TOSHIBA CMOS DIGITAL INTEGRATED CIRCUIT SILICON MONOLITHIC

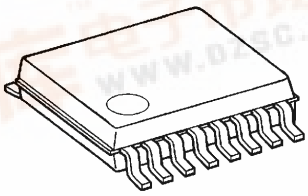
TC7MH153FK

Dual 4-Channel Multiplexer

The TC7MH153 is an advanced high speed CMOS DUAL 4-CHANNEL MULTIPLEXERs fabricated with silicon gate C²MOS technology.
It achieves the high speed operation similar to equivalent Bipolar Schottky TTL while maintaining the CMOS low power dissipation.
Each of these data (1C0 - 1C3, 2C0 - 2C3) is selected by the two address inputs A and B.
Separate strobe inputs ($1\overline{G}$, $2\overline{G}$) are provided for each of the two four-line sections.
The strobe input ($\overline{G}$) can be used to inhibit the data output; the output is fixed in low level while the strobe input is held high.
An input protection circuit ensures that 0 to 7V can be applied to the input pins without regard to the supply voltage. This device can be used to interface 5V to 3V systems and two supply systems such as battery back up. This circuit prevents device destruction due to mismatched supply and input voltages.

Features:

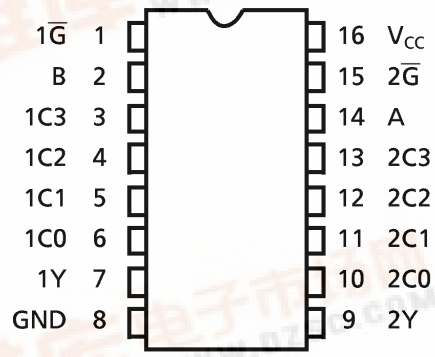
- High Speed ····· t_{pd} = 5.0ns(typ.) at V_{CC} = 5V
- Low Power Dissipation ····· I_{CC} = 4μA(max) at Ta = 25°C
- High Noise Immunity ····· $V_{NIH} = V_{NIL}$ = 28% V_{CC} (min)
- Power Down Protection is provided on all inputs.
- Balanced Propagation Delays ····· $t_{pLH} \simeq t_{pHL}$
- Wide Operating Voltage Range ···· V_{CC} (opr) = 2V~5.5V
- Pin and Function Compatible with 74ALS153



VSSOP16-P-0030-0.50

Weight: 0.02g (Typ.)

Pin Assignment



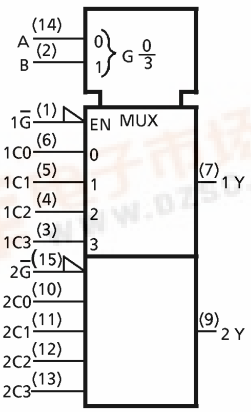
(TOP VIEW)

Truth Table

SELECT INPUTS		DATA INPUTS				STROBE	OUTPUTS
B	A	C0	C1	C2	C3	$\overline{G}$	Y
X	X	X	X	X	X	H	L
L	L	L	X	X	X	L	L
L	L	H	X	X	X	L	H
L	H	X	L	X	X	L	L
L	H	X	H	X	X	L	H
H	L	X	X	L	X	L	L
H	L	X	X	H	X	L	H
H	H	X	X	X	L	L	L
H	H	X	X	X	H	L	H

