1. General description

The 74HC4514; 74HCT4514 is a 4-to-16 line decoder/demultiplexer having four binary weighted address inputs (A0 to A3), with latches, a latch enable input (LE), an enable input (\overline{E}) and 16 outputs (Q0 to Q15). When LE is HIGH, the selected output is determined by the data on An. When LE goes LOW, the last data present at An are stored in the latches and the outputs remain stable. When \overline{E} is LOW, the selected output, determined by the contents of the latch, is HIGH. At \overline{E} HIGH, all outputs are LOW. The enable input \overline{E} does not affect the state of the latch. When the device is used as a demultiplexer, \overline{E} is the data input and A0 to A3 are the address inputs. Inputs include clamp diodes. This enables the use of current limiting resistors to interface inputs to voltages in excess of V_{CC} .

The 74HCT4514 features reduced input threshold levels to allow interfacing to TTL logic levels.

2. Features and benefits

- Wide supply voltage range from 2.0 V to 6.0 V
- CMOS low power dissipation
- High noise immunity
- Input levels:
 - For 74HC4514: CMOS level
 - For 74HCT4514: TTL level
- 16-line demultiplexing capability
- Decodes 4 binary-coded inputs into 16 mutually-exclusive outputs
- Latch-up performance exceeds 100 mA per JESD 78 Class II Level B
- Complies with JEDEC standards
 - JESD8C (2.7 V to 3.6 V)
 - JESD7A (2.0 V to 6.0 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. Applications

- · Digital multiplexing
- Address decoding
- Hexadecimal/BCD decoding

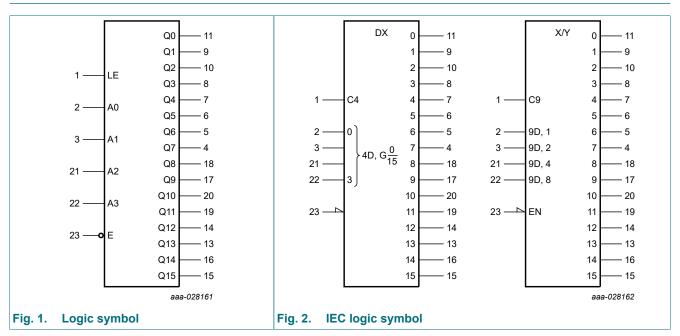
4. Ordering information

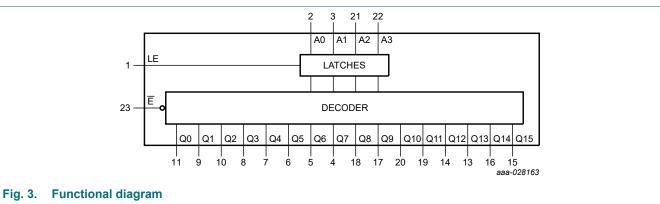
Table 1. Ordering information

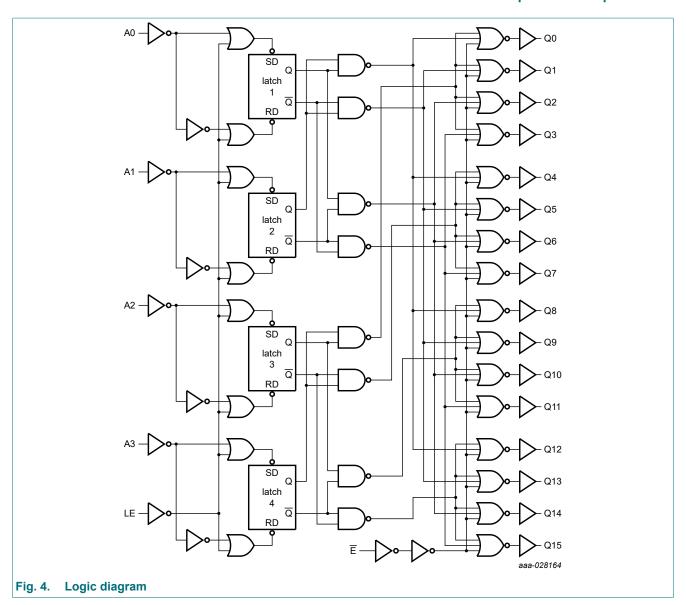
Type number	Package	Package													
	Temperature range	Name	Description	Version											
74HC4514PW 74HCT4514PW	-40 °C to +125 °C	TSSOP24	plastic thin shrink small outline package; 24 leads; body width 4.4 mm	SOT355-1											



