

HD74ALVC2G240

Dual Bus Buffer Inverted with 3-state Output

REJ03D0174-0300Z
(Previous ADE-205-623B (Z))
Rev.3.00
Dec.18.2003

Description

The HD74ALVC2G240 has dual bus buffer inverted with 3-state output in an 8 pin package. Output is disabled when the associated output enable (\overline{OE}) input is high. To ensure the high impedance state during power up or power down, \overline{OE} should be connected to V_{CC} through a pull-up resistor; the minimum value of the resistor is determined by the current sinking capability of the driver. Low voltage and high-speed operation is suitable for the battery powered products (e.g., notebook computers), and the low power consumption extends the battery life.

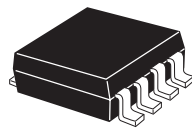
Features

- The basic gate function is lined up as Renesas uni logic series.
- Supplied on emboss taping for high-speed automatic mounting.
- Supply voltage range : 1.2 to 3.6 V
Operating temperature range: -40 to $+85^{\circ}\text{C}$
- All inputs V_{IH} (Max.) = 3.6 V (@ $V_{CC} = 0$ V to 3.6 V)
All outputs V_O (Max.) = 3.6 V (@ $V_{CC} = 0$ V)
- Output current ± 2 mA (@ $V_{CC} = 1.2$ V)
 ± 4 mA (@ $V_{CC} = 1.4$ V to 1.6 V)
 ± 6 mA (@ $V_{CC} = 1.65$ V to 1.95 V)
 ± 18 mA (@ $V_{CC} = 2.3$ V to 2.7 V)
 ± 24 mA (@ $V_{CC} = 3.0$ V to 3.6 V)
- Ordering Information

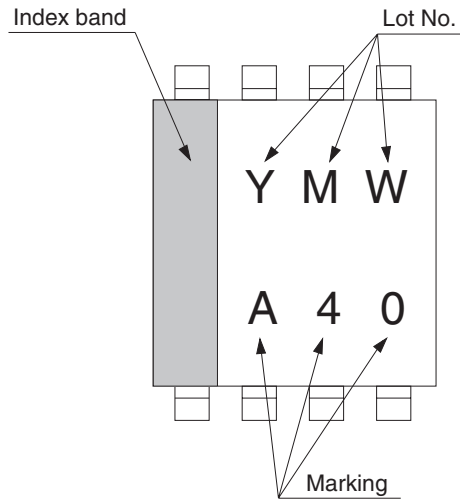
| Part Name | Package Type | Package Code | Package Abbreviation | Taping Abbreviation (Quantity) |
|------------------|--------------|--------------|----------------------|--------------------------------|
| HD74ALVC2G240USE | SSOP-8 pin | TTP-8DBV | US | E (3,000 pcs/reel) |

