TOSHIBA CMOS Digital Integrated Circuit Silicon Monolithic

TC7MBD3245FK

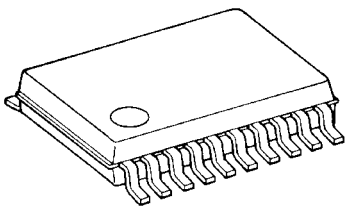
Octal Bus Switch

The TC7MBD3245FK 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 internal diode which adds to power supply line is enable to realize the shift of signal level from 5 V to 3.3 V. (Note 1)

All inputs are equipped with protection circuits against static discharge.



VSSOP20-P-0030-0.50

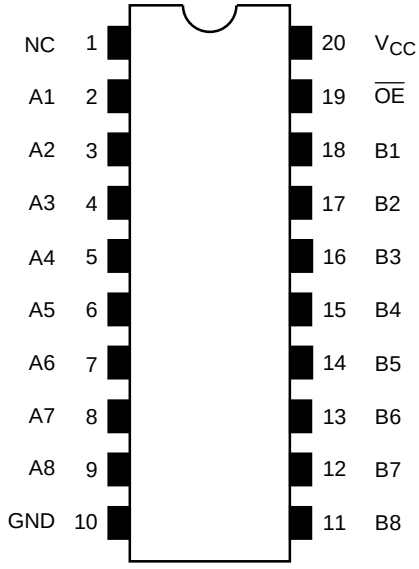
Weight: 0.03 g (typ.)

Features

- Operating voltage: V_{CC} = 4.5~5.5 V
- High speed: t_{pd} = 0.25 ns (max)
- Low on resistance: R_{ON} = 5 Ω (typ.)
- ESD performance: Human body model > ±2000 V
  Machine model > ±200 V
- Compatible with TTL outputs (control inputs)
- Package: VSSOP (US20)
- Pin compatible with the 74xx245 type.
- Functionally equivalent to (FST/CBT) 3245.

Note 1: In case that over-shoot noise is detected, this device should be used with clamp diode to prevent the next stage device from over-stress.

Pin Assignment (top view)

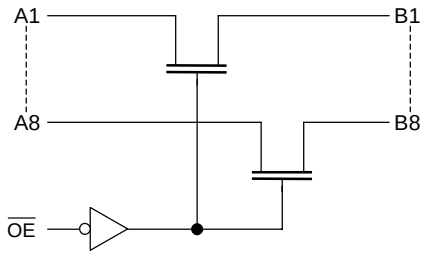


NC-No Internal Connection

Truth Table

Inputs $\overline{OE}$	Function
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}	±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_{CC} (V)	Min	Typ. (Note 2)	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		V_{OH}	Figure 4		—	—	—	—	—
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 (Note 3)		R_{ON}	V_{IS} = 0 V	I_{IS} = 64 mA	4.5	—	5	7	Ω
				I_{IS} = 30 mA	4.5	—	5	7	
			V_{IS} = 2.4 V, I_{IS} = 15 mA		4.5	—	35	15	
Quiescent supply current		I_{CC}	V_{IN} = V_{CC} or GND	Switch ON	5.5	—	—	1.5	mA
			I_{OUT} = 0	Switch OFF	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 2: Typical values are at V_{CC} = 5 V, Ta = 25°C.

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)	4.5	—	0.25	ns
Output enable time	t_{pZL} t_{pZH}	Figure 1, Figure 3		4.5	—	7.0	ns
Output disable time	t_{pLZ} t_{pHZ}	Figure 1, Figure 3		4.5	—	6.0	ns

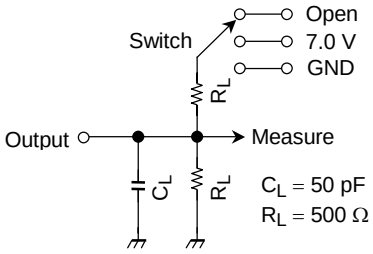
Note 4: The propagation delay time is calculated by the RC (on-resistance and load capacitance) time constant.

Capacitive Characteristics (Ta = 25°C)

Characteristics	Symbol	Test Condition		V_{CC} (V)	Typ.	Unit
Control pin input capacitance	C_{IN}		(Note 5)	5.0	3	pF
Switch terminal capacitance	$C_{I/O}$	$\overline{OE}$ = V_{CC}	(Note 5)	5.0	10	pF

Note 5: This parameter is guaranteed by design.

