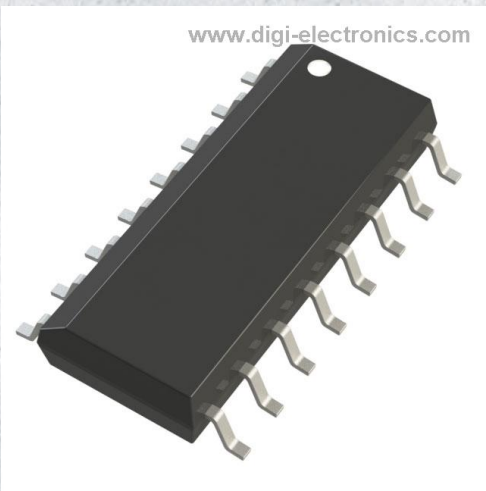
74AHCT594D-Q100,11 Datasheet



https://www.DiGi-Electronics.com

DiGi Electronics Part Number	74AHCT594D-Q100,11-DG
Manufacturer	Nexperia USA Inc.
Manufacturer Product Number	74AHCT594D-Q100,11
Description	IC SHIFT REGISTER 8BIT 16SOIC
Detailed Description	Shift Shift Register 1 Element 8 Bit 16-SO

Tel: +00 852-30501935

RFQ Email: Info@DiGi-Electronics.com

Purchase and inquiry

Manufacturer Product Number:	Manufacturer:
74AHCT594D-Q100,11	Nexperia USA Inc.
Series:	Product Status:
74AHCT	Active
Logic Type:	Output Type:
Shift Register	Push-Pull
Number of Elements:	Number of Bits per Element:
1	8
Function:	Voltage - Supply:
Serial to Parallel, Serial	4.5V ~ 5.5V
Operating Temperature:	Grade:
-40°C ~ 125°C	Automotive
Qualification:	Mounting Type:
AEC-Q100	Surface Mount
Package / Case:	Supplier Device Package:
16-SOIC (0.154", 3.90mm Width)	16-SO
Base Product Number:	
74AHCT594	

Environmental & Export classification

RoHS Status:	Moisture Sensitivity Level (MSL):
ROHS3 Compliant	1 (Unlimited)
REACH Status:	ECCN:
REACH Unaffected	EAR99
HTSUS:	
8542.39.0001	

74AHC594-Q100; 74AHCT594-Q100

8-bit shift register with output register

Rev. 6 — 7 March 2024 Product data sheet

1. General description

The 74AHC594-Q100; 74AHCT594-Q100 is a high-speed Si-gate CMOS device and is pin compatible with Low-Power Schottky TTL (LSTTL). It is specified in compliance with JEDEC standard No. 7-A.

The 74AHC594-Q100; 74AHCT594-Q100 is an 8-bit, non-inverting, serial-in, parallel-out shift register that feeds an 8-bit D-type storage register. Separate clocks (SHCP and STCP) and direct overriding clears ($\overline{SHR}$ and $\overline{STR}$) are provided on both the shift and storage registers. A serial output (Q7S) is provided for cascading purposes.

Both the shift and storage register clocks are positive-edge triggered. If the user wishes to connect both clocks together, the shift register will always be one count pulse ahead of the storage register.

This product has been qualified to the Automotive Electronics Council (AEC) standard Q100 (Grade 1) and is suitable for use in automotive applications.

2. Features and benefits

- Automotive product qualification in accordance with AEC-Q100 (Grade 1)
  - Specified from -40 °C to +85 °C and from -40 °C to +125 °C
- 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
- 8-bit serial-in, parallel-out shift register with storage
- Independent direct overriding clears on shift and storage registers
- Independent clocks for shift and storage registers
- Latch-up performance exceeds 100 mA per JESD 78 Class II Level A
- Input levels:
  - For 74AHC594-Q100: CMOS level
  - For 74AHCT594-Q100: TTL level
- 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
- DHVQFN package with Side-Wettable Flanks enabling Automatic Optical Inspection (AOI) of solder joints

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
74AHC594D-Q100 74AHCT594D-Q100	-40 °C to +125 °C	SO16	plastic small outline package; 16 leads; body width 3.9 mm	SOT109-1
74AHC594PW-Q100 74AHCT594PW-Q100	-40 °C to +125 °C	TSSOP16	plastic thin shrink small outline package; 16 leads; body width 4.4 mm	SOT403-1
74AHC594BQ-Q100 74AHCT594BQ-Q100	-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

