74AHC595; 74AHCT595

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

Rev. 7 — 6 October 2023 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
- 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
- Latch-up performance exceeds 100 mA per JESD 78 Class II Level A
- 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

4. Ordering information

Table 1. Ordering information

Type number	Package			
	Temperature range	Name	Description	Version
74AHC595D 74AHCT595D	-40 °C to +125 °C	SO16	plastic small outline package; 16 leads; body width 3.9 mm	SOT109-1
74AHC595PW 74AHCT595PW	-40 °C to +125 °C	TSSOP16	plastic thin shrink small outline package; 16 leads; body width 4.4 mm	SOT403-1
74AHC595BQ 74AHCT595BQ	-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	SOT763-1

5. Functional diagram

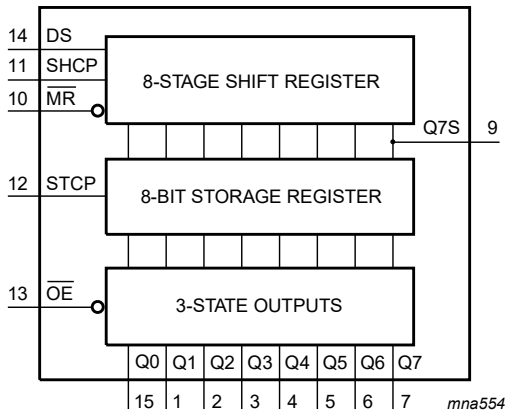


Fig. 1. Functional diagram

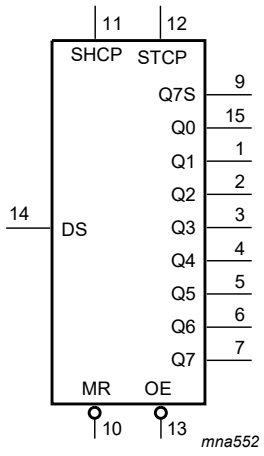


Fig. 2. Logic symbol

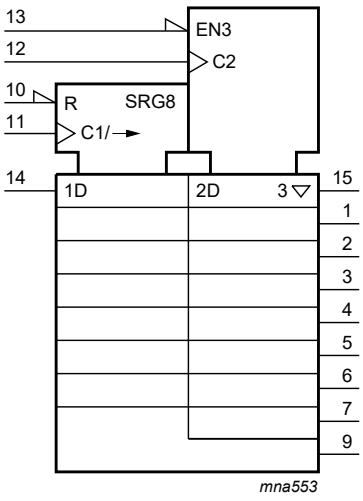


Fig. 3. IEC logic symbol

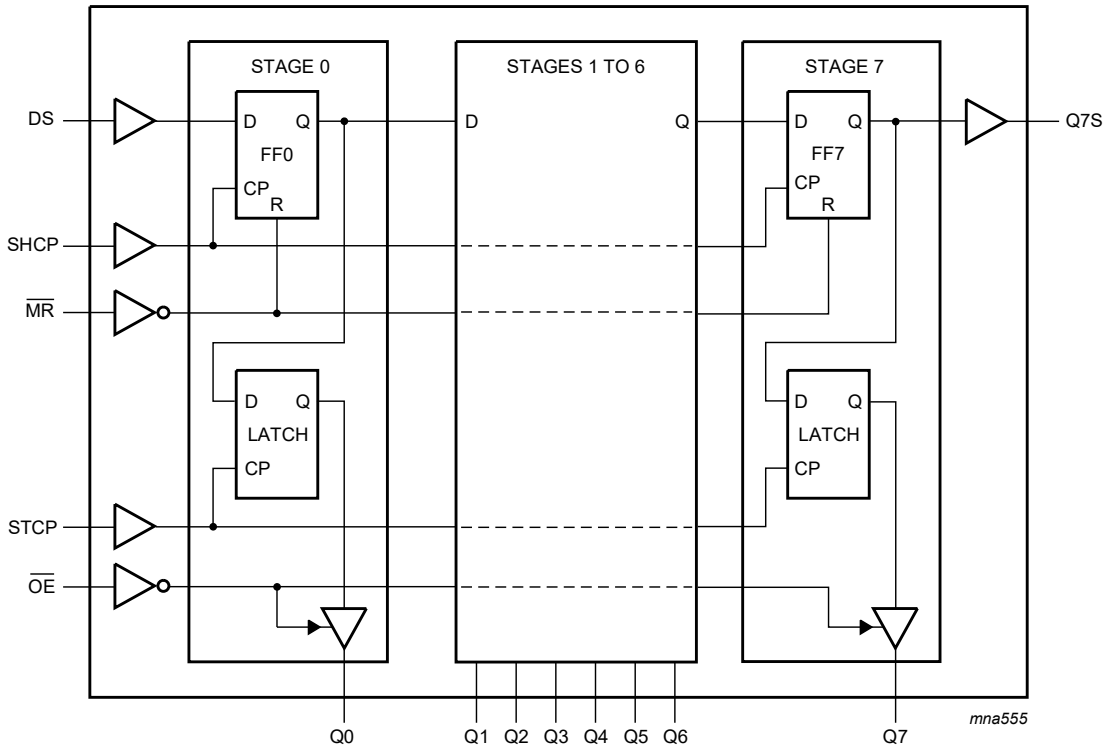
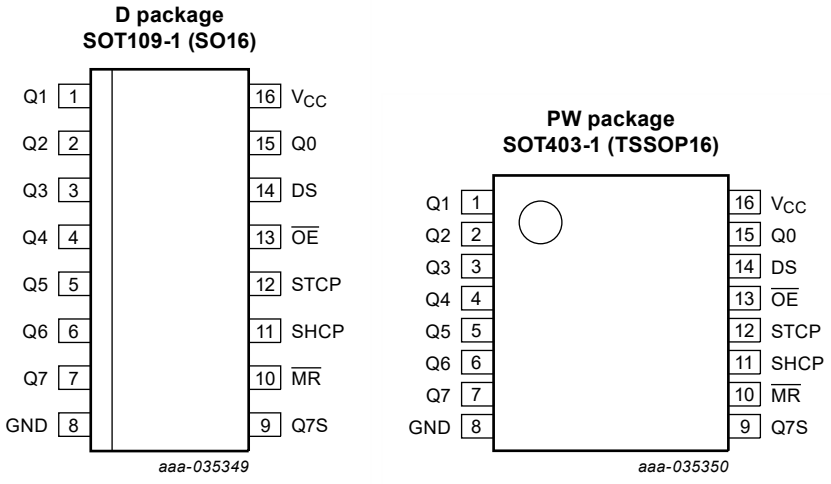


