

74HC2G17-Q100; 74HCT2G17-Q100

Dual non-inverting Schmitt trigger

Rev. 3 — 4 December 2023

Product data sheet

1. General description

The 74HC2G17-Q100; 74HCT2G17-Q100 are dual buffers with Schmitt-trigger inputs. Inputs include clamp diodes. This enables the use of current limiting resistors to interface inputs to voltages in excess of V_{CC} . Schmitt trigger inputs transform slowly changing input signals into sharply defined jitter-free output signals.

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 6.0 V
- CMOS low power dissipation
- High noise immunity
- Unlimited input rise and fall times
- Balanced propagation delays
- Input levels:
 - For 74HC2G17-Q100: CMOS level
 - For 74HCT2G17-Q100: TTL level
- Latch-up performance exceeds 100 mA per JESD 78 Class II Level B
- Complies with JEDEC standards:
 - JESD8C (2.7 V to 3.6 V)
 - JESD7A (2.0 V to 6.0 V)
- ESD protection:
 - HBM: ANSI/ESDA/JEDEC JS-001 class 2 exceeds 2000 V
 - CDM: ANSI/ESDA/JEDEC JS-002 class C3 exceeds 1000 V

3. Applications

- Wave and pulse shaper for highly noisy environments
- Astable multivibrators
- Monostable multivibrators

4. Ordering information

Table 1. Ordering information

Type number	Package			
	Temperature range	Name	Description	Version
74HC2G17GW-Q100	-40 °C to +125 °C	TSSOP6	plastic thin shrink small outline package; 6 leads; body width 1.25 mm	SOT363-2
74HCT2G17GW-Q100				
74HC2G17GV-Q100	-40 °C to +125 °C	SC-74; TSOP6	plastic surface-mounted package; 6 leads	SOT457
74HCT2G17GV-Q100				

5. Marking

Table 2. Marking

Type number	Marking code[1]
74HC2G17GW-Q100	HV
74HCT2G17GW-Q100	TV
74HC2G17GV-Q100	HV
74HCT2G17GV-Q100	TV

[1] The pin 1 indicator is located on the lower left corner of the device, below the marking code.

6. Functional diagram

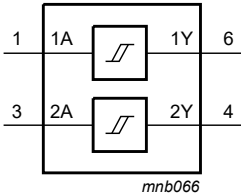


Fig. 1. Logic symbol

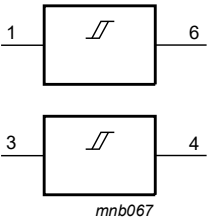


Fig. 2. IEC logic symbol

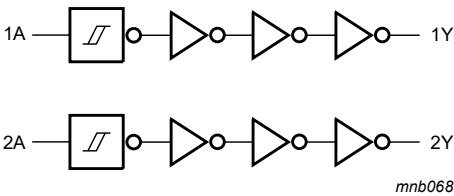


Fig. 3. Logic diagram

7. Pinning information

7.1. Pinning

74HC2G17
74HCT2G17

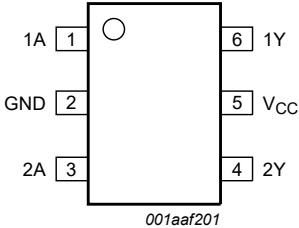


Fig. 4. Pin configuration SOT363-2 (TSSOP6) and SOT457 (SC-74; TSOP6)

7.2. Pin description

Table 3. Pin description

Symbol	Pin	Description
1A	1	data input
GND	2	ground (0 V)
2A	3	data input
2Y	4	data output
V _{CC}	5	supply voltage
1Y	6	data output

8. Functional description

Table 4. Function table

H = HIGH voltage level; L = LOW voltage level.

Input	Output
nA	nY
L	L
H	H

9. Limiting values

Table 5. 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
I _{IK}	input clamping current	V _I < -0.5 V or V _I > V _{CC} + 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	mA
I _O	output current	V _O = -0.5 V to V _{CC} + 0.5 V [1]	-	±25	mA
I _{CC}	supply current	[1]	-	50	mA
I _{GND}	ground current	[1]	-	-50	mA
T _{stg}	storage temperature		-65	+150	°C
P _{tot}	total power dissipation	[2]	-	250	mW

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

[2] For SOT363-2 (TSSOP6) package: P_{tot} derates linearly with 3.7 mW/K above 83 °C.
For SOT457 (SC-74; TSOP6) package: P_{tot} derates linearly with 4.1 mW/K above 89 °C.

10. Recommended operating conditions

Table 6. Recommended operating conditions

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
74HC2G17-Q100						
V _{CC}	supply voltage		2.0	5.0	6.0	V
V _I	input voltage		0	-	V _{CC}	V
V _O	output voltage		0	-	V _{CC}	V
T _{amb}	ambient temperature		-40	+25	+125	°C
74HCT2G17-Q100						
V _{CC}	supply voltage		4.5	5.0	5.5	V
V _I	input voltage		0	-	V _{CC}	V
V _O	output voltage		0	-	V _{CC}	V
T _{amb}	ambient temperature		-40	+25	+125	°C

