

# TC7SB66FU

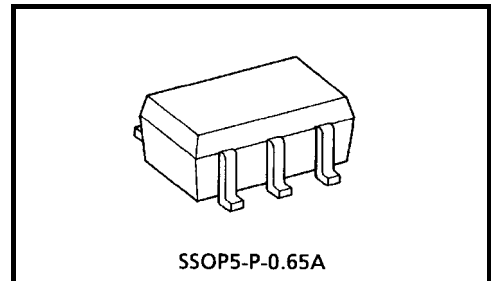
## Single Bus Switch

The TC7SB66FU is a low on-resistance, high-speed CMOS 1-bit bus switch. This bus switch allows the connections or disconnections to be made with minimal propagation delay while maintaining Low power dissipation which is the feature of CMOS.

When output enable (OE) is at High level, the switch is on; when at Low level, the switch is off.

P-MOS and N-MOS channel block means the device is suitable for analog signal transmission.

All inputs are equipped with protector circuits to protect the device from static discharge.

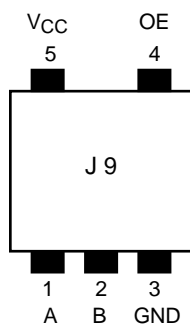


Weight: 0.006 g (typ.)

## Features

- Operating voltage:  $V_{CC} = 2\sim 5.5\text{ V}$
- High speed operation:  $t_{pd} = 0.25\text{ ns (max)}$
- Ultra-low on resistance:  $R_{ON} = 5\ \Omega\text{ (typ.)}$
- ESD performance: Machine model  $\geq \pm 200\text{ V}$   
Human body model  $\geq \pm 2000\text{ V}$
- High noise margin:  $V_{NIL} = V_{NIH} = 28\% V_{CC}\text{ (min)}$
- Power-down protection for inputs (control inputs only)
- Package: USV

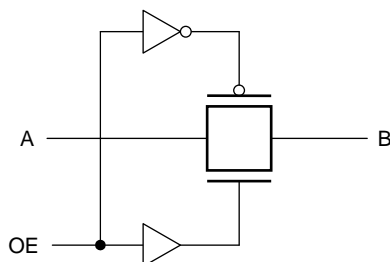
## Pin Assignment (top view)



## Truth Table

Inputs	Function
OE	
H	A port = B port
L	Disconnect

## System Diagram



## Absolute Maximum Ratings (Note)

Characteristics	Symbol	Rating	Unit
Power supply voltage	$V_{CC}$	-0.5~7.0	V
Control pin input voltage	$V_{IN}$	-0.5~7.0	V
Switch terminal I/O voltage	$V_S$	-0.5~ $V_{CC} + 0.5$	V
Clump diode current	Control input pin	-50	mA
	Switch terminal	±50	
Switch I/O 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	°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).

## Operating Ranges (Note)

Characteristics	Symbol	Rating	Unit
Power supply voltage	$V_{CC}$	2.0~5.5	V
Control pin input voltage	$V_{IN}$	0~5.5	V
Switch I/O voltage	$V_S$	0~ $V_{CC}$	V
Operating temperature	$T_{opr}$	-40~85	°C
Control pin input rise/fall time	dt/dv	0~10	ns/V

