# 74HC574-Q100; 74HCT574-Q100

Octal D-type flip-flop; positive edge-trigger; 3-state

Rev. 1 — 2 August 2012

Production

Product data sheet

#### 1. **General description**

The 74HC574-Q100; 74HCT574-Q100 is a high-speed Si-gate CMOS device and is pin compatible with Low-power Schottky TTL. It is specified in compliance with JEDEC standard no. 7A.

The 74HC574-Q100; 74HCT574-Q100 are octal D-type flip-flops featuring separate D-type inputs for each flip-flop and 3-state outputs for bus-oriented applications. A clock (CP) and an output enable (OE) input are common to all flip-flops. The 8 flip-flops store the state of their individual D-inputs that meet the set-up and hold times requirements on the LOW-to-HIGH CP transition. When OE is LOW the contents of the 8 flip-flops are available at the outputs. When  $\overline{\text{OE}}$  is HIGH, the outputs go to the high-impedance OFF-state. Operation of the OE input does not affect the state of the flip-flops.

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
- 3-state non-inverting outputs for bus-oriented applications
- 8-bit positive, edge-triggered register
- Common 3-state output enable input
- ESD protection:
  - MIL-STD-883, method 3015 exceeds 2000 V
  - HBM JESD22-A114F exceeds 2000 V
  - ♦ MM JESD22-A115-A exceeds 200 V (C = 200 pF, R = 0 Ω)
- Multiple package options

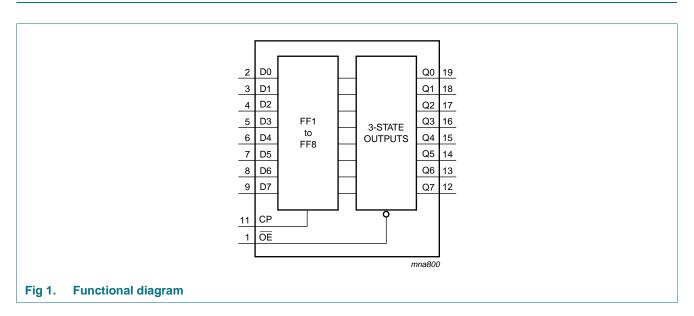


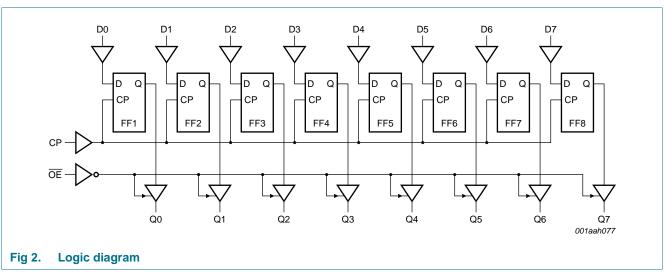
## 3. Ordering information

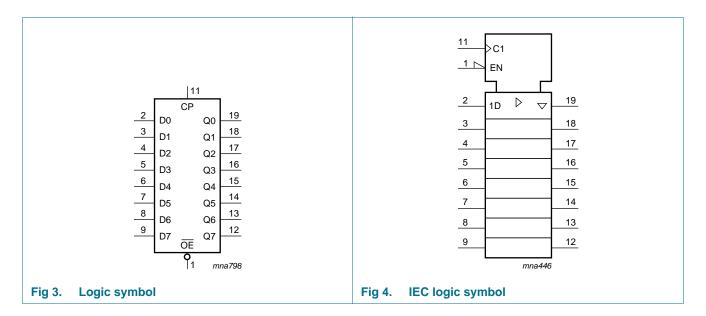
Table 1. Ordering information

Type number	Package								
	Temperature range	Name	Description	Version					
74HC574D-Q100	–40 °C to +125 °C	SO20	plastic small outline package; 20 leads;	SOT163-1					
74HCT574D-Q100			body width 7.5 mm						
74HC574PW-Q100	–40 °C to +125 °C	TSSOP20	plastic thin shrink small outline package; 20 leads;	SOT360-1					
74HCT574PW-Q100			body width 4.4 mm						

## 4. Functional diagram

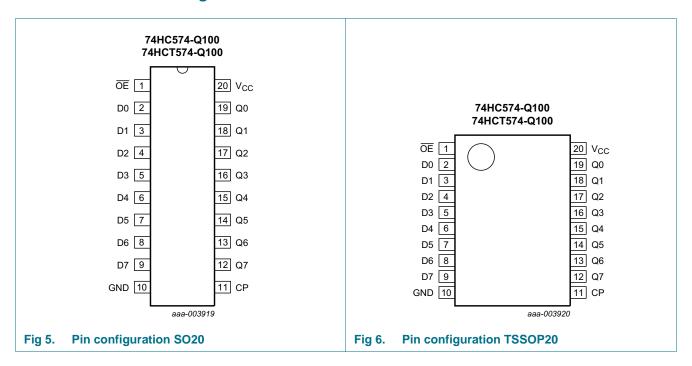






## 5. Pinning information

#### 5.1 Pinning



### 5.2 Pin description

Table 2. Pin description

Symbol	Pin	Description
OE	1	3-state output enable input (active LOW)
D[0:7]	2, 3, 4, 5, 6, 7, 8, 9	data input
GND	10	ground (0 V)
СР	11	clock input (LOW-to-HIGH, edge triggered)
Q[0:7]	19, 18, 17, 16, 15, 14, 13, 12	3-state flip-flop output
V <sub>CC</sub>	20	supply voltage

## 6. Functional description

Table 3. Function table[1]

Operating mode	Input			Internal	Output
	OE	СР	Dn	flip-flop	Qn
Load and read register	L	<b>↑</b>	I	L	L
	L	<b>↑</b>	h	Н	Н
Load register and disable output	Н	<b>↑</b>	I	L	Z
	Н	<b>↑</b>	h	Н	Z

<sup>[1]</sup> H = HIGH voltage level;

h = HIGH voltage level one setup time prior to the HIGH-to-LOW CP transition;

## 7. Limiting values

Table 4. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134). Voltages are referenced to GND (ground = 0 V).

