

Important notice

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Kind regards,

Team Nexperia

74VHC541-Q100; 74VHCT541-Q100 Octal buffer/line driver; 3-state Rev. 1 — 4 June 2013

Product data sheet

1. **General description**

The 74VHC541-Q100; 74VHCT541-Q100 are high-speed Si-gate CMOS devices.

The 74VHC541-Q100; 74VHCT541-Q100 are octal non-inverting buffer/line drivers with 3-state bus compatible outputs.

The output enable inputs $\overline{OE}0$ and $\overline{OE}1$ control the 3-state outputs.

A HIGH on $\overline{\text{OE}}$ n causes the outputs to assume a high-impedance OFF-state.

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

Features and benefits 2.

- Automotive product qualification in accordance with AEC-Q100 (Grade 1)
 - ◆ Specified from -40 °C to +85 °C and from -40 °C to +125 °C
- Balanced propagation delays
- All inputs have a Schmitt-trigger action
- Inputs accept voltages higher than V_{CC}
- The 74VHC541-Q100 operates with CMOS input level
- The 74VHCT541-Q100 operates with TTL input level
- 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

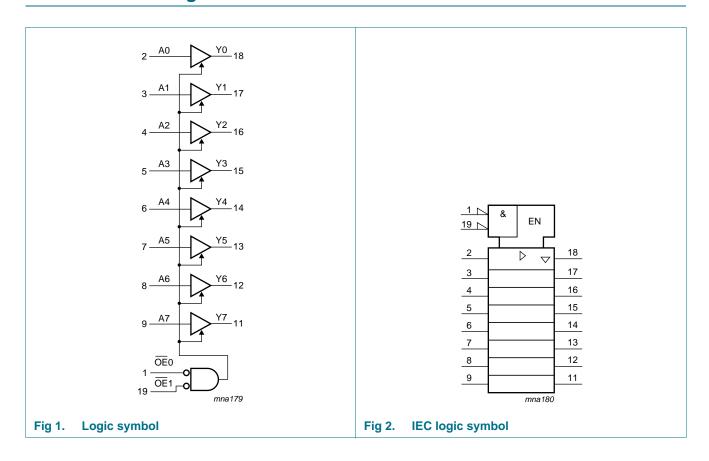


3. Ordering information

Table 1. Ordering information

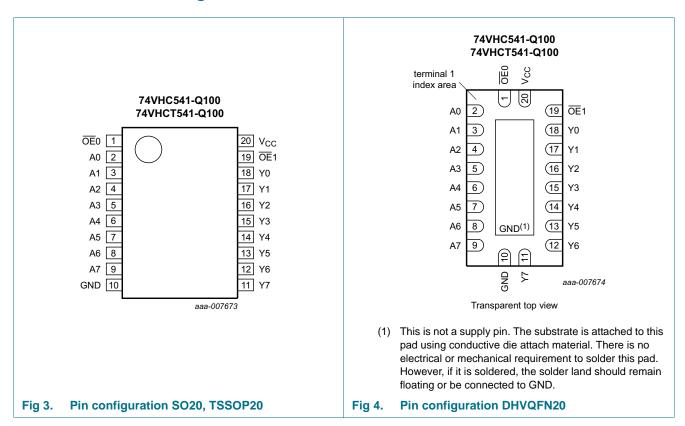
Type number	Package				
	Temperature range	Name	Description	Version	
74VHC541D-Q100	−40 °C to +125 °C	SO20	plastic small outline package; 20 leads;	SOT163-1	
74VHCT541D-Q100			body width 7.5 mm		
74VHC541PW-Q100	−40 °C to +125 °C	TSSOP20	plastic thin shrink small outline package; 20 leads;	SOT360-1	
74VHCT541PW-Q100			body width 4.4 mm		
74VHC541BQ-Q100	−40 °C to +125 °C	DHVQFN20	plastic dual-in-line compatible thermal enhanced	SOT764-1	
74VHCT541BQ-Q100			very thin quad flat package; no leads; 20 terminals; body $2.5 \times 4.5 \times 0.85$ mm		

4. Functional diagram



5. Pinning information

5.1 Pinning



5.2 Pin description

Table 2. Pin description

10010 21	i iii doconpilon	
Symbol	Pin	Description
OE0	1	output enable input (active LOW)
A[0:7]	2, 3, 4, 5, 6, 7, 8, 9	data input
GND	10	ground (0 V)
Y[0:7]	18, 17, 16, 15, 14, 13, 12, 11	data output
OE1	19	output enable input (active LOW)
V _{CC}	20	supply voltage

6. Functional description

Table 3. Functional table[1]

Control		Input	Output
OE0	OE1	An	Yn
L	L	L	L
L	L	Н	Н
Χ	Н	X	Z
Н	X	X	Z

^[1] H = HIGH voltage level;

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	+7.0	V
VI	input voltage		-0.5	+7.0	V
I _{IK}	input clamping current	V _I < -0.5 V	<u>[1]</u> –20	-	mA
I _{OK}	output clamping current	$V_O < -0.5 \text{ V or } V_O > V_{CC} + 0.5 \text{ V}$	<u>[1]</u> -	±20	mA
Io	output current	$V_{O} = -0.5 \text{ V to } (V_{CC} + 0.5 \text{ V})$	-	±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	$T_{amb} = -40 ^{\circ}\text{C} \text{ to } +125 ^{\circ}\text{C}$			
	SO20 package		[2] _	500	mW
	TSSOP20 package		<u>[3]</u> _	500	mW
	DHVQFN20 package		<u>[4]</u> _	500	mW

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

L = LOW voltage level;

X = don't care;

Z = high-impedance OFF-state.

