

# HD74CBT1G126

R04DS0016EJ0200

## Single FET Bus Switch

Rev.2.00

Jan 10, 2014

### Description

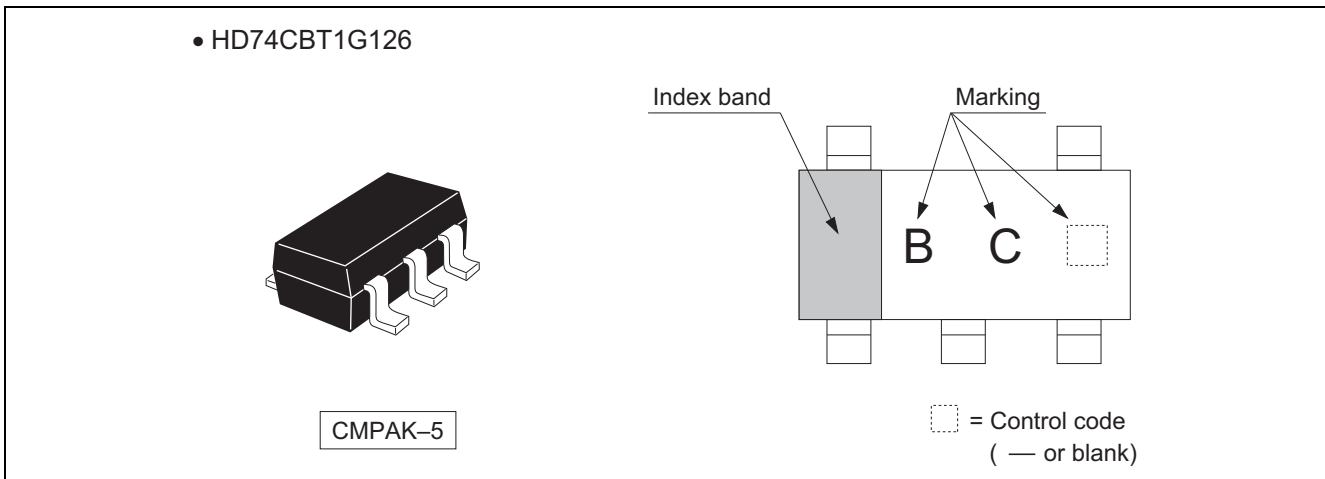
The HD74CBT1G126 features a single high-speed line switch. The switch is disabled when the output enable (OE) input is low.

### Features

- Minimal propagation delay through the switch.
- 5 Ω switch connection between two ports.
- TTL-compatible input levels.
- Ultra low quiescent power.  
— Ideally suited for notebook applications.
- Ordering Information

| Part Name       | Package Type | Package Code (Previous code) | Package Abbreviation | Taping Abbreviation (Quantity) |
|-----------------|--------------|------------------------------|----------------------|--------------------------------|
| HD74CBT1G126CME | CMPAK-5pin   | PTSP0005ZC-A (CMPAK-5V)      | CM                   | E (3,000pcs / Reel)            |

