74AHC132; 74AHCT132

Quad 2-input NAND Schmitt trigger

Rev. 04 — 7 February 2005 Product data sheet

1. General description

The 74AHC132; 74AHCT132 is a high-speed Si-gate CMOS device and is pin compatible with Low-power Schottky TTL (LSTTL). The device is specified in compliance with JEDEC standard No. 7A.

The 74AHC132; 74AHCT132 contains four 2-input NAND gates which accept standard input signals. They are capable of transforming slowly changing input signals into sharply defined, jitter free output signals.

The gate switches at different points for positive-going and negative-going signals. The difference between the positive voltage V_{T+} and the negative V_{T-} is defined as the hysteresis voltage V_H.

2. Features

- Balanced propagation delays
- Inputs accepts voltages higher than V_{CC}
- For 74AHC132 only: operates with CMOS input levels
- For 74AHCT132 only: operates with TTL input levels
- ESD protection:
  - HBM EIA/JESD22-A114-B exceeds 2000 V
  - MM EIA/JESD22-A115-A exceeds 200 V
  - CDM EIA/JESD22-C101 exceeds 1000 V
- Specified from –40 °C to +85 °C and from –40 °C to +125 °C

3. Quick reference data

Table 1: Quick reference data

GND = 0 V; T_{amb} = 25 °C; $t_r = t_f \leq 3.0$ ns.

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Type 74AHC132							
t_{PHL}, t_{PLH}	propagation delay nA to nY	C_L = 15 pF; V_{CC} = 5 V		-	3.3	-	ns
C_I	input capacitance	V_I = V_{CC} or GND		-	3.0	-	pF
C_O	output capacitance			-	4.0	-	pF
C_{PD}	power dissipation capacitance	C_L = 50 pF; f = 1 MHz	[1] [2]	-	11	-	pF

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Table 1: Quick reference data *...continued*

GND = 0 V; T_{amb} = 25 °C; $t_r = t_f \leq 3.0$ ns.

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Type 74AHCT132							
t_{PHL}, t_{PLH}	propagation delay nA to nY	C_L = 15 pF; V_{CC} = 5 V		-	3.5	-	ns
C_I	input capacitance	$V_I = V_{CC}$ or GND		-	3.0	-	pF
C_O	output capacitance			-	4.0	-	pF
C_{PD}	power dissipation capacitance	C_L = 50 pF; f = 1 MHz	[1] [2]	-	14	-	pF

[1] 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 outputs.

[2] The condition is V_I = GND to V_{CC}.

4. Ordering information

Table 2: Ordering information

Type number	Package			
	Temperature range	Name	Description	Version
74AHC132D	–40 °C to +125 °C	SO14	plastic small outline package; 14 leads; body width 3.9 mm	SOT108-1
74AHC132PW	–40 °C to +125 °C	TSSOP14	plastic thin shrink small outline package; 14 leads; body width 4.4 mm	SOT402-1
74AHC132BQ	–40 °C to +125 °C	DHVQFN14	plastic dual in-line compatible thermal enhanced very thin quad flat package; no leads; 14 terminals; body 2.5 × 3 × 0.85 mm	SOT762-1
74AHCT132D	–40 °C to +125 °C	SO14	plastic small outline package; 14 leads; body width 3.9 mm	SOT108-1
74AHCT132PW	–40 °C to +125 °C	TSSOP14	plastic thin shrink small outline package; 14 leads; body width 4.4 mm	SOT402-1
74AHCT132BQ	–40 °C to +125 °C	DHVQFN14	plastic dual in-line compatible thermal enhanced very thin quad flat package; no leads; 14 terminals; body 2.5 × 3 × 0.85 mm	SOT762-1

5. Functional diagram

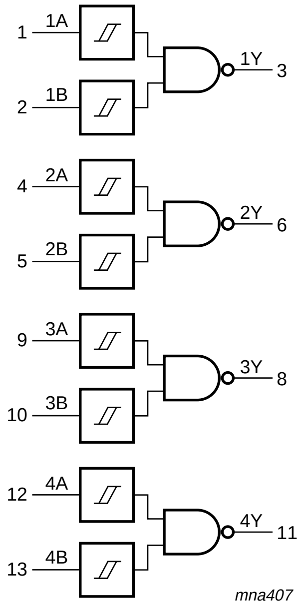


Fig 1. Logic symbol

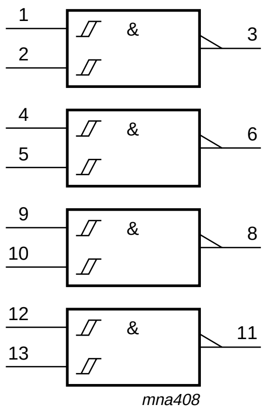


Fig 2. IEC logic symbol

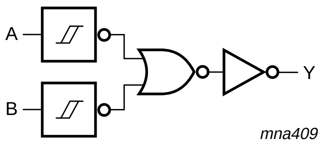


Fig 3. Logic diagram (one Schmitt trigger)

6. Pinning information

6.1 Pinning

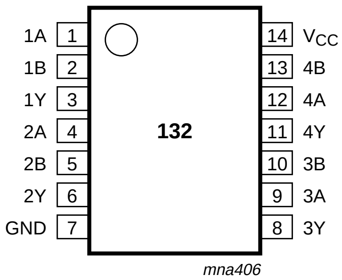
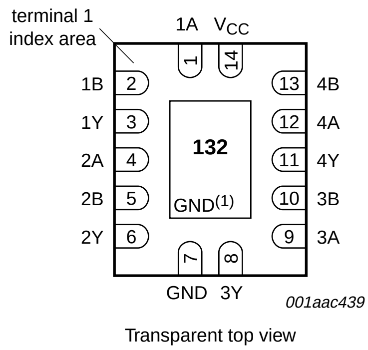


Fig 4. Pin configuration SO14 and TSSOP14



(1) The die substrate is attached to the exposed die pad using conductive die attach material. It can not be used as a supply pin or input.