^[2] P_{tot} derates linearly with 8 mW/K above 70 °C.

^[3] P_{tot} derates linearly with 5.5 mW/K above 60 °C.

^[4] Ptot derates linearly with 4.5 mW/K above 60 °C.

8. Recommended operating conditions

Table 5. Recommended operating conditions

Voltages are referenced to GND (ground = 0 V).

Symbol	Parameter	Conditions	74VHC5	41-Q100)	74VHC1	0	Unit	
			Min	Тур	Max	Min	Тур	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
Vo	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	V_{CC} = 3.3 V \pm 0.3 V	-	-	100	-	-	-	ns/V
	and fall rate	$V_{CC} = 5.0 \text{ V} \pm 0.5 \text{ V}$	-	-	20	-	-	20	ns/V

9. Static characteristics

Table 6. Static characteristics

Voltages are referenced to GND (ground = 0 V).

Parameter	Conditions		25 °C		-40 °C 1	to +85 °C	-40 °C t	Unit	
		Min	Тур	Max	Min	Max	Min	Max	
74VHC541-Q1	00								
HIGH-level	V _{CC} = 2.0 V	1.5	-	-	1.5	-	1.5	-	٧
input voltage	V _{CC} = 3.0 V	2.1	-	-	2.1	-	2.1	-	٧
	V _{CC} = 5.5 V	3.85	-	-	3.85	-	3.85	-	٧
LOW-level	V _{CC} = 2.0 V	-	-	0.5	-	0.5	-	0.5	٧
input voltage	V _{CC} = 3.0 V	-	-	0.9	-	0.9	-	0.9	٧
	V _{CC} = 5.5 V	-	-	1.65	-	1.65	-	1.65	V
HIGH-level	$V_I = V_{IH}$ or V_{IL}								
output voltage	$I_{O} = -50 \mu A; V_{CC} = 2.0 V$	1.9	2.0	-	1.9	-	1.9	-	V
	$I_O = -50 \mu A; V_{CC} = 3.0 V$	2.9	3.0	-	2.9	-	2.9	-	V
	$I_O = -50 \mu A; V_{CC} = 4.5 V$	4.4	4.5	-	4.4	-	4.4	-	V
	$I_{O} = -4.0 \text{ mA}; V_{CC} = 3.0 \text{ V}$	2.58	-	-	2.48	-	2.40	-	V
	$I_{O} = -8.0 \text{ mA}; V_{CC} = 4.5 \text{ V}$	3.94	-	-	3.8	-	3.70	-	V
LOW-level	$V_I = V_{IH}$ or V_{IL}								
output voltage	$I_O = 50 \mu A; V_{CC} = 2.0 V$	-	0	0.1	-	0.1	-	0.1	٧
	$I_O = 50 \mu A; V_{CC} = 3.0 \text{ V}$	-	0	0.1	-	0.1	-	0.1	٧
	$I_O = 50 \mu A; V_{CC} = 4.5 V$	-	0	0.1	-	0.1	-	0.1	٧
	$I_O = 4.0 \text{ mA}; V_{CC} = 3.0 \text{ V}$	-	-	0.36	-	0.44	-	0.55	٧
	$I_O = 8.0 \text{ mA}; V_{CC} = 4.5 \text{ V}$	-	-	0.36	-	0.44	-	0.55	٧
OFF-state output current	$V_I = V_{IH} \text{ or } V_{IL};$ $V_O = V_{CC} \text{ or GND};$ $V_{CC} = 5.5 \text{ V}$	-	-	±0.25	-	±2.5	-	±10.0	μА
input leakage current	$V_I = V_{CC}$ or GND; $V_{CC} = 0$ V to 5.5 V	-	-	0.1	-	1.0	-	2.0	μА
supply current	$V_I = V_{CC}$ or GND; $I_O = 0$ A; $V_{CC} = 5.5 \text{ V}$	-	-	4.0	-	40	-	80	μА
	74VHC541-Q1 HIGH-level input voltage LOW-level input voltage HIGH-level output voltage OFF-state output current input leakage current				$ \begin{array}{ c c c c } \hline \textbf{74VHC541-Q100} \\ \hline \textbf{HIGH-level} & V_{CC} = 2.0 \text{ V} & 1.5 & - & - \\ \hline V_{CC} = 3.0 \text{ V} & 2.1 & - & - \\ \hline V_{CC} = 5.5 \text{ V} & 3.85 & - & - \\ \hline \textbf{LOW-level} & V_{CC} = 2.0 \text{ V} & - & 0.5 \\ \hline \textbf{Input voltage} & V_{CC} = 2.0 \text{ V} & - & - & 0.5 \\ \hline \textbf{LOW-level} & V_{CC} = 3.0 \text{ V} & - & - & 0.9 \\ \hline \textbf{V}_{CC} = 3.0 \text{ V} & - & - & 0.9 \\ \hline \textbf{V}_{CC} = 5.5 \text{ V} & - & - & 1.65 \\ \hline \textbf{HIGH-level} & V_{I} = V_{IH} \text{ or } V_{IL} \\ \hline \textbf{I}_{O} = -50 \ \mu \text{A}; \ V_{CC} = 2.0 \text{ V} & 1.9 & 2.0 & - \\ \hline \textbf{I}_{O} = -50 \ \mu \text{A}; \ V_{CC} = 3.0 \text{ V} & 2.9 & 3.0 & - \\ \hline \textbf{I}_{O} = -50 \ \mu \text{A}; \ V_{CC} = 3.0 \text{ V} & 2.9 & 3.0 & - \\ \hline \textbf{I}_{O} = -50 \ \mu \text{A}; \ V_{CC} = 3.0 \text{ V} & 2.58 & - & - \\ \hline \textbf{I}_{O} = -4.0 \ \text{mA}; \ V_{CC} = 4.5 \text{ V} & 3.94 & - & - \\ \hline \textbf{I}_{O} = -8.0 \ \text{mA}; \ V_{CC} = 4.5 \text{ V} & 3.94 & - & - \\ \hline \textbf{I}_{O} = -8.0 \ \text{mA}; \ V_{CC} = 3.0 \text{ V} & 2.58 & - & - \\ \hline \textbf{I}_{O} = -8.0 \ \text{mA}; \ V_{CC} = 3.0 \text{ V} & 2.58 & - & - \\ \hline \textbf{I}_{O} = -8.0 \ \text{mA}; \ V_{CC} = 3.0 \text{ V} & 2.58 & - & - \\ \hline \textbf{I}_{O} = -8.0 \ \text{mA}; \ V_{CC} = 3.0 \text{ V} & - & 0 & 0.1 \\ \hline \textbf{I}_{O} = 50 \ \mu \text{A}; \ V_{CC} = 2.0 \text{ V} & - & 0 & 0.1 \\ \hline \textbf{I}_{O} = 50 \ \mu \text{A}; \ V_{CC} = 3.0 \text{ V} & - & 0 & 0.1 \\ \hline \textbf{I}_{O} = 50 \ \mu \text{A}; \ V_{CC} = 3.0 \text{ V} & - & 0 & 0.1 \\ \hline \textbf{I}_{O} = 50 \ \mu \text{A}; \ V_{CC} = 3.0 \text{ V} & - & 0 & 0.1 \\ \hline \textbf{I}_{O} = 50 \ \mu \text{A}; \ V_{CC} = 3.0 \text{ V} & - & 0 & 0.1 \\ \hline \textbf{I}_{O} = 50 \ \mu \text{A}; \ V_{CC} = 3.0 \text{ V} & - & 0 & 0.1 \\ \hline \textbf{I}_{O} = 8.0 \ \text{mA}; \ V_{CC} = 4.5 \text{ V} & - & 0 & 0.1 \\ \hline \textbf{I}_{O} = 8.0 \ \text{mA}; \ V_{CC} = 4.5 \text{ V} & - & 0 & 0.36 \\ \hline \textbf{I}_{O} = 8.0 \ \text{mA}; \ V_{CC} = 4.5 \text{ V} & - & - & 0.36 \\ \hline \textbf{I}_{O} = 8.0 \ \text{mA}; \ V_{CC} = 4.5 \text{ V} & - & - & 0.36 \\ \hline \textbf{I}_{O} = 8.0 \ \text{mA}; \ V_{CC} = 4.5 \text{ V} & - & - & 0.36 \\ \hline \textbf{I}_{O} = 8.0 \ \text{mA}; \ V_{CC} = 4.5 \text{ V} & - & - & 0.36 \\ \hline \textbf{I}_{O} = 8.0 \ \text{mA}; \ V_{CC} = 3.0 \text{ V} & - & - & 0.36 \\ \hline \textbf{I}_{O} = 8.0 \ \text{mA}; \ V_{CC} = 0.0 \ \text{ V}; \ V_{CC} = 0.0 \ \text{ V}; \ V_{CC} = 0.0 \ \text{ V}; \ V_{CC} = 0.0 \ $	$ \begin{array}{ c c c c c c } \hline \textbf{74VHC541-Q100} \\ \hline \textbf{HIGH-level} & V_{CC} = 2.0 \text{ V} & 1.5 & - & - & 1.5 \\ \hline \textbf{V}_{CC} = 3.0 \text{ V} & 2.1 & - & - & 2.1 \\ \hline \textbf{V}_{CC} = 5.5 \text{ V} & 3.85 & - & - & 3.85 \\ \hline \textbf{LOW-level} & V_{CC} = 2.0 \text{ V} & - & - & 0.5 & - \\ \hline \textbf{Input voltage} & V_{CC} = 2.0 \text{ V} & - & - & 0.5 & - \\ \hline \textbf{V}_{CC} = 3.0 \text{ V} & - & - & 0.9 & - \\ \hline \textbf{V}_{CC} = 3.0 \text{ V} & - & - & 0.9 & - \\ \hline \textbf{V}_{CC} = 5.5 \text{ V} & - & - & 1.65 & - \\ \hline \textbf{HIGH-level} & V_{I} = V_{IH} \text{ or } V_{IL} \\ \hline \textbf{I}_{O} = -50 \text{ μA}; \text{ $V_{CC} = 2.0 \text{ V}} & 1.9 & 2.0 & - & 1.9 \\ \hline \textbf{I}_{O} = -50 \text{ μA}; \text{ $V_{CC} = 3.0 \text{ V}} & 2.9 & 3.0 & - & 2.9 \\ \hline \textbf{I}_{O} = -50 \text{ μA}; \text{ $V_{CC} = 3.0 \text{ V}} & 2.9 & 3.0 & - & 2.9 \\ \hline \textbf{I}_{O} = -50 \text{ μA}; \text{ $V_{CC} = 3.0 \text{ V}} & 2.58 & - & - & 2.48 \\ \hline \textbf{I}_{O} = -8.0 \text{ mA}; \text{ $V_{CC} = 3.0 \text{ V}} & 2.58 & - & - & 2.48 \\ \hline \textbf{I}_{O} = -8.0 \text{ mA}; \text{ $V_{CC} = 4.5 \text{ V}} & 3.94 & - & - & 3.8 \\ \hline \textbf{LOW-level} & \textbf{V}_{I} = \textbf{V}_{IH} \text{ or } \textbf{V}_{IL} \\ \hline \textbf{I}_{O} = 50 \text{ μA}; \text{ $V_{CC} = 2.0 \text{ V}} & - & 0 & 0.1 & - \\ \hline \textbf{I}_{O} = 50 \text{ μA}; \text{ $V_{CC} = 2.0 \text{ V}} & - & 0 & 0.1 & - \\ \hline \textbf{I}_{O} = 50 \text{ μA}; \text{ $V_{CC} = 2.0 \text{ V}} & - & 0 & 0.1 & - \\ \hline \textbf{I}_{O} = 50 \text{ μA}; \text{ $V_{CC} = 3.0 \text{ V}} & - & 0 & 0.1 & - \\ \hline \textbf{I}_{O} = 50 \text{ μA}; \text{ $V_{CC} = 3.0 \text{ V}} & - & 0 & 0.1 & - \\ \hline \textbf{I}_{O} = 50 \text{ μA}; \text{ $V_{CC} = 3.0 \text{ V}} & - & 0 & 0.1 & - \\ \hline \textbf{I}_{O} = 8.0 \text{ mA}; \text{ $V_{CC} = 4.5 \text{ V}} & - & 0 & 0.36 & - \\ \hline \textbf{I}_{O} = 8.0 \text{ mA}; \text{ $V_{CC} = 4.5 \text{ V}} & - & 0 & 0.36 & - \\ \hline \textbf{I}_{O} = 8.0 \text{ mA}; \text{ $V_{CC} = 4.5 \text{ V}} & - & - & 0.36 & - \\ \hline \textbf{I}_{O} = 8.0 \text{ mA}; \text{ $V_{CC} = 4.5 \text{ V}} & - & - & 0.36 & - \\ \hline \textbf{I}_{O} = 8.0 \text{ mA}; \text{ $V_{CC} = 3.0 \text{ V}} & - & - & 0.36 & - \\ \hline \textbf{I}_{O} = 8.0 \text{ mA}; \text{ $V_{CC} = 3.0 \text{ V}} & - & - & 0.36 & - \\ \hline \textbf{I}_{O} = 8.0 \text{ mA}; \text{ $V_{CC} = 3.0 \text{ V}} & - & - & 0.36 & - \\ \hline \textbf{I}_{O} = 8.0 \text{ mA}; \text{ $V_{CC} = 3.0 \text{ V}} & - & - & 0.36 & - \\ \hline \textbf{I}_{O} = 8.0 \text{ mA}; \text{ $V_{CC} = 3.0 \text{ V}} & - & - & 0.36 & - $	$ \begin{array}{ c c c c c c c } \hline \textbf{74VHC541-Q100} \\ \hline \textbf{74VHC541-Q100} \\ \hline \textbf{HIGH-level} & V_{CC} = 2.0 \ V & 1.5 & - & - & 1.5 & - \\ \hline \textbf{V}_{CC} = 3.0 \ V & 2.1 & - & - & 2.1 & - \\ \hline \textbf{V}_{CC} = 5.5 \ V & 3.85 & - & - & 3.85 & - \\ \hline \textbf{LOW-level} & V_{CC} = 2.0 \ V & - & - & 0.5 & - & 0.5 \\ \hline \textbf{Input voltage} & V_{CC} = 2.0 \ V & - & - & 0.5 & - & 0.5 \\ \hline \textbf{V}_{CC} = 3.0 \ V & - & - & 0.9 & - & 0.9 \\ \hline \textbf{V}_{CC} = 5.5 \ V & - & - & 1.65 & - & 1.65 \\ \hline \textbf{HIGH-level} & V_{I} = V_{IH} \ \text{or } V_{IL} \\ \hline \textbf{Output voltage} & V_{I} = V_{IH} \ \text{or } V_{IL} \\ \hline \textbf{I}_{O} = -50 \ \mu \text{A; } V_{CC} = 2.0 \ V & 1.9 & 2.0 & - & 1.9 & - \\ \hline \textbf{I}_{O} = -50 \ \mu \text{A; } V_{CC} = 3.0 \ V & 2.9 & 3.0 & - & 2.9 & - \\ \hline \textbf{I}_{O} = -50 \ \mu \text{A; } V_{CC} = 3.0 \ V & 2.9 & 3.0 & - & 2.9 & - \\ \hline \textbf{I}_{O} = -50 \ \mu \text{A; } V_{CC} = 4.5 \ V & 4.4 & 4.5 & - & 4.4 & - \\ \hline \textbf{I}_{O} = -8.0 \ \text{mA; } V_{CC} = 4.5 \ V & 3.94 & - & - & 3.8 & - \\ \hline \textbf{LOW-level} & V_{I} = V_{IH} \ \text{or } V_{IL} \\ \hline \textbf{Output voltage} & V_{I} = V_{IH} \ \text{or } V_{IL} \\ \hline \textbf{I}_{O} = 50 \ \mu \text{A; } V_{CC} = 2.0 \ V & - & 0 & 0.1 & - & 0.1 \\ \hline \textbf{I}_{O} = 50 \ \mu \text{A; } V_{CC} = 3.0 \ V & - & 0 & 0.1 & - & 0.1 \\ \hline \textbf{I}_{O} = 50 \ \mu \text{A; } V_{CC} = 3.0 \ V & - & 0 & 0.1 & - & 0.1 \\ \hline \textbf{I}_{O} = 50 \ \mu \text{A; } V_{CC} = 3.0 \ V & - & 0 & 0.1 & - & 0.1 \\ \hline \textbf{I}_{O} = 50 \ \mu \text{A; } V_{CC} = 3.0 \ V & - & 0 & 0.1 & - & 0.1 \\ \hline \textbf{I}_{O} = 50 \ \mu \text{A; } V_{CC} = 3.0 \ V & - & 0 & 0.1 & - & 0.1 \\ \hline \textbf{I}_{O} = 50 \ \mu \text{A; } V_{CC} = 3.0 \ V & - & 0 & 0.1 & - & 0.1 \\ \hline \textbf{I}_{O} = 50 \ \mu \text{A; } V_{CC} = 3.0 \ V & - & 0 & 0.1 & - & 0.1 \\ \hline \textbf{I}_{O} = 50 \ \mu \text{A; } V_{CC} = 4.5 \ V & - & 0 & 0.1 & - & 0.1 \\ \hline \textbf{I}_{O} = 4.0 \ \text{mA; } V_{CC} = 4.5 \ V & - & 0 & 0.1 & - & 0.1 \\ \hline \textbf{I}_{O} = 8.0 \ \text{mA; } V_{CC} = 4.5 \ V & - & 0 & 0.1 & - & 0.1 \\ \hline \textbf{I}_{O} = 8.0 \ \text{mA; } V_{CC} = 4.5 \ V & - & 0 & 0.1 & - & 0.1 \\ \hline \textbf{I}_{O} = 8.0 \ \text{mA; } V_{CC} = 4.5 \ V & - & 0 & 0.36 & - & 0.44 \\ \hline \textbf{OFF-state} & V_{I} = V_{IL} \ \text{or } GND; \\ V_{CC} = 5.5 \ V & \text{input leakage} \\ \text{current} & V_{I} = V_{CC} $	$ \begin{array}{ c c c c c c c c c } \hline \textbf{74VHC541-Q100} \\ \hline \textbf{74VHC541-Q100} \\ \hline \textbf{HIGH-level} \\ \text{input voltage} \\ \hline \textbf{PIGH-level} \\ \text{input voltage} \\ \hline \textbf{PV}_{CC} = 3.0 \ V \\ \hline \textbf{V}_{CC} = 5.5 \ V \\ \hline \textbf{V}_{CC} = 3.0 \ V \\ \hline \textbf{V}_{CC} = 5.5 \ V \\ \hline \textbf{V}_{CC} = 3.0 \ V \\ \hline \textbf{V}_{CC} = 5.5 \ V \\ \hline \textbf{V}_{CC} = 3.0 \ V \\ \hline \textbf{V}_{CC} = 5.5 \ V \\ \hline \textbf{V}_{CC} = 3.0 \ V \\ \hline \textbf{V}_$	Min Typ Max Min Max Min Max