5. Functional diagram

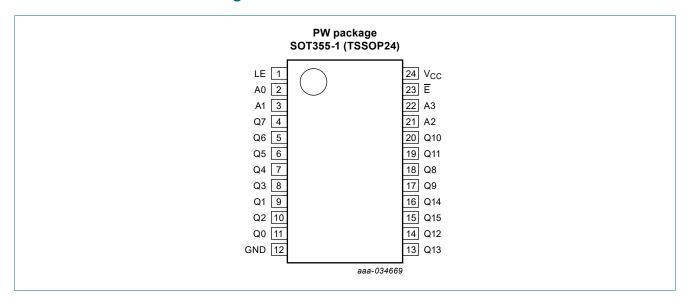






6. Pinning information

6.1. Pinning



6.2. Pin description

Table 2. Pin description

Symbol	Pin	Description
LE	1	latch enable input (active HIGH)
Ē	23	enable input (active LOW)
Q0, Q1, Q2, Q3, Q4, Q5, Q6, Q7, Q8, Q9, Q10, Q11, Q12, Q13, Q14, Q15	11, 9, 10, 8, 7, 6, 5, 4, 18, 17, 20, 19, 14, 13, 16, 15	multiplexer outputs (active HIGH)
A0, A1, A2, A3	2, 3, 21, 22	address inputs
GND	12	ground (0 V)
Vcc	24	supply voltage

7. Functional description

Table 3. Function table

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

1	_				Outputs															
Input	S				Outp	uts														
E	A0	A 1	A2	А3	Q0	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
Н	Х	Χ	Х	X	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
L	L	L	L	L	Н	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
L	Н	L	L	L	L	Н	L	L	L	L	L	L	L	L	L	L	L	L	L	L
L	L	Н	L	L	L	L	Н	L	L	L	L	L	L	L	L	L	L	L	L	L
L	Н	Н	L	L	L	L	L	Н	L	L	L	L	L	L	L	L	L	L	L	L
L	L	L	Н	L	L	L	L	L	Н	L	L	L	L	L	L	L	L	L	L	L
L	Н	L	Н	L	L	L	L	L	L	Н	L	L	L	L	L	L	L	L	L	L
L	L	Н	Н	L	L	L	L	L	L	L	Н	L	L	L	L	L	L	L	L	L
L	Н	Н	Н	L	L	L	L	L	L	L	L	Н	L	L	L	L	L	L	L	L
L	L	L	L	Н	L	L	L	L	L	L	L	L	Н	L	L	L	L	L	L	L
L	Н	L	L	Н	L	L	L	L	L	L	L	L	L	Н	L	L	L	L	L	L
L	L	Н	L	Н	L	L	L	L	L	L	L	L	L	L	Н	L	L	L	L	L
L	Н	Н	L	Н	L	L	L	L	L	L	L	L	L	L	L	Н	L	L	L	L
L	L	L	Н	Н	L	L	L	L	L	L	L	L	L	L	L	L	Н	L	L	L
L	Н	L	Н	Н	L	L	L	L	L	L	L	L	L	L	L	L	L	Н	L	L
L	L	Н	Н	Н	L	L	L	L	L	L	L	L	L	L	L	L	L	L	Н	L
L	Н	Н	Н	Н	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	Н

8. 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	V
I _{IK}	input clamping current	$V_1 < -0.5 \text{ V or } V_1 > V_{CC} + 0.5 \text{ V}$	-	±20	mA
I _{OK}	output clamping current	V_{O} < -0.5 V or V_{O} > V_{CC} + 0.5 V	-	±20	mA
Io	output current	-0.5 V < V _O < 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
P _{tot}	total power dissipation	[1]	-	500	mW

[1] For SOT355-1 (TSSOP24) package: P_{tot} derates linearly with 12.4 mW/K above 110 $^{\circ}\text{C}.$

9. Recommended operating conditions

Table 5. Recommended operating conditions

Symbol	Parameter	Conditions	-	74HC4514	4	7	Unit		
			Min	Тур	Max	Min	Тур	Max	
V _{CC}	supply voltage		2.0	5.0	6.0	4.5	5.0	5.5	V
VI	input voltage		0	-	V _{CC}	0	-	V _{CC}	V
Vo	output voltage		0	-	V _{CC}	0	-	V _{CC}	V
Δt/ΔV	input transition rise and fall rate	V _{CC} = 2.0 V	-	-	625	-	-	-	ns/V
		V _{CC} = 4.5 V	-	1.67	139	-	1.67	139	ns/V
		V _{CC} = 6.0 V	-	-	83	-	-	-	ns/V
T _{amb}	ambient temperature		-40	-	+125	-40	-	+125	°C

