

TOSHIBA CMOS Digital Integrated Circuit Silicon Monolithic

# TC7MBL3245AFK

## Octal Bus Switch

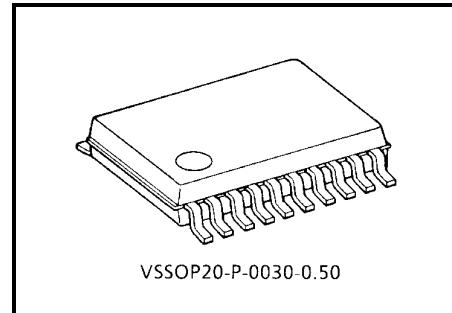
The TC7MBD3245AFK provides eight bits of low-voltage, high-speed bus switching in a standard '245 device pinout. The low ON-resistance of the switch allows connections to be made with minimal propagation delay and while maintaining CMOS low power dissipation.

The device comprises a single 8-bit switch. When output enable ( $\overline{OE}$ ) is low, the switch is on and port A is connected to port B. 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 to guard against static discharge.

## Features

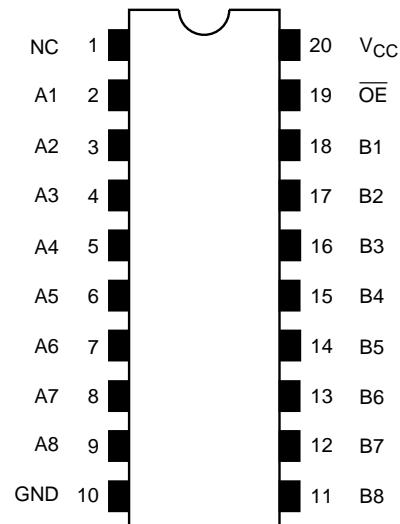
- Operating voltage:  $V_{CC} = 2.0\sim3.6$  V
- High speed:  $t_{pd} = 0.31$  ns (max) @  $V_{CC} = 3.0$  V
- Low ON-resistance:  $RON = 5\ \Omega$  (typ.) @  $V_{CC} = 3.0$  V
- ESD performance: human body model  $> \pm 2000$  V  
machine model  $> \pm 200$  V
- Power-down protection for inputs ( $\overline{OE}$  input only)
- Package: VSSOP (US20)
- Pin compatible with the 74xx245 type
- ..



VSSOP20-P-0030-0.50

Weight: 0.03 g (typ.)

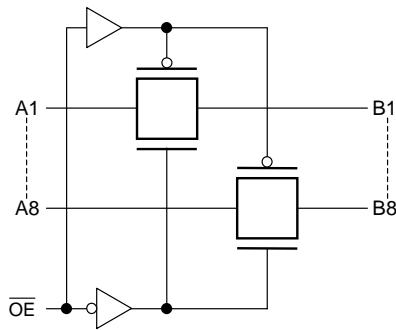
## Pin Assignment (top view)



NC-No Internal Connection

**Truth Table**

Inputs	Function
OE	
L	A port = B port
H	Disconnect

**System Diagram****Maximum Ratings**

Characteristic	Symbol	Rating	Unit
Power supply range	V <sub>CC</sub>	-0.5~4.6	V
Control pin input voltage	V <sub>IN</sub>	-0.5~4.6	V
Switch terminal I/O voltage	V <sub>S</sub>	-0.5~V <sub>CC</sub> +0.5	V
Clump diode current Control input pin	I <sub>IK</sub>	-50	mA
Switch terminal	I <sub>IK</sub>	±50	
Switch I/O current	I <sub>S</sub>	128	mA
Power dissipation	P <sub>D</sub>	180	mW
DC V <sub>CC</sub> /GND current	I <sub>CC</sub> /I <sub>GND</sub>	±100	mA
Storage temperature	T <sub>stg</sub>	-65~150	°C

**Recommended Operating Conditions**

Characteristic	Symbol	Rating	Unit
Power supply voltage	V <sub>CC</sub>	2.0~3.6	V
Control pin input voltage	V <sub>IN</sub>	0~3.6	V
Switch I/O voltage	V <sub>S</sub>	0~V <sub>CC</sub>	V
Operating temperature	T <sub>opr</sub>	-40~85	°C
Input rise and fall time	dt/dv	0~10	ns/V

