

TOSHIBA CMOS Digital Integrated Circuit Silicon Monolithic

# TC7MBD3245AFK

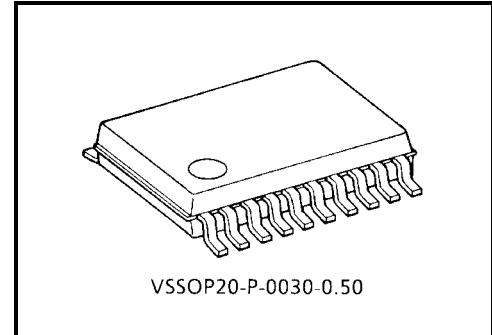
## Octal Bus Switch

The TC7MBD3245AFK provides eight bits of high-speed TTL-compatible bus switching in a standard '245 device pinout. The low on-state resistance of the switch allows connections to be made with minimal propagation delay.

The device is organized as one 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.

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.

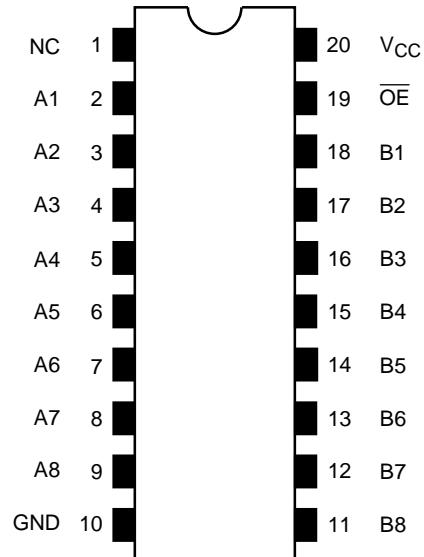


Weight: 0.03 g (typ.)

## Features

- Operating voltage:  $V_{CC} = 4.5\sim 5.5$  V
- High speed:  $t_{pd} = 0.32$  ns (max)
- Low on resistance:  $RON = 5$   $\Omega$  (typ.)
- ESD performance: Human body model  $> \pm 2000$  V  
Machine model  $> \pm 200$  V
- Compatible with TTL outputs (control inputs)
- Low Power Dissipation:  $I_{CC} = 10$   $\mu A$  (max.)
- Package: VSSOP (US20)
- Pin compatible with the 74xx245 type.
- Functionally equivalent to (FST/CBT) 3245.

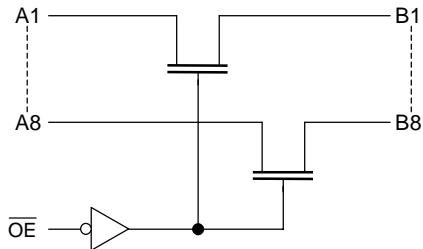
## Pin Assignment (top view)



NC-No Internal Connection

**Truth Table**

Inputs	Function
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	°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 <sub>CC</sub> (V)	Min	Typ. (Note 1)	Max	Unit
Input voltage	"H" level		V <sub>IH</sub>	—	4.5~5.5	2.0	—	—	
	"L" level	V <sub>IL</sub>	—	—	4.5~5.5	—	—	0.8	
High-level output voltage (Note 2)	V <sub>OH</sub>	IOH=-1μA V <sub>IS</sub> = V <sub>CC</sub>	4.75 5.0 5.25	2.3 2.5 2.7	2.8 3.0 3.2	3.2 3.4 3.6			V
Input leakage current	I <sub>IN</sub>	V <sub>IN</sub> = 0~5.5 V	4.5~5.5	—	—	—	±1.0	μA	
Power off leakage current	I <sub>OFF</sub>	A, B, $\overline{OE}$ = 0~5.5 V	0	—	—	—	±1.0	μA	
Off-STATE leakage current (switch off)	I <sub>SZ</sub>	A, B = 0~5.5 V, $\overline{OE}$ = V <sub>CC</sub>	4.5~5.5	—	—	—	±1.0	μA	
ON resistance (Note 3)	R <sub>ON</sub>	V <sub>IS</sub> = 0 V	I <sub>S</sub> = 64 mA	4.5	—	5	9	Ω	
				4.75	—	5	8		
			I <sub>S</sub> = 30 mA	4.5	—	5	9		
		V <sub>IS</sub> = 2.3 V, I <sub>S</sub> = 15 mA	4.75	—	5	8			
			4.5	—	35	65			
			4.75	—	35	50			
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		

