



# 74AHC595; 74AHCT595

8-bit serial-in/serial-out or parallel-out shift register with output latches

Rev. 9 — 9 May 2025

Product data sheet

## 1. General description

The 74AHC595; 74AHCT595 is an 8-bit serial-in/serial or parallel-out shift register with a storage register and 3-state outputs. Both the shift and storage register have separate clocks. The device features a serial input (DS) and a serial output (Q7S) to enable cascading and an asynchronous reset  $\overline{MR}$  input. A LOW on  $\overline{MR}$  will reset the shift register. Data is shifted on the LOW-to-HIGH transitions of the SHCP input. The data in the shift register is transferred to the storage register on a LOW-to-HIGH transition of the STCP input. If both clocks are connected together, the shift register will always be one clock pulse ahead of the storage register. Data in the storage register appears at the output whenever the output enable input ( $\overline{OE}$ ) is LOW. A HIGH on  $\overline{OE}$  causes the outputs to assume a high-impedance OFF-state. Operation of the  $\overline{OE}$  input does not affect the state of the registers. The 74AHCT595 features TTL compatible inputs. Both 74AHC595 and 74AHCT595 inputs are overvoltage tolerant. This feature allows the use of these devices as translators in mixed voltage environments.

## 2. Features and benefits

- Wide supply voltage range from 2.0 V to 5.5 V
- Balanced propagation delays
- All inputs have Schmitt-trigger action
- Overvoltage tolerant inputs to 5.5 V
- High noise immunity
- CMOS low power dissipation
- Latch-up performance exceeds 100 mA per JESD 78 Class II Level A
- Input levels:
  - The 74AHC595 operates with CMOS input levels
  - The 74AHCT595 operates with TTL input levels
- ESD protection:
  - HBM: ANSI/ESDA/JEDEC JS-001 class 2 exceeds 2000 V
  - CDM: ANSI/ESDA/JEDEC JS-002 class C3 exceeds 1000 V
- Multiple package options
- Specified from -40 °C to +85 °C and from -40 °C to +125 °C

## 3. Applications

- Serial-to-parallel data conversion
- Remote control holding register

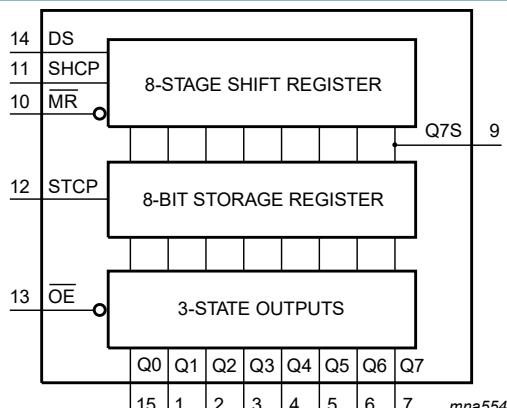
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## 4. Ordering information

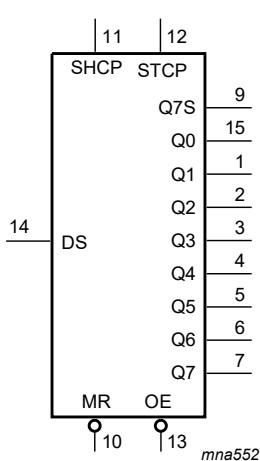
**Table 1. Ordering information**

Type number	Package			
	Temperature range	Name	Description	Version
<a href="#">74AHC595D</a> <a href="#">74AHCT595D</a>	-40 °C to +125 °C	SO16	plastic small outline package; 16 leads; body width 3.9 mm	<a href="#">SOT109-1</a>
<a href="#">74AHC595PW</a> <a href="#">74AHCT595PW</a>	-40 °C to +125 °C	TSSOP16	plastic thin shrink small outline package; 16 leads; body width 4.4 mm	<a href="#">SOT403-1</a>
<a href="#">74AHC595BQ</a> <a href="#">74AHCT595BQ</a>	-40 °C to +125 °C	DHVQFN16	plastic dual in-line compatible thermal enhanced very thin quad flat package; no leads; 16 terminals; body 2.5 × 3.5 × 0.85 mm	<a href="#">SOT763-1</a>
<a href="#">74AHC595BZ</a> <a href="#">74AHCT595BZ</a>	-40 °C to +125 °C	DHXQFN16	plastic, leadless dual in-line compatible thermal enhanced extreme thin quad flat package; no leads; 16 terminals; 0.4 mm pitch; body 2 mm × 2.4 mm × 0.48 mm	<a href="#">SOT8016-1</a>

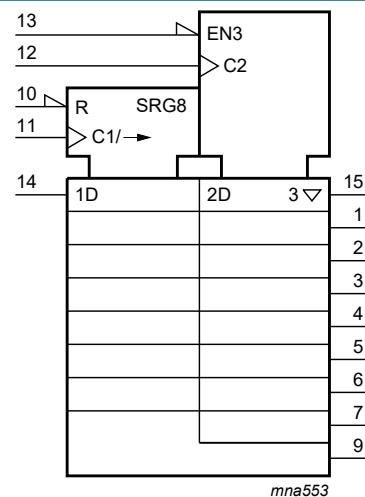
## 5. Functional diagram



**Fig. 1. Functional diagram**



**Fig. 2. Logic symbol**



**Fig. 3. IEC logic symbol**

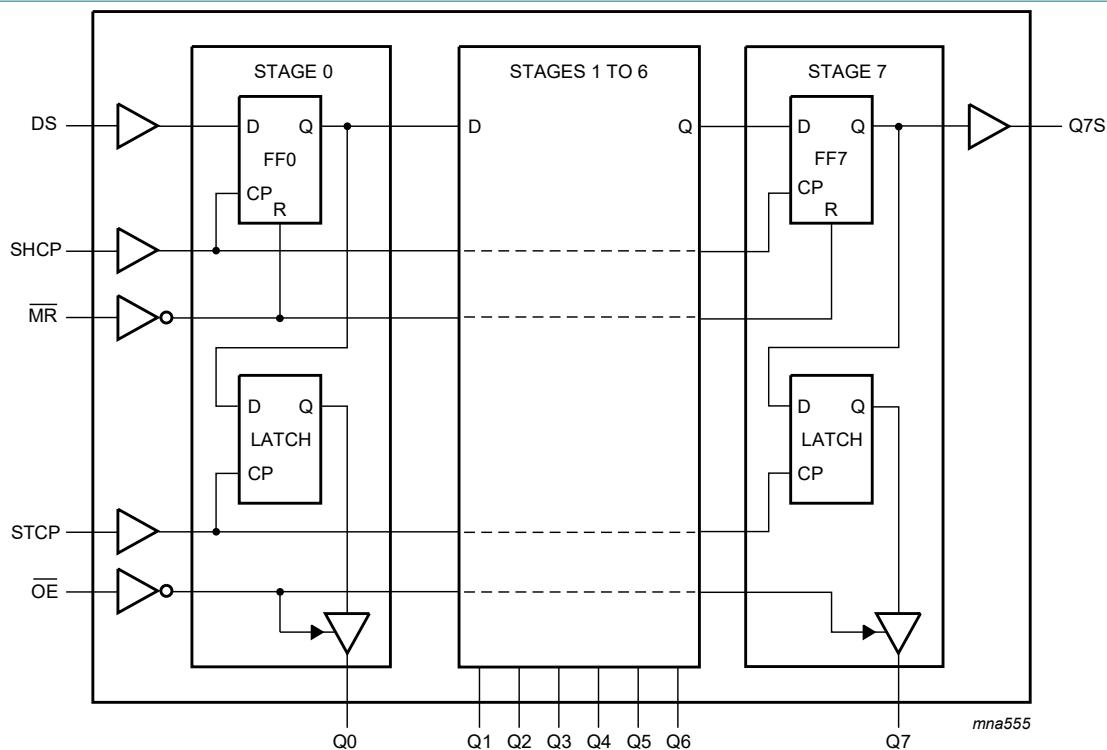
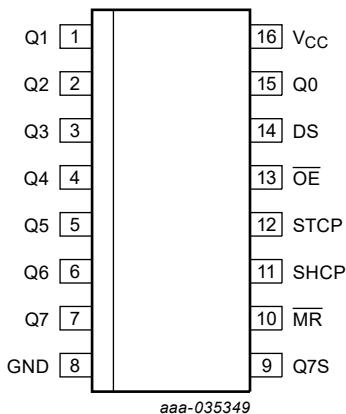


