



**THE DATASHEET OF  
74AHCT595PW,118**



# 74AHC595; 74AHCT595

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

Rev. 5 — 4 July 2012

Product data sheet

### 1. General description

---

The 74AHC595; 74AHCT595 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 74AHC595; 74AHCT595 are 8-stage serial shift registers with a storage register and 3-state outputs. The registers have separate clocks.

Data is shifted on the positive-going transitions of the shift register clock input (SHCP). The data in each register is transferred to the storage register on a positive-going transition of the storage register clock input (STCP). If both clocks are connected together, the shift register will always be one clock pulse ahead of the storage register.

The shift register has a serial input (DS) and a serial standard output (Q7S) for cascading. It is also provided with asynchronous reset (active LOW) for all 8 shift register stages. The storage register has 8 parallel 3-state bus driver outputs. Data in the storage register appears at the output whenever the output enable input ( $\overline{OE}$ ) is LOW.

### 2. Features and benefits

---

- Balanced propagation delays
- All inputs have Schmitt-trigger action
- Inputs accept voltages higher than  $V_{CC}$
- Input levels:
  - ◆ The 74AHC595 operates with CMOS input levels
  - ◆ The 74AHCT595 operates with TTL input levels
- ESD protection:
  - ◆ HBM JESD22-A114F exceeds 2000 V
  - ◆ MM JESD22-A115-A exceeds 200 V
  - ◆ CDM JESD22-C101E exceeds 1000 V
- Multiple package options
- Specified from  $-40\text{ }^{\circ}\text{C}$  to  $+85\text{ }^{\circ}\text{C}$  and from  $-40\text{ }^{\circ}\text{C}$  to  $+125\text{ }^{\circ}\text{C}$

### 3. Applications

---

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

## 4. Ordering information

Table 1. Ordering information

Type number	Package			Version
	Temperature range	Name	Description	
<b>74AHC595</b>				
74AHC595D	−40 °C to +125 °C	SO16	plastic small outline package; 16 leads; body width 3.9 mm	SOT109-1
74AHC595PW	−40 °C to +125 °C	TSSOP16	plastic thin shrink small outline package; 16 leads; body width 4.4 mm	SOT403-1
74AHC595BQ	−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
<b>74AHCT595</b>				
74AHCT595D	−40 °C to +125 °C	SO16	plastic small outline package; 16 leads; body width 3.9 mm	SOT109-1
74AHCT595PW	−40 °C to +125 °C	TSSOP16	plastic thin shrink small outline package; 16 leads; body width 4.4 mm	SOT403-1
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