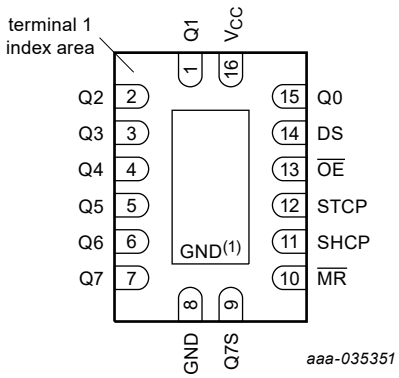
Fig. 4. Logic diagram

6. Pinning information

6.1. Pinning



BQ package
SOT763-1 (DHVQFN16)



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
$\overline{MR}$	10	master reset (active LOW)
SHCP	11	shift register clock input
STCP	12	storage register clock input
$\overline{OE}$	13	output enable input (active LOW)
DS	14	serial data input
V_{CC}	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	$\overline{OE}$	$\overline{MR}$	DS	Q7S	Qn	
X	X	L	L	X	L	NC	a LOW-level on $\overline{MR}$ 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

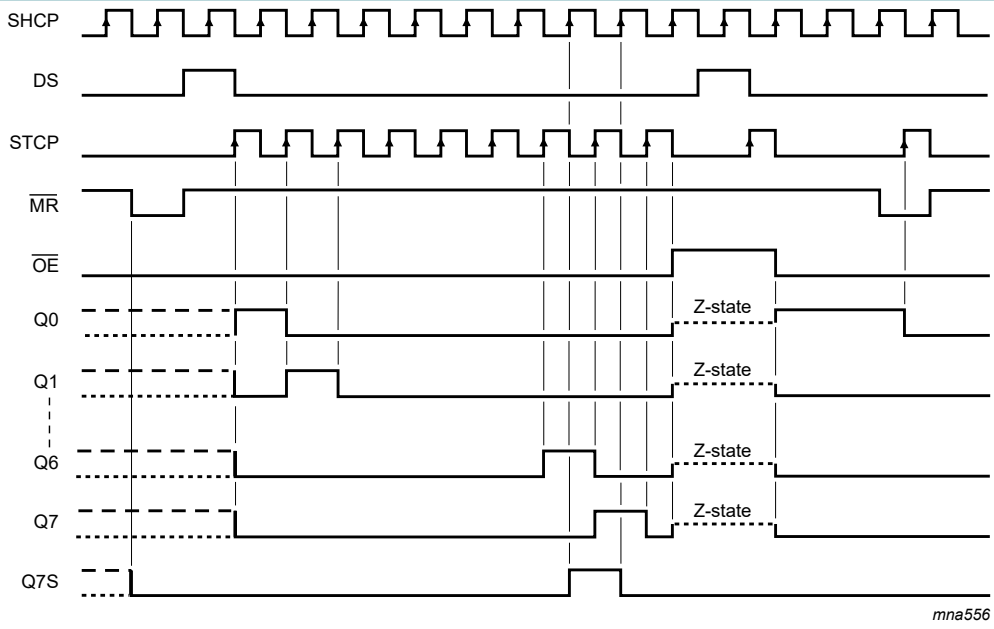


Fig. 5. Timing diagram

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_{CC}	supply voltage			-0.5	+7.0	V
V_I	input voltage			-0.5	+7.0	V
I_{IK}	input clamping current	V_I < -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]	-20	+20	mA
I_O	output current	V_O = -0.5 V to (V_{CC} + 0.5 V)		-25	+25	mA
I_{CC}	supply current			-	+75	mA
I_{GND}	ground current			-75	-	mA
T_{stg}	storage temperature			-65	+150	°C
P_{tot}	total power dissipation	T_{amb} = -40 °C to +125 °C	[2]	-	500	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_{tot} derates linearly with 12.4 mW/K above 110 °C.
For SOT403-1 (TSSOP16) package: P_{tot} derates linearly with 8.5 mW/K above 91 °C.
For SOT763-1 (DHVQFN16) package: P_{tot} 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_{CC}	supply voltage		2.0	5.0	5.5	4.5	5.0	5.5	V
V_I	input voltage		0	-	5.5	0	-	5.5	V
V_O	output voltage		0	-	V_{CC}	0	-	V_{CC}	V
T_{amb}	ambient temperature		-40	+25	+125	-40	+25	+125	°C
Δt/ΔV	input transition rise and fall rate	V_{CC} = 3.0 V to 3.6 V	-	-	100	-	-	-	ns/V
		V_{CC} = 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	
74AHC595										
V_{IH}	HIGH-level input voltage	V_{CC} = 2.0 V	1.5	-	-	1.5	-	1.5	-	V
		V_{CC} = 3.0 V	2.1	-	-	2.1	-	2.1	-	V
		V_{CC} = 5.5 V	3.85	-	-	3.85	-	3.85	-	V
V_{IL}	LOW-level input voltage	V_{CC} = 2.0 V	-	-	0.5	-	0.5	-	0.5	V
		V_{CC} = 3.0 V	-	-	0.9	-	0.9	-	0.9	V
		V_{CC} = 5.5 V	-	-	1.65	-	1.65	-	1.65	V

Symbol	Parameter	Conditions	25 °C			-40 °C to +85 °C		-40 °C to +125 °C		Unit
			Min	Typ	Max	Min	Max	Min	Max	
V_{OH}	HIGH-level output voltage	$V_I = V_{IH}$ or V_{IL}								
		I_O = -50 µA; V_{CC} = 2.0 V	1.9	2.0	-	1.9	-	1.9	-	V
		I_O = -50 µA; V_{CC} = 3.0 V	2.9	3.0	-	2.9	-	2.9	-	V
		I_O = -50 µA; V_{CC} = 4.5 V	4.4	4.5	-	4.4	-	4.4	-	V
		I_O = -4.0 mA; V_{CC} = 3.0 V	2.58	-	-	2.48	-	2.40	-	V
		I_O = -8.0 mA; V_{CC} = 4.5 V	3.94	-	-	3.80	-	3.70	-	V
V_{OL}	LOW-level output voltage	$V_I = V_{IH}$ or V_{IL}								
		I_O = 50 µA; V_{CC} = 2.0 V	-	0	0.1	-	0.1	-	0.1	V
		I_O = 50 µA; V_{CC} = 3.0 V	-	0	0.1	-	0.1	-	0.1	V
		I_O = 50 µA; V_{CC} = 4.5 V	-	0	0.1	-	0.1	-	0.1	V
		I_O = 4.0 mA; V_{CC} = 3.0 V	-	-	0.36	-	0.44	-	0.55	V
		I_O = 8.0 mA; V_{CC} = 4.5 V	-	-	0.36	-	0.44	-	0.55	V
I_I	input leakage current	V_I = 5.5 V or GND; V_{CC} = 0 V to 5.5 V	-	-	0.1	-	1.0	-	2.0	µA
I_{OZ}	OFF-state output current	$V_I = V_{IH}$ or V_{IL}; $V_O = V_{CC}$ or GND; V_{CC} = 5.5 V	-	-	±0.25	-	±2.5	-	±10	µA
I_{CC}	supply current	$V_I = V_{CC}$ or GND; I_O = 0 A; V_{CC} = 5.5 V	-	-	4.0	-	40	-	80	µA
C_I	input capacitance		-	3	10	-	10	-	10	pF
74AHCT595										
V_{IH}	HIGH-level input voltage	V_{CC} = 4.5 V to 5.5 V	2.0	-	-	2.0	-	2.0	-	V
V_{IL}	LOW-level input voltage	V_{CC} = 4.5 V to 5.5 V	-	-	0.8	-	0.8	-	0.8	V
V_{OH}	HIGH-level output voltage	$V_I = V_{IH}$ or V_{IL}; V_{CC} = 4.5 V								
		I_O = -50 µA	4.4	4.5	-	4.4	-	4.4	-	V
		I_O = -8.0 mA	3.94	-	-	3.80	-	3.70	-	V
V_{OL}	LOW-level output voltage	$V_I = V_{IH}$ or V_{IL}; V_{CC} = 4.5 V								
		I_O = 50 µA	-	0	0.1	-	0.1	-	0.1	V
		I_O = 8.0 mA	-	-	0.36	-	0.44	-	0.55	V
I_I	input leakage current	V_I = 5.5 V or GND; V_{CC} = 0 V to 5.5 V	-	-	0.1	-	1.0	-	2.0	µA
I_{OZ}	OFF-state output current	$V_I = V_{IH}$ or V_{IL}; $V_O = V_{CC}$ or GND; V_{CC} = 5.5 V	-	-	±0.25	-	±2.5	-	±10	µA
I_{CC}	supply current	$V_I = V_{CC}$ or GND; I_O = 0 A; V_{CC} = 5.5 V	-	-	4.0	-	40	-	80	µA
ΔI_{CC}	additional supply current	per input pin; $V_I = V_{CC}$ - 2.1 V; other inputs at V_{CC} or GND; I_O = 0 A; V_{CC} = 4.5 V to 5.5 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.

