

Toshiba CMOS Digital Integrated Circuit Silicon Monolithic

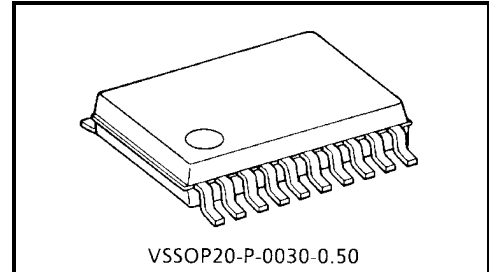
# TC7MB3244FK

## Octal Bus Switch

The TC7MB3244FK provides eight bits of high-speed TTL-compatible bus switching in a standard '244 device pinout. The low on resistance of the switch allows connections to be made with minimal propagation delay.

The device is organized as two 4-bit low-impedance switches with separate output-enable ( $\overline{OE}$ ) inputs. 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.



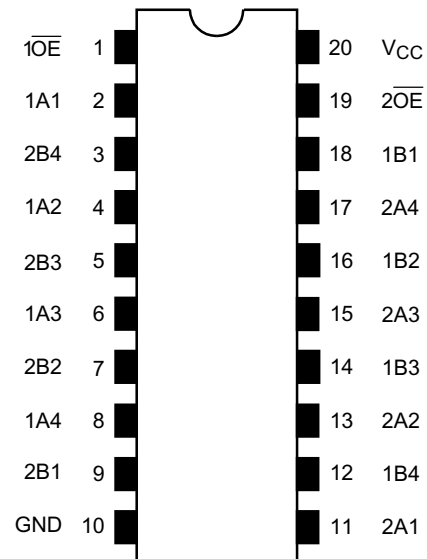
VSSOP20-P-0030-0.50

Weight: 0.03 g (typ.)

## Features

- Operating voltage:  $V_{CC} = 4.5 \sim 5.5 \text{ V}$
- High speed:  $t_{pd} = 0.25 \text{ ns (max)}$
- Low on resistance:  $R_{ON} = 5 \Omega \text{ (typ.)}$
- ESD performance: Human body model  $> \pm 2000 \text{ V}$   
Machine model  $> \pm 200 \text{ V}$
- Compatible with TTL outputs (control inputs)
- Package: VSSOP (US20)
- Pin compatible with the 74xx244 type.  
Functionally equivalent to (FST/CBT) 3244.

## Pin Assignment (top view)



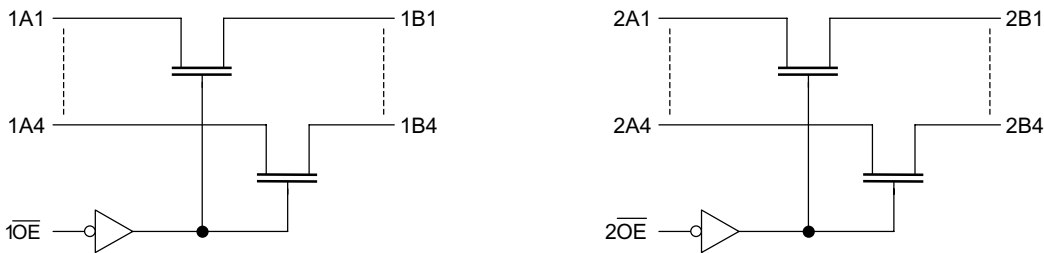
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Truth Table

