# HD74HCT125, HD74HCT126

## Quad. Bus Buffer Gates (with 3-state outputs)

REJ03D0657–0200
(Previous ADE-205-545)
Rev.2.00
Mar 30, 2006

## Description

The HD74HCT125, HD74HCT126 require the 3-state control input C to be taken high to put the output into the high impedance condition, whereas the HD74HCT125, HD74HCT126 requires the control input to be low to put the output into high impedance.

## Features

- LSTTL Output Logic Level Compatibility as well as CMOS Output Compatibility
- High Speed Operation: $t_{pd}$ (A to Y) = 12 ns typ ($C_L$ = 50 pF)
- High Output Current: Fanout of 15 LSTTL Loads
- Wide Operating Voltage: $V_{CC}$ = 4.5 to 5.5 V
- Low Input Current: 1 µA max
- Low Quiescent Supply Current: $I_{CC}$ (static) = 4 µA max (Ta = 25°C)
- Ordering Information

| Part Name | Package Type | Package Code (Previous Code) | Package Abbreviation | Taping Abbreviation (Quantity) |
|---|---|---|---|---|
| HD74HCT125P | DILP-14 pin | PRDP0014AB-B (DP-14AV) | P | — |
| HD74HCT125FPEL<br>HD74HCT126FPEL | SOP-14 pin (JEITA) | PRSP0014DF-B (FP-14DAV) | FP | EL (2,000 pcs/reel) |
| HD74HCT125TELL<br>HD74HCT126TELL | TSSOP-14 pin | PTSP0014JA-B (TTP-14DV) | T | ELL (2,000 pcs/reel) |

Note: Please consult the sales office for the above package availability.

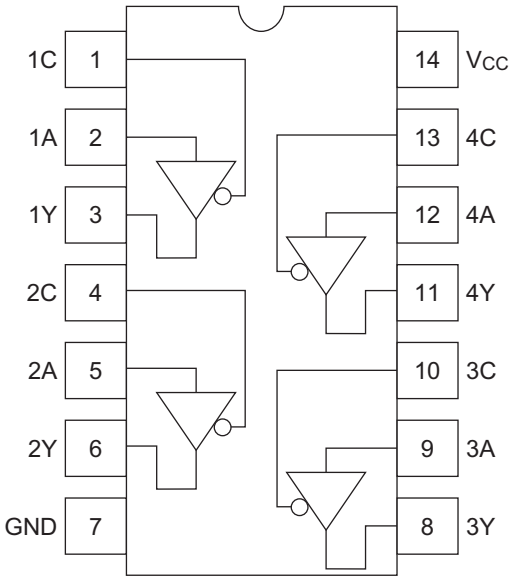
## Function Table

| Inputs | | | Output | |
|---|---|---|---|---|
| C | | A | Y | |
| HCT125 | HCT126 | | HCT125 | HCT126 |
| H | L | X | Z | Z |
| L | H | L | L | L |
| L | H | H | H | H |

H : High level
L : Low level
X : Irrelevant
Z : Off (high-impedance) state of a 3-state output.

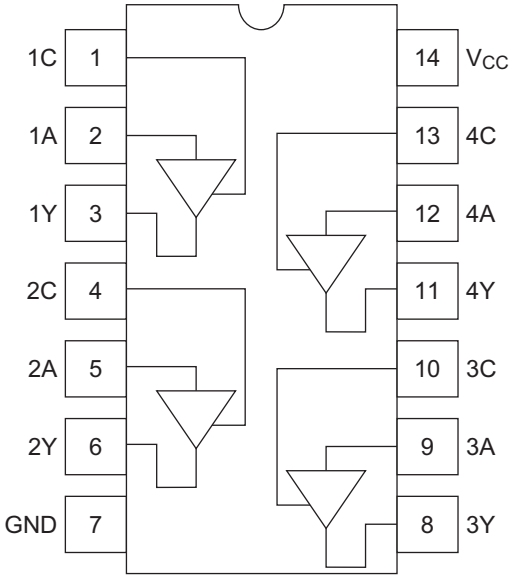
## Pin Arrangement

- HD74HCT125




(Top view)

- HD74HCT126




(Top view)