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

## Electrical Characteristics

### DC Characteristics (Ta = -40~85°C)

Characteristics		Symbol	Test Condition	V <sub>CC</sub> (V)	Min	Typ. (Note 1)	Max	Unit
Control pin input voltage	"H" level	V <sub>IH</sub>	—	2.0~5.5	0.7 × V <sub>CC</sub>	—	—	V
	"L" level	V <sub>IL</sub>	—	2.0~5.5	—	—	0.3 × V <sub>CC</sub>	
Control pin input leakage current		I <sub>IN</sub>	V <sub>IN</sub> = 0~5.5 V	2.0~5.5	—	—	±1.0	μA
Off-state leakage current (switch off)		I <sub>SZ</sub>	A, B = 0~V <sub>CC</sub> , OE = GND	2.0~5.5	—	—	±1.0	μA
ON resistance (Note 2)		R <sub>ON</sub>	V <sub>IS</sub> = 0 V, I <sub>IS</sub> = 30 mA	4.5	—	3	7	Ω
			V <sub>IS</sub> = 4.5 V, I <sub>IS</sub> = 30 mA	4.5	—	5	15	
			V <sub>IS</sub> = 2.4 V, I <sub>IS</sub> = 15 mA	4.5	—	6	12	
			V <sub>IS</sub> = 0 V, I <sub>IS</sub> = 24 mA	3.0	—	4	9	
			V <sub>IS</sub> = 3 V, I <sub>IS</sub> = 24 mA	3.0	—	7	20	
			V <sub>IS</sub> = 0 V, I <sub>IS</sub> = 8 mA	2.0	—	6	12	
			V <sub>IS</sub> = 2 V, I <sub>IS</sub> = 8 mA	2.0	—	10	30	
Quiescent supply current		I <sub>CC</sub>	V <sub>IN</sub> = V <sub>CC</sub> or GND, I <sub>OUT</sub> = 0	5.5	—	—	10	μA

Note 1: The typical values are at Ta = 25°C.

Note 2: Apply the specified current to the switch, then measure the voltages on pins A and B. The on-resistance is the lower of the two.

### AC Characteristics (Ta = -40~85°C)

Characteristics		Symbol	Test Condition	V <sub>CC</sub> (V)	Min	Max	Unit
Propagation delay time (bus to bus)	t <sub>pLH</sub> t <sub>pHL</sub>	Figure 1, Figure 2	(Note)	2.0	—	0.5	ns
				3.3 ± 0.3	—	0.35	
				5.0 ± 0.5	—	0.25	
Output enable time	t <sub>pZL</sub> t <sub>pZH</sub>	Figure 1, Figure 3		2.0	—	8	ns
				3.3 ± 0.3	—	5	
				5.0 ± 0.5	—	4.5	
Output disable time	t <sub>pLZ</sub> t <sub>pHZ</sub>	Figure 1, Figure 3		2.0	—	8	ns
				3.3 ± 0.3	—	6.5	
				5.0 ± 0.5	—	5	

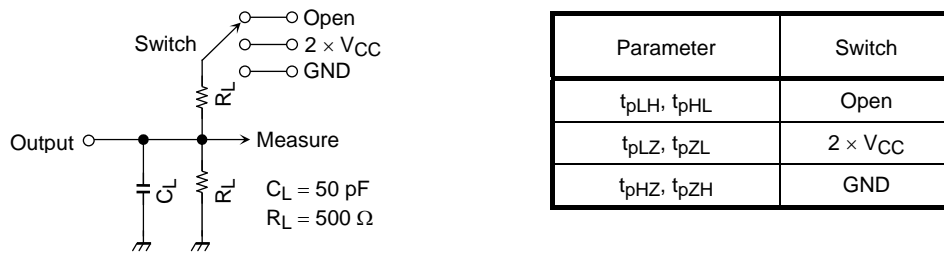
Note: The propagation delay time is calculated by the RC (on-resistance and load capacitance) time constant.

### Capacitive Characteristics (Ta = 25°C)

Characteristics		Symbol	Test Condition	V <sub>CC</sub> (V)	Typ.	Unit	
Control pin input capacitance		C <sub>IN</sub>		(Note)	5.0	3	pF
Switch terminal capacitance		C <sub>I/O</sub>	OE = GND	(Note)	5.0	10	pF

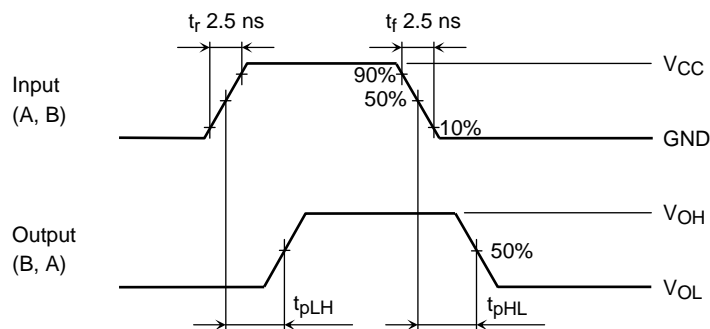
Note: Guaranteed by design.

