

TC7SBD385AFU

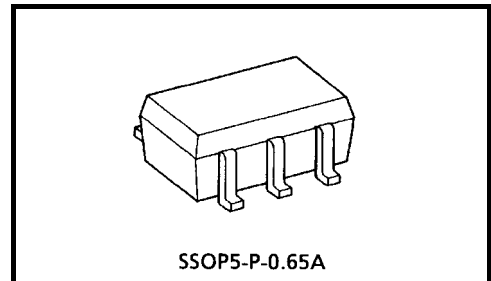
Single Bus Switch with Level Shifting

The TC7SBD385AFU 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 (OE) input. When OE is high, the switch is on and data can flow from port A to port B, or vice versa. When OE is low, the switch is open and a high-impedance state exists between the two ports.

The device is enable to realize the shift of signal level from 5 V to 3.3 V.

All inputs are equipped with protection circuits against static discharge.

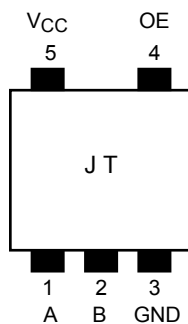


Weight: 0.006 g (typ.)

Features

- Operating voltage: $V_{CC} = 4.5\sim 5.5\text{ V}$
- High speed operation: $t_{pd} = 0.32\text{ ns (max)}$
- Low on resistance: $R_{ON} = 5\ \Omega\text{ (typ.)}$
- ESD performance: Machine model $\geq \pm 200\text{ V}$
Human body model $\geq \pm 2000\text{ V}$
- TTL level input (control input)
- Low Power Dissipation: $I_{cc} = 10\ \mu\text{A (max.)}$
- Package: USV

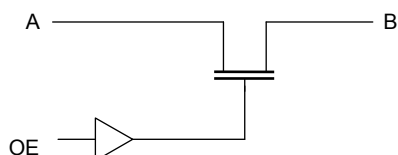
Pin Assignment (top view)



Truth Table

Input	Function
OE	
L	Disconnect
H	A port = B port

System Diagram



Absolute Maximum Ratings (Note)

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	$^{\circ}C$

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
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

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 _{CC} (V)	Min	Typ. (Note 1)	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 (Note 2)		V _{OH}	I _{OH} =-1μA V _{IS} = V _{CC}	4.75	2.3	2.8	3.2	V			
				5.0	2.5	3.0	3.4				
				5.25	2.7	3.2	3.6				
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, OE= 0~5.5 V	0	—	—	±1.0	μA			
Off-STATE leakage current (switch off)		I _{SZ}	A, B = 0~5.5 V, OE = GND	4.5~5.5	—	—	±1.0	μA			
ON resistance (Note 3)		R _{ON}	V _{IS} = 0 V	I _{IS} = 64 mA	4.5	—	5	9	Ω		
					4.75	—	5	8			
				I _{IS} = 30 mA	4.5	—	5	9			
					4.75	—	5	8			
						V _{IS} = 2.3 V, I _{IS} = 15 mA	4.5	—		35	65
							4.75	—		35	50
Quiescent supply current		I _{CC}	V _{IN} = V _{CC} or GND, I _{OUT} = 0	5.5	—	—	10	μA			
Increase in I _{CC} per input		ΔI _{CC}	V _{IN} = 3.4 V (one input)	5.5	—	—	2.5	mA			

Note 1: Typical values are at V_{CC} = 5 V, Ta = 25°C.

Note 2: It recommends that this device uses Pull-up resistance when adding and using resistance for an output terminal. Since it causes to drop a V_{OH} voltage level when using Pull-down resistance for an output terminal.

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)	4.5	—	0.32	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	—	5.0	ns

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 _{CC} (V)	Typ.	Unit
Control pin input capacitance		C _{IN}	(Note)	5.0	3	pF
Switch terminal capacitance		C _{I/O}	OE = GND (Note)	5.0	10	pF

Note: This parameter is guaranteed by design.

