

TC7SBD384FU

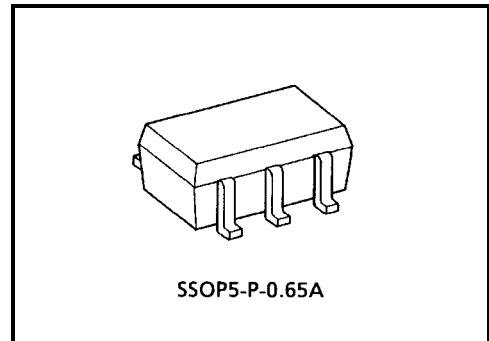
Single Bus Switch with Level Shifting

The TC7SBD384FU provides single bit of high-speed TTL-compatible switching. The low on resistance of the switch allows connections to be made with minimal propagation delay.

The device is organized as just 1-bit low-impedance switch with output-enable (\overline{OE}) input. When \overline{OE} is low, the switch is on and data can flow from port A to port B, or vice versa. When \overline{OE} is high, the switch is open and a high-impedance state exists between the two ports.

The internal diode which adds to power supply line is enable to realize the shift of signal level from 5 V to 3.3 V. (Note 1)

All inputs are equipped with protection circuits against static discharge.



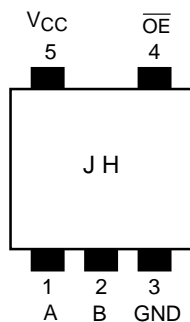
Weight: 0.006 g (typ.)

Features

- Operating voltage: $V_{CC} = 4.5\sim 5.5$ V
- High speed operation: $t_{pd} = 0.25$ ns (max)
- Low on resistance: $R_{ON} = 5 \Omega$ (typ.)
- ESD performance: Machine model $> \pm 200$ V
Human body model $> \pm 2000$ V
- TTL level input (control input)
- Package: USV

Note 1: In case that over-shoot noise is detected, this device should be used with clamp diode to prevent the next stage device from over-stress.

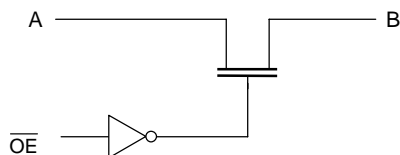
Pin Assignment (top view)



Truth Table

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

System Diagram



Maximum Ratings

| Characteristics | Symbol | Rating | Unit |
|----------------------------|------------------|-----------|-------------|
| Power supply range | V_{CC} | -0.5~7.0 | V |
| DC input voltage | V_{IN} | -0.5~7.0 | V |
| DC switch voltage | V_S | -0.5~7.0 | V |
| Input diode current | I_{IK} | -50 | mA |
| Continuous channel current | I_S | 128 | mA |
| Power dissipation | P_D | 200 | mW |
| DC V_{CC}/GND current | I_{CC}/I_{GND} | ± 100 | mA |
| Storage temperature | T_{stg} | -65~150 | $^{\circ}C$ |

Recommended Operating Conditions

| Characteristics | Symbol | Rating | Unit |
|--------------------------|-----------|---------|-------------|
| Supply voltage | V_{CC} | 4.5~5.5 | V |
| Input voltage | V_{IN} | 0~5.5 | V |
| Switch voltage | V_S | 0~5.5 | V |
| Operating temperature | T_{opr} | -40~85 | $^{\circ}C$ |
| Input rise and fall time | dt/dv | 0~10 | ns/V |

Electrical Characteristics

DC Characteristics (Ta = -40~85°C)

