

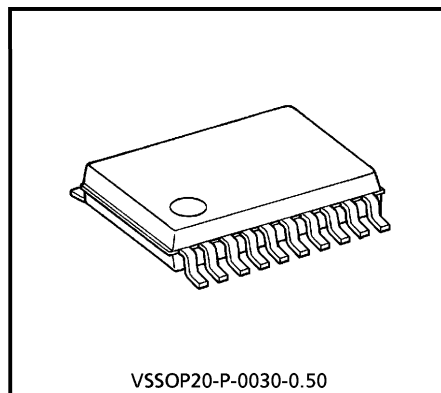
TOSHIBA CMOS DIGITAL INTEGRATED CIRCUIT SILICON MONOLITHIC

# 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.

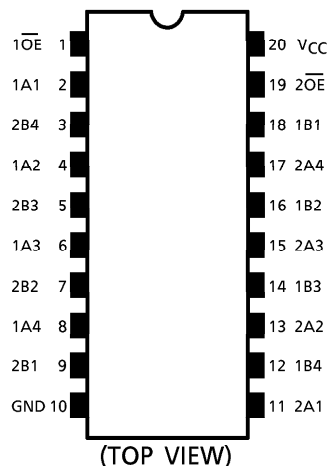


Weight : 0.03 g (typ.)

### 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



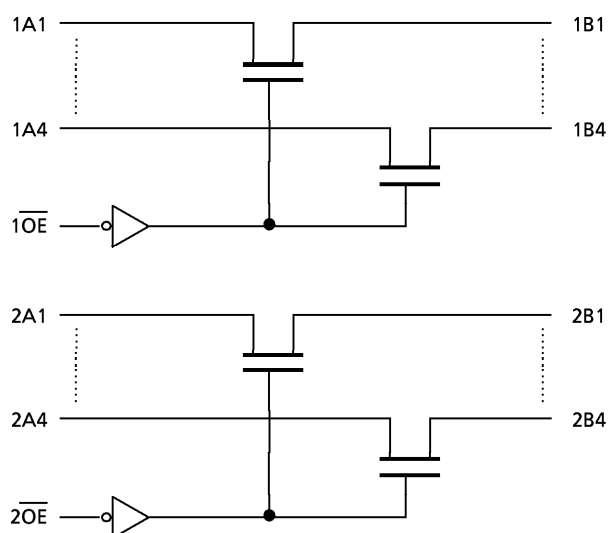
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TRUTH TABLE

INPUTS		FUNCTION
$\overline{OE}$		
L		Aport = Bport
H		Disconnect

SYSTEM DIAGRAM



MAXIMUM RATINGS

PARAMETER	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 Current	$I_S$	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	$^{\circ}C$

## RECOMMENDED OPERATING CONDITIONS

PARAMETER	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 ( $T_a = -40\sim 85^\circ\text{C}$ )

PARAMETER		SYMBOL	TEST CONDITION	$V_{CC}$ (V)	Min	Typ. (Note 1)	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		$V_{OH}$	(Fig.4)	—	—	—	—	—	
Input Leakage Current		$I_{IN}$	$V_{IN} = 0\sim 5.5\text{ V}$	5.5	—	—	$\pm 1.0$	$\mu\text{A}$	
Off-STATE Leakage Current		$I_{SZ}$	A, B = 0~5.5 V, $\overline{OE} = V_{CC}$	0~5.5	—	—	$\pm 1.0$	$\mu\text{A}$	
ON Resistance (Note 2)		$R_{ON}$	$V_{IS} = 0\text{ V}$	$I_{IS} = 64\text{ mA}$	4.5	—	5	7	$\Omega$
				$I_{IS} = 30\text{ mA}$	4.5	—	5	7	
			$V_{IS} = 2.4\text{ V}, I_{IS} = 15\text{ mA}$	4.5	—	35	50		
Quiescent Supply Current		$I_{CC}$	$V_{IN} = V_{CC}$ or GND, $I_{OUT} = 0$		Switch ON	—	—	1.5	mA
					Switch OFF	—	—	10	$\mu\text{A}$
Increase In $I_{CC}$ Per Input		$\Delta I_{CC}$	$V_{IN} = 3.4\text{ V}$ (One Input)	5.5	—	—	2.5	mA	

(Note 1): Typical values are at  $V_{CC} = 5.0\text{ V}$  and  $T_a = +25^\circ\text{C}$ .

