74LV153

Dual 4-input multiplexer

Rev. 5 — 12 December 2011 Product data sheet

1. General description

The 74LV153 is a low-voltage Si-gate CMOS device that is pin and function compatible with 74HC153 and 74HCT153.

The 74LV153 provides a dual 4-input multiplexer which selects 2 bits of data from up to four sources selected by common data select inputs (S0, S1). The two 4-input multiplexer circuits have individual active LOW output enable inputs ($1\overline{E}$, $2\overline{E}$) which can be used to strobe the outputs independently. The outputs (1Y, 2Y) are forced LOW when the corresponding output enable inputs are HIGH. The 74LV153 is the logic implementation of a 2-pole, 4-position switch, where the position of the switch, is determined by the logic levels applied to S0 and S1. The logic equations for the outputs are:

$$1Y = 1\overline{E} \times (1I0 \times \overline{S1} \times \overline{S0} + 1I1 \times \overline{S1} \times S0 + 1I2 \times S1 \times \overline{S0} + 1I3 \times S1 \times S0)$$

$$2Y = 2\overline{E} \times (2I0 \times \overline{S1} \times \overline{S0} + 2I1 \times \overline{S1} \times S0 + 2I2 \times S1 \times \overline{S0} + 2I3 \times S1 \times S0)$$

The 74LV153 can be used to move data to a common output bus from a group of registers. The state of the select inputs would determine the particular register from which the data came. An alternative application is a function generator. The device can generate two functions or three variables. This is useful for implementing highly irregular random logic.

2. Features and benefits

- Wide operating voltage: 1.0 V to 3.6 V
- Accepts TTL input levels between V_{CC} = 2.7 V and V_{CC} = 3.6 V
- Typical output ground bounce < 0.8 V at V_{CC} = 3.3 V and T_{amb} = 25 °C
- Typical HIGH-level output voltage (V_{OH}) undershoot: > 2 V at V_{CC} = 3.3 V and T_{amb} = 25 °C
- Non-inverting outputs
- Separate enable input for each output
- Common select inputs
- Permits multiplexing from n lines to 1 line
- Enable line provided for cascading (n lines to 1 line)
- ESD protection:
  - HBM JESD22-A114F 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			
	Temperature range	Name	Description	Version
74LV153N	−40 °C to +125 °C	DIP16	plastic dual in-line package; 16 leads (300 mil)	SOT38-4
74LV153D	−40 °C to +125 °C	SO16	plastic small outline package; 16 leads; body width 3.9 mm	SOT109-1
74LV153DB	−40 °C to +125 °C	SSOP16	plastic shrink small outline package; 16 leads; body width 5.3 mm	SOT338-1
74LV153PW	−40 °C to +125 °C	TSSOP16	plastic thin shrink small outline package; 16 leads; body width 4.4 mm	SOT403-1