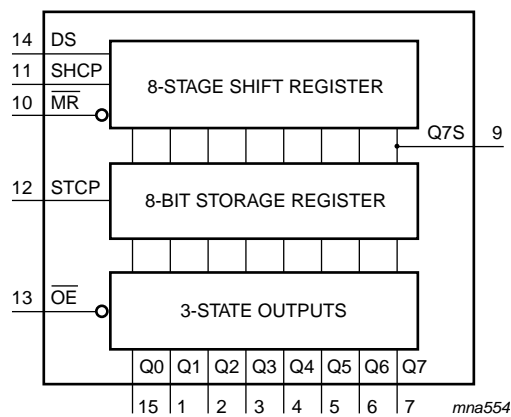


Fig 1. Functional diagram

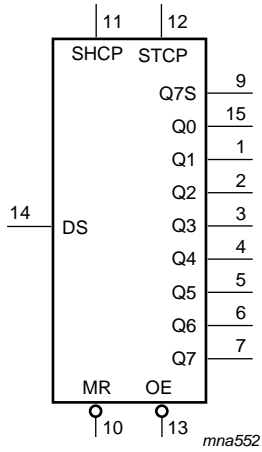


Fig 2. Logic symbol

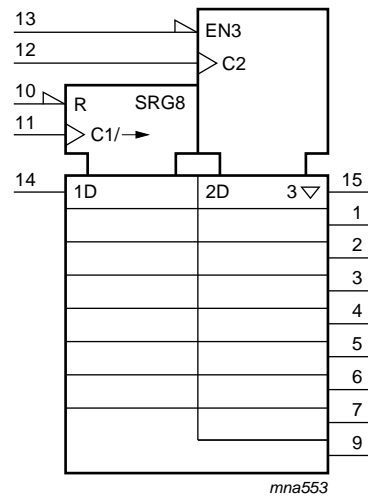


Fig 3. IEC logic symbol

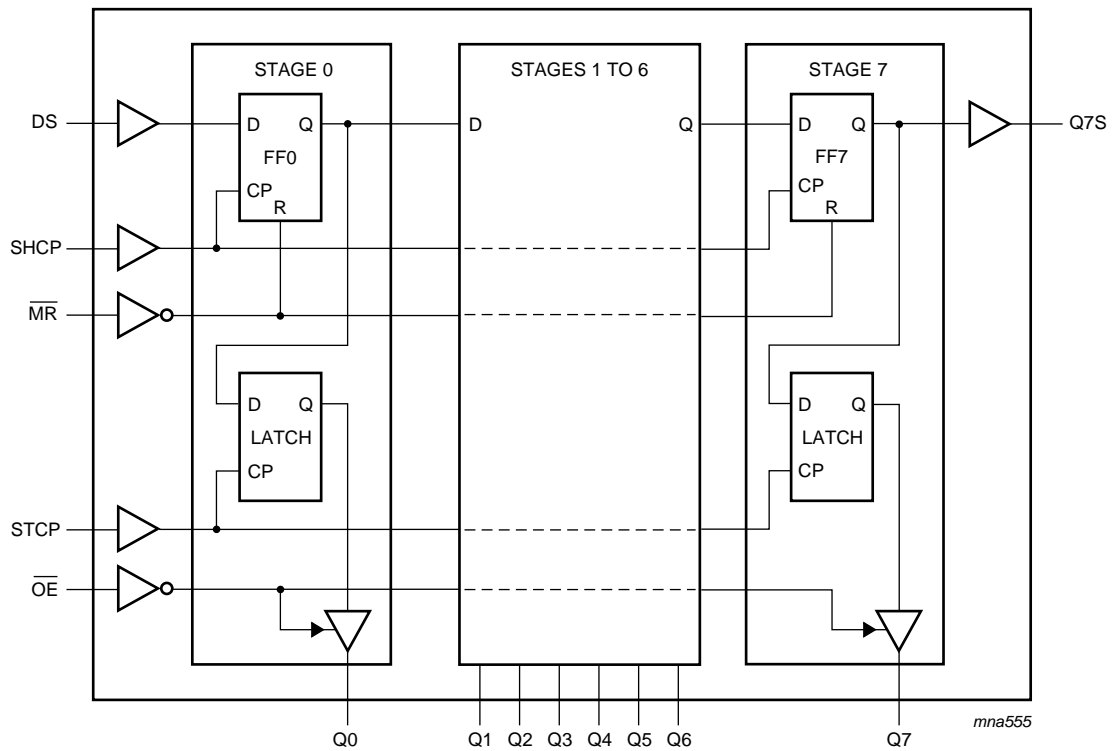
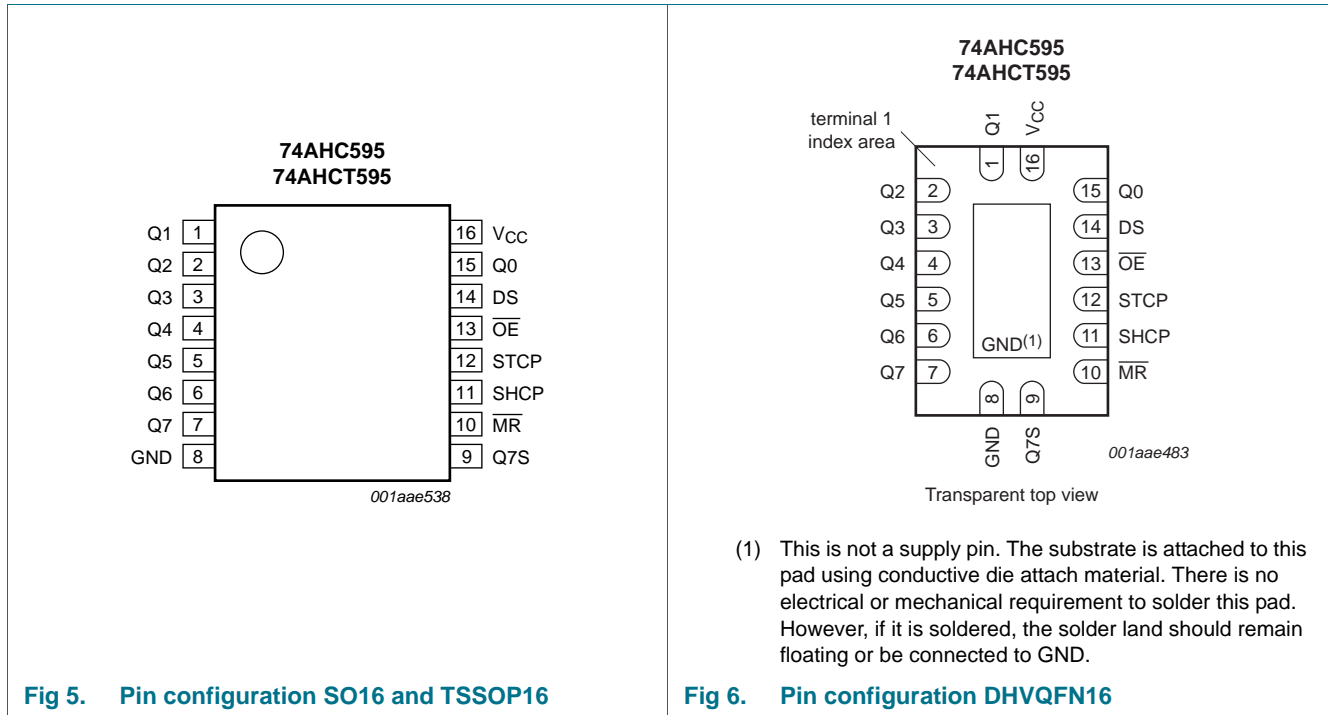


Fig 4. Logic diagram

## 6. Pinning information

### 6.1 Pinning



### 6.2 Pin description

**Table 2. Pin description**

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

## 7. Functional description

Table 3. Function table<sup>[1]</sup>

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

- [1] H = HIGH voltage state;  
 L = LOW voltage state;  
 ↑ = LOW-to-HIGH transition;  
 X = don't care;  
 NC = no change;  
 Z = high-impedance OFF-state.

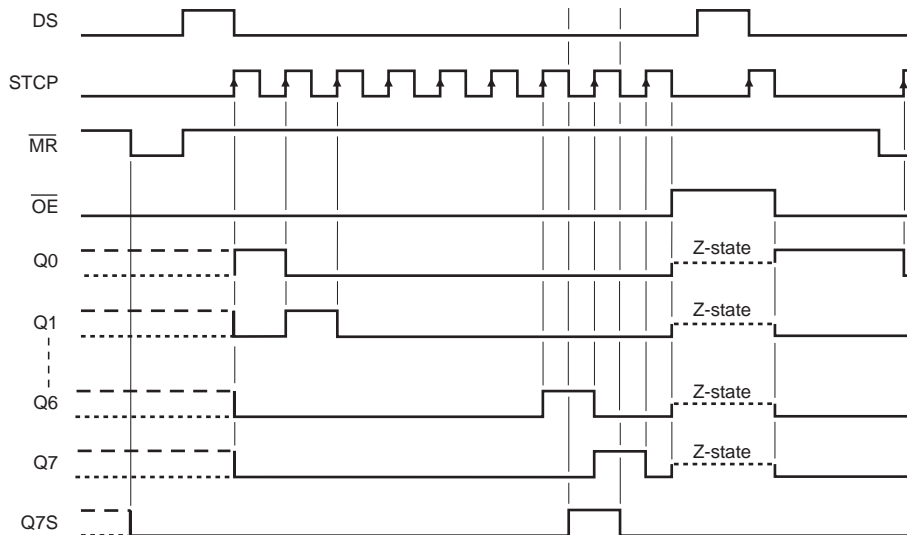


Fig 7. Timing diagram

## 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 SO16 packages: above 70 °C the value of  $P_{tot}$  derates linearly at 8 mW/K.

For TSSOP16 packages: above 60 °C the value of  $P_{tot}$  derates linearly at 5.5 mW/K.

For DHVQFN16 packages: above 60 °C the value of  $P_{tot}$  derates linearly at 4.5 mW/K.