### Outline and Article Indication



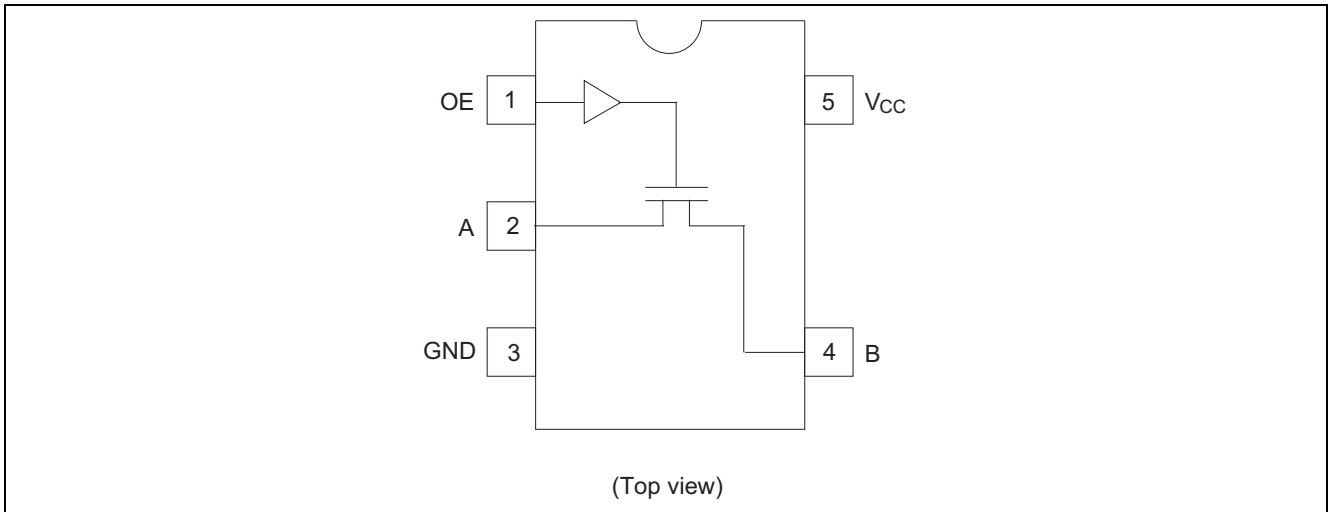
### Function Table

| Input OE | Function        |
|----------|-----------------|
| H        | A port = B port |
| L        | Disconnect      |

H: High level

L: Low level

## Pin Arrangement



## Absolute Maximum Ratings

| Item   | Symbol                | Ratings     | Unit             | Conditions            |
|--|-----------------------|-------------|------------------|-----------------------|
| Supply voltage range   | $V_{CC}$              | -0.5 to 7.0 | V                |                       |
| Input voltage range <sup>*1</sup>  | $V_I$                 | -0.5 to 7.0 | V                |                       |
| Input clamp current  | $I_{IK}$              | -50         | mA               | $V_I < 0$             |
| Continuous output current  | $I_O$                 | 128         | mA               | $V_O = 0$ to $V_{CC}$ |
| Continuous current through $V_{CC}$ or GND   | $I_{CC}$ or $I_{GND}$ | $\pm 100$   | mA               |                       |
| Maximum power dissipation at $T_a = 25^\circ\text{C}$ (in still air) <sup>*2</sup> | $P_T$                 | 200         | mW               |                       |
| Storage temperature  | $T_{stg}$             | -65 to 150  | $^\circ\text{C}$ |                       |

Notes: 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.

1. The input and output voltage ratings may be exceeded even if the input and output clamp-current ratings are observed.
2. The maximum package power dissipation was calculated using a junction temperature of  $150^\circ\text{C}$ .

## Recommended Operating Conditions

| Item                               | Symbol                | Min | Max | Unit             | Conditions                |
|------------------------------------|-----------------------|-----|-----|------------------|---------------------------|
| Supply voltage range               | $V_{CC}$              | 4.0 | 5.5 | V                |                           |
| Input voltage range                | $V_I$                 | 0   | 5.5 | V                |                           |
| Output voltage range               | $V_{IO}$              | 0   | 5.5 | V                |                           |
| Input transition rise or fall rate | $\Delta t / \Delta v$ | 0   | 5   | ns / V           | $V_{CC} = 4.5$ to $5.5$ V |
| Operating free-air temperature     | $T_a$                 | -40 | 85  | $^\circ\text{C}$ |                           |

Note: Unused or floating inputs must be held high or low.

## DC Electrical Characteristics

(Ta = -40 to 85°C)