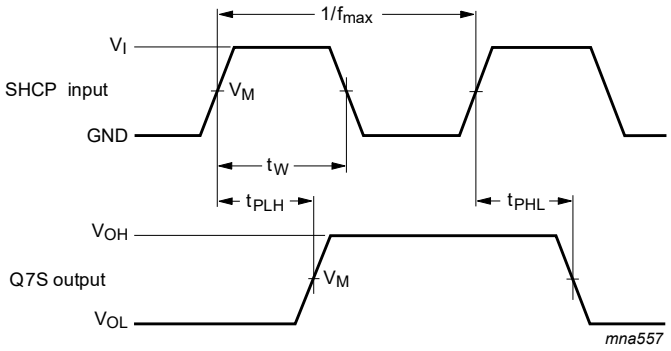
Symbol	Parameter	Conditions	25 °C			-40 °C to +85 °C		-40 °C to +125 °C		Unit
			Min	Typ [1]	Max	Min	Max	Min	Max	
74AHC595										
t_{pd}	propagation delay	SHCP to Q7S; see Fig. 6 [2]								
		V_{CC} = 3.0 V to 3.6 V; C_L = 15 pF	-	5.7	13.0	1.0	15.0	1.0	16.5	ns
		V_{CC} = 3.0 V to 3.6 V; C_L = 50 pF	-	7.7	16.5	1.0	18.5	1.0	20.1	ns
		V_{CC} = 4.5 V to 5.5 V; C_L = 15 pF	-	4.0	8.2	1.0	9.4	1.0	10.5	ns
		V_{CC} = 4.5 V to 5.5 V; C_L = 50 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 V to 3.6 V; C_L = 15 pF	-	5.9	11.9	1.0	13.5	1.0	15.0	ns
		V_{CC} = 3.0 V to 3.6 V; C_L = 50 pF	-	7.7	15.4	1.0	17.0	1.0	18.5	ns
		V_{CC} = 4.5 V to 5.5 V; C_L = 15 pF	-	4.2	7.4	1.0	8.5	1.0	9.5	ns
		V_{CC} = 4.5 V to 5.5 V; C_L = 50 pF	-	5.5	9.0	1.0	10.5	1.0	11.5	ns
t_{PHL}	HIGH to LOW propagation delay	$\overline{MR}$ to Q7S; see Fig. 9								
		V_{CC} = 3.0 V to 3.6 V; C_L = 15 pF	-	5.9	12.8	1.0	13.7	1.0	15.0	ns
		V_{CC} = 3.0 V to 3.6 V; C_L = 50 pF	-	7.4	16.3	1.0	17.2	1.0	18.7	ns
		V_{CC} = 4.5 V to 5.5 V; C_L = 15 pF	-	4.4	8.0	1.0	9.1	1.0	10.0	ns
		V_{CC} = 4.5 V to 5.5 V; C_L = 50 pF	-	5.6	10.0	1.0	11.1	1.0	12.0	ns
t_{en}	enable time	$\overline{OE}$ to Qn; see Fig. 10 [3]								
		V_{CC} = 3.0 V to 3.6 V; C_L = 15 pF	-	5.6	11.5	1.0	13.5	1.0	15.0	ns
		V_{CC} = 3.0 V to 3.6 V; C_L = 50 pF	-	7.4	15.0	1.0	17.0	1.0	18.5	ns
		V_{CC} = 4.5 V to 5.5 V; C_L = 15 pF	-	4.0	8.6	1.0	10.0	1.0	11.0	ns
		V_{CC} = 4.5 V to 5.5 V; C_L = 50 pF	-	5.3	10.6	1.0	12.0	1.0	13.0	ns
t_{dis}	disable time	$\overline{OE}$ to Qn; see Fig. 10 [4]								
		V_{CC} = 3.0 V to 3.6 V; C_L = 15 pF	-	5.4	11.0	1.0	13.0	1.0	14.5	ns
		V_{CC} = 3.0 V to 3.6 V; C_L = 50 pF	-	8.7	15.7	1.0	16.2	1.0	17.5	ns
		V_{CC} = 4.5 V to 5.5 V; C_L = 15 pF	-	3.8	8.0	1.0	9.5	1.0	10.5	ns
		V_{CC} = 4.5 V to 5.5 V; C_L = 50 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 V to 3.6 V	80	125	-	60	-	40	-	MHz
		V_{CC} = 4.5 V to 5.5 V	130	170	-	110	-	90	-	MHz
t_W	pulse width	SHCP HIGH or LOW; see Fig. 6								
		V_{CC} = 3.0 V to 3.6 V	5.0	-	-	5.0	-	5.0	-	ns
		V_{CC} = 4.5 V to 5.5 V	5.0	-	-	5.0	-	5.0	-	ns
		STCP HIGH or LOW; see Fig. 7								
		V_{CC} = 3.0 V to 3.6 V	5.0	-	-	5.0	-	5.0	-	ns
		V_{CC} = 4.5 V to 5.5 V	5.0	-	-	5.0	-	5.0	-	ns
		$\overline{MR}$ LOW; see Fig. 9								
		V_{CC} = 3.0 V to 3.6 V	5.0	-	-	5.0	-	5.0	-	ns
		V_{CC} = 4.5 V to 5.5 V	5.0	-	-	5.0	-	5.0	-	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_{su}	set-up time	DS to SHCP; see Fig. 8								