## 9. Recommended operating conditions

**Table 5. Operating conditions**

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>74AHC595</b>						
$V_{CC}$	supply voltage		2.0	5.0	5.5	V
$V_I$	input voltage		0	-	5.5	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	$V_{CC} = 3.0$ V to 3.6 V	-	-	100	ns/V
		$V_{CC} = 4.5$ V to 5.5 V	-	-	20	ns/V
<b>74AHCT595</b>						
$V_{CC}$	supply voltage		4.5	5.0	5.5	V
$V_I$	input voltage		0	-	5.5	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	$V_{CC} = 4.5$ V to 5.5 V	-	-	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
<b>74AHCT595</b>										
V <sub>IH</sub>	HIGH-level input voltage	V <sub>CC</sub> = 4.5 V to 5.5 V	2.0	-	-	2.0	-	2.0	-	V
V <sub>IL</sub>	LOW-level input voltage	V <sub>CC</sub> = 4.5 V to 5.5 V	-	-	0.8	-	0.8	-	0.8	V
V <sub>OH</sub>	HIGH-level output voltage	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> ; V <sub>CC</sub> = 4.5 V								
		I <sub>O</sub> = -50 μA	4.4	4.5	-	4.4	-	4.4	-	V
		I <sub>O</sub> = -8.0 mA	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> ; V <sub>CC</sub> = 4.5 V								
		I <sub>O</sub> = 50 μA	-	0	0.1	-	0.1	-	0.1	V
		I <sub>O</sub> = 8.0 mA	-	-	0.36	-	0.44	-	0.55	V

**Table 6.** Static characteristics ...continued

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	
$I_I$	input leakage current	$V_I = 5.5 \text{ V}$ or GND; $V_{CC} = 0 \text{ V}$ to 5.5 V	-	-	0.1	-	1.0	-	2.0	$\mu\text{A}$
$I_{OZ}$	OFF-state output current	$V_I = V_{IH}$ or $V_{IL}$ ; $V_O = V_{CC}$ or GND per input pin; other inputs at $V_{CC}$ or GND; $I_O = 0 \text{ A}$ ; $V_{CC} = 5.5 \text{ V}$	-	-	$\pm 0.25$	-	$\pm 2.5$	-	$\pm 10$	$\mu\text{A}$
$I_{CC}$	supply current	$V_I = V_{CC}$ 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 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 [Figure 13](#).

Symbol	Parameter	Conditions	25 °C			–40 °C to +85 °C		–40 °C to +125 °C		Unit		
			Min	Typ <sup>[1]</sup>	Max	Min	Max	Min	Max			
<b>74AHC595</b>												
t <sub>pd</sub>	propagation delay	SHCP to Q7S; see <a href="#">Figure 8</a> <sup>[2]</sup>										
		V <sub>CC</sub> = 3.0 V to 3.6 V										
		C <sub>L</sub> = 15 pF	-	5.7	13.0	1.0	15.0	1.0	16.5	ns		
		C <sub>L</sub> = 50 pF	-	7.7	16.5	1.0	18.5	1.0	20.1	ns		
		V <sub>CC</sub> = 4.5 V to 5.5 V										
		C <sub>L</sub> = 15 pF	-	4.0	8.2	1.0	9.4	1.0	10.5	ns		
		C <sub>L</sub> = 50 pF	-	5.4	10.0	1.0	11.4	1.0	12.5	ns		
		STCP to Qn; see <a href="#">Figure 9</a> <sup>[2]</sup>										
		V <sub>CC</sub> = 3.0 V to 3.6 V										
		C <sub>L</sub> = 15 pF	-	5.9	11.9	1.0	13.5	1.0	15.0	ns		
		C <sub>L</sub> = 50 pF	-	7.7	15.4	1.0	17.0	1.0	18.5	ns		
		V <sub>CC</sub> = 4.5 V to 5.5 V										
		C <sub>L</sub> = 15 pF	-	4.2	7.4	1.0	8.5	1.0	9.5	ns		
		C <sub>L</sub> = 50 pF	-	5.5	9.0	1.0	10.5	1.0	11.5	ns		
		t <sub>en</sub>	enable time	MR to Q7S; see <a href="#">Figure 11</a> <sup>[3]</sup>								
				V <sub>CC</sub> = 3.0 V to 3.6 V								
C <sub>L</sub> = 15 pF	-			5.9	12.8	1.0	13.7	1.0	15.0	ns		
C <sub>L</sub> = 50 pF	-			7.4	16.3	1.0	17.2	1.0	18.7	ns		
V <sub>CC</sub> = 4.5 V to 5.5 V												
C <sub>L</sub> = 15 pF	-			4.4	8.0	1.0	9.1	1.0	10.0	ns		
C <sub>L</sub> = 50 pF	-			5.6	10.0	1.0	11.1	1.0	12.0	ns		
t <sub>dis</sub>	disable time			OE to Qn; see <a href="#">Figure 12</a> <sup>[4]</sup>								
		V <sub>CC</sub> = 3.0 V to 3.6 V										
		C <sub>L</sub> = 15 pF	-	5.6	11.5	1.0	13.5	1.0	15.0	ns		
		C <sub>L</sub> = 50 pF	-	7.4	15.0	1.0	17.0	1.0	18.5	ns		
		V <sub>CC</sub> = 4.5 V to 5.5 V										
		C <sub>L</sub> = 15 pF	-	4.0	8.6	1.0	10.0	1.0	11.0	ns		
		C <sub>L</sub> = 50 pF	-	5.3	10.6	1.0	12.0	1.0	13.0	ns		
		t <sub>dis</sub>	disable time	OE to Qn; see <a href="#">Figure 12</a> <sup>[5]</sup>								
V <sub>CC</sub> = 3.0 V to 3.6 V												
C <sub>L</sub> = 15 pF	-			5.4	11.0	1.0	13.0	1.0	14.5	ns		
C <sub>L</sub> = 50 pF	-			8.7	15.7	1.0	16.2	1.0	17.5	ns		
V <sub>CC</sub> = 4.5 V to 5.5 V												
C <sub>L</sub> = 15 pF	-			3.8	8.0	1.0	9.5	1.0	10.5	ns		
C <sub>L</sub> = 50 pF	-			5.8	10.3	1.0	11.0	1.0	12.0	ns		

**Table 7. Dynamic characteristics ...continued**Voltages are referenced to GND (ground = 0 V); for test circuit see [Figure 13](#).