Fig 5. Pin configuration DHVQFN14

6.2 Pin description

Table 3: Pin description

Symbol	Pin	Description
1A	1	1 data input A
1B	2	1 data input B
1Y	3	1 data output Y
2A	4	2 data input A
2B	5	2 data input B
2Y	6	2 data output Y
GND	7	ground (0 V)
3Y	8	3 data output Y
3A	9	3 data input A
3B	10	3 data input B
4Y	11	4 data output Y
4A	12	4 data input A
4B	13	4 data input B
V_{CC}	14	supply voltage

7. Functional description

7.1 Function table

Table 4: Function table [1]

Input		Output
nA	**nB**	**nY**
L	L	H
L	H	H
H	L	H
H	H	L

[1] H = HIGH voltage level;
L = LOW voltage level.

8. 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
V_I	input voltage range			–0.5	+7.0	V
I_{IK}	input diode current	$V_I < –0.5$ V	[1]	-	–20	mA
I_{OK}	output diode current	$V_O < –0.5$ V or $V_O > V_{CC} + 0.5$ V	[1]	-	±20	mA
I_O	output source or sink current	$V_O > –0.5$ V or $V_O < V_{CC} + 0.5$ V		-	±25	mA
I_{CC}, I_{GND}	V_{CC} or GND 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 SO14 packages: P_{tot} derates linearly with 8 mW/K above 70 °C.
For TSSOP14 packages: P_{tot} derates linearly with 5.5 mW/K above 60 °C.
For DHVQFN14 packages: P_{tot} derates linearly with 4.5 mW/K above 60 °C.

9. Recommended operating conditions

Table 6: Recommended operating conditions

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Type74AHC132						
V_{CC}	supply voltage		2.0	5.0	5.5	V
V_I	input voltage		0	-	5.5	V
V_O	output voltage		0	-	V_{CC}	V
T_{amb}	ambient temperature		–40	+25	+125	°C

Table 6: Recommended operating conditions *...continued*

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Type 74AHCT132						
V_{CC}	supply voltage		4.5	5.0	5.5	V
V_I	input voltage		0	-	5.5	V
V_O	output voltage		0	-	V_{CC}	V
T_{amb}	ambient temperature		–40	+25	+125	°C

10. Static characteristics

Table 7: Static characteristics type 74AHC132

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
T_{amb} = 25 °C						
V_{T+}	positive-going threshold	V_{CC} = 3.0 V	-	-	2.2	V
		V_{CC} = 4.5 V	-	-	3.15	V
		V_{CC} = 5.5 V	-	-	3.85	V
V_{T-}	negative-going threshold	V_{CC} = 3.0 V	0.9	-	-	V
		V_{CC} = 4.5 V	1.35	-	-	V
		V_{CC} = 5.5 V	1.65	-	-	V
V_H	hysteresis ($V_{T+} - V_{T-}$)	V_{CC} = 3.0 V	0.3	-	1.2	V
		V_{CC} = 4.5 V	0.4	-	1.4	V
		V_{CC} = 5.5 V	0.5	-	1.6	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	-	V
		I_O = –50 µA; V_{CC} = 3.0 V	2.9	3.0	-	V
		I_O = –50 µA; V_{CC} = 4.5 V	4.4	4.5	-	V
		I_O = –4.0 mA; V_{CC} = 3.0 V	2.58	-	-	V
		I_O = –8.0 mA; V_{CC} = 4.5 V	3.94	-	-	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	V
		I_O = 50 µA; V_{CC} = 3.0 V	-	0	0.1	V
		I_O = 50 µA; V_{CC} = 4.5 V	-	0	0.1	V
		I_O = 4.0 mA; V_{CC} = 3.0 V	-	-	0.36	V
		I_O = 8.0 mA; V_{CC} = 4.5 V	-	-	0.36	V
I_{LI}	input leakage current	$V_I = V_{CC}$ or GND; V_{CC} = 5.5 V	-	-	0.1	µA
I_{CC}	quiescent supply current	$V_I = V_{CC}$ or GND; I_O = 0 A; V_{CC} = 5.5 V	-	-	2.0	µA
C_I	input capacitance	$V_I = V_{CC}$ or GND	-	3.0	10	pF
C_O	output capacitance		-	4.0	-	pF
T_{amb} = –40 °C to +85 °C						
V_{T+}	positive-going threshold	V_{CC} = 3.0 V	-	-	2.2	V
		V_{CC} = 4.5 V	-	-	3.15	V
		V_{CC} = 5.5 V	-	-	3.85	V

