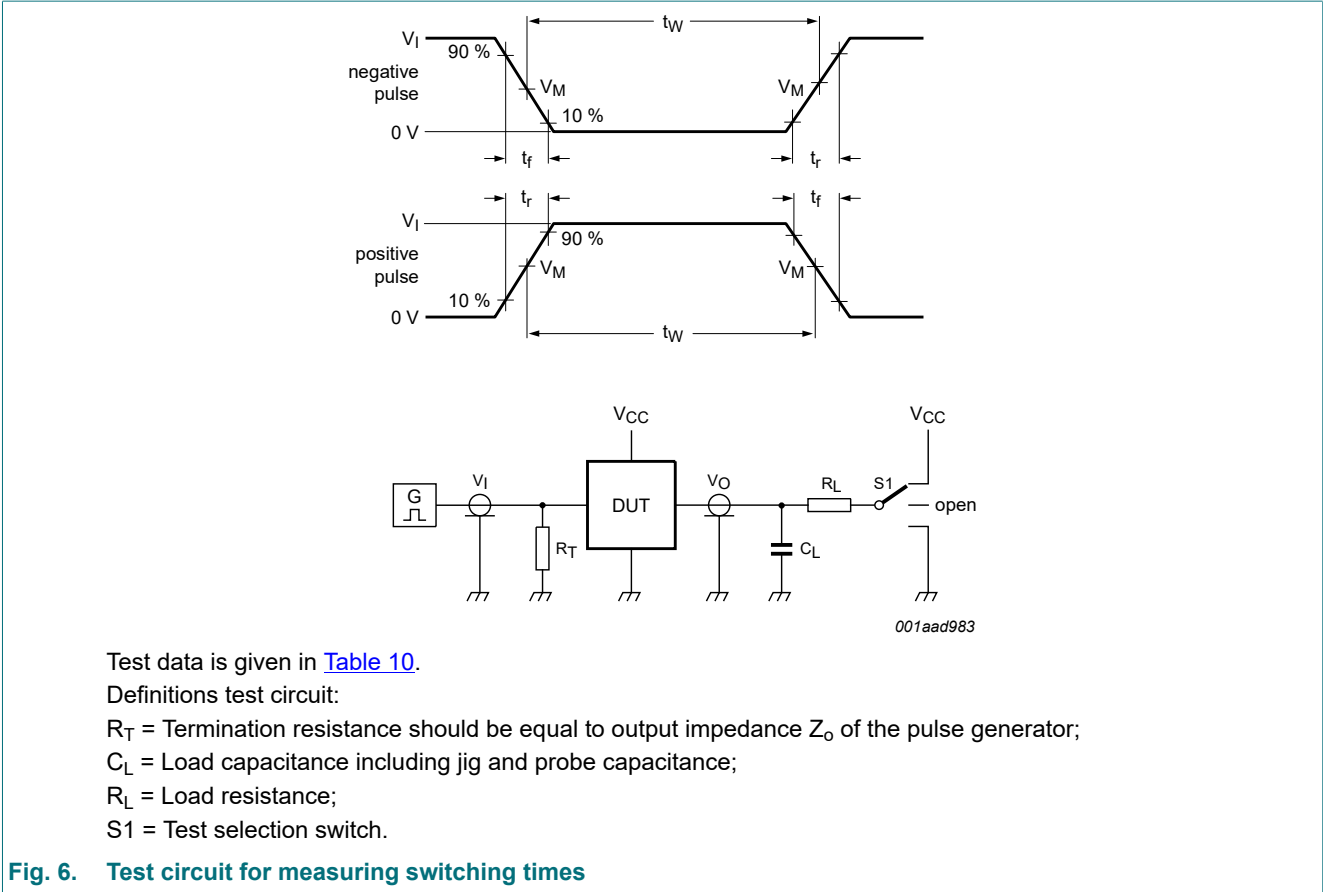


Table 10. Test data

Type	Input		Load		S1 position		
	$V_I$	$t_r, t_f$	$C_L$	$R_L$	$t_{PHL}, t_{PLH}$	$t_{PZH}, t_{PHZ}$	$t_{PZL}, t_{PLZ}$
74HC2G125	$V_{CC}$	$\leq 6$ ns	15 pF, 50 pF	1 k $\Omega$	open	GND	$V_{CC}$
74HCT2G125	3 V	$\leq 6$ ns	15 pF, 50 pF	1 k $\Omega$	open	GND	$V_{CC}$

12. Package outline

TSSOP8: plastic thin shrink small outline package; 8 leads; body width 3 mm; lead length 0.5 mm SOT505-2