Table 6. Static characteristics ...continued Voltages are referenced to GND (ground = 0 V).

Symbol	Parameter	Conditions		25 °C		-40 °C	to +85 °C	-40 °C t	Unit	
			Min	Тур	Max	Min	Max	Min	Max	
C _I	input capacitance		-	3.0	10	-	10	-	10	pF
Co	output capacitance		-	4.0	-	-	-	-	-	pF
For type	74VHCT541-Q	100								
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	$V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}$	-	-	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 = -50 μA	4.4	4.5	-	4.4	-	4.4	-	V
		$I_0 = -8.0 \text{ mA}$	3.94	-	-	3.8	-	3.70	-	V
V _{OL}	LOW-level	$V_I = V_{IH}$ or V_{IL} ; $V_{CC} = 4.5 \text{ V}$								
	output voltage	I _O = 50 μA	-	0	0.1	-	0.1	-	0.1	V
		$I_0 = 8.0 \text{ mA}$	-	-	0.36	-	0.44	-	0.55	V
l _{OZ}	OFF-state output current	per input pin; $V_I = V_{IH}$ or V_{IL} ; $V_{CC} = 5.5$ V; $I_O = 0$ A; $V_O = V_{CC}$ or GND; other pins at V_{CC} or GND	-	-	±0.25	-	±2.5	-	±10.0	μА
II	input leakage current	$V_I = V_{CC}$ or GND; $V_{CC} = 0$ V to 5.5 V	-	-	0.1	-	1.0	-	2.0	μА
I _{CC}	supply current	$V_I = V_{CC}$ or GND; $I_O = 0$ A; $V_{CC} = 5.5 \text{ V}$	-	-	4.0	-	40	-	80	μА
ΔI_{CC}	additional supply current	per input pin; $V_{I} = V_{CC} - 2.1 \text{ V; } I_{O} = 0 \text{ A;}$ other pins at V_{CC} or GND; $V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}$	-	-	1.35	-	1.5	-	1.5	mA
C _I	input capacitance		-	3	10	-	10	-	10	pF
Co	output capacitance		-	4.0	-	-	-	-	-	pF