Table 7: Static characteristics type 74AHC132 *…continued*

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{T-}	negative-going threshold	V_{CC} = 3.0 V	0.9	-	-	V
		V_{CC} = 4.5 V	1.35	-	-	V
		V_{CC} = 5.5 V	1.65	-	-	V
V_H	hysteresis ($V_{T+} - V_{T-}$)	V_{CC} = 3.0 V	0.3	-	1.2	V
		V_{CC} = 4.5 V	0.4	-	1.4	V
		V_{CC} = 5.5 V	0.5	-	1.6	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	-	2.2	V
		I_O = –50 μA; V_{CC} = 3.0 V	2.9	-	3.15	V
		I_O = –50 μA; V_{CC} = 4.5 V	4.4	-	3.85	V
		I_O = –4.0 mA; V_{CC} = 3.0 V	2.48	-	-	V
		I_O = –8.0 mA; V_{CC} = 4.5 V	3.8	-	-	V
V_{OL}	LOW-level output voltage	$V_I = V_{IH}$ or V_{IL}				
		I_O = 50 μA; V_{CC} = 2.0 V	-	-	0.1	V
		I_O = 50 μA; V_{CC} = 3.0 V	-	-	0.1	V
		I_O = 50 μA; V_{CC} = 4.5 V	-	-	0.1	V
		I_O = 4.0 mA; V_{CC} = 3.0 V	-	-	0.44	V
		I_O = 8.0 mA; V_{CC} = 4.5 V	-	-	0.44	V
I_{LI}	input leakage current	$V_I = V_{CC}$ or GND; V_{CC} = 5.5 V	-	-	1.0	μA
I_{CC}	quiescent supply current	$V_I = V_{CC}$ or GND; I_O = 0 A; V_{CC} = 5.5 V	-	-	20	μA
C_I	input capacitance		-	-	10	pF
T_{amb} = –40 °C to +125 °C						
V_{T+}	positive-going threshold	V_{CC} = 3.0 V	-	-	2.2	V
		V_{CC} = 4.5 V	-	-	3.15	V
		V_{CC} = 5.5 V	-	-	3.85	V
V_{T-}	negative-going threshold	V_{CC} = 3.0 V	0.9	-	-	V
		V_{CC} = 4.5 V	1.35	-	-	V
		V_{CC} = 5.5 V	1.65	-	-	V
V_H	hysteresis ($V_{T+} - V_{T-}$)	V_{CC} = 3.0 V	0.25	-	1.2	V
		V_{CC} = 4.5 V	0.35	-	1.4	V
		V_{CC} = 5.5 V	0.45	-	1.6	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	-	-	V
		I_O = –50 μA; V_{CC} = 3.0 V	2.9	-	-	V
		I_O = –50 μA; V_{CC} = 4.5 V	4.4	-	-	V
		I_O = –4.0 mA; V_{CC} = 3.0 V	2.40	-	-	V
		I_O = –8.0 mA; V_{CC} = 4.5 V	3.7	-	-	V

Table 7: Static characteristics type 74AHC132 *…continued*

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{OL}	LOW-level output voltage	$V_I = V_{IH}$ or V_{IL}				
		$I_O = 50\ \mu A$; $V_{CC} = 2.0\ V$	-	-	0.1	V
		$I_O = 50\ \mu A$; $V_{CC} = 3.0\ V$	-	-	0.1	V
		$I_O = 50\ \mu A$; $V_{CC} = 4.5\ V$	-	-	0.1	V
		$I_O = 4.0\ mA$; $V_{CC} = 3.0\ V$	-	-	0.55	V
		$I_O = 8.0\ mA$; $V_{CC} = 4.5\ V$	-	-	0.55	V
I_{LI}	input leakage current	$V_I = V_{CC}$ or GND; $V_{CC} = 5.5\ V$	-	-	2.0	μA
I_{CC}	quiescent supply current	$V_I = V_{CC}$ or GND; $I_O = 0\ A$; $V_{CC} = 5.5\ V$	-	-	40	μA
C_I	input capacitance		-	-	10	pF

Table 8: Static characteristics type 74AHCT132

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
T_{amb} = 25 °C						
V_{T+}	positive-going threshold	$V_{CC} = 4.5\ V$	-	-	1.9	V
		$V_{CC} = 5.5\ V$	-	-	2.1	V
V_{T-}	negative-going threshold	$V_{CC} = 4.5\ V$	0.5	-	-	V
		$V_{CC} = 5.5\ V$	0.6	-	-	V
V_H	hysteresis ($V_{T+} - V_{T-}$)	$V_{CC} = 4.5\ V$	0.3	-	1.4	V
		$V_{CC} = 5.5\ V$	0.3	-	1.5	V
V_{OH}	HIGH-level output voltage	$V_I = V_{IH}$ or V_{IL}				
		$I_O = -50\ \mu A$; $V_{CC} = 4.5\ V$	4.4	4.5	-	V
		$I_O = -8.0\ mA$; $V_{CC} = 4.5\ V$	3.94	-	-	V
V_{OL}	LOW-level output voltage	$V_I = V_{IH}$ or V_{IL}				
		$I_O = 50\ \mu A$; $V_{CC} = 4.5\ V$	-	0	0.1	V
		$I_O = 8.0\ mA$; $V_{CC} = 4.5\ V$	-	-	0.36	V
I_{LI}	input leakage current	$V_I = V_{CC}$ or GND; $V_{CC} = 5.5\ V$	-	-	0.1	μA
I_{CC}	quiescent supply current	$V_I = V_{CC}$ or GND; $I_O = 0\ A$; $V_{CC} = 5.5\ V$	-	-	2.0	μA
ΔI_{CC}	additional quiescent supply current per input pin	$V_I = V_{CC} - 2.1\ V$ and other inputs at V_{CC} or GND; $I_O = 0\ A$; $V_{CC} = 4.5\ V$ to $5.5\ V$	-	-	1.35	mA
C_I	input capacitance	$V_I = V_{CC}$ or GND	-	3.0	10	pF
C_O	output capacitance		-	4.0	-	pF
T_{amb} = −40 °C to +85 °C						
V_{T+}	positive-going threshold	$V_{CC} = 4.5\ V$	-	-	1.9	V
		$V_{CC} = 5.5\ V$	-	-	2.1	V
V_{T-}	negative-going threshold	$V_{CC} = 4.5\ V$	0.5	-	-	V
		$V_{CC} = 5.5\ V$	0.6	-	-	V
V_H	hysteresis ($V_{T+} - V_{T-}$)	$V_{CC} = 4.5\ V$	0.3	-	1.4	V
		$V_{CC} = 5.5\ V$	0.3	-	1.5	V