4. Functional diagram

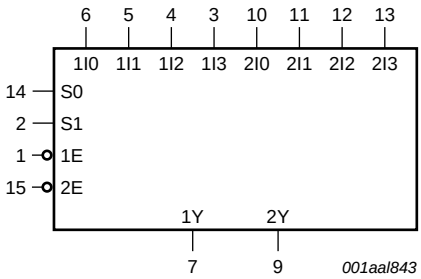


Fig 1. Logic symbol

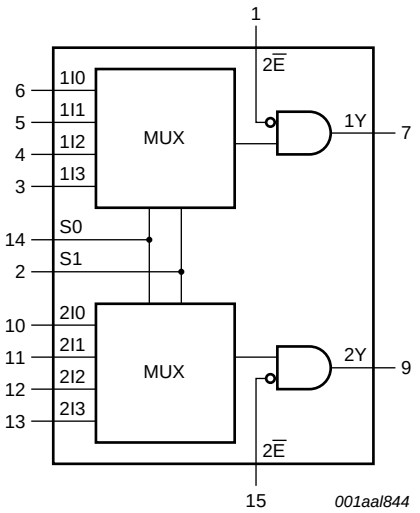


Fig 2. Functional diagram

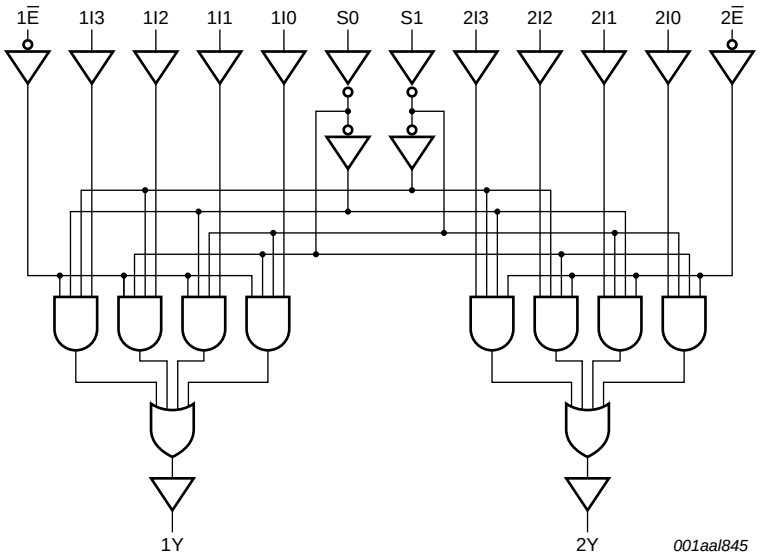


Fig 3. Logic diagram

5. Pinning information

5.1 Pinning

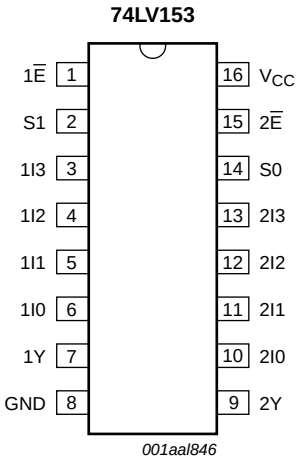


Fig 4. Pin configuration DIP16, SO16

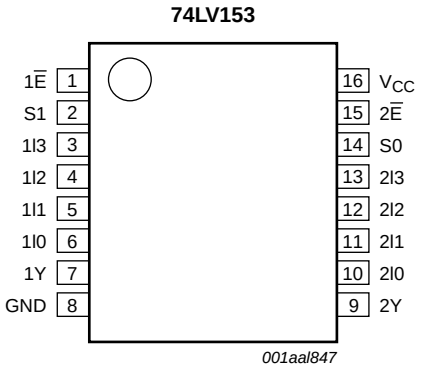


Fig 5. Pin configuration (T)SSOP16

5.2 Pin description

Table 2. Pin description

Symbol	Pin	Description
$1\overline{E}$, $2\overline{E}$	1, 15	output enable inputs (active LOW)
S0, S1	14, 2	data select inputs
1I0, 1I1, 1I2, 1I3	6, 5, 4, 3	data inputs source 1
1Y	7	multiplexer output source 1
GND	8	ground (0 V)
2Y	9	multiplexer output source 2
2I0, 2I1, 2I2, 2I3	10, 11, 12, 13	data inputs source 2
V_{CC}	16	supply voltage

6. Functional description

Table 3. Function table

H = HIGH voltage level; L = LOW voltage level; X = don't care.

select Inputs		data inputs				output enable	output
S0	S1	nI0	nI1	nI2	nI3	$n\overline{E}$	nY
X	X	X	X	X	X	H	L
L	L	L	X	X	X	L	L
L	L	H	X	X	X	L	H
H	L	X	L	X	X	L	L
H	L	X	H	X	X	L	H
L	H	X	X	L	X	L	L
L	H	X	X	H	X	L	H
H	H	X	X	X	L	L	L
H	H	X	X	X	H	L	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	+4.6	V
I_{IK}	input clamping current	$V_I < -0.5$ V or $V_I > V_{CC} + 0.5$ V	[1]	-	±20	mA
I_{OK}	output clamping current	$V_O < -0.5$ V or $V_O > V_{CC} + 0.5$ V	[1]	-	±50	mA
I_O	output current	$V_O = -0.5$ V to $(V_{CC} + 0.5$ V)		-	±25	mA
I_{CC}	supply current			-	50	mA
I_{GND}	ground current			–50	-	mA
T_{stg}	storage temperature			–65	+150	°C

Table 4. Limiting values *...continued*

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

Symbol	Parameter	Conditions		Min	Max	Unit
P_{tot}	total power dissipation	T_{amb} = −40 °C to +125 °C				
	DIP16 package		[2]	-	750	mW
	SO16 package		[3]	-	500	mW
	(T)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

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

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{CC}	supply voltage		[1]	1.0	3.3	3.6	V
V_I	input voltage			0	-	V_{CC}	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} = 1.0 V to 2.0 V		-	-	500	ns/V
		V_{CC} = 2.0 V to 2.7 V		-	-	200	ns/V
		V_{CC} = 2.7 V to 3.6 V		-	-	100	ns/V

[1] The static characteristics are guaranteed from V_{CC} = 1.2 V to V_{CC} = 5.5 V, but LV devices are guaranteed to function down to V_{CC} = 1.0 V (with input levels GND or V_{CC}).