		V_{CC} = 3.0 V to 3.6 V	3.5	-	-	3.5	-	3.5	-	ns
		V_{CC} = 4.5 V to 5.5 V	3.0	-	-	3.0	-	3.0	-	ns
		SHCP to STCP; see Fig. 7								
		V_{CC} = 3.0 V to 3.6 V	8.5	-	-	8.5	-	8.5	-	ns
		V_{CC} = 4.5 V to 5.5 V	5.0	-	-	5.0	-	5.0	-	ns
t_h	hold time	DS to SHCP; see Fig. 8								
		V_{CC} = 3.0 V to 3.6 V	1.5	-	-	1.5	-	1.5	-	ns
		V_{CC} = 4.5 V to 5.5 V	2.0	-	-	2.0	-	2.0	-	ns
t_{rec}	recovery time	$\overline{MR}$ to SHCP; see Fig. 9								
		V_{CC} = 3.0 V to 3.6 V	3.0	-	-	3.0	-	3.0	-	ns
		V_{CC} = 4.5 V to 5.5 V	2.5	-	-	2.5	-	2.5	-	ns
C_{PD}	power dissipation capacitance	f_i = 1 MHz; V_I = GND to V_{CC} [5] [6]	-	180	-	-	-	-	-	pF
74AHCT595										
t_{pd}	propagation delay	SHCP to Q7S; see Fig. 6 [2]								
		V_{CC} = 4.5 V to 5.5 V; C_L = 15 pF	-	3.8	8.2	1.0	9.0	1.0	10.0	ns
		V_{CC} = 4.5 V to 5.5 V; C_L = 50 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 V to 5.5 V; C_L = 15 pF	-	4.0	7.4	1.0	8.5	1.0	9.5	ns
		V_{CC} = 4.5 V to 5.5 V; C_L = 50 pF	-	5.3	9.0	1.0	10.5	1.0	11.5	ns
t_{PHL}	HIGH to LOW propagation delay	$\overline{MR}$ to Q7S; see Fig. 9								
		V_{CC} = 4.5 V to 5.5 V; C_L = 15 pF	-	4.6	8.2	1.0	9.5	1.0	10.5	ns
		V_{CC} = 4.5 V to 5.5 V; C_L = 50 pF	-	5.8	10.5	1.0	11.5	1.0	12.5	ns
t_{en}	enable time	$\overline{OE}$ to Qn; see Fig. 10 [3]								
		V_{CC} = 4.5 V to 5.5 V; C_L = 15 pF	-	4.8	9.0	1.0	11.0	1.0	12.0	ns
		V_{CC} = 4.5 V to 5.5 V; C_L = 50 pF	-	6.2	11.6	1.0	13.0	1.0	14.5	ns
t_{dis}	disable time	$\overline{OE}$ to Qn; see Fig. 10 [4]								
		V_{CC} = 4.5 V to 5.5 V; C_L = 15 pF	-	3.6	6.9	1.0	8.0	1.0	9.0	ns
		V_{CC} = 4.5 V to 5.5 V; C_L = 50 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 V to 5.5 V; see Fig. 6 and Fig. 7	130	170	-	110	-	90	-	MHz
t_W	pulse width	SHCP HIGH or LOW; V_{CC} = 4.5 V to 5.5 V; see Fig. 6	5.0	-	-	5.0	-	5.0	-	ns
		STCP HIGH or LOW; V_{CC} = 4.5 V to 5.5 V; see Fig. 7	5.0	-	-	5.0	-	5.0	-	ns
		$\overline{MR}$ LOW; V_{CC} = 4.5 V to 5.5 V; see Fig. 9	5.0	-	-	5.0	-	5.0	-	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_{su}	set-up time	DS to SHCP; V_{CC} = 4.5 V to 5.5 V; see Fig. 8	3.0	-	-	3.0	-	3.0	-	ns
		SHCP to STCP; V_{CC} = 4.5 V to 5.5 V; see Fig. 7	5.0	-	-	5.0	-	5.0	-	ns
t_h	hold time	DS to SHCP; V_{CC} = 4.5 V to 5.5 V; see Fig. 8	2.0	-	-	2.0	-	2.0	-	ns
t_{rec}	recovery time	$\overline{MR}$ to SHCP; V_{CC} = 4.5 V to 5.5 V; see Fig. 9	3.0	-	-	3.0	-	3.0	-	ns
C_{PD}	power dissipation capacitance	f_i = 1 MHz; V_I = GND to V_{CC} [5] [6]	-	190	-	-	-	-	-	pF