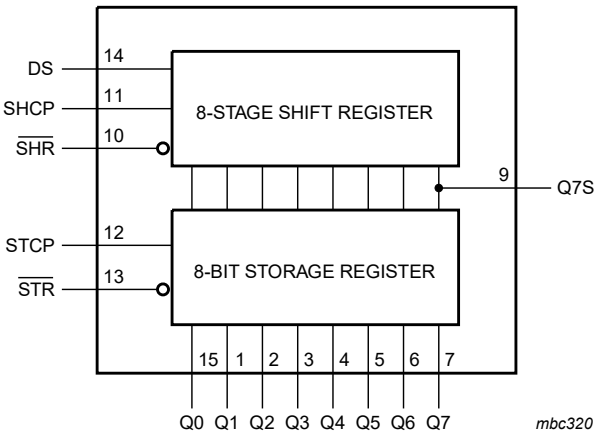


Fig. 1. Functional diagram

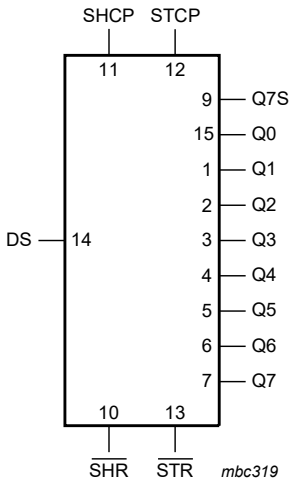


Fig. 2. Logic symbol

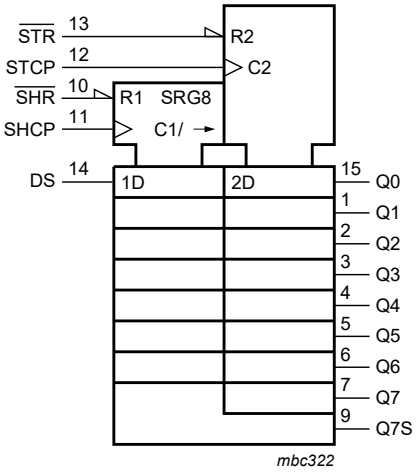


Fig. 3. IEC logic symbol

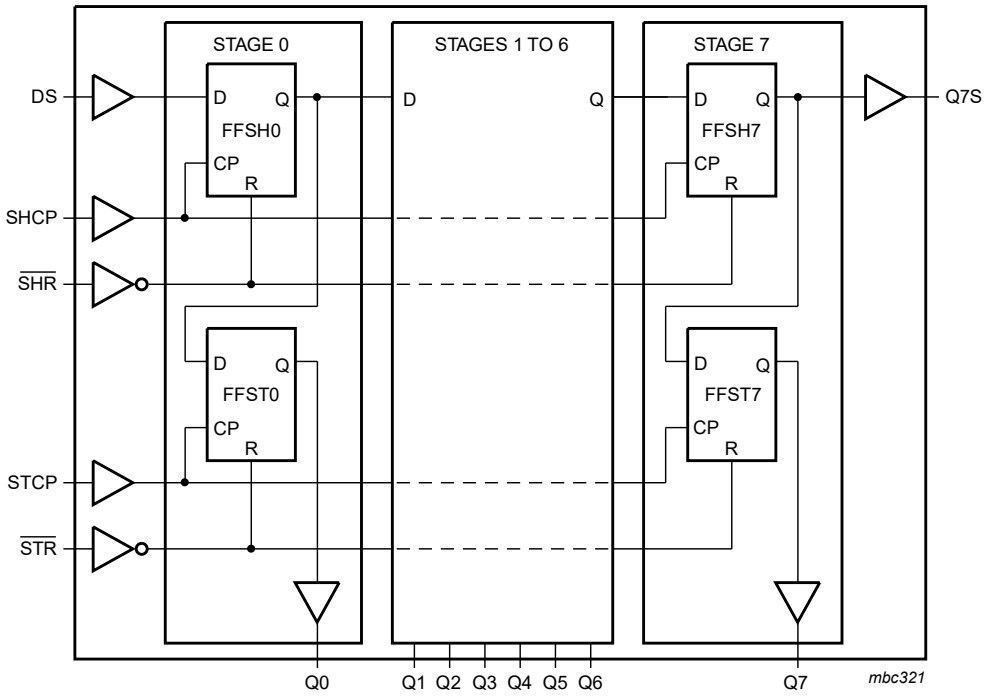
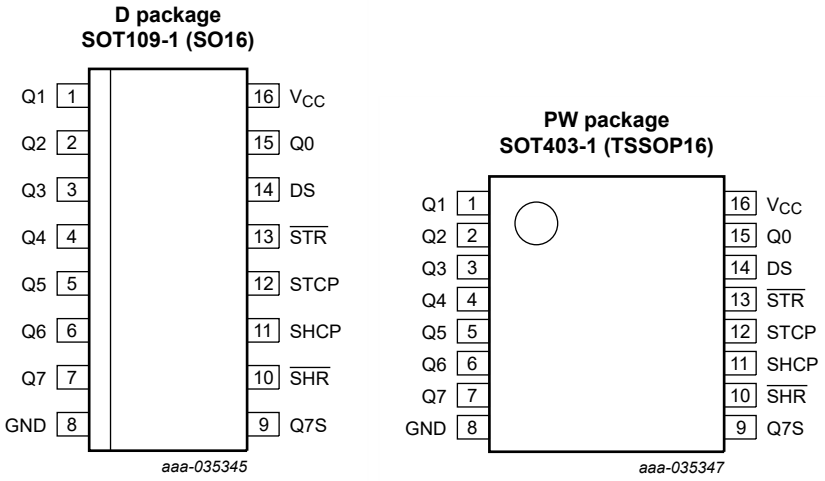


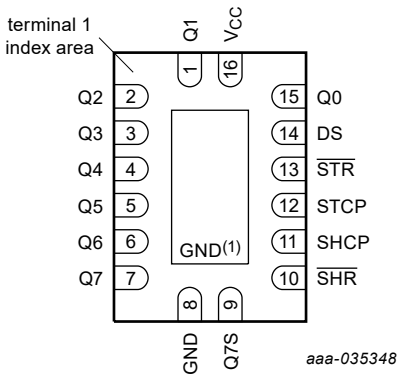
Fig. 4. Logic diagram

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
$\overline{SHR}$	10	shift register reset input (active LOW)
SHCP	11	shift register clock input
STCP	12	storage register clock input
$\overline{STR}$	13	storage register reset 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.