AC Test Circuit

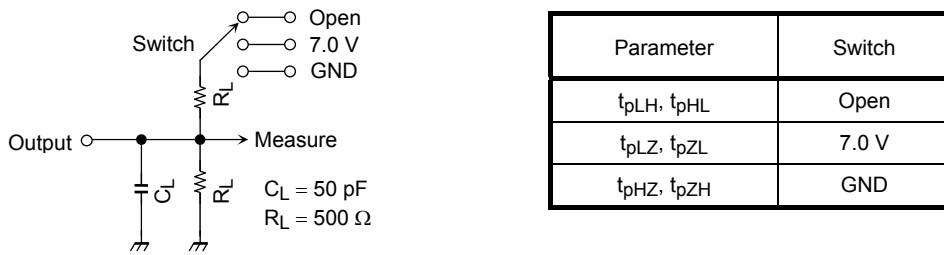


Figure 1

AC Waveform

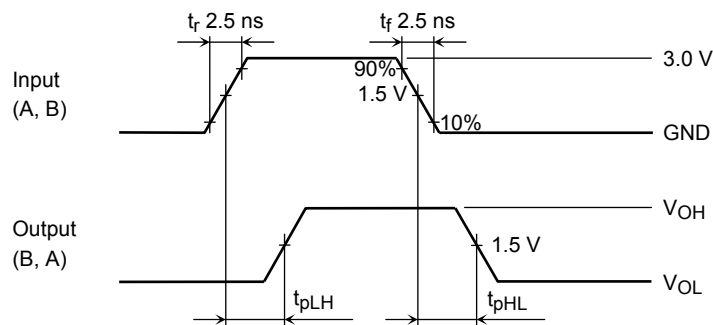


Figure 2 t_{pLH} , t_{pHL}

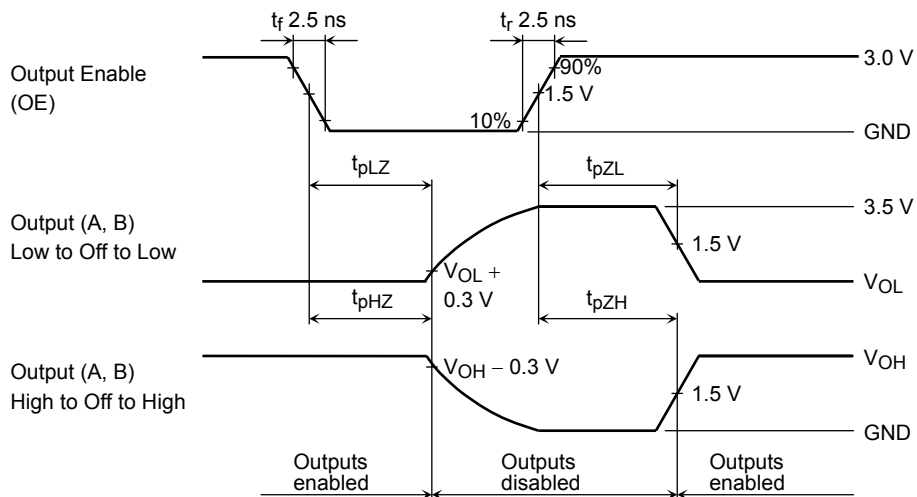


Figure 3 t_{pLZ} , t_{pHZ} , t_{pZL} , t_{pZH}

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

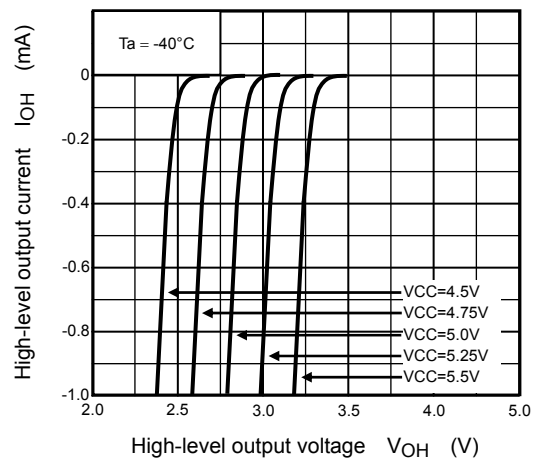
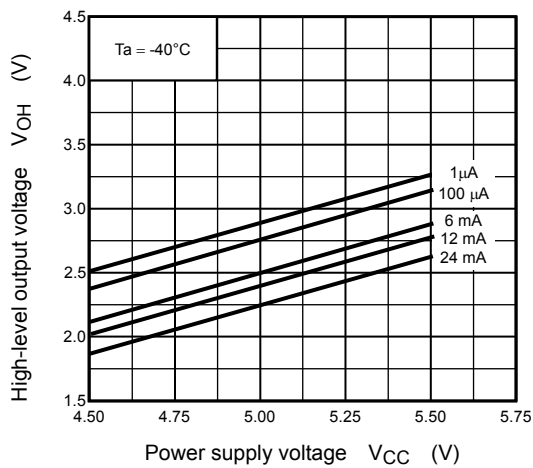