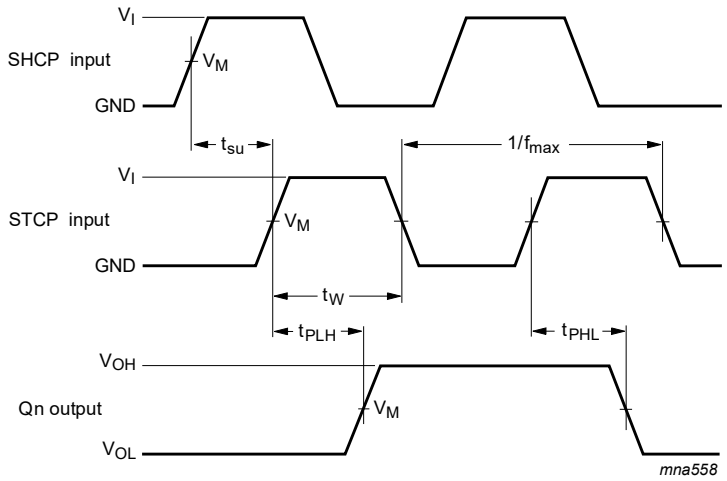
[1] Typical values are measured at nominal supply voltage.
[2] t_{pd} is the same as t_{PHL} and t_{PLH}.
[3] t_{en} is the same as t_{PZL} and t_{PZH}.
[4] t_{dis} is the same as t_{PLZ} and t_{PHZ}.
[5] C_{PD} is used to determine the dynamic power dissipation (P_D in µW).
$P_D = C_{PD} \times V_{CC}^2 \times f_i + \Sigma(C_L \times V_{CC}^2 \times f_o)$ where:
f_i = input frequency in MHz;
f_o = output frequency in MHz;
$\Sigma(C_L \times V_{CC}^2 \times f_o)$ = 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.

