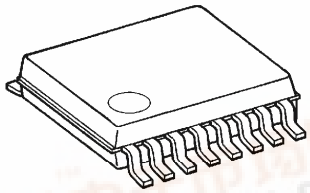
TOSHIBA CMOS DIGITAL INTEGRATED CIRCUIT SILICON MONOLITHIC

TC7MZ157FK

Low Voltage Quad 2-Channel Multiplexer With 5V Tolerant Inputs And Outputs

The TC7MZ157 is a high performance CMOS MULTIPLEXER. Designed for use in 3.3 Volt systems, it achieves high speed operation while maintaining the CMOS low power dissipation.
The device is designed for low-voltage (3.3V) V_{CC} applications, but it could be used to interface to 5V supply environment for inputs.
It consists of four 2-input digital multiplexers with common select and strobe inputs.
When the $\overline{\text{STROBE}}$ input is held "H" level, selection of data is inhibited and all the outputs become "L" level.
The SELECT decoding determines whether the A or B inputs get routed to their corresponding Y outputs.
All inputs are equipped with protection circuits against static discharge.



VSSOP16-P-0030-0.50

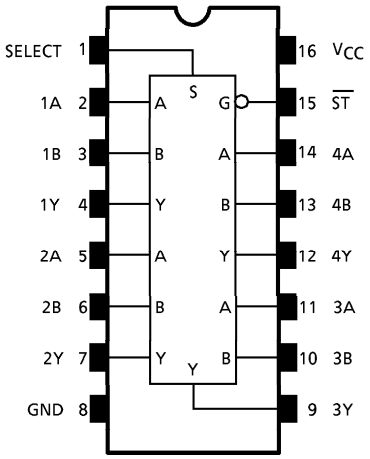
Weight: 0.02g (Typ.)

Features

- Low voltage operation: $V_{CC} = 2.0 \sim 3.6V$
- High speed operation : $t_{pd} = 6.0ns$ (max) ($V_{CC} = 3.0 \sim 3.6V$)
- Output current : $|I_{OH}| / I_{OL} = 24mA$ (min) ($V_{CC} = 3.0V$)
- Latch-up performance : $\pm 500mA$
- Available in VSSOP (US16)
- Power down protection is provided on all inputs and outputs.
- Pin and function compatible with the 74 series (74AC / VHC / HC / F / ALS / LS etc.) 157 type.

980910EBA2

Pin Assignment



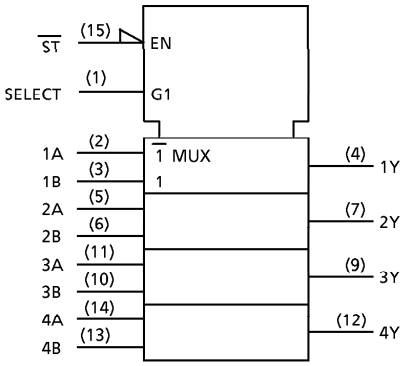
(TOP VIEW)

Truth Table

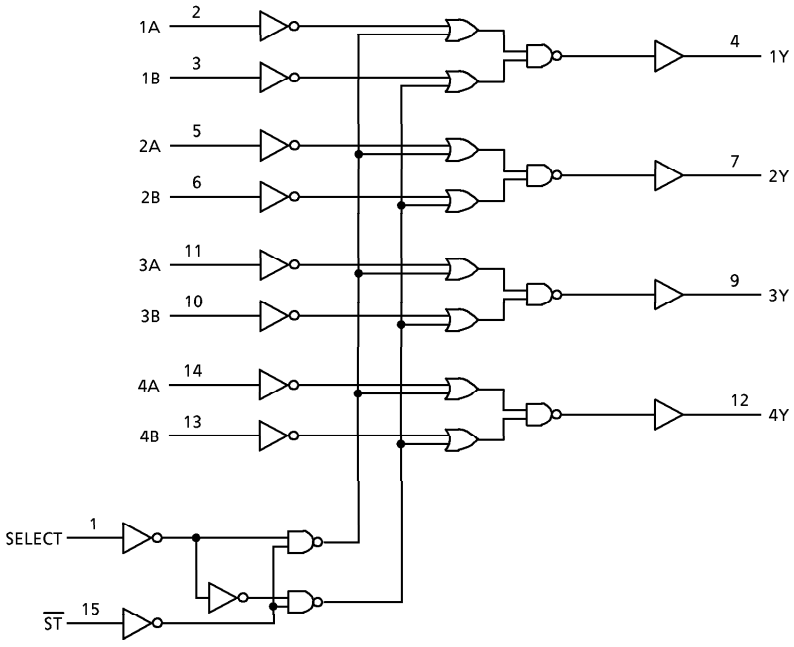
INPUTS				OUTPUTS
$\overline{ST}$	SELECT	A	B	Y
H	X	X	X	L
L	L	L	X	L
L	L	H	X	H
L	H	X	L	L
L	H	X	H	H

X: Don't Care

IEC Logic Symbol



System Diagram



980910EBA2'