## Electrical Characteristics

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

Characteristic	Symbol	Test Condition	V <sub>CC</sub> (V)	Min	Typ.	Max	Unit
High-level control input voltage	V <sub>IH</sub>	—	2.0 to 3.6	0.7 × V <sub>CC</sub>	—	—	V
Low-level control input voltage	V <sub>IL</sub>	—	2.0 to 3.6	—	—	0.3 × V <sub>CC</sub>	
Control input current	I <sub>IN</sub>	V <sub>IN</sub> = 0 to 3.6 V	2.0 to 3.6	—	—	±1.0	μA
Power off leakage current	I <sub>OFF</sub>	OĒ = 0 to 3.6 V	0	—	—	±1.0	μA
Off-stage leakage current (switch off)	I <sub>SZ</sub>	A, B = 0 to V <sub>CC</sub> , OĒ = V <sub>CC</sub>	2.0 to 3.6	—	—	±1.0	μA
Switch ON-resistance (Note 2)	R <sub>ON</sub>	V <sub>IS</sub> = 0 V, I <sub>IS</sub> = 30 mA (Note 1)	3.0	—	2	7	Ω
		V <sub>IS</sub> = 3.0 V, I <sub>IS</sub> = 30 mA (Note 1)	3.0	—	3	9	
		V <sub>IS</sub> = 2.4 V, I <sub>IS</sub> = 15 mA (Note 1)	3.0	—	5	20	
		V <sub>IS</sub> = 0 V, I <sub>IS</sub> = 24 mA (Note 1)	2.3	—	3	10	
		V <sub>IS</sub> = 2.3 V, I <sub>IS</sub> = 24 mA (Note 1)	2.3	—	4	15	
Quiescent supply current	I <sub>CC</sub>	V <sub>IN</sub> = V <sub>CC</sub> or GND, I <sub>OUT</sub> = 0	3.6	—	—	10	μA

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

Note 2: Measured by voltage drop between A and B pins at indicated current through the switch. ON-resistance is determined by the lower of the voltages on the two pins (A or B).

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

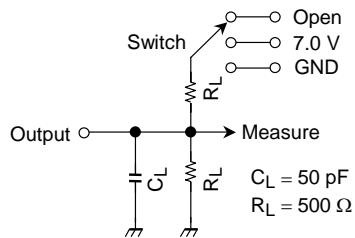
Characteristic	Symbol	Test Condition	V <sub>CC</sub> (V)	Min	Max	Unit
Propagation delay (bus to bus)	t <sub>pLH</sub> t <sub>pHL</sub>	Figure 1, Figure 2 (Note 3)	3.3 ± 0.3	—	0.31	ns
			2.5 ± 0.2	—	0.52	
Output enable time	t <sub>pZL</sub> t <sub>pZH</sub>	Figure 1, Figure 3	3.3 ± 0.3	—	6.5	ns
			2.5 ± 0.2	—	8	
Output disable time	t <sub>pLZ</sub> t <sub>pHZ</sub>	Figure 1, Figure 3	3.3 ± 0.3	—	6.5	ns
			2.5 ± 0.2	—	8	

Note 3: 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 from the source (zero output impedance).

## Capacitance (Ta = 25°C)

Characteristic	Symbol	Test Condition	V <sub>CC</sub> (V)	Typ.	Unit
Control input capacitance	C <sub>IN</sub>	—	3.0	3	pF
Switch terminal capacitance	C <sub>I/O</sub>	OĒ = V <sub>CC</sub>	3.0	17	pF