11. Static characteristics

Table 7. Static characteristics for 74HC2G17-Q100

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
T_{amb} = 25 °C						
V _{OH}	HIGH-level output voltage	V _I = V _{T+} or V _{T-}				
		I _O = -20 µA; V _{CC} = 2.0 V	1.9	2.0	-	V
		I _O = -20 µA; V _{CC} = 4.5 V	4.4	4.5	-	V
		I _O = -20 µA; V _{CC} = 6.0 V	5.9	6.0	-	V
		I _O = -4.0 mA; V _{CC} = 4.5 V	4.18	4.32	-	V
		I _O = -5.2 mA; V _{CC} = 6.0 V	5.68	5.81	-	V
V _{OL}	LOW-level output voltage	V _I = V _{T+} or V _{T-}				
		I _O = 20 µA; V _{CC} = 2.0 V	-	0	0.1	V
		I _O = 20 µA; V _{CC} = 4.5 V	-	0	0.1	V
		I _O = 20 µA; V _{CC} = 6.0 V	-	0	0.1	V
		I _O = 4.0 mA; V _{CC} = 4.5 V	-	0.15	0.26	V
		I _O = 5.2 mA; V _{CC} = 6.0 V	-	0.16	0.26	V
I _I	input leakage current	V _I = GND or V _{CC} ; V _{CC} = 6.0 V	-	-	±0.1	µA
I _{CC}	supply current	V _I = GND or V _{CC} ; I _O = 0 A; V _{CC} = 6.0 V	-	-	1.0	µA
C _I	input capacitance		-	2.0	-	pF
T_{amb} = -40 °C to +85 °C						
V _{OH}	HIGH-level output voltage	V _I = V _{T+} or V _{T-}				
		I _O = -20 µA; V _{CC} = 2.0 V	1.9	-	-	V
		I _O = -20 µA; V _{CC} = 4.5 V	4.4	-	-	V
		I _O = -20 µA; V _{CC} = 6.0 V	5.9	-	-	V
		I _O = -4.0 mA; V _{CC} = 4.5 V	4.13	-	-	V
		I _O = -5.2 mA; V _{CC} = 6.0 V	5.63	-	-	V
V _{OL}	LOW-level output voltage	V _I = V _{T+} or V _{T-}				
		I _O = 20 µA; V _{CC} = 2.0 V	-	-	0.1	V
		I _O = 20 µA; V _{CC} = 4.5 V	-	-	0.1	V
		I _O = 20 µA; V _{CC} = 6.0 V	-	-	0.1	V
		I _O = 4.0 mA; V _{CC} = 4.5 V	-	-	0.33	V
		I _O = 5.2 mA; V _{CC} = 6.0 V	-	-	0.33	V
I _I	input leakage current	V _I = GND or V _{CC} ; V _{CC} = 6.0 V	-	-	±1.0	µA
I _{CC}	supply current	V _I = GND or V _{CC} ; I _O = 0 A; V _{CC} = 6.0 V	-	-	10.0	µA

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
T_{amb} = -40 °C to +125 °C						
V _{OH}	HIGH-level output voltage	V _I = V _{T+} or V _{T-}				
		I _O = -20 µA; V _{CC} = 2.0 V	1.9	-	-	V
		I _O = -20 µA; V _{CC} = 4.5 V	4.4	-	-	V
		I _O = -20 µA; V _{CC} = 6.0 V	5.9	-	-	V
		I _O = -4.0 mA; V _{CC} = 4.5 V	3.7	-	-	V
		I _O = -5.2 mA; V _{CC} = 6.0 V	5.2	-	-	V
V _{OL}	LOW-level output voltage	V _I = V _{T+} or V _{T-}				
		I _O = 20 µA; V _{CC} = 2.0 V	-	-	0.1	V
		I _O = 20 µA; V _{CC} = 4.5 V	-	-	0.1	V
		I _O = 20 µA; V _{CC} = 6.0 V	-	-	0.1	V
		I _O = 4.0 mA; V _{CC} = 4.5 V	-	-	0.4	V
		I _O = 5.2 mA; V _{CC} = 6.0 V	-	-	0.4	V
I _I	input leakage current	V _I = GND or V _{CC} ; V _{CC} = 6.0 V	-	-	±1.0	µA
I _{CC}	supply current	V _I = GND or V _{CC} ; I _O = 0 A; V _{CC} = 6.0 V	-	-	20.0	µA

Table 8. Static characteristics for 74HCT2G17-Q100

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
T_{amb} = 25 °C						
V _{OH}	HIGH-level output voltage	V _I = V _{T+} or V _{T-} ; V _{CC} = 4.5 V				
		I _O = -20 µA	4.4	4.5	-	V
		I _O = -4.0 mA	4.18	4.32	-	V
V _{OL}	LOW-level output voltage	V _I = V _{T+} or V _{T-} ; V _{CC} = 4.5 V				
		I _O = -20 µA	-	0	0.1	V
		I _O = -4.0 mA	-	0.15	0.26	V
I _I	input leakage current	V _I = GND or V _{CC} ; V _{CC} = 5.5 V	-	-	±0.1	µA
I _{CC}	supply current	V _I = GND or V _{CC} ; I _O = 0 A; V _{CC} = 5.5 V	-	-	1.0	µA
ΔI _{CC}	additional supply current	V _I = V _{CC} - 2.1 V; V _{CC} = 4.5 V to 5.5 V; I _O = 0 A	-	-	300	µA
C _I	input capacitance		-	2.0	-	pF
T_{amb} = -40 °C to +85 °C						
V _{OH}	HIGH-level output voltage	V _I = V _{T+} or V _{T-} ; V _{CC} = 4.5 V				
		I _O = -20 µA	4.4	-	-	V
		I _O = -4.0 mA	4.13	-	-	V
V _{OL}	LOW-level output voltage	V _I = V _{T+} or V _{T-} ; V _{CC} = 4.5 V				
		I _O = -20 µA	-	-	0.1	V
		I _O = -4.0 mA	-	-	0.33	V
I _I	input leakage current	V _I = GND or V _{CC} ; V _{CC} = 5.5 V	-	-	±1.0	µA
I _{CC}	supply current	V _I = GND or V _{CC} ; I _O = 0 A; V _{CC} = 5.5 V	-	-	10.0	µA
ΔI _{CC}	additional supply current	V _I = V _{CC} - 2.1 V; V _{CC} = 4.5 V to 5.5 V; I _O = 0 A	-	-	375	µA