Fig. 4. Logic diagram

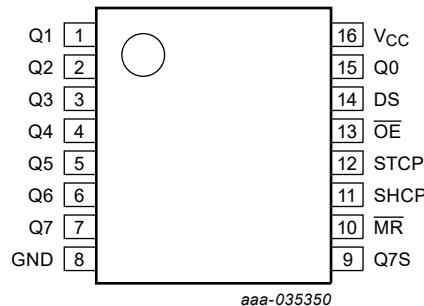
## 6. Pinning information

### 6.1. Pinning

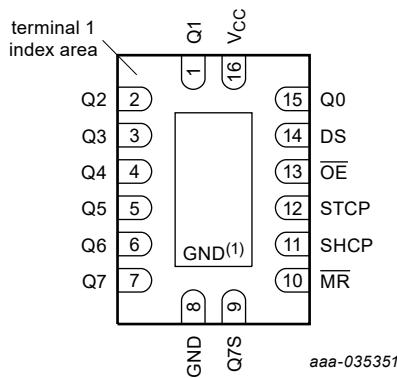
D package  
SOT109-1 (SO16)



PW package  
SOT403-1 (TSSOP16)

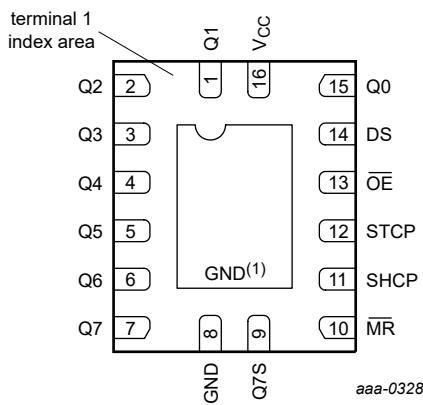


BQ package  
SOT763-1 (DHVQFN16)



Transparent top view

BZ package  
SOT8016-1 (DHXQFN16)



Transparent top view

(1) This is not a ground pin. There is no electrical or mechanical requirement to solder the pad. In case soldered, the solder land should remain floating or connected to GND.

## 6.2. Pin description

**Table 2. Pin description**

Symbol	Pin	Description
Q0, Q1, Q2, Q3, Q4, Q5, Q6, Q7	15, 1, 2, 3, 4, 5, 6, 7	parallel data output
GND	8	ground (0 V)
Q7S	9	serial data output
MR	10	master reset (active LOW)
SHCP	11	shift register clock input
STCP	12	storage register clock input
OE	13	output enable input (active LOW)
DS	14	serial data input
V <sub>CC</sub>	16	supply voltage

## 7. Functional description

**Table 3. Function table**

H = HIGH voltage state; L = LOW voltage state; ↑ = LOW-to-HIGH transition;

X = don't care; NC = no change; Z = high-impedance OFF-state.

Control				Input	Output		Function
SHCP	STCP	OE	MR	DS	Q7S	Qn	
X	X	L	L	X	L	NC	a LOW-level on MR only affects the shift registers
X	↑	L	L	X	L	L	empty shift register loaded into storage register
X	X	H	L	X	L	Z	shift register clear; parallel outputs in high-impedance OFF-state
↑	X	L	H	H	Q6S	NC	logic HIGH-level shifted into shift register stage 0. Contents of all shift register stages shifted through, e.g. previous state of stage 6 (internal Q6S) appears on the serial output (Q7S).
X	↑	L	H	X	NC	QnS	contents of shift register stages (internal QnS) are transferred to the storage register and parallel output stages
↑	↑	L	H	X	Q6S	QnS	contents of shift register shifted through; previous contents of the shift register is transferred to the storage register and the parallel output stages

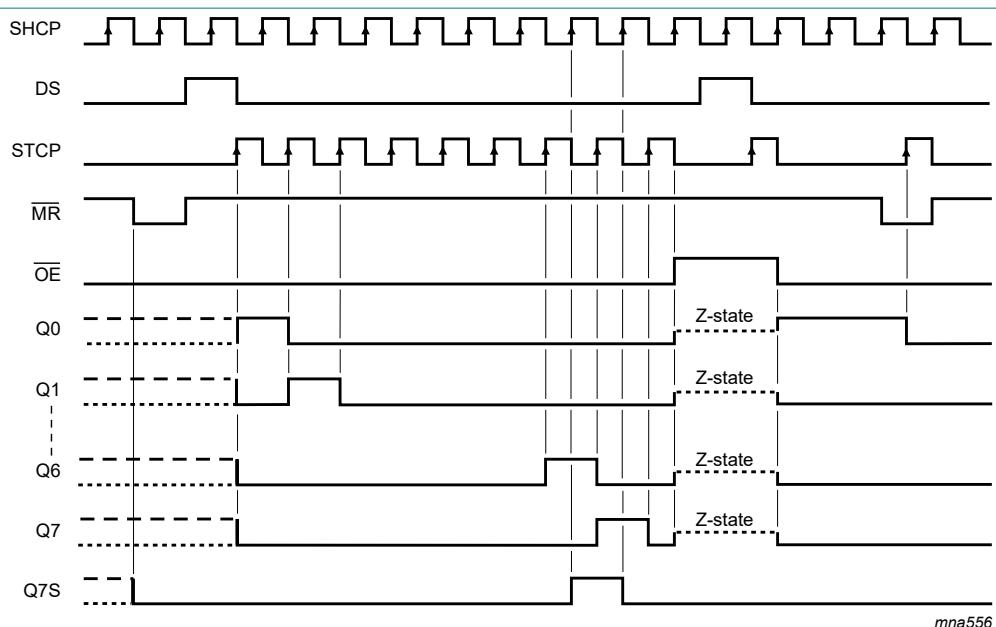


Fig. 5. Timing diagram

## 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 <sub>CC</sub>	supply voltage		-0.5	+7.0	V
V <sub>I</sub>	input voltage		-0.5	+7.0	V
I <sub>IK</sub>	input clamping current	V <sub>I</sub> < -0.5 V	[1]	-20	- mA
I <sub>OK</sub>	output clamping current	V <sub>O</sub> < -0.5 V or V <sub>O</sub> > V <sub>CC</sub> + 0.5 V	[1]	-20	+20 mA
I <sub>O</sub>	output current	V <sub>O</sub> = -0.5 V to (V <sub>CC</sub> + 0.5 V)	-25	+25	mA
I <sub>CC</sub>	supply current		-	+75	mA
I <sub>GND</sub>	ground current		-75	-	mA
T <sub>stg</sub>	storage temperature		-65	+150	°C
P <sub>tot</sub>	total power dissipation	T <sub>amb</sub> = -40 °C to +125 °C			
		SOT109-1 (SO16) SOT403-1 (TSSOP16) SOT763-1 (DHVQFN16)	[2] [3] [4]	-	500 mW
		SOT8016-1 (DHXQFN16)		-	250 mW

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

[2] For SOT109-1 (SO16) package: P<sub>tot</sub> derates linearly with 12.4 mW/K above 110 °C.