Note 1: Typical values are at V<sub>CC</sub> = 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<sub>OH</sub> 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 <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	(Note 4)				
Output enable time	t <sub>pZL</sub> t <sub>pZH</sub>	Figure 1, Figure 3		4.5	—	7.0	ns
Output disable time	t <sub>pLZ</sub> t <sub>pHZ</sub>	Figure 1, Figure 3		4.5	—	7.0	ns

Note 4: 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 <sub>CC</sub> (V)	Typ.	Unit
Control pin input capacitance	C <sub>IN</sub>	(Note 5)				
Switch terminal capacitance	C <sub>I/O</sub>	$\overline{OE}$ = V <sub>CC</sub>		(Note 5)	5.0	10 pF

Note 5: This parameter is guaranteed by design.

## AC Test Circuit

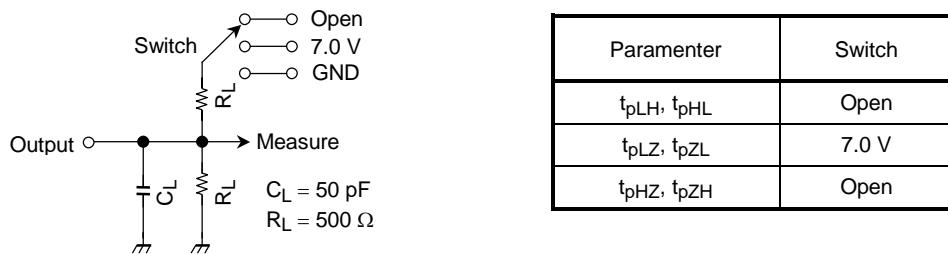
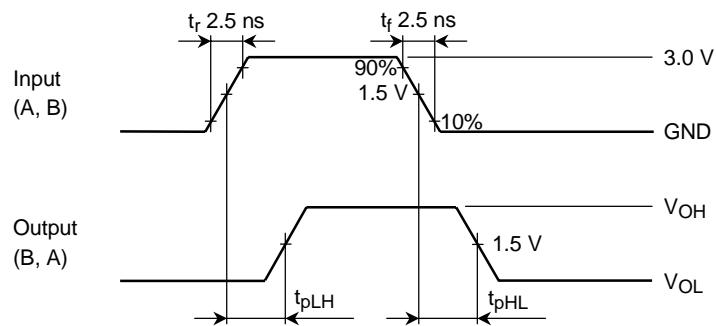
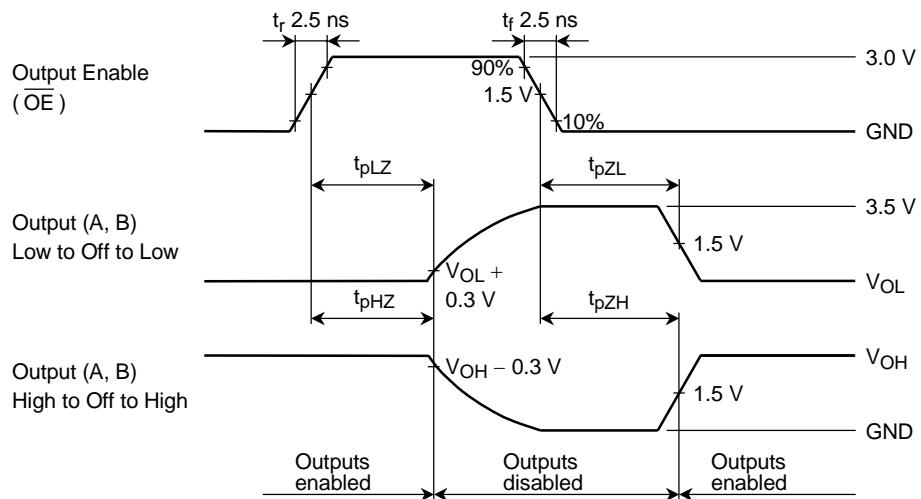
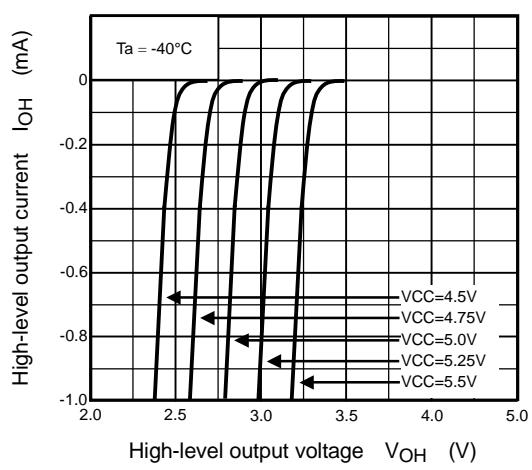
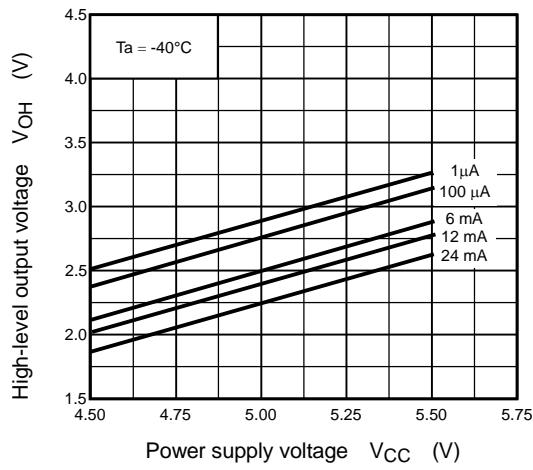
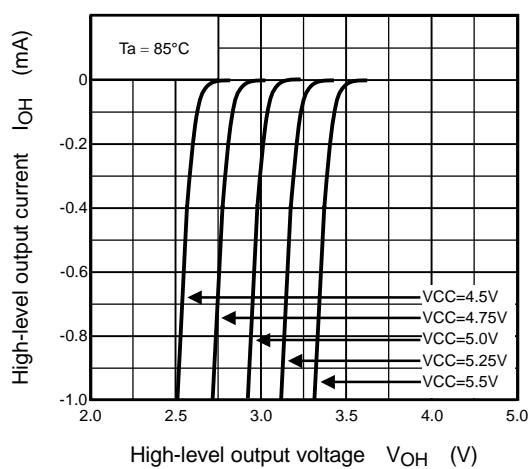
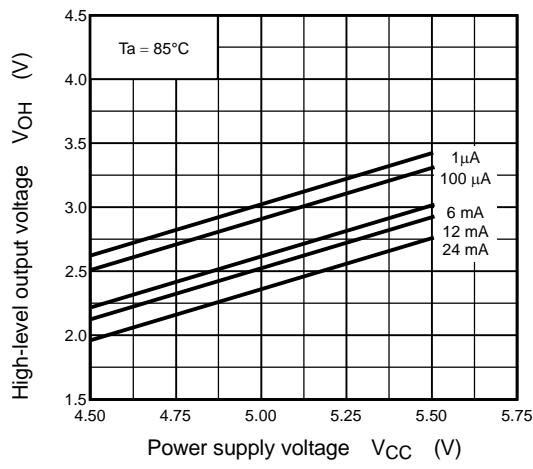
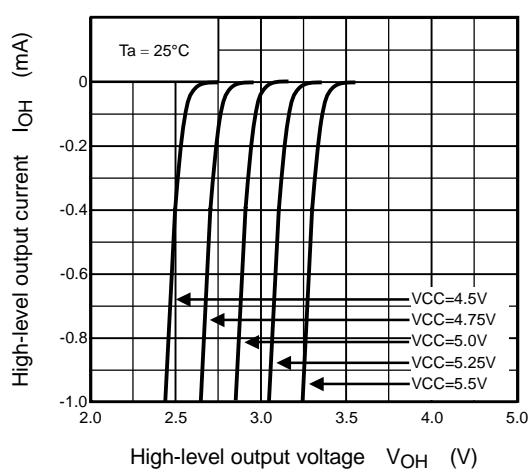
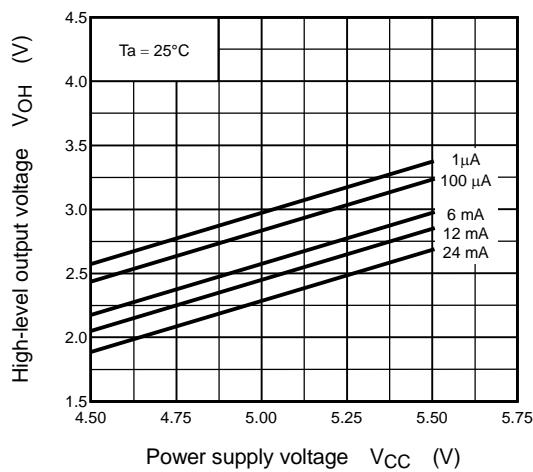