X: Don't Care

IEC Logic Symbol



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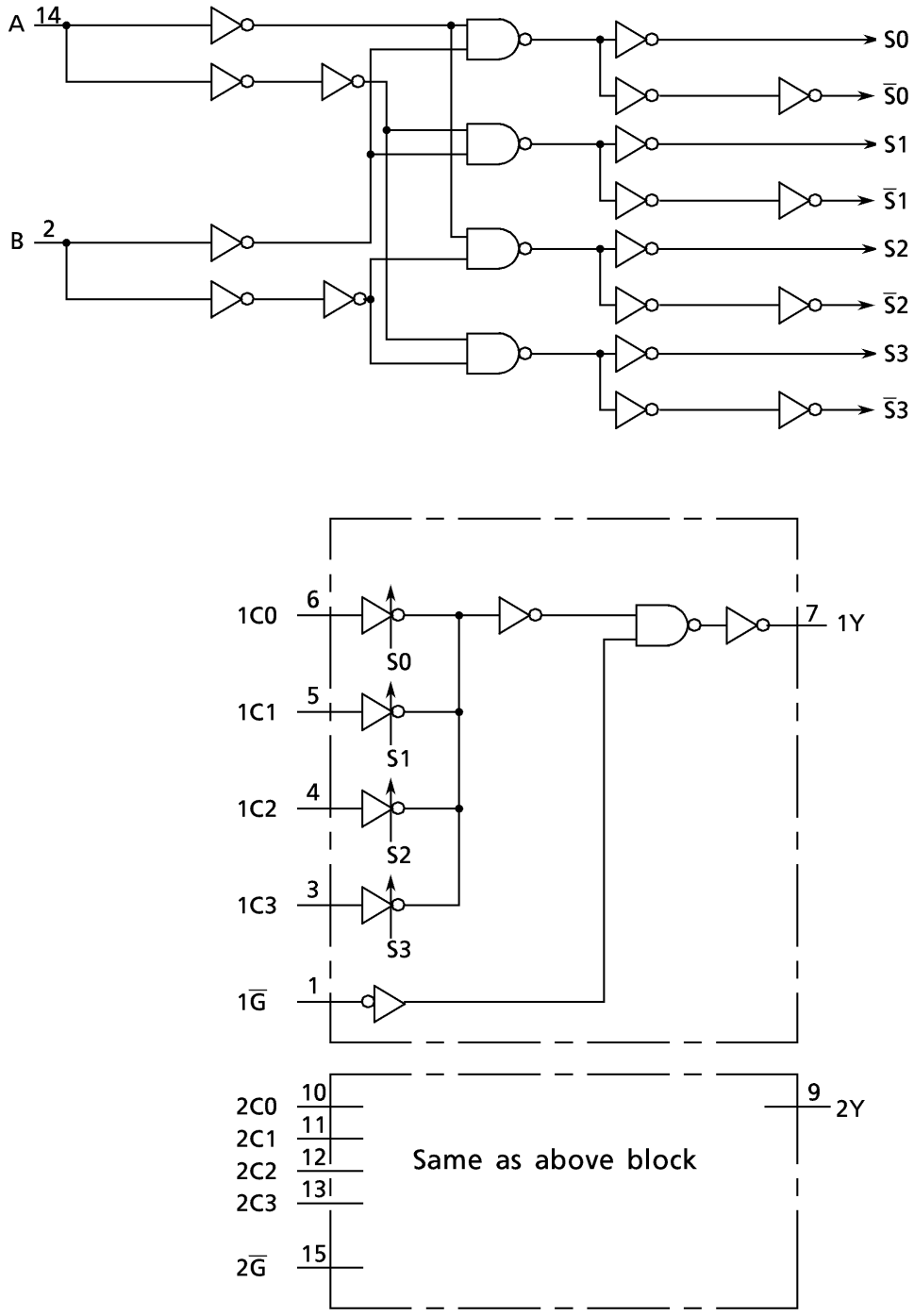
System Diagram



Absolute Maximum Ratings

PARAMETER	SYMBOL	VALUE	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~V_{CC} + 0.5	V
Input Diode Current	I_{IK}	−20	mA
Output Diode Current	I_{OK}	±20	mA
DC Output Current	I_{OUT}	±25	mA
DC V_{CC}/Ground Current	I_{CC}	±50	mA
Power Dissipation	P_D	180	mW
Storage Temperature	T_{stg}	−65~150	°C