[3] For SOT403-1 (TSSOP16) package: P<sub>tot</sub> derates linearly with 8.5 mW/K above 91 °C.

[4] For SOT763-1 (DHVQFN16) package: P<sub>tot</sub> derates linearly with 11.2 mW/K above 106 °C.

## 9. Recommended operating conditions

**Table 5. Operating conditions**

Symbol	Parameter	Conditions	74AHC595			74AHCT595			Unit
			Min	Typ	Max	Min	Typ	Max	
V <sub>CC</sub>	supply voltage		2.0	5.0	5.5	4.5	5.0	5.5	V
V <sub>I</sub>	input voltage		0	-	5.5	0	-	5.5	V
V <sub>O</sub>	output voltage		0	-	V <sub>CC</sub>	0	-	V <sub>CC</sub>	V
T <sub>amb</sub>	ambient temperature		-40	+25	+125	-40	+25	+125	°C
$\Delta t/\Delta V$	input transition rise and fall rate	V <sub>CC</sub> = 3.0 V to 3.6 V	-	-	100	-	-	-	ns/V
		V <sub>CC</sub> = 4.5 V to 5.5 V	-	-	20	-	-	20	ns/V

## 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 to +85 °C		-40 °C to +125 °C		Unit
			Min	Typ	Max	Min	Max	Min	Max	
<b>74AHC595</b>										
V <sub>IH</sub>	HIGH-level input voltage	V <sub>CC</sub> = 2.0 V	1.5	-	-	1.5	-	1.5	-	V
		V <sub>CC</sub> = 3.0 V	2.1	-	-	2.1	-	2.1	-	V
		V <sub>CC</sub> = 5.5 V	3.85	-	-	3.85	-	3.85	-	V
V <sub>IL</sub>	LOW-level input voltage	V <sub>CC</sub> = 2.0 V	-	-	0.5	-	0.5	-	0.5	V
		V <sub>CC</sub> = 3.0 V	-	-	0.9	-	0.9	-	0.9	V
		V <sub>CC</sub> = 5.5 V	-	-	1.65	-	1.65	-	1.65	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> = -50 µA; V <sub>CC</sub> = 2.0 V	1.9	2.0	-	1.9	-	1.9	-	V
		I <sub>O</sub> = -50 µA; V <sub>CC</sub> = 3.0 V	2.9	3.0	-	2.9	-	2.9	-	V
		I <sub>O</sub> = -50 µA; V <sub>CC</sub> = 4.5 V	4.4	4.5	-	4.4	-	4.4	-	V
		I <sub>O</sub> = -4.0 mA; V <sub>CC</sub> = 3.0 V	2.58	-	-	2.48	-	2.40	-	V
		I <sub>O</sub> = -8.0 mA; V <sub>CC</sub> = 4.5 V	3.94	-	-	3.80	-	3.70	-	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> = 50 µA; V <sub>CC</sub> = 2.0 V	-	0	0.1	-	0.1	-	0.1	V
		I <sub>O</sub> = 50 µA; V <sub>CC</sub> = 3.0 V	-	0	0.1	-	0.1	-	0.1	V
		I <sub>O</sub> = 50 µA; V <sub>CC</sub> = 4.5 V	-	0	0.1	-	0.1	-	0.1	V
		I <sub>O</sub> = 4.0 mA; V <sub>CC</sub> = 3.0 V	-	-	0.36	-	0.44	-	0.55	V
		I <sub>O</sub> = 8.0 mA; V <sub>CC</sub> = 4.5 V	-	-	0.36	-	0.44	-	0.55	V
I <sub>I</sub>	input leakage current	V <sub>I</sub> = 5.5 V or GND; V <sub>CC</sub> = 0 V to 5.5 V	-	-	0.1	-	1.0	-	2.0	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	-	-	±0.25	-	±2.5	-	±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	-	-	4.0	-	40	-	80	µA
C <sub>I</sub>	input capacitance		-	3	10	-	10	-	10	pF

Symbol	Parameter	Conditions	25 °C			-40 °C to +85 °C		-40 °C to +125 °C		Unit
			Min	Typ	Max	Min	Max	Min	Max	
<b>74AHCT595</b>										
$V_{IH}$	HIGH-level input voltage	$V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}$	2.0	-	-	2.0	-	2.0	-	V
$V_{IL}$	LOW-level input voltage	$V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}$	-	-	0.8	-	0.8	-	0.8	V
$V_{OH}$	HIGH-level output voltage	$V_I = V_{IH} \text{ or } V_{IL}; V_{CC} = 4.5 \text{ V}$								
		$I_O = -50 \mu\text{A}$	4.4	4.5	-	4.4	-	4.4	-	V
		$I_O = -8.0 \text{ mA}$	3.94	-	-	3.80	-	3.70	-	V
$V_{OL}$	LOW-level output voltage	$V_I = V_{IH} \text{ or } V_{IL}; V_{CC} = 4.5 \text{ V}$								
		$I_O = 50 \mu\text{A}$	-	0	0.1	-	0.1	-	0.1	V
		$I_O = 8.0 \text{ mA}$	-	-	0.36	-	0.44	-	0.55	V
$I_I$	input leakage current	$V_I = 5.5 \text{ V or GND}; V_{CC} = 0 \text{ V to } 5.5 \text{ V}$	-	-	0.1	-	1.0	-	2.0	$\mu\text{A}$
$I_{OZ}$	OFF-state output current	$V_I = V_{IH} \text{ or } V_{IL}; V_O = V_{CC} \text{ or GND}; V_{CC} = 5.5 \text{ V}$	-	-	$\pm 0.25$	-	$\pm 2.5$	-	$\pm 10$	$\mu\text{A}$
$I_{CC}$	supply current	$V_I = V_{CC} \text{ or GND}; I_O = 0 \text{ A}; V_{CC} = 5.5 \text{ V}$	-	-	4.0	-	40	-	80	$\mu\text{A}$
$\Delta I_{CC}$	additional supply current	per input pin; $V_I = V_{CC} - 2.1 \text{ V}$ ; other inputs at $V_{CC}$ or GND; $I_O = 0 \text{ A}; V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}$	-	-	1.35	-	1.5	-	1.5	mA
$C_I$	input capacitance		-	3	10	-	10	-	10	pF

## 11. Dynamic characteristics

**Table 7. Dynamic characteristics**

Voltages are referenced to GND (ground = 0 V); for test circuit see Fig. 11.

