

TOSHIBA CMOS Digital Integrated Circuit Silicon Monolithic

TC7MBD3244FK

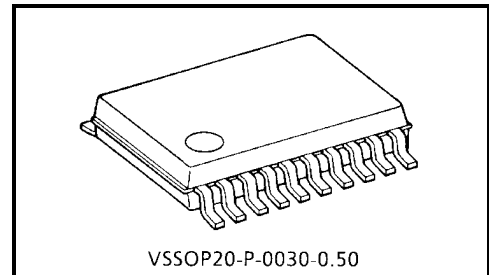
Octal Bus Switch

The TC7MBD3244FK 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.

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.

All inputs are equipped with protection circuits against static discharge.



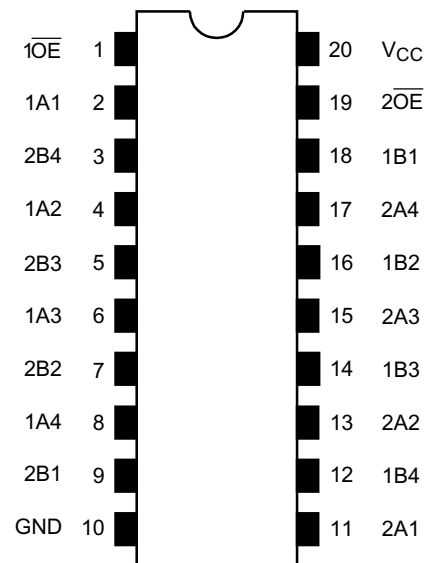
VSSOP20-P-0030-0.50

Weight: 0.03 g (typ.)

Features

- Operating voltage: $V_{CC} = 4.5 \sim 5.5$ V
- High speed: $t_{pd} = 0.25$ ns (max)
- Low on resistance: $R_{ON} = 5 \Omega$ (typ.)
- ESD performance: Human body model $> \pm 2000$ V
Machine model $> \pm 200$ 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)



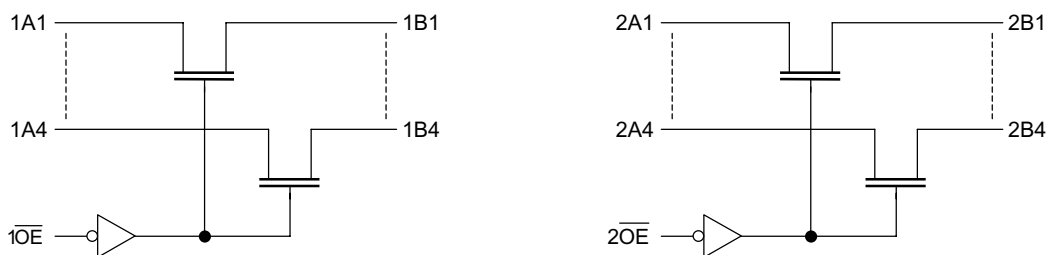
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Truth Table

Inputs	Function
\overline{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}	± 100	mA
Storage temperature	T_{stg}	-65~150	$^{\circ}C$

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	$^{\circ}C$
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. (Note1)	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		5.5	—	—	±1.0	μA
Off-STATE leakage current (switch off)		I _{SZ}	A, B = 0~5.5 V, $\overline{OE} = V_{CC}$		0~5.5	—	—	±1.0	μA
ON resistance (Note2)	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	50		
Quiescent supply current	I _{CC}	V _{IN} = V _{CC} or GND I _{OUT} = 0	Switch ON		5.5	—	—	1.5	mA
			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

Note1: Typical values are at V_{CC} = 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 _{CC} (V)	Min	Max	Unit
Propagation delay time (bus to bus)	t _{pLH}	t _{pLH} t _{pHL}	Figure 1, Figure 2 (Note3)		4.5	—	0.25	ns
	t _{pHL}							
Output enable time	t _{pZL}	t _{pZL} t _{pZH}	Figure 1, Figure 3		4.5	—	6.0	ns
	t _{pZH}							
Output disable time	t _{pLZ}	t _{pLZ} t _{pHZ}	Figure 1, Figure 3		4.5	—	5.0	ns
	t _{pHZ}							

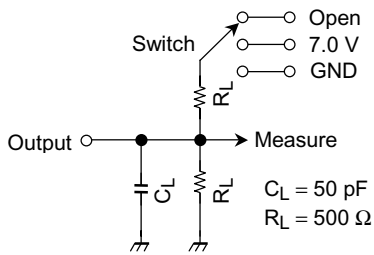
Note3: The propagation delay time is calculated by the RC (on-resistance and load capacitance) time constant.