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
T_{amb} = -40 °C to +125 °C						
V _{OH}	HIGH-level output voltage	V _I = V _{T+} or V _{T-} ; V _{CC} = 4.5 V				
		I _O = -20 µA	4.4	-	-	V
		I _O = -4.0 mA	3.7	-	-	V
V _{OL}	LOW-level output voltage	V _I = V _{T+} or V _{T-} ; V _{CC} = 4.5 V				
		I _O = -20 µA	-	-	0.1	V
		I _O = -4.0 mA	-	-	0.4	V
I _I	input leakage current	V _I = GND or V _{CC} ; V _{CC} = 5.5 V	-	-	±1.0	µA
I _{CC}	supply current	V _I = GND or V _{CC} ; I _O = 0 A; V _{CC} = 5.5 V	-	-	20.0	µA
ΔI _{CC}	additional supply current	V _I = V _{CC} - 2.1 V; V _{CC} = 4.5 V to 5.5 V; I _O = 0 A	-	-	410	µA

12. Dynamic characteristics

Table 9. Dynamic characteristics

Voltages are referenced to GND (ground = 0 V); for test circuit see Fig. 6.

Symbol	Parameter	Conditions	25 °C			-40 °C to +85 °C		-40 °C to +125 °C		Unit
			Min	Typ	Max	Min	Max	Min	Max	
74HC2G17-Q100										
t _{pd}	propagation delay	nA to nY; see Fig. 5 [1]								
		V _{CC} = 2.0 V; C _L = 50 pF	-	36	115	-	140	-	175	ns
		V _{CC} = 4.5 V; C _L = 50 pF	-	12	22	-	27	-	34	ns
		V _{CC} = 6.0 V; C _L = 50 pF	-	10	18	-	22	-	28	ns
t _t	transition time	nY; see Fig. 5 [2]								
		V _{CC} = 2.0 V; C _L = 50 pF	-	20	75	-	95	-	110	ns
		V _{CC} = 4.5 V; C _L = 50 pF	-	7	15	-	19	-	22	ns
		V _{CC} = 6.0 V; C _L = 50 pF	-	5	13	-	16	-	19	ns
C _{PD}	power dissipation capacitance	V _I = GND to V _{CC} [3]	-	10	-	-	-	-	-	pF
74HCT2G17-Q100										
t _{pd}	propagation delay	nA to nY; see Fig. 5 [1]								
		V _{CC} = 4.5 V; C _L = 50 pF	-	21	29	-	36	-	45	ns
t _t	transition time	nY; see Fig. 5 [2]								
		V _{CC} = 4.5 V; C _L = 50 pF	-	6	15	-	19	-	22	ns
C _{PD}	power dissipation capacitance	V _I = GND to V _{CC} - 1.5 V [3]	-	10	-	-	-	-	-	pF

[1] t_{pd} is the same as t_{PLH} and t_{PHL}

[2] t_t is the same as t_{TLH} and t_{THL}

[3] C_{PD} is used to determine the dynamic power dissipation (P_D in µW). P_D = C_{PD} × V_{CC}² × f_i × N + Σ(C_L × V_{CC}² × 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;

Σ(C_L × V_{CC}² × f_o) = sum of the outputs.