Symbol	Parameter	Conditions	25 °C			–40 °C to +85 °C		–40 °C to +125 °C		Unit
			Min	Typ <sup>[1]</sup>	Max	Min	Max	Min	Max	
f <sub>max</sub>	maximum frequency	SHCP or STCP; see <a href="#">Figure 8</a> and <a href="#">9</a>								
		V <sub>CC</sub> = 3.0 V to 3.6 V	80	125	-	60	-	40	-	MHz
		V <sub>CC</sub> = 4.5 V to 5.5 V	130	170	-	110	-	90	-	MHz
t <sub>w</sub>	pulse width	SHCP HIGH or LOW; see <a href="#">Figure 8</a>								
		V <sub>CC</sub> = 3.0 V to 3.6 V	5.0	-	-	5.0	-	5.0	-	ns
		V <sub>CC</sub> = 4.5 V to 5.5 V	5.0	-	-	5.0	-	5.0	-	ns
		STCP HIGH or LOW; see <a href="#">Figure 9</a>								
		V <sub>CC</sub> = 3.0 V to 3.6 V	5.0	-	-	5.0	-	5.0	-	ns
		V <sub>CC</sub> = 4.5 V to 5.5 V	5.0	-	-	5.0	-	5.0	-	ns
		MR LOW; see <a href="#">Figure 11</a>								
t <sub>su</sub>	set-up time	DS to SHCP; see <a href="#">Figure 9</a>								
		V <sub>CC</sub> = 3.0 V to 3.6 V	3.5	-	-	3.5	-	3.5	-	ns
		V <sub>CC</sub> = 4.5 V to 5.5 V	3.0	-	-	3.0	-	3.0	-	ns
		SHCP to STCP; see <a href="#">Figure 10</a>								
		V <sub>CC</sub> = 3.0 V to 3.6 V	8.5	-	-	8.5	-	8.5	-	ns
t <sub>h</sub>	hold time	DS to SHCP; see <a href="#">Figure 10</a>								
		V <sub>CC</sub> = 3.0 V to 3.6 V	1.5	-	-	1.5	-	1.5	-	ns
		V <sub>CC</sub> = 4.5 V to 5.5 V	2.0	-	-	2.0	-	2.0	-	ns
t <sub>rec</sub>	recovery time	MR to SHCP; see <a href="#">Figure 11</a>								
		V <sub>CC</sub> = 3.0 V to 3.6 V	3.0	-	-	3.0	-	3.0	-	ns
		V <sub>CC</sub> = 4.5 V to 5.5 V	2.5	-	-	2.5	-	2.5	-	ns
C <sub>PD</sub>	power dissipation capacitance	f <sub>i</sub> = 1 MHz; V <sub>I</sub> = GND to V <sub>CC</sub> <a href="#">[6]</a> <a href="#">[7]</a>	-	180	-	-	-	-	-	pF

**74AHCT595; V<sub>CC</sub> = 4.5 V to 5.5 V**

t <sub>pd</sub>	propagation delay	SHCP to Q7S; see <a href="#">Figure 8</a> <a href="#">[2]</a>								
		C <sub>L</sub> = 15 pF	-	3.8	8.2	1.0	9.0	1.0	10.0	ns
		C <sub>L</sub> = 50 pF	-	5.2	10.0	1.0	11.0	1.0	12.0	ns
		STCP to Qn; see <a href="#">Figure 9</a> <a href="#">[2]</a>								
		C <sub>L</sub> = 15 pF	-	4.0	7.4	1.0	8.5	1.0	9.5	ns
		C <sub>L</sub> = 50 pF	-	5.3	9.0	1.0	10.5	1.0	11.5	ns
		MR to Q7S; see <a href="#">Figure 11</a> <a href="#">[3]</a>								
		C <sub>L</sub> = 15 pF	-	4.6	8.2	1.0	9.5	1.0	10.5	ns
		C <sub>L</sub> = 50 pF	-	5.8	10.5	1.0	11.5	1.0	12.5	ns

**Table 7. Dynamic characteristics ...continued**Voltages are referenced to GND (ground = 0 V); for test circuit see [Figure 13](#).

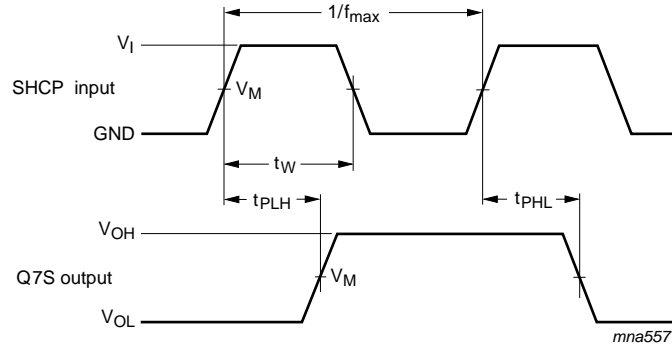
Symbol	Parameter	Conditions	25 °C			–40 °C to +85 °C		–40 °C to +125 °C		Unit
			Min	Typ <sup>[1]</sup>	Max	Min	Max	Min	Max	
t <sub>en</sub>	enable time	$\overline{OE}$ to Qn; see <a href="#">Figure 12</a>								
		C <sub>L</sub> = 15 pF	-	4.8	9.0	1.0	11.0	1.0	12.0	ns
		C <sub>L</sub> = 50 pF	-	6.2	11.6	1.0	13.0	1.0	14.5	ns
t <sub>dis</sub>	disable time	$\overline{OE}$ to Qn; see <a href="#">Figure 12</a>								
		C <sub>L</sub> = 15 pF	-	3.6	6.9	1.0	8.0	1.0	9.0	ns
		C <sub>L</sub> = 50 pF	-	5.8	10.3	1.0	11.0	1.0	12.0	ns
f <sub>max</sub>	maximum frequency	SHCP and STCP; see <a href="#">Figure 8</a> and <a href="#">9</a>	130	170	-	110	-	90	-	MHz
t <sub>W</sub>	pulse width	SHCP HIGH or LOW; see <a href="#">Figure 8</a>	5.0	-	-	5.0	-	5.0	-	ns
		STCP HIGH or LOW; see <a href="#">Figure 9</a>	5.0	-	-	5.0	-	5.0	-	ns
		$\overline{MR}$ LOW; see <a href="#">Figure 11</a>	5.0	-	-	5.0	-	5.0	-	ns
t <sub>su</sub>	set-up time	DS to SHCP; see <a href="#">Figure 9</a>	3.0	-	-	3.0	-	3.0	-	ns
		SHCP to STCP; see <a href="#">Figure 10</a>	5.0	-	-	5.0	-	5.0	-	ns
t <sub>h</sub>	hold time	DS to SHCP; see <a href="#">Figure 10</a>	2.0	-	-	2.0	-	2.0	-	ns
t <sub>rec</sub>	recovery time	$\overline{MR}$ to SHCP; see <a href="#">Figure 11</a>	3.0	-	-	3.0	-	3.0	-	ns
C <sub>PD</sub>	power dissipation capacitance	f <sub>i</sub> = 1 MHz; V <sub>I</sub> = GND to V <sub>CC</sub>								
			[6]	-	190	-	-	-	-	pF
			[7]							

