

## 7UL1G86FU

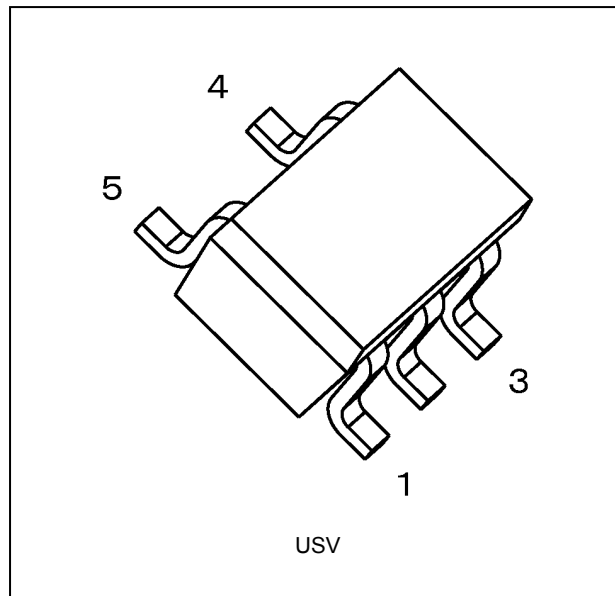
### 1. Functional Description

- 2-Input Exclusive-OR Gate

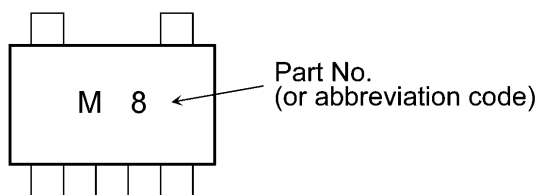
### 2. Features

- (1) Wide operating temperature range:  $T_{opr} = -40$  to  $125$  °C
- (2) High output current:  $\pm 8.0$  mA (min) at  $V_{CC} = 3.0$  V
- (3) Super high speed operation:  $t_{pd} = 2.5$  ns (typ.) at  $V_{CC} = 3.3$  V,  $C_L = 15$  pF
- (4) Operating voltage range:  $V_{CC} = 0.9$  to  $3.6$  V
- (5) 3.6 V tolerant inputs
- (6) 3.6 V power down protection output

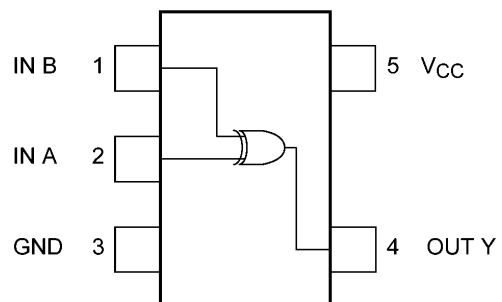
### 3. Packaging



### 4. Marking and Pin Assignment



Marking

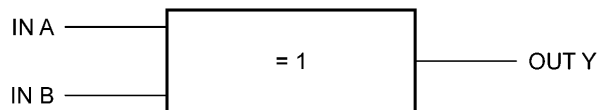


Pin Assignment (Top view)

Start of commercial production

2020-12

## 5. IEC Logic Symbol



## 6. Truth Table

| Input A | Input B | Output Y |
|---------|---------|----------|
| L       | L       | L        |
| L       | H       | H        |
| H       | L       | H        |
| H       | H       | L        |

## 7. Absolute Maximum Ratings (Note) (Unless otherwise specified, $T_a = 25\text{ }^\circ\text{C}$ )

| Characteristics          | Symbol    | Note     | Rating                 | Unit             |
|--------------------------|-----------|----------|------------------------|------------------|
| Supply voltage           | $V_{CC}$  |          | -0.5 to 4.6            | V                |
| Input voltage            | $V_{IN}$  |          | -0.5 to 4.6            | V                |
| DC output voltage        | $V_{OUT}$ | (Note 1) | -0.5 to 4.6            | V                |
|                          |           | (Note 2) | -0.5 to $V_{CC} + 0.5$ |                  |
| Input diode current      | $I_{IK}$  |          | -20                    | mA               |
| Output diode current     | $I_{OK}$  | (Note 3) | -20                    | mA               |
| DC output current        | $I_{OUT}$ |          | $\pm 25$               | mA               |
| $V_{CC}$ /ground current | $I_{CC}$  |          | $\pm 50$               | mA               |
| Power dissipation        | $P_D$     |          | 200                    | mW               |
| Storage temperature      | $T_{stg}$ |          | -65 to 150             | $^\circ\text{C}$ |

Note: Exceeding any of the absolute maximum ratings, even briefly, lead to deterioration in IC performance or even destruction.

Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings and the operating ranges.

Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook (“Handling Precautions”/“Derating Concept and Methods”) and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

Note 1:  $V_{CC} = 0\text{ V}$

Note 2: High (H) or Low (L) state.  $I_{OUT}$  absolute maximum rating must be observed.

Note 3:  $V_{OUT} < \text{GND}$

### 8. Operating Ranges (Note)

| Characteristics          | Symbol           | Note     | Test Condition                              | Rating        | Unit |
|--------------------------|------------------|----------|---|---------------|------|
| Supply voltage           | $V_{CC}$         |          | —   | 0.9 to 3.6    | V    |
| Input voltage            | $V_{IN}$         |          | —   | 0 to 3.6      | V    |
| Output voltage           | $V_{OUT}$        | (Note 1) | —   | 0 to 3.6      | V    |
|                          |                  | (Note 2) | —   | 0 to $V_{CC}$ |      |
| Output current           | $I_{OH}, I_{OL}$ |          | $V_{CC} = 3.0$ to $3.6$ V                   | $\pm 8.0$     | mA   |
|                          |                  |          | $V_{CC} = 2.3$ to $2.7$ V                   | $\pm 4.0$     |      |
|                          |                  |          | $V_{CC} = 1.65$ to $1.95$ V                 | $\pm 3.0$     |      |
|                          |                  |          | $V_{CC} = 1.4$ to $1.6$ V                   | $\pm 1.7$     |      |
|                          |                  |          | $V_{CC} = 1.1$ to $1.3$ V                   | $\pm 0.3$     |      |
|                          |                  |          | $V_{CC} = 0.9$ V                            | $\pm 0.02$    |      |
| Operating temperature    | $T_{opr}$        |          | —   | -40 to 125    | °C   |
| Input rise and fall time | dt/dv            |          | $V_{IN} = 0.8$ to $2.0$ V, $V_{CC} = 3.0$ V | 0 to 10       | ns/V |

Note: The operating ranges must be maintained to ensure the normal operation of the device.

Unused inputs must be tied to either  $V_{CC}$  or GND.

Note 1:  $V_{CC} = 0$  V

Note 2: High (H) or Low (L) state.