Table 8: Static characteristics type 74AHCT132 *...continued*

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{OH}	HIGH-level output voltage	$V_I = V_{IH}$ or V_{IL}				
		$I_O = -50\ \mu A$; $V_{CC} = 4.5\ V$	4.4	-	-	V
		$I_O = -8.0\ mA$; $V_{CC} = 4.5\ V$	3.8	-	-	V
V_{OL}	LOW-level output voltage	$V_I = V_{IH}$ or V_{IL}				
		$I_O = 50\ \mu A$; $V_{CC} = 4.5\ V$	-	-	0.1	V
		$I_O = 8.0\ mA$; $V_{CC} = 4.5\ V$	-	-	0.44	V
I_{LI}	input leakage current	$V_I = V_{CC}$ or GND; $V_{CC} = 5.5\ V$	-	-	1.0	μA
I_{CC}	quiescent supply current	$V_I = V_{CC}$ or GND; $I_O = 0\ A$; $V_{CC} = 5.5\ V$	-	-	20	μA
ΔI_{CC}	additional quiescent supply current per input pin	$V_I = V_{CC} - 2.1\ V$ and other inputs at V_{CC} or GND; $I_O = 0\ A$; $V_{CC} = 4.5\ V$ to $5.5\ V$	-	-	1.5	mA
C_I	input capacitance		-	-	10	pF
$T_{amb} = -40\ °C$ to $+125\ °C$						
V_{T+}	positive-going threshold	$V_{CC} = 4.5\ V$	-	-	1.9	V
		$V_{CC} = 5.5\ V$	-	-	2.1	V
V_{T-}	negative-going threshold	$V_{CC} = 4.5\ V$	0.5	-	-	V
		$V_{CC} = 5.5\ V$	0.6	-	-	V
V_H	hysteresis ($V_{T+} - V_{T-}$)	$V_{CC} = 4.5\ V$	0.3	-	1.4	V
		$V_{CC} = 5.5\ V$	0.3	-	1.5	V
V_{OH}	HIGH-level output voltage	$V_I = V_{IH}$ or V_{IL}				
		$I_O = -50\ \mu A$; $V_{CC} = 4.5\ V$	4.4	-	-	V
		$I_O = -8.0\ mA$; $V_{CC} = 4.5\ V$	3.7	-	-	V
V_{OL}	LOW-level output voltage	$V_I = V_{IH}$ or V_{IL}				
		$I_O = 50\ \mu A$; $V_{CC} = 4.5\ V$	-	-	0.1	V
		$I_O = 8.0\ mA$; $V_{CC} = 4.5\ V$	-	-	0.55	V
I_{LI}	input leakage current	$V_I = V_{CC}$ or GND; $V_{CC} = 5.5\ V$	-	-	2.0	μA
I_{CC}	quiescent supply current	$V_I = V_{CC}$ or GND; $I_O = 0\ A$; $V_{CC} = 5.5\ V$	-	-	40	μA
ΔI_{CC}	additional quiescent supply current per input pin	$V_I = V_{CC} - 2.1\ V$ and other inputs at V_{CC} or GND; $I_O = 0\ A$; $V_{CC} = 4.5\ V$ to $5.5\ V$	-	-	1.5	mA
C_I	input capacitance		-	-	10	pF

11. Dynamic characteristics

Table 9: Dynamic characteristics type 74AHC132

GND = 0 V; $t_r = t_f \leq 3.0$ ns; for test circuit see Figure 7.

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
T_{amb} = 25 °C							
t_{PHL}, t_{PLH}	propagation delay nA, nB to nY	V_{CC} = 3.0 V to 3.6 V; see Figure 6	[1]				
		C_L = 15 pF		-	4.4	11.9	ns
		C_L = 50 pF		-	6.2	15.4	ns
		V_{CC} = 4.5 V to 5.5 V; see Figure 6	[2]				
		C_L = 15 pF		-	3.3	7.7	ns
		C_L = 50 pF		-	4.7	9.7	ns
C_{PD}	power dissipation capacitance	C_L = 50 pF; f = 1 MHz	[3] [4]	-	11	-	pF
T_{amb} = −40 °C to +85 °C							
t_{PHL}, t_{PLH}	propagation delay nA, nB to nY	V_{CC} = 3.0 V to 3.6 V; see Figure 6					
		C_L = 15 pF		1.0	-	14.0	ns
		C_L = 50 pF		1.0	-	17.5	ns
		V_{CC} = 4.5 V to 5.5 V; see Figure 6					
		C_L = 15 pF		1.0	-	9.0	ns
		C_L = 50 pF		1.0	-	11.0	ns
T_{amb} = −40 °C to +125 °C							
t_{PHL}, t_{PLH}	propagation delay nA, nB to nY	V_{CC} = 3.0 V to 3.6 V; see Figure 6					
		C_L = 15 pF		1.0	-	15.0	ns
		C_L = 50 pF		1.0	-	19.5	ns
		V_{CC} = 4.5 V to 5.5 V; see Figure 6					
		C_L = 15 pF		1.0	-	10.0	ns
		C_L = 50 pF		1.0	-	12.5	ns

[1] Typical values are measured at V_{CC} = 3.3 V.

[2] Typical values are measured at V_{CC} = 5.0 V.

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

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

N = number of inputs switching;

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

[4] The condition is V_I = GND to V_{CC}.

Table 10: Dynamic characteristics type 74AHCT132

GND = 0 V; $t_r = t_f \leq 3.0$ ns; for test circuit see Figure 7.