10. Dynamic characteristics

Table 7. Dynamic characteristics

GND = 0 V. For test circuit, see Figure 7.

Symbol	Parameter	Conditions			25 °C		-40 °C	to +85 °C	-40 °C 1	o +125 °C	Unit
				Min	Typ[1]	Max	Min	Max	Min	Max	
For type	74VHC541-Q	100	·		'			'			
t _{pd}	propagation	An to Yn; see Figure 5	[2]								
	delay	$V_{CC} = 3.0 \text{ V to } 3.6 \text{ V}$									
		$C_L = 15 pF$		-	5.0	7.0	1.0	8.5	1.0	9.0	ns
		$C_L = 50 pF$		-	7.0	10.5	1.0	12.0	1.0	13.5	ns
		$V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}$									
		C _L = 15 pF		-	3.5	5.0	1.0	6.0	1.0	6.5	ns
		$C_L = 50 pF$			5.0	7.0	1.0	8.0	1.0	9.0	ns
t _{en} enable time		OEn to Yn; see Figure 6	[2]								
		$V_{CC} = 3.0 \text{ V to } 3.6 \text{ V}$									
		C _L = 15 pF		-	5.5	10.5	1.0	11.0	1.0	13.5	ns
		$C_L = 50 pF$		-	7.5	14.0	1.0	16.0	1.0	17.5	ns
		$V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}$									
		C _L = 15 pF		-	3.5	7.2	1.0	8.5	1.0	9.0	ns
		$C_L = 50 pF$		-	5.0	9.2	1.0	10.5	1.0	11.5	ns
t _{dis}	disable time	OEn to Yn; see Figure 6	[2]								
		$V_{CC} = 3.0 \text{ V to } 3.6 \text{ V}$									
		C _L = 15 pF		-	6.0	11.0	1.0	12.0	1.0	14.0	ns
		$C_L = 50 pF$		-	9.5	15.4	1.0	17.5	1.0	19.5	ns
		$V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}$									
		C _L = 15 pF		-	4.5	7.5	1.0	8.0	1.0	9.5	ns
		$C_L = 50 pF$		-	6.5	8.8	1.0	10.0	1.0	11.0	ns
C_{PD}	power dissipation capacitance	C_L = 50 pF; f_i = 1 MHz; V_I = GND to V_{CC}	[3]	-	10	-	-	-	-	-	pF

 Table 7.
 Dynamic characteristics ...continued

GND = 0 V. For test circuit, see <u>Figure 7</u>.

Symbol	Parameter	Conditions			25 °C		-40 °C	to +85 °C	-40 °C t	o +125 °C	Unit
				Min	Typ[1]	Max	Min	Max	Min	Max	
For type	74VHCT541-	Q100						ı	1	1	
t _{pd}	propagation	An to Yn; see Figure 5	[2]								
	delay	$V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}$									
		C _L = 15 pF		-	3.5	5.5	1.0	6.5	1.0	7.0	ns
		$C_L = 50 pF$		-	5.0	8.5	1.0	9.5	1.0	11.0	ns
t _{en}	enable time	OEn to Yn; see Figure 6									
		$V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}$									
		C _L = 15 pF		-	4.0	7.0	1.0	8.0	1.0	9.0	ns
		$C_L = 50 pF$		-	5.5	10.0	1.0	12.0	1.0	12.5	ns
t _{dis}	disable time	OEn to Yn; see Figure 6	[2]								
		$V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}$									
		C _L = 15 pF		-	5.0	7.0	1.0	8.0	1.0	9.0	ns
		C _L = 50 pF		-	7.0	10.0	1.0	12.0	1.0	12.5	ns
C_{PD}	power dissipation capacitance	per buffer; $C_L = 50 \text{ pF}$; $f = 1 \text{ MHz}$; $V_I = \text{GND to } V_{CC}$	<u>[3]</u>	-	12	-	-	-	-	-	pF