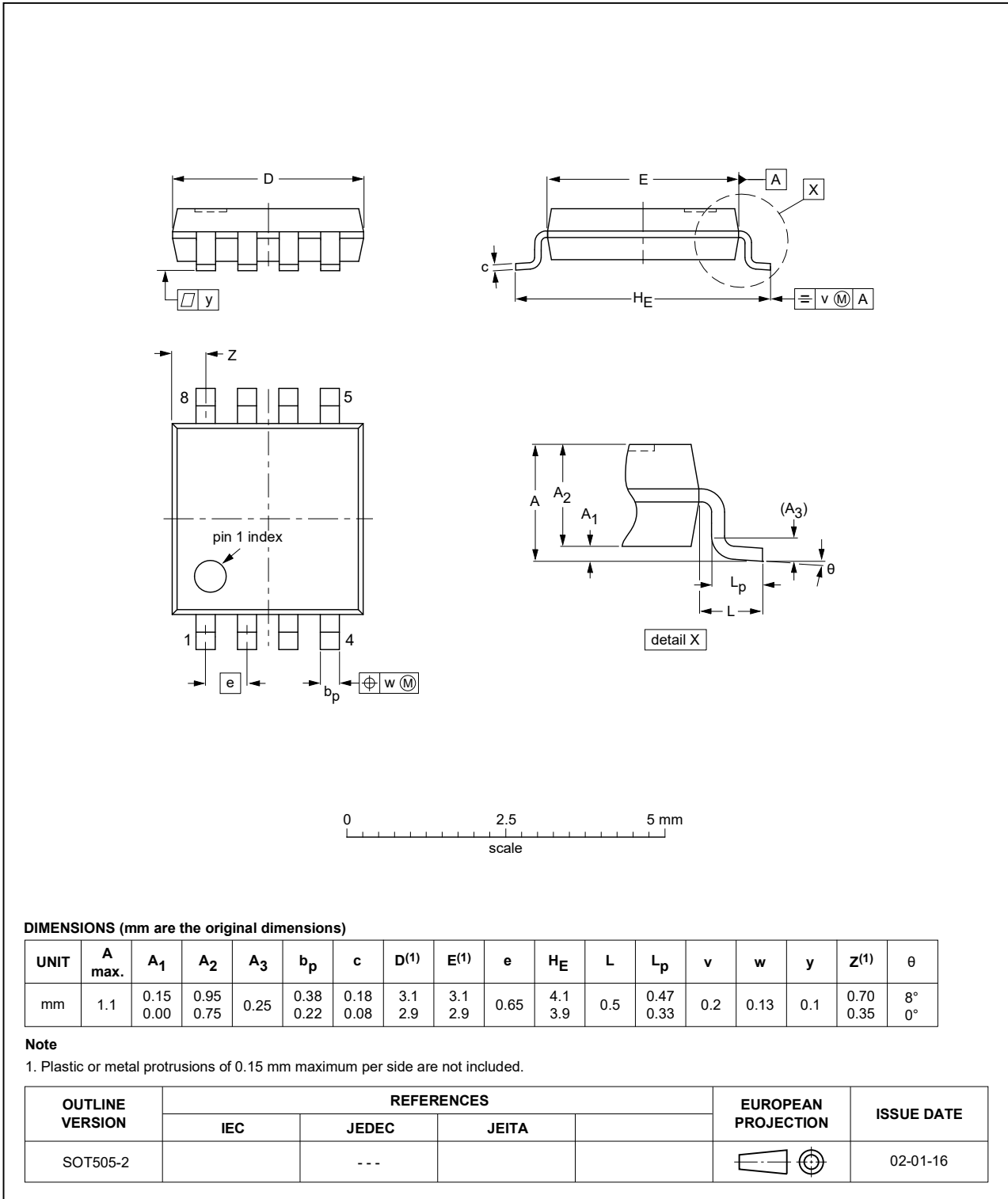


Fig. 7. Package outline SOT505-2 (TSSOP8)

VSSOP8: plastic very thin shrink small outline package; 8 leads; body width 2.3 mm

SOT765-1



Fig. 8. Package outline SOT765-1 (VSSOP8)

## 13. Abbreviations

Table 11. 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

## 14. Revision history

Table 12. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
74HC_HCT2G125 v.7	20231116	Product data sheet	-	74HC_HCT2G125 v.6
Modifications:	<ul style="list-style-type: none"> <li>• <a href="#">Section 2</a> updated.</li> <li>• <a href="#">Section 2</a>: ESD specification updated according to the latest JEDEC standard.</li> <li>• <a href="#">Section 8</a>: <math>P_{tot}</math> and derating values for <math>P_{tot}</math> total power dissipation updated.</li> </ul>			
74HC_HCT2G125 v.6	20181101	Product data sheet	-	74HC_HCT2G125 v.5
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>• Type numbers 74HC2G125GD and 74HCT2G125GD (SOT996-2/XSON8) removed.</li> </ul>			
74HC_HCT2G125 v.5	20140317	Product data sheet	-	74HC_HCT2G125 v.4
Modifications:	<ul style="list-style-type: none"> <li>• For type numbers 74HC2G125GD and 74HCT2G125GD XSON8U has changed to XSON8.</li> </ul>			
74HC_HCT2G125 v.4	20080704	Product data sheet	-	74HC_HCT2G125 v.3
74HC_HCT2G125 v.3	20060102	Product data sheet	-	74HC_HCT2G125 v.2
74HC_HCT2G125 v.2	20030303	Product specification	-	74HC_HCT2G125 v.1
74HC_HCT2G125 v.1	20030131	Product specification	-	-

## 15. 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.

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- [2] The term 'short data sheet' is explained in section "Definitions".
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