Symbol	Parameter	Conditions	25 °C			-40 °C to +85 °C		-40 °C to +125 °C		Unit
			Min	Typ	Max	Min	Max	Min	Max	
<b>74AHC595</b>										
$t_{pd}$	propagation delay	SHCP to Q7S; see Fig. 6 [2]								
		$V_{CC} = 3.0 \text{ V to } 3.6 \text{ V}; C_L = 15 \text{ pF}$	-	5.7	13.0	1.0	15.0	1.0	16.5	ns
		$V_{CC} = 3.0 \text{ V to } 3.6 \text{ V}; C_L = 50 \text{ pF}$	-	7.7	16.5	1.0	18.5	1.0	20.1	ns
		$V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}; C_L = 15 \text{ pF}$	-	4.0	8.2	1.0	9.4	1.0	10.5	ns
		$V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}; C_L = 50 \text{ pF}$	-	5.4	10.0	1.0	11.4	1.0	12.5	ns
		STCP to Qn; see Fig. 7 [2]								
		$V_{CC} = 3.0 \text{ V to } 3.6 \text{ V}; C_L = 15 \text{ pF}$	-	5.9	11.9	1.0	13.5	1.0	15.0	ns
		$V_{CC} = 3.0 \text{ V to } 3.6 \text{ V}; C_L = 50 \text{ pF}$	-	7.7	15.4	1.0	17.0	1.0	18.5	ns
		$V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}; C_L = 15 \text{ pF}$	-	4.2	7.4	1.0	8.5	1.0	9.5	ns
		$V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}; C_L = 50 \text{ pF}$	-	5.5	9.0	1.0	10.5	1.0	11.5	ns

Symbol	Parameter	Conditions	25 °C			-40 °C to +85 °C		-40 °C to +125 °C		Unit
			Min	Typ [1]	Max	Min	Max	Min	Max	
$t_{PHL}$	HIGH to LOW propagation delay	MR to Q7S; see Fig. 9								
		$V_{CC} = 3.0 \text{ V to } 3.6 \text{ V}; C_L = 15 \text{ pF}$	-	5.9	12.8	1.0	13.7	1.0	15.0	ns
		$V_{CC} = 3.0 \text{ V to } 3.6 \text{ V}; C_L = 50 \text{ pF}$	-	7.4	16.3	1.0	17.2	1.0	18.7	ns
		$V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}; C_L = 15 \text{ pF}$	-	4.4	8.0	1.0	9.1	1.0	10.0	ns
		$V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}; C_L = 50 \text{ pF}$	-	5.6	10.0	1.0	11.1	1.0	12.0	ns
$t_{en}$	enable time	OE to Qn; see Fig. 10 [3]								
		$V_{CC} = 3.0 \text{ V to } 3.6 \text{ V}; C_L = 15 \text{ pF}$	-	5.6	11.5	1.0	13.5	1.0	15.0	ns
		$V_{CC} = 3.0 \text{ V to } 3.6 \text{ V}; C_L = 50 \text{ pF}$	-	7.4	15.0	1.0	17.0	1.0	18.5	ns
		$V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}; C_L = 15 \text{ pF}$	-	4.0	8.6	1.0	10.0	1.0	11.0	ns
		$V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}; C_L = 50 \text{ pF}$	-	5.3	10.6	1.0	12.0	1.0	13.0	ns
$t_{dis}$	disable time	OE to Qn; see Fig. 10 [4]								
		$V_{CC} = 3.0 \text{ V to } 3.6 \text{ V}; C_L = 15 \text{ pF}$	-	5.4	11.0	1.0	13.0	1.0	14.5	ns
		$V_{CC} = 3.0 \text{ V to } 3.6 \text{ V}; C_L = 50 \text{ pF}$	-	8.7	15.7	1.0	16.2	1.0	17.5	ns
		$V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}; C_L = 15 \text{ pF}$	-	3.8	8.0	1.0	9.5	1.0	10.5	ns
		$V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}; C_L = 50 \text{ pF}$	-	5.8	10.3	1.0	11.0	1.0	12.0	ns
$f_{max}$	maximum frequency	SHCP or STCP; see Fig. 6 and Fig. 7								
		$V_{CC} = 3.0 \text{ V to } 3.6 \text{ V}$	80	125	-	60	-	40	-	MHz
		$V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}$	130	170	-	110	-	90	-	MHz
$t_w$	pulse width	SHCP HIGH or LOW; see Fig. 6								
		$V_{CC} = 3.0 \text{ V to } 3.6 \text{ V}$	5.0	-	-	5.0	-	5.0	-	ns
		$V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}$	5.0	-	-	5.0	-	5.0	-	ns
		STCP HIGH or LOW; see Fig. 7								
		$V_{CC} = 3.0 \text{ V to } 3.6 \text{ V}$	5.0	-	-	5.0	-	5.0	-	ns
		$V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}$	5.0	-	-	5.0	-	5.0	-	ns
		MR LOW; see Fig. 9								
		$V_{CC} = 3.0 \text{ V to } 3.6 \text{ V}$	5.0	-	-	5.0	-	5.0	-	ns
		$V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}$	5.0	-	-	5.0	-	5.0	-	ns
$t_{su}$	set-up time	DS to SHCP; see Fig. 8								
		$V_{CC} = 3.0 \text{ V to } 3.6 \text{ V}$	3.5	-	-	3.5	-	3.5	-	ns
		$V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}$	3.0	-	-	3.0	-	3.0	-	ns
		SHCP to STCP; see Fig. 7								
		$V_{CC} = 3.0 \text{ V to } 3.6 \text{ V}$	8.5	-	-	8.5	-	8.5	-	ns
		$V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}$	5.0	-	-	5.0	-	5.0	-	ns
$t_h$	hold time	DS to SHCP; see Fig. 8								
		$V_{CC} = 3.0 \text{ V to } 3.6 \text{ V}$	1.5	-	-	1.5	-	1.5	-	ns
		$V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}$	2.0	-	-	2.0	-	2.0	-	ns
$t_{rec}$	recovery time	MR to SHCP; see Fig. 9								
		$V_{CC} = 3.0 \text{ V to } 3.6 \text{ V}$	3.0	-	-	3.0	-	3.0	-	ns
		$V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}$	2.5	-	-	2.5	-	2.5	-	ns
$C_{PD}$	power dissipation capacitance	$f_i = 1 \text{ MHz}; V_I = \text{GND to } V_{CC}$	[5] [6]	-	180	-	-	-	-	pF

Symbol	Parameter	Conditions	25 °C			-40 °C to +85 °C		-40 °C to +125 °C		Unit
			Min	Typ [1]	Max	Min	Max	Min	Max	
<b>74AHCT595</b>										
$t_{pd}$	propagation delay	SHCP to Q7S; see Fig. 6 [2]								
		$V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}; C_L = 15 \text{ pF}$	-	3.8	8.2	1.0	9.0	1.0	10.0	ns
		$V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}; C_L = 50 \text{ pF}$	-	5.2	10.0	1.0	11.0	1.0	12.0	ns
		STCP to Qn; see Fig. 7 [2]								
		$V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}; C_L = 15 \text{ pF}$	-	4.0	7.4	1.0	8.5	1.0	9.5	ns
		$V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}; C_L = 50 \text{ pF}$	-	5.3	9.0	1.0	10.5	1.0	11.5	ns
$t_{PHL}$	HIGH to LOW propagation delay	MR to Q7S; see Fig. 9								
		$V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}; C_L = 15 \text{ pF}$	-	4.6	8.2	1.0	9.5	1.0	10.5	ns
		$V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}; C_L = 50 \text{ pF}$	-	5.8	10.5	1.0	11.5	1.0	12.5	ns
$t_{en}$	enable time	OE to Qn; see Fig. 10 [3]								
		$V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}; C_L = 15 \text{ pF}$	-	4.8	9.0	1.0	11.0	1.0	12.0	ns
		$V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}; C_L = 50 \text{ pF}$	-	6.2	11.6	1.0	13.0	1.0	14.5	ns
$t_{dis}$	disable time	OE to Qn; see Fig. 10 [4]								
		$V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}; C_L = 15 \text{ pF}$	-	3.6	6.9	1.0	8.0	1.0	9.0	ns
		$V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}; C_L = 50 \text{ pF}$	-	5.8	10.3	1.0	11.0	1.0	12.0	ns
$f_{max}$	maximum frequency	SHCP and STCP; $V_{CC} = 4.5 \text{ V to } 5.5 \text{ V};$ see Fig. 6 and Fig. 7	130	170	-	110	-	90	-	MHz
$t_w$	pulse width	SHCP HIGH or LOW; $V_{CC} = 4.5 \text{ V to } 5.5 \text{ V};$ see Fig. 6	5.0	-	-	5.0	-	5.0	-	ns
		STCP HIGH or LOW; $V_{CC} = 4.5 \text{ V to } 5.5 \text{ V};$ see Fig. 7	5.0	-	-	5.0	-	5.0	-	ns
		MR LOW; $V_{CC} = 4.5 \text{ V to } 5.5 \text{ V};$ see Fig. 9	5.0	-	-	5.0	-	5.0	-	ns
$t_{su}$	set-up time	DS to SHCP; $V_{CC} = 4.5 \text{ V to } 5.5 \text{ V};$ see Fig. 8	3.0	-	-	3.0	-	3.0	-	ns
		SHCP to STCP; $V_{CC} = 4.5 \text{ V to } 5.5 \text{ V};$ see Fig. 7	5.0	-	-	5.0	-	5.0	-	ns
$t_h$	hold time	DS to SHCP; $V_{CC} = 4.5 \text{ V to } 5.5 \text{ V};$ see Fig. 8	2.0	-	-	2.0	-	2.0	-	ns
$t_{rec}$	recovery time	MR to SHCP; $V_{CC} = 4.5 \text{ V to } 5.5 \text{ V};$ see Fig. 9	3.0	-	-	3.0	-	3.0	-	ns
$C_{PD}$	power dissipation capacitance	$f_i = 1 \text{ MHz}; V_i = \text{GND to } V_{CC}$ [5] [6]	-	190	-	-	-	-	-	pF