Outline and Article Indication

- HD74ALVC2G240



SSOP-8



Y : Year code
(the last digit of year)
M : Month code
W : Week code

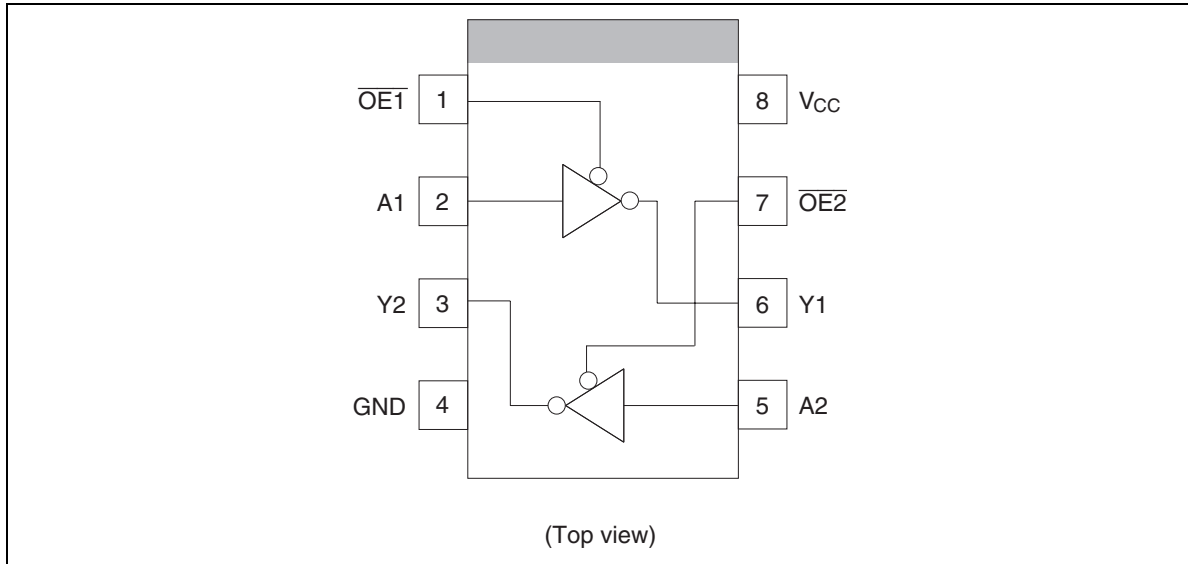
Function Table

Inputs

| \overline{OE} | A | Output Y |
|-----------------|---|----------|
| L | L | H |
| L | H | L |
| H | X | Z |

H: High level
L: Low level
X: Immaterial
Z: High impedance

Pin Arrangement



Absolute Maximum Ratings

| Item | Symbol | Ratings | Unit | Conditions |
|--|-----------------------|-------------------------------------|------------------|--|
| Supply voltage range | V_{CC} | -0.5 to 4.6 | V | |
| Input voltage range ^{*1} | V_I | -0.5 to 4.6 | V | |
| Output voltage range ^{*1, 2} | V_O | -0.5 to $V_{CC}+0.5$ -0.5 to 4.6 | V | Output : H or L or Z V_{CC} : OFF |
| Input clamp current | I_{IK} | -50 | mA | $V_I < 0$ |
| Output clamp current | I_{OK} | ± 50 | mA | $V_O < 0$ or $V_O > V_{CC}$ |
| Continuous output current | I_O | ± 50 | mA | $V_O = 0$ to V_{CC} |
| Continuous current through V_{CC} or GND | I_{CC} or I_{GND} | ± 100 | mA | |
| Maximum power dissipation at $T_a = 25^\circ\text{C}$ (in still air) ^{*3} | 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 if the input and output clamp-current ratings are observed.
2. This value is limited to 4.6 V maximum.
3. The maximum package power dissipation was calculated using a junction temperature of 150°C.

Recommended Operating Conditions

| Item | Symbol | Min | Max | Unit | Conditions |
|------------------------------------|-----------------------|-----|----------|--------|---------------------------------------|
| Supply voltage range | V_{CC} | 1.2 | 3.6 | V | |
| Input voltage range | V_I | 0 | 3.6 | V | |
| Output voltage range | V_O | 0 | V_{CC} | V | |
| Output current | I_{OH} | — | –2 | mA | $V_{CC} = 1.2\text{ V}$ |
| | | — | –4 | | $V_{CC} = 1.4\text{ V}$ |
| | | — | –6 | | $V_{CC} = 1.65\text{ V}$ |
| | | — | –18 | | $V_{CC} = 2.3\text{ V}$ |
| | | — | –24 | | $V_{CC} = 3.0\text{ V}$ |
| | I_{OL} | — | 2 | | $V_{CC} = 1.2\text{ V}$ |
| | | — | 4 | | $V_{CC} = 1.4\text{ V}$ |
| | | — | 6 | | $V_{CC} = 1.65\text{ V}$ |
| | | — | 18 | | $V_{CC} = 2.3\text{ V}$ |
| | | — | 24 | | $V_{CC} = 3.0\text{ V}$ |
| Input transition rise or fall rate | $\Delta t / \Delta v$ | 0 | 20 | ns / V | $V_{CC} = 1.2\text{ to }2.7\text{ V}$ |
| | | 0 | 10 | | $V_{CC} = 3.3\pm 0.3\text{ V}$ |
| Operating free-air temperature | T_a | –40 | 85 | °C | |