Inputs	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 circuit	$I_S$	128	mA
Power dissipation	$P_D$	180	mW
DC $V_{CC}$ /ground current	$I_{CC}/I_{GND}$	$\pm 100$	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 <sub>CC</sub> (V)				
Input voltage	“H” level	V <sub>IH</sub>	—		4.5~5.5	2.0	—	V
	“L ” level	V <sub>IL</sub>	—		4.5~5.5	—	0.8	
Input leakage current		I <sub>IN</sub>	V <sub>IN</sub> = 0~5.5 V		5.5	—	±1.0	μA
Off-STATE leakage current (switch off)		I <sub>SZ</sub>	A, B = 0~5.5 V, $\overline{\text{OE}}$ = V <sub>CC</sub>		0~5.5	—	±1.0	μA
ON resistance  (Note2)	R <sub>ON</sub>	V <sub>IS</sub> = 0 V	I <sub>IS</sub> = 64 mA	4.5	—	5	7	Ω
			I <sub>IS</sub> = 30 mA	4.5	—	5	7	
		V <sub>IS</sub> = 2.4 V, I <sub>IS</sub> = 15 mA		4.5	—	10	15	
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
Increase in I <sub>CC</sub> per input		ΔI <sub>CC</sub>	V <sub>IN</sub> = 3.4 V (one input)		5.5	—	2.5	mA

Note1: Typical values are at V<sub>CC</sub> = 5 V, 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 <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 (Note3)	4.5	—	0.25	ns
Output enable time		t <sub>pZL</sub> t <sub>pZH</sub>	Figure 1, Figure 3	4.5	—	5.0	ns
Output disable time		t <sub>pLZ</sub> t <sub>pHZ</sub>	Figure 1, Figure 3	4.5	—	5.0	ns

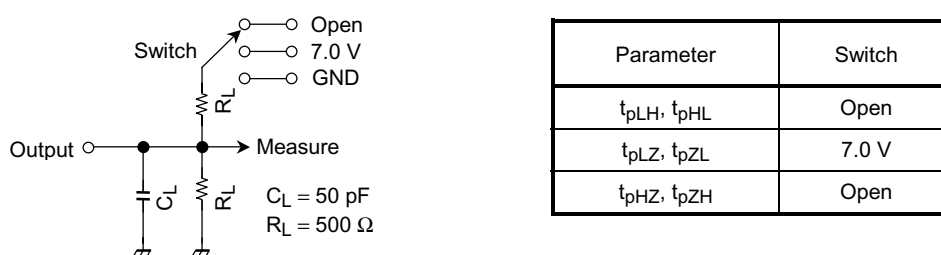
Note3: This parameter is guaranteed by design but is not tested. The bus switch contributes no propagation delay other than the RC delay of the typical On resistance of the switch and the 50 pF load capacitance, when driven by an ideal voltage the source (zero output impedance).

## Capacitive Characteristics (Ta = 25°C)

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

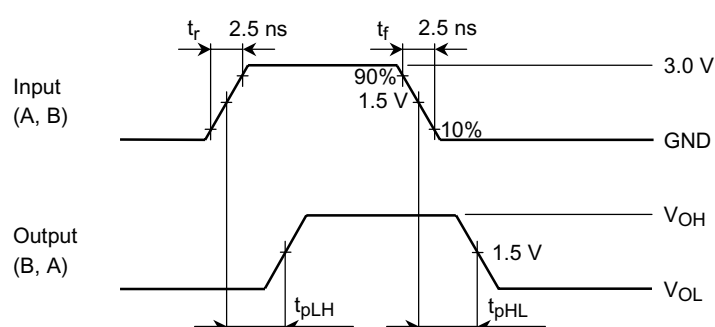
Note4: Parameter guaranteed by design.