10. 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 t	o +85 °C	-40 °C to	+125 °C	Unit
			Min	Тур	Max	Min	Max	Min	Max	
74HC45	14							-		
V _{IH}	HIGH-level	V _{CC} = 2.0 V	1.5	1.2	-	1.5	-	1.5	-	V
	input voltage	V _{CC} = 4.5 V	3.15	2.4	-	3.15	-	3.15	-	V
		V _{CC} = 6.0 V	4.2	3.2	-	4.2	-	4.2	-	V
V _{IL}	LOW-level	V _{CC} = 2.0 V	-	0.8	0.5	-	0.5	-	0.5	V
	input voltage	V _{CC} = 4.5 V	-	2.1	1.35	-	1.35	-	1.35	V
		V _{CC} = 6.0 V	-	2.8	1.8	-	1.8	-	1.8	V
V _{OH}	HIGH-	$V_I = V_{IH}$ or V_{IL}								
	level output voltage	I _O = -20 μA; V _{CC} = 2.0 V	1.9	2.0	-	1.9	-	1.9	-	V
	Voltage	I _O = -20 μA; V _{CC} = 4.5 V	4.4	4.5	-	4.4	-	4.4	-	V
		I _O = -20 μA; V _{CC} = 6.0 V	5.9	6.0	-	5.9	-	5.9	-	V
		$I_O = -4.0 \text{ mA}; V_{CC} = 4.5 \text{ V}$	3.98	4.32	-	3.84	-	3.7	-	V
		$I_O = -5.2 \text{ mA}; V_{CC} = 6.0 \text{ V}$	5.48	5.81	-	5.34	-	5.2	-	V
V _{OL}	LOW-level	$V_I = V_{IH}$ or V_{IL}								
	output voltage	I _O = 20 μA; V _{CC} = 2.0 V	-	0	0.1	-	0.1	-	0.1	V
	Voltage	I _O = 20 μA; V _{CC} = 4.5 V	-	0	0.1	-	0.1	-	0.1	V
		I _O = 20 μA; V _{CC} = 6.0 V	-	0	0.1	-	0.1	-	0.1	V
		$I_O = 4.0 \text{ mA}; V_{CC} = 4.5 \text{ V}$	-	0.15	0.26	-	0.33	-	0.4	V
		I_{O} = 5.2 mA; V_{CC} = 6.0 V	-	0.16	0.26	-	0.33	-	0.4	V
I _I	input leakage current	$V_I = V_{CC}$ or GND; $V_{CC} = 6.0 \text{ V}$	-	-	±0.1	-	±1.0	-	±1.0	μΑ
I _{CC}	supply current	$V_I = V_{CC}$ or GND; $I_O = 0$ A; $V_{CC} = 6.0 \text{ V}$	-	-	8.0	-	80	-	160	μΑ
Cı	input capacitance		-	3.5	-	-	-	-	-	pF

Symbol	Parameter	Conditions		+25 °C		-40 °C t	o +85 °C	-40 °C t	o +125 °C	Unit
			Min	Тур	Max	Min	Max	Min	Max	
74HCT4	514						'		'	
V _{IH}	HIGH-level input voltage	V _{CC} = 4.5 V to 5.5 V	2.0	1.6	-	2.0	-	2.0	-	V
V _{IL}	LOW-level input voltage	V _{CC} = 4.5 V to 5.5 V	-	1.2	0.8	-	0.8	-	0.8	V
V _{OH}	HIGH-	$V_I = V_{IH}$ or V_{IL} ; $V_{CC} = 4.5 V$								
	level output voltage	Ι _Ο = -20 μΑ	4.4	4.5	-	4.4	-	4.4	-	٧
	voltage	I _O = -4 mA	3.98	4.32	-	3.84	-	3.7	-	٧
V _{OL}	LOW-level	$V_I = V_{IH}$ or V_{IL} ; $V_{CC} = 4.5 V$								
	output voltage	Ι _Ο = 20 μΑ	-	0	0.1	-	0.1	-	0.1	V
	voltage	I _O = 4.0 mA	-	0.15	0.26	-	0.33	-	0.4	٧
I _I	input leakage current	$V_I = V_{CC}$ or GND; $V_{CC} = 5.5 \text{ V}$	-	-	±0.1	-	±1.0	-	±1.0	μΑ
I _{CC}	supply current	$V_I = V_{CC}$ or GND; $V_{CC} = 5.5$ V; $I_O = 0$ A	-	-	8.0	-	80	-	160	μΑ
ΔI _{CC}	additional supply current	per input pin; $V_{CC} = 4.5 \text{ V to } 5.5 \text{ V;}$ $V_{I} = V_{CC} - 2.1 \text{ V;}$ other inputs at V_{CC} or GND; $I_{O} = 0 \text{ A}$								
		An	-	65	234	-	292.5	-	318.5	μΑ
		LE	-	140	504	-	630	-	686	μΑ
		Ē	-	100	360	-	450	-	490	μΑ
Cı	input capacitance		-	3.5	-	-	-	-	-	pF