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

Electrical Characteristics

(Ta = -40 to 85°C)

| Item | Symbol | V _{CC} (V) * | Min | Typ | Max | Unit | Test conditions |
|--------------------------|------------------|-----------------------|-----------------------|-----|-----------------------|------|--|
| Input voltage | V _{IH} | 1.2 | V _{CC} ×0.75 | — | — | V | |
| | | 1.4 to 1.6 | V _{CC} ×0.7 | — | — | | |
| | | 1.65 to 1.95 | V _{CC} ×0.7 | — | — | | |
| | | 2.3 to 2.7 | 1.7 | — | — | | |
| | | 3.0 to 3.6 | 2.0 | — | — | | |
| | V _{IL} | 1.2 | — | — | V _{CC} ×0.25 | | |
| | | 1.4 to 1.6 | — | — | V _{CC} ×0.3 | | |
| | | 1.65 to 1.95 | — | — | V _{CC} ×0.3 | | |
| | | 2.3 to 2.7 | — | — | 0.7 | | |
| | | 3.0 to 3.6 | — | — | 0.8 | | |
| Output voltage | V _{OH} | Min to Max | V _{CC} -0.2 | — | — | V | I _{OH} = -100 μA |
| | | 1.2 | 0.9 | — | — | | I _{OH} = -2 mA |
| | | 1.4 | 1.1 | — | — | | I _{OH} = -4 mA |
| | | 1.65 | 1.2 | — | — | | I _{OH} = -6 mA |
| | | 2.3 | 1.7 | — | — | | I _{OH} = -18 mA |
| | | 3.0 | 2.2 | — | — | | I _{OH} = -24 mA |
| | V _{OL} | Min to Max | — | — | 0.2 | | I _{OL} = 100 μA |
| | | 1.2 | — | — | 0.3 | | I _{OL} = 2 mA |
| | | 1.4 | — | — | 0.3 | | I _{OL} = 4 mA |
| | | 1.65 | — | — | 0.3 | | I _{OL} = 6 mA |
| | | 2.3 | — | — | 0.55 | | I _{OL} = 18 mA |
| | | 3.0 | — | — | 0.55 | | I _{OL} = 24 mA |
| Input current | I _{IN} | 3.6 | — | — | ±5 | μA | V _{IN} = 3.6 V or GND |
| Off state output current | I _{OZ} | 3.6 | — | — | ±5 | μA | V _O = V _{CC} or GND |
| Quiescent supply current | I _{CC} | 3.6 | — | — | 10 | μA | V _{IN} = V _{CC} or GND, I _O = 0 |
| Output leakage current | I _{OFF} | 0 | — | — | 5 | μA | V _{IN} or V _O = 0 to 3.6 V |
| Input capacitance | C _{IN} | 3.3 | — | 4.5 | — | pF | V _{IN} = V _{CC} or GND |

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

Switching Characteristics

(Ta = -40 to 85°C)

V_{CC} = 1.2 V

| Item | Symbol | Min | Typ | Max | Unit | Test conditions | FROM (Input) | TO (Output) |
|------------------------|--------------------------------------|-----|-----|-----|------|------------------------|------------------------|-------------|
| Propagation delay time | t _{PLH} t _{PHL} | — | 5.5 | — | ns | C _L = 15 pF | A | Y |
| Enable time | t _{ZH} t _{ZL} | — | 6.5 | — | ns | C _L = 15 pF | $\overline{\text{OE}}$ | Y |
| Disable time | t _{HZ} t _{LZ} | — | 4.5 | — | ns | C _L = 15 pF | $\overline{\text{OE}}$ | Y |