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
T_{amb} = 25 °C [1]							
t_{PHL}, t_{PLH}	propagation delay nA, nB to nY	V_{CC} = 4.5 V to 5.5 V; see Figure 6					
		C_L = 15 pF		-	3.5	7.0	ns
		C_L = 50 pF		-	5.0	8.0	ns
C_{PD}	power dissipation capacitance	C_L = 50 pF; f = 1 MHz	[2] [3]	-	14	-	pF
T_{amb} = −40 °C to +85 °C							
t_{PHL}, t_{PLH}	propagation delay nA, nB to nY	V_{CC} = 4.5 V to 5.5 V; see Figure 6					
		C_L = 15 pF		1.0	-	8.0	ns
		C_L = 50 pF		1.0	-	9.0	ns
T_{amb} = −40 °C to +125 °C							
t_{PHL}, t_{PLH}	propagation delay nA, nB to nY	V_{CC} = 4.5 V to 5.5 V; see Figure 6					
		C_L = 15 pF		1.0	-	9.0	ns
		C_L = 50 pF		1.0	-	1o.0	ns

[1] Typical values are measured at V_{CC} = 5.0 V.

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

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

f_i = input frequency in MHz;

f_o = output frequency in MHz;

C_L = output load capacitance in pF;

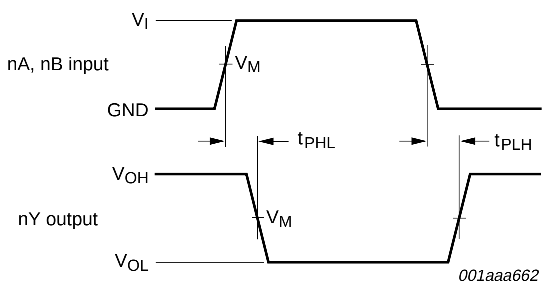
V_{CC} = supply voltage in V;

N = number of inputs switching;

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

[3] The condition is V_I = GND to V_{CC}.

12. Waveforms



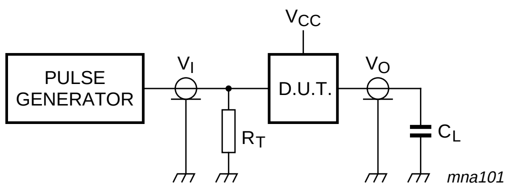
Measurement points are given in Table 11.

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

Fig 6. Input (nA, nB) to output (nY) propagation delays

Table 11: Measurement points

Type	Input	Output
	V_M	V_M
74AHC132	$0.5V_{CC}$	$0.5V_{CC}$
74AHCT132	1.5 V	$0.5V_{CC}$



Test data is given in Table 12.

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.

Fig 7. Load circuitry for switching times

Table 12: Test data

Type	Input		Load	Test
	V_I	t_r, t_f	C_L	
74AHC132	V_{CC}	≤ 3.0 ns	50 pF, 15 pF	t_{PLH}, t_{PHL}
74AHCT132	3.0 V	≤ 3.0 ns	50 pF, 15 pF	t_{PLH}, t_{PHL}

13. Transfer characteristics waveforms

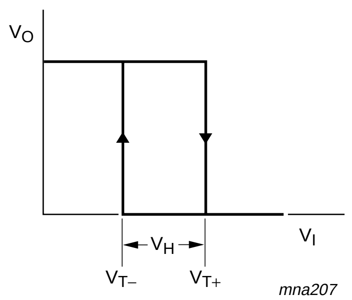


Fig 8. Transfer characteristics

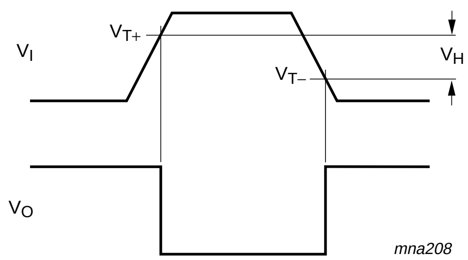
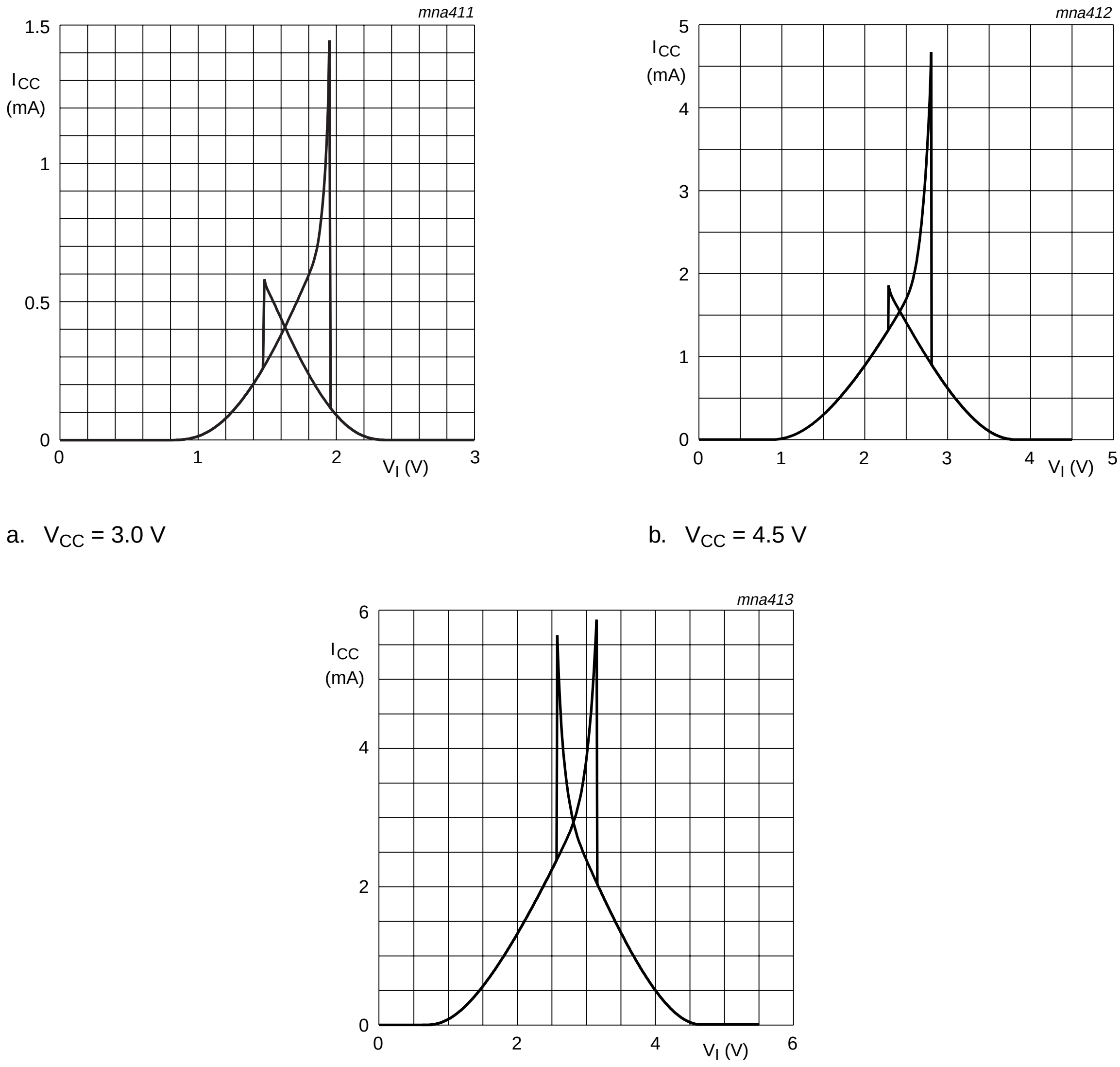