Maximum Ratings

PARAMETER	SYMBOL	RATING	UNIT
Supply Voltage Range	V_{CC}	−0.5~7.0	V
DC Input Voltage	V_{IN}	−0.5~7.0	V
DC Output Voltage	V_{OUT}	−0.5~7.0 (Note 1)	V
		−0.5~V_{CC}+0.5 (Note 2)	
Input Diode Current	I_{IK}	−50	mA
Output Diode Current	I_{OK}	±50 (Note 3)	mA
DC Output Current	I_{OUT}	±50	mA
Power Dissipation	P_D	TBD	mW
DC V_{CC}/Ground Current	I_{CC} / I_{GND}	±100	mA
Storage Temperature	T_{stg}	−65~150	°C

(Note 1): V_{CC} = 0V
(Note 2): High or Low State. I_{OUT} absolute maximum rating must be observed.
(Note 3): V_{OUT}<GND, V_{OUT}>V_{CC}

Recommended Operating Conditions

PARAMETER	SYMBOL	RATING	UNIT
Supply Voltage	V_{CC}	2.0~3.6	V
		1.5~3.6 (Note 4)	
Input Voltage	V_{IN}	0~5.5	V
Output Voltage	V_{OUT}	0~5.5 (Note 5)	V
		0~ V_{CC} (Note 6)	
Output Current	I_{OH} / I_{OL}	±24 (Note 7)	mA
		±12 (Note 8)	
Operating Temperature	T_{opr}	−40~85	°C
Input Rise And Fall Time	dt / dv	0~10 (Note 9)	ns / V

(Note 4): Data Retention Only
(Note 5): V_{CC} = 0V
(Note 6): High or Low State
(Note 7): V_{CC} = 3.0~3.6V
(Note 8): V_{CC} = 2.7~3.0V
(Note 9): V_{IN} = 0.8~2.0V, V_{CC} = 3.0V

Electrical Characteristics

DC Characteristics (Ta = −40~85°C)

PARAMETER		SYMBOL	TEST CONDITION		V_{CC} (V)	Min	Max	UNIT
Input Voltage	"H" Level	V_{IH}			2.7~3.6	2.0	—	V
	"L" Level	V_{IL}			2.7~3.6	—	0.8	
Output Voltage	"H" Level	V_{OH}	$V_{IN} = V_{IH}$ or V_{IL}	$I_{OH} = -100\mu A$	2.7~3.6	V_{CC} −0.2	—	V
				$I_{OH} = -12mA$	2.7	2.2	—	
				$I_{OH} = -18mA$	3.0	2.4	—	
				$I_{OH} = -24mA$	3.0	2.2	—	
	"L" Level	V_{OL}	$V_{IN} = V_{IH}$ or V_{IL}	$I_{OL} = 100\mu A$	2.7~3.6	—	0.2	
				$I_{OL} = 12mA$	2.7	—	0.4	
				$I_{OL} = 16mA$	3.0	—	0.4	
				$I_{OL} = 24mA$	3.0	—	0.55	
Input Leakage Current		I_{IN}	$V_{IN} = 0$~5.5V		2.7~3.6	—	±5.0	μA
Power Off Leakage Cuurent		I_{OFF}	V_{IN} / $V_{OUT} = 5.5V$		0	—	10.0	μA
Quiescent Supply Current		I_{CC}	$V_{IN} = V_{CC}$ or GND		2.7~3.6	—	10.0	μA
			V_{IN} / $V_{OUT} = 3.6$~5.5V		2.7~3.6	—	±10.0	
Increase In I_{CC} Per Input		ΔI_{CC}	$V_{IH} = V_{CC} - 0.6V$		2.7~3.6	—	500	μA

AC Characteristics (Ta = −40~85°C)

PARAMETER	SYMBOL	TEST CONDITION	V_{CC} (V)	Min	Max	UNIT
Propagation Delay Time (A, B-Y)	t_{pLH} t_{pHL}	(Fig.1, 2)	2.7	—	6.3	ns
			3.3 ± 0.3	1.5	5.8	
Propagation Delay Time (SELECT-Y)	t_{pLH} t_{pHL}	(Fig.1, 2)	2.7	—	8.0	ns
			3.3 ± 0.3	1.5	7.0	
Propagation Delay Time ($\overline{ST}$-Y)	t_{pLH} t_{pHL}	(Fig.1, 2)	2.7	—	8.0	ns
			3.3 ± 0.3	1.5	7.0	
Output To Output Skew	t_{osLH} t_{osHL}	(Note 10)	2.7	—	—	ns
			3.3 ± 0.3	—	1.0	

(Note 10): Parameter guaranteed by design.
($t_{osLH} = |t_{pLHm} - t_{pLHn}|$, $t_{osHL} = |t_{pHLm} - t_{pHLn}|$)

Dynamic Switching Characteristics (Ta = 25°C, Input $t_r = t_f = 2.5ns$, $C_L = 50pF$, $R_L = 500\Omega$)

