DATA SHEET

For a complete data sheet, please also download:

- The IC06 74HC/HCT/HCU/HCMOS Logic Family Specifications
- The IC06 74HC/HCT/HCU/HCMOS Logic Package Information
- The IC06 74HC/HCT/HCU/HCMOS Logic Package Outlines

74HC/HCT153

Dual 4-input multiplexer

Product specification

File under Integrated Circuits, IC06

December 1990

Philips Semiconductors

PHILIPS

Dual 4-input multiplexer   74HC/HCT153

FEATURES

- Non-inverting output
- Separate enable for each output
- Common select inputs
- See '253" for 3-state version
- Permits multiplexing from n lines to 1 line
- Enable line provided for cascading (n lines to 1 line)
- Output capability: standard
- I_{CC} category: MSI

GENERAL DESCRIPTION

The 74HC/HCT153 are high-speed Si-gate CMOS devices and are pin compatible with low power Schottky TTL (LSTTL). They are specified in compliance with JEDEC standard no. 7A.

The 74HC/HCT153 have two identical 4-input multiplexers which select two bits of data from up to four sources selected by common data select inputs (S_0, S_1). 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 "153" 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 S_0 and S_1.

The logic equations for the outputs are:

$$1Y = 1\overline{E}.(1I_0.\overline{S}_1.\overline{S}_0 + 1I_1.\overline{S}_1.S_0 + 1I_2.S_1.\overline{S}_0 + 1I_3.S_1.S_0)$$

$$2Y = 2\overline{E}.(2I_0.\overline{S}_1.\overline{S}_0 + 2I_1.\overline{S}_1.S_0 + 2I_2.S_1.\overline{S}_0 + 2I_3.S_1.S_0)$$

The "153" 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.

The "153" is similar to the "253" but has standard outputs.

QUICK REFERENCE DATA

GND = 0 V; T_{amb} = 25 °C; t_r = t_f = 6 ns

SYMBOL	PARAMETER	CONDITIONS	TYPICAL		UNIT
			HC	HCT	
t_{PHL}/ t_{PLH}	propagation delay	C_L = 15 pF; V_{CC} = 5 V			
	$1I_n$, $2I_n$ to nY		14	16	ns
	S_n to nY		15	17	ns
	$n\overline{E}$ to nY		10	11	ns
C_I	input capacitance		3.5	3.5	pF
C_{PD}	power dissipation capacitance per multiplexer	notes 1 and 2	30	30	pF

Notes

1. C_{PD} is used to determine the dynamic power dissipation (P_D in µW):

    $P_D = C_{PD} \times V_{CC}^2 \times f_i + \Sigma (C_L \times V_{CC}^2 \times f_o)$ 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

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

2. For HC the condition is V_I = GND to V_{CC}

    For HCT the condition is V_I = GND to $V_{CC} - 1.5$ V

ORDERING INFORMATION

See *"74HC/HCT/HCU/HCMOS Logic Package Information"*.