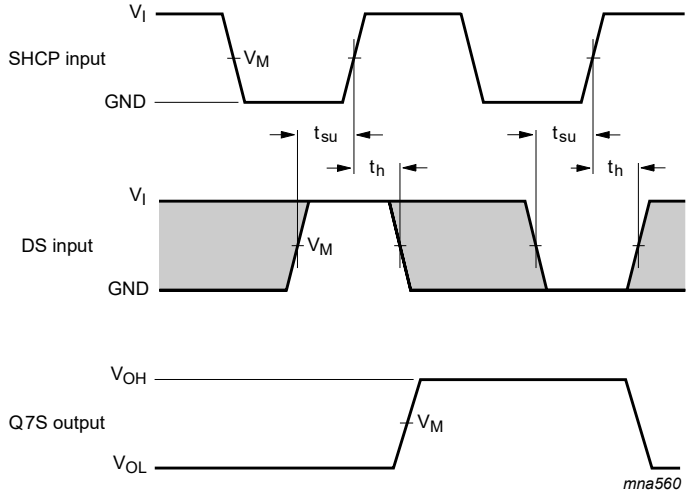
Fig. 6. Shift clock pulse, maximum frequency and input to output propagation delays



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

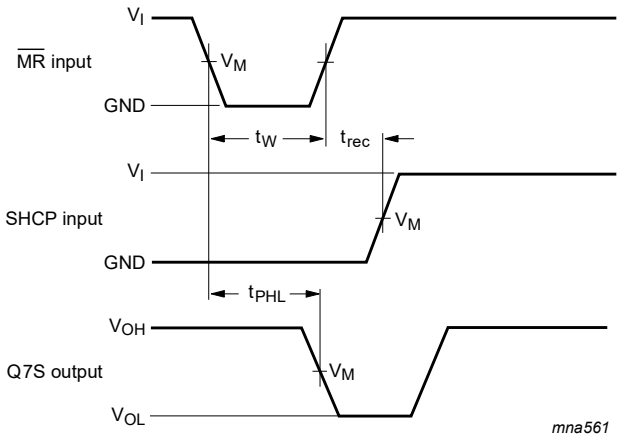


Measurement points are given in Table 8.

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

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

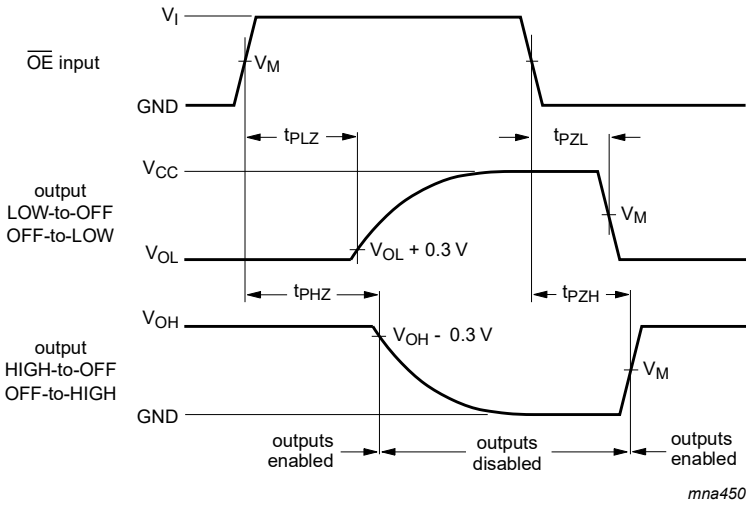
Fig. 8. Data set-up and hold times



Measurement points are given in Table 8.

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

Fig. 9. Master reset to output propagation delays



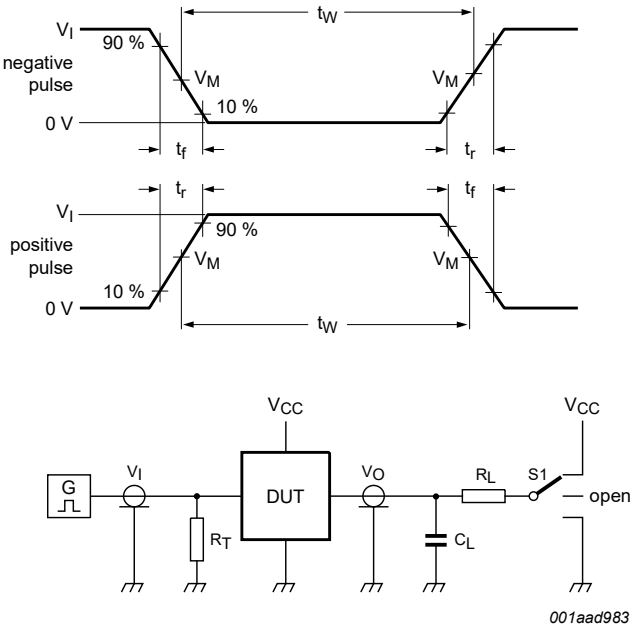
Measurement points are given in Table 8.