## Absolute Maximum Ratings

| Item | Symbol | Rating | Unit |
|---|---|---|---|
| Supply voltage range | $V_{CC}$ | –0.5 to +7.0 | V |
| Input voltage | $V_{IN}$ | –0.5 to $V_{CC}$ + 0.5 | V |
| Output voltage | $V_{OUT}$ | –0.5 to $V_{CC}$ + 0.5 | V |
| Output current | $I_{OUT}$ | ±35 | mA |
| DC current drain per $V_{CC}$, GND | $I_{CC}$, $I_{GND}$ | ±75 | mA |
| DC input diode current | $I_{IK}$ | ±20 | mA |
| DC output diode current | $I_{OK}$ | ±20 | mA |
| Power dissipation per package | $P_T$ | 500 | mW |
| Storage temperature | Tstg | –65 to +150 | °C |

Note: The absolute maximum ratings are values, which must not individually be exceeded, and furthermore, no two of which may be realized at the same time.

## Recommended Operating Conditions

| Item | Symbol | Ratings | Unit | Conditions |
|---|---|---|---|---|
| Supply voltage | $V_{CC}$ | 4.5 to 5.5 | V | |
| Input / Output voltage | $V_{IN}$, $V_{OUT}$ | 0 to $V_{CC}$ | V | |
| Operating temperature | Ta | –40 to 85 | °C | |
| Input rise / fall time[*1] | $t_r$, $t_f$ | 0 to 500 | ns | $V_{CC}$ = 4.5 V |

Notes: 1. This item guarantees maximum limit when one input switches.
Waveform: Refer to test circuit of switching characteristics.

## Electrical Characteristics

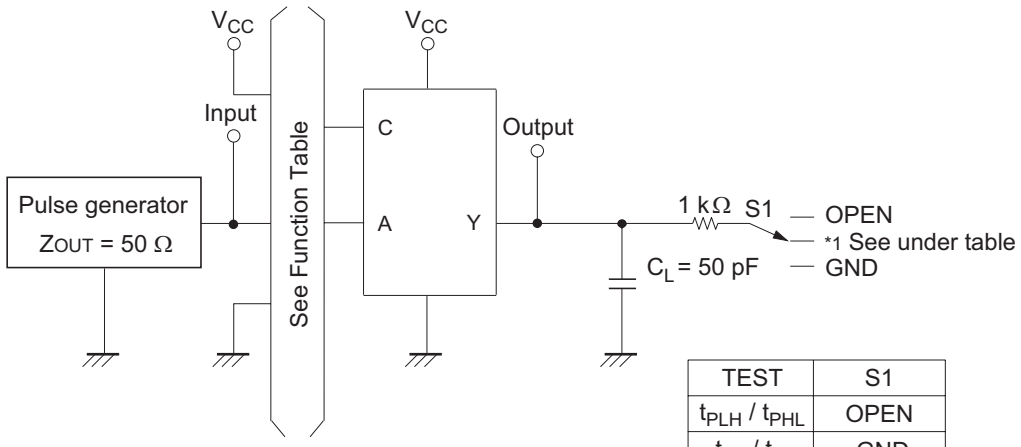
| Item | Symbol | $V_{CC}$ (V) | Ta = 25°C | | | Ta = –40 to+85°C | | Unit | Test Conditions | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Min | Typ | Max | Min | Max | | | |
| Input voltage | $V_{IH}$ | 4.5 to 5.5 | 2.0 | — | — | 2.0 | — | V | | |
| | $V_{IL}$ | 4.5 to 5.5 | — | — | 0.8 | — | 0.8 | V | | |
| Output voltage | $V_{OH}$ | 4.5 | 4.4 | — | — | 4.4 | — | V | Vin = $V_{IH}$ or $V_{IL}$ | $I_{OH}$ = –20 µA |
| | | 4.5 | 4.18 | — | — | 4.13 | — | | | $I_{OH}$ = –6 mA |
| | $V_{OL}$ | 4.5 | — | — | 0.1 | — | 0.1 | V | Vin = $V_{IH}$ or $V_{IL}$ | $I_{OL}$ = 20 µA |
| | | 4.5 | — | — | 0.26 | — | 0.33 | | | $I_{OL}$ = 6 mA |
| Off-state output current | $I_{OZ}$ | 5.5 | — | — | ±0.5 | — | ±5.0 | µA | Vin = $V_{IH}$ or $V_{IL}$, Vout = $V_{CC}$ or GND | |
| Input current | Iin | 5.5 | — | — | ±0.1 | — | ±1.0 | µA | Vin = $V_{CC}$ or GND | |
| Quiescent supply current | $I_{CC}$ | 5.5 | — | — | 4.0 | — | 40 | µA | Vin = $V_{CC}$ or GND, Iout = 0 µA | |