12.1. Waveforms and test circuit

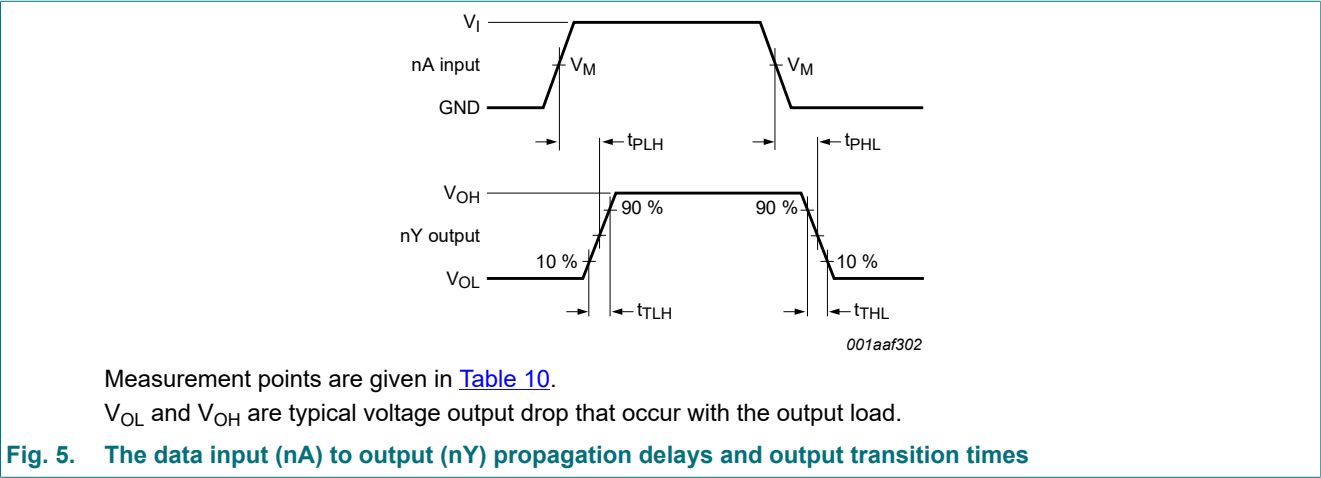


Table 10. Measurement points

Type	Input			Output
	V_M	V_I	$t_r = t_f$	V_M
74HC2G17-Q100	$0.5V_{CC}$	GND to V_{CC}	6.0 ns	$0.5V_{CC}$
74HCT2G17-Q100	1.3 V	GND to 3.0 V	6.0 ns	1.3 V

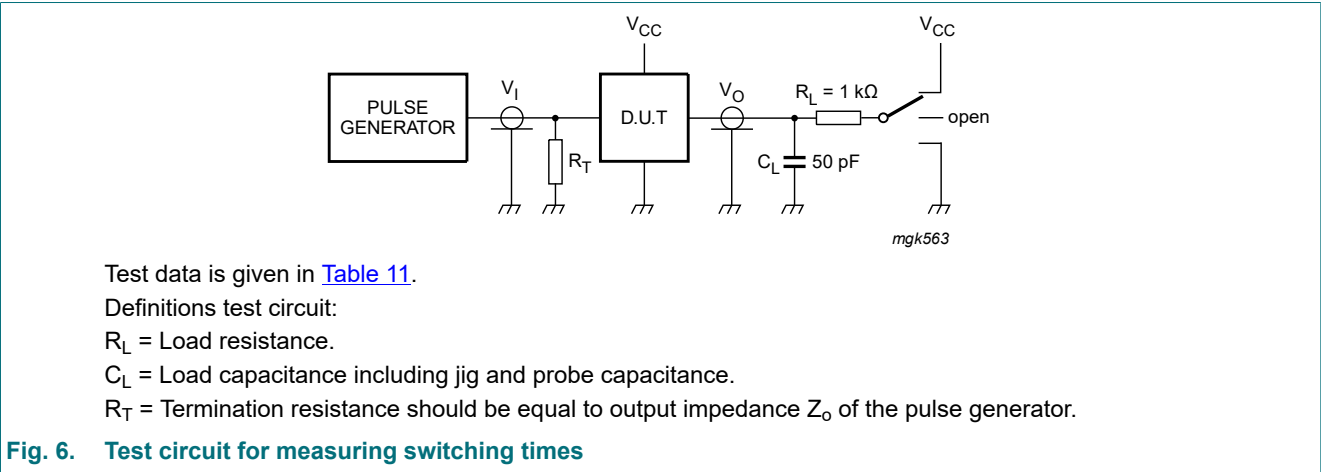


Table 11. Test data

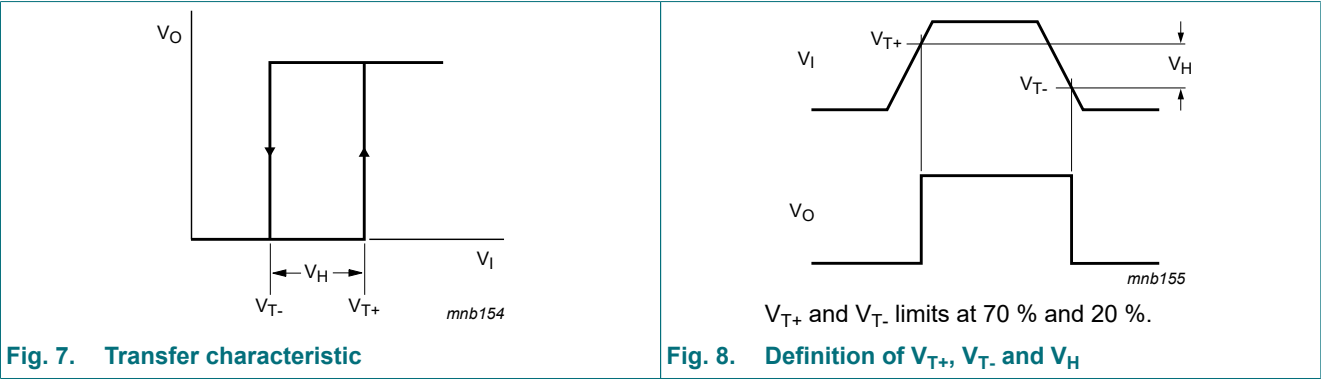
Type	Input		Test
	V_I	t_r, t_f	t_{PHL}, t_{PLH}
74HC2G17-Q100	GND to V_{CC}	6 ns	open
74HCT2G17-Q100	GND to 3.0 V	6 ns	open

13. Transfer characteristics

Table 12. Transfer characteristics
 Voltages are referenced to GND (ground = 0 V); for test circuit see Fig. 6.