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

[2] t<sub>pd</sub> is the same as t<sub>PHL</sub> and t<sub>PLH</sub>.[3] t<sub>pd</sub> is the same as t<sub>PHL</sub> only.[4] t<sub>en</sub> is the same as t<sub>PZL</sub> and t<sub>PZH</sub>.[5] t<sub>dis</sub> is the same as t<sub>PLZ</sub> and t<sub>PHZ</sub>.[6] C<sub>PD</sub> is used to determine the dynamic power dissipation (P<sub>D</sub> in μW).P<sub>D</sub> = C<sub>PD</sub> × V<sub>CC</sub><sup>2</sup> × f<sub>i</sub> + Σ(C<sub>L</sub> × V<sub>CC</sub><sup>2</sup> × f<sub>o</sub>) where:f<sub>i</sub> = input frequency in MHz;f<sub>o</sub> = output frequency in MHz;Σ(C<sub>L</sub> × V<sub>CC</sub><sup>2</sup> × f<sub>o</sub>) = sum of outputs;C<sub>L</sub> = output load capacitance in pF;V<sub>CC</sub> = supply voltage in V.

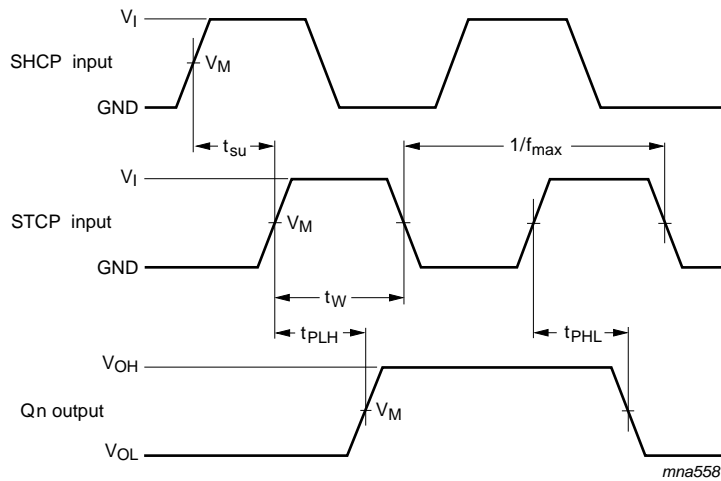
[7] All 9 outputs switching.

12. Waveforms



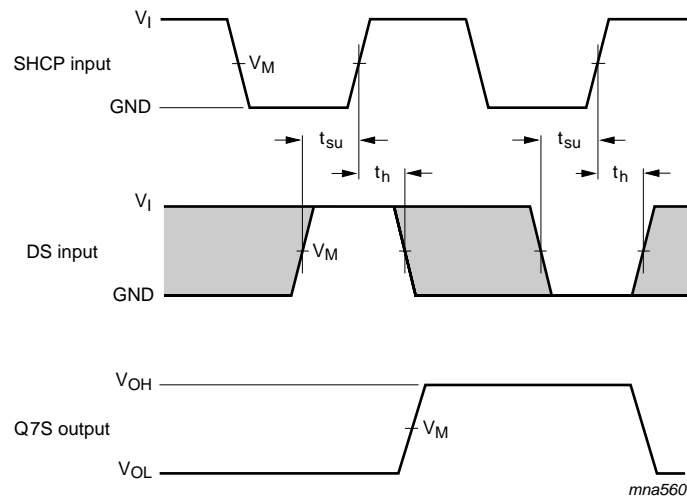
Measurement points are given in [Table 8](#).  
 VOL and VOH are typical output voltage levels that occur with the output load.

**Fig 8. Shift clock pulse, maximum frequency and input to output propagation delays**



Measurement points are given in [Table 8](#).  
 VOL and VOH are typical output voltage levels that occur with the output load.

**Fig 9. Storage clock to output propagation delays**

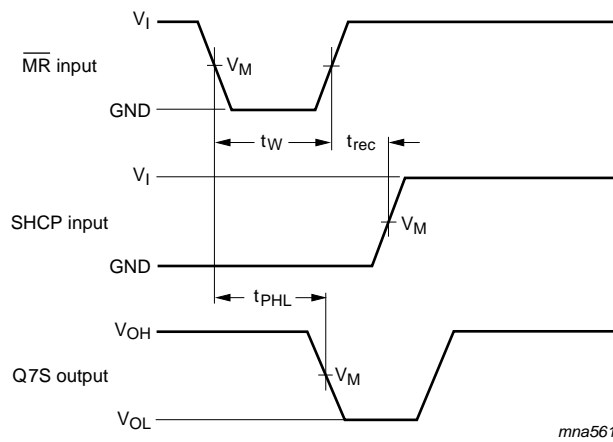


Measurement points are given in [Table 8](#).

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.

