Preliminary TOSHIBA CMOS Digital Integrated Circuit Silicon Monolithic

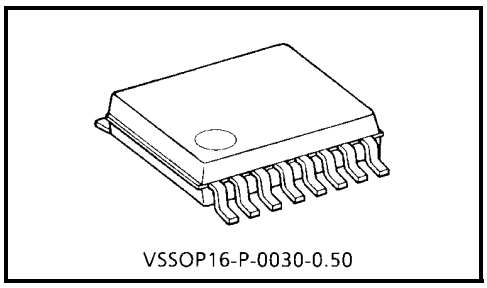
T C 7 M B 3 2 5 1 F K

1-of-8 FET Multiplexer/Demultiplexer

The TC7MB3251FK is high-speed CMOS 1-8 multiplexer/demultiplexer. The low on resistance of the switch allows connections to be made with minimal propagation delay time.

This device is 1 to 8 multiplexer/demultiplexer controlled by the combination of select inputs (S0, S1, S2) and output enable ($\overline{OE}$). The A inputs is connected to the corresponded B1~B8 outputs determined by the combination both the select inputs (S0, S1, S2) and output enable ($\overline{OE}$). When the output enable ($\overline{OE}$) input is held "H" level, the switches are open with regardless the state of select inputs and a high-impedance state exists between the switches.

All inputs are equipped with protection circuits against static discharge.

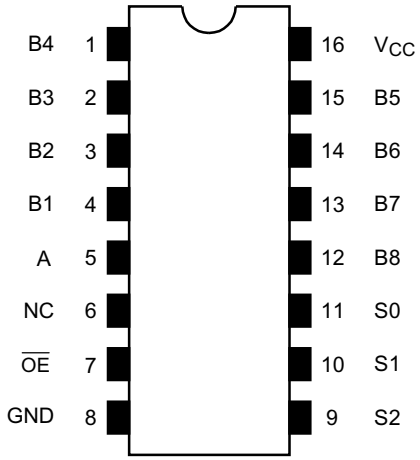


Weight: 0.02 g (typ.)

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: Machine model > ±200 V
  Human body model > ±2000 V
- Compatible with TTL outputs (control inputs)
- Package: VSSOP (US16)
- Pin compatible with the 74xx251 type.
  Functionally equivalent to (FST/CBT) 3251.

Pin Assignment (top view)