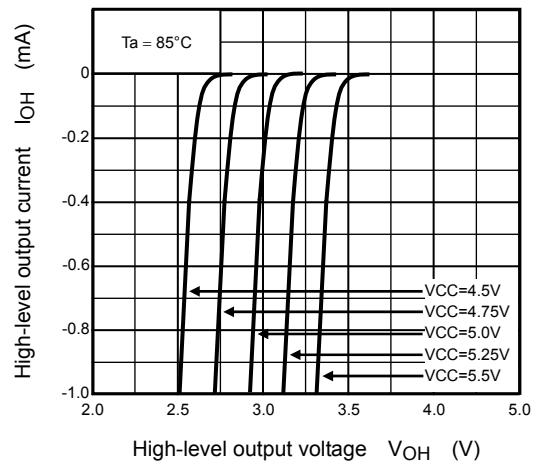
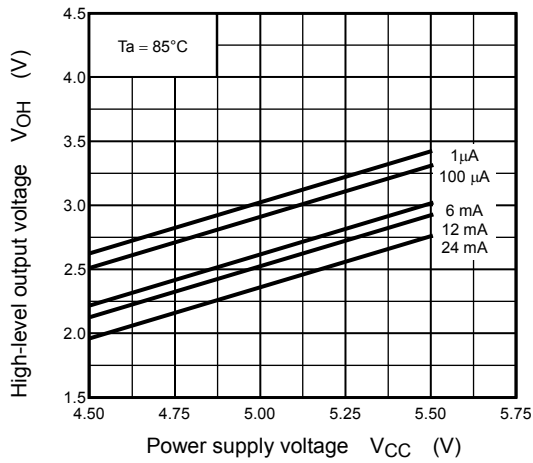
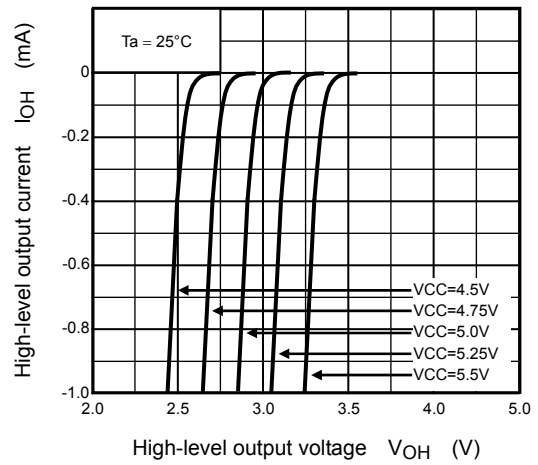
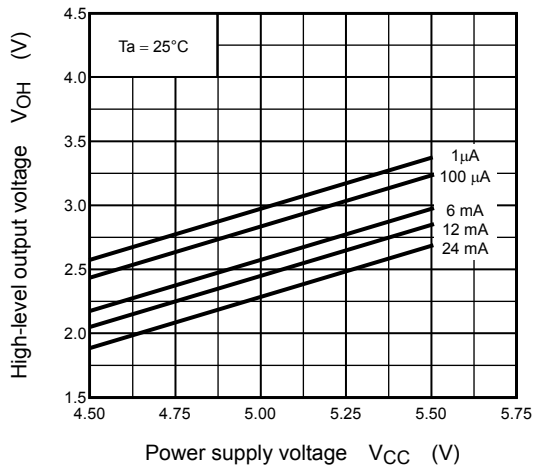
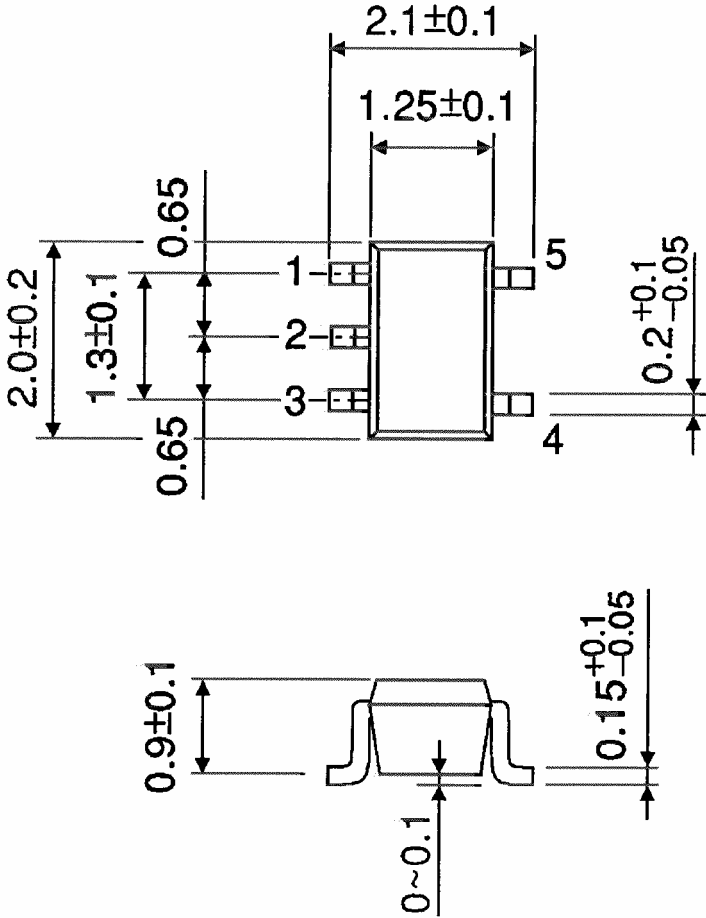


Figure 4

Package Dimensions

SSOP5-P-0.65A

Unit : mm



Weight: 0.006 g (typ.)

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20070701-EN GENERAL

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