9. Static characteristics

Table 6. Static characteristics

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

Symbol	Parameter	Conditions	–40 °C to +85 °C			–40 °C to +125 °C		Unit
			Min	Typ[1]	Max	Min	Max	
V_{IH}	HIGH-level input voltage	V_{CC} = 1.2 V	0.9	-	-	0.9	-	V
		V_{CC} = 2.0 V	1.4	-	-	1.4	-	V
		V_{CC} = 2.7 V to 3.6 V	2.0	-	-	2.0	-	V
V_{IL}	LOW-level input voltage	V_{CC} = 1.2 V	-	-	0.3	-	0.3	V
		V_{CC} = 2.0 V	-	-	0.6	-	0.6	V
		V_{CC} = 2.7 V to 3.6 V	-	-	0.8	-	0.8	V
V_{OH}	HIGH-level output voltage	$V_I = V_{IH}$ or V_{IL}						
		I_O = –100 μA; V_{CC} = 1.2 V	-	1.2	-	-	-	V
		I_O = –100 μA; V_{CC} = 2.0 V	1.8	2.0	-	1.8	-	V
		I_O = –100 μA; V_{CC} = 2.7 V	2.5	2.7	-	2.5	-	V
		I_O = –100 μA; V_{CC} = 3.0 V	2.8	3.0	-	2.8	-	V
		I_O = –6 mA; V_{CC} = 3.0 V	2.4	2.82	-	2.2	-	V
V_{OL}	LOW-level output voltage	$V_I = V_{IH}$ or V_{IL}						
		I_O = 100 μA; V_{CC} = 1.2 V	-	0	-	-	-	V
		I_O = 100 μA; V_{CC} = 2.0 V	-	0	0.2	-	0.2	V
		I_O = 100 μA; V_{CC} = 2.7 V	-	0	0.2	-	0.2	V
		I_O = 100 μA; V_{CC} = 3.0 V	-	0	0.2	-	0.2	V
		I_O = 6 mA; V_{CC} = 3.0 V	-	0.25	0.40	-	0.50	V
I_I	input leakage current	$V_I = V_{CC}$ or GND; V_{CC} = 3.6 V	-	-	1.0	-	1.0	μA
I_{CC}	supply current	$V_I = V_{CC}$ or GND; I_O = 0 A; V_{CC} = 3.6 V	-	-	20.0	-	160	μA
ΔI_{CC}	additional supply current	per input; $V_I = V_{CC}$ – 0.6 V; V_{CC} = 2.7 V to 3.6 V	-	-	500	-	850	μA
C_I	input capacitance		-	3.5	-	-	-	pF

[1] Typical values are measured at T_{amb} = 25 °C.

10. Dynamic characteristics

Table 7. Dynamic characteristics

GND = 0 V; For test circuit see Figure 8.

Symbol	Parameter	Conditions		–40 °C to +85 °C			–40 °C to +125 °C		Unit
				Min	Typ[1]	Max	Min	Max	
t_{pd}	propagation delay	1In to 1Y and 2In to 2Y; see Figure 6	[2]						
		V_{CC} = 1.2 V		-	85	-	-	-	ns
		V_{CC} = 2.0 V		-	29	56	-	66	ns
		V_{CC} = 2.7 V		-	21	41	-	49	ns
		V_{CC} = 3.3 V; C_L = 15 pF		-	14	-	-	-	ns
		V_{CC} = 3.0 V to 3.6 V	[3]	-	16	33	-	39	ns
		Sn to nY; see Figure 6							
		V_{CC} = 1.2 V		-	90	-	-	-	ns
		V_{CC} = 2.0 V		-	31	58	-	70	ns
		V_{CC} = 2.7 V		-	23	43	-	51	ns
		V_{CC} = 3.3 V; C_L = 15 pF		-	14	-	-	-	ns
		V_{CC} = 3.0 V to 3.6 V	[3]	-	17	34	-	41	ns
		$n\overline{E}$ to nY; see Figure 6							
		V_{CC} = 1.2 V		-	60	-	-	-	ns
		V_{CC} = 2.0 V		-	20	39	-	46	ns
		V_{CC} = 2.7 V		-	15	29	-	34	ns
		V_{CC} = 3.3 V; C_L = 15 pF		-	10	-	-	-	ns
		V_{CC} = 3.0 V to 3.6 V	[3]	-	11	23	-	27	ns
C_{PD}	power dissipation capacitance	C_L = 50 pF; f_i = 1 MHz; V_I = GND to V_{CC}	[4]	-	30	-	-	-	pF