## 9. Electrical Characteristics

### 9.1. DC Characteristics (Unless otherwise specified, $T_a = 25\text{ }^\circ\text{C}$ )

| Characteristics           | Symbol    | Test Condition  | $V_{CC}$ (V)               | Min                  | Typ.                 | Max                  | Unit          |                      |
|---------------------------|-----------|---|----------------------------|----------------------|----------------------|----------------------|---------------|----------------------|
| High-level input voltage  | $V_{IH}$  | —   | 0.9                        | $V_{CC}$             | —                    | —                    | V             |                      |
|                           |           |   | 1.1 to 1.3                 | $V_{CC} \times 0.70$ | —                    | —                    |               |                      |
|                           |           |   | 1.4 to 1.6                 | $V_{CC} \times 0.65$ | —                    | —                    |               |                      |
|                           |           |   | 1.65 to 1.95               | $V_{CC} \times 0.65$ | —                    | —                    |               |                      |
|                           |           |   | 2.3 to 2.7                 | 1.7                  | —                    | —                    |               |                      |
|                           |           |   | 3.0 to 3.6                 | 2.0                  | —                    | —                    |               |                      |
| Low-level input voltage   | $V_{IL}$  | —   | 0.9                        | —                    | —                    | GND                  | V             |                      |
|                           |           |   | 1.1 to 1.3                 | —                    | —                    | $V_{CC} \times 0.30$ |               |                      |
|                           |           |   | 1.4 to 1.6                 | —                    | —                    | $V_{CC} \times 0.35$ |               |                      |
|                           |           |   | 1.65 to 1.95               | —                    | —                    | $V_{CC} \times 0.35$ |               |                      |
|                           |           |   | 2.3 to 2.7                 | —                    | —                    | 0.7                  |               |                      |
|                           |           |   | 3.0 to 3.6                 | —                    | —                    | 0.8                  |               |                      |
| High-level output voltage | $V_{OH}$  | $V_{IN} = V_{IH}$ or $V_{IL}$                                       | $I_{OH} = -0.02\text{ mA}$ | 0.9                  | 0.75                 | —                    | V             |                      |
|                           |           |   | $I_{OH} = -0.3\text{ mA}$  | 1.1 to 1.3           | $V_{CC} \times 0.75$ | —                    |               | —                    |
|                           |           |   | $I_{OH} = -1.7\text{ mA}$  | 1.4 to 1.6           | $V_{CC} \times 0.75$ | —                    |               | —                    |
|                           |           |   | $I_{OH} = -3.0\text{ mA}$  | 1.65 to 1.95         | $V_{CC} - 0.45$      | —                    |               | —                    |
|                           |           |   | $I_{OH} = -4.0\text{ mA}$  | 2.3 to 2.7           | 2.0                  | —                    |               | —                    |
|                           |           |   | $I_{OH} = -8.0\text{ mA}$  | 3.0 to 3.6           | 2.48                 | —                    |               | —                    |
| Low-level output voltage  | $V_{OL}$  | $V_{IN} = V_{IH}$ or $V_{IL}$                                       | $I_{OL} = 0.02\text{ mA}$  | 0.9                  | —                    | —                    | V             |                      |
|                           |           |   | $I_{OL} = 0.3\text{ mA}$   | 1.1 to 1.3           | —                    | —                    |               | $V_{CC} \times 0.25$ |
|                           |           |   | $I_{OL} = 1.7\text{ mA}$   | 1.4 to 1.6           | —                    | —                    |               | $V_{CC} \times 0.25$ |
|                           |           |   | $I_{OL} = 3.0\text{ mA}$   | 1.65 to 1.95         | —                    | —                    |               | 0.45                 |
|                           |           |   | $I_{OL} = 4.0\text{ mA}$   | 2.3 to 2.7           | —                    | —                    |               | 0.4                  |
|                           |           |   | $I_{OL} = 8.0\text{ mA}$   | 3.0 to 3.6           | —                    | —                    |               | 0.4                  |
| Input leakage current     | $I_{IN}$  | $V_{IN} = 0$ to $3.6\text{ V}$                                      | 0 to 3.6                   | —                    | —                    | $\pm 0.1$            | $\mu\text{A}$ |                      |
| Power-OFF leakage current | $I_{OFF}$ | $V_{IN} = 0$ to $3.6\text{ V}$ ,<br>$V_{OUT} = 0$ to $3.6\text{ V}$ | 0                          | —                    | —                    | 1.0                  | $\mu\text{A}$ |                      |
| Quiescent supply current  | $I_{CC}$  | $V_{IN} = V_{CC}$ or GND  | 3.6                        | —                    | —                    | 1.0                  | $\mu\text{A}$ |                      |