Fig 9. Definition of V_{T+}, V_{T-} and V_H

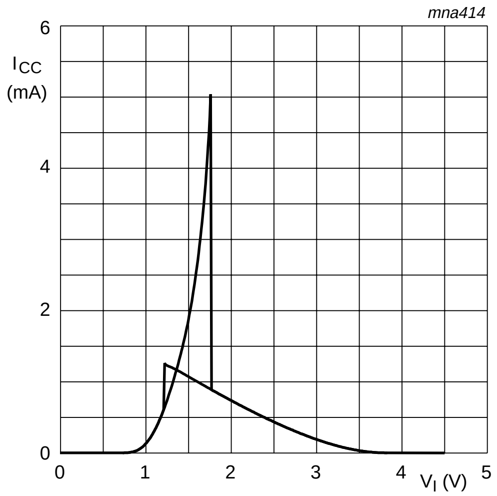


a. V_{CC} = 3.0 V

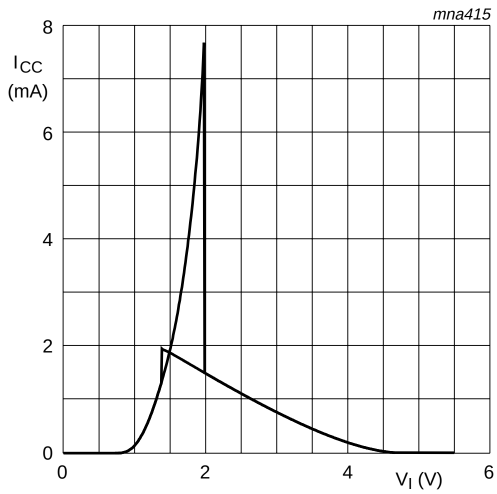
b. V_{CC} = 4.5 V

c. V_{CC} = 5.5 V

Fig 10. Typical 74AHC132 transfer characteristics



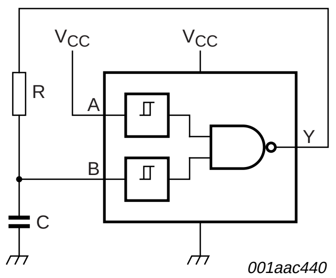
a. V_{CC} = 4.5 V.



b. V_{CC} = 5.5 V.