(Note 2): 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 ELECTRICAL CHARACTERISTICS (Ta = -40~85°C)

PARAMETER	SYMBOL	TEST CONDITION	V <sub>CC</sub> (V)	Min	Max	UNIT
Propagation Delay Time (Bus to Bus)	t <sub>pLH</sub>	(Fig.1, 2) (Note 3)	4.5	—	0.25	ns
	t <sub>pHL</sub>					
Output Enable Time	t <sub>pZL</sub>	(Fig.1, 3)	4.5	—	6.0	ns
	t <sub>pZH</sub>					
Output Disable Time	t <sub>pLZ</sub>	(Fig.1, 3)	4.5	—	5.0	ns
	t <sub>pHZ</sub>					

(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 the source (zero output impedance).

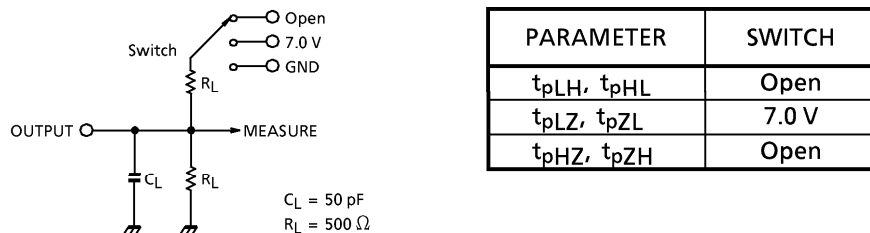
## Capacitive Characteristics (Ta = 25°C)

PARAMETER	SYMBOL	TEST CONDITION	V <sub>CC</sub> (V)	Typ.	UNIT
Control Pin Input Capacitance	C <sub>IN</sub>	(Note 4)	5.0	3	pF
Switch Terminal Capacitance	C <sub>I/O</sub>	$\overline{OE} = V_{CC}$ (Note 4)	5.0	10	pF