Input					Output		Function
SHCP	STCP	$\overline{SHR}$	$\overline{STR}$	DS	Q7S	Qn	
X	X	L	X	X	L	NC	a LOW-state on $\overline{SHR}$ only affects the shift register
X	X	X	L	X	NC	L	a LOW-state on $\overline{STR}$ only affects the storage register
X	↑	L	H	X	L	L	empty shift register loaded into storage register
↑	X	H	X	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	↑	H	H	X	NC	QnS	contents of shift register stages (internal QnS) are transferred to the storage register and parallel output stages
↑	↑	H	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

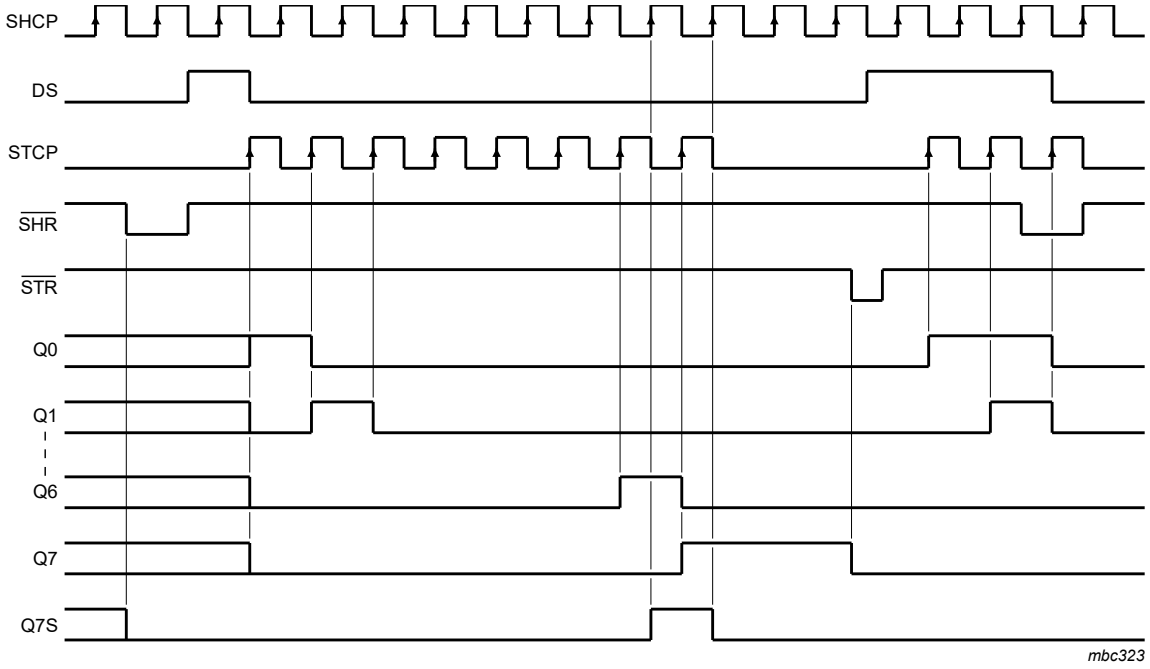


Fig. 5. Timing diagram

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	74AHC594-Q100			74AHCT594-Q100			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
$\Delta t/\Delta V$	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	-	-	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	
74AHC594-Q100										
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
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 mA; V_{CC} = 3.0 V	-	-	0.36	-	0.44	-	0.55	V
		I_O = 8 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_{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	V_I = V_{CC} or GND	-	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	
74AHCT594-Q100										
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}								
		I_O = -50 μA; V_{CC} = 4.5 V	4.4	4.5	-	4.4	-	4.4	-	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} = 4.5 V	-	0	0.1	-	0.1	-	0.1	V
		I_O = 8 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_{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 pins 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	V_I = V_{CC} or GND	-	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. 12.