- [1] Typical values are measured at nominal supply voltage ($V_{CC} = 3.3 \text{ V}$ and $V_{CC} = 5.0 \text{ V}$).
- [2] t_{pd} is the same as t_{PLH} and t_{PHL} .

 t_{en} is the same as t_{PZL} and t_{PZH} .

 t_{dis} is the same as t_{PLZ} and $t_{\text{PHZ}}.$

[3] C_{PD} is used to determine the dynamic power dissipation P_D (μW).

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

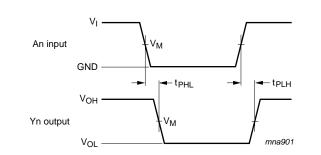
 f_i = input frequency in MHz;

 $f_o = output frequency in MHz;$

 C_L = output load capacitance in pF;

V_{CC} = supply voltage in Volts.

11. Waveforms



Measurement points are given in Table 8.

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

Fig 5. Propagation delay input (An) to output (Yn)

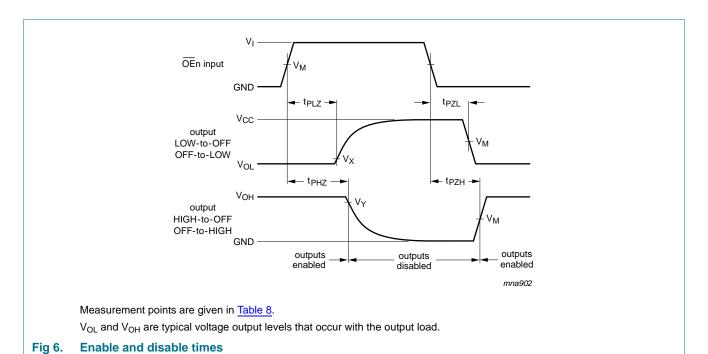


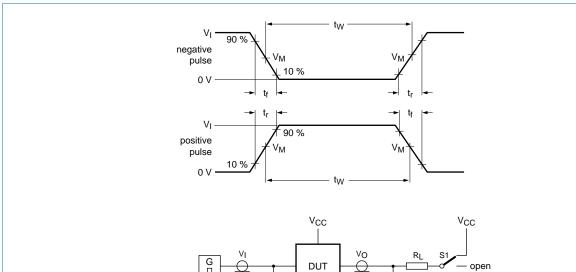
Table 8. Measurement points

Туре	Input	Output	Output			
	V _M	V _M	V _X	V _Y		
74VHC541-Q100	0.5V _{CC}	0.5V _{CC}	V _{OL} + 0.3 V	$V_{OH} - 0.3 V$		
74VHCT541-Q100	1.5 V	0.5V _{CC}	V _{OL} + 0.3 V	$V_{OH} - 0.3 V$		

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001aad983

Octal buffer/line driver; 3-state



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_L = Load resistor

S1 = Test selection switch

Fig 7. Load circuitry for switching times

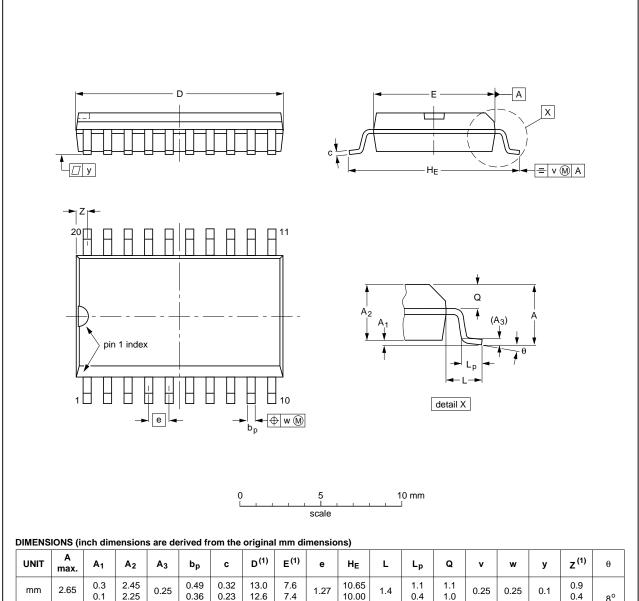
Table 9. Test data

Туре	Input		Load		S1 position				
	VI	t _r , t _f	C _L	R _L	t _{PHL} , t _{PLH}	t _{PZH} , t _{PHZ}	t _{PZL} , t _{PLZ}		
74VHC541-Q100	V_{CC}	3.0 ns	15 pF, 50 pF	1 kΩ	open	GND	V_{CC}		
74VHCT541-Q100	3.0 V	3.0 ns	15 pF, 50 pF	1 kΩ	open	GND	V _{CC}		