11. Dynamic characteristics

Table 7. Dynamic characteristics

Voltages are referenced to GND (ground = 0 V); C_L = 50 pF unless otherwise specified; for test circuit, see Fig. 7.

Symbol	Parameter	Conditions		+25 °C		-40 °C t	o +85 °C	-40 °C to	o +125 °C	Unit
			Min	Тур	Max	Min	Max	Min	Max	
74HC45	14						1		'	
t _{pd}	propagation	An to Qn; see Fig. 5 [1]								
	delay	V _{CC} = 2.0 V	-	74	230	-	290	-	345	ns
		V _{CC} = 4.5 V	-	27	46	-	58	-	69	ns
		V _{CC} = 5 V; C _L = 15 pF	-	23	-	-	-	-	-	ns
		V _{CC} = 6.0 V	-	22	39	-	49	-	59	ns
		LE to Qn; see Fig. 5								
		V _{CC} = 2.0 V	-	74	230	-	290	-	345	ns
		V _{CC} = 4.5 V	-	27	46	-	58	-	69	ns
		V _{CC} = 6.0 V	-	22	39	-	49	-	59	ns
		E to Qn; see Fig. 5								
		V _{CC} = 2.0 V	-	41	175	-	220	-	265	ns
		V _{CC} = 4.5 V	-	15	35	-	44	-	53	ns
		V _{CC} = 6.0 V	-	12	30	-	37	-	45	ns
t _t	transition	Qn; see <u>Fig. 5</u> [2]								
	time	V _{CC} = 2.0 V	-	19	75	-	95	-	110	ns
		V _{CC} = 4.5 V	-	7	15	-	19	-	22	ns
		V _{CC} = 6.0 V	-	6	13	-	16	-	19	ns
t _W	pulse witdh	LE HIGH; see Fig. 6								
		V _{CC} = 2.0 V	80	14	-	100	-	120	-	ns
		V _{CC} = 4.5 V	16	5	-	20	-	24	-	ns
		V _{CC} = 6.0 V	14	4	-	17	-	20	-	ns
t _{su}	set-up time	An to LE; see Fig. 6								
		V _{CC} = 2.0 V	90	25	-	115	-	135	-	ns
		V _{CC} = 4.5 V	18	9	-	23	-	27	-	ns
		V _{CC} = 6.0 V	15	7	-	20	-	23	-	ns
t _h	hold time	An to LE; see Fig. 6								
		V _{CC} = 2.0 V	1	-11	-	1	-	1	-	ns
		V _{CC} = 4.5 V	1	-4	-	1	-	1	-	ns
		V _{CC} = 6.0 V	1	-3	-	1	-	1	-	ns
C _{PD}	power dissipation capacitance	per package; [3] V _I = GND to V _{CC}	-	44	-	-	-	-	-	pF