Symbol	Parameter	Conditions	25 °C			-40 °C to +85 °C		-40 °C to +125 °C		Unit
			Min	Typ[1]	Max	Min	Max	Min	Max	
74AHC594-Q100										
t_{PLH}	LOW to HIGH propagation delay	SHCP to Q7S; see Fig. 6								
		V_{CC} = 3.0 V to 3.6 V								
		C_L = 15 pF	-	5.2	8.5	2.2	9.7	2.2	10.6	ns
		C_L = 50 pF	-	7.4	11.5	3.0	13.2	3.0	14.3	ns
		V_{CC} = 4.5 V to 5.5 V								
		C_L = 15 pF	-	3.8	6.3	1.7	7.2	1.7	7.8	ns
		C_L = 50 pF	-	4.8	8.0	2.4	9.1	2.4	10.0	ns
		STCP to Qn; see Fig. 7								
		V_{CC} = 3.0 V to 3.6 V								
		C_L = 15 pF	-	5.1	8.3	2.3	9.5	2.3	10.6	ns
		C_L = 50 pF	-	7.3	11.9	3.3	13.6	3.3	14.7	ns
		V_{CC} = 4.5 V to 5.5 V								
		C_L = 15 pF	-	3.5	5.7	1.8	6.5	1.8	7.1	ns
		C_L = 50 pF	-	4.8	7.8	2.6	9.0	2.6	9.8	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	SHCP to Q7S; see Fig. 6								
		V_{CC} = 3.0 V to 3.6 V								
		C_L = 15 pF	-	5.5	8.9	2.3	10.2	2.3	11.0	ns
		C_L = 50 pF	-	7.4	12.1	3.0	13.9	3.0	15.1	ns
		V_{CC} = 4.5 V to 5.5 V								
		C_L = 15 pF	-	4.1	6.7	1.9	7.6	1.9	8.2	ns
		C_L = 50 pF	-	5.4	8.8	2.5	10.1	2.5	11.0	ns
		STCP to Qn; see Fig. 7								
		V_{CC} = 3.0 V to 3.6 V								
		C_L = 15 pF	-	5.5	9.1	2.4	10.4	2.4	11.3	ns
		C_L = 50 pF	-	7.3	12.0	3.2	13.8	3.2	15.0	ns
		V_{CC} = 4.5 V to 5.5 V								
		C_L = 15 pF	-	3.7	6.0	1.9	6.9	1.9	7.5	ns
		C_L = 50 pF	-	5.2	8.5	2.6	9.7	2.6	10.5	ns
		$\overline{SHR}$ to Q7S; see Fig. 10								
		V_{CC} = 3.0 V to 3.6 V								
		C_L = 15 pF	-	5.7	9.5	2.3	10.8	2.3	11.7	ns
		C_L = 50 pF	-	7.5	12.2	3.6	14.0	3.6	15.2	ns
		V_{CC} = 4.5 V to 5.5 V								
		C_L = 15 pF	-	4.1	6.7	2.0	7.6	2.0	8.2	ns
		C_L = 50 pF	-	5.4	8.8	2.8	10.1	2.8	11.0	ns
		$\overline{STR}$ to Qn; see Fig. 9								
		V_{CC} = 3.0 V to 3.6 V								
		C_L = 15 pF	-	5.8	9.6	2.8	11.0	2.8	12.0	ns
		C_L = 50 pF	-	7.7	12.5	3.8	14.4	3.8	15.6	ns
		V_{CC} = 4.5 V to 5.5 V								
		C_L = 15 pF	-	4.1	7.2	2.2	8.2	2.2	8.9	ns
		C_L = 50 pF	-	5.4	9.4	3.0	10.7	3.0	11.6	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	-	70	-	65	-	MHz
		V_{CC} = 4.5 V to 5.5 V	90	170	-	80	-	70	-	MHz
t_W	pulse width	SHCP and STCP HIGH or LOW; see Fig. 6 and Fig. 7								
		V_{CC} = 3.0 V to 3.6 V	6.0	-	-	6.5	-	7.0	-	ns
		V_{CC} = 4.5 V to 5.5 V	5.5	-	-	6.0	-	6.5	-	ns
		$\overline{SHR}$ and $\overline{STR}$ HIGH or LOW; see Fig. 10 and Fig. 9								
		V_{CC} = 3.0 V to 3.6 V	5.0	-	-	5.0	-	5.5	-	ns
		V_{CC} = 4.5 V to 5.5 V	5.0	-	-	5.2	-	5.7	-	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	-	4.0	-	ns
		V_{CC} = 4.5 V to 5.5 V	3.0	-	-	3.0	-	3.5	-	ns
		$\overline{SHR}$ to STCP; see Fig. 11								
		V_{CC} = 3.0 V to 3.6 V	8.0	-	-	9.0	-	9.5	-	ns
		V_{CC} = 4.5 V to 5.5 V	5.0	-	-	5.0	-	5.5	-	ns
		SHCP to STCP; see Fig. 7								
		V_{CC} = 3.0 V to 3.6 V	8.0	-	-	8.5	-	9.0	-	ns
		V_{CC} = 4.5 V to 5.5 V	5.0	-	-	5.0	-	5.5	-	ns
t_h	hold time	DS to SHCP; see Fig. 8								
		V_{CC} = 3.0 V to 3.6 V	1.5	-	-	1.5	-	2.0	-	ns
		V_{CC} = 4.5 V to 5.5 V	2.0	-	-	2.0	-	2.5	-	ns
t_{rec}	recovery time	$\overline{SHR}$ to SHCP; see Fig. 10								
		V_{CC} = 3.0 V to 3.6 V	4.2	-	-	4.8	-	5.3	-	ns
		V_{CC} = 4.5 V to 5.5 V	2.9	-	-	3.3	-	3.8	-	ns
		$\overline{STR}$ to STCP; see Fig. 9								
		V_{CC} = 3.0 V to 3.6 V	4.6	-	-	5.3	-	5.8	-	ns
		V_{CC} = 4.5 V to 5.5 V	3.2	-	-	3.7	-	4.3	-	ns
C_{PD}	power dissipation capacitance	f_i = 1 MHz; V_I = GND to V_{CC} [2]	-	55	-	-	-	-	-	pF
74AHCT594-Q100; V_{CC} = 4.5 V to 5.5 V										
t_{PLH}	LOW to HIGH propagation delay	SHCP to Q7S; see Fig. 6								
		C_L = 15 pF	-	3.8	6.3	1.7	7.2	1.7	7.8	ns
		C_L = 50 pF	-	4.8	8.0	2.2	9.1	2.2	9.9	ns
		STCP to Qn; see Fig. 7								
		C_L = 15 pF	-	3.5	5.7	1.8	6.5	1.8	7.1	ns
		C_L = 50 pF	-	4.6	7.7	2.6	8.8	2.6	9.6	ns
t_{PHL}	HIGH to LOW propagation delay	SHCP to Q7S; see Fig. 6								
		C_L = 15 pF	-	4.1	6.7	1.8	7.6	1.8	8.3	ns
		C_L = 50 pF	-	5.4	8.8	2.4	10.1	2.4	11.0	ns
		STCP to Qn; see Fig. 7								
		C_L = 15 pF	-	3.7	6.1	1.9	6.9	1.9	7.2	ns
		C_L = 50 pF	-	5.2	8.5	2.6	9.7	2.6	10.5	ns
		$\overline{SHR}$ to Q7S; see Fig. 10								
		C_L = 15 pF	-	4.3	7.0	2.4	8.0	2.4	8.7	ns
		C_L = 50 pF	-	5.4	8.8	2.7	10.1	2.7	11.0	ns
		$\overline{STR}$ to Qn; see Fig. 9								
		C_L = 15 pF	-	4.5	7.4	2.3	8.4	2.3	9.2	ns
		C_L = 50 pF	-	5.7	9.4	3.1	10.7	3.1	11.7	ns
f_{max}	maximum frequency	SHCP or STCP; see Fig. 6 and Fig. 7	90	160	-	80	-	70	-	MHz