V_{CC} = 1.5±0.1 V

| Item | Symbol | Min | Typ | Max | Unit | Test conditions | FROM (Input) | TO (Output) |
|------------------------|--------------------------------------|-----|-----|-----|------|------------------------|------------------------|-------------|
| Propagation delay time | t _{PLH} t _{PHL} | 2.0 | — | 7.0 | ns | C _L = 15 pF | A | Y |
| Enable time | t _{ZH} t _{ZL} | 2.0 | — | 7.0 | ns | C _L = 15 pF | $\overline{\text{OE}}$ | Y |
| Disable time | t _{HZ} t _{LZ} | 2.0 | — | 7.0 | ns | C _L = 15 pF | $\overline{\text{OE}}$ | Y |

V_{CC} = 1.8±0.15 V

| Item | Symbol | Min | Typ | Max | Unit | Test conditions | FROM (Input) | TO (Output) |
|------------------------|--------------------------------------|-----|-----|-----|------|------------------------|------------------------|-------------|
| Propagation delay time | t _{PLH} t _{PHL} | 1.5 | — | 5.0 | ns | C _L = 30 pF | A | Y |
| Enable time | t _{ZH} t _{ZL} | 1.5 | — | 5.0 | ns | C _L = 30 pF | $\overline{\text{OE}}$ | Y |
| Disable time | t _{HZ} t _{LZ} | 1.5 | — | 5.0 | ns | C _L = 30 pF | $\overline{\text{OE}}$ | Y |

HD74ALVC2G240

Switching Characteristics (cont)

$$V_{CC} = 2.5 \pm 0.2 \text{ V}$$

| Item | Symbol | Min | Typ | Max | Unit | Test conditions | FROM (Input) | TO (Output) |
|------------------------|------------------------|-----|-----|-----|------|-----------------------|-----------------|-------------|
| Propagation delay time | t_{PLH} t_{PHL} | 1.0 | — | 4.0 | ns | $C_L = 30 \text{ pF}$ | A | Y |
| Enable time | t_{ZH} t_{ZL} | 1.0 | — | 4.0 | ns | $C_L = 30 \text{ pF}$ | \overline{OE} | Y |
| Disable time | t_{HZ} t_{LZ} | 1.0 | — | 4.0 | ns | $C_L = 30 \text{ pF}$ | \overline{OE} | Y |

$$V_{CC} = 3.3 \pm 0.3 \text{ V}$$

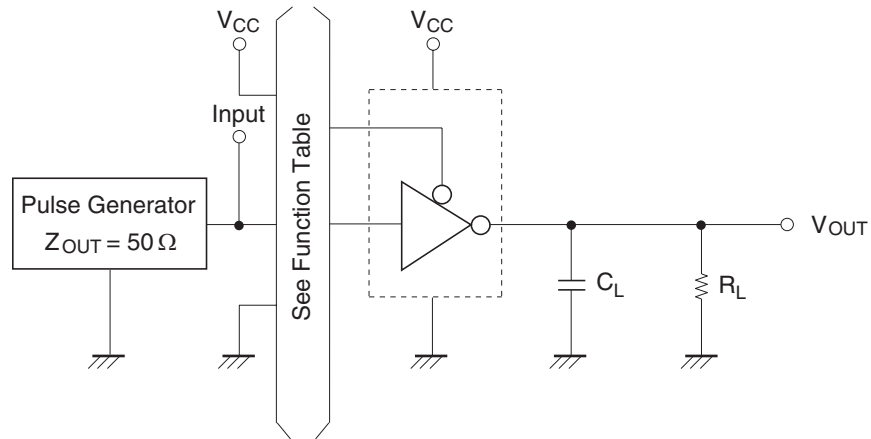
| Item | Symbol | Min | Typ | Max | Unit | Test conditions | FROM (Input) | TO (Output) |
|------------------------|------------------------|-----|-----|-----|------|-----------------------|-----------------|-------------|
| Propagation delay time | t_{PLH} t_{PHL} | 1.0 | — | 3.0 | ns | $C_L = 30 \text{ pF}$ | A | Y |
| Enable time | t_{ZH} t_{ZL} | 1.0 | — | 3.0 | ns | $C_L = 30 \text{ pF}$ | \overline{OE} | Y |
| Disable time | t_{HZ} t_{LZ} | 1.0 | — | 3.0 | ns | $C_L = 30 \text{ pF}$ | \overline{OE} | Y |