Recommended Operating Conditions

PARAMETER	SYMBOL	VALUE	UNIT
Supply Voltage	V_{CC}	2.0~5.5	V
Input Voltage	V_{IN}	0~5.5	V
Output Voltage	V_{OUT}	0~V_{CC}	V
Operating Temperature	T_{opr}	−40~85	°C
Input Rise and Fall Time	dt / dv	0~ 100 (Vcc = 3.3 ± 0.3V) 0~ 20 (Vcc = 5 ± 0.5V)	ns / V

DC Electrical Characteristics

PARAMETER	SYMBOL	TEST CONDITION		V_{CC} (V)	Ta = 25°C			Ta = −40~85°C		UNIT
					Min	Typ.	Max	Min	Max	
High - Level Input Voltage	V_{IH}			2.0	1.50	−	−	1.50	−	V
				3.0~5.5	V_{CC} × 0.7	−	−	V_{CC} × 0.7	−	
Low - Level Input Voltage	V_{IL}			2.0	−	−	0.50	−	0.50	V
				3.0~5.5	−	−	V_{CC} × 0.3	−	V_{CC} × 0.3	
High - Level Output Voltage	V_{OH}	V_{IN} = V_{IH} or V_{IL}	I_{OH} = −50μA	2.0	1.9	2.0	−	1.9	−	V
				3.0	2.9	3.0	−	2.9	−	
				4.5	4.4	4.5	−	4.4	−	
			I_{OH} = −4mA	3.0	2.58	−	−	2.48	−	
			I_{OH} = −8mA	4.5	3.94	−	−	3.80	−	
Low - Level Output Voltage	V_{OL}	V_{IN} = V_{IH} or V_{IL}	I_{OL} = 50μA	2.0	−	0.0	0.1	−	0.1	V
				3.0	−	0.0	0.1	−	0.1	
				4.5	−	0.0	0.1	−	0.1	
			I_{OL} = 4mA	3.0	−	−	0.36	−	0.44	
			I_{OL} = 8mA	4.5	−	−	0.36	−	0.44	
Input Leakage Current	I_{IN}	V_{IN} = 5.5V or GND		0~5.5	−	−	±0.1	−	±1.0	μA
Quiescent Supply Current	I_{CC}	V_{IN} = V_{CC} or GND		5.5	−	−	4.0	−	40.0	

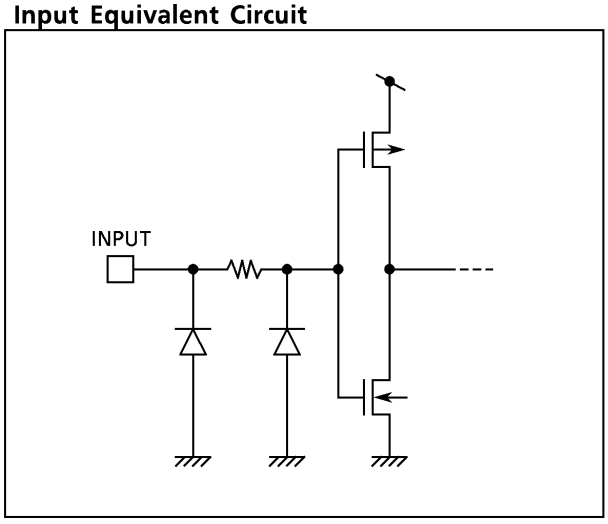
AC Electrical Characteristics (Input $t_r = t_f = 3ns$)