## Switching Characteristics

($C_L$ = 50 pF, Input $t_r$ = $t_f$ = 6 ns)

| Item | Symbol | $V_{CC}$ (V) | Ta = 25°C | | | Ta = –40 to +85°C | | Unit | Test Conditions |
|---|---|---|---|---|---|---|---|---|---|
| | | | Min | Typ | Max | Min | Max | | |
| Propagation delay time | $t_{PHL}$ | 4.5 | — | 12 | 20 | — | 25 | ns | |
| | $t_{PLH}$ | 4.5 | — | 12 | 20 | — | 25 | | |
| Output enable time | $t_{ZL}$ | 4.5 | — | 12 | 30 | — | 38 | ns | |
| | $t_{ZH}$ | 4.5 | — | 12 | 30 | — | 38 | | |
| Output disable time | $t_{LZ}$ | 4.5 | — | 15 | 30 | — | 38 | ns | |
| | $t_{HZ}$ | 4.5 | — | 15 | 30 | — | 38 | | |
| Output rise/fall time | $t_{TLH}$ | 4.5 | — | 4 | 12 | — | 15 | ns | |
| | $t_{THL}$ | 4.5 | — | 4 | 12 | — | 15 | | |
| Input capacitance | Cin | — | — | 5 | 10 | — | 10 | pF | |

## Test Circuit



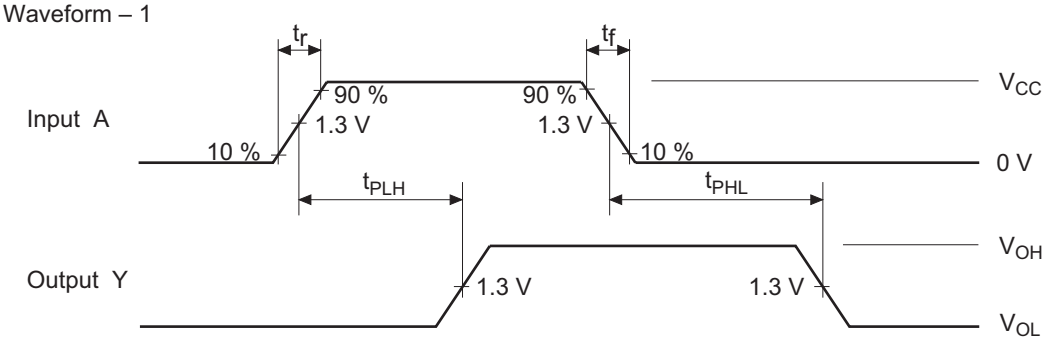

| TEST | S1 |
|---|---|
| $t_{PLH}$ / $t_{PHL}$ | OPEN |
| $t_{ZH}$ / $t_{HZ}$ | GND |
| $t_{ZL}$ / $t_{LZ}$ | $V_{CC}$ |

Note: $C_L$ includes the probe and jig capacitance.