Operating Characteristics

$$(T_a = 25^\circ\text{C})$$

| Item | Symbol | V_{CC} (V) | Min | Typ | Max | Unit | Test conditions |
|-------------------------------|----------|--------------|-----|------|-----|------|----------------------|
| Power dissipation capacitance | C_{PD} | 1.5 | — | 10.5 | — | pF | $f = 10 \text{ MHz}$ |
| | | 1.8 | — | 10.5 | — | | |
| | | 2.5 | — | 11.0 | — | | |
| | | 3.3 | — | 13.0 | — | | |

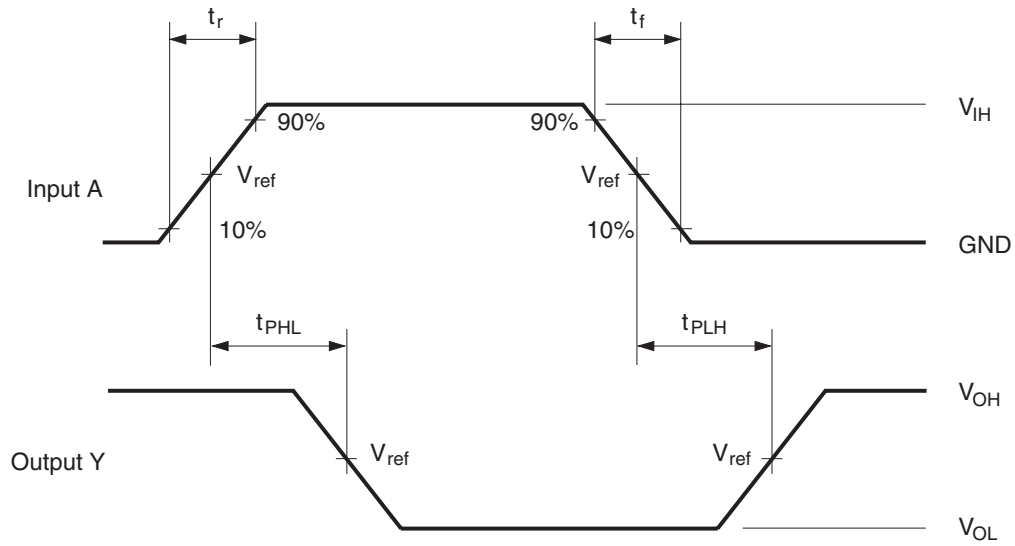
Test Circuit - 1



| Symbol | $V_{CC} = 1.2 \text{ V},$ $1.5 \pm 0.1 \text{ V}$ | $V_{CC} = 1.8 \pm 0.15 \text{ V}$ | $V_{CC} = 2.5 \pm 0.2 \text{ V},$ $3.3 \pm 0.3 \text{ V}$ |
|--------|--|-----------------------------------|--|
| R_L | 2.0 k Ω | 1.0 k Ω | 500 Ω |
| C_L | 15 pF | 30 pF | 30 pF |

Note: C_L includes probe and jig capacitance.