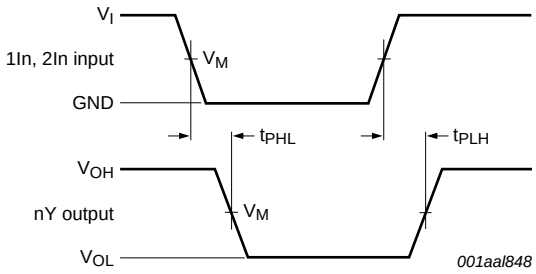
[1] All typical values are measured at T_{amb} = 25 °C.

[2] t_{pd} is the same as t_{PLH} and t_{PHL}.

[3] Typical values are measured at nominal supply voltage (V_{CC} = 3.3 V) unless otherwise stated.

[4] C_{PD} is used to determine the dynamic power dissipation (P_D in μW).
$P_D = C_{PD} \times V_{CC}^2 \times f_i \times N + \Sigma(C_L \times V_{CC}^2 \times f_o)$ 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 the outputs.

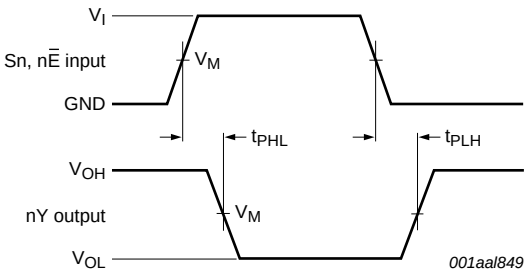
11. Waveforms



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. The input (1In, 2In) to output (1Y, 2Y) propagation delays



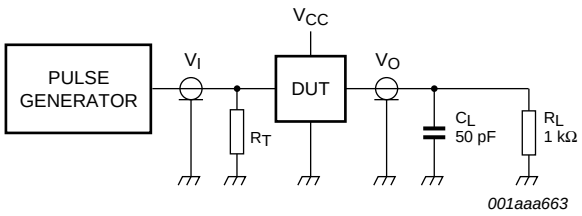
Measurement points are given in Table 8.

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

Fig 7. The input (Sn, nĒ) to output (nY) propagation delays

Table 8. Measurement points

Supply voltage	Input	Output
V_{CC}	V_M	V_M
< 2.7 V	$0.5V_{CC}$	$0.5V_{CC}$
2.7 V to 3.6 V	1.5 V	1.5 V



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.

R_L = Load resistance.

C_L = Load capacitance including jig and probe capacitance.

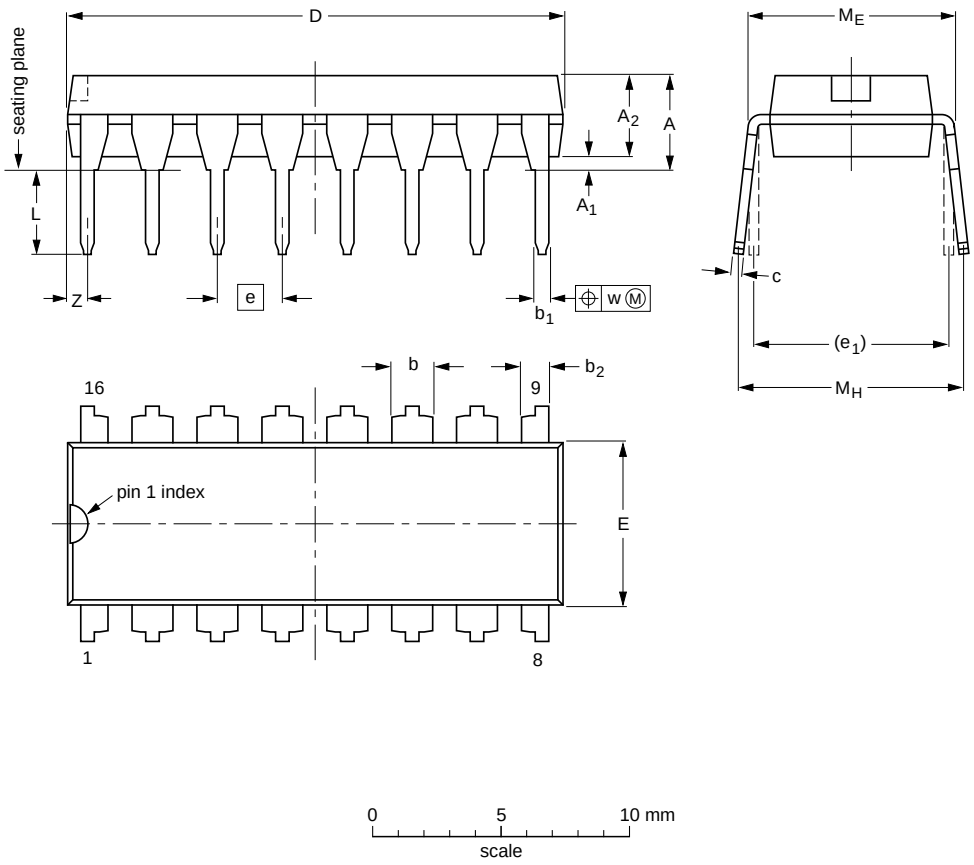
Fig 8. Test circuit for measuring switching times