PARAMETER	SYMBOL	TEST CONDITION	V_{CC} (V)	Typ.	UNIT
Quiet Output Maximum Dynamic V_{OL}	V_{OLP}	$V_{IH} = 3.3V$, $V_{IL} = 0V$	3.3	0.8	V
Quiet Output Minimum Dynamic V_{OL}	$\|V_{OLV}\|$	$V_{IH} = 3.3V$, $V_{IL} = 0V$	3.3	0.8	V

Capacitive Characteristics (Ta = 25°C)

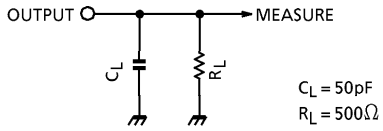
PARAMETER	SYMBOL	TEST CONDITION	V_{CC} (V)	Typ.	UNIT
Input Capacitance	C_{IN}	—	3.3	7	pF
Output Capacitance	C_{OUT}	—	0	8	pF
Power Dissipation Capacitance	C_{PD}	$f_{IN} = 10MHz$ (Note 11)	3.3	25	pF

(Note 11): C_{PD} is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption without load.
Average operating current can be obtained by the equation:

$$I_{CC\,(opr.)} = C_{PD} \cdot V_{CC} \cdot f_{IN} + I_{CC}$$

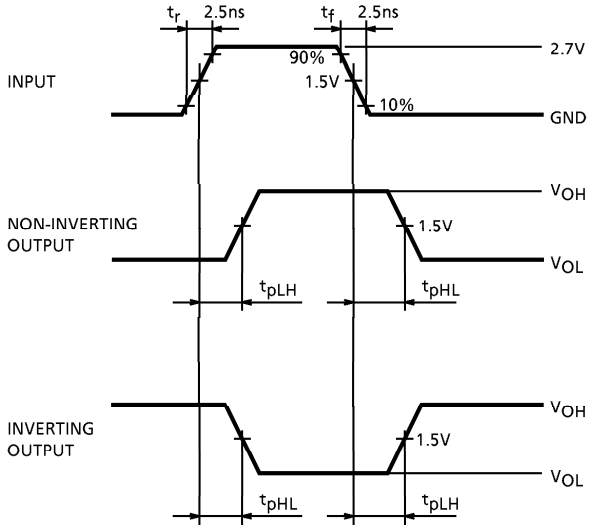
Test Circuit

Fig.1



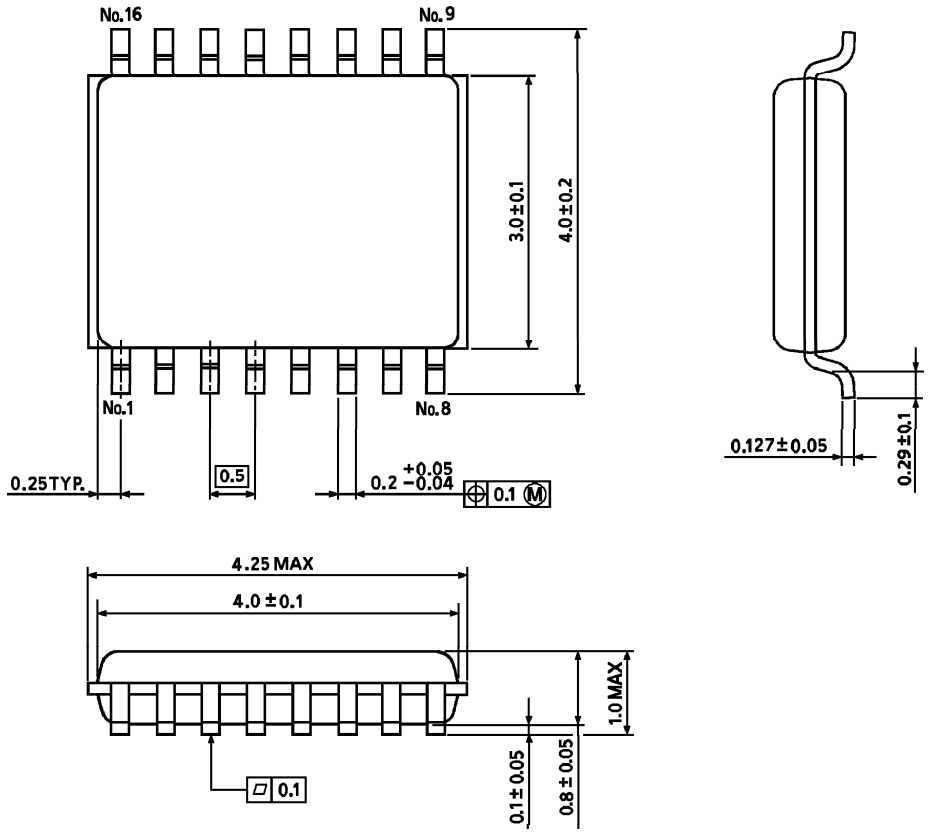
AC Waveform

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



Outline Drawing

VSSOP16-P-0030-0.50 Unit: mm



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