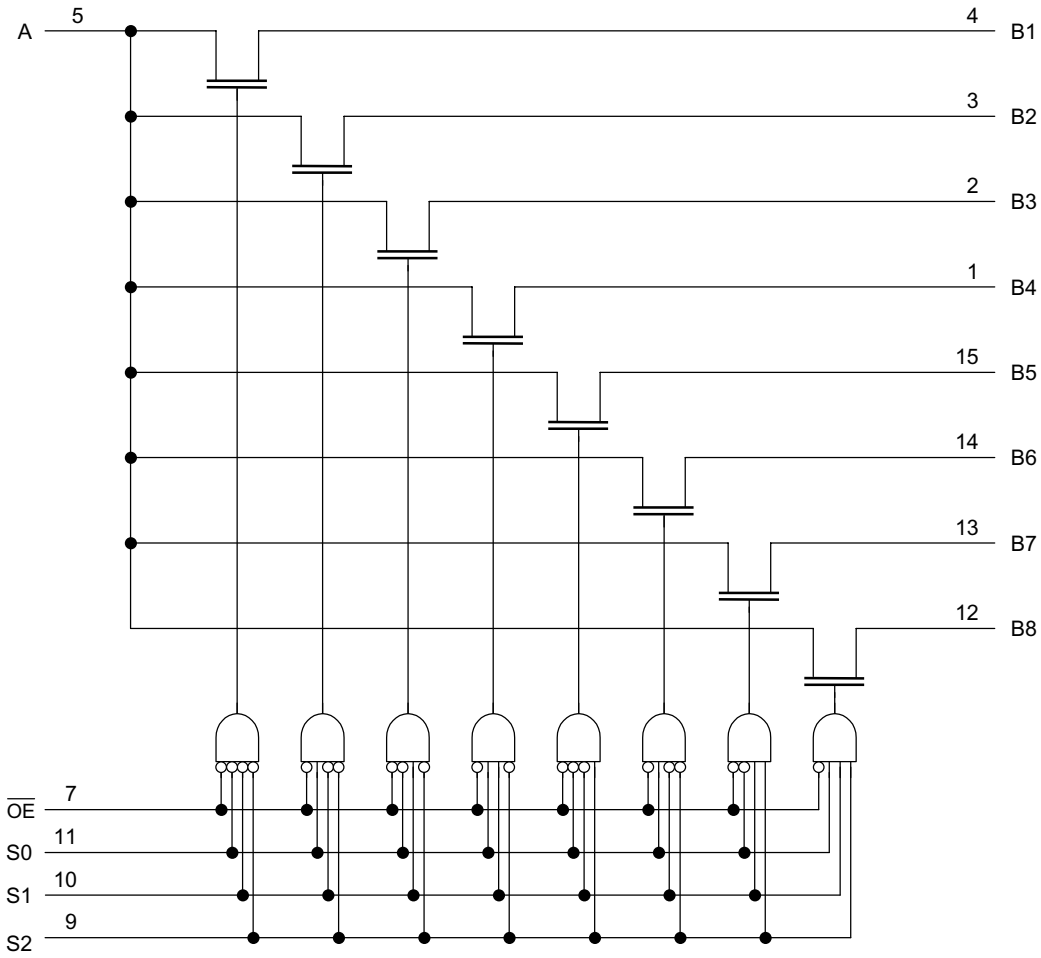


000630EBA1

Truth Table

Inputs				Function
$\overline{OE}$	S2	S1	S0	
L	L	L	L	A port = B1 port
L	L	L	H	A port = B2 port
L	L	H	L	A port = B3 port
L	L	H	H	A port = B4 port
L	H	L	L	A port = B5 port
L	H	L	H	A port = B6 port
L	H	H	L	A port = B7 port
L	H	H	H	A port = B8 port
H	X	X	X	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 current	I_S	128	mA
Power dissipation	P_D	180	mW
DC V_{CC}/GND 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 ($\overline{OE}$, S)	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. (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	
Input leakage current ($\overline{OE}$, S)		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}		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	—	10	15	
Increase in I_{CC} per input		I_{CC}	V_{IN} = V_{CC} or GND, I_{OUT} = 0		5.5	—	—	10	μA
		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_{pHL}	Figure 1, Figure 2 (Note3)	4.5	—	0.25	ns
Propagation delay time (S to bus)	t_{pLH} t_{pHL}	Figure 1, Figure 2	4.5	—	TBD	ns
Output enable time ($\overline{OE}$ to bus)	t_{pZL} t_{pZH}	Figure 1, Figure 3	4.5	—	TBD	ns
Output enable time (S to bus)	t_{pZL} t_{pZH}	Figure 1, Figure 3	4.5	—	TBD	ns
Output disable time ($\overline{OE}$ to bus)	t_{pLZ} t_{pHZ}	Figure 1, Figure 3	4.5	—	TBD	ns
Output disable time (S to bus)	t_{pLZ} t_{pHZ}	Figure 1, Figure 3	4.5	—	TBD	ns

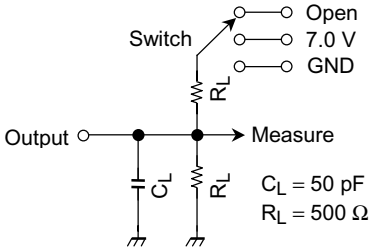
Note3: This parameter is guaranteed by design but is not tested. The bus switch contributes no propagation delay other than the RC delay of the typical on resistance of the switch and the 50 pF load capacitance, when driven by an ideal voltage the source (zero output impedance).

Capacitive Characteristics (Ta = 25°C)

Characteristics	Symbol	Test Condition	V_{CC} (V)	Typ.	Unit
Control pin input capacitance ($\overline{OE}$, S)	C_{IN}	(Note4)	5.0	3	pF
Switch terminal capacitance (B1~8)	$C_{I/O}$	$\overline{OE}$ = V_{CC} (Note4)	5.0	10	pF
Switch terminal capacitance (A)	$C_{I/O}$	$\overline{OE}$ = V_{CC} (Note4)	5.0	59	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