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

Fig. 10. Enable and disable times

Table 8. Measurement points

Type	Input	Output
	V_M	V_M
74AHC595	0.5 × V_{CC}	0.5 × V_{CC}
74AHCT595	1.5 V	0.5 × V_{CC}



Test data is given in Table 9.

Definitions for 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.

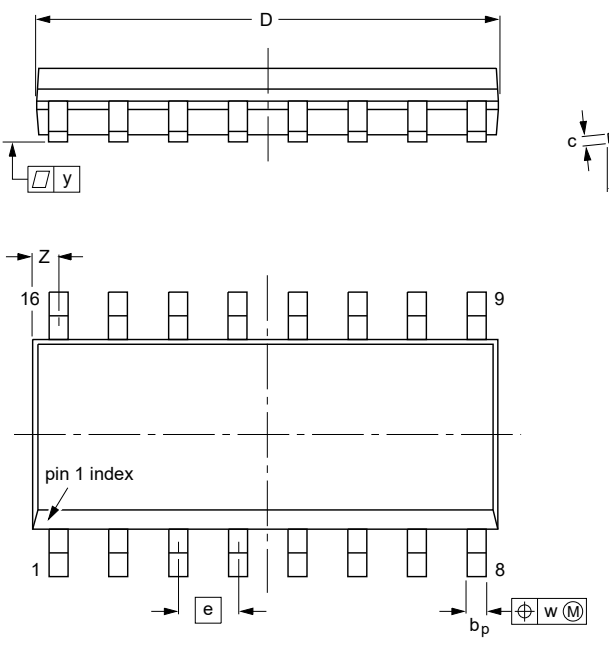
Fig. 11. Test circuit for measuring switching times

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}	≤ 3.0 ns	15 pF, 50 pF	1 kΩ	open	GND	V_{CC}
74AHCT595	3.0 V	≤ 3.0 ns	15 pF, 50 pF	1 kΩ	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 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° 0°
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	

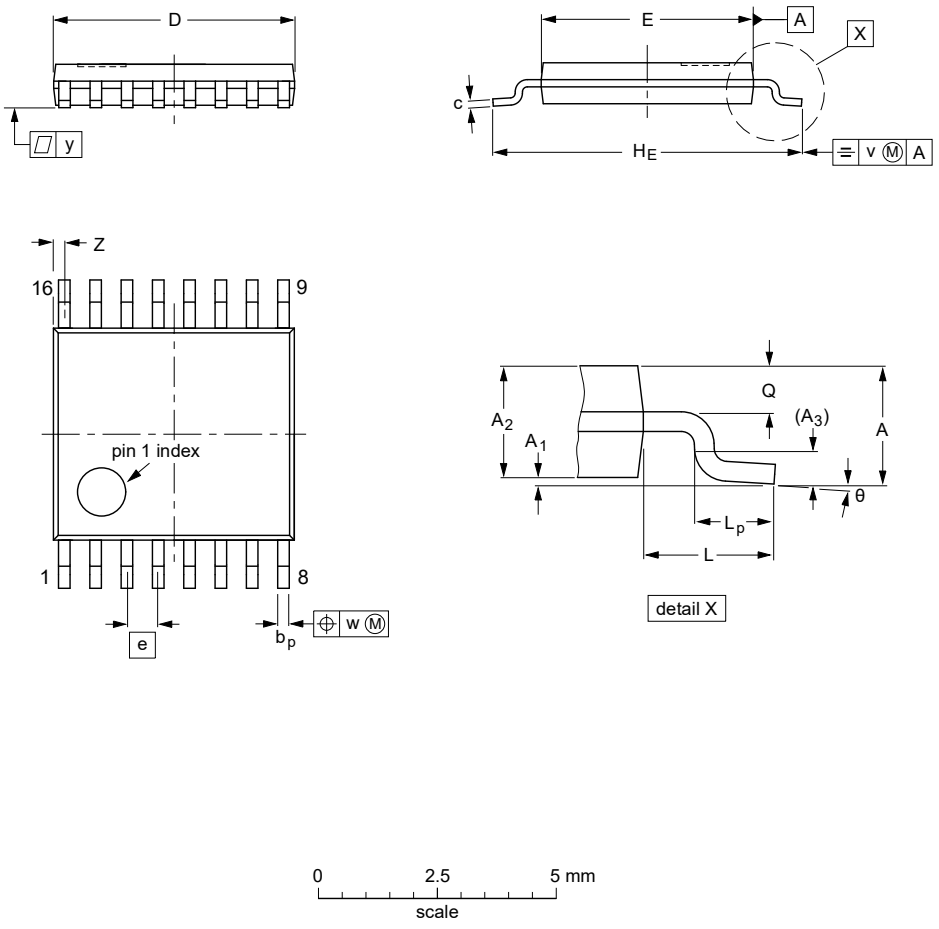
Note

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. 12. Package outline SOT109-1 (SO16)