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_W	pulse width	SHCP and STCP HIGH or LOW; see Fig. 6 and Fig. 7	5.5	-	-	6.0	-	6.5	-	ns
		$\overline{SHR}$ and $\overline{STR}$ HIGH or LOW; see Fig. 10 and Fig. 9	5.2	-	-	5.5	-	6.0	-	ns
t_{su}	set-up time	DS to SHCP; see Fig. 8	3.0	-	-	3.0	-	3.5	-	ns
		$\overline{SHR}$ to STCP; see Fig. 11	5.0	-	-	5.0	-	5.5	-	ns
		SHCP to STCP; see Fig. 7	5.0	-	-	5.0	-	5.5	-	ns
t_h	hold time	DS to SHCP; see Fig. 8	2.0	-	-	2.0	-	2.5	-	ns
t_{rec}	recovery time	$\overline{SHR}$ to SHCP; see Fig. 10	2.9	-	-	3.3	-	3.8	-	ns
		$\overline{STR}$ to STCP; see Fig. 9	3.4	-	-	3.8	-	4.3	-	ns
C_{PD}	power dissipation capacitance	f_i = 1 MHz; V_I = GND to V_{CC} [2]	-	55	-	-	-	-	-	pF

[1] Typical values are measured at nominal supply voltage (V_{CC} = 3.3 V and V_{CC} = 5.0 V).

[2] 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;

f_o = output frequency in MHz;

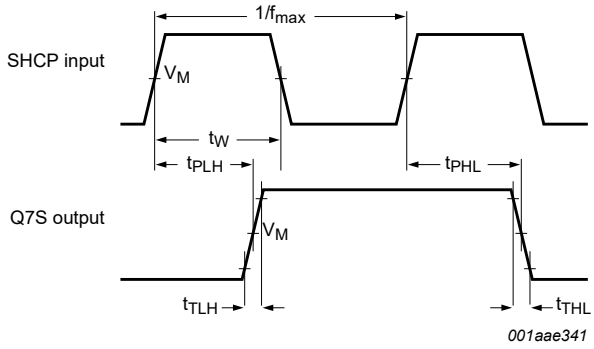
C_L = output load capacitance in pF;

V_{CC} = supply voltage in V;

N = number of inputs switching;

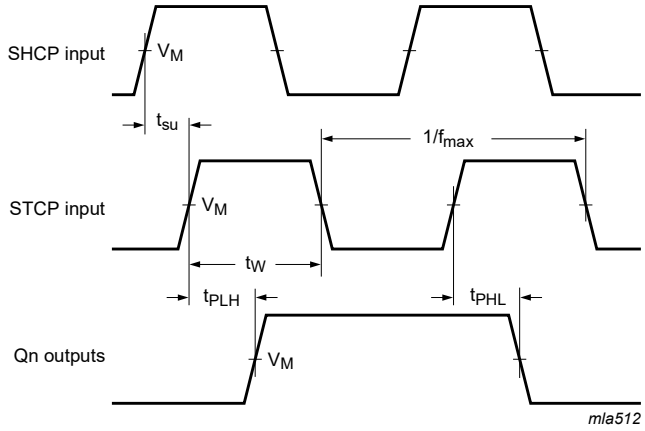
$\Sigma(C_L \times V_{CC}^2 \times f_o)$ = sum of the outputs.

11.1. Waveforms and test circuit



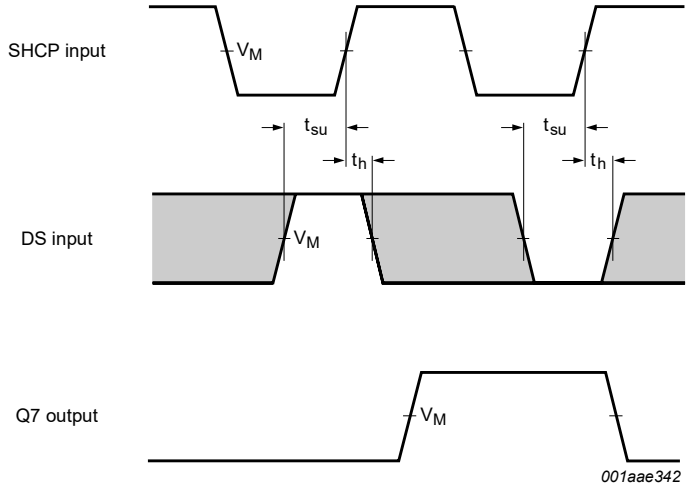
Measurement points are given in Table 8.

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



Measurement points are given in Table 8.