### 9.2. DC Characteristics (Unless otherwise specified, $T_a = -40$ to $85$ °C)

| Characteristics           | Symbol    | Test Condition                                       | $V_{CC}$ (V)        | Min                  | Max                  | Unit                 |   |
|---------------------------|-----------|--|---------------------|----------------------|----------------------|----------------------|---|
| High-level input voltage  | $V_{IH}$  | —  | 0.9                 | $V_{CC}$             | —                    | V                    |   |
|                           |           |  | 1.1 to 1.3          | $V_{CC} \times 0.70$ | —                    |                      |   |
|                           |           |  | 1.4 to 1.6          | $V_{CC} \times 0.65$ | —                    |                      |   |
|                           |           |  | 1.65 to 1.95        | $V_{CC} \times 0.65$ | —                    |                      |   |
|                           |           |  | 2.3 to 2.7          | 1.7                  | —                    |                      |   |
|                           |           |  | 3.0 to 3.6          | 2.0                  | —                    |                      |   |
| Low-level input voltage   | $V_{IL}$  | —  | 0.9                 | —                    | GND                  | V                    |   |
|                           |           |  | 1.1 to 1.3          | —                    | $V_{CC} \times 0.30$ |                      |   |
|                           |           |  | 1.4 to 1.6          | —                    | $V_{CC} \times 0.35$ |                      |   |
|                           |           |  | 1.65 to 1.95        | —                    | $V_{CC} \times 0.35$ |                      |   |
|                           |           |  | 2.3 to 2.7          | —                    | 0.7                  |                      |   |
|                           |           |  | 3.0 to 3.6          | —                    | 0.8                  |                      |   |
| High-level output voltage | $V_{OH}$  | $V_{IN} = V_{IH}$ or $V_{IL}$                        | $I_{OH} = -0.02$ mA | 0.9                  | 0.75                 | —                    | V |
|                           |           |  | $I_{OH} = -0.3$ mA  | 1.1 to 1.3           | $V_{CC} \times 0.75$ | —                    |   |
|                           |           |  | $I_{OH} = -1.7$ mA  | 1.4 to 1.6           | $V_{CC} \times 0.75$ | —                    |   |
|                           |           |  | $I_{OH} = -3.0$ mA  | 1.65 to 1.95         | $V_{CC} - 0.45$      | —                    |   |
|                           |           |  | $I_{OH} = -4.0$ mA  | 2.3 to 2.7           | 2.0                  | —                    |   |
|                           |           |  | $I_{OH} = -8.0$ mA  | 3.0 to 3.6           | 2.48                 | —                    |   |
| Low-level output voltage  | $V_{OL}$  | $V_{IN} = V_{IH}$ or $V_{IL}$                        | $I_{OL} = 0.02$ mA  | 0.9                  | —                    | 0.1                  | V |
|                           |           |  | $I_{OL} = 0.3$ mA   | 1.1 to 1.3           | —                    | $V_{CC} \times 0.25$ |   |
|                           |           |  | $I_{OL} = 1.7$ mA   | 1.4 to 1.6           | —                    | $V_{CC} \times 0.25$ |   |
|                           |           |  | $I_{OL} = 3.0$ mA   | 1.65 to 1.95         | —                    | 0.45                 |   |
|                           |           |  | $I_{OL} = 4.0$ mA   | 2.3 to 2.7           | —                    | 0.4                  |   |
|                           |           |  | $I_{OL} = 8.0$ mA   | 3.0 to 3.6           | —                    | 0.4                  |   |
| Input leakage current     | $I_{IN}$  | $V_{IN} = 0$ to $3.6$ V                              | 0 to 3.6            | —                    | $\pm 0.5$            | $\mu$ A              |   |
| Power-OFF leakage current | $I_{OFF}$ | $V_{IN} = 0$ to $3.6$ V,<br>$V_{OUT} = 0$ to $3.6$ V | 0                   | —                    | 10.0                 | $\mu$ A              |   |
| Quiescent supply current  | $I_{CC}$  | $V_{IN} = V_{CC}$ or GND                             | 3.6                 | —                    | 10.0                 | $\mu$ A              |   |