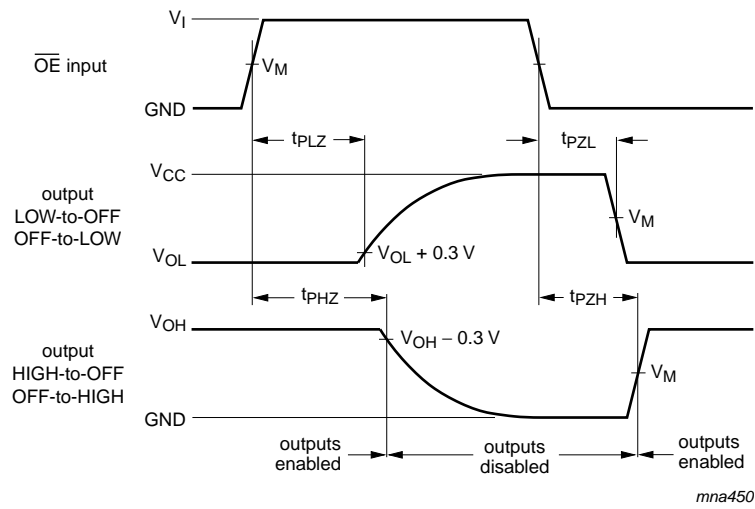
**Fig 10. Data set-up and hold times**



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

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

**Fig 11. Master reset to output propagation delays**

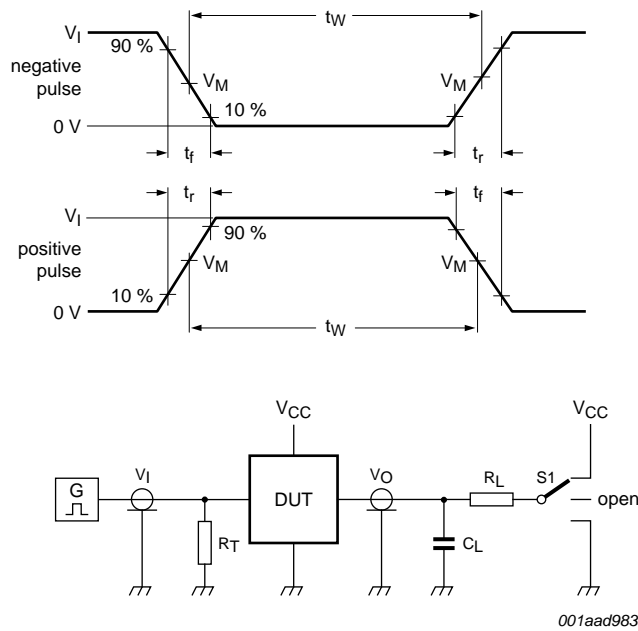


Measurement points are given in [Table 8](#).  
 V<sub>OL</sub> and V<sub>OH</sub> are typical output voltage levels that occur with the output load.

**Fig 12. Enable and disable times**

**Table 8. Measurement points**

Type	Input	Output
	V <sub>M</sub>	V <sub>M</sub>
74AHC595	0.5V <sub>CC</sub>	0.5V <sub>CC</sub>
74AHCT595	1.5 V	0.5V <sub>CC</sub>



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 13. Load circuitry for 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	$V_{CC}$	$\leq 3.0$ ns	15 pF, 50 pF	1 k $\Omega$	open	GND	$V_{CC}$
74AHCT595	3.0 V	$\leq 3.0$ ns	15 pF, 50 pF	1 k $\Omega$	open	GND	$V_{CC}$

## 13. Package outline

SO16: plastic small outline package; 16 leads; body width 3.9 mm

SOT109-1

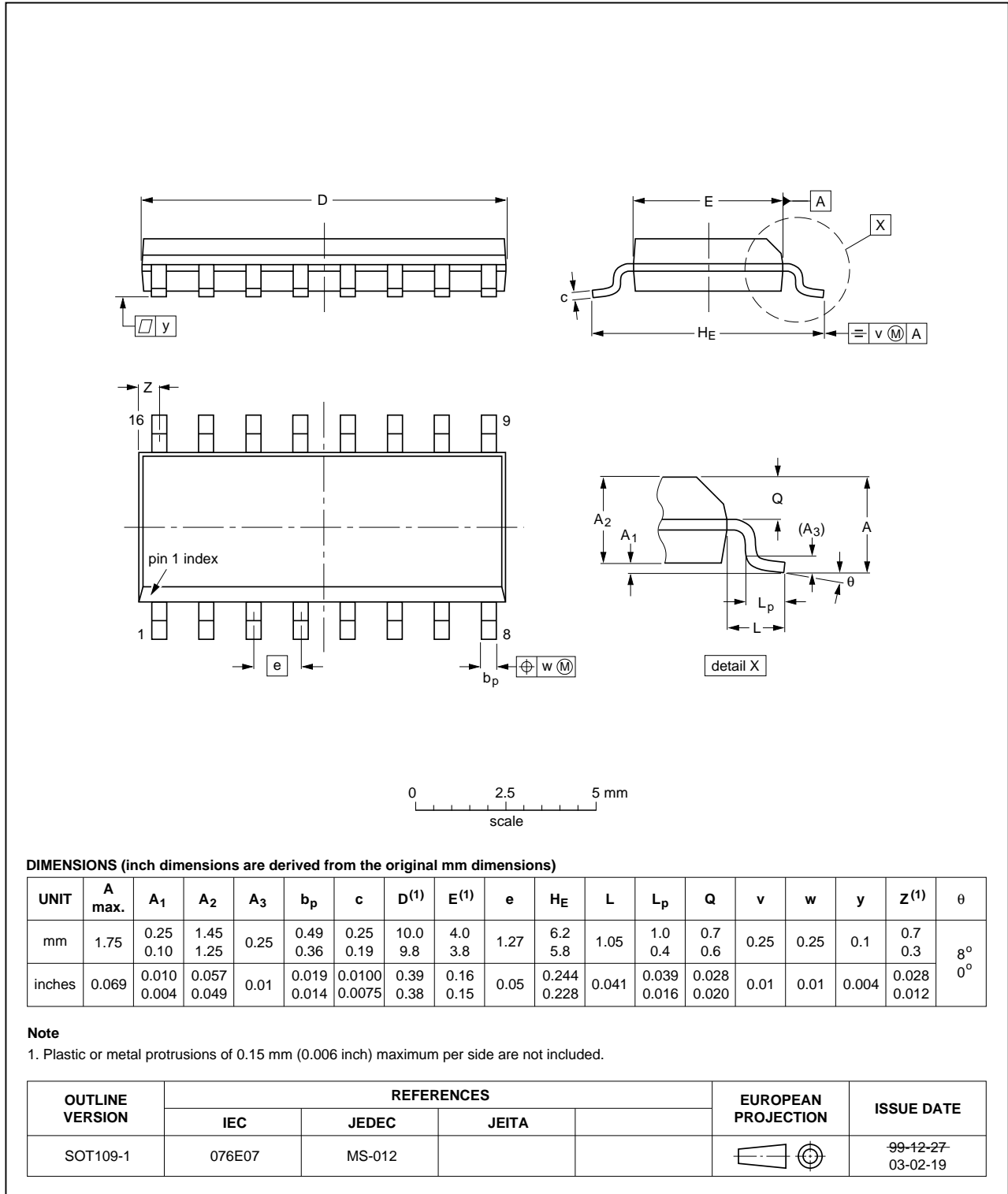


Fig 14. Package outline SOT109-1 (SO16)