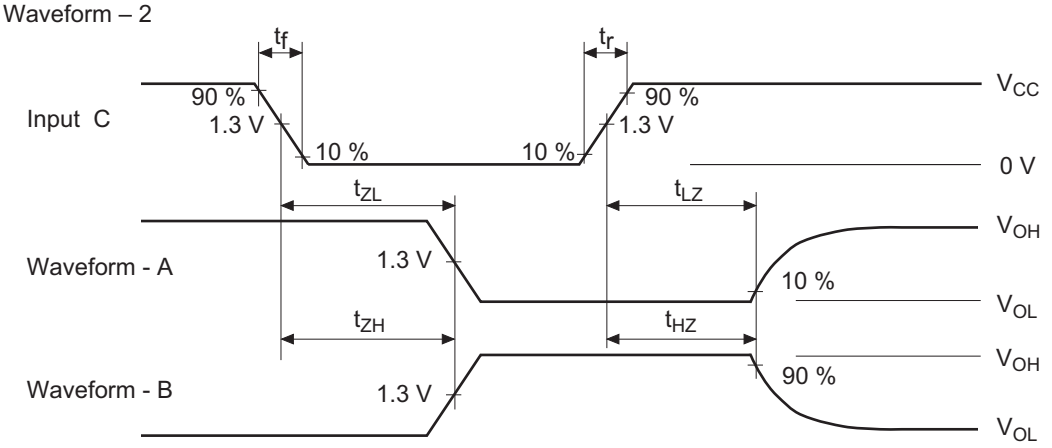
## Waveforms

- HD74HCT125

• Waveform – 1




• Waveform – 2

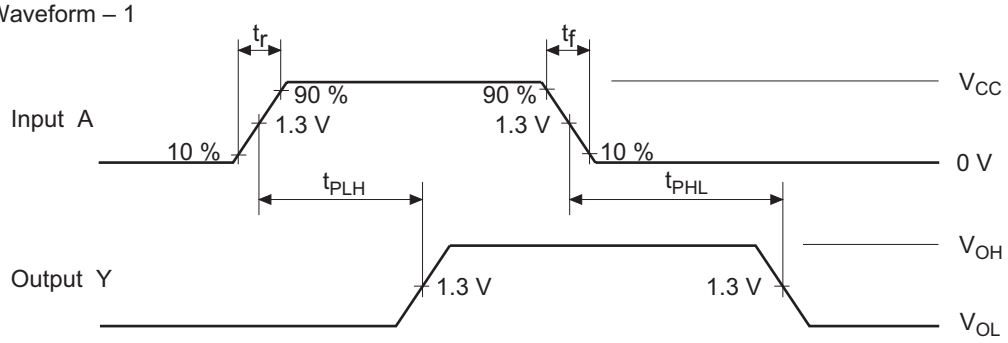



Notes : 1. $t_r \leq 6$ ns, $t_f \leq 6$ ns
2. Input waveform : PRR ≤ 1 MHz, duty cycle 50%
3. Waveform– A is for an output with internal conditions such that the output is low except when disabled by the output control.
4. Waveform– B is for an output with internal conditions such that the output is high except when disabled by the output control.