Dual 4-input multiplexer

74HC/HCT153

PIN DESCRIPTION

PIN NO.	SYMBOL	NAME AND FUNCTION
1, 15	$1\overline{E}$, $2\overline{E}$	output enable inputs (active LOW)
14, 2	S_0, S_1	common data select inputs
6, 5, 4, 3	$1I_0$ to $1I_3$	data inputs from source 1
7	1Y	multiplexer output from source 1
8	GND	ground (0 V)
9	2Y	multiplexer output from source 2
10, 11, 12, 13	$2I_0$ to $2I_3$	data inputs from source 2
16	V_{CC}	positive supply voltage
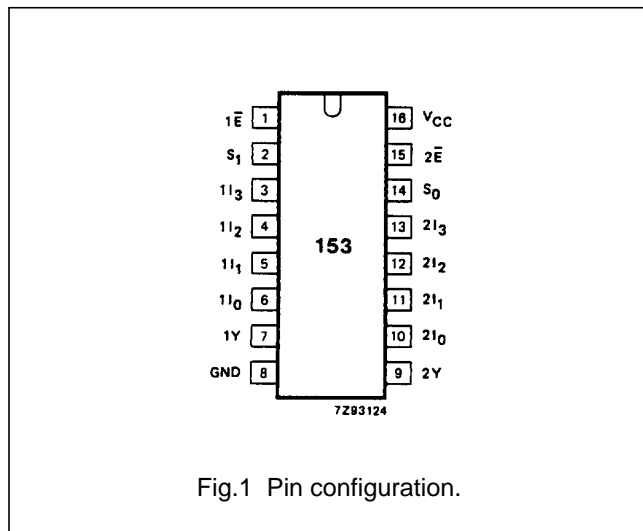
Fig.1 Pin configuration.
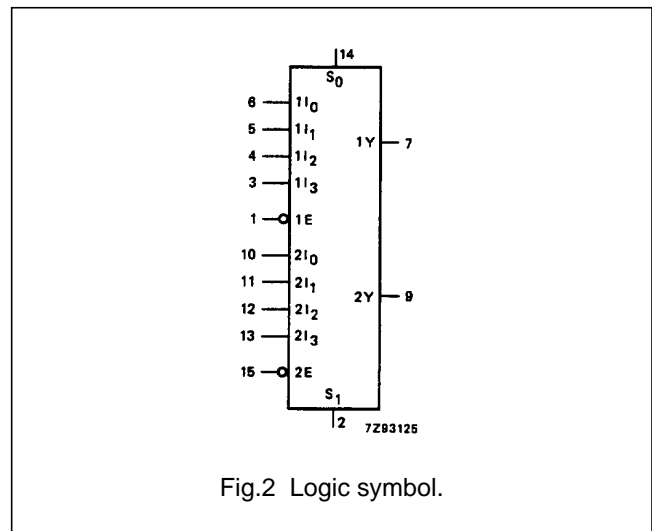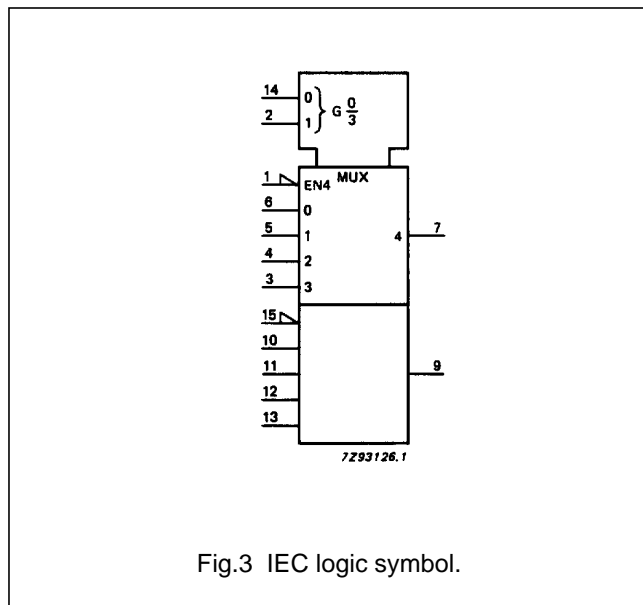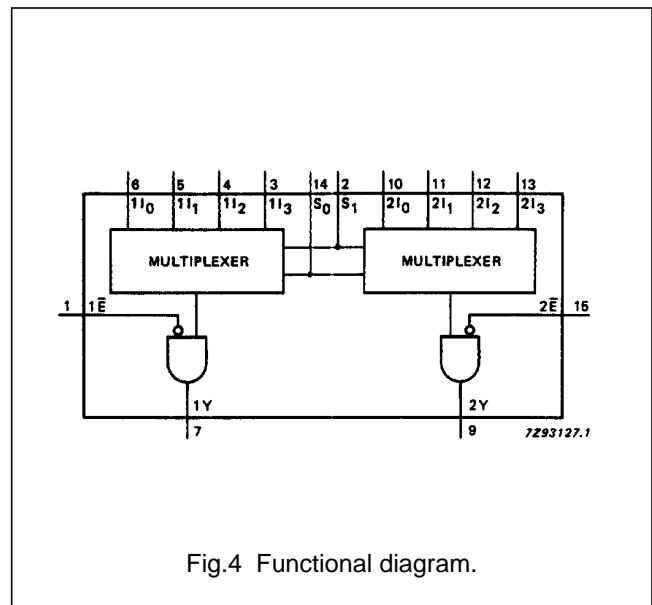

Fig.2 Logic symbol.

Fig.3 IEC logic symbol.

Fig.4 Functional diagram.