[1] Typical values are measured at nominal supply voltage.

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

[3]  $t_{en}$  is the same as  $t_{PZL}$  and  $t_{PZH}$ .

[4]  $t_{dis}$  is the same as  $t_{PLZ}$  and  $t_{PHZ}$ .

[5]  $C_{PD}$  is used to determine the dynamic power dissipation ( $P_D$  in  $\mu\text{W}$ ).

$$P_D = C_{PD} \times V_{CC}^2 \times f_i + \sum(C_L \times V_{CC}^2 \times f_o) \text{ where:}$$

$f_i$  = input frequency in MHz;

$f_o$  = output frequency in MHz;

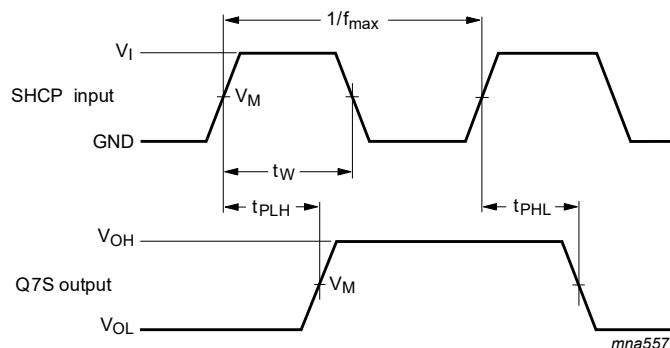
$$\sum(C_L \times V_{CC}^2 \times f_o) = \text{sum of outputs;}$$

$C_L$  = output load capacitance in pF;

$V_{CC}$  = supply voltage in V.

[6] All 9 outputs switching.

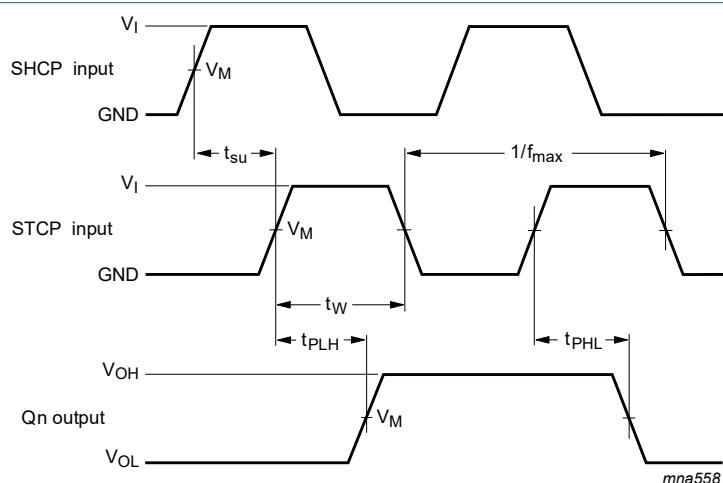
### 11.1. Waveforms and test circuit



Measurement points are given in [Table 8](#).

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

**Fig. 6. Shift clock pulse, maximum frequency and input to output propagation delays**

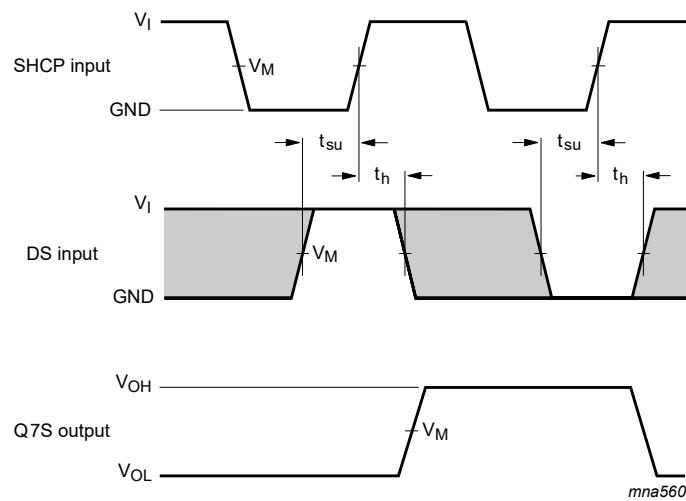


Measurement points are given in [Table 8](#).

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

**Fig. 7. Storage clock to output propagation delays**

## 8-bit serial-in/serial-out or parallel-out shift register with output latches

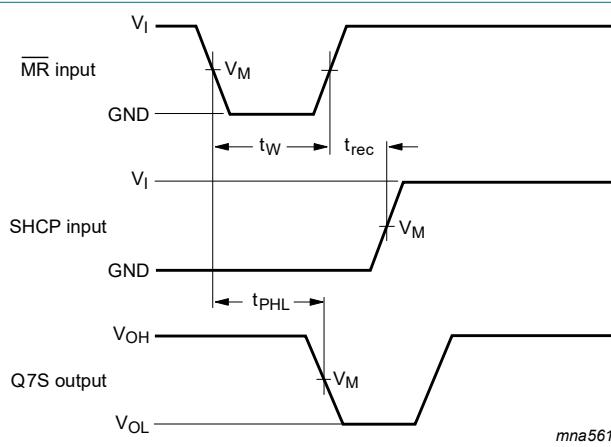


Measurement points are given in [Table 8](#).

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

V<sub>OL</sub> and V<sub>OH</sub> are typical output voltage levels that occur with the output load.

**Fig. 8. Data set-up and hold times**

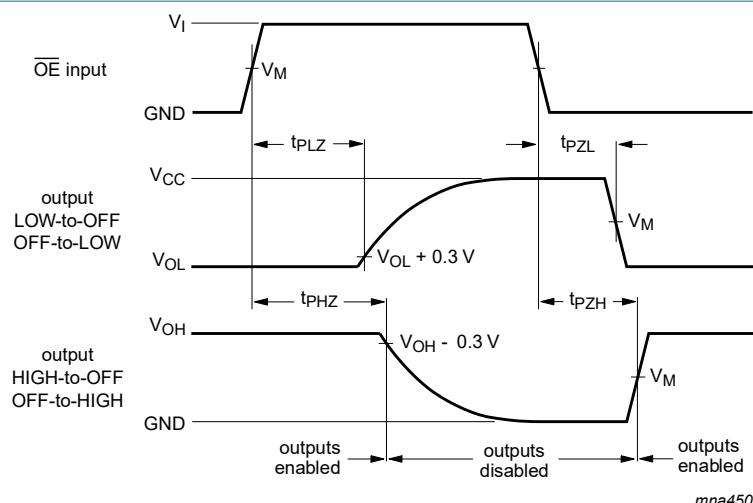


Measurement points are given in [Table 8](#).