12. Package outline

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

SOT163-1



UNIT	A max.	A ₁	A ₂	А3	bp	С	D ⁽¹⁾	E ⁽¹⁾	е	HE	L	Lp	Q	v	w	у	z ⁽¹⁾	θ
mm	2.65	0.3 0.1	2.45 2.25	0.25	0.49 0.36	0.32 0.23	13.0 12.6	7.6 7.4	1.27	10.65 10.00	1.4	1.1 0.4	1.1 1.0	0.25	0.25	0.1	0.9 0.4	8°
inches	0.1	0.012 0.004	0.096 0.089	0.01	0.019 0.014	0.013 0.009	0.51 0.49	0.30 0.29	0.05	0.419 0.394	0.055	0.043 0.016	0.043 0.039	0.01	0.01	0.004	0.035 0.016	0°

Note

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

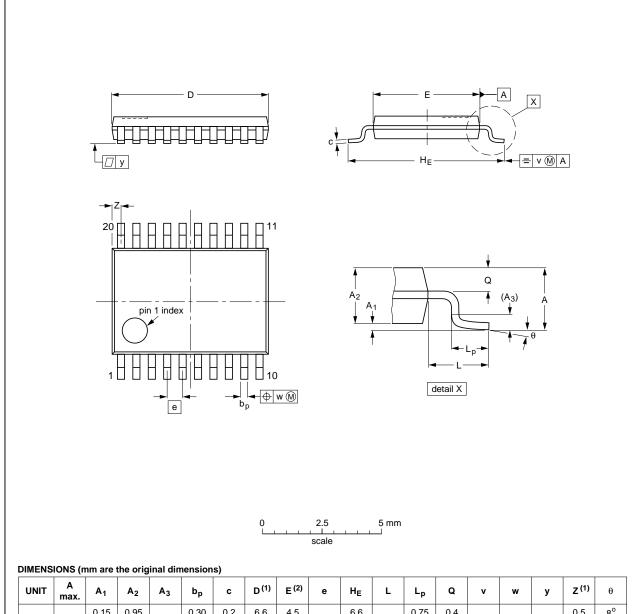
OUTLINE VERSION		REFER	EUROPEAN	ISSUE DATE		
	IEC	JEDEC	JEITA		PROJECTION	ISSUE DATE
SOT163-1	075E04	MS-013				99-12-27 03-02-19

Fig 8. Package outline SOT163-1 (SO20)

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

SOT360-1



UNIT	A max.	A ₁	A ₂	A ₃	bp	С	D ⁽¹⁾	E ⁽²⁾	е	HE	L	Lp	Q	v	w	у	Z ⁽¹⁾	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				99-12-27 03-02-19	

Fig 9. Package outline SOT360-1 (TSSOP20)

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DHVQFN20: plastic dual in-line compatible thermal enhanced very thin quad flat package; no leads; 20 terminals; body 2.5 x 4.5 x 0.85 mm SOT764-1

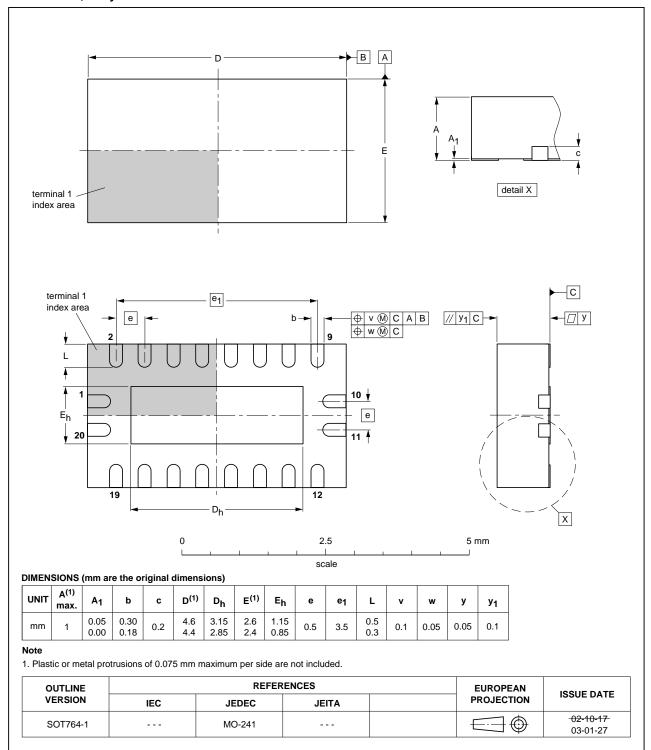


Fig 10. Package outline SOT764-1 (DHVQFN20)

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13. Abbreviations

Table 10. Abbreviations

Acronym	Description
CDM	Charged Device Model
CMOS	Complementary Metal Oxide Semiconductor
DUT	Device Under Test
ESD	ElectroStatic Discharge
НВМ	Human Body Model
MIL	Military
MM	Machine Model
TTL	Transistor-Transistor Logic

14. Revision history

Table 11. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
74VHC_VHCT541 v.1	20130604	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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