Symbol	Parameter	Conditions	Min	Max	Unit
$V_{CC}$	supply voltage		-0.5	+7	V
I <sub>IK</sub>	input clamping current	$V_I < -0.5 \text{ V or } V_I > V_{CC} + 0.5 \text{ V}$	-	±20	mA
I <sub>OK</sub>	output clamping current	$V_O < -0.5 \text{ V or } V_O > V_{CC} + 0.5 \text{ V}$	-	±20	mA
I <sub>O</sub>	output current	$V_{O} = -0.5 \text{ V to } (V_{CC} + 0.5 \text{ V})$	-	±35	mA
I <sub>CC</sub>	supply current		-	+70	mA
I <sub>GND</sub>	ground current		-	<b>-70</b>	mA
T <sub>stg</sub>	storage temperature		-65	+150	°C
P <sub>tot</sub>	total power dissipation		[1] -	500	mW

<sup>[1]</sup> For SO20 packages: P<sub>tot</sub> derates linearly with 8 mW/K above 70 °C.
For TSSOP20 packages: P<sub>tot</sub> derates linearly with 5.5 mW/K above 60 °C.

L = LOW voltage level;

I = LOW voltage level one setup time prior to the HIGH-to-LOW CP transition;

Z = high-impedance OFF-state;

 $<sup>\</sup>uparrow$  = LOW-to-HIGH clock transition.

## 8. Recommended operating conditions

Table 5. Recommended operating conditions

Voltages are referenced to GND (ground = 0 V)

Symbol	Parameter	Conditions	74HC574-Q100			74HCT	574-Q10	0	Unit
			Min	Тур	Max	Min	Тур	Max	
$V_{CC}$	supply voltage		2.0	5.0	6.0	4.5	5.0	5.5	V
VI	input voltage		0	-	$V_{CC}$	0	-	$V_{CC}$	V
Vo	output voltage		0	-	$V_{CC}$	0	-	$V_{CC}$	V
T <sub>amb</sub>	ambient temperature		-40	+25	+125	-40	+25	+125	°C
Δt/ΔV	input transition rise and fall rate	$V_{CC} = 2.0 \text{ V}$	-	-	625	-	-	-	ns/V
		V <sub>CC</sub> = 4.5 V	-	1.67	139	-	1.67	139	ns/V
		$V_{CC} = 6.0 \text{ V}$	-	-	83	-	-	-	ns/V

## 9. Static characteristics

Table 6. Static characteristics

At recommended operating conditions; voltages are referenced to GND (ground = 0 V).

Symbol	Parameter	Conditions	25 °C			–40 °C t	o +85 °C	-40 °C to +125 °C		Unit	
			Min	Тур	Max	Min	Max	Min	Max		
74HC574	4-Q100					'		ı		1	
V <sub>IH</sub>	HIGH-level	V <sub>CC</sub> = 2.0 V	1.5	1.2	-	1.5	-	1.5	-	V	
	input voltage	V <sub>CC</sub> = 4.5 V	3.15	2.4	-	3.15	-	3.15	-	V	
		$V_{CC} = 6.0 \text{ V}$	4.2	3.2	-	4.2	-	4.2	-	V	
V <sub>IL</sub>	LOW-level	$V_{CC} = 2.0 \text{ V}$	-	8.0	0.5	-	0.5	-	0.5	V	
	input voltage	V <sub>CC</sub> = 4.5 V	-	2.1	1.35	-	1.35	-	1.35	V	
		$V_{CC} = 6.0 \text{ V}$	-	2.8	1.8	-	1.8	-	1.8	V	
$V_{OH}$	HIGH-level	$V_I = V_{IH}$ or $V_{IL}$									
	output voltage	$I_{O} = -20 \mu A; V_{CC} = 2.0 V$	1.9	2.0	-	1.9	-	1.9	-	V	
		$I_{O} = -20 \mu A; V_{CC} = 4.5 V$	4.4	4.5	-	4.4	-	4.4	-	V	
		$I_O = -20 \mu A; V_{CC} = 6.0 V$	5.9	6.0	-	5.9	-	5.9	-	V	
		$I_{O} = -6.0 \text{ mA}; V_{CC} = 4.5 \text{ V}$	3.98	4.32	-	3.84	-	3.7	-	V	
		$I_{O} = -7.8 \text{ mA}; V_{CC} = 6.0 \text{ V}$	5.48	5.81	-	5.34	-	5.2	-	V	
$V_{OL}$	LOW-level	$V_I = V_{IH}$ or $V_{IL}$									
	output voltage	$I_O = 20 \mu A; V_{CC} = 2.0 V$	-	0	0.1	-	0.1	-	0.1	V	
		$I_O = 20 \mu A; V_{CC} = 4.5 V$	-	0	0.1	-	0.1	-	0.1	V	
		$I_O = 20 \mu A; V_{CC} = 6.0 V$	-	0	0.1	-	0.1	-	0.1	V	
		$I_O = 6.0 \text{ mA}; V_{CC} = 4.5 \text{ V}$	-	0.15	0.26	-	0.33	-	0.4	V	
		$I_O = 7.8 \text{ mA}; V_{CC} = 6.0 \text{ V}$	-	0.16	0.26	-	0.33	-	0.4	V	
l <sub>l</sub>	input leakage current	$V_I = V_{CC}$ or GND; $V_{CC} = 6.0 \text{ V}$	-	-	±0.1	-	±1.0	-	±1.0	μΑ	
l <sub>OZ</sub>	OFF-state output current	$V_I = V_{IH}$ or $V_{IL}$ ; $V_O = V_{CC}$ or GND; $V_{CC} = 6.0 \text{ V}$	-	-	±0.5	-	±5.0	-	±10.0	μА	

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 Table 6.
 Static characteristics ...continued

At recommended operating conditions; voltages are referenced to GND (ground = 0 V).