V<sub>OL</sub> and V<sub>OH</sub> are typical output voltage levels that occur with the output load.

**Fig. 9. Master reset to output propagation delays**

## 8-bit serial-in/serial-out or parallel-out shift register with output latches



Measurement points are given in [Table 8](#).

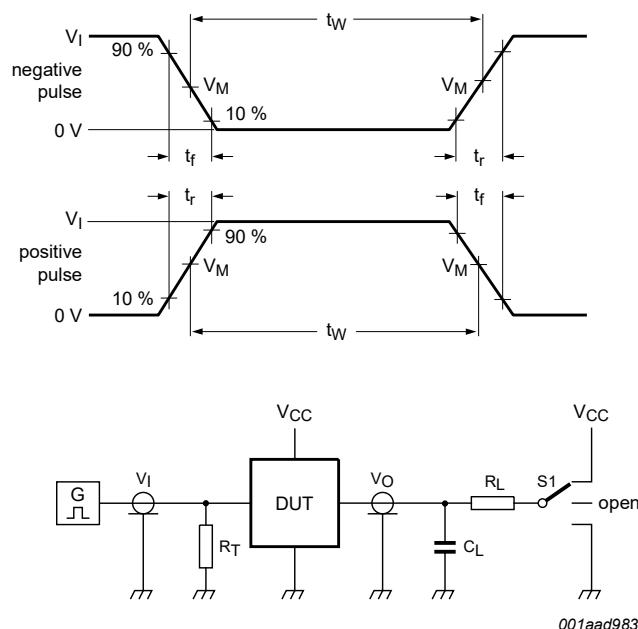
$V_{OL}$  and  $V_{OH}$  are typical output voltage levels that occur with the output load.

**Fig. 10. Enable and disable times**

**Table 8. Measurement points**

Type	Input	Output
	$V_M$	$V_M$
74AHC595	$0.5 \times V_{CC}$	$0.5 \times V_{CC}$
74AHCT595	1.5 V	$0.5 \times V_{CC}$

## 8-bit serial-in/serial-out or parallel-out shift register with output latches



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

Definitions test circuit:

$C_L$  = load capacitance including jig and probe capacitance;

$R_L$  = load resistance;

$R_T$  = termination resistance should be equal to the output impedance  $Z_o$  of the pulse generator;

S1 = test selection switch.

**Fig. 11. Test circuit for measuring switching times**

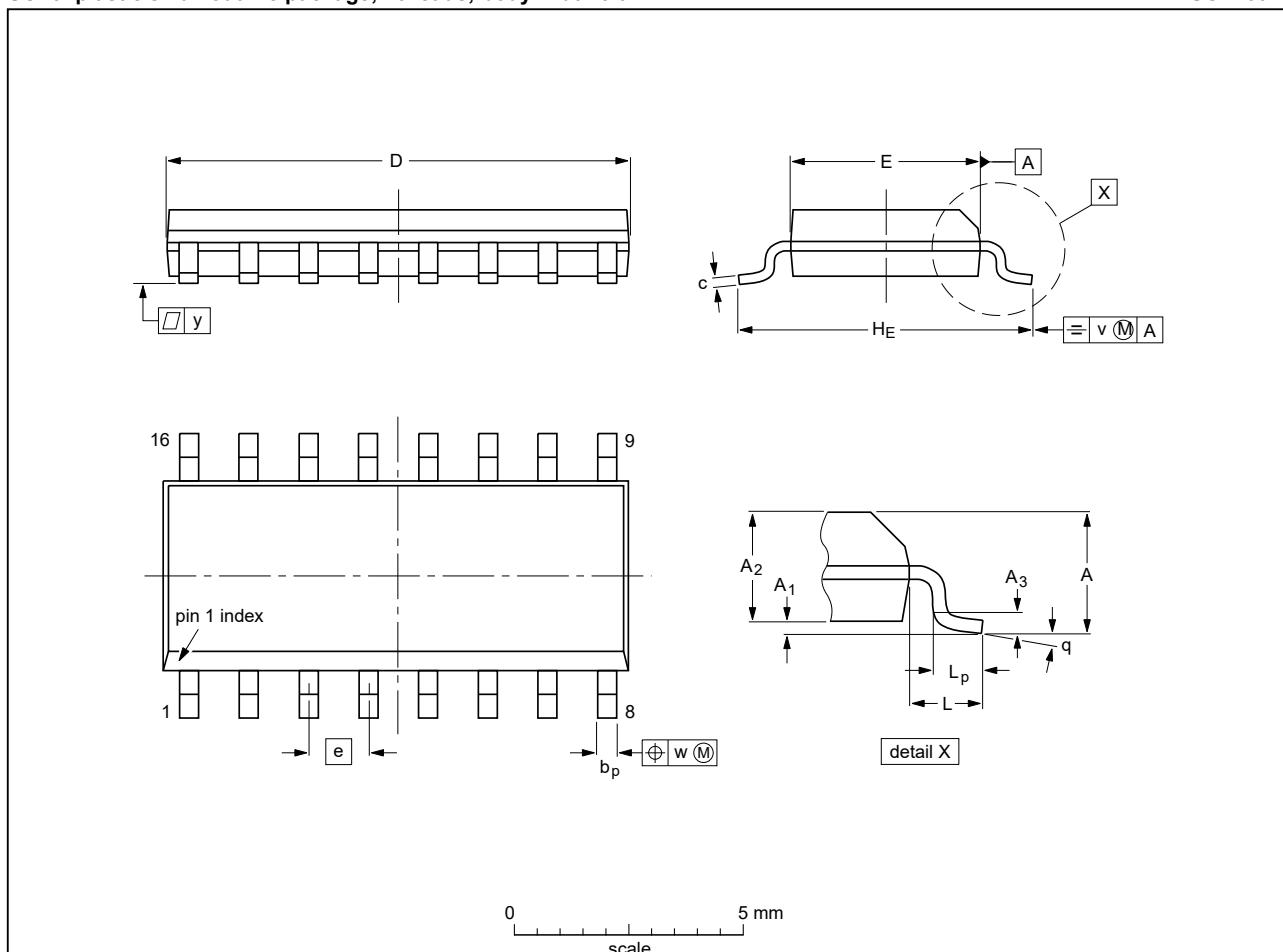
**Table 9. Test data**

Type	Input		Load		S1 position		
	$V_I$	$t_r, t_f$	$C_L$	$R_L$	$t_{PHL}, t_{PLH}$	$t_{PZH}, t_{PHZ}$	$t_{PZL}, t_{PLZ}$
74AHC595	$V_{CC}$	$\leq 3.0 \text{ ns}$	15 pF, 50 pF	1 k $\Omega$	open	GND	$V_{CC}$
74AHCT595	3.0 V	$\leq 3.0 \text{ ns}$	15 pF, 50 pF	1 k $\Omega$	open	GND	$V_{CC}$