Capacitive Characteristics (Ta = 25°C)

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

Note4: This parameter is guaranteed by design.

AC Test Circuit



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

Figure 1

AC Waveform

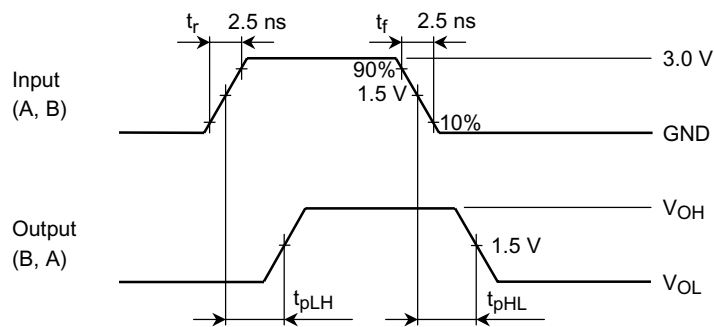


Figure 2 t_{pLH}, t_{pHL}

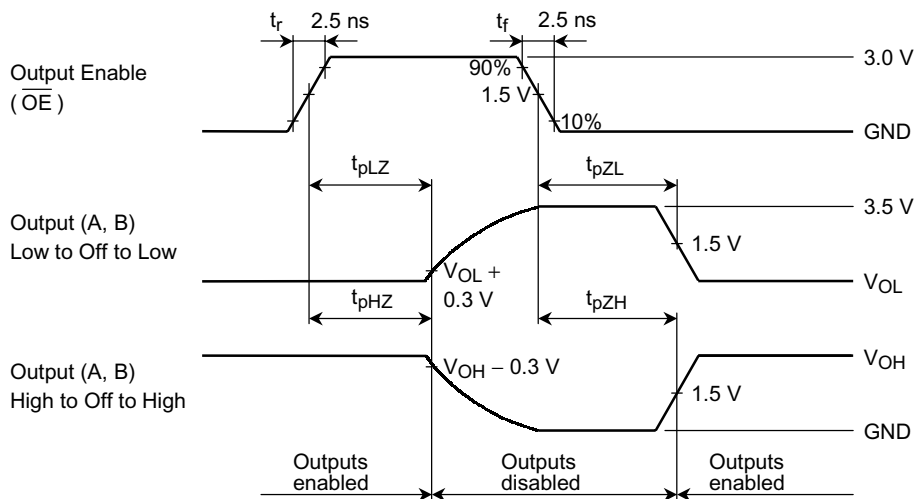


Figure 3 $t_{pLZ}, t_{pHZ}, t_{pZL}, t_{pZH}$

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

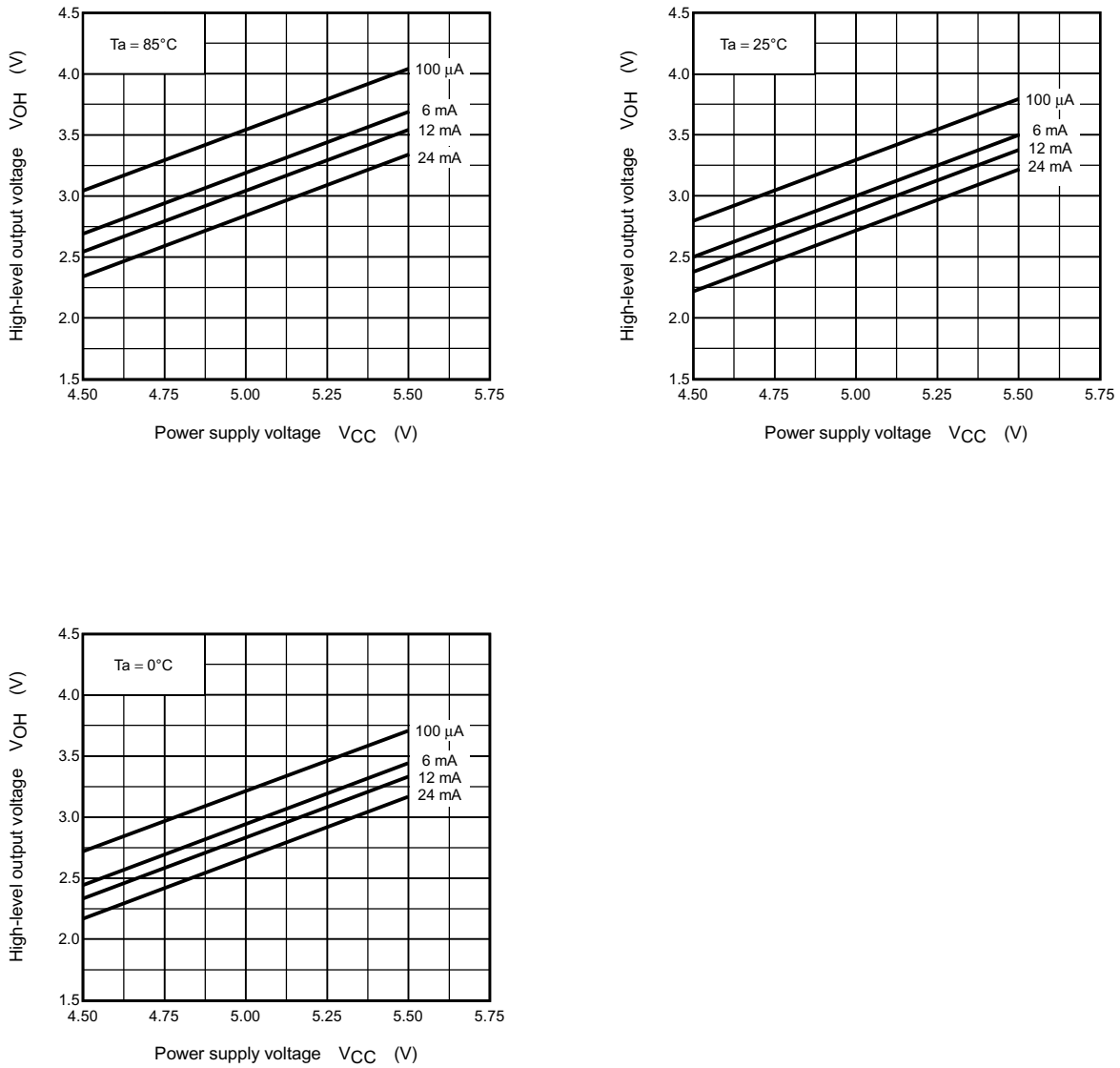
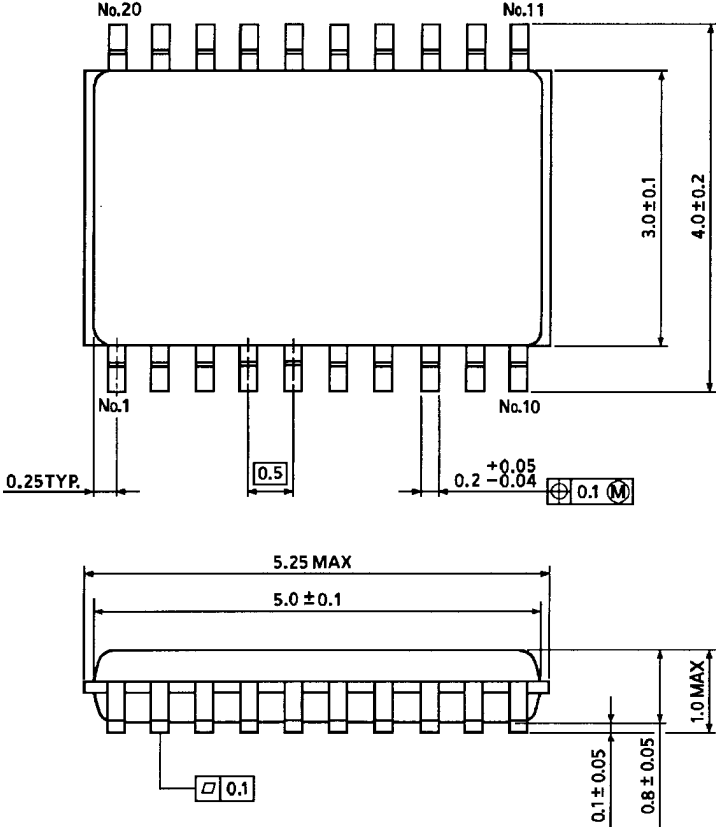


Figure 4

Package Dimensions

VSSOP20-P-0030-0.50

Unit : mm



Weight: 0.03 g (typ.)