Symbol	Parameter	Conditions		25 °C		-40 °C t	o +85 °C	-40 °C to	+125 °C	Unit
			Min	Тур	Max	Min	Max	Min	Max	
I <sub>CC</sub>	supply current	$V_I = V_{CC}$ or GND; $I_O = 0$ A; $V_{CC} = 6.0 \text{ V}$	-	-	8.0	-	80	-	160	μΑ
C <sub>I</sub>	input capacitance		-	3.5	-					pF
74HCT5	74-Q100									
$V_{IH}$	HIGH-level input voltage	$V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}$	2.0	1.6	-	2.0	-	2.0	-	V
$V_{IL}$	LOW-level input voltage	$V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}$	-	1.2	8.0	-	0.8	-	0.8	V
$V_{OH}$	HIGH-level	$V_I = V_{IH}$ or $V_{IL}$ ; $V_{CC} = 4.5 \text{ V}$								
	output voltage	$I_{O} = -20 \mu A$	4.4	4.5	-	4.4	-	4.4	-	V
		$I_O = -6 \text{ mA}$	3.98	4.32	-	3.84	-	3.7	-	V
V <sub>OL</sub>	LOW-level	$V_I = V_{IH}$ or $V_{IL}$ ; $V_{CC} = 4.5 \text{ V}$								
	output voltage	I <sub>O</sub> = 20 μA	-	0	0.1	-	0.1	-	0.1	V
		$I_{O} = 6.0 \text{ mA}$	-	0.16	0.26	-	0.33	-	0.4	V
I <sub>I</sub>	input leakage current	$V_I = V_{CC}$ or GND; $V_{CC} = 5.5 \text{ V}$	-	-	±0.1	-	±1.0	-	±1.0	μΑ
l <sub>OZ</sub>	OFF-state output current	$V_I = V_{IH}$ or $V_{IL}$ ; $V_{CC} = 5.5$ V; $V_O = V_{CC}$ or GND per input pin; other inputs at $V_{CC}$ or GND; $I_O = 0$ A	-	-	±0.5	-	±5.0	-	±10	μΑ
I <sub>CC</sub>	supply current	$V_I = V_{CC}$ or GND; $I_O = 0$ A; $V_{CC} = 5.5$ V	-	-	8.0	-	80	-	160	μΑ
Δl <sub>CC</sub>	additional supply current	$V_I = V_{CC} - 2.1 \text{ V};$ other inputs at $V_{CC}$ or GND; $V_{CC} = 4.5 \text{ V}$ to 5.5 V; $I_O = 0 \text{ A}$								
		per input pin; Dn inputs	-	50	180	-	225	-	245	μΑ
		per input pin; OE input	-	125	450	-	563	-	613	μΑ
		per input pin; CP input	-	150	540	-	675	-	735	μΑ
C <sub>I</sub>	input capacitance		-	3.5	-					pF

## 10. Dynamic characteristics

Table 7. Dynamic characteristics

Voltages are referenced to GND (ground = 0 V);  $C_L = 50 \ pF$  unless otherwise specified; for test circuit see <u>Figure 10</u>.