## 12. Package outline

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	A <sub>1</sub>	A <sub>2</sub>	A <sub>3</sub>	b <sub>p</sub>	c	D <sup>(1)</sup>	E <sup>(1)</sup>	e	H <sub>E</sub>	L	L <sub>p</sub>	v	w	y	θ
mm	max 1.75	0.25			0.51	0.25	10.0	4.0		6.2		1.27	0.2	0.25	0.1	8°
mm	nom			0.25					1.27		1.05					0°
mm	min 0.10	1.25		0.31	0.10	9.8	3.8		5.8		0.4					0°
inches	max 0.069	0.010		0.020	0.010	0.394	0.16		0.244		0.05					8°
inches	nom			0.01					0.05		0.041		0.008	0.01	0.004	
inches	min 0.004	0.049		0.012	0.004	0.386	0.15		0.228		0.016					0°

Note

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

sot109-1\_po

Outline version	References				European projection	Issue date
	IEC	JEDEC	JEITA			
SOT109-1		MS-012				03-02-19 23-10-27

Fig. 12. Package outline SOT109-1 (SO16)

TSSOP16: plastic thin shrink small outline package; 16 leads; body width 4.4 mm

SOT403-1

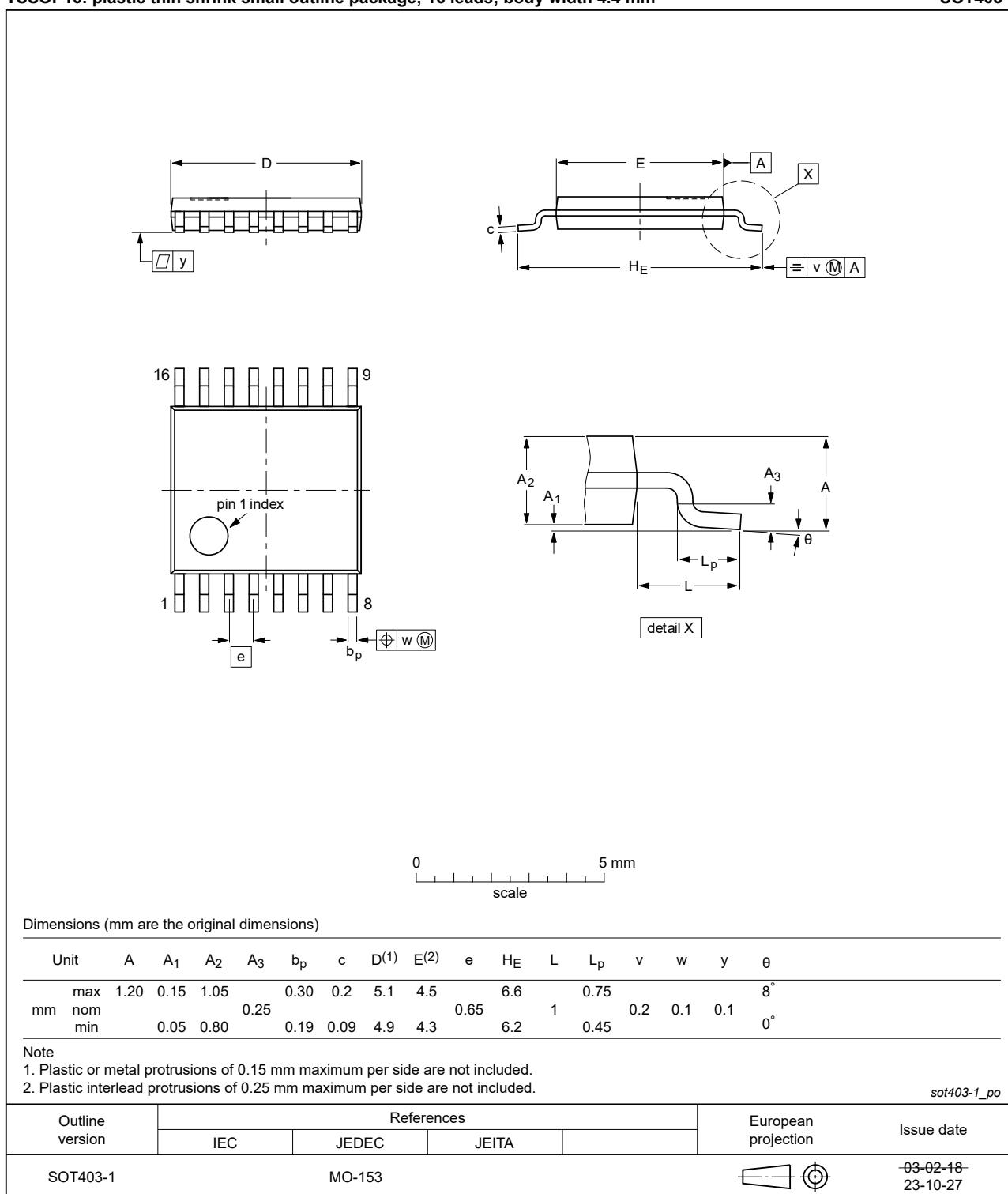


Fig. 13. Package outline SOT403-1 (TSSOP16)

DHVQFN16: plastic dual in-line compatible thermal enhanced very thin quad flat package; no leads;  
16 terminals; body 2.5 x 3.5 x 0.85 mm