Symbol	Parameter	Conditions		+25 °C	;	-40 °C 1	to +85 °C	-40 °C t	o +125 °C	Unit
			Mir	Тур	Max	Min	Max	Min	Max	
74HCT4	514					'		-		
t _{pd}	propagation	An to Qn; see Fig. 5	1]							
	delay	V _{CC} = 4.5 V	-	30	55	-	69	-	83	ns
		V _{CC} = 5 V; C _L = 15 pF	-	26	-	-	-	-	-	ns
		LE to Qn; V _{CC} = 4.5 V; see <u>Fig. 5</u>	-	29	50	-	63	-	75	ns
		Ē to Qn; V _{CC} = 4.5 V; see <u>Fig. 5</u>	-	17	40	-	50	-	60	ns
t _t	transition time	Qn; V _{CC} = 4.5 V; [see <u>Fig. 5</u>	2] -	7	15	-	19	-	22	ns
t _W	pulse witdh	LE HIGH; V _{CC} = 4.5 V; see <u>Fig. 6</u>	16	4	-	20	-	24	-	ns
t _{su}	set-up time	An to LE; $V_{CC} = 4.5 \text{ V}$; see Fig. 6	18	9	-	23	-	27	-	ns
t _h	hold time	An to LE; $V_{CC} = 4.5 \text{ V}$; see Fig. 6	3	-3	-	3	-	3	-	ns
C _{PD}	power dissipation capacitance	per package; V _I = GND to V _{CC} - 1.5 V	3] -	45	-	-	-	-	-	pF

- t_{pd} is the same as t_{PLH} and t_{PHL}
- [2]
- t_t is the same as t_{TLH} and t_{THL} 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;

fo = output frequency in MHz;

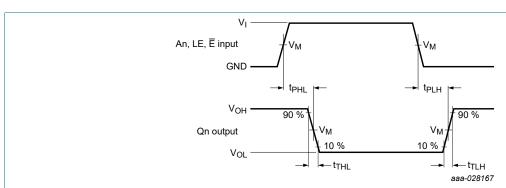
C_L = output load capacitance in pF;

V_{CC} = supply voltage in V;

N = number of load switching outputs;

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

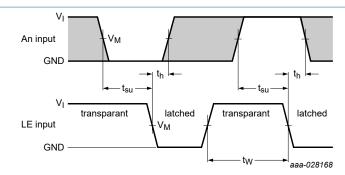
11.1. Waveforms and test circuit



Measurement points are given in Table 8.

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

Fig. 5. The inputs (An, LE, E) to output (Qn) propagation delays and the output transition times



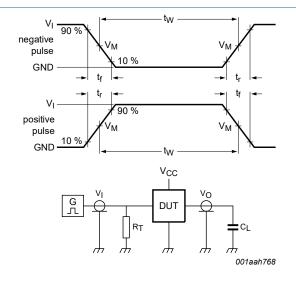
Measurement points are given in Table 8.

The shaded areas indicate when the input is permitted to change for predictable output performance.

Fig. 6. Data set-up and hold times for An input to LE input and LE input pulse width

Table 8. Measurement points

Туре	Input		Output
	V _I	V _M	V _M
74HC4514	GND to V _{CC}	0.5V _{CC}	0.5V _{CC}
74HCT4514	GND to 3 V	1.3 V	1.3 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;

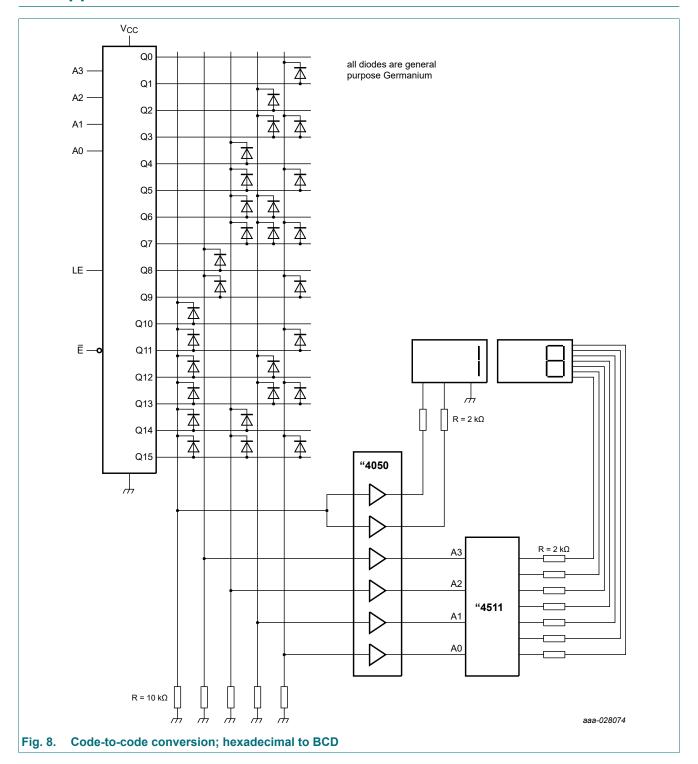
 C_L = Load capacitance including jig and probe capacitance.