### 9.3. DC Characteristics (Unless otherwise specified, $T_a = -40$ to $125$ °C)

| Characteristics           | Symbol    | Test Condition                                       | $V_{CC}$ (V)        | Min                  | Max                  | Unit                 |   |
|---------------------------|-----------|--|---------------------|----------------------|----------------------|----------------------|---|
| High-level input voltage  | $V_{IH}$  | —  | 0.9                 | $V_{CC}$             | —                    | V                    |   |
|                           |           |  | 1.1 to 1.3          | $V_{CC} \times 0.70$ | —                    |                      |   |
|                           |           |  | 1.4 to 1.6          | $V_{CC} \times 0.65$ | —                    |                      |   |
|                           |           |  | 1.65 to 1.95        | $V_{CC} \times 0.65$ | —                    |                      |   |
|                           |           |  | 2.3 to 2.7          | 1.7                  | —                    |                      |   |
|                           |           |  | 3.0 to 3.6          | 2.0                  | —                    |                      |   |
| Low-level input voltage   | $V_{IL}$  | —  | 0.9                 | —                    | GND                  | V                    |   |
|                           |           |  | 1.1 to 1.3          | —                    | $V_{CC} \times 0.30$ |                      |   |
|                           |           |  | 1.4 to 1.6          | —                    | $V_{CC} \times 0.35$ |                      |   |
|                           |           |  | 1.65 to 1.95        | —                    | $V_{CC} \times 0.35$ |                      |   |
|                           |           |  | 2.3 to 2.7          | —                    | 0.7                  |                      |   |
|                           |           |  | 3.0 to 3.6          | —                    | 0.8                  |                      |   |
| High-level output voltage | $V_{OH}$  | $V_{IN} = V_{IH}$ or $V_{IL}$                        | $I_{OH} = -0.02$ mA | 0.9                  | 0.75                 | —                    | V |
|                           |           |  | $I_{OH} = -0.3$ mA  | 1.1 to 1.3           | $V_{CC} \times 0.73$ | —                    |   |
|                           |           |  | $I_{OH} = -1.7$ mA  | 1.4 to 1.6           | $V_{CC} \times 0.73$ | —                    |   |
|                           |           |  | $I_{OH} = -3.0$ mA  | 1.65 to 1.95         | $V_{CC} - 0.5$       | —                    |   |
|                           |           |  | $I_{OH} = -4.0$ mA  | 2.3 to 2.7           | 1.95                 | —                    |   |
|                           |           |  | $I_{OH} = -8.0$ mA  | 3.0 to 3.6           | 2.4                  | —                    |   |
| Low-level output voltage  | $V_{OL}$  | $V_{IN} = V_{IH}$ or $V_{IL}$                        | $I_{OL} = 0.02$ mA  | 0.9                  | —                    | 0.1                  | V |
|                           |           |  | $I_{OL} = 0.3$ mA   | 1.1 to 1.3           | —                    | $V_{CC} \times 0.27$ |   |
|                           |           |  | $I_{OL} = 1.7$ mA   | 1.4 to 1.6           | —                    | $V_{CC} \times 0.27$ |   |
|                           |           |  | $I_{OL} = 3.0$ mA   | 1.65 to 1.95         | —                    | 0.5                  |   |
|                           |           |  | $I_{OL} = 4.0$ mA   | 2.3 to 2.7           | —                    | 0.45                 |   |
|                           |           |  | $I_{OL} = 8.0$ mA   | 3.0 to 3.6           | —                    | 0.45                 |   |
| Input leakage current     | $I_{IN}$  | $V_{IN} = 0$ to $3.6$ V                              | 0 to 3.6            | —                    | $\pm 2.0$            | $\mu$ A              |   |
| Power-OFF leakage current | $I_{OFF}$ | $V_{IN} = 0$ to $3.6$ V,<br>$V_{OUT} = 0$ to $3.6$ V | 0                   | —                    | 80.0                 | $\mu$ A              |   |
| Quiescent supply current  | $I_{CC}$  | $V_{IN} = V_{CC}$ or GND                             | 3.6                 | —                    | 80.0                 | $\mu$ A              |   |

### 9.4. AC Characteristics (Unless otherwise specified, $T_a = 25\text{ }^\circ\text{C}$ , Input: $t_r = t_f = 3\text{ ns}$ )

| Characteristics               | Symbol             | Note     | Test Condition   | $V_{CC}$ (V) | $C_L$ (pF) | Min | Typ. | Max  | Unit |
|-------------------------------|--------------------|----------|--|--------------|------------|-----|------|------|------|
| Propagation delay time        | $t_{PLH}, t_{PHL}$ |          | $R_L = 1\text{ M}\Omega$<br>See Fig. 9.7.1,<br>Table 9.7.1 | 0.9          | 10         | —   | 20.7 | —    | ns   |
|                               |                    |          |  | 1.1 to 1.3   |            | —   | 10.5 | 18.4 |      |
|                               |                    |          |  | 1.4 to 1.6   |            | —   | 6.1  | 8.5  |      |
|                               |                    |          |  | 1.65 to 1.95 |            | —   | 4.5  | 6.2  |      |
|                               |                    |          |  | 2.3 to 2.7   |            | —   | 3.0  | 3.9  |      |
|                               |                    |          |  | 3.0 to 3.6   |            | —   | 2.3  | 3.1  |      |
| Propagation delay time        | $t_{PLH}, t_{PHL}$ |          | $R_L = 1\text{ M}\Omega$<br>See Fig. 9.7.1,<br>Table 9.7.1 | 0.9          | 15         | —   | 22.9 | —    | ns   |
|                               |                    |          |  | 1.1 to 1.3   |            | —   | 11.5 | 21.5 |      |
|                               |                    |          |  | 1.4 to 1.6   |            | —   | 6.7  | 9.3  |      |
|                               |                    |          |  | 1.65 to 1.95 |            | —   | 4.9  | 6.9  |      |
|                               |                    |          |  | 2.3 to 2.7   |            | —   | 3.2  | 4.4  |      |
|                               |                    |          |  | 3.0 to 3.6   |            | —   | 2.5  | 3.4  |      |
| Propagation delay time        | $t_{PLH}, t_{PHL}$ |          | $R_L = 1\text{ M}\Omega$<br>See Fig. 9.7.1,<br>Table 9.7.1 | 0.9          | 30         | —   | 30.6 | —    | ns   |
|                               |                    |          |  | 1.1 to 1.3   |            | —   | 14.8 | 29.6 |      |
|                               |                    |          |  | 1.4 to 1.6   |            | —   | 8.5  | 13.1 |      |
|                               |                    |          |  | 1.65 to 1.95 |            | —   | 6.3  | 9.2  |      |
|                               |                    |          |  | 2.3 to 2.7   |            | —   | 4.3  | 5.7  |      |
|                               |                    |          |  | 3.0 to 3.6   |            | —   | 3.3  | 4.4  |      |
| Input capacitance             | $C_{IN}$           |          | —  | 3.6          | —          | —   | 3    | —    | pF   |
| Power dissipation capacitance | $C_{PD}$           | (Note 1) | —  | 0.9 to 3.6   | —          | —   | 9    | —    | pF   |

