

TC7MH257FK

Quad 2-Channel Multiplexer (3-State)

The TC7MH257FK is an advanced high speed CMOS multiplexer fabricated with silicon gate C²MOS technology.

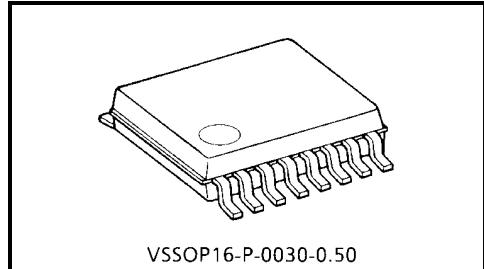
It achieves the high speed operation similar to equivalent bipolar schottky TTL while maintaining the CMOS low power dissipation.

It is composed of four independent 2-channel multiplexers with common SELECT and OUTPUTENABLE (OE).

If OE is set low, the outputs are held in a high-impedance state. When SELECT is set low, "A" data inputs are enabled.

Conversely, when SELECT is high, "B" data inputs are enabled.

An input protection circuit ensures that 0 to 7 V can be applied to the input pins without regard to the supply voltage. This device can be used to interface 5 V to 3 V systems and two supply systems such as battery back up. This circuit prevents device destruction due to mismatched supply and input voltages.



VSSOP16-P-0030-0.50

Weight: 0.02 g (typ.)

Features

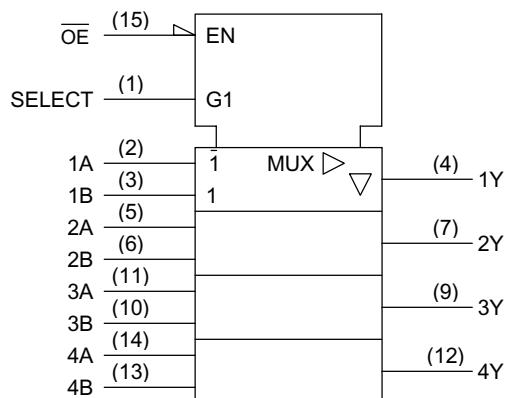
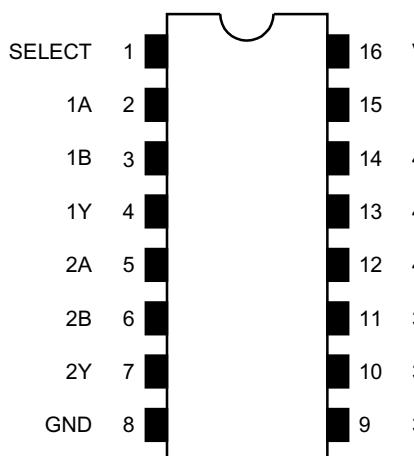
- High speed: $t_{pd} = 3.6$ ns (typ.) ($V_{CC} = 5$ V)
- Low power dissipation: $I_{CC} = 4 \mu A$ (max) ($T_a = 25^\circ C$)
- High noise immunity: $V_{NIH} = V_{NIL} = 28\%$ V_{CC} (min)
- Power down protection is provided on all inputs.
- Balanced propagation delays: $t_{PLH} \approx t_{PHL}$
- Wide operating voltage range: V_{CC} (opr) = 2~5.5 V
- Low noise: $V_{OLP} = 0.8$ V (max)
- Pin and function compatible with 74ALS257

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Pin Assignment (top view)

IEC Logic Symbol



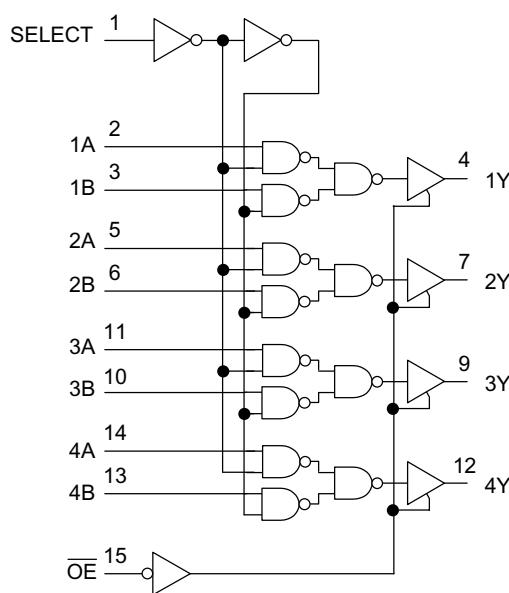
Truth Table

Inputs				Outputs
OE	Select	A	B	
H	X	X	X	Z
L	L	L	X	L
L	L	H	X	H
L	H	X	L	L
L	H	X	H	H