Dual 4-input multiplexer

FUNCTION TABLE

SELECT INPUTS		DATA INPUTS				OUTPUT ENABLE	OUTPUT
S_0	S_1	nI_0	nI_1	nI_2	nI_3	$n\overline{E}$	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

Note

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

Fig.5 Logic diagram.
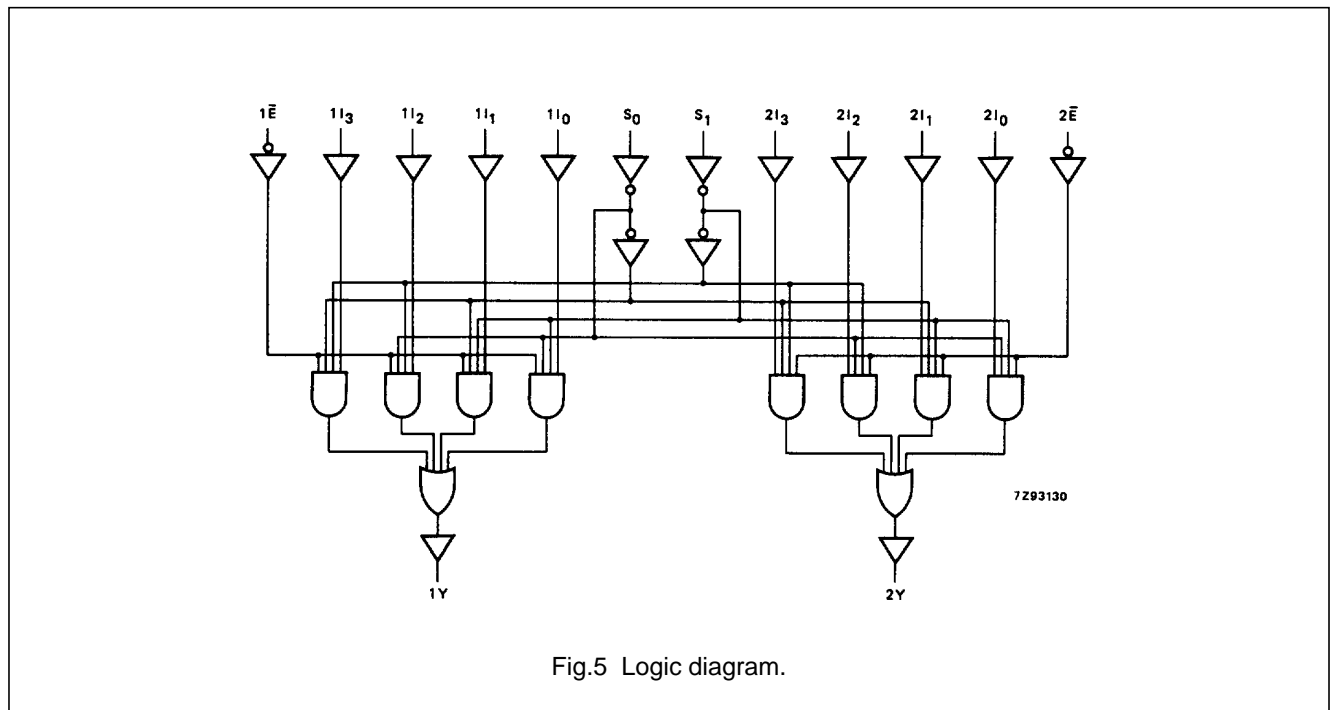
Dual 4-input multiplexer   74HC/HCT153

DC CHARACTERISTICS FOR 74HC

For the DC characteristics see *"74HC/HCT/HCU/HCMOS Logic Family Specifications"*.

Output capability: standard
I_{CC} category: MSI

AC CHARACTERISTICS FOR 74HC

GND = 0 V; $t_r = t_f = 6$ ns; $C_L = 50$ pF

SYMBOL	PARAMETER	T_{amb} (°C)						UNIT	TEST CONDITIONS	
		74HC							V_{CC} (V)	WAVEFORMS
		+25			−40 to+85		−40 to+125				
		min.	typ.	max.	min.	max.	min.	max.			
t_{PHL}/ t_{PLH}	propagation delay $1I_n$ to nY; $2I_n$ to nY		47 17 14	145 29 25		180 36 31		220 44 38	ns	2.0 4.5 6.0	Fig.6
t_{PHL}/ t_{PLH}	propagation delay S_n to nY		50 18 14	150 30 26		190 38 33		225 45 38	ns	2.0 4.5 6.0	Fig.7
t_{PHL}/ t_{PLH}	propagation delay $n\overline{E}$ to nY		33 12 10	100 20 17		125 25 21		150 30 26	ns	2.0 4.5 6.0	Fig.7
t_{THL}/ t_{TLH}	output transition time		19 7 6	75 15 13		95 19 16		110 22 19	ns	2.0 4.5 6.0	Figs 6 and 7

Dual 4-input multiplexer

74HC/HCT153

DC CHARACTERISTICS FOR 74HCT

For the DC characteristics see *"74HC/HCT/HCU/HCMOS Logic Family Specifications"*.