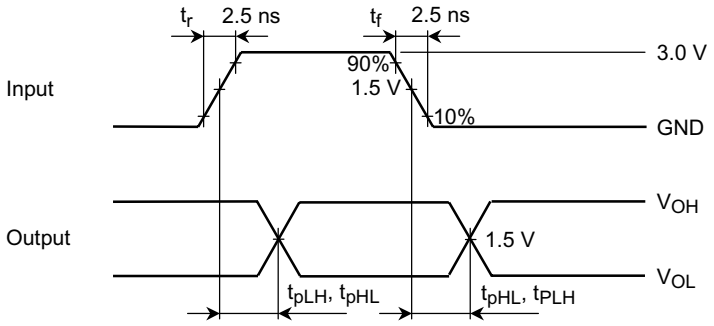


Figure 2 t_{pLH}, t_{pHL}

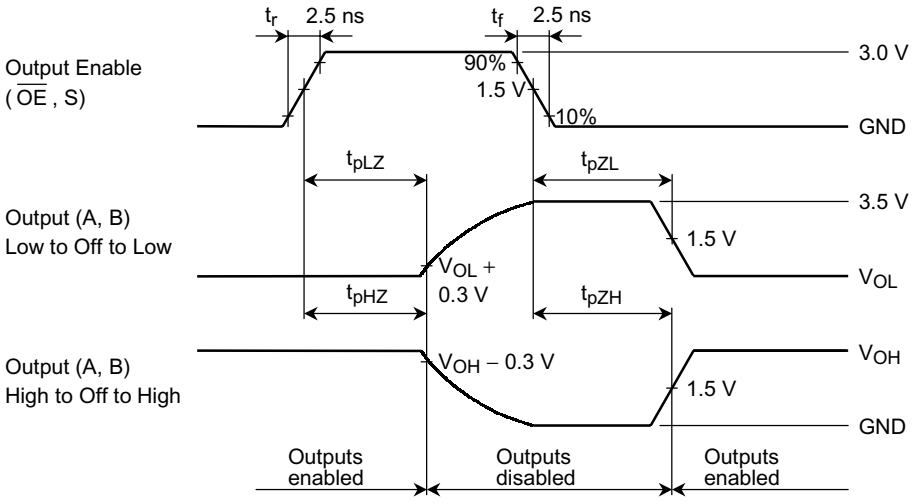
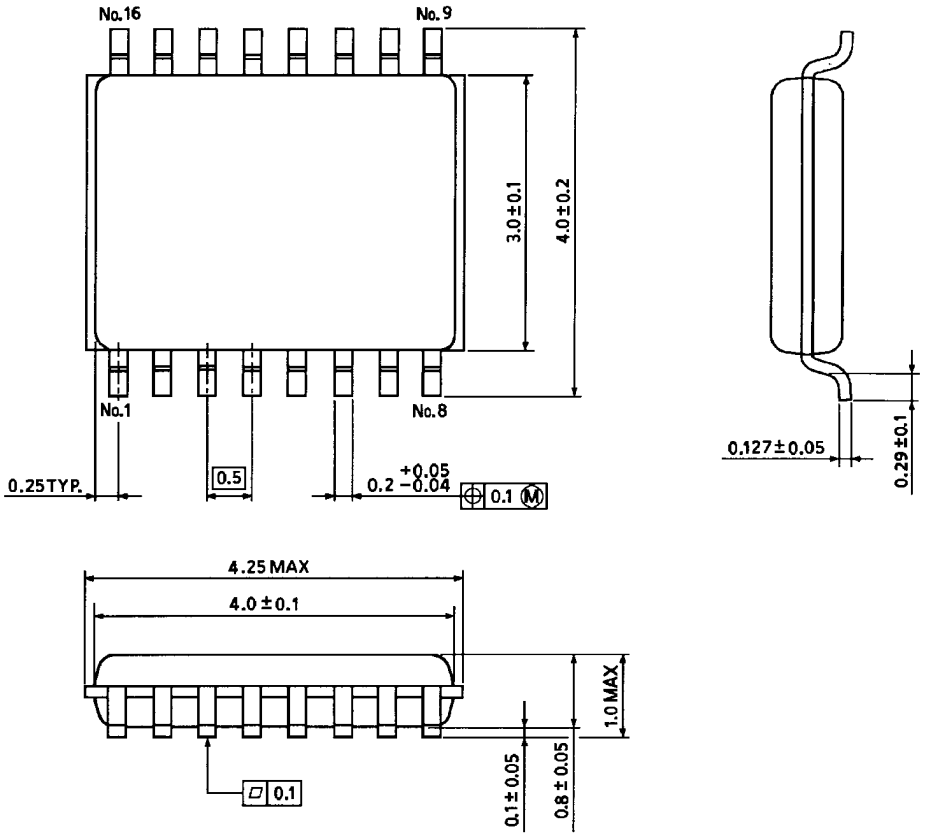


Figure 3 t_{pLZ}, t_{pHZ}, t_{pZL}, t_{pZH}

Package Dimensions

VSSOP16-P-0030-0.50 Unit : mm



Weight: 0.02 g (typ.)