Symbol	Parameter	Conditions	25 °C			-40 °C to +85 °C		-40 °C to +125 °C		Unit
			Min	Typ	Max	Min	Max	Min	Max	
74HC2G17-Q100										
V _{T+}	positive-going threshold voltage	see Fig. 7 , Fig. 8								
		V _{CC} = 2.0 V	1.00	1.18	1.50	1.00	1.50	1.00	1.50	V
		V _{CC} = 4.5 V	2.30	2.60	3.15	2.30	3.15	2.30	3.15	V
		V _{CC} = 6.0 V	3.00	3.46	4.20	3.00	4.20	3.00	4.20	V
V _{T-}	negative-going threshold voltage	see Fig. 7 , Fig. 8								
		V _{CC} = 2.0 V	0.30	0.60	0.90	0.30	0.90	0.30	0.90	V
		V _{CC} = 4.5 V	1.13	1.47	2.00	1.13	2.00	1.13	2.00	V
		V _{CC} = 6.0 V	1.50	2.06	2.60	1.50	2.60	1.50	2.60	V
V _H	hysteresis voltage	V _{T+} - V _{T-} ; see Fig. 7 , Fig. 8 and Fig. 9								
		V _{CC} = 2.0 V	0.30	0.60	1.00	0.30	1.00	0.30	1.00	V
		V _{CC} = 4.5 V	0.60	1.13	1.40	0.60	1.40	0.60	1.40	V
		V _{CC} = 6.0 V	0.80	1.40	1.70	0.80	1.70	0.80	1.70	V
74HCT2G17-Q100										
V _{T+}	positive-going threshold voltage	see Fig. 7 and Fig. 8								
		V _{CC} = 4.5 V	1.20	1.58	1.90	1.20	1.90	1.20	1.90	V
		V _{CC} = 5.5 V	1.40	1.78	2.10	1.40	2.10	1.40	2.10	V
V _{T-}	negative-going threshold voltage	see Fig. 7 and Fig. 8								
		V _{CC} = 4.5 V	0.50	0.87	1.20	0.50	1.20	0.50	1.20	V
		V _{CC} = 5.5 V	0.60	1.11	1.40	0.60	1.40	0.60	1.40	V
V _H	hysteresis voltage	V _{T+} - V _{T-} ; see Fig. 7 , Fig. 8 and Fig. 10								
		V _{CC} = 4.5 V	0.40	0.71	-	0.40	-	0.40	-	V
		V _{CC} = 5.5 V	0.40	0.67	-	0.40	-	0.40	-	V