For type 74HC574-Q100  ***Type 74HC574-Q100	Symbol	Parameter	Conditions			25 °C		-40 °C	to +85 °C	-40 °C 1	to +125 °C	Unit
the delay					Min	Тур	Max	Min	Max	Min	Max	
delay         V <sub>CC</sub> = 2.0 V         -         47         150         -         190         -         225           V <sub>CC</sub> = 4.5 V         -         17         30         -         35         -         45           V <sub>CC</sub> = 5 V; C <sub>L</sub> = 15 pF         -         14         -<	or type	74HC574-Q1	00									
Variable	pd		CP to Qn; see Figure 7	<u>[1]</u>								
$ \frac{V_{CC} = 5 \ V; \ C_L = 15 \ pF}{V_{CC} = 6.0 \ V} \qquad 0. \qquad 14 \qquad 0. \qquad 0$		delay	$V_{CC} = 2.0 \text{ V}$		-	47	150	-	190	-	225	ns
$t_{tan} = t_{tan} = t_{t$			$V_{CC} = 4.5 \text{ V}$		-	17	30	-	35	-	45	ns
Part			$V_{CC} = 5 \text{ V}; C_L = 15 \text{ pF}$		-	14	-	-	-	-	-	ns
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$			$V_{CC} = 6.0 \text{ V}$		-	14	26	-	33	-	38	ns
$ \begin{array}{c} V_{CC} = 4.5 \ V & - & 16 & 28 & - & 35 & - & 42 \\ V_{CC} = 6.0 \ V & - & 13 & 24 & - & 30 & - & 36 \\ \hline V_{CC} = 6.0 \ V & - & 13 & 24 & - & 30 & - & 36 \\ \hline V_{CC} = 2.0 \ V & - & 39 & 125 & - & 155 & - & 190 \\ \hline V_{CC} = 4.5 \ V & - & 14 & 25 & - & 31 & - & 38 \\ \hline V_{CC} = 6.0 \ V & - & 11 & 21 & - & 26 & - & 32 \\ \hline V_{CC} = 6.0 \ V & - & 11 & 21 & - & 26 & - & 32 \\ \hline V_{CC} = 2.0 \ V & - & 14 & 60 & - & 75 & - & 90 \\ \hline V_{CC} = 4.5 \ V & - & 14 & 60 & - & 75 & - & 90 \\ \hline V_{CC} = 4.5 \ V & - & 5 & 12 & - & 15 & - & 18 \\ \hline V_{CC} = 6.0 \ V & - & 4 & 10 & - & 13 & - & 15 \\ \hline V_{CC} = 6.0 \ V & - & 4 & 10 & - & 13 & - & 15 \\ \hline V_{CC} = 2.0 \ V & 80 & 14 & - & 100 & - & 120 & - \\ \hline V_{CC} = 4.5 \ V & 16 & 5 & - & 20 & - & 24 & - \\ \hline V_{CC} = 4.5 \ V & 16 & 5 & - & 20 & - & 24 & - \\ \hline V_{CC} = 4.5 \ V & 16 & 5 & - & 20 & - & 24 & - \\ \hline V_{CC} = 2.0 \ V & 14 & 4 & - & 17 & - & 20 & - \\ \hline V_{CC} = 4.5 \ V & 12 & 2 & - & 15 & - & 18 & - \\ \hline V_{CC} = 4.5 \ V & 12 & 2 & - & 15 & - & 18 & - \\ \hline V_{CC} = 4.5 \ V & 12 & 2 & - & 15 & - & 18 & - \\ \hline V_{CC} = 6.0 \ V & 5 & 0 & - & 5 & - & 5 & - & 5 \\ \hline V_{CC} = 4.5 \ V & 5 & 0 & - & 5 & - & 5 & - & 5 \\ \hline V_{CC} = 4.5 \ V & 5 & 0 & - & 5 & - & 5 & - & 5 \\ \hline V_{CC} = 4.5 \ V & 5 & 0 & - & 5 & - & 5 & - & 5 \\ \hline V_{CC} = 4.5 \ V & 5 & 0 & - & 5 & - & 5 & - & 5 \\ \hline V_{CC} = 4.5 \ V & 5 & 0 & - & 5 & - & 5 & - & 5 \\ \hline V_{CC} = 4.5 \ V & 5 & 0 & - & 5 & - & 5 & - & 5 \\ \hline V_{CC} = 4.5 \ V & 5 & 0 & - & 5 & - & 5 & - & 5 \\ \hline V_{CC} = 4.5 \ V & 5 & 0 & - & 5 & - & 5 & - & 5 \\ \hline V_{CC} = 4.5 \ V & 5 & 0 & - & 5 & - & 5 & - & 5 \\ \hline V_{CC} = 4.5 \ V & 5 & 0 & - & 5 & - & 5 & - & 5 \\ \hline V_{CC} = 4.5 \ V & 5 & 0 & - & 5 & - & 5 & - & 5 \\ \hline V_{CC} = 4.5 \ V & 5 & 0 & - & 5 & - & 5 & - & 5 \\ \hline V_{CC} = 4.5 \ V & 5 & 0 & - & 5 & - & 5 & - & 5 \\ \hline V_{CC} = 4.5 \ V & 5 & 0 & - & 5 & - & 5 & - & 5 \\ \hline V_{CC} = 5.0 \ V & 6.0 & 37 & - & 4.8 & - & 4.0 & - \\ \hline V_{CC} = 4.5 \ V & 5 & 0 & 112 & - & 24 & - & 20 & - \\ \hline V_{CC} = 4.5 \ V & 5 & 0 & 112 & - & 24 & - & 20 & - \\ \hline V_{CC} = 4.5 \ V & 5$	en	enable time	OE to Qn; see Figure 9	[2]								
V <sub>CC</sub> = 6.0 V     -     13     24     -     30     -     36       t <sub>clis</sub> disable time     OE to Qn; see Figure 9     I3       V <sub>CC</sub> = 2.0 V     -     39     125     -     155     -     190       V <sub>CC</sub> = 4.5 V     -     14     25     -     31     -     38       V <sub>CC</sub> = 6.0 V     -     11     21     -     26     -     32       Image: Set Figure 7     Id       V <sub>CC</sub> = 2.0 V     -     14     60     -     75     -     90       V <sub>CC</sub> = 4.5 V     -     5     12     -     15     -     18       V <sub>CC</sub> = 6.0 V     -     4     10     -     13     -     15       V <sub>CC</sub> = 2.0 V     80     14     -     100     -     120     -       V <sub>CC</sub> = 4.5 V     16     5     -     20     -     24     -       V <sub>CC</sub> = 4.5 V     16     5     -     20     -     24     -       V <sub>CC</sub> = 6.0 V     14     4     -     17     -     20     -       V <sub>CC</sub> = 4.5 V     12     2     -     15     -     18     -       V <sub>CC</sub> = 6.0 V     5			$V_{CC} = 2.0 \text{ V}$		-	44	140	-	175	-	210	ns