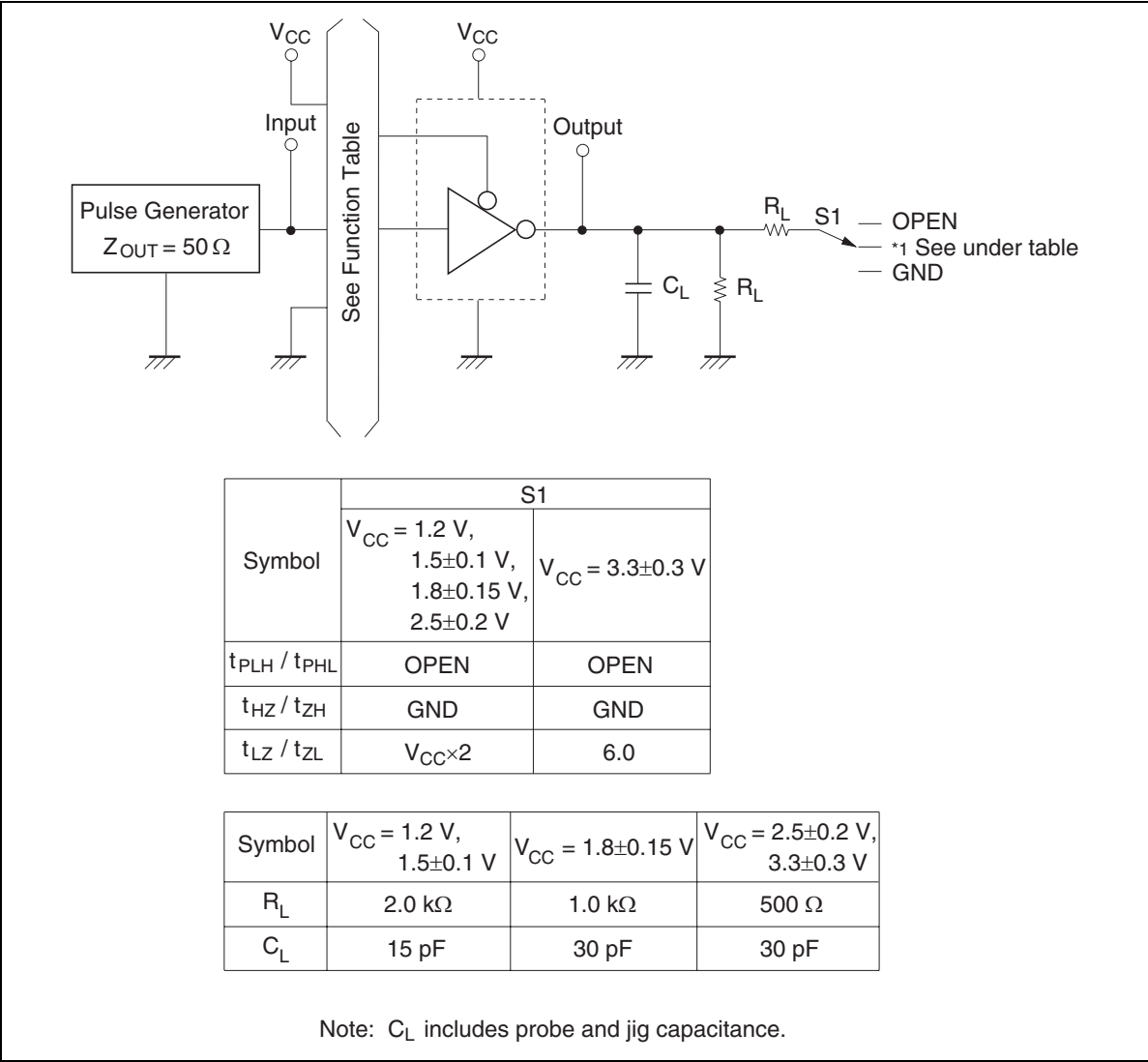
Waveforms - 1



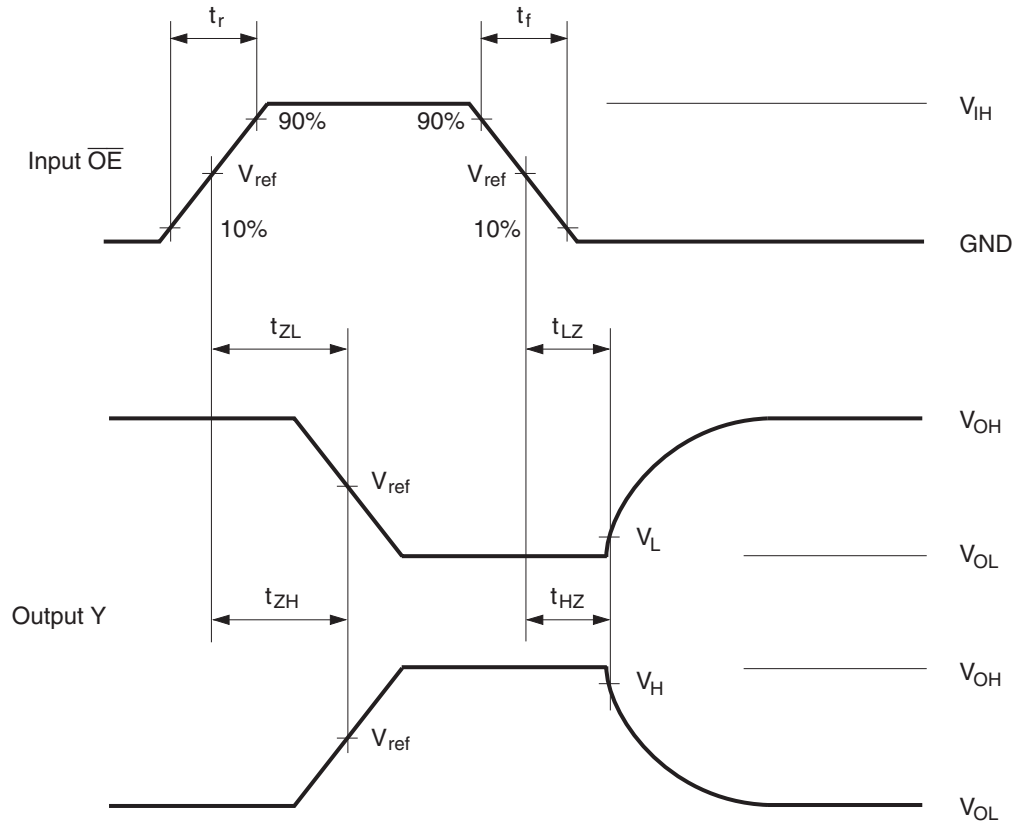
| Symbol | $V_{CC} = 1.2\text{ V},$ $1.5 \pm 0.1\text{ V},$ $1.8 \pm 0.15\text{ V}$ | $V_{CC} = 2.5 \pm 0.2\text{ V}$ | $V_{CC} = 3.3 \pm 0.3\text{ V}$ |
|-------------|--|---------------------------------|---------------------------------|
| t_r / t_f | 2.0 ns | 2.5 ns | 2.5 ns |
| V_{IH} | V_{CC} | V_{CC} | 2.7 V |
| V_{ref} | 50% | 50% | 1.5 V |