AC Test Circuit



Paramenter	Switch
t_{pLH}, t_{pHL}	Open
t_{pLZ}, t_{pZL}	7.0 V
t_{pHZ}, t_{pZH}	Open

Figure 1

AC Waveform

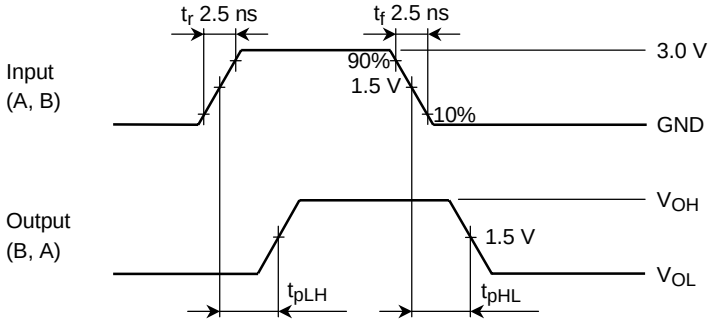


Figure 2 t_{pLH}, t_{pHL}

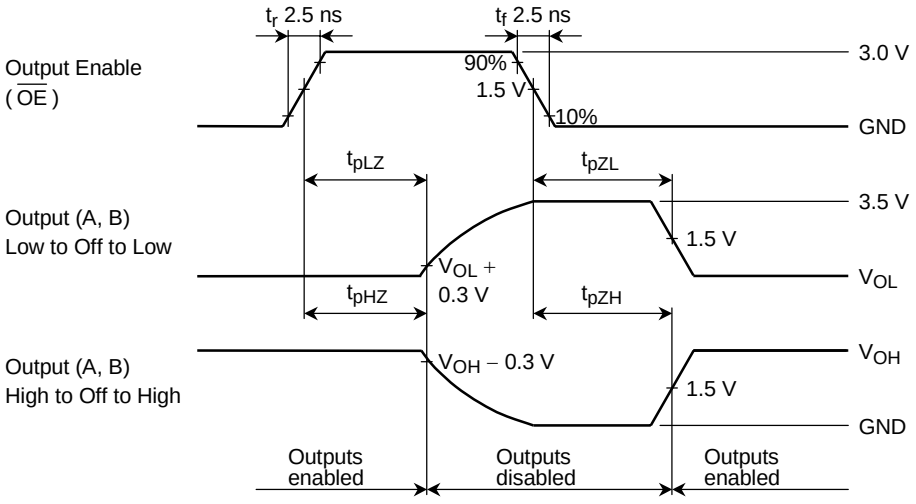
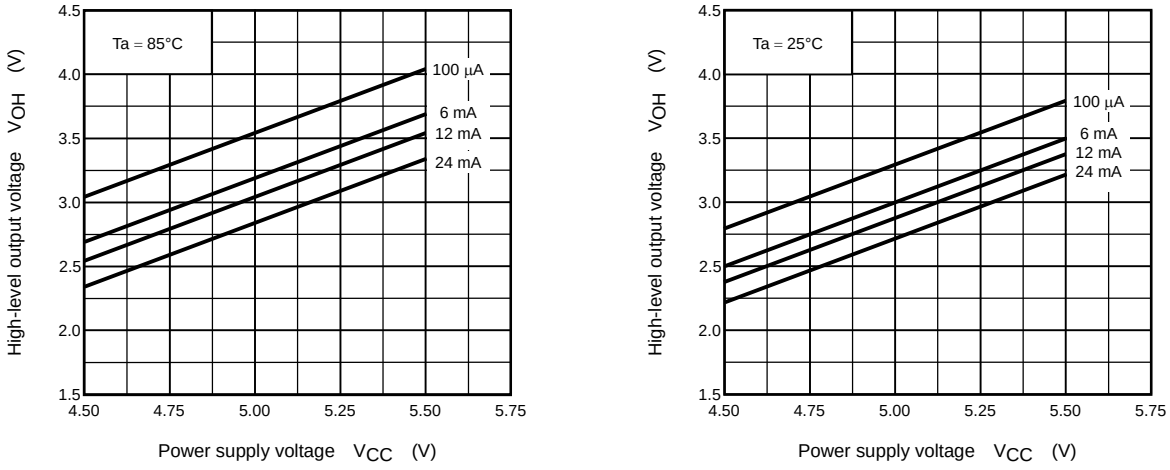


Figure 3 t_{pLZ}, t_{pHZ}, t_{pZL}, t_{pZH}

V_{OH} – V_{CC} Characteristics (typ.)