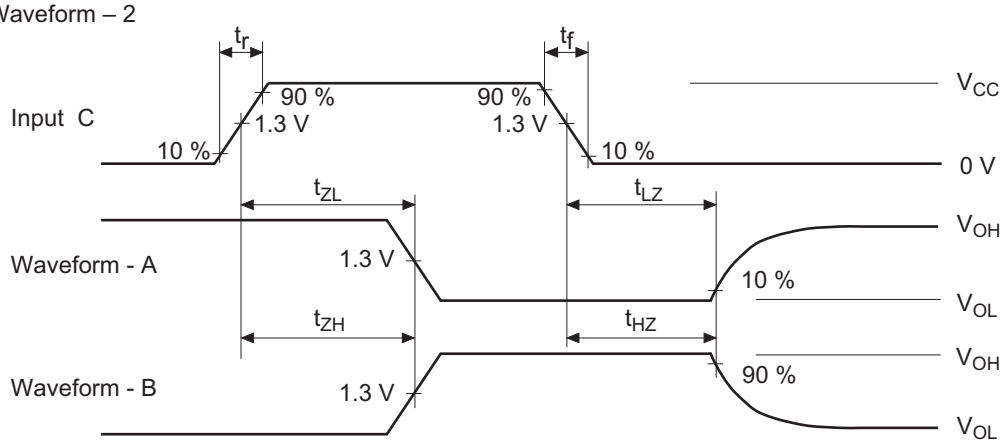
## Waveforms

- HD74HCT126

• Waveform – 1



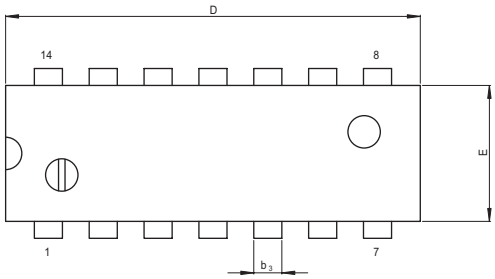

• Waveform – 2

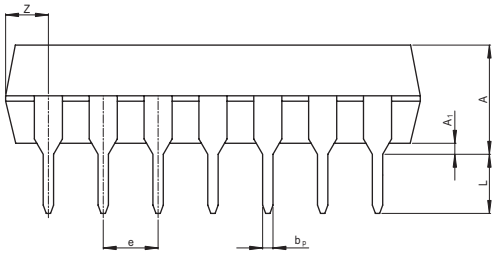


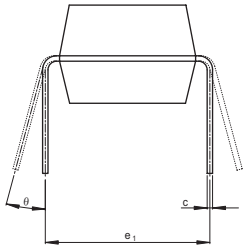

Notes : 1. $t_r \leq 6$ ns, $t_f \leq 6$ ns
2. Input waveform : PRR ≤ 1 MHz, duty cycle 50%
3. Waveform– A is for an output with internal conditions such that the output is low except when disabled by the output control.
4. Waveform– B is for an output with internal conditions such that the output is high except when disabled by the output control.

## Package Dimensions

| JEITA Package Code | RENESAS Code | Previous Code | MASS[Typ.] |
|---|---|---|---|
| P-DIP14-6.3x19.2-2.54 | PRDP0014AB-B | DP-14AV | 0.97g |



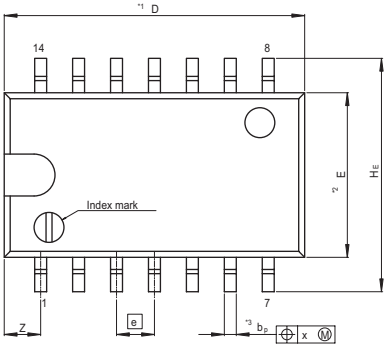



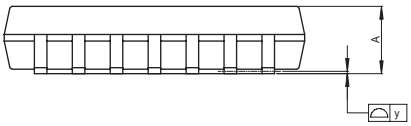



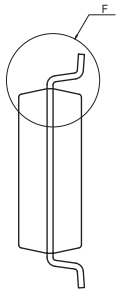

( Ni/Pd/Au plating )

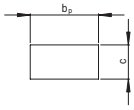
| Reference Symbol | Dimension in Millimeters | | |
|---|---|---|---|
| | Min | Nom | Max |
| $e_1$ | — | 7.62 | — |
| D | — | 19.2 | 20.32 |
| E | — | 6.3 | 7.4 |
| A | — | — | 5.06 |
| $A_1$ | 0.51 | — | — |
| $b_p$ | 0.40 | 0.48 | 0.56 |
| $b_3$ | — | 1.30 | — |
| c | 0.19 | 0.25 | 0.31 |
| θ | 0° | — | 15° |
| e | 2.29 | 2.54 | 2.79 |
| Z | — | — | 2.39 |
| L | 2.54 | — | — |

| JEITA Package Code | RENESAS Code | Previous Code | MASS[Typ.] |
|---|---|---|---|
| P-SOP14-5.5x10.06-1.27 | PRSP0014DF-B | FP-14DAV | 0.23g |

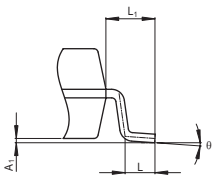



Terminal cross section
( Ni/Pd/Au plating )