Figure 1

## AC Waveform

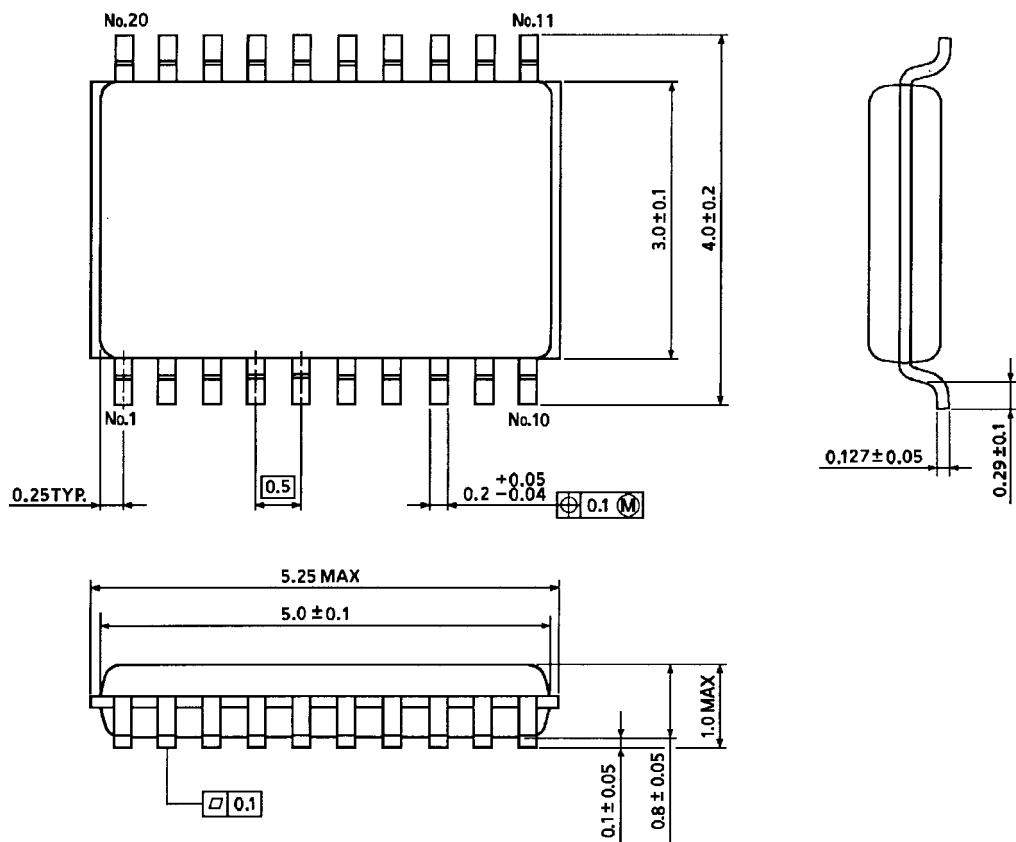
Figure 2  $t_{pLH}, t_{pHL}$ Figure 3  $t_{pLZ}, t_{pHZ}, t_{pZL}, t_{pZH}$

**V<sub>OH</sub> – V<sub>CC</sub> Characteristics (typ.)****Figure 4**

**Package Dimensions**

VSSOP20-P-0030-0.50

Unit : mm



Weight: 0.03 g (typ.)

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