

TOSHIBA CMOS Digital Integrated Circuit Silicon Monolithic

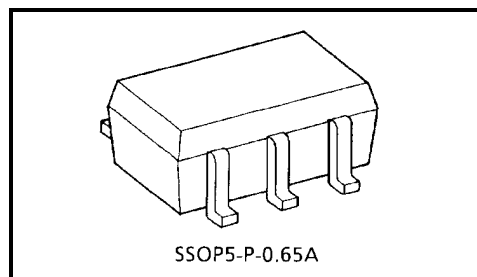
TC7SB384FU

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.

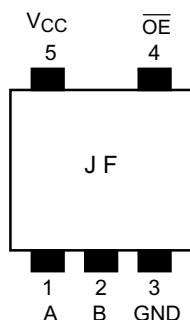


Weight: 0.006 g (typ.)

Features

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

Pin Assignment (top view)



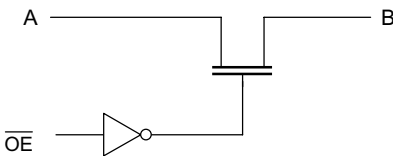
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Truth Table

Input	Function
$\overline{\text{OE}}$	
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	$^{\circ}\text{C}$

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	$^{\circ}\text{C}$
Input rise and fall time	dt/dv	0~10	ns/V

Electrical Characteristics

DC Characteristics (Ta = -40~85°C)

Characteristics		Symbol	Test Condition		Min	Typ. (Note1)	Max	Unit
				V _{CC} (V)				
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 _S = 30 mA	4.5	—	5	7	Ω
			I _S = 64 mA	4.5	—	5	7	
		V _{IS} = 2.4 V, I _S = 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		Min	Max	Unit
				V _{CC} (V)			
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		Typ.	Unit
				V _{CC} (V)		
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

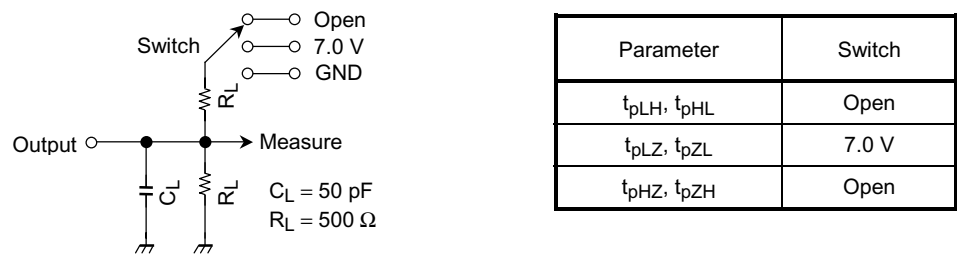


Figure 1

AC Waveform

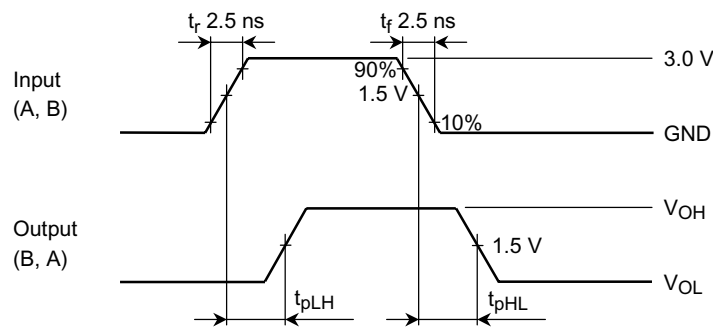


Figure 2 t_{pLH} , t_{pHL}

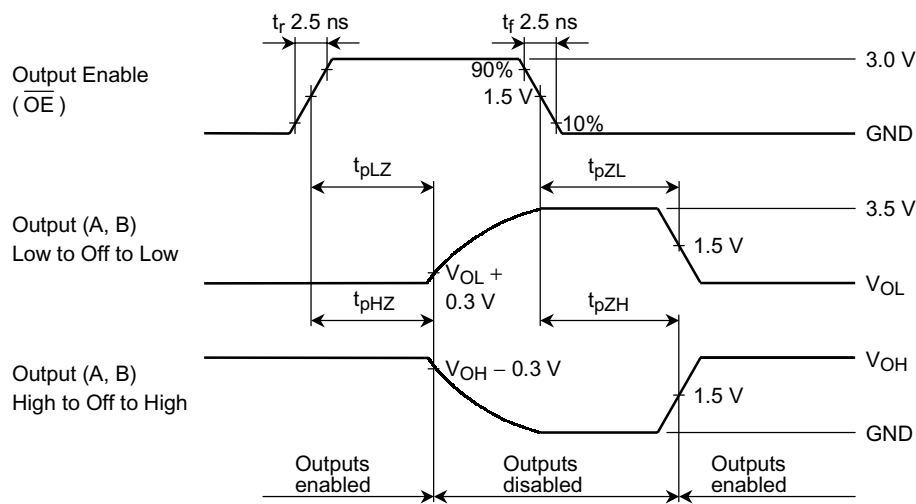
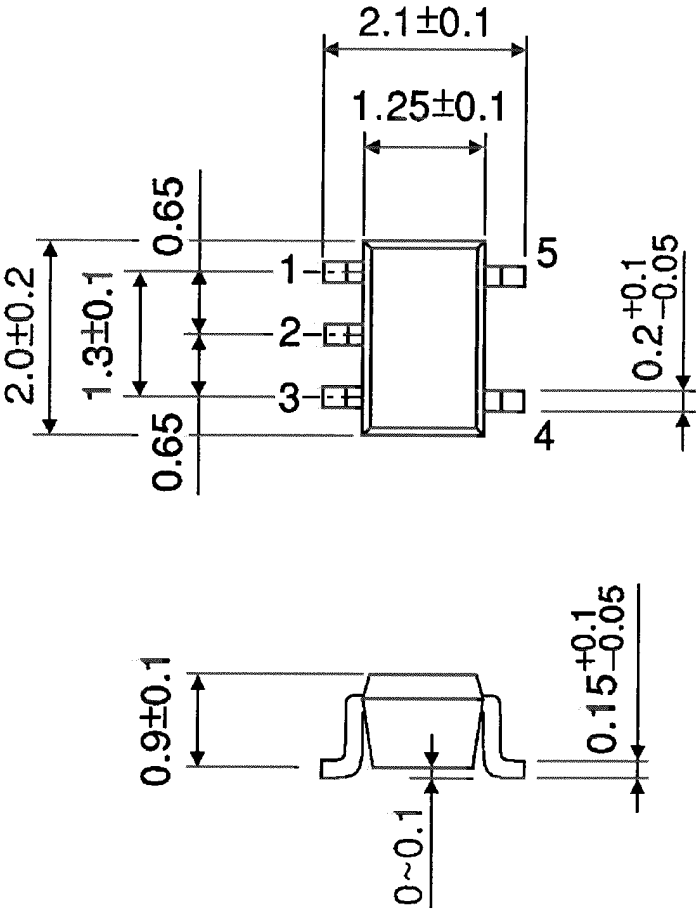


Figure 3 t_{pLZ} , t_{pHZ} , t_{pZL} , t_{pZH}

Package Dimensions

SSOP5-P-0.65A

Unit : mm



Weight: 0.006 g (typ.)