

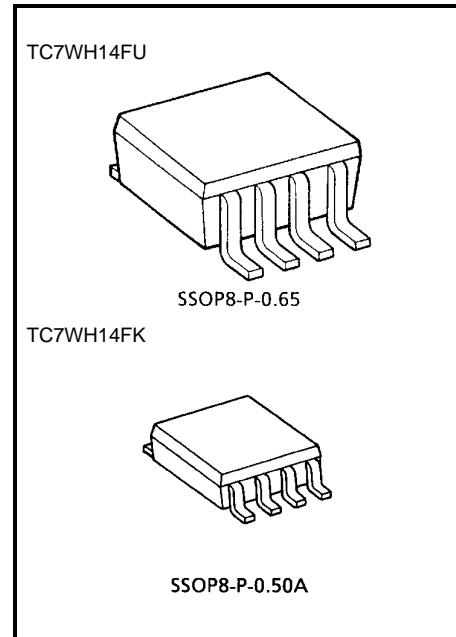
TC7WH14FU, TC7WH14FK

Triple Schmitt Inverter

The TC7WH14 is an advanced high speed CMOS Schmitt Inverter fabricated with silicon gate CMOS technology. It achieves the high speed operation similar to equivalent Bipolar Schottky TTL while maintaining the CMOS low power dissipation. Pin configuration and function are the same as the TC7SH14 but the inputs have hysteresis and with its schmitt trigger function, the TC7WH14 can be used as a line receivers which will receive slow input signals. 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.

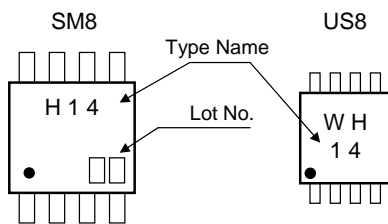
Features

- High speed: $t_{pd} = 5.5 \text{ ns (typ.)}$ at $V_{CC} = 5 \text{ V}$
- Low power dissipation: $I_{CC} = 2 \mu\text{A (max)}$ at $T_a = 25^\circ\text{C}$
- High noise immunity: $V_{NIH} = V_{NIL} = 28\% V_{CC} \text{ (min)}$
- 5.5-V Tolerant inputs.
- Balanced propagation delays: $t_{pLH} \approx t_{pHL}$
- Wide operating voltage range: $V_{CC} \text{ (opr)} = 2\sim 5.5 \text{ V}$

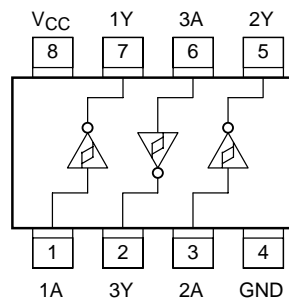


Weight
 SSOP8-P-0.65: 0.02 g (typ.)
 SSOP8-P-0.50A: 0.01 g (typ.)

Marking



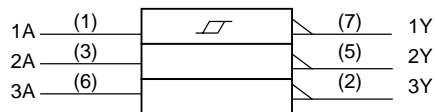
Pin Assignment (top view)



Maximum Ratings (Ta = 25°C)

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	300 (SM8)	mW
		200 (US8)	
Storage temperature	T_{stg}	-65~150	°C
Lead temperature (10 s)	T_L	260	°C

IEC Logic Symbol



Truth Table

A	Y
L	H
H	L

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

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	Positive threshold voltage	V _P	—	3.0	—	—	2.20	—	2.20	V	
				4.5	—	—	3.15	—	3.15		
				5.5	—	—	3.85	—	3.85		
	Negative threshold voltage	V _N	—	3.0	0.90	—	—	0.90	—		
				4.5	1.35	—	—	1.35	—		
				5.5	1.65	—	—	1.65	—		
Hysteresis voltage		V _H	—	3.0	0.30	—	1.20	0.30	1.20	V	
				4.5	0.40	—	1.40	0.40	1.40		
				5.5	0.50	—	1.60	0.50	1.60		
Output voltage	High level	V _{OH}	V _{IN} = 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	—	
	I _{OH} = -8 mA	4.5	3.94	—	—	3.80	—				
	Low level	V _{OL}	V _{IN} = V _{IH}	I _{OL} = 50 μA	2.0	—	0	0.1	—	0.1	
					3.0	—	0	0.1	—	0.1	
				4.5	—	0	0.1	—	0.1		
				I _{OL} = 4 mA	3.0	—	—	0.36	—	0.44	
				I _{OL} = 8 mA	4.5	—	—	0.36	—	0.44	
Input leakage current				I _{IN}	V _{IN} = 5.5 V or GND	0~5.5	—	—	±0.1	—	±1.0
Quiescent supply current	I _{CC}	V _{IN} = V _{CC} or GND	5.5	—	—	2.0	—	20.0	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	Min	Max		
Propagation delay time	t _{pLH} t _{pHL}	—	3.3 ± 0.3	15	—	8.3	12.8	1.0	15.0	ns
				50	—	10.8	16.3	1.0	18.5	
			5.0 ± 0.5	15	—	5.5	8.6	1.0	10.0	
				50	—	7.0	10.6	1.0	12.0	
Input capacitance	C _{IN}	—		—	4	10	—	10	—	
Power dissipation capacitance	C _{PD}	(Note)		—	21	—	—	—	—	