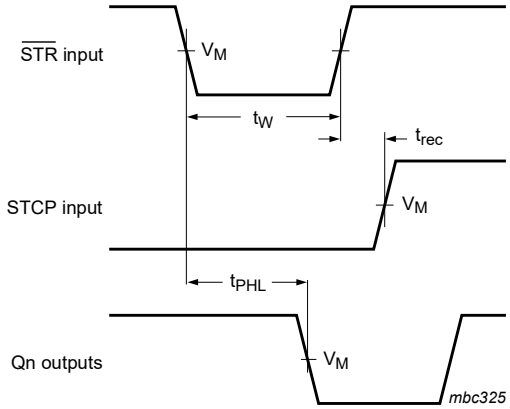
Fig. 7. Shift register clock to storage register clock set-up time and storage clock pulse width, maximum frequency and input to output propagation delays



Measurement points are given in Table 8.

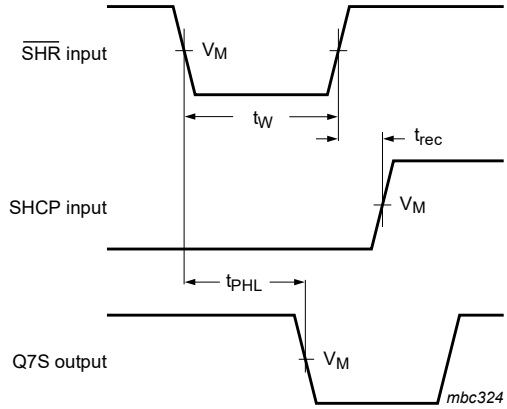
The shaded areas indicate when the input is permitted to change for predictable output performance.

Fig. 8. Shift register clock to data input set-up and hold times



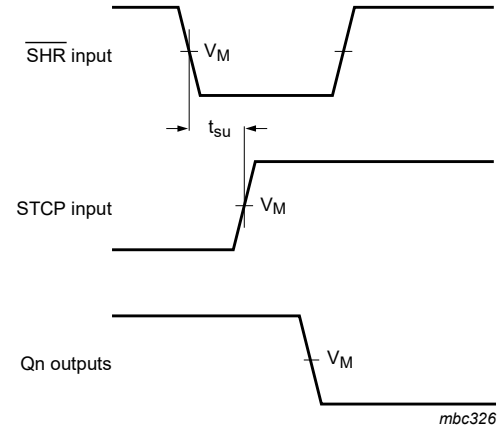
Measurement points are given in Table 8.

Fig. 9. Storage register reset pulse width, input to output propagation delay and recovery time



Measurement points are given in Table 8.

Fig. 10. Shift register reset pulse width, input to output propagation delay and recovery time

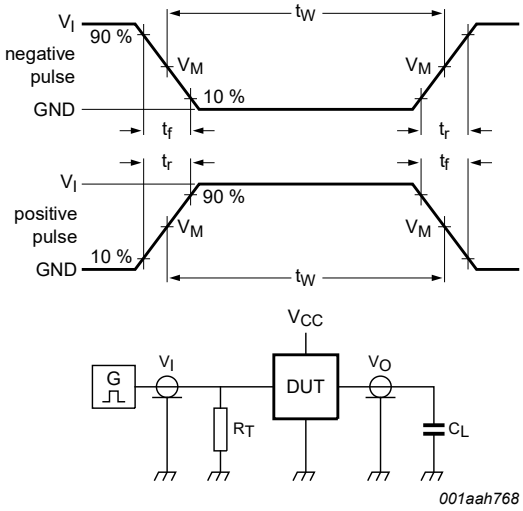


Measurement points are given in Table 8.

Fig. 11. Shift register reset to storage register clock set-up time

Table 8. Measurement points

Type	Input	Output
	V_M	V_M
74AHC594-Q100	0.5 × V_{CC}	0.5 × V_{CC}
74AHCT594-Q100	1.5 V	0.5 × V_{CC}



For test data see Table 9.

Definitions for 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.

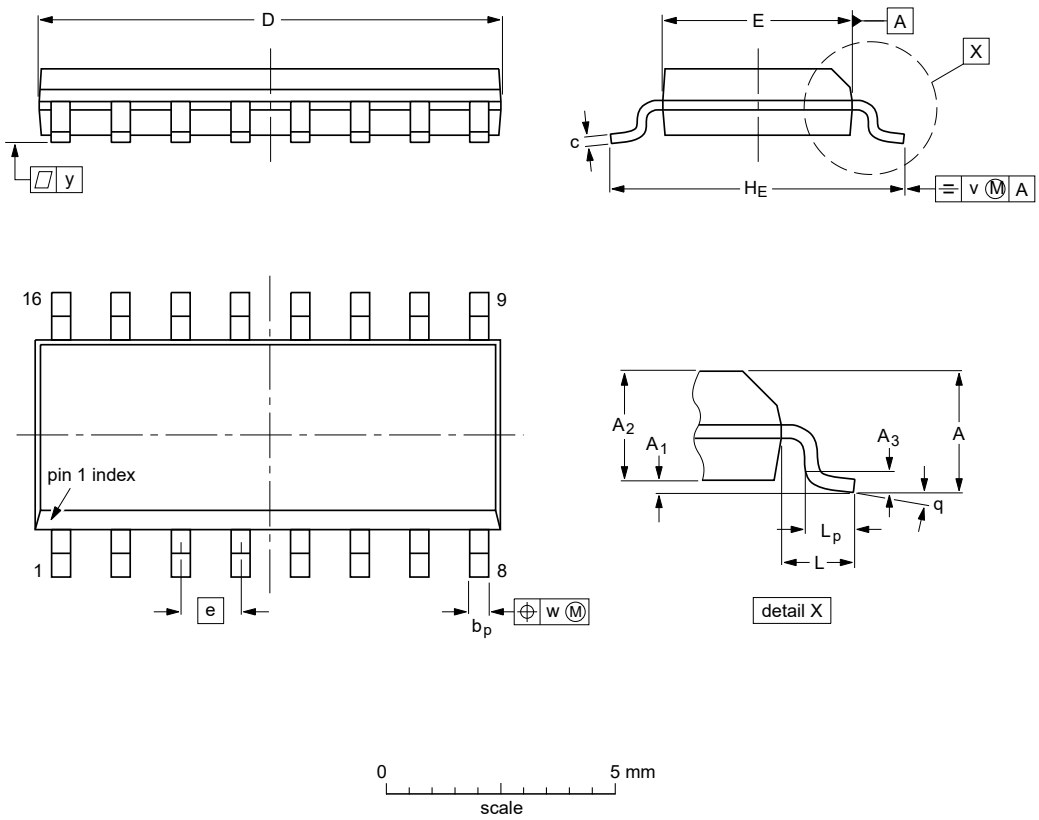
Fig. 12. Test circuit for measuring switching times