| Characteristics | | Symbol | Test Condition | V _{CC} (V) | Min | Typ. (Note 2) | Max | Unit |
|---|------------------|---|---|---------------------|-----|------------------|------|------|
| | | | | | | | | |
| Input voltage | "H" level | V _{IH} | — | 4.5~5.5 | 2.0 | — | — | V |
| | "L" level | V _{IL} | — | 4.5~5.5 | — | — | 0.8 | |
| High-level output voltage | | V _{OH} | Figure 4 | — | — | — | — | — |
| Input leakage current | | I _{IN} | V _{IN} = 0~5.5 V | 4.5~5.5 | — | — | ±1.0 | μA |
| Power off leakage current | | I _{OFF} | A, B, \overline{OE} = 0~5.5 V | 0 | — | — | ±1.0 | μA |
| Off-state leakage current (switch off) | | I _{SZ} | A, B = 0~5.5 V, \overline{OE} = V _{CC} | 4.5~5.5 | — | — | ±1.0 | μA |
| ON resistance (Note 3) | R _{ON} | V _{IS} = 0 V | I _{IS} = 30 mA | 4.5 | — | 5 | 7 | Ω |
| | | | I _{IS} = 64 mA | 4.5 | — | 5 | 7 | |
| | | V _{IS} = 2.4 V, I _{IS} = 15 mA | 4.5 | — | 35 | 50 | | |
| Quiescent supply current | I _{CC} | V _{IN} = V _{CC} or GND, I _{OUT} = 0 | Switch ON | 5.5 | — | — | 1.5 | mA |
| | | | Switch OFF | 5.5 | — | — | 10 | μA |
| | ΔI _{CC} | V _{IN} = 3.4 V (one input) | 5.5 | — | — | 2.5 | mA | |

Note 2: Typical values are at V_{CC} = 5 V and Ta = 25°C.

Note 3: Measured by the voltage drop between A and B pins at the indicated current through the switch. On resistance is determined by the lower of the voltages on the two (A or B) pins.

AC Characteristics (Ta = -40~85°C)

| Characteristics | | Symbol | Test Condition | V _{CC} (V) | Min | Max | Unit |
|--|--|--------------------------------------|--------------------------------|---------------------|-----|------|------|
| | | | | | | | |
| Propagation delay time (bus to bus) | | t _{pLH} t _{pHL} | Figure 1, Figure 2 (Note 4) | 4.5 | — | 0.25 | ns |
| Output enable time | | t _{pZL} t _{pZH} | Figure 1, Figure 3 | 4.5 | — | 4.5 | ns |
| Output disable time | | t _{pLZ} t _{pHZ} | Figure 1, Figure 3 | 4.5 | — | 4.5 | ns |

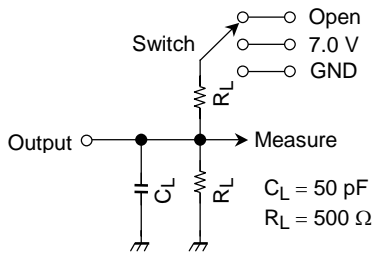
Note 4: This parameter is guaranteed by design but is not tested. The bus switch contributes no propagation delay other than the RC delay of the typical on resistance of the switch and the 50 pF load capacitance, when driven by an ideal voltage the source (zero output impedance).

Capacitive Characteristics (Ta = 25°C)

| Characteristics | | Symbol | Test Condition | V _{CC} (V) | Typ. | Unit |
|-------------------------------|--|------------------|---|---------------------|------|------|
| | | | | | | |
| Control pin input capacitance | | C _{IN} | (Note 5) | 5.0 | 3 | pF |
| Switch terminal capacitance | | C _{I/O} | \overline{OE} = V _{CC} (Note 5) | 5.0 | 10 | pF |

Note 5: This item is guaranteed by design.

AC Test Circuit



| Parameter | Switch |
|-----------------------|--------|
| t_{pLH} , t_{pHL} | Open |
| t_{pLZ} , t_{pZL} | 7.0 V |
| t_{pHZ} , t_{pZH} | Open |