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

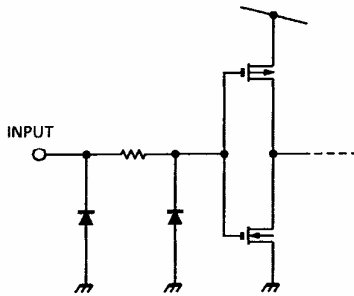
Average operating current can be obtained by the equation:

$$I_{CC(opr)} = C_{PD} \cdot V_{CC} \cdot f_{IN} + I_{CC}/3$$

Noise Characteristics (Ta = 25°C, input: $t_r = t_f = 3$ ns)

Characteristics	Symbol	Test Condition	V _{CC} (V)	Typ.	Limit	Unit
Quiet output maximum dynamic V _{OL}	V _{OLP}	C _L = 50 pF	5.0	0.3	0.8	V
Quiet output minimum dynamic V _{OL}	V _{OLV}	C _L = 50 pF	5.0	-0.3	-0.8	V
Minimum high level dynamic input voltage	V _{IHD}	C _L = 50 pF	5.0	—	3.5	V
Maximum low level dynamic input voltage	V _{ILD}	C _L = 50 pF	5.0	—	1.5	V

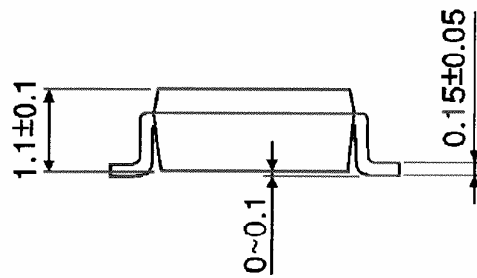
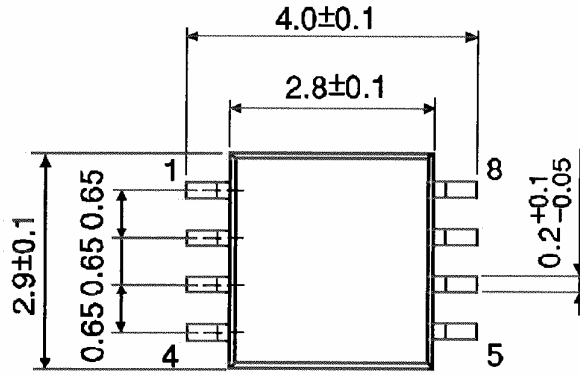
Input Equivalent Circuit



Package Dimensions

SSOP8-P-0.65

Unit : mm

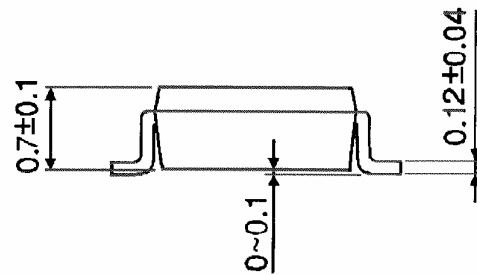
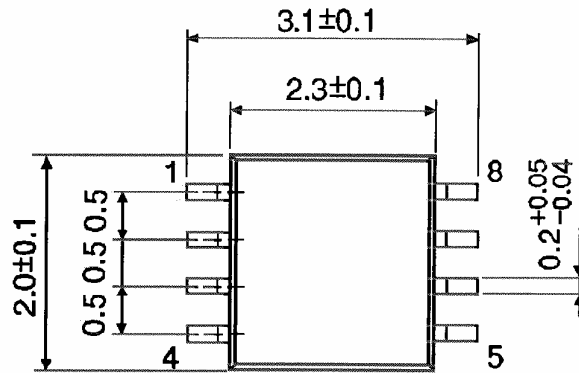


Weight: 0.02 g (typ.)

Package Dimensions

SSOP8-P-0.50A

Unit : mm



Weight: 0.01 g (typ.)

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