Output capability: standard
I_{CC} category: MSI

Note to HCT types

The value of additional quiescent supply current (ΔI_{CC}) for a unit load of 1 is given in the family specifications.
To determine ΔI_{CC} per input, multiply this value by the unit load coefficient shown in the table below.

INPUT	UNIT LOAD COEFFICIENT
$1I_n$, $2I_n$	0.45
$n\overline{E}$	0.60
S_n	1.35

AC CHARACTERISTICS FOR 74HCT

GND = 0 V; $t_r = t_f = 6$ ns; $C_L = 50$ pF

SYMBOL	PARAMETER	T_{amb} (°C) 74HCT							UNIT	TEST CONDITIONS	
		+25			−40 to+85		−40 to+125			V_{CC} (V)	WAVEFORMS
		min.	typ.	max.	min.	max.	min.	max.			
t_{PHL}	propagation delay $1I_n$ to nY; $2I_n$ to nY		19	34		43		51	ns	4.5	Fig.6
t_{PLH}	propagation delay $1I_n$ to nY; $2I_n$ to nY		13	24		30		36	ns	4.5	Fig.6
t_{PHL}/ t_{PLH}	propagation delay S_n to nY		20	34		43		51	ns	4.5	Fig.7
t_{PHL}/ t_{PLH}	propagation delay $n\overline{E}$ to nY		14	27		34		41	ns	4.5	Fig.7
t_{THL}/ t_{TLH}	output transition time		7	15		19		22	ns	4.5	Figs 6 and 7

Dual 4-input multiplexer   74HC/HCT153

AC WAVEFORMS

(1) HC : $V_M = 50\%$; V_I = GND to V_{CC}.
      HCT: $V_M = 1.3$ V; V_I = GND to 3 V.

Fig.6 Waveforms showing the input ($1I_n$, $2I_n$) to output (1Y, 2Y) propagation delays and the output transition times.

(1) HC : $V_M = 50\%$; V_I = GND to V_{CC}.
      HCT: $V_M = 1.3$ V; V_I = GND to 3 V.