Table 9. Test data

Supply voltage	Input	
V_{CC}	V_I	t_r, t_f
< 2.7 V	V_{CC}	≤ 2.5 ns
2.7 V to 3.6 V	2.7 V	≤ 2.5 ns

12. Package outline

DIP16: plastic dual in-line package; 16 leads (300 mil) **SOT38-4**



DIMENSIONS (inch dimensions are derived from the original mm dimensions)

UNIT	A max.	A_1 min.	A_2 max.	b	b_1	b_2	c	D (1)	E (1)	e	e_1	L	M_E	M_H	w	Z (1) max.
mm	4.2	0.51	3.2	1.73 1.30	0.53 0.38	1.25 0.85	0.36 0.23	19.50 18.55	6.48 6.20	2.54	7.62	3.60 3.05	8.25 7.80	10.0 8.3	0.254	0.76
inches	0.17	0.02	0.13	0.068 0.051	0.021 0.015	0.049 0.033	0.014 0.009	0.77 0.73	0.26 0.24	0.1	0.3	0.14 0.12	0.32 0.31	0.39 0.33	0.01	0.03

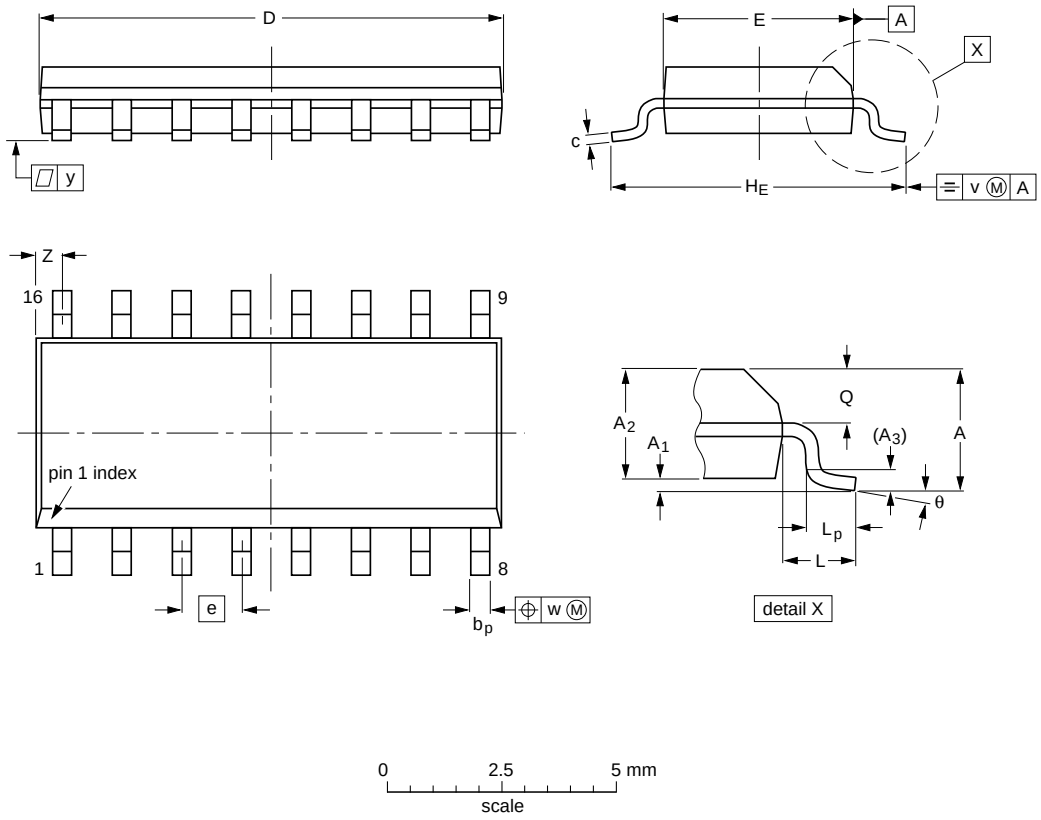
Note

1. Plastic or metal protrusions of 0.25 mm (0.01 inch) maximum per side are not included.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT38-4						~~95-01-14~~ 03-02-13