13.1. Waveforms transfer characteristics



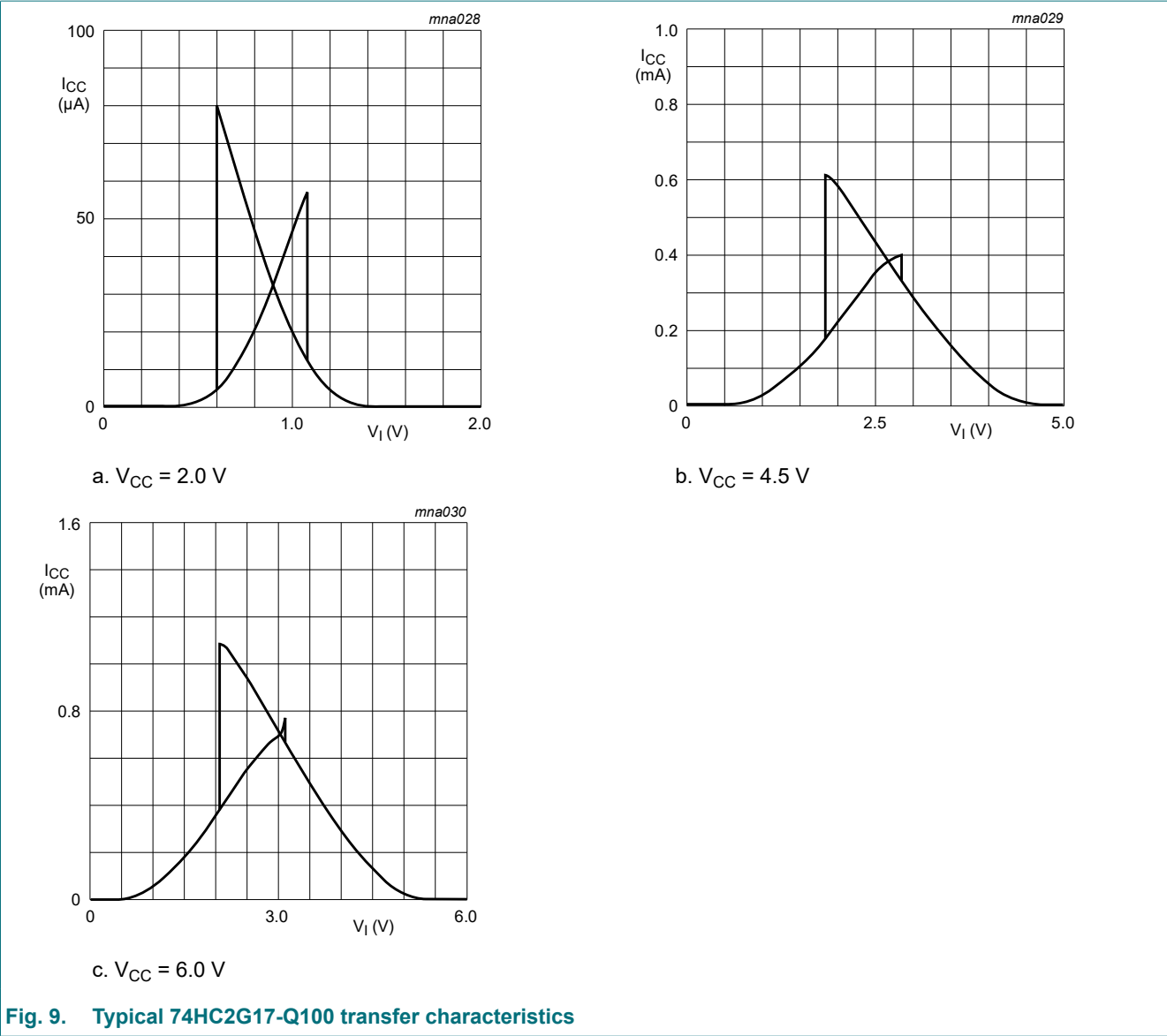


Fig. 9. Typical 74HC2G17-Q100 transfer characteristics

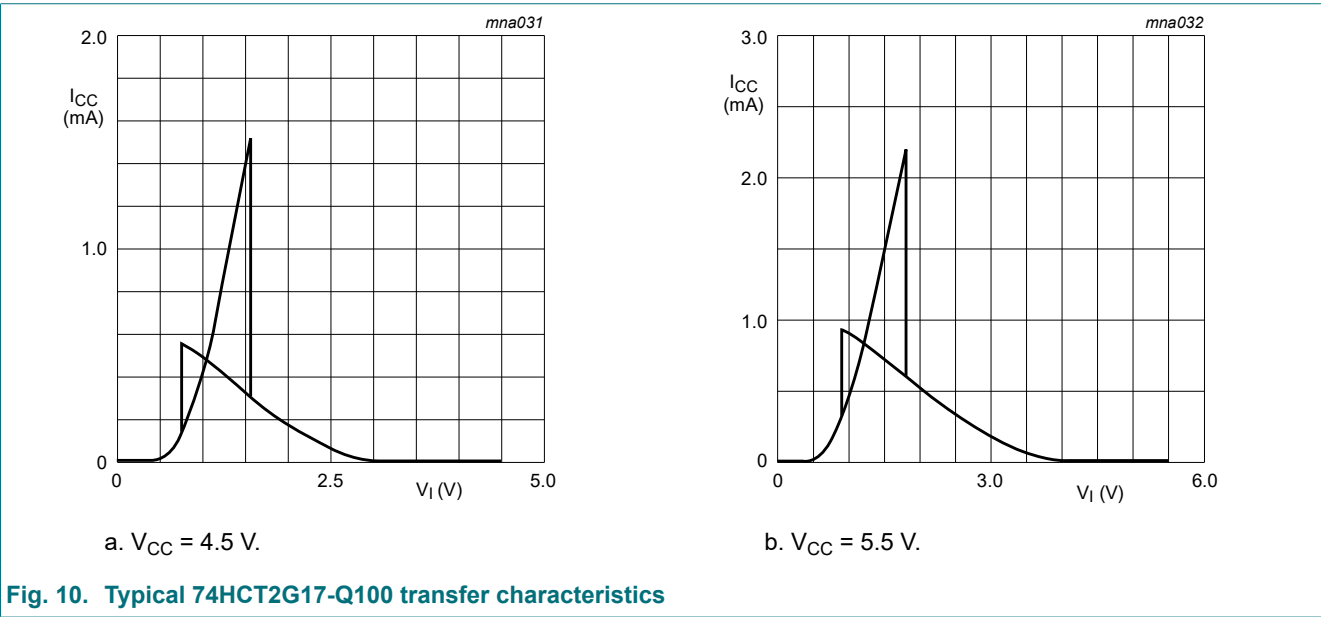


Fig. 10. Typical 74HCT2G17-Q100 transfer characteristics

14. Application information

The slow input rise and fall times cause additional power dissipation, this can be calculated using the following formula:

$$P_{\text{add}} = f_i \times (t_r \times \Delta I_{\text{CC(AV)}} + t_f \times \Delta I_{\text{CC(AV)}}) \times V_{\text{CC}} \text{ where:}$$

P_{add} = additional power dissipation (μW);

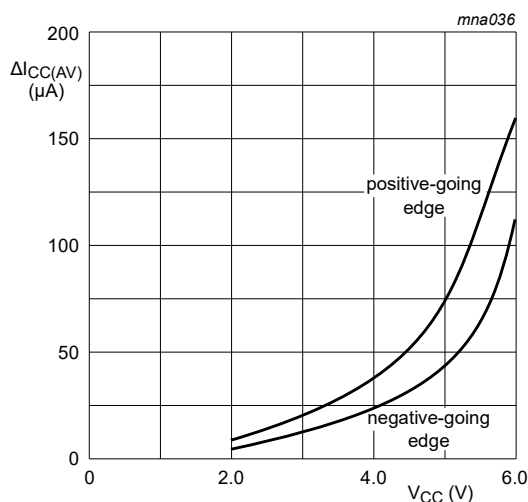
f_i = input frequency (MHz);

t_r = input rise time (ns); 10 % to 90 %;

t_f = input fall time (ns); 90 % to 10 %;

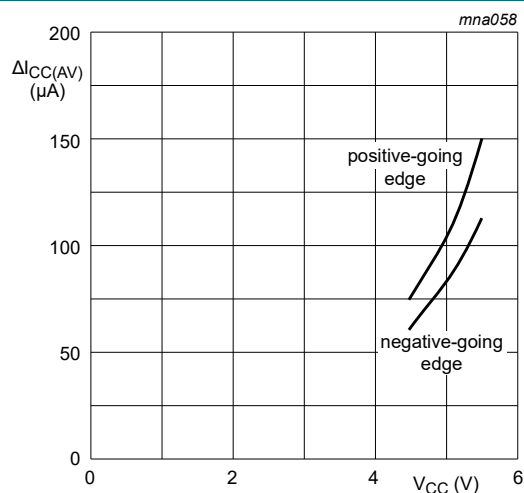
$\Delta I_{\text{CC(AV)}}$ = average additional supply current (μA).