$ \begin{array}{c} \text{disable time} \\ \text{disable time} \\ & \begin{array}{c} \hline{\text{OE to On; see Figure 9}} \\ \hline{\text{V}_{\text{CC}}} = 2.0  \text{V} \\ \hline{\text{V}_{\text{CC}}} = 4.5  \text{V} \\ \hline{\text{V}_{\text{CC}}} = 6.0  \text{V} \\ \hline{\text{V}_{\text{CC}}} = 6.0  \text{V} \\ \hline{\text{V}_{\text{CC}}} = 6.0  \text{V} \\ \hline{\text{V}_{\text{CC}}} = 2.0  \text{V} \\ \hline{\text{V}_{\text{CC}}} = 6.0  \text{V} \\ \hline{\text{V}_{\text{CC}}} = 2.0  \text{V} \\ \hline{\text{V}_{\text{CC}}} = 4.5  \text{V} \\ \hline{\text{V}_{\text{CC}}} = 6.0  \text{V} \\ \hline{\text{V}_{\text{CC}}} = 2.0  \text{V} \\ \hline{\text{V}_{\text{CC}}} = 4.5  \text{V} \\ \hline{\text{V}_{\text{CC}}} = 2.0  \text{V} \\ \hline{\text{V}_{\text{CC}}} = 4.5  \text{V} \\ \hline{\text{V}_{\text{CC}}} = 2.0  \text{V} \\ \hline{\text{V}_{\text{CC}}} = 2.0  \text{V} \\ \hline{\text{V}_{\text{CC}}} = 4.5  \text{V} \\ \hline{\text{V}_{\text{CC}}} = 2.0  \text{V} \\ \hline{\text{V}_{\text{CC}}} = 4.5  \text{V} \\ \hline{\text{V}_{\text{CC}}} = 2.0  \text{V} \\ \hline{\text{V}_{\text{CC}}} = 4.5  \text{V} \\ \hline{\text{V}_{\text{CC}}} = 2.0  \text{V} \\ \hline{\text{V}_{\text{CC}}} = 6.0  \text{V} \\ \hline{\text{V}_{\text{CC}}} = 2.0  \text{V} \\ \hline{\text{V}_{C$			$V_{CC} = 4.5 \text{ V}$		-	16	28	-	35	-	42	ns
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$			$V_{CC} = 6.0 \text{ V}$		-	13	24	-	30	-	36	ns
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	dis	disable time	OE to Qn; see Figure 9	[3]								
$V_{CC} = 6.0 \ V \qquad -  11  21  -  26  -  32$ $V_{CC} = 6.0 \ V \qquad -  11  21  -  26  -  32$ $V_{CC} = 2.0 \ V \qquad -  14  60 \qquad -  75 \qquad -  90$ $V_{CC} = 4.5 \ V \qquad -  5  12 \qquad -  15 \qquad -  18$ $V_{CC} = 6.0 \ V \qquad -  4  10 \qquad -  13 \qquad -  15$ $V_{CC} = 6.0 \ V \qquad -  4  10 \qquad -  13 \qquad -  15$ $V_{CC} = 2.0 \ V \qquad 80 \qquad 14 \qquad -  100 \qquad -  120 \qquad - $			$V_{CC} = 2.0 \text{ V}$		-	39	125	-	155	-	190	ns
$ \begin{array}{c} \begin{array}{c} \text{transition} \\ \text{time} \end{array} \end{array} \begin{array}{c} \text{Qn; see} \ \frac{\text{Figure} \ 7}{\text{V}_{\text{CC}} = 2.0 \ V} & - & 14 & 60 & - & 75 & - & 90 \\ \hline V_{\text{CC}} = 4.5 \ V & - & 5 & 12 & - & 15 & - & 18 \\ \hline V_{\text{CC}} = 6.0 \ V & - & 4 & 10 & - & 13 & - & 15 \\ \hline \text{Transition} \\ \text{Transition} \end{array} \end{array} \begin{array}{c} \text{Dulse width} \\ \text{Dulse width} \end{array} \begin{array}{c} \begin{array}{c} \text{CP HIGH or LOW;} \\ \text{See Figure 8} \end{array} \\ \hline V_{\text{CC}} = 2.0 \ V & 80 & 14 & - & 100 & - & 120 & - \\ \hline V_{\text{CC}} = 4.5 \ V & 16 & 5 & - & 20 & - & 24 & - \\ \hline V_{\text{CC}} = 4.5 \ V & 16 & 5 & - & 20 & - & 24 & - \\ \hline V_{\text{CC}} = 6.0 \ V & 14 & 4 & - & 17 & - & 20 & - \\ \hline V_{\text{CC}} = 2.0 \ V & 60 & 6 & - & 75 & - & 90 & - \\ \hline V_{\text{CC}} = 4.5 \ V & 12 & 2 & - & 15 & - & 18 & - \\ \hline V_{\text{CC}} = 6.0 \ V & 10 & 2 & - & 13 & - & 15 & - \\ \hline V_{\text{CC}} = 6.0 \ V & 5 & 0 & - & 5 & - & 5 & - \\ \hline V_{\text{CC}} = 2.0 \ V & 5 & 0 & - & 5 & - & 5 & - \\ \hline V_{\text{CC}} = 4.5 \ V & 5 & 0 & - & 5 & - & 5 & - \\ \hline V_{\text{CC}} = 6.0 \ V & 5 & 0 & - & 5 & - & 5 & - \\ \hline V_{\text{CC}} = 6.0 \ V & 5 & 0 & - & 5 & - & 5 & - \\ \hline V_{\text{CC}} = 6.0 \ V & 5 & 0 & - & 5 & - & 5 & - \\ \hline V_{\text{CC}} = 6.0 \ V & 5 & 0 & - & 5 & - & 5 & - \\ \hline V_{\text{CC}} = 2.0 \ V & 5 & 0 & - & 5 & - & 5 & - \\ \hline V_{\text{CC}} = 2.0 \ V & 5 & 0 & - & 5 & - & 5 & - \\ \hline V_{\text{CC}} = 2.0 \ V & 5 & 0 & - & 5 & - & 5 & - \\ \hline V_{\text{CC}} = 2.0 \ V & 5 & 0 & - & 5 & - & 5 & - \\ \hline V_{\text{CC}} = 4.5 \ V & 5 & 0 & - & 5 & - & 5 & - \\ \hline V_{\text{CC}} = 4.5 \ V & 5 & 0 & - & 5 & - & 5 & - \\ \hline V_{\text{CC}} = 2.0 \ V & 5 & 0 & - & 5 & - & 5 & - \\ \hline V_{\text{CC}} = 2.0 \ V & 5 & 0 & - & 5 & - & 5 & - \\ \hline V_{\text{CC}} = 4.5 \ V & 5 & 0 & - & 5 & - & 5 & - \\ \hline V_{\text{CC}} = 2.0 \ V & 5 & 0 & - & 5 & - & 5 & - \\ \hline V_{\text{CC}} = 2.0 \ V & 5 & 0 & - & 5 & - & 5 & - \\ \hline V_{\text{CC}} = 2.0 \ V & 5 & 0 & - & 5 & - & 5 & - \\ \hline V_{\text{CC}} = 2.0 \ V & 5 & 0 & - & 5 & - & 5 & - \\ \hline V_{\text{CC}} = 2.0 \ V & 5 & 0 & - & 5 & - & 5 & - \\ \hline V_{\text{CC}} = 2.0 \ V & 5 & 0 & - & 5 & - & 5 & - \\ \hline V_{\text{CC}} = 2.0 \ V & 5 & 0 & - & 5 & - & 5 & - \\ \hline V_{\text{CC}} = 2.0 \ V & 5 & 0 & - & 5 & - & 4.8 & - & 4.0 & - \\ \hline V_{\text{CC}} = 2.0 \ V & 5 & $			V <sub>CC</sub> = 4.5 V		-	14	25	-	31	-	38	ns
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$			$V_{CC} = 6.0 \text{ V}$		-	11	21	-	26	-	32	ns
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	t	transition	Qn; see Figure 7	[4]								
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		time	$V_{CC} = 2.0 \text{ V}$		-	14	60	-	75	-	90	ns
$ \begin{array}{c} \text{Pulse width} \\ \text{Figure 8} \\ \text{V}_{CC} = 2.0  \text{V} \\ \text{V}_{CC} = 4.5  \text{V} \\ \text{V}_{CC} = 6.0  \text{V} \\ \text{V}_{CC} = 6.0  \text{V} \\ \text{V}_{CC} = 6.0  \text{V} \\ \text{V}_{CC} = 2.0  \text{V} \\ \text{V}_{CC} = 6.0  \text{V} \\ \text{V}_{CC} = 6.0  \text{V} \\ \text{V}_{CC} = 2.0  \text{V} \\ \text{V}_{CC} = 2.0  \text{V} \\ \text{V}_{CC} = 2.0  \text{V} \\ \text{V}_{CC} = 4.5  \text{V} \\ \text{V}_{CC} = 4.5  \text{V} \\ \text{V}_{CC} = 6.0  \text{V} \\ \text{V}_{CC} = 6.0  \text{V} \\ \text{V}_{CC} = 6.0  \text{V} \\ \text{V}_{CC} = 2.0  \text{V} \\ \text{V}_{C$			V <sub>CC</sub> = 4.5 V		-	5	12	-	15	-	18	ns
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $			V <sub>CC</sub> = 6.0 V		-	4	10	-	13	-	15	ns
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	W	pulse width										
$V_{CC} = 6.0 \text{ V} \qquad 14  4  -  17  -  20  -  15  V_{CC} = 6.0 \text{ V} \qquad 60  6  -  75  -  90  -  18  -  15  V_{CC} = 4.5 \text{ V} \qquad 12  2  -  15  -  18  -  15  -  18  -  15  -$			V <sub>CC</sub> = 2.0 V		80	14	-	100	-	120	-	ns
			V <sub>CC</sub> = 4.5 V		16	5	-	20	-	24	-	ns
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$			$V_{CC} = 6.0 \text{ V}$		14	4	-	17	-	20	-	ns
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	su	set-up time	Dn to CP; see Figure 8									
$V_{CC} = 6.0 \text{ V} \qquad 10  2  -  13  -  15 $			V <sub>CC</sub> = 2.0 V		60	6	-	75	-	90	-	ns
$\begin{array}{cccccccccccccccccccccccccccccccccccc$			V <sub>CC</sub> = 4.5 V		12	2	-	15	-	18	-	ns
$V_{CC} = 2.0 \text{ V} \qquad \qquad 5 \qquad 0 \qquad - \qquad 5 \qquad - \qquad 5 \qquad - \qquad 5 \qquad - \qquad V_{CC} = 4.5 \text{ V} \qquad \qquad 5 \qquad 0 \qquad - \qquad 5 \qquad - \qquad 5 \qquad - \qquad 5 \qquad - \qquad V_{CC} = 6.0 \text{ V} \qquad \qquad 5 \qquad 0 \qquad - \qquad 5 \qquad$			$V_{CC} = 6.0 \text{ V}$		10	2	-	13	-	15	-	ns
$ \frac{V_{CC} = 4.5 \text{ V}}{V_{CC} = 6.0 \text{ V}} \qquad \qquad 5 \qquad 0 \qquad - \qquad 5 \qquad - \qquad 5$	h	hold time	Dn to CP; see Figure 8									
			V <sub>CC</sub> = 2.0 V		5	0	-	5	-	5	-	ns
			V <sub>CC</sub> = 4.5 V		5	0	-	5	-	5	-	ns
frequency $V_{CC} = 2.0 \text{ V}$ $6.0  37  -  4.8  -  4.0  -  V_{CC} = 4.5 \text{ V}$ $30  112  -  24  -  20  -  V_{CC} = 5 \text{ V}; C_L = 15 \text{ pF}$ $-  123  -  -  -  -  -  -  -  -  -  $			V <sub>CC</sub> = 6.0 V		5	0	-	5	-	5	-	ns
frequency $V_{CC} = 2.0 \text{ V}$ $6.0  37  -  4.8  -  4.0  -  V_{CC} = 4.5 \text{ V}$ $30  112  -  24  -  20  -  V_{CC} = 5 \text{ V}; C_L = 15 \text{ pF}$ $-  123  -  -  -  -  -  -  -  -  -  $	max	maximum	CP; see Figure 7									
$V_{CC} = 4.5 \text{ V}$ 30 112 - 24 - 20 - $V_{CC} = 5 \text{ V}$ ; $C_L = 15 \text{ pF}$ - 123			V <sub>CC</sub> = 2.0 V		6.0	37	-	4.8	-	4.0	-	МН
$V_{CC} = 5 \text{ V}; C_L = 15 \text{ pF}$ - 123					30	112	-	24	-	20	-	МН
<u> </u>							-		-		-	МН
					35		-	28	-	24	-	МН