Fig 9. Package outline SOT38-4 (DIP16)

SO16: plastic small outline package; 16 leads; body width 3.9 mm **SOT109-1**



DIMENSIONS (inch dimensions are derived from the original mm dimensions)

UNIT	A max.	A_1	A_2	A_3	b_p	c	$D^{(1)}$	$E^{(1)}$	e	H_E	L	L_p	Q	v	w	y	$Z^{(1)}$	θ
mm	1.75	0.25 0.10	1.45 1.25	0.25	0.49 0.36	0.25 0.19	10.0 9.8	4.0 3.8	1.27	6.2 5.8	1.05	1.0 0.4	0.7 0.6	0.25	0.25	0.1	0.7 0.3	8^o 0^o
inches	0.069	0.010 0.004	0.057 0.049	0.01	0.019 0.014	0.0100 0.0075	0.39 0.38	0.16 0.15	0.05	0.244 0.228	0.041	0.039 0.016	0.028 0.020	0.01	0.01	0.004	0.028 0.012	

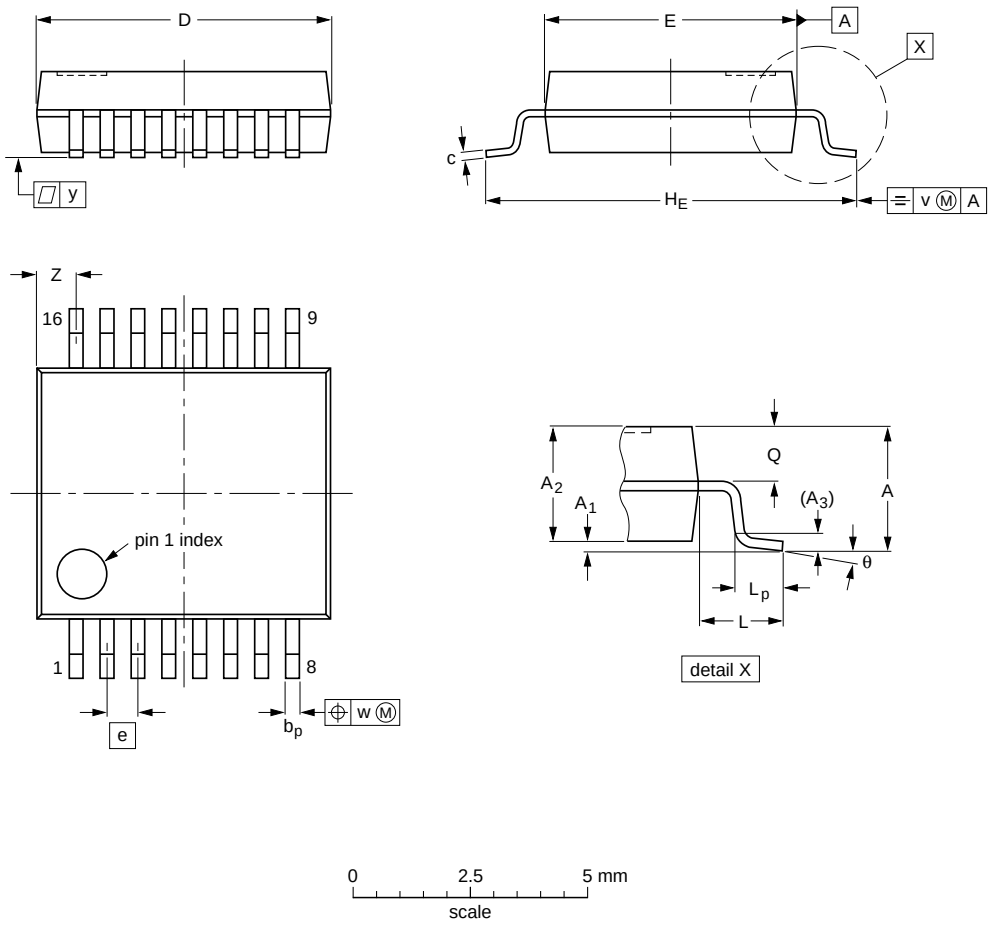
Note

1. Plastic or metal protrusions of 0.15 mm (0.006 inch) maximum per side are not included.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT109-1	076E07	MS-012				~~99-12-27~~ 03-02-19