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

SOT403-1

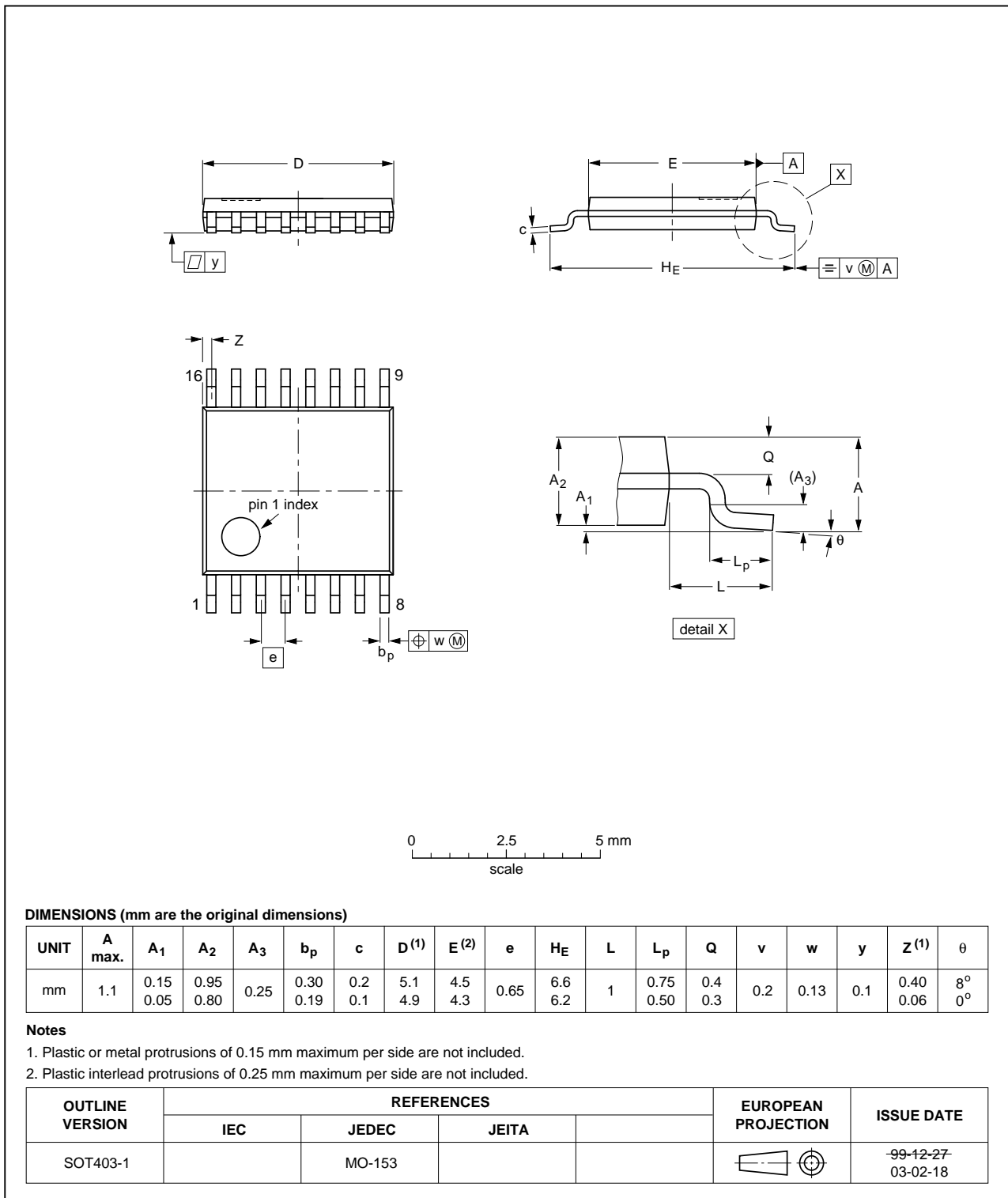


Fig 15. Package outline SOT403-1 (TSSOP16)