Fig. 7. Test circuit for measuring switching times

Table 9. Test data

Туре	Input		Load
	V _I	t _r , t _f	C _L
74HC4514	GND to V _{CC}	6 ns	15 pF, 50 pF
74HCT4514	GND to 3 V	6 ns	15 pF, 50 pF

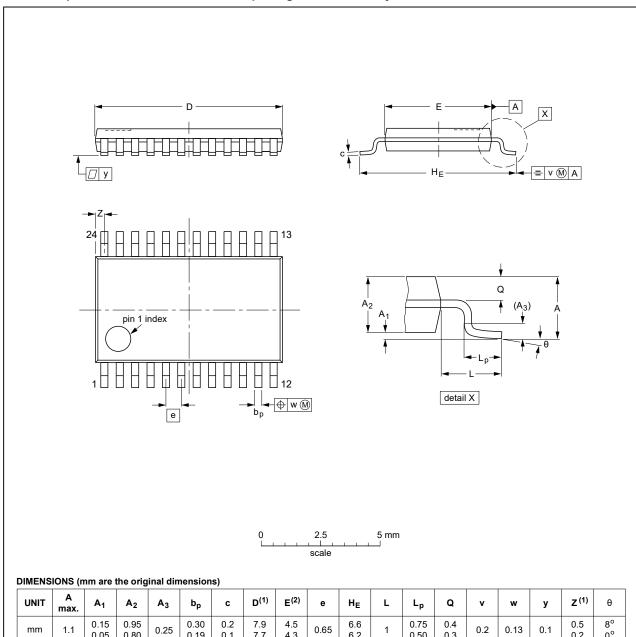
12. Application information



13. Package outline

TSSOP24: plastic thin shrink small outline package; 24 leads; body width 4.4 mm

SOT355-1



UNIT	A max.	A ₁	A ₂	A ₃	bp	С	D ⁽¹⁾	E ⁽²⁾	е	HE	L	Lp	Q	v	w	у	Z ⁽¹⁾	θ
mm	1.1	0.15 0.05	0.95 0.80	0.25	0.30 0.19	0.2 0.1	7.9 7.7	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	0.5 0.2	8° 0°

- 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	ISSUE DATE		
	IEC	JEDEC	JEITA		PROJECTION	ISSUE DATE	
SOT355-1		MO-153				99-12-27 03-02-19	

Fig. 9. Package outline SOT355-1 (TSSOP24)

14. Abbreviations

Table 10. Abbreviations

Acronym	Description
ANSI	American National Standards Institute
CDM	Charged Device Model
CMOS	Complementary Metal-Oxide Semiconductor
DUT	Device Under Test
ESD	ElectroStatic Discharge
ESDA	ElectroStatic Discharge Association
НВМ	Human Body Model
JEDEC	Joint Electron Device Engineering Council
TTL Transistor-Transistor Logic	

15. Revision history

Table 11. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes	
74HC_HCT4514 v.6.1	20240812	Product data sheet	-	74HC_HCT4514 v.6	
74HC_HCT4514 v.6	20240805	Product data sheet	-	74HC_HCT4514 v.5	
Modifications:	 Section 2: ESD specification updated according to the latest JEDEC standard. Type number 74HC4514D (SOT137-1/SO24) removed. 				
74HC_HCT4514 v.5	20240507	Product data sheet	-	74HC_HCT4514 v.4	
Modifications:	Type number 7	74HCT4514D (SOT137-1/SO2	24) removed.		
74HC_HCT4514 v.4	20210715	Product data sheet	-	74HC_HCT4514 v.3	
Modifications:	 Type number 74HC4514DB (SOT340-1/SSOP24) removed. Section 2 updated. Section 8: Derating values for P_{tot} total power dissipation updated. 				
74HC_HCT4514 v.3	20180220	Product data sheet	-	74HC_HCT4514 v.2	
 Modifications: The format of this data sheet has been redesigned to comply with the identity g Nexperia. Legal texts have been adapted to the new company name where appropriate. 				, ,	
74HC_HCT4514 v.2	19930901	Product specification	-	74HC_HCT4514 v.1	

16. 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.

- Please consult the most recently issued document before initiating or completing a design.
- [2] The term 'short data sheet' is explained in section "Definitions".
- 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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4-to-16 line decoder/demultiplexer with input latches

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