| Item  | Symbol           | V <sub>CC</sub> (V) | Min | Typ <sup>*1</sup> | Max  | Unit | Test conditions  |
|---|------------------|---------------------|-----|-------------------|------|------|--|
| Clamp diode voltage                                 | V <sub>IK</sub>  | 4.5                 | —   | —                 | -1.2 | V    | I <sub>IN</sub> = -18 mA   |
| Input voltage                                       | V <sub>IH</sub>  | 4.0 to 5.5          | —   | —                 | —    | V    |  |
|   | V <sub>IL</sub>  | 4.0 to 5.5          | —   | —                 | 0.8  |      |  |
| On-state switch resistance <sup>*2</sup>            | R <sub>ON</sub>  | 4.0                 | —   | 14                | 20   | Ω    | V <sub>IN</sub> = 2.4 V, I <sub>IN</sub> = 15 mA<br>Typ at V <sub>CC</sub> = 4.0 V |
|   |                  | 4.5                 | —   | 5                 | 7    |      | V <sub>IN</sub> = 0 V, I <sub>IN</sub> = 64 mA                                     |
|   |                  | 4.5                 | —   | 5                 | 7    |      | V <sub>IN</sub> = 0 V, I <sub>IN</sub> = 30 mA                                     |
|   |                  | 4.5                 | —   | 10                | 15   |      | V <sub>IN</sub> = 2.4 V, I <sub>IN</sub> = 15 mA                                   |
| Input current                                       | I <sub>IN</sub>  | 0 to 5.5            | —   | —                 | ±1.0 | μA   | V <sub>IN</sub> = 5.5 V or GND   |
| Off-state leakage current                           | I <sub>OZ</sub>  | 5.5                 | —   | —                 | ±1.0 | μA   | 0 ≤ A, B ≤ V <sub>CC</sub>   |
| Quiescent supply current                            | I <sub>CC</sub>  | 5.5                 | —   | —                 | 1.0  | μA   | V <sub>IN</sub> = V <sub>CC</sub> or GND, I <sub>O</sub> = 0 mA                    |
| Increase in I <sub>CC</sub> per input <sup>*3</sup> | ΔI <sub>CC</sub> | 5.5                 | —   | —                 | 2.5  | mA   | One input at 3.4 V,<br>other inputs at V <sub>CC</sub> or GND                      |

Notes: For condition shown as Min or Max use the appropriate values under recommended operating conditions.

1. All typical values are at V<sub>CC</sub> = 5 V (unless otherwise noted), Ta = 25°C.
2. Measured by the voltage drop between the A and B terminals at the indicated current through the switch. On-state resistance is determined by the lower voltage of the two (A or B) terminals.
3. This is the increase in supply current for each input that is at the specified TTL voltage level rather than V<sub>CC</sub> or GND.

## Capacitance

(Ta = 25°C)

| Item                       | Symbol                 | V <sub>CC</sub> (V) | Min | Typ | Max | Unit | Test conditions                                 |
|----------------------------|------------------------|---------------------|-----|-----|-----|------|---|
| Control input capacitance  | C <sub>IN</sub>        | 5.0                 | —   | 3   | —   | pF   | V <sub>IN</sub> = 0 or 3 V                      |
| Input / output capacitance | C <sub>I/O (OFF)</sub> | 5.0                 | —   | 5   | —   | pF   | V <sub>O</sub> = 0 or 3 V, OE = V <sub>CC</sub> |

Note: This parameter is determined by device characterization is not production tested.

### Switching Characteristics

(Ta = -40 to 85°C)