Note 1:  $C_{PD}$  is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption without load. Average operating current can be obtained by the equation.

$$I_{CC(opr)} = C_{PD} \cdot V_{CC} \cdot f_{IN} + I_{CC}$$

### 9.5. AC Characteristics (Unless otherwise specified, $T_a = -40\text{ to }85\text{ }^\circ\text{C}$ , Input: $t_r = t_f = 3\text{ ns}$ )

| Characteristics        | Symbol             | Test Condition   | $V_{CC}$ (V) | $C_L$ (pF) | Min | Max  | Unit |
|------------------------|--------------------|--|--------------|------------|-----|------|------|
| Propagation delay time | $t_{PLH}, t_{PHL}$ | $R_L = 1\text{ M}\Omega$<br>See Fig. 9.7.1,<br>Table 9.7.1 | 0.9          | 10         | —   | —    | ns   |
|                        |                    |  | 1.1 to 1.3   |            | 1.0 | 34.2 |      |
|                        |                    |  | 1.4 to 1.6   |            | 1.0 | 10.0 |      |
|                        |                    |  | 1.65 to 1.95 |            | 1.0 | 6.7  |      |
|                        |                    |  | 2.3 to 2.7   |            | 1.0 | 4.4  |      |
|                        |                    |  | 3.0 to 3.6   |            | 1.0 | 3.7  |      |
| Propagation delay time | $t_{PLH}, t_{PHL}$ | $R_L = 1\text{ M}\Omega$<br>See Fig. 9.7.1,<br>Table 9.7.1 | 0.9          | 15         | —   | —    | ns   |
|                        |                    |  | 1.1 to 1.3   |            | 1.0 | 37.2 |      |
|                        |                    |  | 1.4 to 1.6   |            | 1.0 | 11.2 |      |
|                        |                    |  | 1.65 to 1.95 |            | 1.0 | 7.1  |      |
|                        |                    |  | 2.3 to 2.7   |            | 1.0 | 5.0  |      |
|                        |                    |  | 3.0 to 3.6   |            | 1.0 | 3.9  |      |
| Propagation delay time | $t_{PLH}, t_{PHL}$ | $R_L = 1\text{ M}\Omega$<br>See Fig. 9.7.1,<br>Table 9.7.1 | 0.9          | 30         | —   | —    | ns   |
|                        |                    |  | 1.1 to 1.3   |            | 1.0 | 56.0 |      |
|                        |                    |  | 1.4 to 1.6   |            | 1.0 | 15.9 |      |
|                        |                    |  | 1.65 to 1.95 |            | 1.0 | 9.6  |      |
|                        |                    |  | 2.3 to 2.7   |            | 1.0 | 6.1  |      |
|                        |                    |  | 3.0 to 3.6   |            | 1.0 | 4.8  |      |