X: Don't care

Z: High impedance

System Diagram



Maximum Ratings

Characteristics	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~ 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

Characteristics	Symbol	Rating	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 ($V_{CC} = 3.3 \pm 0.3$ V) 0~20 ($V_{CC} = 5 \pm 0.5$ V)	ns/V

Electrical Characteristics

DC Characteristics

Characteristics		Symbol	Test Condition	V _{CC} (V)	Ta = 25°C			Ta = -40~85°C		Unit	
					Min	Typ.	Max	Min	Max		
Input voltage	High level	V _{IH}	—	2.0	1.50	—	—	1.50	—	V	
				3.0~5.5	V _{CC} × 0.7	—	—	V _{CC} × 0.7	—		
	Low level	V _{IL}	—	2.0	—	—	0.50	—	0.50		
				3.0~5.5	—	—	V _{CC} × 0.3	—	V _{CC} × 0.3		
Output voltage	High level	V _{OH}	V _{IN} = V _{IH} or V _{IL}	I _{OH} = -50 μA	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} = -4 mA	3.0	2.58	—	—	2.48		
	Low level	V _{OL}	V _{IN} = V _{IH} or V _{IL}	I _{OL} = 50 μA	4.5	3.94	—	—	3.80	V	
					2.0	—	0	0.1	—		
					3.0	—	0	0.1	—		
					4.5	—	0	0.1	—		
				I _{OL} = 4 mA	3.0	—	—	0.36	—		
				I _{OL} = 8 mA	4.5	—	—	0.36	—		
3-state output off-state current	I _{OZ}	V _{IN} = V _{IH} or V _{IL} V _{OUT} = V _{CC} or GND		5.5	—	—	±0.25	—	±2.50	μA	
Input leakage current	I _{IN}	V _{IN} = 5.5 V 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	μA	

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

Characteristics	Symbol	Test Condition	Ta = 25°C			Ta = -40~85°C		Unit
			V _{CC} (V)	C _L (pF)	Min	Typ.	Max	
Propagation delay time (A, B-Y)	t _{pLH} t _{pHL}	—	3.3 ± 0.3	15	—	5.8	9.3	1.0 11.0
				50	—	8.3	12.8	1.0 14.5
			5.0 ± 0.5	15	—	3.6	5.9	1.0 7.0
				50	—	5.1	7.9	1.0 9.0
	t _{pLH} t _{pHL}	—	3.3 ± 0.3	15	—	7.0	11.0	1.0 13.0
				50	—	9.5	14.5	1.0 16.5
			5.0 ± 0.5	15	—	4.0	6.8	1.0 8.0
				50	—	5.5	8.8	1.0 10.0
3-state output enable time	t _{pZL} t _{pZH}	R _L = 1 kΩ	3.3 ± 0.3	15	—	6.7	10.5	1.0 12.5
				50	—	9.2	14.0	1.0 16.0
			5.0 ± 0.5	15	—	3.6	6.8	1.0 8.0
				50	—	5.1	8.8	1.0 10.0
3-state output disable time	t _{pLZ} t _{pHZ}	R _L = 1 kΩ	3.3 ± 0.3	50	—	8.6	12.0	1.0 13.5
			5.0 ± 0.5	50	—	5.7	7.9	1.0 9.0
Input capacitance	C _{IN}	—	—	—	4	10	—	10 pF
Output capacitance	C _{OUT}	—	—	—	6	—	—	— pF
Power dissipation capacitance	C _{PD}	(Note)	—	—	23	—	—	— pF

Note: C_{PD} is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption without load.