Fig 10. Package outline SOT109-1 (SO16)

SSOP16: plastic shrink small outline package; 16 leads; body width 5.3 mm **SOT338-1**



DIMENSIONS (mm are the original dimensions)

UNIT	A max.	A_1	A_2	A_3	b_p	c	D (1)	E (1)	e	H_E	L	L_p	Q	v	w	y	Z (1)	θ
mm	2	0.21 0.05	1.80 1.65	0.25	0.38 0.25	0.20 0.09	6.4 6.0	5.4 5.2	0.65	7.9 7.6	1.25	1.03 0.63	0.9 0.7	0.2	0.13	0.1	1.00 0.55	8^o 0^o

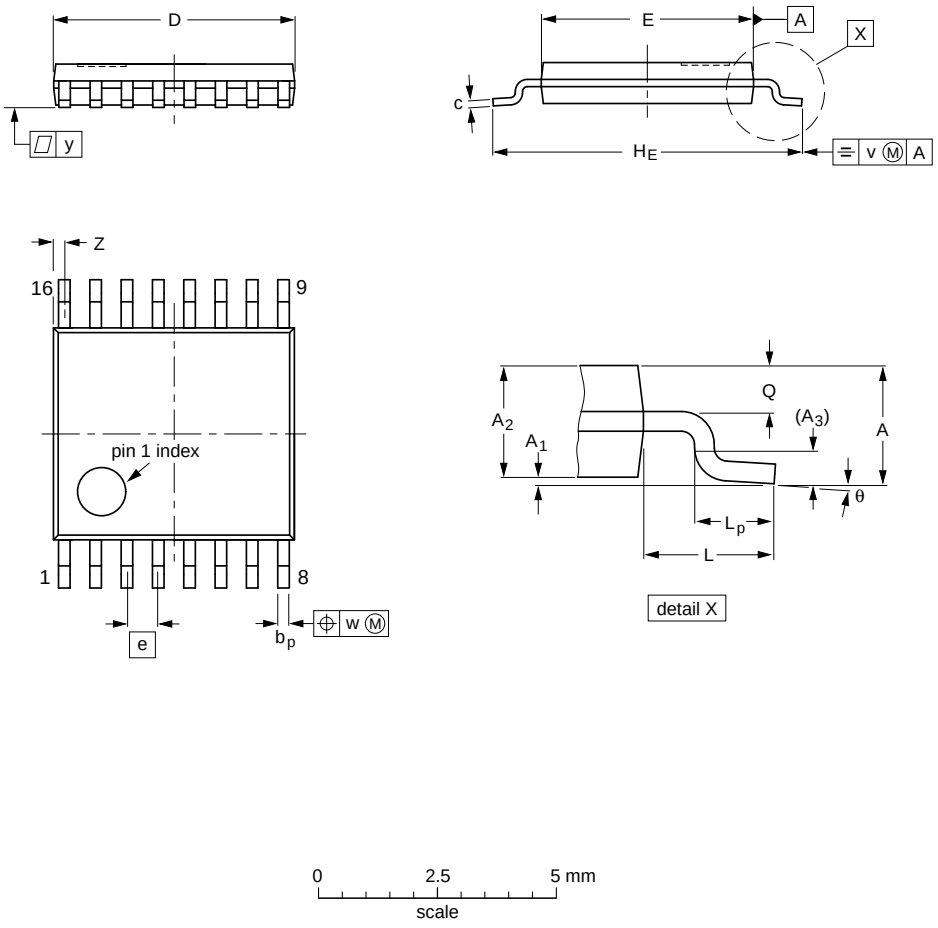
Note

1. Plastic or metal protrusions of 0.25 mm maximum per side are not included.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT338-1		MO-150				~~99-12-27~~ 03-02-19

Fig 11. Package outline SOT338-1 (SSOP16)

TSSOP16: plastic thin shrink small outline package; 16 leads; body width 4.4 mm **SOT403-1**



DIMENSIONS (mm are the original dimensions)

UNIT	A max.	A_1	A_2	A_3	b_p	c	D (1)	E (2)	e	H_E	L	L_p	Q	v	w	y	Z (1)	θ
mm	1.1	0.15 0.05	0.95 0.80	0.25	0.30 0.19	0.2 0.1	5.1 4.9	4.5 4.3	0.65	6.6 6.2	1	0.75 0.50	0.4 0.3	0.2	0.13	0.1	0.40 0.06	8^o 0^o