V<sub>CC</sub> = 4.0 V

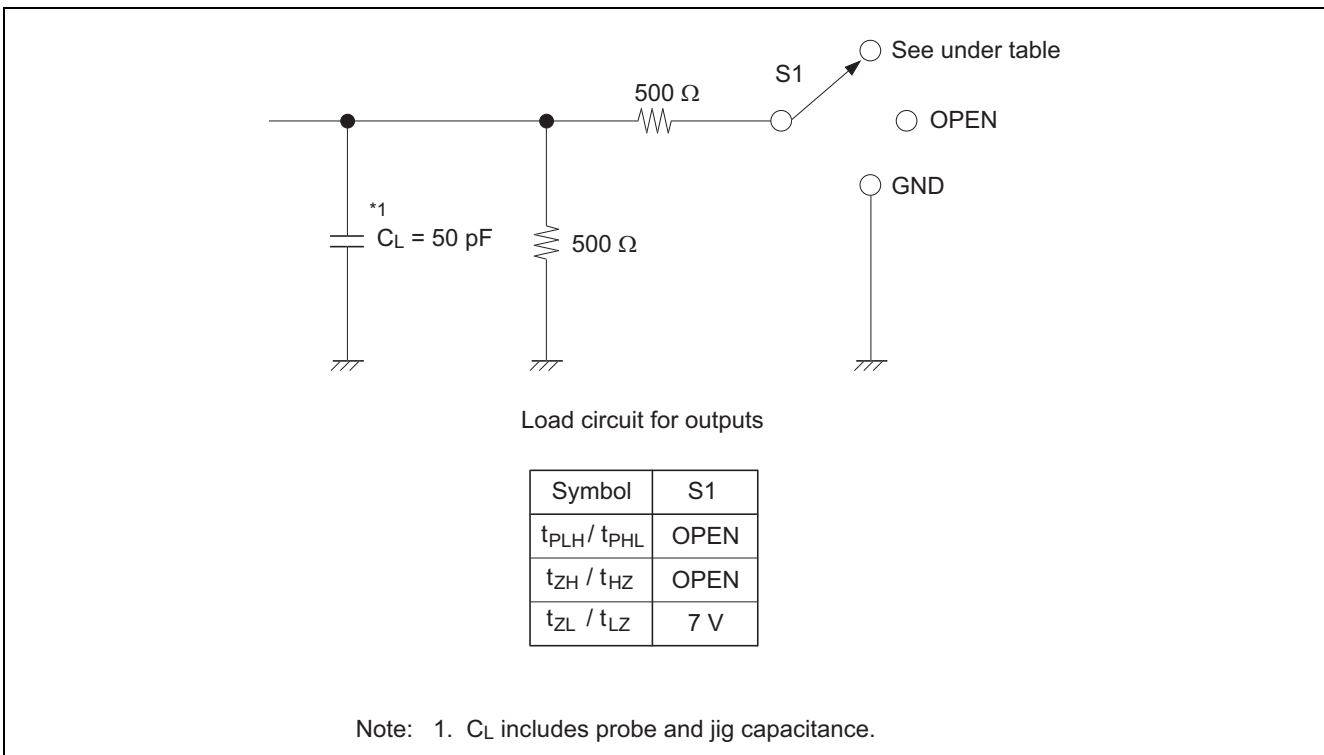
| Item                      | Symbol                               | Min | Max  | Unit | Test conditions                                  | FROM (Input) | TO (Output) |
|---------------------------|--------------------------------------|-----|------|------|--|--------------|-------------|
| Propagation delay time *1 | t <sub>PLH</sub><br>t <sub>PHL</sub> | —   | 0.35 | ns   | C <sub>L</sub> = 50 pF<br>R <sub>L</sub> = 500 Ω | A or B       | B or A      |
| Enable time               | t <sub>ZH</sub><br>t <sub>ZL</sub>   | —   | 5.5  | ns   | C <sub>L</sub> = 50 pF<br>R <sub>L</sub> = 500 Ω | OE           | A or B      |
| Disable time              | t <sub>HZ</sub>                      | —   | 4.5  | ns   | C <sub>L</sub> = 50 pF<br>R <sub>L</sub> = 500 Ω | OE           | A or B      |
|                           | t <sub>LZ</sub>                      | —   | 4.5  |      |  |              |             |