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° 0°

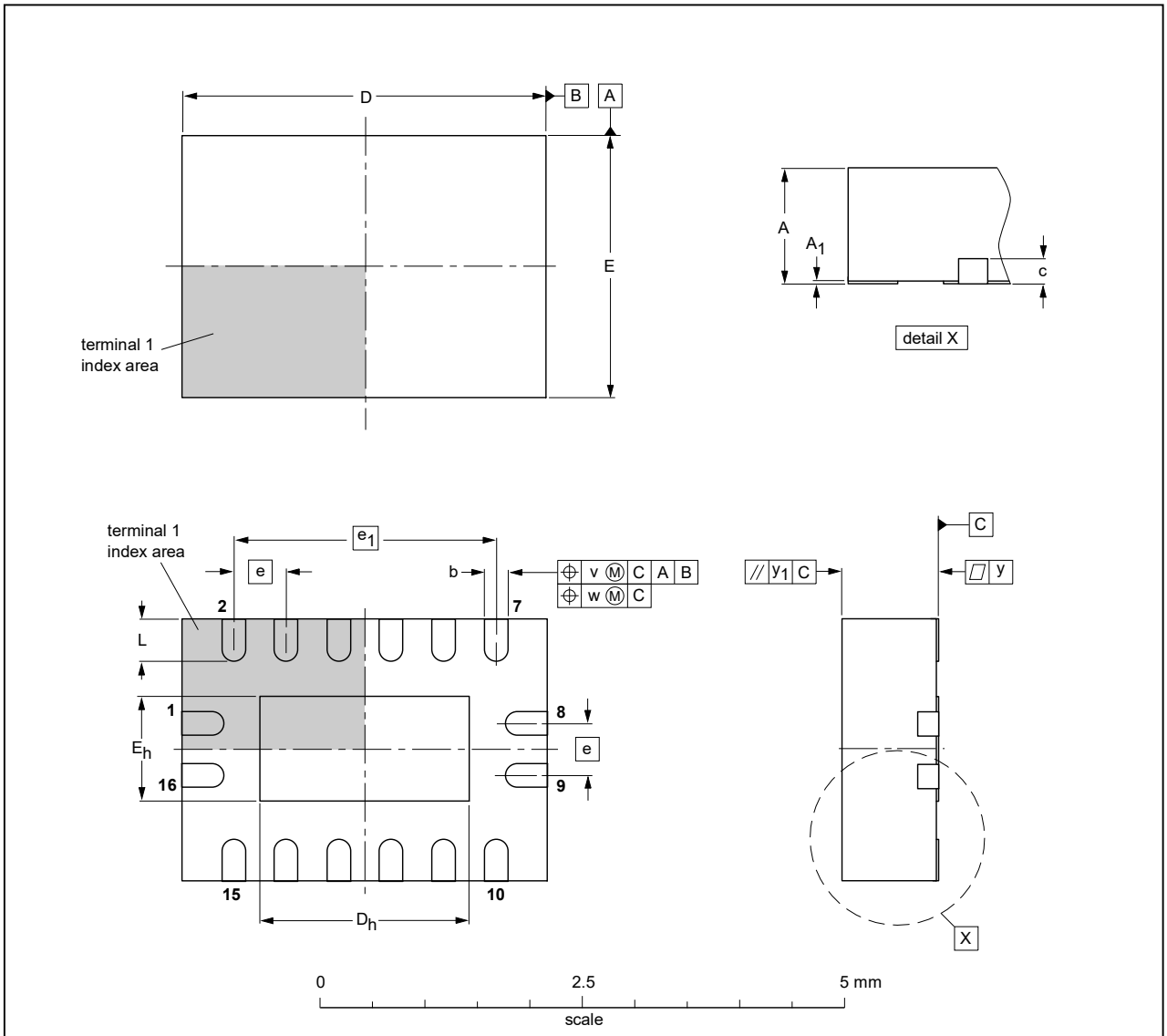
Notes

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. 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**



DIMENSIONS (mm are the original dimensions)

UNIT	$A^{(1)}$ max.	A_1	b	c	$D^{(1)}$	D_h	$E^{(1)}$	E_h	e	e_1	L	v	w	y	y_1
mm	1	0.05 0.00	0.30 0.18	0.2	3.6 3.4	2.15 1.85	2.6 2.4	1.15 0.85	0.5	2.5	0.5 0.3	0.1	0.05	0.05	0.1

Note

1. Plastic or metal protrusions of 0.075 mm maximum per side are not included.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT763-1	- - -	MO-241	- - -			~~02-10-17~~ 03-01-27

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

13. Abbreviations

Table 10. Abbreviations

Acronym	Description
CDM	Charged Device Model
CMOS	Complementary Metal-Oxide Semiconductor
ESD	ElectroStatic Discharge
HBM	Human Body Model
TTL	Transistor-Transistor Logic

14. Revision history

Table 11. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
74AHC_AHCT595 v.7	20231006	Product data sheet	-	74AHC_AHCT595 v.6
Modifications:	• Section 2: ESD specification updated according to the latest JEDEC standard.			
74AHC_AHCT595 v.6	20200526	Product data sheet	-	74AHC_AHCT595 v.5
Modifications:	• The format of this data sheet has been redesigned to comply with the identity guidelines of Nexperia. • Legal texts have been adapted to the new company name where appropriate. • Section 1 and Section 2 updated. • Fig. 5: Timing diagram updated with SHCP waveform. • Table 4: Derating values for P_{tot} total power dissipation updated. • Table 7: Propagation delay symbol and parameter corrected (Errata).			
74AHC_AHCT595 v.5	20120704	Product data sheet	-	74AHC_AHCT595 v.4
Modifications:	• Added GND in the pin configuration drawing DHVQFN16 (errata)			
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.

[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".
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