Fig 11. Typical 74AHCT132 transfer characteristics

14. Application information

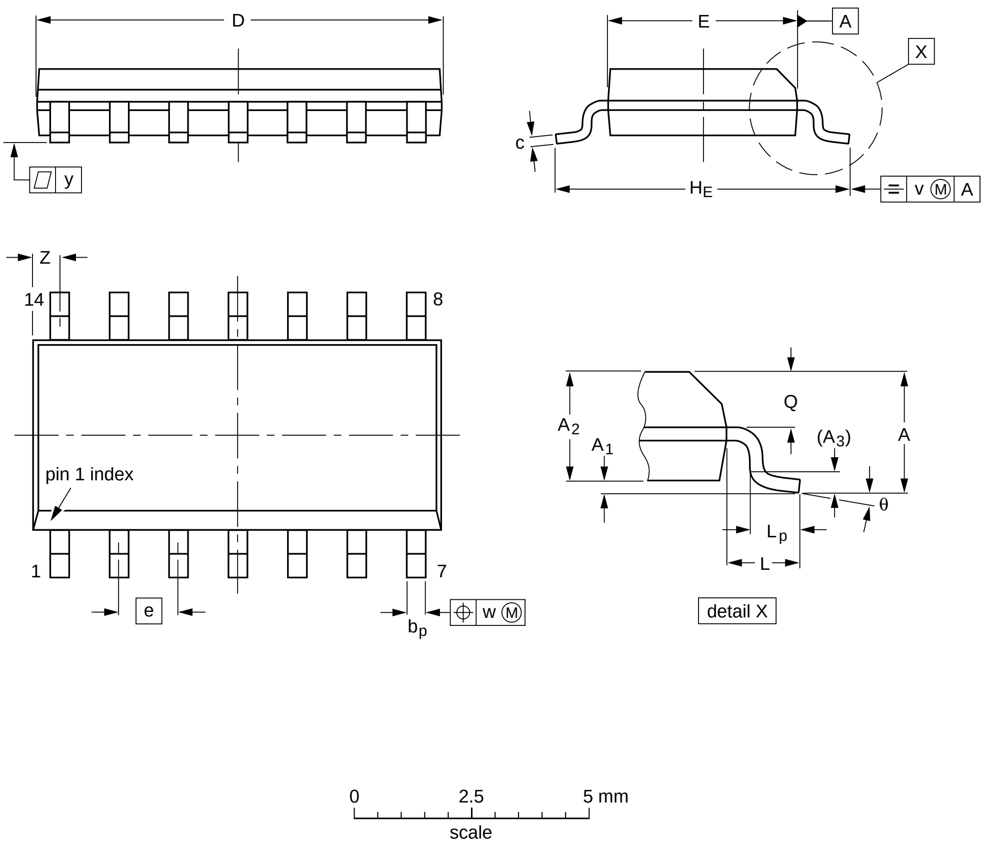


For 74AHC132: $f = \frac{1}{T} \approx \frac{1}{0.55 \times RC}$ and for 74AHCT132: $f = \frac{1}{T} \approx \frac{1}{0.60 \times RC}$

Fig 12. Relaxation oscillator

15. Package outline

SO14: plastic small outline package; 14 leads; body width 3.9 mm **SOT108-1**



DIMENSIONS (inch dimensions are derived from the original mm dimensions)

UNIT	A max.	A_1	A_2	A_3	b_p	c	$D^{(1)}$	$E^{(1)}$	e	H_E	L	L_p	Q	v	w	y	$Z^{(1)}$	θ
mm	1.75	0.25 0.10	1.45 1.25	0.25	0.49 0.36	0.25 0.19	8.75 8.55	4.0 3.8	1.27	6.2 5.8	1.05	1.0 0.4	0.7 0.6	0.25	0.25	0.1	0.7 0.3	8° 0°
inches	0.069	0.010 0.004	0.057 0.049	0.01	0.019 0.014	0.0100 0.0075	0.35 0.34	0.16 0.15	0.05	0.244 0.228	0.041	0.039 0.016	0.028 0.024	0.01	0.01	0.004	0.028 0.012	

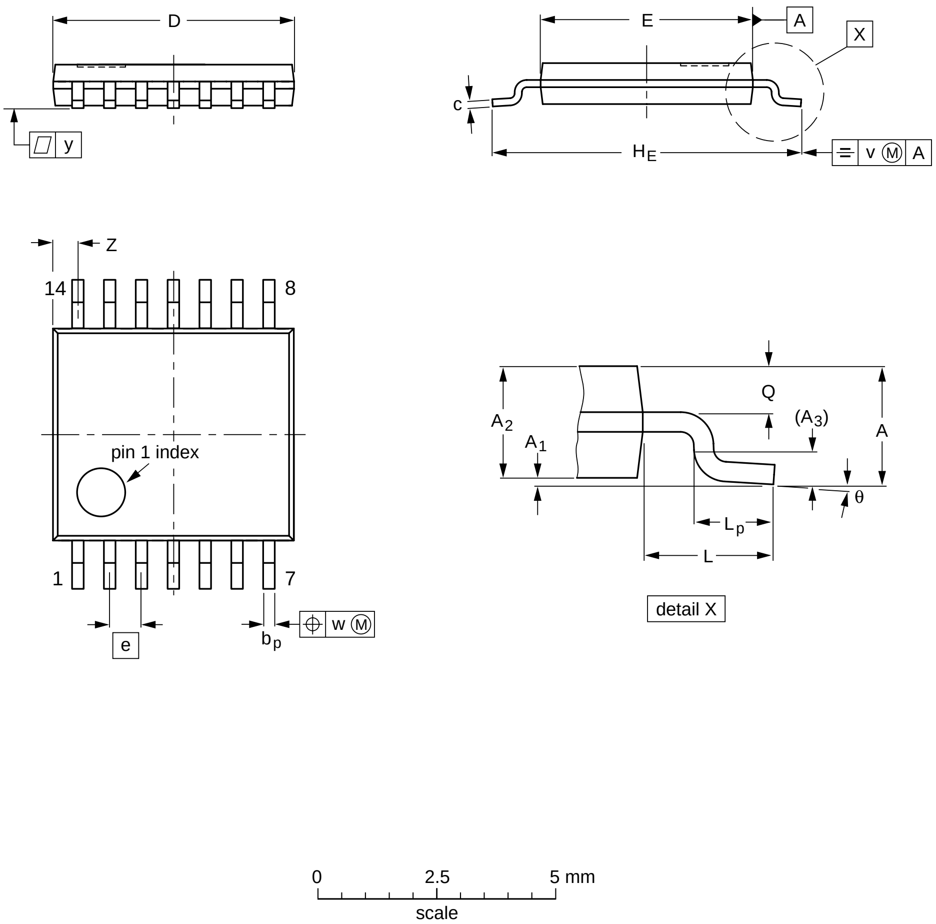
Note

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

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT108-1	076E06	MS-012				~~99-12-27~~ 03-02-19

Fig 13. Package outline SOT108-1 (SO14)

TSSOP14: plastic thin shrink small outline package; 14 leads; body width 4.4 mm **SOT402-1**



DIMENSIONS (mm are the original dimensions)

UNIT	A max.	A_1	A_2	A_3	b_p	c	D (1)	E (2)	e	H_E	L	L_p	Q	v	w	y	Z (1)	θ
mm	1.1	0.15 0.05	0.95 0.80	0.25	0.30 0.19	0.2 0.1	5.1 4.9	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	0.72 0.38	8° 0°