Table 9. Test data

Type	Input		Load	Test
	V_I	t_r, t_f	C_L	
74AHC594-Q100	V_{CC}	≤ 3.0 ns	15 pF, 50 pF	t_{PLH}, t_{PHL}
74AHCT594-Q100	3.0 V	≤ 3.0 ns	15 pF, 50 pF	t_{PLH}, t_{PHL}

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_1	A_2	A_3	b_p	c	$D^{(1)}$	$E^{(1)}$	e	H_E	L	L_p	v	w	y	θ
mm	max	1.75	0.25			0.51	0.25	10.0	4.0		6.2		1.27				8°
	nom				0.25					1.27		1.05		0.2	0.25	0.1	
	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°
	nom				0.01					0.05		0.041		0.008	0.01	0.004	
	min		0.004	0.049		0.012	0.004	0.386	0.15		0.228		0.016				0°

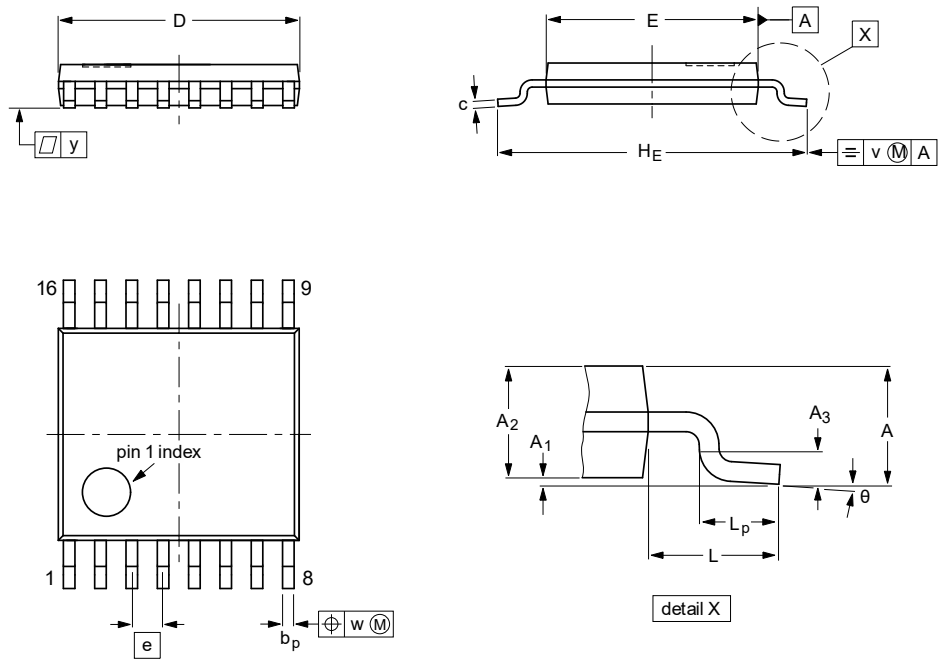
Note
1. Plastic or metal protrusions of 0.15 mm (0.006 inch) maximum per side are not included.

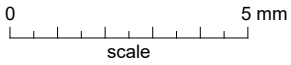
sot109-1_po

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

Fig. 13. 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	A_1	A_2	A_3	b_p	c	$D^{(1)}$	$E^{(2)}$	e	H_E	L	L_p	v	w	y	θ
mm	max	1.20	0.15	1.05		0.30	0.2	5.1	4.5		6.6		0.75				8°
	nom				0.25					0.65		1		0.2	0.1	0.1	
	min		0.05	0.80		0.19	0.09	4.9	4.3		6.2		0.45				0°