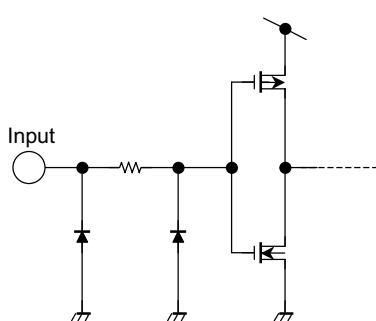
Average operating current can be obtained by the equation:

$$I_{CC} (\text{opr}) = C_{PD} \cdot V_{CC} \cdot f_{IN} + I_{CC}/4 \text{ (per bit)}$$

Noise Characteristics (Input: $t_r = t_f = 3$ ns)

Characteristics	Symbol	Test Condition	Ta = 25°C			Unit
			V _{CC} (V)	Typ.	Limit	
Quiet output maximum dynamic V _{OL}	V _{O LP}	C _L = 50 pF	5.0	0.3	0.8	V
Quiet output minimum dynamic V _{OL}	V _{O LV}	C _L = 50 pF	5.0	-0.3	-0.8	V
Minimum high level dynamic input voltage V _{IHD}	V _{I HD}	C _L = 50 pF	5.0	—	3.5	V
Maximum low level dynamic input voltage V _{ILD}	V _{I LD}	C _L = 50 pF	5.0	—	1.5	V

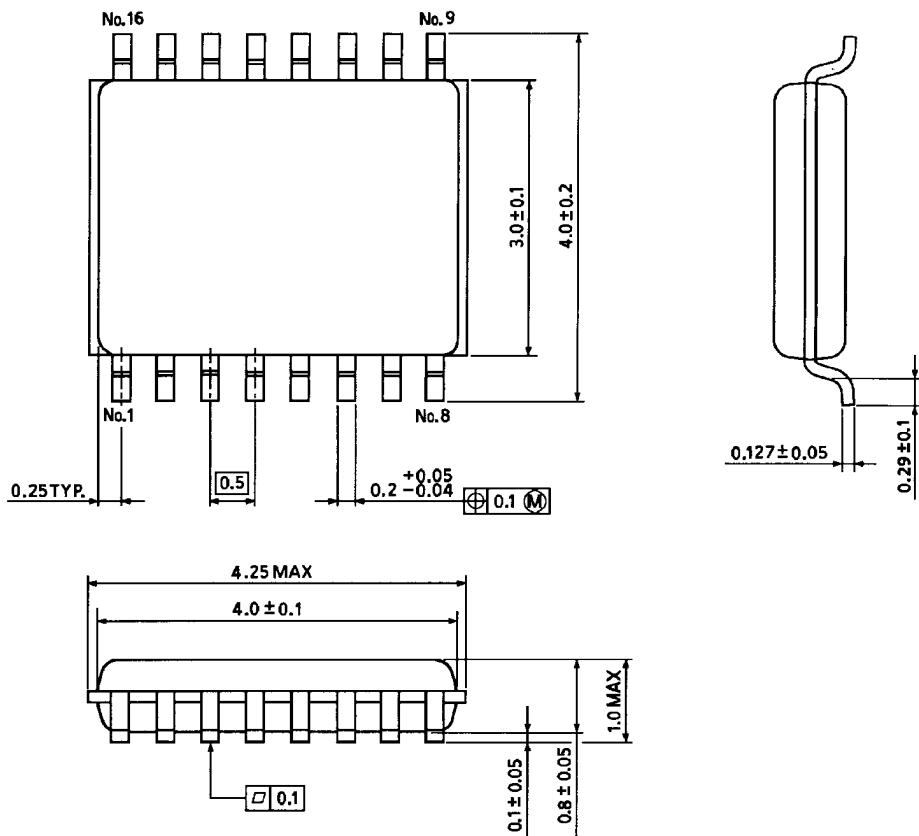
Input Equivalent Circuit



Package Dimensions

VSSOP16-P-0030-0.50

Unit : mm



Weight: 0.02 g (typ.)