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 Table 7.
 Dynamic characteristics ...continued

Voltages are referenced to GND (ground = 0 V);  $C_L = 50 \text{ pF}$  unless otherwise specified; for test circuit see Figure 10.

Symbol	Parameter	Conditions			25 °C		-40 °C	to +85 °C	-40 °C t	o +125 °C	Unit
				Min	Тур	Max	Min	Max	Min	Max	
$C_{PD}$	power dissipation capacitance	$C_L = 50 \text{ pF}; f = 1 \text{ MHz};$ $V_I = \text{GND to } V_{CC}$	<u>[5]</u>	-	22	-	-	-	-	-	pF
For type	74HCT574-Q	1100									
t <sub>pd</sub>	propagation	CP to Qn; see Figure 7	[1]								
	delay	$V_{CC} = 4.5 \text{ V}$		-	18	33	-	41	-	50	ns
		$V_{CC} = 5 \text{ V}; C_L = 15 \text{ pF}$		-	15	-	-	-	-	-	ns
t <sub>en</sub>	enable time	OE to Qn; see Figure 9	[2]								
		$V_{CC} = 4.5 \text{ V}$		-	19	33	-	41	-	50	ns
t <sub>dis</sub>	disable time	OE to Qn; see Figure 9	[3]								
		V <sub>CC</sub> = 4.5 V		-	16	28	-	35	-	42	ns
t <sub>t</sub> transition		Qn; see Figure 7	[4]								
	time	V <sub>CC</sub> = 4.5 V		-	5	12	-	15	-	18	ns
t <sub>W</sub>	pulse width	CP HIGH or LOW; see Figure 8									
		V <sub>CC</sub> = 4.5 V		16	7	-	20	-	24	-	ns
t <sub>su</sub>	set-up time	Dn to CP; see Figure 8									
		V <sub>CC</sub> = 4.5 V		12	3	-	15	-	18	-	ns
t <sub>h</sub>	hold time	Dn to CP; see Figure 8									
		V <sub>CC</sub> = 4.5 V		5	-1	-	5	-	5	-	ns
f <sub>max</sub>	maximum	CP; see Figure 7									
	frequency	V <sub>CC</sub> = 4.5 V		30	69	-	24	-	20	-	MHz
		$V_{CC} = 5 \text{ V}; C_L = 15 \text{ pF}$		-	76	-	-	-	-	-	MHz
$C_{PD}$	power dissipation capacitance	$C_L = 50 \text{ pF}; f = 1 \text{ MHz};$ $V_I = \text{GND to } V_{CC}$	<u>[5]</u>	-	25	-	-	-	-	-	pF

<sup>[1]</sup>  $t_{pd}$  is the same as  $t_{PLH}$  and  $t_{PHL}$ .

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

f<sub>i</sub> = input frequency in MHz;

f<sub>o</sub> = output frequency in MHz;

 $C_L$  = output load capacitance in pF;

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

N = number of inputs switching;

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

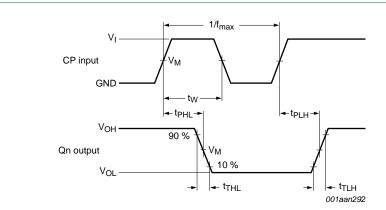
<sup>[2]</sup>  $t_{en}$  is the same as  $t_{PZH}$  and  $t_{PZL}$ .

<sup>[3]</sup>  $t_{dis}$  is the same as  $t_{PLZ}$  and  $t_{PHZ}$ .

<sup>[4]</sup>  $t_t$  is the same as  $t_{THL}$  and  $t_{TLH}$ .

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

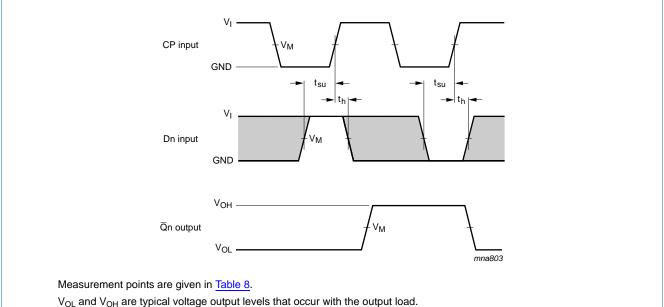
### 11. Waveforms



Measurement points are given in Table 8.

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

Propagation delay input (CP) to output (Qn), output transition time, clock input (CP) pulse width and the Fig 7. maximum frequency (CP)



The data input (D) to clock input (CP) set-up times and clock input (CP) to data input (D) hold times Fig 8.

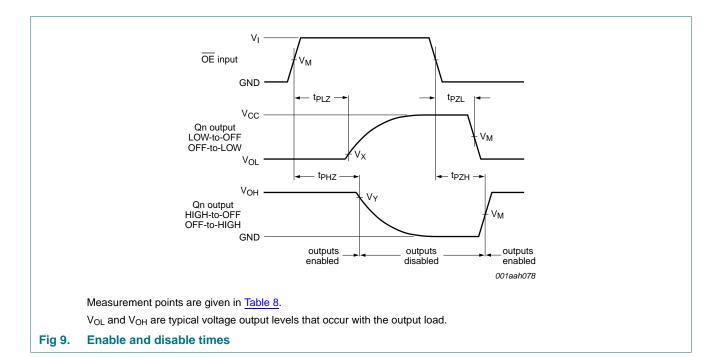
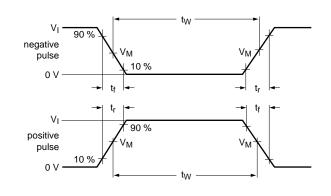
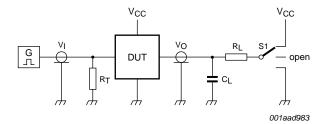


Table 8. Measurement points

Туре	Input	Output		
	V <sub>M</sub>	V <sub>M</sub>	V <sub>X</sub>	V <sub>Y</sub>
74HC574-Q100	0.5V <sub>CC</sub>	0.5V <sub>CC</sub>	0.1V <sub>CC</sub>	0.9V <sub>CC</sub>
74HCT574-Q100	1.3 V	1.3 V	0.1V <sub>CC</sub>	0.9V <sub>CC</sub>

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Test data is given in Table 9.