V<sub>CC</sub> = 5.0±0.5 V

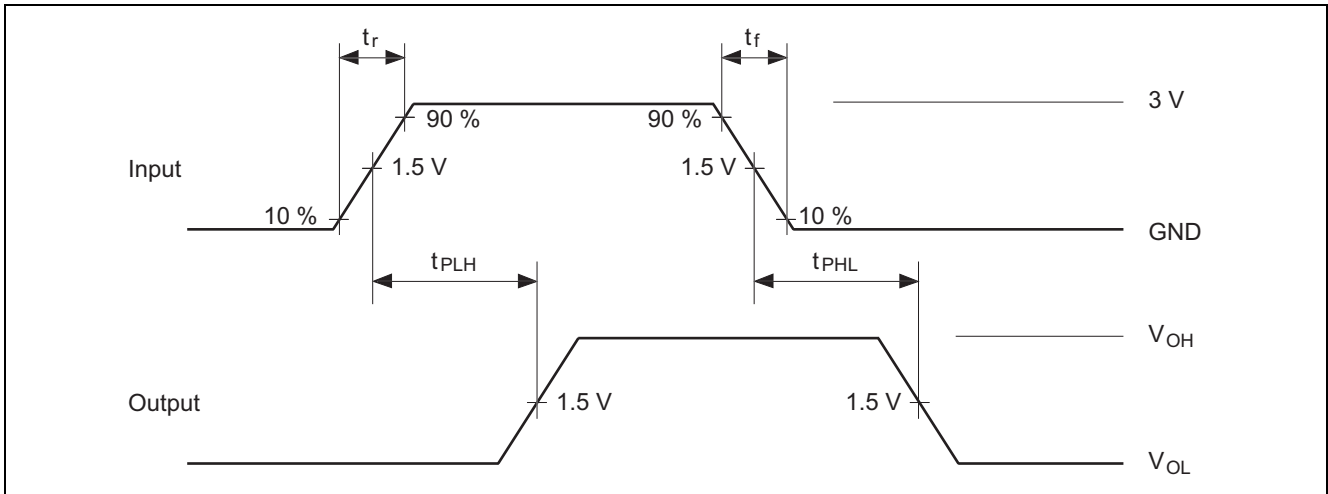
| Item                      | Symbol                               | Min | Max  | Unit | Test conditions                                  | FROM (Input) | TO (Output) |
|---------------------------|--------------------------------------|-----|------|------|--|--------------|-------------|
| Propagation delay time *1 | t <sub>PLH</sub><br>t <sub>PHL</sub> | —   | 0.25 | ns   | C <sub>L</sub> = 50 pF<br>R <sub>L</sub> = 500 Ω | A or B       | B or A      |
| Enable time               | t <sub>ZH</sub><br>t <sub>ZL</sub>   | 1.6 | 4.9  | ns   | C <sub>L</sub> = 50 pF<br>R <sub>L</sub> = 500 Ω | OE           | A or B      |
| Disable time              | t <sub>HZ</sub>                      | 1.0 | 4.2  | ns   | C <sub>L</sub> = 50 pF<br>R <sub>L</sub> = 500 Ω | OE           | A or B      |
|                           | t <sub>LZ</sub>                      | 1.0 | 4.8  |      |  |              |             |

Note: 1. The propagation delay is the calculated RC time constant of the typical on-state resistance of the switch and the specified load capacitance, when driven by an ideal voltage source (zero output impedance).