Fig.7   Waveforms showing the select input (S_0, S_1) and the output enable input ($\overline{E}$) to output (1Y, 2Y) propagation delays and the output transition times.
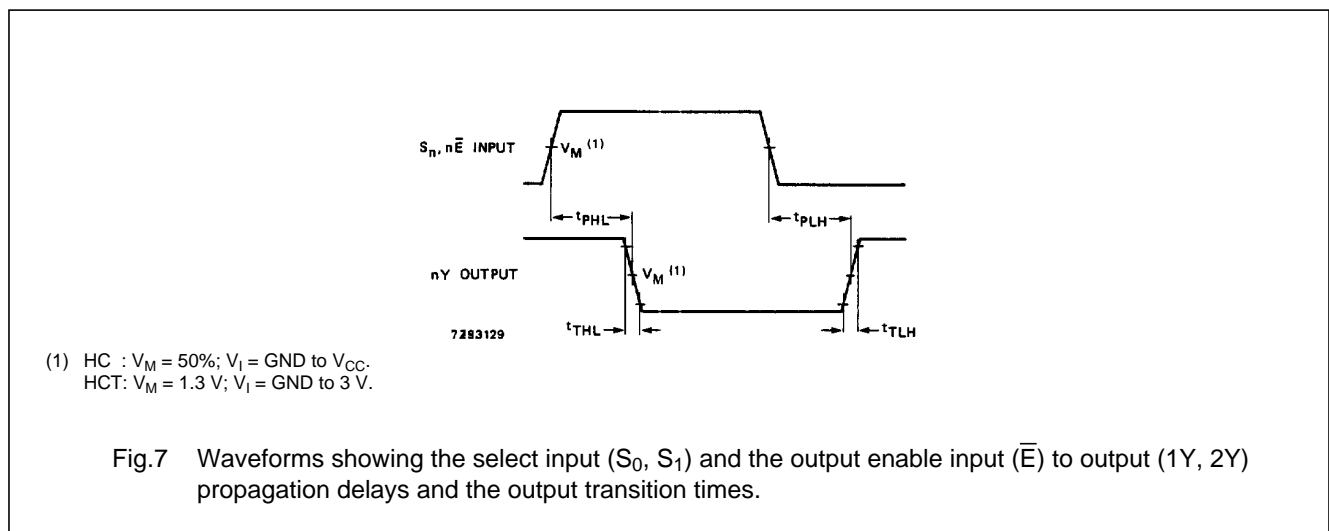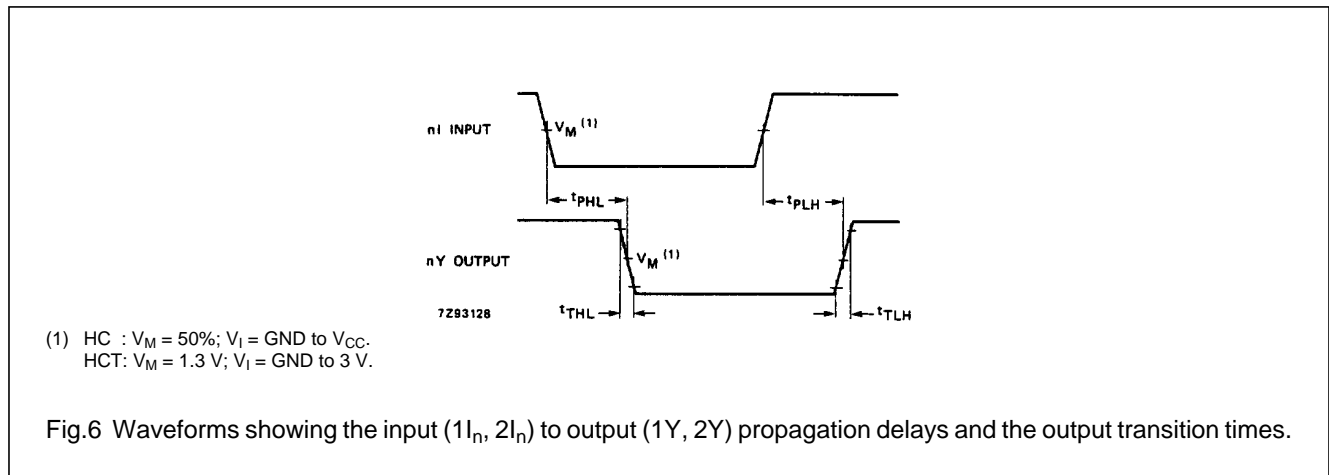
PACKAGE OUTLINES

See *"74HC/HCT/HCU/HCMOS Logic Package Outlines"*.

Product Information

74HC/HCT153; Dual 4-input multiplexer

Information as of 2003-04-22

General description

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The logic equations for the outputs are:

$1Y = 1E.(1I_0.S_1.S_0 + 1I_1.S_1.S_0 + 1I_2.S_1.S_0 + 1I_3.S_1.S_0)$ $2Y = 2E.(2I_0.S_1.S_0 + 2I_1.S_1.S_0 + 2I_2.S_1.S_0 + 2I_3.S_1.S_0)$

The '153' 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.

The '153' is similar to the '253' but has standard outputs.

Features

- Non-inverting output
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- Common select inputs
- See '253' for 3-state version
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☐ Datasheet

Type number	Title	Publication release date	Datasheet status	Page count	File size (kB)	Datasheet
74HC/HCT153	Dual 4-input multiplexer	12/1/1990	Product specification	7	44	☐ Download

Additional datasheet info

To complete the device datasheet with package and family information, also download the following PDF files. The "Logic Package Information" document is required to determine in which package(s) this device is available.