$\Delta I_{\text{CC(AV)}}$ differs with positive or negative input transitions, as shown in Fig. 11 and Fig. 12.



Linear change of V_i between $0.1V_{\text{CC}}$ to $0.9V_{\text{CC}}$

Fig. 11. $\Delta I_{\text{CC(AV)}}$ as a function of V_{CC} for 74HC2G17-Q100



Linear change of V_i between $0.1V_{\text{CC}}$ to $0.9V_{\text{CC}}$

Fig. 12. $\Delta I_{\text{CC(AV)}}$ as a function of V_{CC} for 74HCT2G17-Q100

15. Package outline

TSSOP6: plastic thin shrink small outline package; 6 leads; body width 1.25 mm

SOT363-2

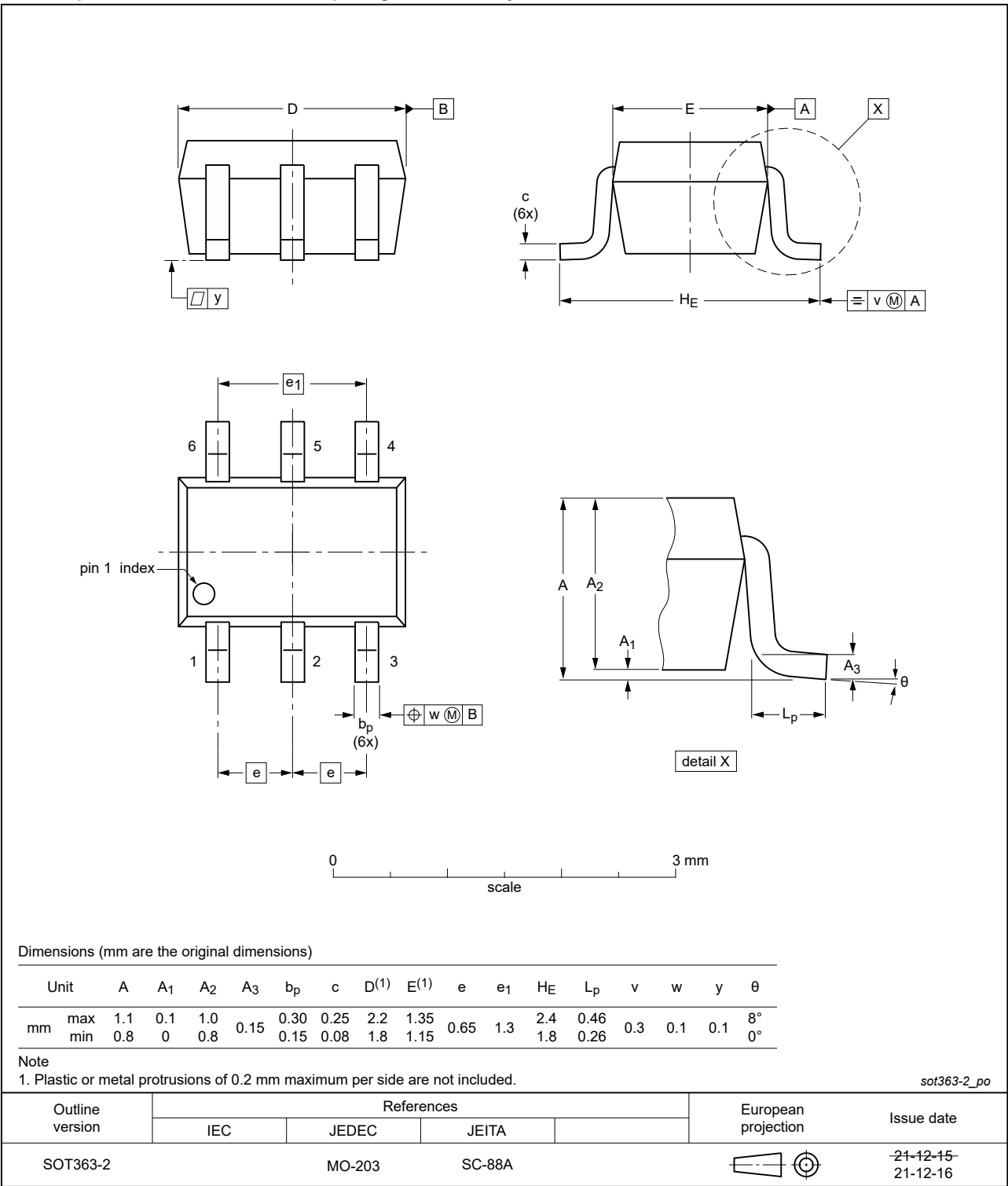


Fig. 13. Package outline SOT363-2 (TSSOP6)