## 9.6. AC Characteristics

(Unless otherwise specified,  $T_a = -40$  to  $125$  °C, Input:  $t_r = t_f = 3$  ns)

| Characteristics        | Symbol             | Test Condition   | $V_{CC}$ (V) | $C_L$ (pF) | Min | Max  | Unit |
|------------------------|--------------------|--|--------------|------------|-----|------|------|
| Propagation delay time | $t_{PLH}, t_{PHL}$ | $R_L = 1\text{ M}\Omega$<br>See Fig. 9.7.1,<br>Table 9.7.1 | 0.9          | 10         | —   | —    | ns   |
|                        |                    |  | 1.1 to 1.3   |            | 1.0 | 44.8 |      |
|                        |                    |  | 1.4 to 1.6   |            | 1.0 | 11.0 |      |
|                        |                    |  | 1.65 to 1.95 |            | 1.0 | 7.1  |      |
|                        |                    |  | 2.3 to 2.7   |            | 1.0 | 4.8  |      |
|                        |                    |  | 3.0 to 3.6   |            | 1.0 | 4.1  |      |
| Propagation delay time | $t_{PLH}, t_{PHL}$ | $R_L = 1\text{ M}\Omega$<br>See Fig. 9.7.1,<br>Table 9.7.1 | 0.9          | 15         | —   | —    | ns   |
|                        |                    |  | 1.1 to 1.3   |            | 1.0 | 47.7 |      |
|                        |                    |  | 1.4 to 1.6   |            | 1.0 | 12.5 |      |
|                        |                    |  | 1.65 to 1.95 |            | 1.0 | 7.6  |      |
|                        |                    |  | 2.3 to 2.7   |            | 1.0 | 5.4  |      |
|                        |                    |  | 3.0 to 3.6   |            | 1.0 | 4.3  |      |
| Propagation delay time | $t_{PLH}, t_{PHL}$ | $R_L = 1\text{ M}\Omega$<br>See Fig. 9.7.1,<br>Table 9.7.1 | 0.9          | 30         | —   | —    | ns   |
|                        |                    |  | 1.1 to 1.3   |            | 1.0 | 73.6 |      |
|                        |                    |  | 1.4 to 1.6   |            | 1.0 | 17.8 |      |
|                        |                    |  | 1.65 to 1.95 |            | 1.0 | 10.2 |      |
|                        |                    |  | 2.3 to 2.7   |            | 1.0 | 6.6  |      |
|                        |                    |  | 3.0 to 3.6   |            | 1.0 | 5.2  |      |