Figure 1

AC Waveform

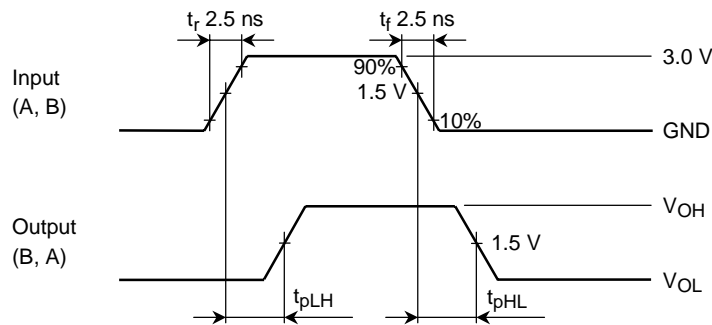


Figure 2 t_{pLH} , t_{pHL}

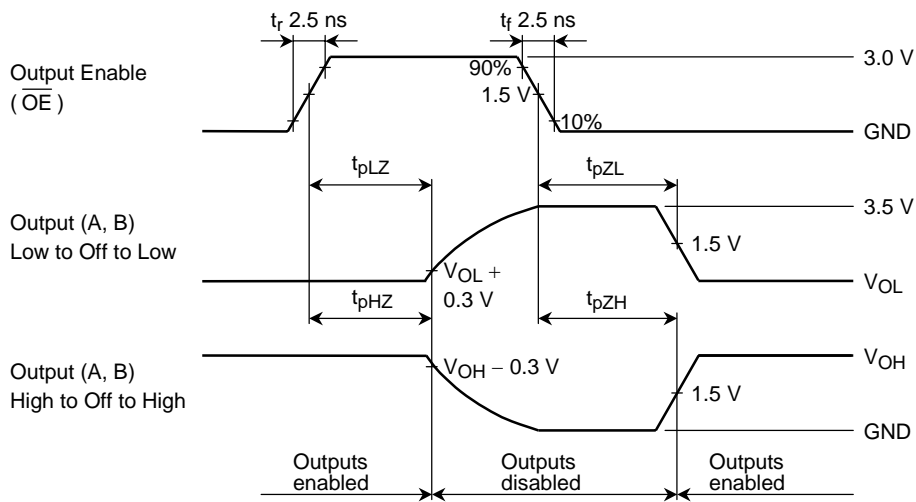


Figure 3 t_{pLZ} , t_{pHZ} , t_{pZL} , t_{pZH}

$V_{OH} - V_{CC}$ Characteristics (typ.)