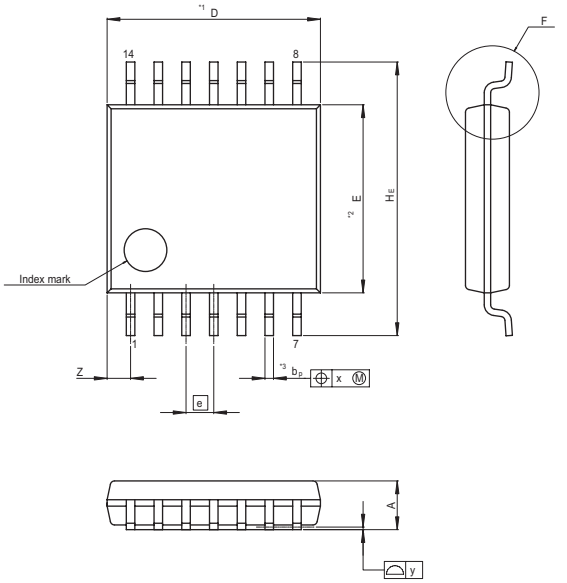


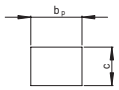

Detail F

NOTE)
1. DIMENSIONS"*1 (Nom)"AND"*2"
DO NOT INCLUDE MOLD FLASH.
2. DIMENSION"*3"DOES NOT
INCLUDE TRIM OFFSET.

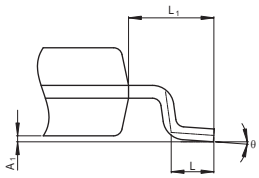
| Reference Symbol | Dimension in Millimeters | | |
|---|---|---|---|
| | Min | Nom | Max |
| D | — | 10.06 | 10.5 |
| E | — | 5.50 | — |
| $A_2$ | — | — | — |
| $A_1$ | 0.00 | 0.10 | 0.20 |
| A | — | — | 2.20 |
| $b_p$ | 0.34 | 0.40 | 0.46 |
| $b_1$ | — | — | — |
| c | 0.15 | 0.20 | 0.25 |
| $c_1$ | — | — | — |
| θ | 0° | — | 8° |
| $H_E$ | 7.50 | 7.80 | 8.00 |
| e | — | 1.27 | — |
| x | — | — | 0.12 |
| y | — | — | 0.15 |
| Z | — | — | 1.42 |
| L | 0.50 | 0.70 | 0.90 |
| $L_1$ | — | 1.15 | — |

| JEITA Package Code | RENESAS Code | Previous Code | MASS[Typ.] |
|---|---|---|---|
| P-TSSOP14-4.4x5-0.65 | PTSP0014JA-B | TTP-14DV | 0.05g |




Terminal cross section
( Ni/Pd/Au plating )




Detail F

NOTE)
1. DIMENSIONS"*1 (Nom)"AND"*2"
DO NOT INCLUDE MOLD FLASH.
2. DIMENSION"*3"DOES NOT
INCLUDE TRIM OFFSET.

| Reference Symbol | Dimension in Millimeters | | |
|---|---|---|---|
| | Min | Nom | Max |
| D | — | 5.00 | 5.30 |
| E | — | 4.40 | — |
| $A_2$ | — | — | — |
| $A_1$ | 0.03 | 0.07 | 0.10 |
| A | — | — | 1.10 |
| $b_p$ | 0.15 | 0.20 | 0.25 |
| $b_1$ | — | — | — |
| c | 0.10 | 0.15 | 0.20 |
| $c_1$ | — | — | — |
| θ | 0° | — | 8° |
| $H_E$ | 6.20 | 6.40 | 6.60 |
| e | — | 0.65 | — |
| x | — | — | 0.13 |
| y | — | — | 0.10 |
| Z | — | — | 0.83 |
| L | 0.4 | 0.5 | 0.6 |
| $L_1$ | — | 1.0 | — |

Renesas Technology Corp. Sales Strategic Planning Div. Nippon Bldg., 2-6-2, Ohte-machi, Chiyoda-ku, Tokyo 100-0004, Japan



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1 Harbour Front Avenue, #06-10, Keppel Bay Tower, Singapore 098632
Tel: <65> 6213-0200, Fax: <65> 6278-8001

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Kukje Center Bldg. 18th Fl., 191, 2-ka, Hangang-ro, Yongsan-ku, Seoul 140-702, Korea
Tel: <82> (2) 796-3115, Fax: <82> (2) 796-2145

**Renesas Technology Malaysia Sdn. Bhd**
Unit 906, Block B, Menara Amcorp, Amcorp Trade Centre, No.18, Jalan Persiaran Barat, 46050 Petaling Jaya, Selangor Darul Ehsan, Malaysia
Tel: <603> 7955-9390, Fax: <603> 7955-9510



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