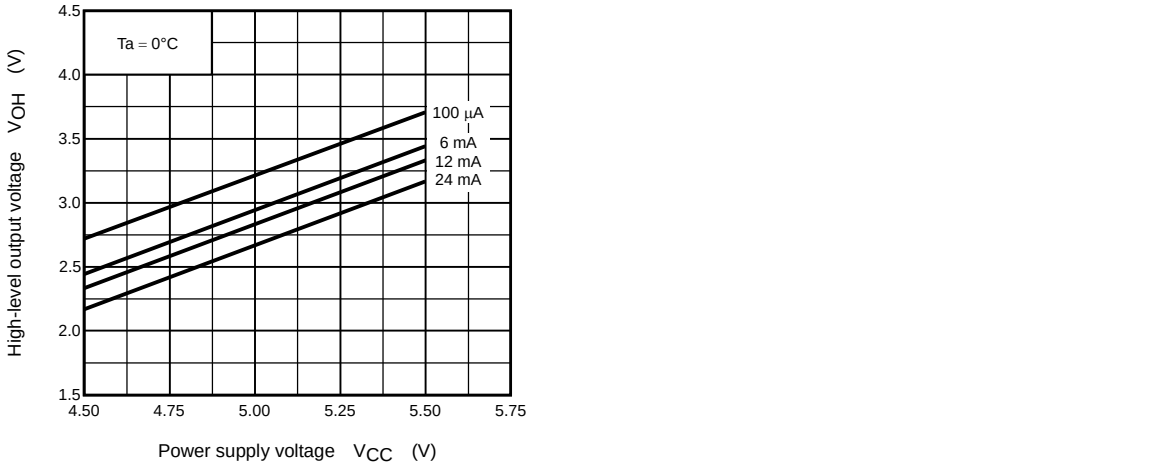
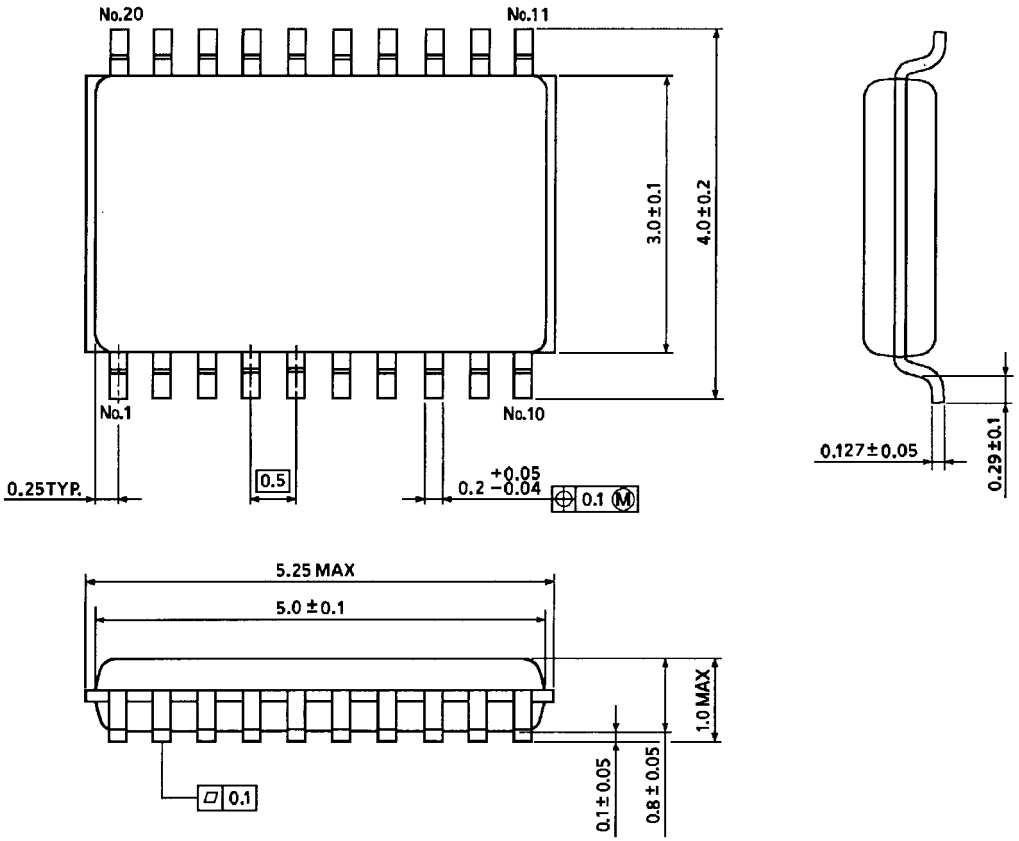


Figure 4

Package Dimensions

VSSOP20-P-0030-0.50 Unit : mm



Weight: 0.03 g (typ.)

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