## 9.7. AC Waveform

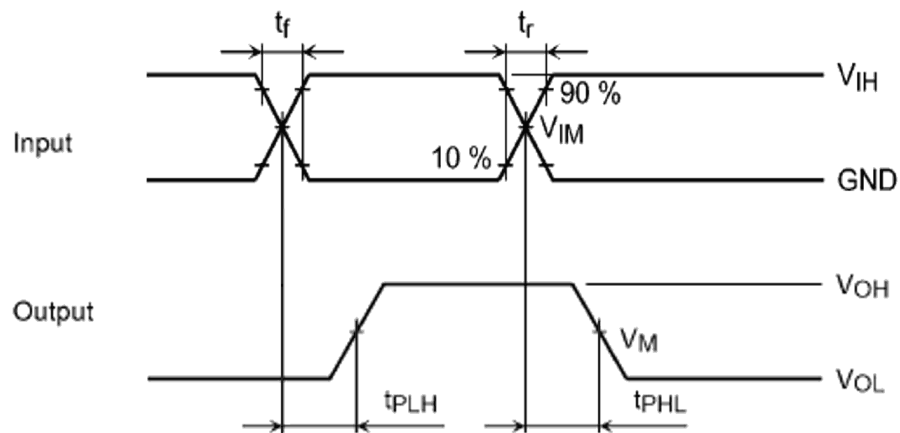


Fig. 9.7.1  $t_{PLH}, t_{PHL}$

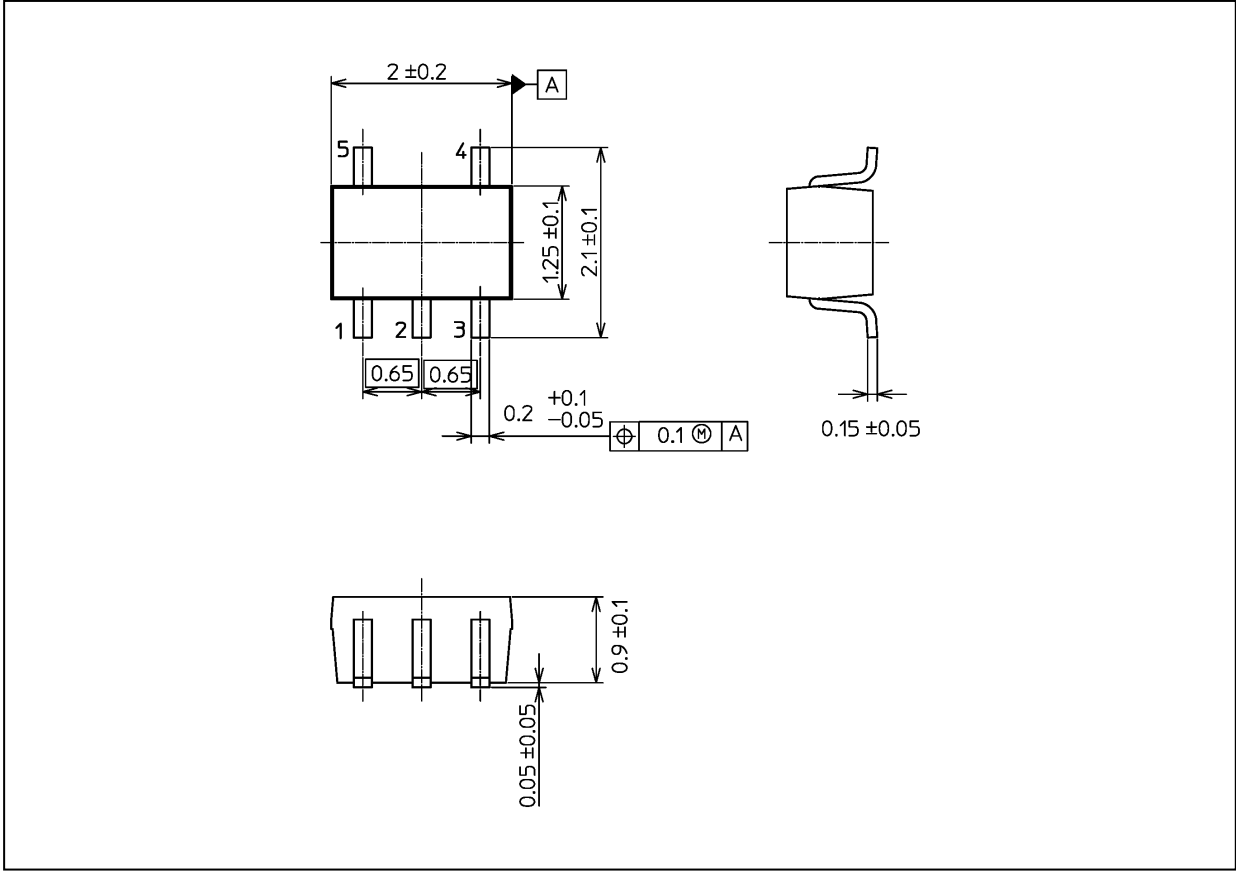
Table 9.7.1 AC Waveform Symbols

|        | Symbol   | $V_{CC} = 3.3 \pm 0.3\text{ V}$ | $V_{CC} = 2.5 \pm 0.2\text{ V}$ | $V_{CC} = 1.8 \pm 0.15\text{ V}$ | $V_{CC} = 1.5 \pm 0.1\text{ V}$ | $V_{CC} = 1.2 \pm 0.1\text{ V}$ | $V_{CC} = 0.9\text{ V}$ |
|--------|----------|---------------------------------|---------------------------------|----------------------------------|---------------------------------|---------------------------------|-------------------------|
| Input  | $V_{IH}$ | $V_{CC}$                        | $V_{CC}$                        | $V_{CC}$                         | $V_{CC}$                        | $V_{CC}$                        | $V_{CC}$                |
|        | $V_M$    | $V_{CC}/2$                      | $V_{CC}/2$                      | $V_{CC}/2$                       | $V_{CC}/2$                      | $V_{CC}/2$                      | $V_{CC}/2$              |
| Output | $V_M$    | $V_{CC}/2$                      | $V_{CC}/2$                      | $V_{CC}/2$                       | $V_{CC}/2$                      | $V_{CC}/2$                      | $V_{CC}/2$              |



Package Dimensions

Unit: mm



Weight: 6.2 mg (typ.)

|                 |
|-----------------|
| Package Name(s) |
| Nickname: USV   |

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