Notes

1. Plastic or metal protrusions of 0.15 mm maximum per side are not included.
2. Plastic interlead protrusions of 0.25 mm maximum per side are not included.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT403-1		MO-153				~~99-12-27~~ 03-02-18

Fig 12. Package outline SOT403-1 (TSSOP16)

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
74LV153 v.5	20111212	Product data sheet	-	74LV153 v.4
Modifications:	• Legal pages updated.			
74LV153 v.4	20100429	Product data sheet	-	74LV153 v.3
74LV153 v.3	19980428	Product specification	-	74LV153 v.2
74LV153 v.2	19970515	Product specification	-	-

15. Legal information

15.1 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 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.

Product specification — The information and data provided in a Product data sheet shall define the specification of the product as agreed between NXP Semiconductors and its customer, unless NXP Semiconductors and customer have explicitly agreed otherwise in writing. In no event however, shall an agreement be valid in which the NXP Semiconductors product is deemed to offer functions and qualities beyond those described in the Product data sheet.

15.3 Disclaimers

Limited warranty and liability — 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.

In no event shall NXP Semiconductors be liable for any indirect, incidental, punitive, special or consequential damages (including - without limitation - lost profits, lost savings, business interruption, costs related to the removal or replacement of any products or rework charges) whether or not such damages are based on tort (including negligence), warranty, breach of contract or any other legal theory.

Notwithstanding any damages that customer might incur for any reason whatsoever, NXP Semiconductors' aggregate and cumulative liability towards customer for the products described herein shall be limited in accordance with the *Terms and conditions of commercial sale* of NXP Semiconductors.

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 life support, life-critical or safety-critical systems or 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.

Customers are responsible for the design and operation of their applications and products using NXP Semiconductors products, and NXP Semiconductors accepts no liability for any assistance with applications or customer product design. It is customer's sole responsibility to determine whether the NXP Semiconductors product is suitable and fit for the customer's applications and products planned, as well as for the planned application and use of customer's third party customer(s). Customers should provide appropriate design and operating safeguards to minimize the risks associated with their applications and products.

NXP Semiconductors does not accept any liability related to any default, damage, costs or problem which is based on any weakness or default in the customer's applications or products, or the application or use by customer's third party customer(s). Customer is responsible for doing all necessary testing for the customer's applications and products using NXP Semiconductors products in order to avoid a default of the applications and the products or of the application or use by customer's third party customer(s). NXP does not accept any liability in this respect.

Limiting values — Stress above one or more limiting values (as defined in the Absolute Maximum Ratings System of IEC 60134) will cause permanent damage to the device. Limiting values are stress ratings only and (proper) operation of the device at these or any other conditions above those given in the Recommended operating conditions section (if present) or the Characteristics sections of this document is not warranted. Constant or repeated exposure to limiting values will permanently and irreversibly affect the quality and reliability of the device.

Terms and conditions of commercial 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, unless otherwise agreed in a valid written individual agreement. In case an individual agreement is concluded only the terms and conditions of the respective agreement shall apply. NXP Semiconductors hereby expressly objects to applying the customer's general terms and conditions with regard to the purchase of NXP Semiconductors products by customer.

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.

Export control — This document as well as the item(s) described herein may be subject to export control regulations. Export might require a prior authorization from competent authorities.

Non-automotive qualified products — Unless this data sheet expressly states that this specific NXP Semiconductors product is automotive qualified, the product is not suitable for automotive use. It is neither qualified nor tested in accordance with automotive testing or application requirements. NXP Semiconductors accepts no liability for inclusion and/or use of non-automotive qualified products in automotive equipment or applications.

In the event that customer uses the product for design-in and use in automotive applications to automotive specifications and standards, customer (a) shall use the product without NXP Semiconductors' warranty of the product for such automotive applications, use and specifications, and (b) whenever customer uses the product for automotive applications beyond NXP Semiconductors' specifications such use shall be solely at customer's own risk, and (c) customer fully indemnifies NXP Semiconductors for any liability, damages or failed product claims resulting from customer design and use of the product for automotive applications beyond NXP Semiconductors' standard warranty and NXP Semiconductors' product specifications.

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**

17. Contents

For more information, please visit: http://www.nxp.com
For sales office addresses, please send an email to: salesaddresses@nxp.com

Date of release: 12 December 2011
Document identifier: 74LV153