PARAMETER	SYMBOL	TEST CONDITION			Ta = 25°C			Ta = −40~85°C		UNIT
			V_{CC} (V)	CL (pF)	Min	Typ.	Max	Min	Max	
Propagation Delay Time (Cn−Y)	t_{pLH} t_{pHL}		3.3 ± 0.3	15	−	7.7	11.9	1.0	14.0	ns
				50	−	10.2	15.4	1.0	17.5	
			5.0 ± 0.5	15	−	5.0	7.7	1.0	9.0	
				50	−	6.5	9.7	1.0	11.0	
Propagation Delay Time (A,B−Y)	t_{pLH} t_{pHL}		3.3 ± 0.3	15	−	10.8	16.7	1.0	19.5	
				50	−	13.3	20.2	1.0	23.0	
			5.0 ± 0.5	15	−	6.8	9.9	1.0	11.5	
				50	−	8.3	11.9	1.0	13.5	
Propagation Delay Time ($\overline{G}$−Y)	t_{pLH} t_{pHL}		3.3 ± 0.3	15	−	6.3	10.1	1.0	12.0	
				50	−	8.8	13.6	1.0	15.5	
			5.0 ± 0.5	15	−	4.4	6.4	1.0	7.5	
				50	−	5.9	8.4	1.0	9.5	
Input Capacitance	C_{IN}				−	4	10	−	10	pF
Power Dissipation Capacitance	C_{PD}	(Note 1)			−	20	−	−	−	

(Note 1): 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:

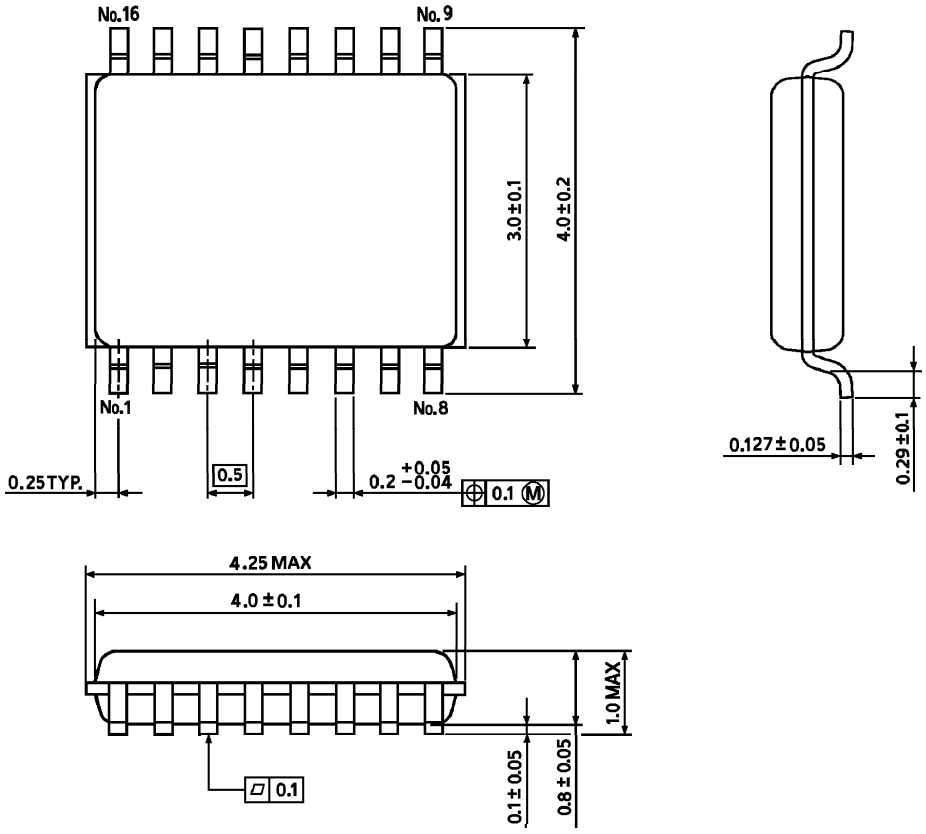
$$I_{CC(opr.)} = C_{PD} \cdot V_{CC} \cdot f_{IN} + I_{CC}$$

Input Equivalent Circuit



Outline Drawing

VSSOP16-P-0030-0.50 Unit: mm



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