## AC Test Circuit

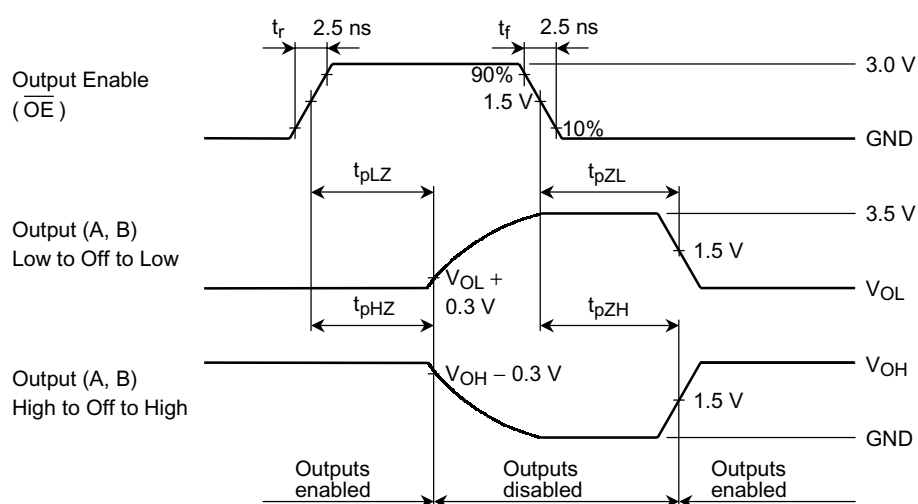


### Figure 1

## AC Waveform



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

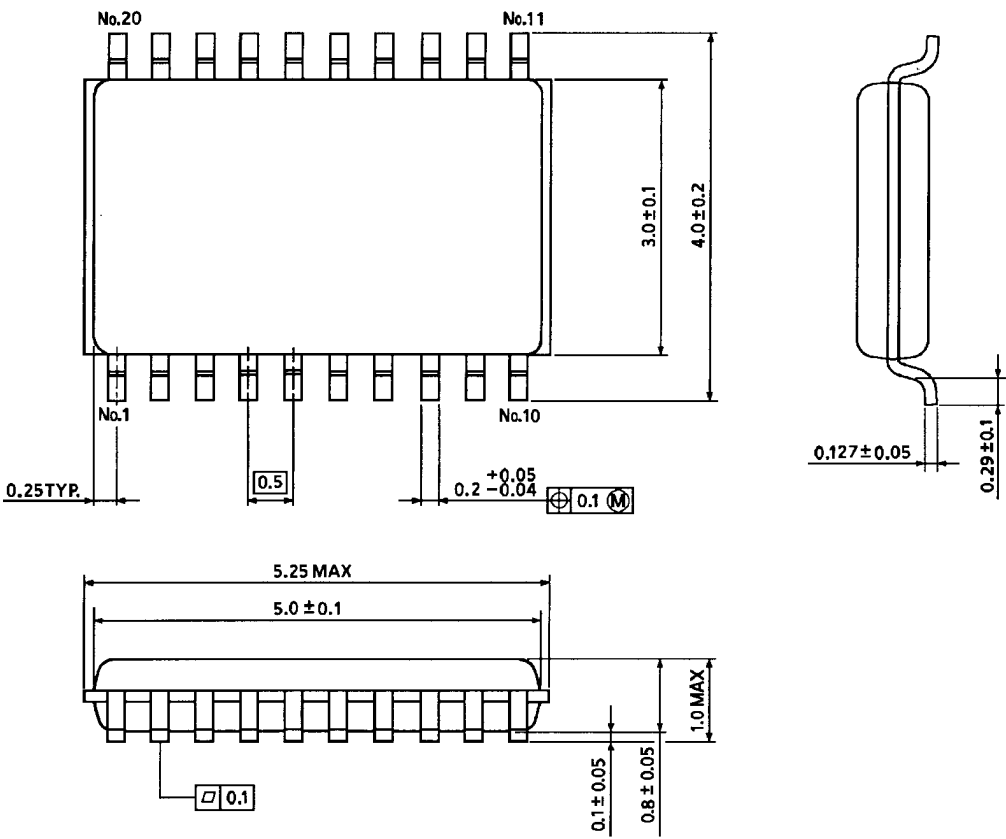


**Figure 3**  $t_{pLZ}$ ,  $t_{pHZ}$ ,  $t_{pZL}$ ,  $t_{pZH}$

Package Dimensions

VSSOP20-P-0030-0.50

Unit : mm



Weight: 0.03 g (typ.)