(Note 4): Parameter guaranteed by design

TEST CIRCUIT

Fig.1



AC WAVEFORM

Fig.2  $t_{pLH}$ ,  $t_{pHL}$

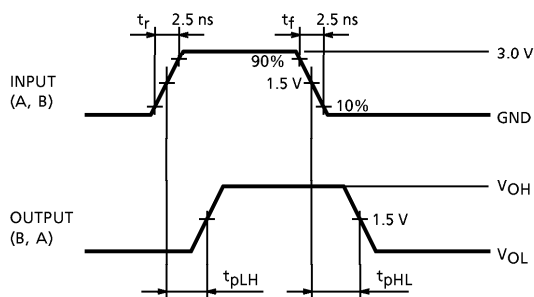


Fig.3  $t_{pLZ}$ ,  $t_{pHZ}$ ,  $t_{pZL}$ ,  $t_{pZH}$

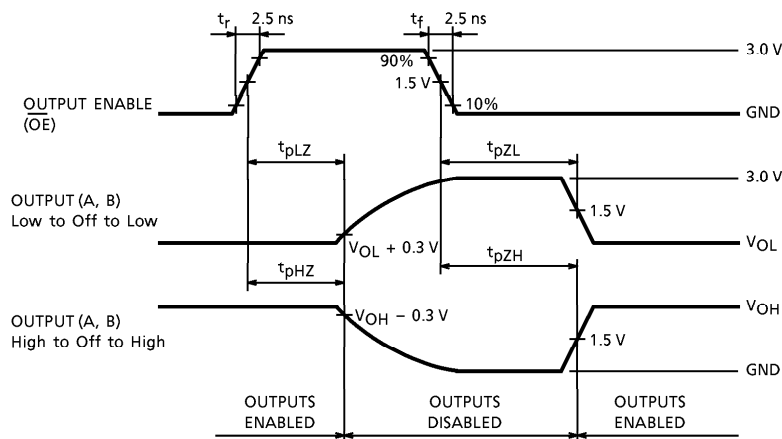
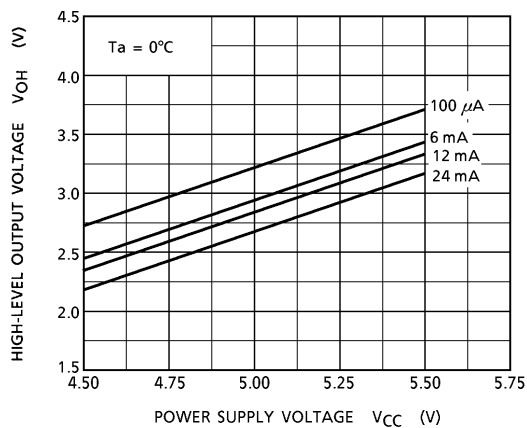
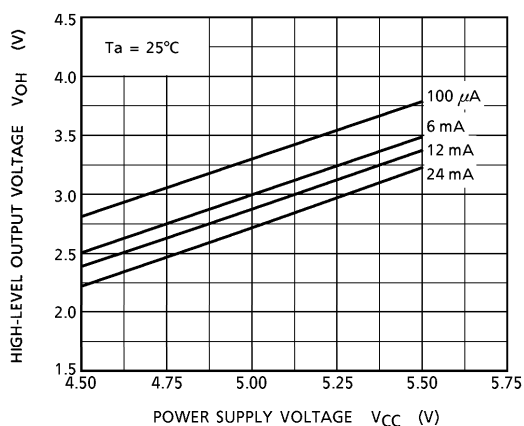
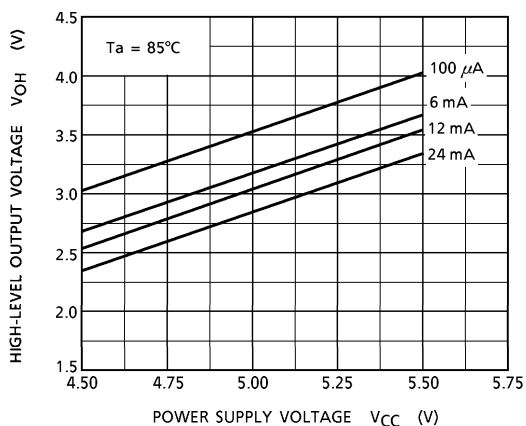
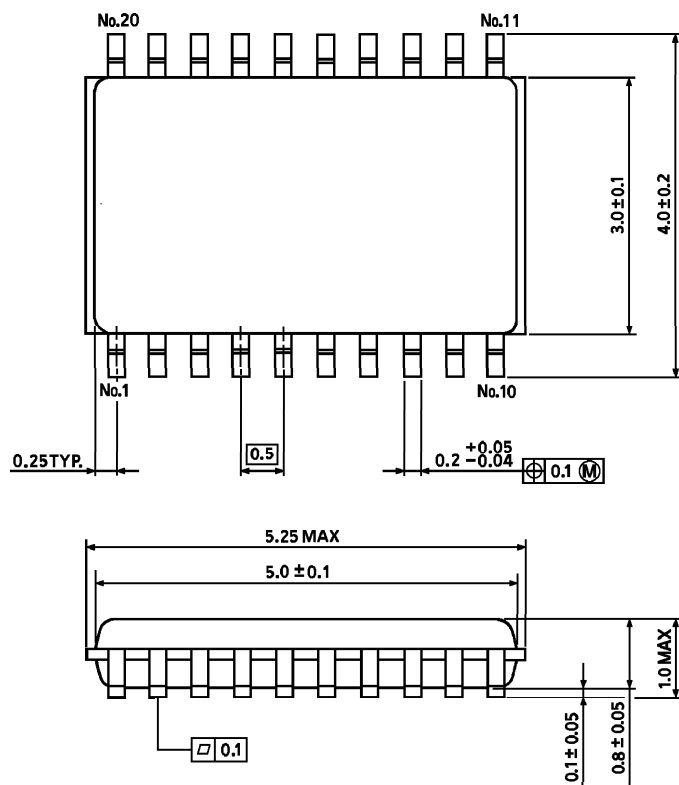


Fig.4  $V_{OH}$ - $V_{CC}$  Characteristics (typ.)



PACKAGE DIMENSIONS  
VSSOP20-P-0030-0.50

Unit : mm



Weight : 0.03 g (typ.)