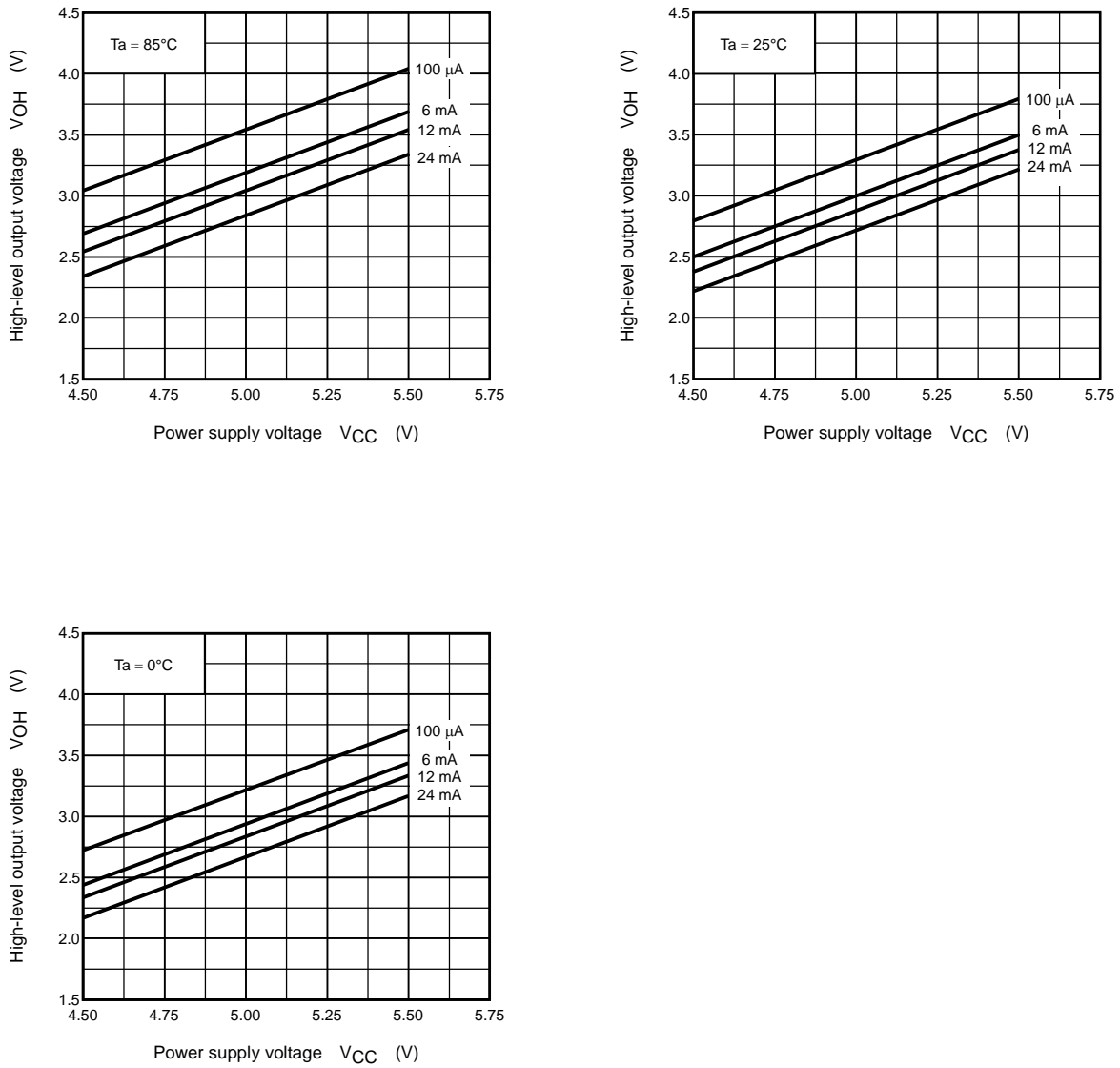
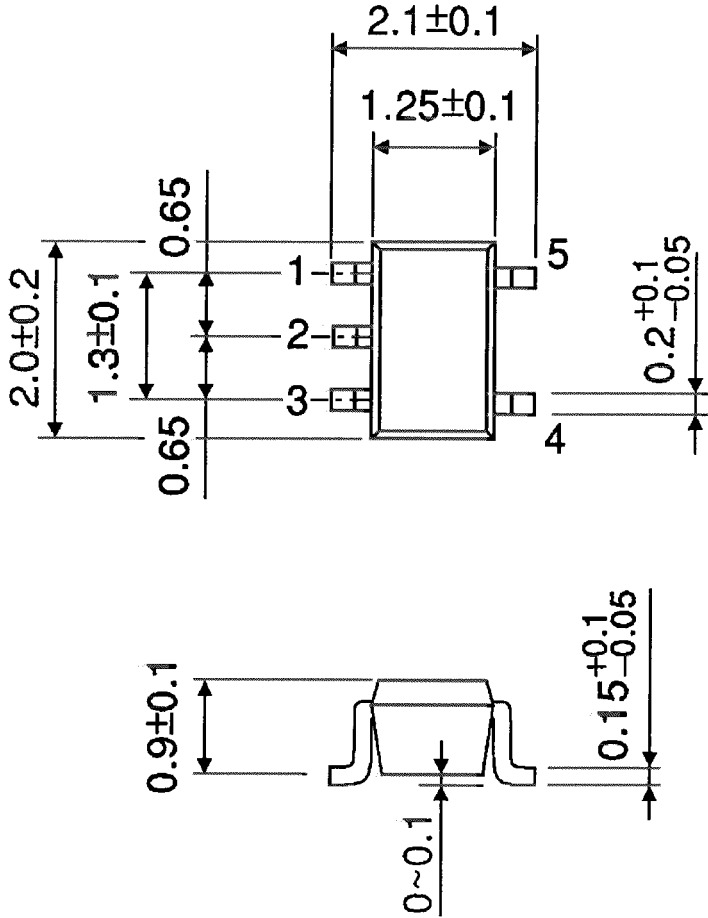


Figure 4

Package Dimensions

SSOP5-P-0.65A

Unit : mm



Weight: 0.006 g (typ.)

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