Note: Input waveform : PRR = 10 MHz, duty cycle 50%

Test Circuit - 2



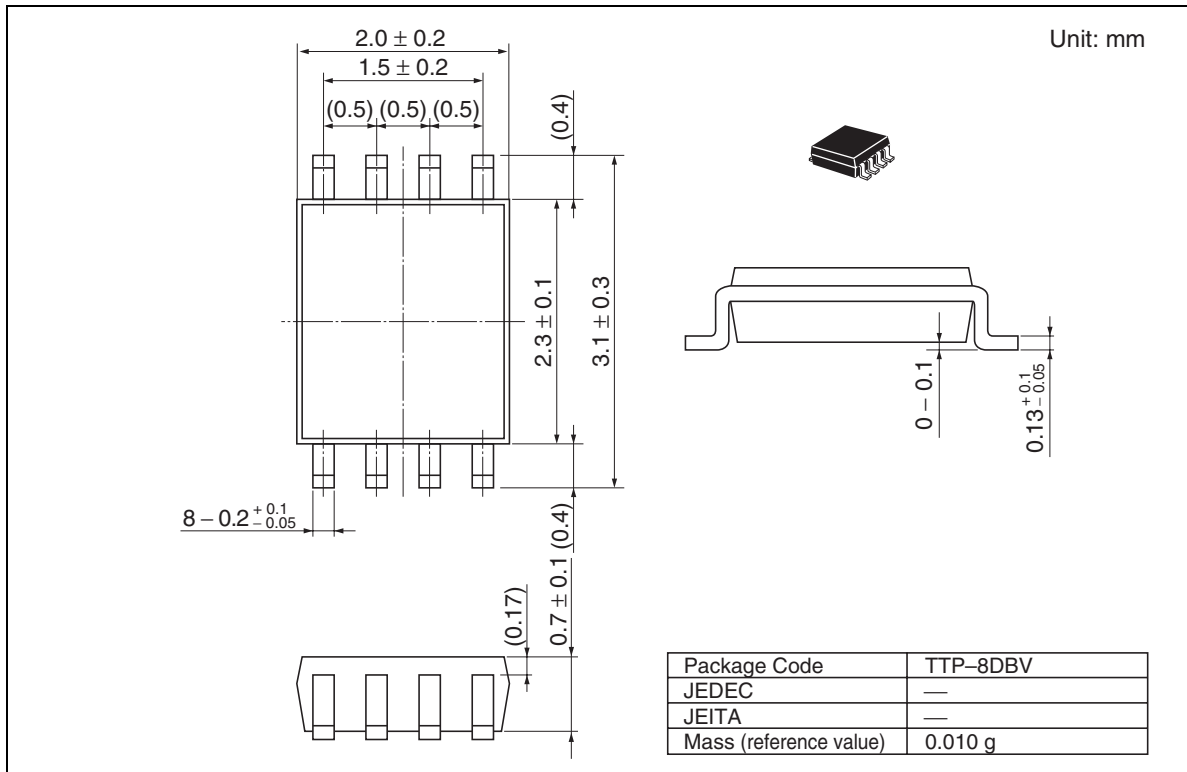
Waveforms - 2



| Symbol | $V_{CC} = 1.2 \text{ V},$ $1.5 \pm 0.1 \text{ V}$ | $V_{CC} = 1.8 \pm 0.15 \text{ V}$ | $V_{CC} = 2.5 \pm 0.2 \text{ V}$ | $V_{CC} = 3.3 \pm 0.3 \text{ V}$ |
|-------------|--|--|--|--|
| t_r / t_f | 2.0 ns | 2.0 ns | 2.5 ns | 2.5 ns |
| V_{IH} | V_{CC} | V_{CC} | V_{CC} | 2.7 V |
| V_{ref} | 50% | 50% | 50% | 1.5 V |
| V_H / V_L | $V_H = V_{OH} - 0.1 \text{ V}$ $V_L = V_{OL} + 0.1 \text{ V}$ | $V_H = V_{OH} - 0.15 \text{ V}$ $V_L = V_{OL} + 0.15 \text{ V}$ | $V_H = V_{OH} - 0.15 \text{ V}$ $V_L = V_{OL} + 0.15 \text{ V}$ | $V_H = V_{OH} - 0.3 \text{ V}$ $V_L = V_{OL} + 0.3 \text{ V}$ |

Note: Input waveform : PRR = 10 MHz, duty cycle 50%

Package Dimensions



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