Definitions test circuit:

 $R_T$  = Termination resistance should be equal to output impedance  $Z_o$  of the pulse generator.

 $C_L$  = Load capacitance including jig and probe capacitance.

 $R_1$  = Load resistance.

S1 = Test selection switch.

Fig 10. Test circuit for measuring switching times

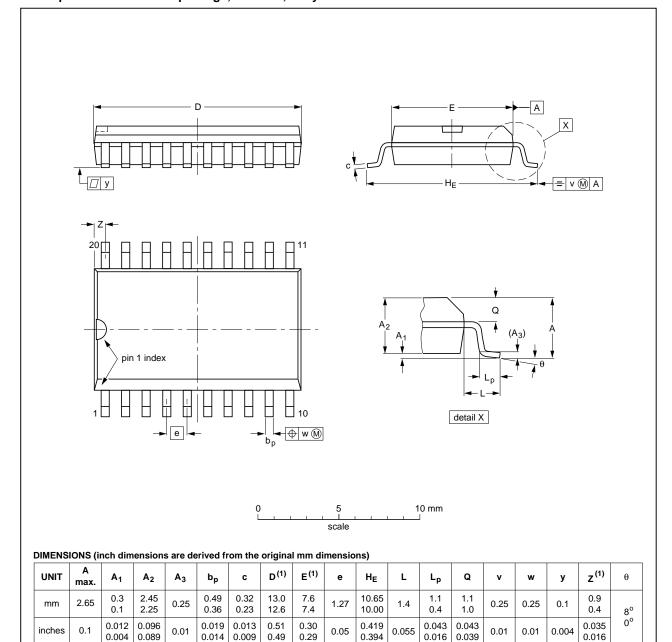
Table 9. Test data

Туре	Input		Load		S1 position		
	VI	t <sub>r</sub> , t <sub>f</sub>	CL	$R_L$	t <sub>PHL</sub> , t <sub>PLH</sub>	t <sub>PZH</sub> , t <sub>PHZ</sub>	t <sub>PZL</sub> , t <sub>PLZ</sub>
74HC574-Q100	$V_{CC}$	6 ns	15 pF, 50 pF	1 kΩ	open	GND	V <sub>CC</sub>
74HCT574-Q100	3 V	6 ns	15 pF, 50 pF	1 kΩ	open	GND	V <sub>CC</sub>

## 12. Package outline

#### SO20: plastic small outline package; 20 leads; body width 7.5 mm

SOT163-1



#### Note

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

OUTLINE		REFER	EUROPEAN	ISSUE DATE		
VERSION	IEC	JEDEC		PROJECTION	ISSUE DATE	
SOT163-1	075E04	MS-013				<del>99-12-27</del> 03-02-19

Fig 11. Package outline SOT163-1 (SO20)

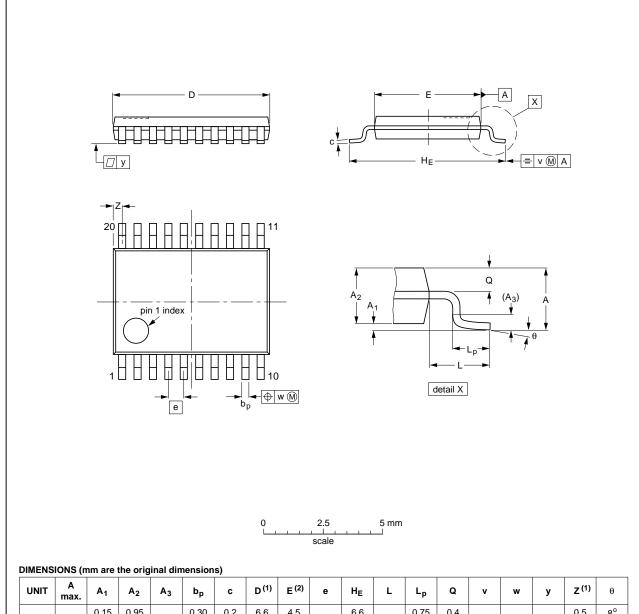
74HC\_HCT574\_Q100

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TSSOP20: plastic thin shrink small outline package; 20 leads; body width 4.4 mm

SOT360-1



Ξ							-,												
	UNIT	A max.	A <sub>1</sub>	A <sub>2</sub>	A <sub>3</sub>	bp	С	D <sup>(1)</sup>	E <sup>(2)</sup>	е	HE	L	Lp	Q	v	w	у	Z <sup>(1)</sup>	θ
	mm	1.1	0.15 0.05	0.95 0.80	0.25	0.30 0.19	0.2 0.1	6.6 6.4	4.5 4.3	0.65	6.6 6.2	1	0.75 0.50	0.4 0.3	0.2	0.13	0.1	0.5 0.2	8° 0°

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

OUTLINE		REFER	EUROPEAN	ISSUE DATE			
VERSION	IEC	JEDEC	JEITA		PROJECTION	ISSUE DATE	
SOT360-1		MO-153				<del>99-12-27</del> 03-02-19	
					1	03-02-19	

Fig 12. Package outline SOT360-1 (TSSOP20)

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## 13. Abbreviations

#### Table 10. Abbreviations

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

## 14. Revision history

#### Table 11. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
74HC_HCT574_Q100 v.1	20120802	Product data sheet	-	-

## 15. Legal information

#### 15.1 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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# 74HC574-Q100; 74HCT574-Q100

#### Octal D-type flip-flop; positive edge-trigger; 3-state

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Octal D-type flip-flop; positive edge-trigger; 3-state

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