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

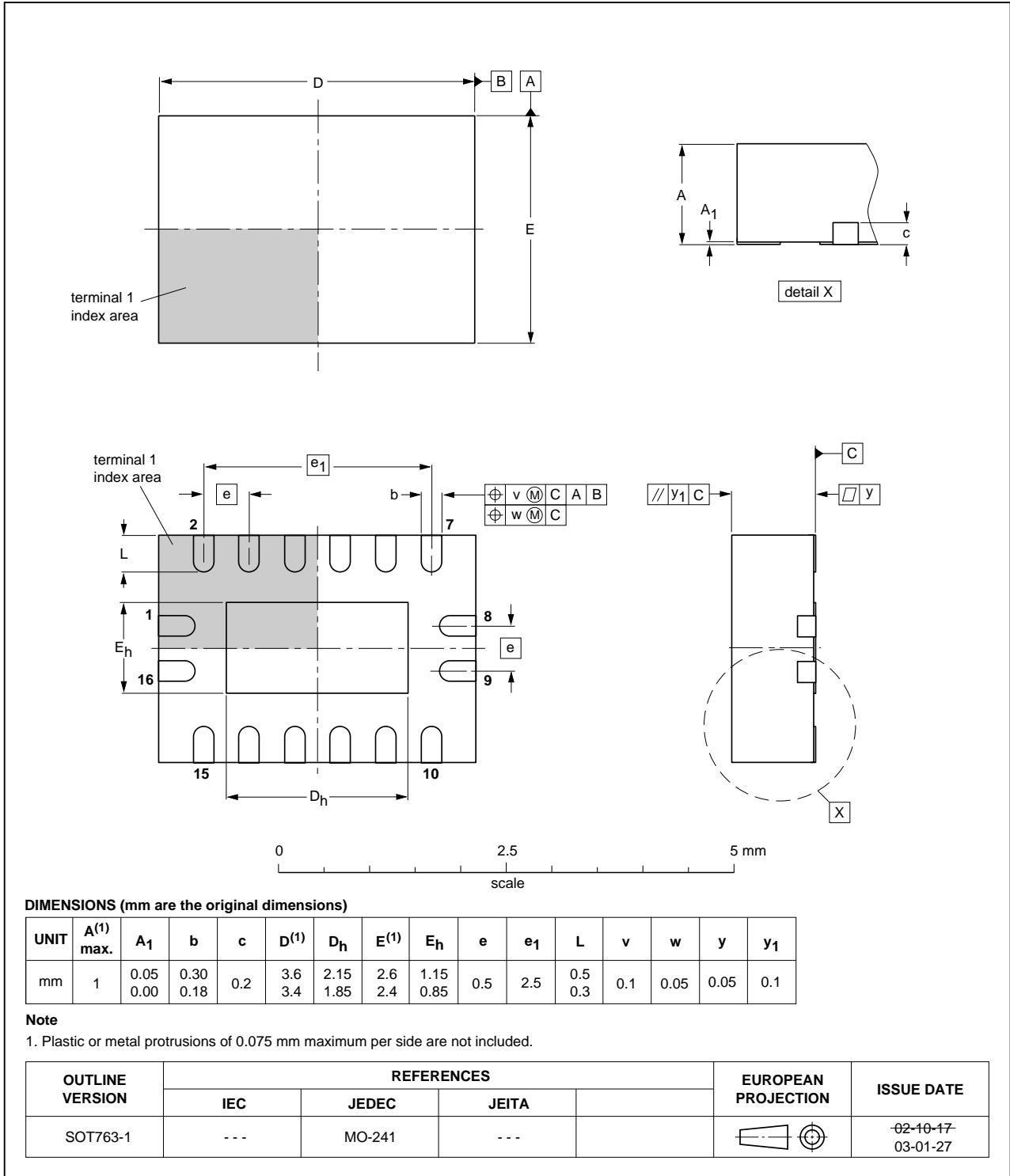


Fig 16. Package outline SOT763-1 (DHVQFN16)

## 14. Abbreviations

Table 10. Abbreviations

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

## 15. Revision history

Table 11. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
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	-	-

## 16. Legal information

### 16.1 Data sheet status

Document status <sup>[1][2]</sup>	Product status <sup>[3]</sup>	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.nexperia.com>.

### 16.2 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. Nexperia 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 Nexperia 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 Nexperia and its customer, unless Nexperia and customer have explicitly agreed otherwise in writing. In no event however, shall an agreement be valid in which the Nexperia product is deemed to offer functions and qualities beyond those described in the Product data sheet.

### 16.3 Disclaimers

**Limited warranty and liability** — Information in this document is believed to be accurate and reliable. However, Nexperia 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. Nexperia takes no responsibility for the content in this document if provided by an information source outside of Nexperia.

In no event shall Nexperia 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, Nexperia's 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 Nexperia.

**Right to make changes** — Nexperia 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** — Nexperia 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 a Nexperia product can reasonably be expected to result in personal injury, death or severe property or environmental damage. Nexperia and its suppliers accept no liability for inclusion and/or use of Nexperia 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. Nexperia 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 Nexperia products, and Nexperia accepts no liability for any assistance with applications or customer product design. It is customer's sole responsibility to determine whether the Nexperia 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.

Nexperia 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 Nexperia 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). Nexperia 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** — Nexperia products are sold subject to the general terms and conditions of commercial sale, as published at <http://www.nexperia.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. Nexperia hereby expressly objects to applying the customer's general terms and conditions with regard to the purchase of Nexperia 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 Nexperia 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. Nexperia 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 Nexperia's warranty of the product for such automotive applications, use and specifications, and (b) whenever customer uses the product for automotive applications beyond

Nexperia's specifications such use shall be solely at customer's own risk, and (c) customer fully indemnifies Nexperia for any liability, damages or failed product claims resulting from customer design and use of the product for automotive applications beyond Nexperia's standard warranty and Nexperia's product specifications.

**Translations** — A non-English (translated) version of a document is for reference only. The English version shall prevail in case of any discrepancy between the translated and English versions.

## 16.4 Trademarks

Notice: All referenced brands, product names, service names and trademarks are the property of their respective owners.

## 17. Contact information

For more information, please visit: <http://www.nexperia.com>

For sales office addresses, please send an email to: [salesaddresses@nexperia.com](mailto:salesaddresses@nexperia.com)



## 18. Contents

---

<b>1</b>	<b>General description</b> .....	<b>1</b>
<b>2</b>	<b>Features and benefits</b> .....	<b>1</b>
<b>3</b>	<b>Applications</b> .....	<b>1</b>
<b>4</b>	<b>Ordering information</b> .....	<b>2</b>
<b>5</b>	<b>Functional diagram</b> .....	<b>2</b>
<b>6</b>	<b>Pinning information</b> .....	<b>4</b>
6.1	Pinning .....	4
6.2	Pin description .....	4
<b>7</b>	<b>Functional description</b> .....	<b>5</b>
<b>8</b>	<b>Limiting values</b> .....	<b>6</b>
<b>9</b>	<b>Recommended operating conditions</b> .....	<b>6</b>
<b>10</b>	<b>Static characteristics</b> .....	<b>7</b>
<b>11</b>	<b>Dynamic characteristics</b> .....	<b>9</b>
<b>12</b>	<b>Waveforms</b> .....	<b>12</b>
<b>13</b>	<b>Package outline</b> .....	<b>16</b>
<b>14</b>	<b>Abbreviations</b> .....	<b>19</b>
<b>15</b>	<b>Revision history</b> .....	<b>19</b>
<b>16</b>	<b>Legal information</b> .....	<b>20</b>
16.1	Data sheet status .....	20
16.2	Definitions .....	20
16.3	Disclaimers .....	20
16.4	Trademarks .....	21
<b>17</b>	<b>Contact information</b> .....	<b>21</b>
<b>18</b>	<b>Contents</b> .....	<b>22</b>

## Looking for pricing, stock, or lifecycle information?

Click below to explore more details on WIN SOURCE:

-  [View 74AHCT595PW,118 on WIN SOURCE](#)
-  [Nexperia USA Inc. Information](#)

## Optimize Your Supply Chain with WIN SOURCE Solutions

-  Global Sourcing Solution
-  Obsolete Management
-  Cost Control Management
-  Shortage Management
-  Alternative Solution
-  Excess Inventory Management