SOT763-1

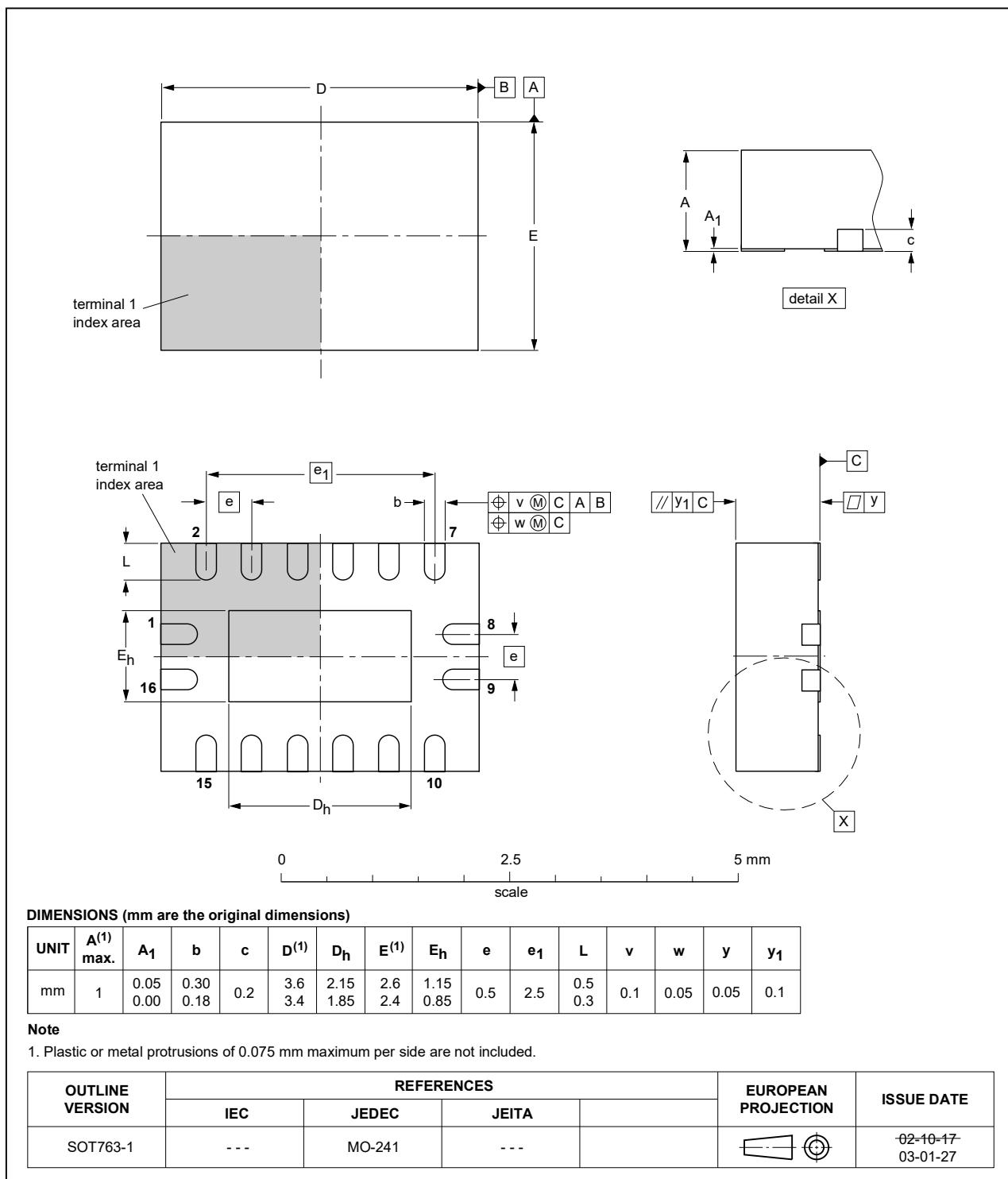


Fig. 14. Package outline SOT763-1 (DHVQFN16)

DHXQFN16: plastic, leadless dual in-line compatible thermal enhanced extreme thin quad flat package;  
no leads; 16 terminals; 0.4 mm pitch; body 2 mm x 2.4 mm x 0.48 mm

SOT8016-1

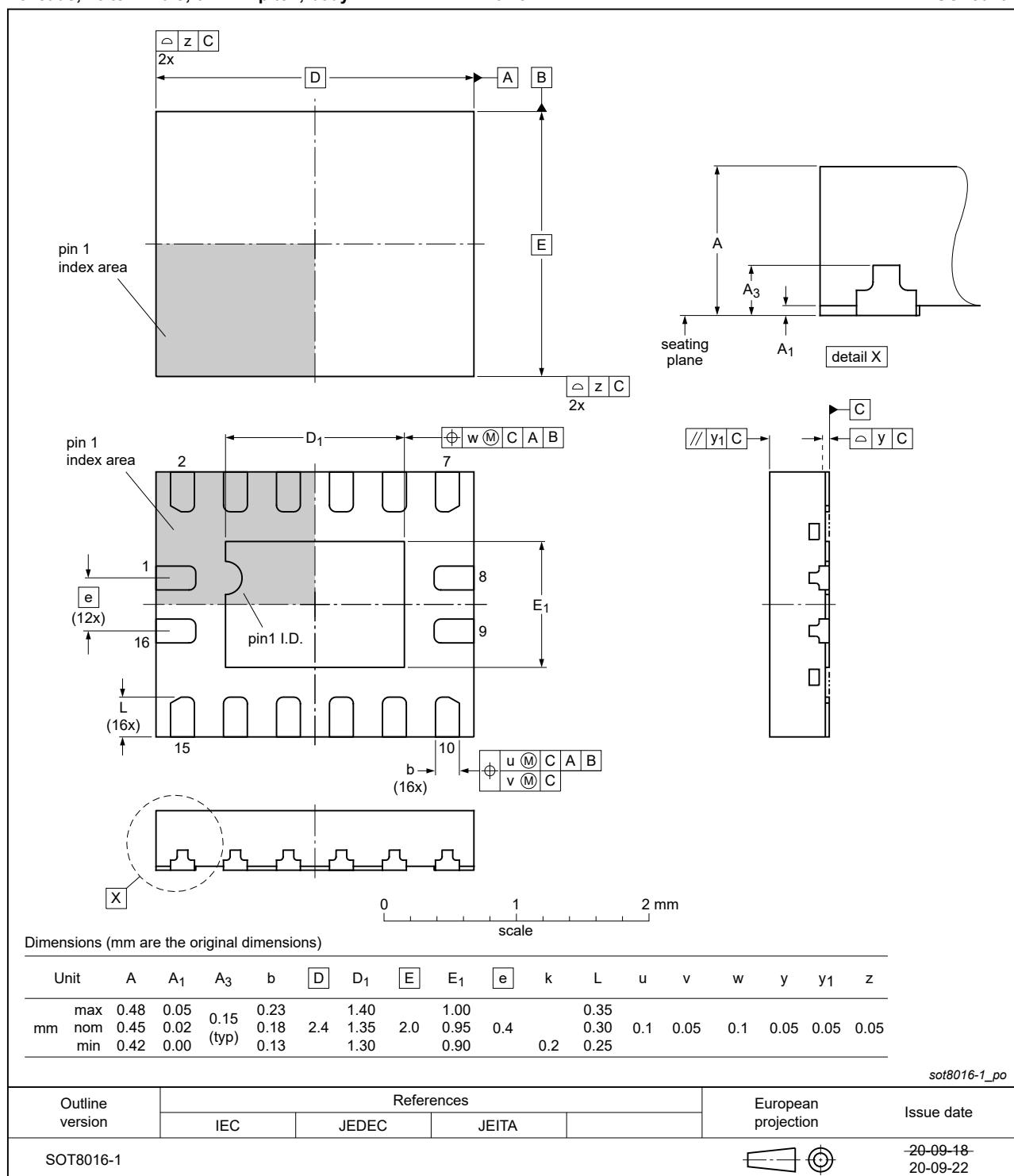


Fig. 15. Package outline SOT8016-1 (DHXQFN16)

## 13. Abbreviations

**Table 10. Abbreviations**

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

## 14. Revision history

**Table 11. Revision history**

Document ID	Release date	Data sheet status	Change notice	Supersedes
74AHC_AHCT595 v.9	20250509	Product data sheet	-	74AHC_AHCT595 v.8
Modifications:	<ul style="list-style-type: none"> <li>Type numbers 74AHC595BZ and 74AHCT595BZ (SOT8016-1/DHXQFN16) added.</li> </ul>			
74AHC_AHCT595 v.8	20240307	Product data sheet	-	74AHC_AHCT595 v.7
Modifications:	<ul style="list-style-type: none"> <li><a href="#">Fig. 12</a>, <a href="#">Fig. 13</a>: Aligned SO and TSSOP package outline drawings to JEDEC MS-012 and MO-153.</li> </ul>			
74AHC_AHCT595 v.7	20231006	Product data sheet	-	74AHC_AHCT595 v.6
Modifications:	<ul style="list-style-type: none"> <li><a href="#">Section 2</a>: ESD specification updated according to the latest JEDEC standard.</li> </ul>			
74AHC_AHCT595 v.6	20200526	Product data sheet	-	74AHC_AHCT595 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><a href="#">Section 1</a> and <a href="#">Section 2</a> updated.</li> <li><a href="#">Fig. 5</a>: Timing diagram updated with SHCP waveform.</li> <li><a href="#">Table 4</a>: Derating values for <math>P_{tot}</math> total power dissipation updated.</li> <li><a href="#">Table 7</a>: Propagation delay symbol and parameter corrected (Errata).</li> </ul>			
74AHC_AHCT595 v.5	20120704	Product data sheet	-	74AHC_AHCT595 v.4
Modifications:	<ul style="list-style-type: none"> <li>Added GND in the pin configuration drawing DHVQFN16 (errata)</li> </ul>			
74AHC_AHCT595 v.4	20090811	Product data sheet	-	74AHC_AHCT595 v.3
74AHC_AHCT595 v.3	20080425	Product data sheet	-	74AHC_AHCT595 v.2
74AHC_AHCT595 v.2	20060323	Product data sheet	-	74AHC_AHCT595 v.1
74AHC_AHCT595 v.1	20000315	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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