**AC Test Circuit**

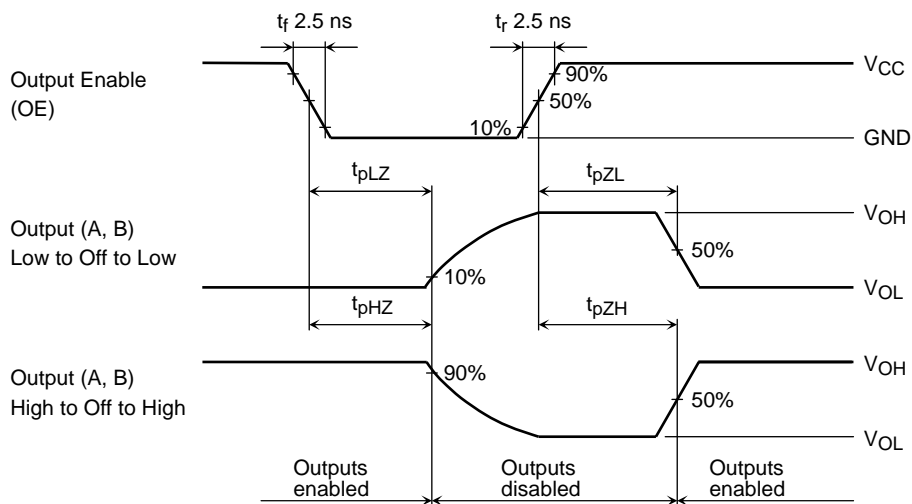


**Figure 1**

**AC Waveform**



**Figure 2  $t_{pLH}$ ,  $t_{pHL}$**

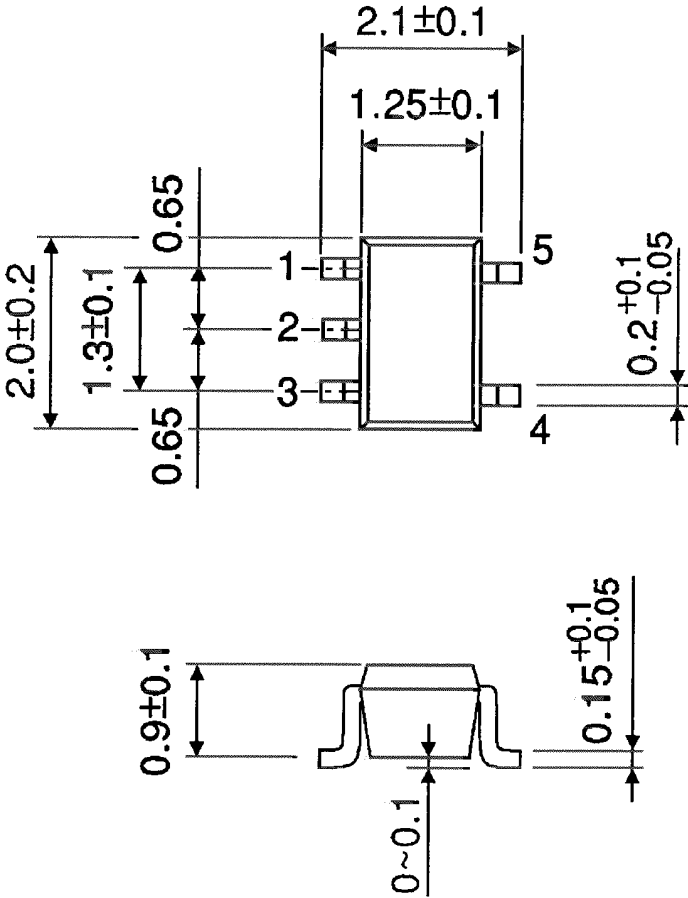


**Figure 3  $t_{pLZ}$ ,  $t_{pHZ}$ ,  $t_{pZL}$ ,  $t_{pZH}$**

Package Dimensions

SSOP5-P-0.65A

Unit : mm



Weight: 0.006 g (typ.)

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