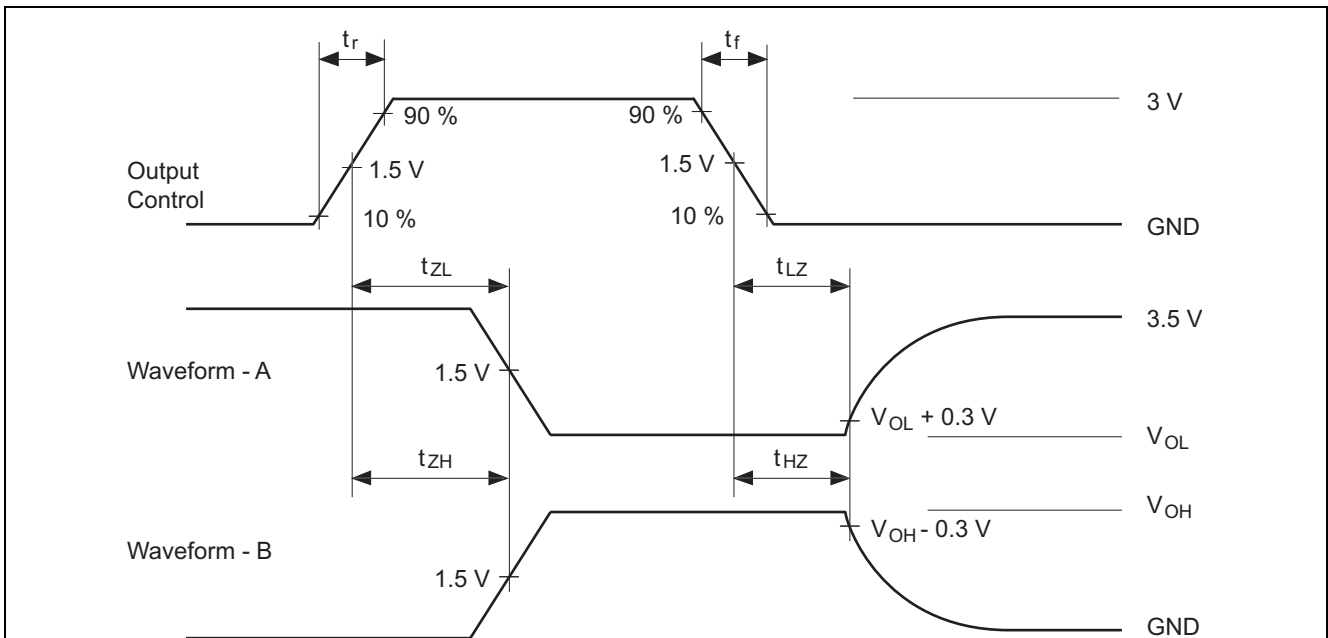
### Test Circuit



Waveforms – 1



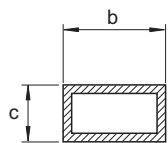
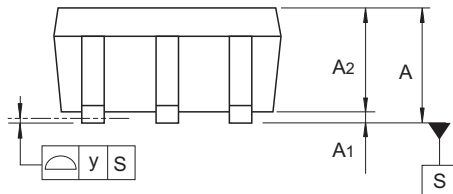
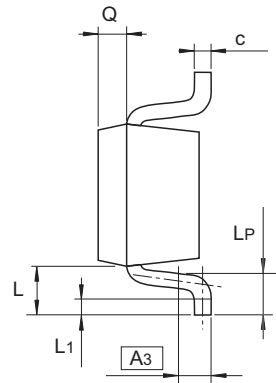
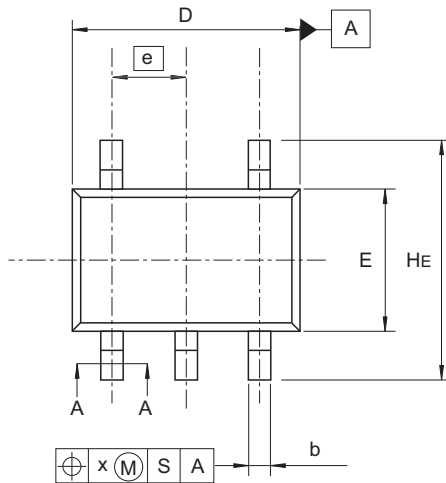
Waveforms – 2



- Notes:
1. All input pulses are supplied by generators having the following characteristics :  
 $PRR \leq 10 \text{ MHz}$ ,  $Z_O = 50 \Omega$ ,  $t_r \leq 2.5 \text{ ns}$ ,  $t_f \leq 2.5 \text{ ns}$ .
  2. Waveform - A is for an output with internal conditions such that the output is low except when disabled by the output control.
  3. Waveform - B is for an output with internal conditions such that the output is high except when disabled by the output control.
  4. The output are measured one at a time with one transition per measurement.

### Package Dimensions

| JEITA Package Code | RENESAS Code | Previous Code      | MASS (Typ) [g] |
|--------------------|--------------|--------------------|----------------|
| SC-88A             | PTSP0005ZC-A | CMPAK-5 / CMPAK-5V | 0.006          |



A-A Section

| Reference Symbol | Dimensions in millimeters |      |      |
|------------------|---------------------------|------|------|
|                  | Min                       | Nom  | Max  |
| A                | 0.8                       | —    | 1.1  |
| A <sub>1</sub>   | 0                         | —    | 0.1  |
| A <sub>2</sub>   | 0.8                       | 0.9  | 1.0  |
| A <sub>3</sub>   | —                         | 0.25 | —    |
| b                | 0.15                      | 0.22 | 0.3  |
| c                | 0.1                       | 0.13 | 0.15 |
| D                | 1.8                       | 2.0  | 2.2  |
| E                | 1.15                      | 1.25 | 1.35 |
| e                | —                         | 0.65 | —    |
| HE               | 1.8                       | 2.1  | 2.4  |
| L                | 0.3                       | —    | 0.7  |
| L <sub>1</sub>   | 0.1                       | —    | 0.5  |
| LP               | 0.2                       | —    | 0.6  |
| x                | —                         | —    | 0.05 |
| y                | —                         | —    | 0.05 |
| Q                | —                         | 0.25 | —    |

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