TOSHIBA CMOS Digital Integrated Circuit Silicon Monolithic

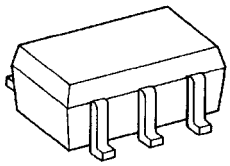
TC7SB384FU

Single Bus Switch

The TC7SB384FU 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.

All inputs are equipped with protection circuits against static discharge.



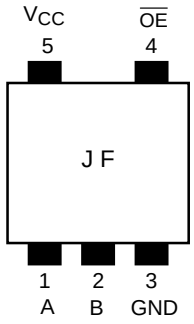
SSOP5-P-0.65A

Weight: 0.006 g (typ.)

Features

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

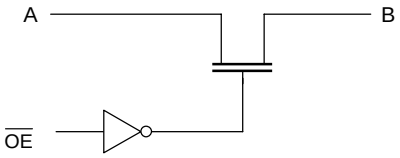
Pin Assignment (top view)



Truth Table

Input $\overline{OE}$	Function
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	°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	°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. (Note1)	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	
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 (Note2)		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	—	10	15	
Quiescent supply current		I_{CC}	V_{IN} = V_{CC} or GND, I_{OUT} = 0		5.5	—	—	10	μA
		ΔI_{CC}	V_{IN} = 3.4 V (one input)		5.5	—	—	2.5	mA

Note1: Typical values are at V_{CC} = 5 V and Ta = 25°C.

Note2: 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 (Note3)	4.5	—	0.25	ns
Output enable time	t_{pZL} t_{pZH}	Figure 1, Figure 3	4.5	—	4.0	ns
Output disable time	t_{pLZ} t_{pHZ}	Figure 1, Figure 3	4.5	—	4.5	ns

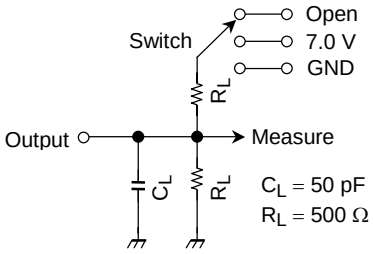
Note3: This parameter is guaranteed by design but is not tested. The bus switch contributes no propagation delay other than the RC delay of the typical on resistance of the switch and the 50 pF load capacitance, when driven by an ideal voltage the source (zero output impedance).

Capacitive Characteristics (Ta = 25°C)

Characteristics	Symbol	Test Condition	V_{CC} (V)	Typ.	Unit
Control pin input capacitance	C_{IN}	(Note4)	5.0	3	pF
Switch terminal capacitance	$C_{I/O}$	$\overline{OE}$ = V_{CC} (Note4)	5.0	10	pF

Note4: 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

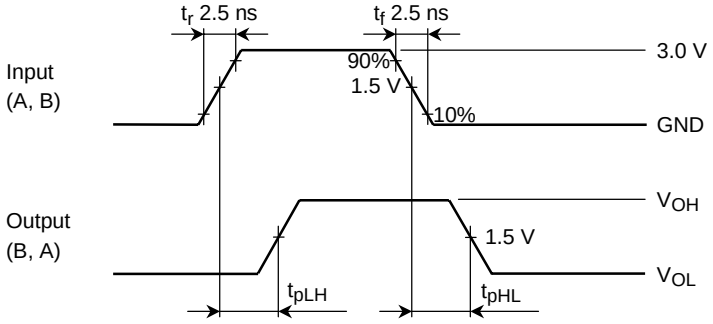


Figure 2 t_{pLH}, t_{pHL}

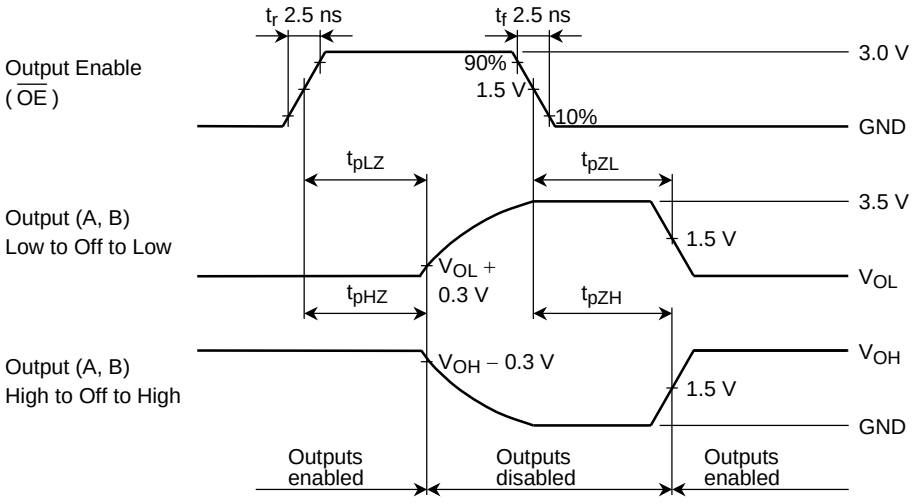
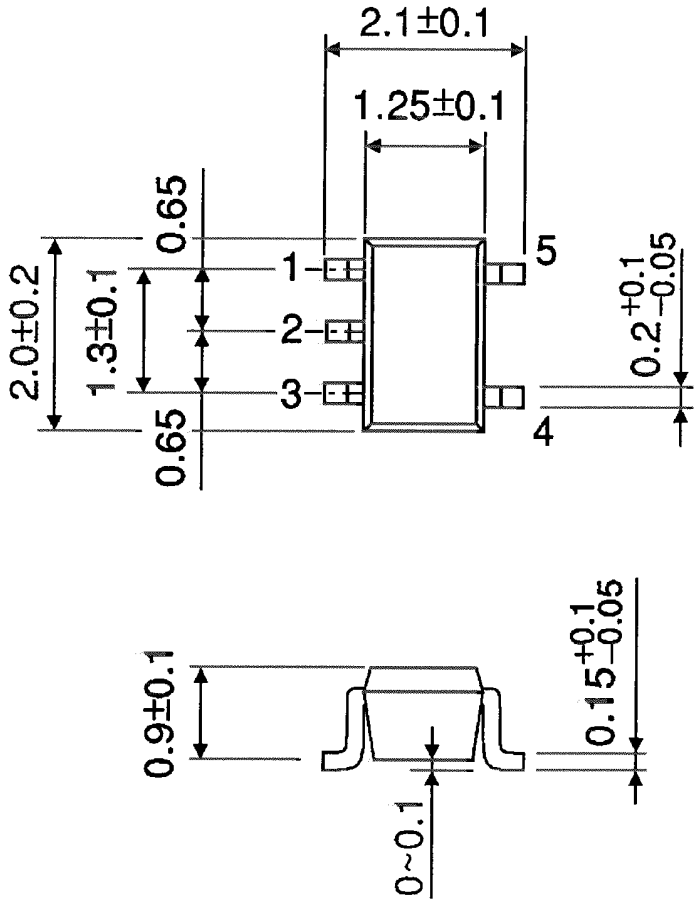


Figure 3 t_{pLZ}, t_{pHZ}, t_{pZL}, t_{pZH}

Package Dimensions

SSOP5-P-0.65A Unit : mm



Weight: 0.006 g (typ.)

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