	Document	Description
1	☐ HCT_FAMILY_SPECIFICATIONS	HC/T Family Specifications, The IC06 74HC/HCT/HCMOS Logic Family Specifications
2	☐ HCT_PACKAGE_INFO	HC/T Package Info, The IC06 74HC/HCT/HCMOS Logic Package Information
3	☐ HCT_PACKAGE_OUTLINES	HC/T Package Outlines, The IC06 74HC/HCT/HCMOS Logic Package Outlines

☐ Parametrics

Type number	Package	Description	Propagation Delay(ns)	Voltage	No. of Pins	Power Dissipation Considerations	Logic Switching Levels	Output Drive Capability
74HC153D	SOT109 (SO16)	Dual 4-Input Multiplexer	15	5 Volts +	16	Low Power or Battery Applications	CMOS	Low
74HC153DB	SOT338-1 (SSOP16)	Dual 4-Input Multiplexer	15	5 Volts +	16	Low Power or Battery Applications	CMOS	Low
74HC153N	SOT38-1 (DIP16)	Dual 4-Input Multiplexer	15	5 Volts +	16	Low Power or Battery Applications	CMOS	Low
74HC153PW	SOT403-1 (TSSOP16)	Dual 4-Input Multiplexer	15	5 Volts +	16	Low Power or Battery Applications	CMOS	Low
74HCT153D	SOT109 (SO16)	Dual 4-Input Multiplexer; TTL Enabled	15	5 Volts +	16	Low Power or Battery Applications	TTL	Low
74HCT153DB	SOT338-1 (SSOP16)	Dual 4-Input Multiplexer; TTL Enabled	15	5 Volts +	16	Low Power or Battery Applications	TTL	Low
74HCT153N	SOT38-1 (DIP16)	Dual 4-Input Multiplexer; TTL Enabled	15	5 Volts +	16	Low Power or Battery Applications	TTL	Low

74HCT153PW	SOT403-1 (TSSOP16)	Dual 4-Input Multiplexer; TTL Enabled	15	5 Volts +	16	Low Power or Battery Applications	TTL	Low

□ Products, packages, availability and ordering

Type number	North American type number	Ordering code (12NC)	Marking/Packing □□□ **Discretes packing info**	Package	Device status	Buy online
74HC153D	74HC153D	9337 140 50652	Standard Marking * Bulk Pack, CECC	SOT109 (SO16)	Full production	order this -
	74HC153D-T	9337 140 50653	Standard Marking * Reel Pack, SMD, 13", CECC	SOT109 (SO16)	Full production	order this -
74HC153DB	74HC153DB	9351 744 90112	Standard Marking * Bulk Pack	SOT338-1 (SSOP16)	Full production	order this -
	74HC153DB-T	9351 744 90118	Standard Marking * Reel Pack, SMD, 13"	SOT338-1 (SSOP16)	Full production	order this -
74HC153N	74HC153N	9336 693 30652	Standard Marking * Bulk Pack, CECC	SOT38-1 (DIP16)	Full production	order this -
74HC153PW	74HC153PW	9351 744 80112	Standard Marking * Bulk Pack	SOT403-1 (TSSOP16)	Full production	order this -
	74HC153PW-T	9351 744 80118	Standard Marking * Reel Pack, SMD, 13"	SOT403-1 (TSSOP16)	Full production	order this -
74HCT153D	74HCT153D	9337 140 60652	Standard Marking * Bulk Pack, CECC	SOT109 (SO16)	Full production	order this -
	74HCT153D-T	9337 140 60653	Standard Marking * Reel Pack, SMD, 13", CECC	SOT109 (SO16)	Full production	order this -
74HCT153DB	74HCT153DB	9351 892 30112	Standard Marking * Bulk Pack	SOT338-1 (SSOP16)	Full production	order this -
	74HCT153DB-T	9351 892 30118	Standard Marking * Reel Pack, SMD, 13"	SOT338-1 (SSOP16)	Full production	order this -
74HCT153N	74HCT153N	9336 699 60652	Standard Marking * Bulk Pack, CECC	SOT38-1 (DIP16)	Full production	order this -
74HCT153PW	74HCT153PW	9351 895 40112	Standard Marking * Bulk Pack	SOT403-1 (TSSOP16)	Full production	order this -
	74HCT153PW-T	9351 895 40118	Standard Marking * Reel Pack, SMD, 13"	SOT403-1 (TSSOP16)	Full production	order this -

□ Similar products

□ [74HC/HCT153](#) links to the similar products page containing an overview of products that are similar in function or related to the type number(s) as listed on this page. The similar products page includes products from the same catalog tree(s), relevant selection guides and products from the same functional category.

□ Support & tools

□ [HC/T Family Specifications, The IC06 74HC/HCT/HCMOS Logic Family Specifications](#)(date 01-Mar-98)
□ [HC/T User Guide](#)(date 01-Nov-97)

□ Email/translate this product information

- [Email this product information.](#)
- Translate this product information page from English to:

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