Plastic, surface-mounted package (SC-74; TSOP6); 6 leadsSOT457

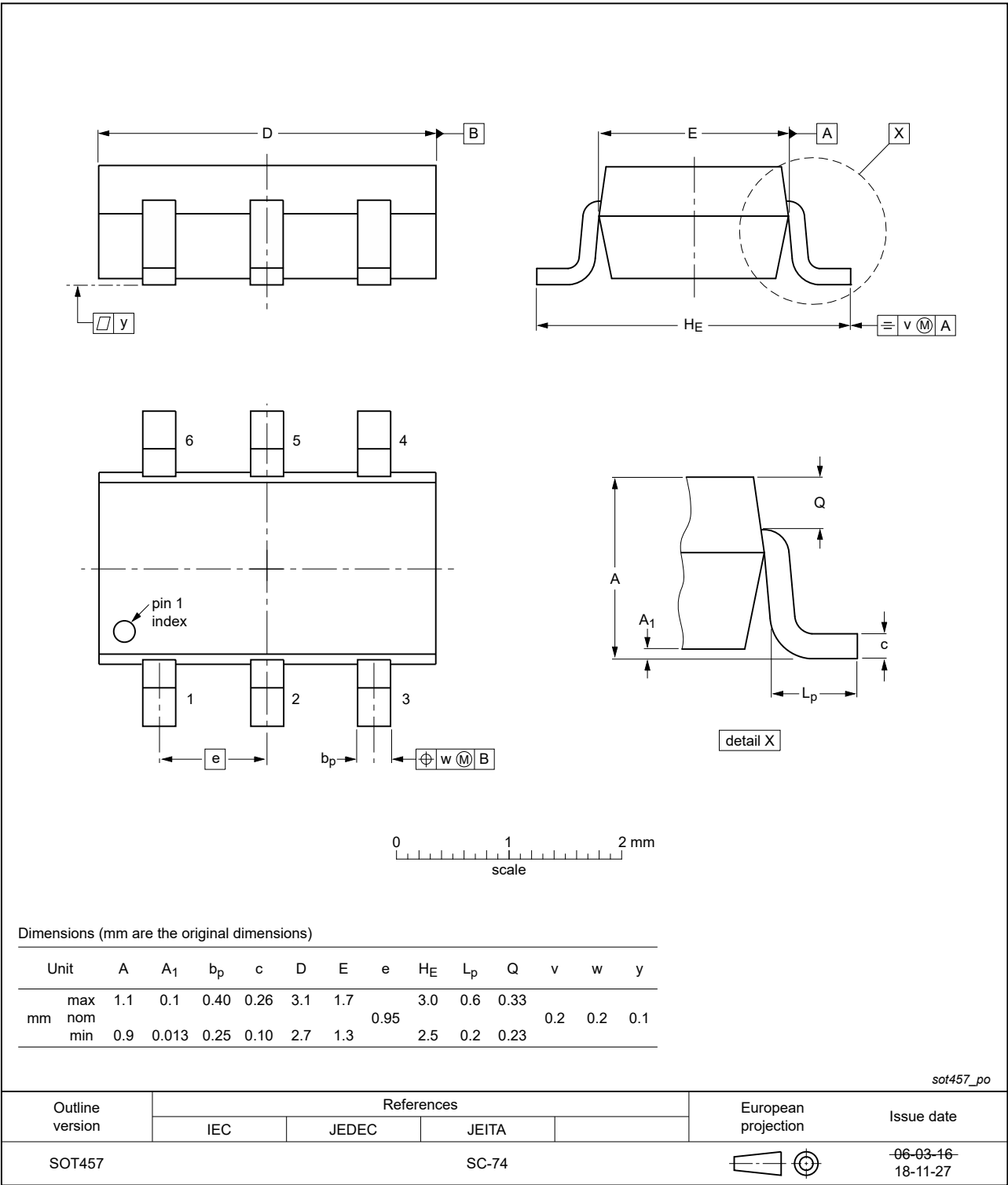


Fig. 14. Package outline SOT457 (SC-74; TSOP6)

16. Abbreviations

Table 13. Abbreviations

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

17. Revision history

Table 14. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
74HC_HCT2G17_Q100 v.3	20231204	Product data sheet	-	74HC_HCT2G17_Q100 v.2
Modifications:	• Section 2: ESD specification updated according to the latest JEDEC standard.			
74HC_HCT2G17_Q100 v.2	20220202	Product data sheet	-	74HC_HCT2G17_Q100 v.1
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. • Package SOT363 (SC-88) changed to SOT363-2 (TSSOP6). • Section 2 updated. • Section 9: Derating values for P_{tot} total power dissipation updated. • Fig. 14: Package outline drawing SOT457 (SC-74; TSOP6) updated.			
74HC_HCT2G17_Q100 v.1	20130522	Product data sheet	-	-

18. 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.

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Contents

1. General description.....	1
2. Features and benefits.....	1
3. Applications.....	1
4. Ordering information.....	1
5. Marking.....	2
6. Functional diagram.....	2
7. Pinning information.....	2
7.1. Pinning.....	2
7.2. Pin description.....	2
8. Functional description.....	3
9. Limiting values.....	3
10. Recommended operating conditions.....	3
11. Static characteristics.....	4
12. Dynamic characteristics.....	6
12.1. Waveforms and test circuit.....	7
13. Transfer characteristics.....	8
13.1. Waveforms transfer characteristics.....	8
14. Application information.....	10
15. Package outline.....	11
16. Abbreviations.....	13
17. Revision history.....	13
18. Legal information.....	14

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