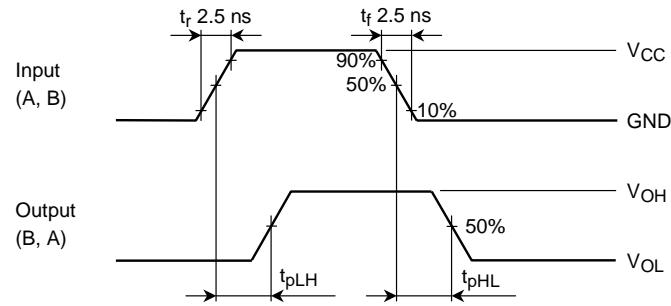
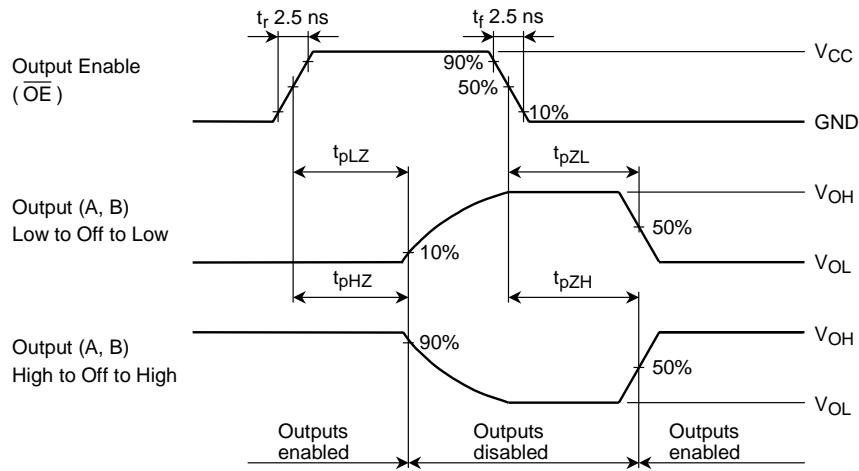
## AC Test Circuit



Parameter	Switch
$t_{pLH}, t_{pHL}$	Open
$t_{pLZ}, t_{pZL}$	$2 \times V_{CC}$
$t_{pHZ}, t_{pZH}$	GND

Figure 1

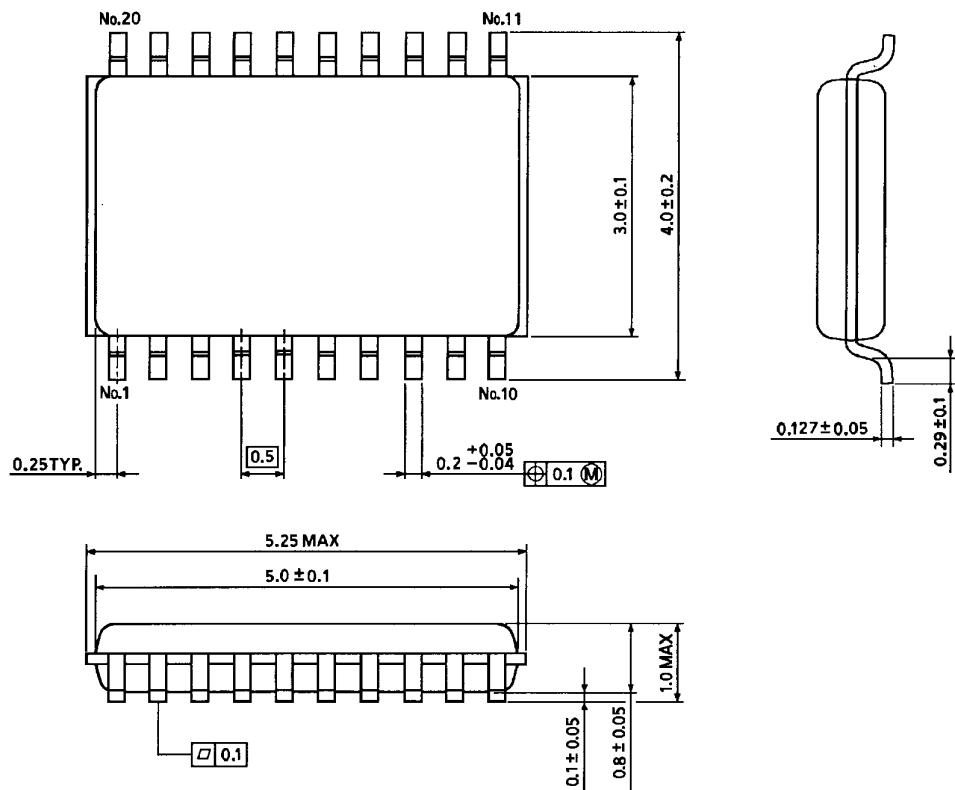
## AC Waveforms

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.)

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