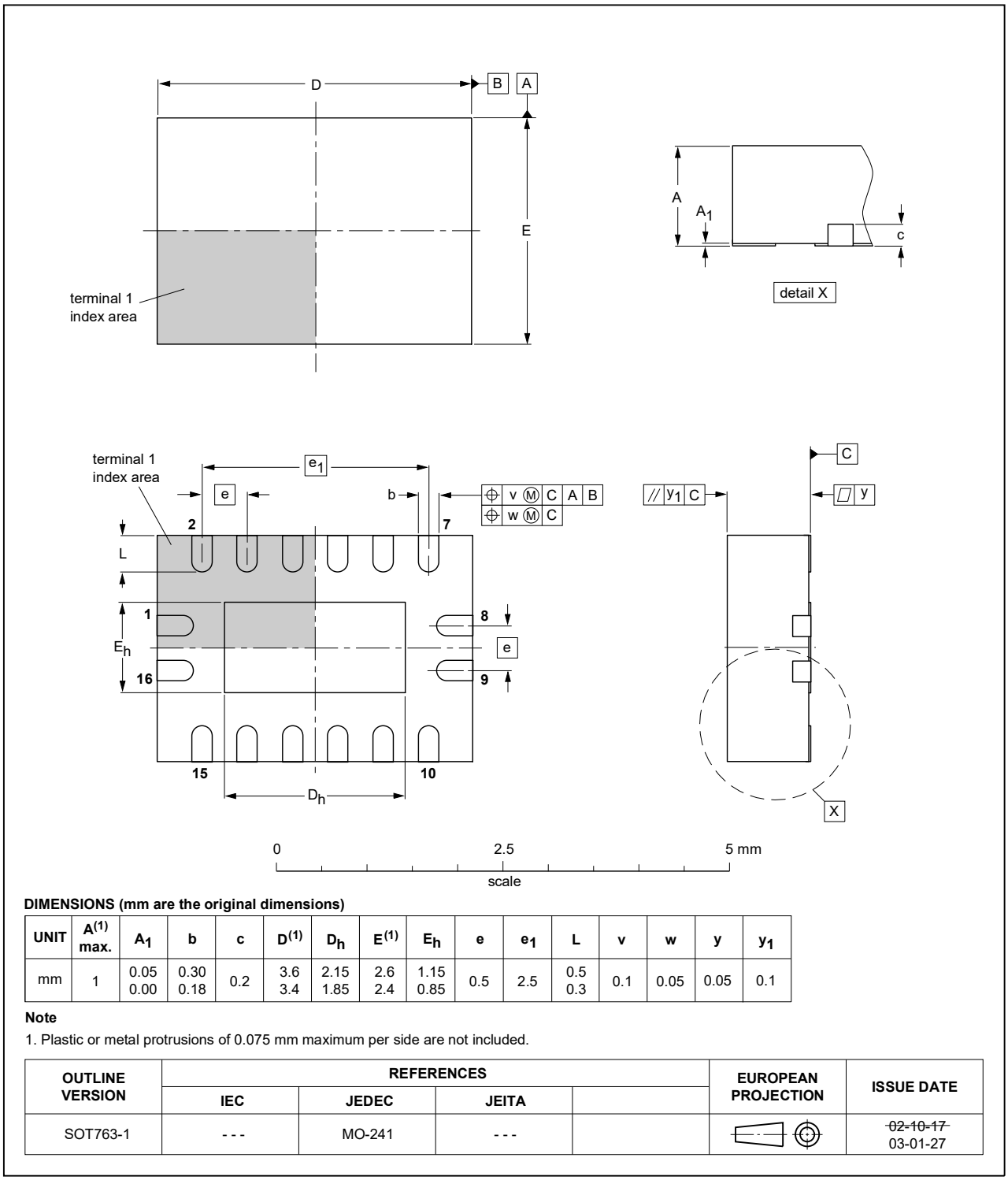
Note
1. Plastic or metal protrusions of 0.15 mm maximum per side are not included.
2. Plastic interlead protrusions of 0.25 mm maximum per side are not included.

sot403-1_po

Outline version	References				European projection	Issue date
	IEC	JEDEC	JEITA			
SOT403-1		MO-153				~~03-02-18~~ 23-10-27

Fig. 14. 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. 15. Package outline SOT763-1 (DHVQFN16)

13. Abbreviations

Table 10. Abbreviations

Acronym	Description
CDM	Charged Device Model
CMOS	Complementary Metal-Oxide Semiconductor
DUT	Device Under Test
ESD	ElectroStatic Discharge
HBM	Human Body Model
LSTTL	Low-power Schottky Transistor-Transistor Logic
TTL	Transistor-Transistor Logic

14. Revision history

Table 11. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
74AHC_AHCT594_Q100 v.6	20240307	Product data sheet	-	74AHC_AHCT594_Q100 v.5
Modifications:	• Fig. 13, Fig. 14: Aligned SO and TSSOP package outline drawings to JEDEC MS-012 and MO-153.			
74AHC_AHCT594_Q100 v.5	20231009	Product data sheet	-	74AHC_AHCT594_Q100 v.4
Modifications:	• Section 2: ESD specification updated according to the latest JEDEC standard.			
74AHC_AHCT594_Q100 v.4	20210707	Product data sheet	-	74AHC_AHCT594_Q100 v.3
Modifications:	• Type number 74AHCT594DB-Q100 (SOT338-1/SSOP16) removed.			
74AHC_AHCT594_Q100 v.3	20200625	Product data sheet	-	74AHC_AHCT594_Q100 v.2
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. • Type number 74AHC594DB-Q100 (SOT338-1/SSOP16) removed. • Section 2 updated. • Table 4: Derating values for P_{tot} total power dissipation updated.			
74AHC_AHCT594_Q100 v.2	20130704	Product data sheet	-	74AHC_AHCT594_Q100 v.1
Modifications:	• 74AHC594DB-Q100 and 74AHCT594DB-Q100 added.			
74AHC_AHCT594_Q100 v.1	20120712	Product data sheet	-	-

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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