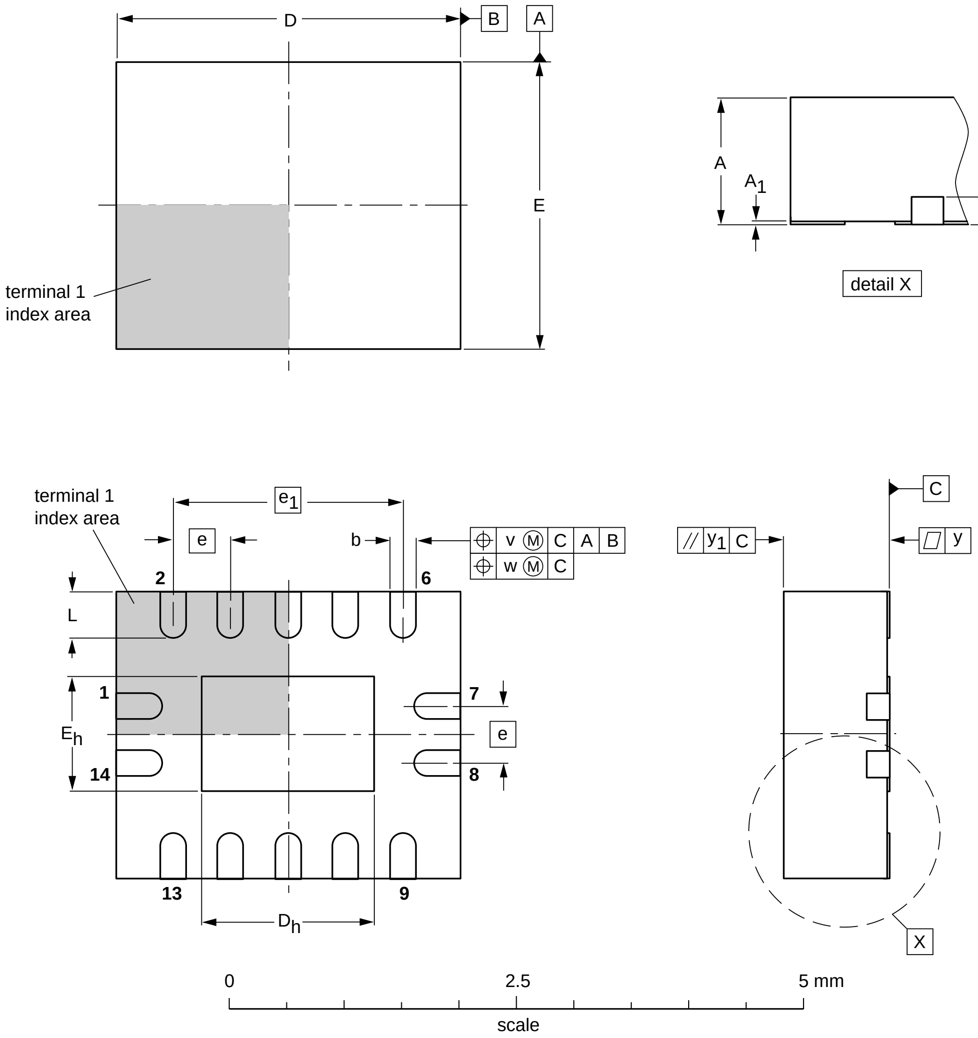
Notes

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 VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT402-1		MO-153				~~99-12-27~~ 03-02-18

Fig 14. Package outline SOT402-1 (TSSOP14)

DHVQFN14: plastic dual in-line compatible thermal enhanced very thin quad flat package; no leads; 14 terminals; body 2.5 x 3 x 0.85 mm **SOT762-1**



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	3.1 2.9	1.65 1.35	2.6 2.4	1.15 0.85	0.5	2	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.

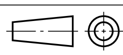
OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT762-1	- - -	MO-241	- - -			~~02-10-17~~ 03-01-27

Fig 15. Package outline SOT762-1 (DHVQFN14)

16. Revision history

Table 13: Revision history

Document ID	Release date	Data sheet status	Change notice	Doc. number	Supersedes
74AHC_AHCT132_4	20050207	Product data sheet	-	9397 750 14505	74AHC_AHCT132_3
Modifications:	• The format of this data sheet is redesigned to comply with the current presentation and information standard of Philips Semiconductors • Added: type numbers 74AHC132BQ and 74AHCT132BQ (DHVQFN14 package)				
74AHC_AHCT132_3	20040415	Product specification	-	9397 750 13051	74AHC_AHCT132_2
74AHC_AHCT132_2	19990924	Product specification	-	9397 750 06294	74AHC_AHCT132_1
74AHC_AHCT132_1	19990531	Product specification	-	9397 750 05748	-

17. Data sheet status

Level	Data sheet status [1]	Product status [2] [3]	Definition
I	Objective data	Development	This data sheet contains data from the objective specification for product development. Philips Semiconductors reserves the right to change the specification in any manner without notice.
II	Preliminary data	Qualification	This data sheet contains data from the preliminary specification. Supplementary data will be published at a later date. Philips Semiconductors reserves the right to change the specification without notice, in order to improve the design and supply the best possible product.
III	Product data	Production	This data sheet contains data from the product specification. Philips Semiconductors reserves the right to make changes at any time in order to improve the design, manufacturing and supply. Relevant changes will be communicated via a Customer Product/Process Change Notification (CPCN).

[1] Please consult the most recently issued data sheet before initiating or completing a design.

[2] The product status of the device(s) described in this data sheet may have changed since this data sheet was published. The latest information is available on the Internet at URL http://www.semiconductors.philips.com.

[3] For data sheets describing multiple type numbers, the highest-level product status determines the data sheet status.

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Short-form specification — The data in a short-form specification is extracted from a full data sheet with the same type number and title. For detailed information see the relevant data sheet or data handbook.

Limiting values definition — Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 60134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of the specification is not implied. Exposure to limiting values for extended periods may affect device reliability.

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9397 750 14505

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