

TC7W14F, TC7W14FU

SCHMITT INVERTER

The TC7W14 is high speed C²MOS SCHMITT INVERTER fabricated with silicon gate C²MOS technology. It achieves the high speed operation similar to equivalent LSTTL while maintaining the C²MOS low power dissipation.

Pin configuration and function are the same as the TC7WU04 but the inputs have 25% V_{CC} hysteresis and with its schmitt trigger function, the TC7W14 can be used as a line receivers which will receive slow input signals.

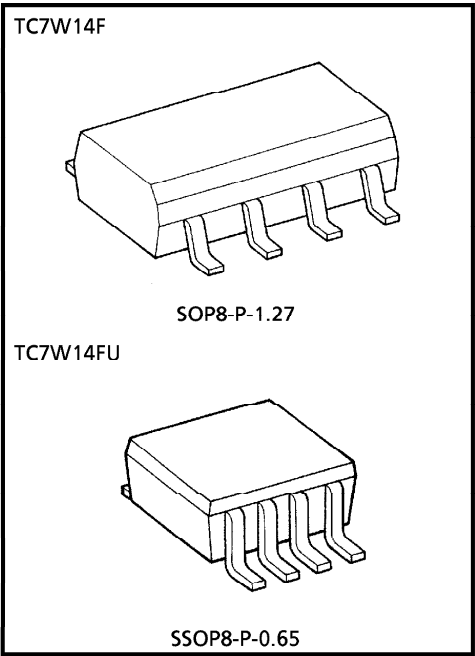
All inputs are equipped with protection circuits against static discharge or transient excess voltage.

FEATURES

- High Speed t_{pd} = 11ns (Typ.) at V_{CC} = 5V
- Low Power Dissipation I_{CC} = 1μA (Max.) at Ta = 25°C
- High Noise Immunity V_H = 1.1V at V_{CC} = 5V
- Output Drive Capability 10 LSTTL Loads
- Symmetrical Output Impedance ... |O_H| = I_OL = 4mA
- Balanced Propagation Delays t_{pLH} ≐ t_{pHL}
- Wide Operating Voltage Range ... V_{CC} (opr) = 2~6V

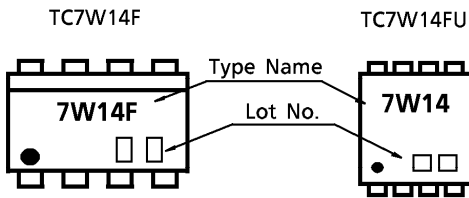
MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	RATING	UNIT
Supply Voltage Range	V _{CC}	- 0.5~7	V
DC Input Voltage	V _{IN}	- 0.5~V _{CC} + 0.5	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}	± 25	mA
Power Dissipation	P _D	300	mW
Storage Temperature	T _{stg}	- 65~150	°C
Lead Temperature (10s)	T _L	260	°C



Weight SOP8-P-1.27 : 0.05g (Typ.)
SSOP8-P-0.65 : 0.02g (Typ.)

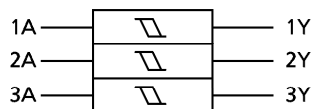
MARKING



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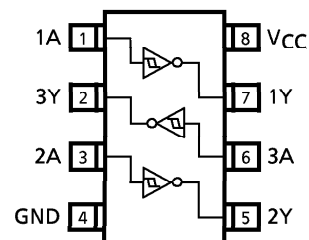
LOGIC DIAGRAM



TRUTH TABLE

A	Y
L	H
H	L

PIN ASSIGNMENT (TOP VIEW)



RECOMMENDED OPERATING CONDITIONS

CHARACTERISTIC	SYMBOL	RATING	UNIT
Supply Voltage	V_{CC}	2~6	V
Input Voltage	V_{IN}	0~ V_{CC}	V
Output Voltage	V_{OUT}	0~ V_{CC}	V
Operating Temperature	T_{opr}	-40~85	°C

DC ELECTRICAL CHARACTERISTICS

CHARACTERISTIC	SYMBOL	TEST CONDITION	$T_a = 25^{\circ}\text{C}$				$T_a = -40 \sim 85^{\circ}\text{C}$		UNIT
			V_{CC}	MIN.	TYP.	MAX.	MIN.	MAX.	
Positive Threshold Voltage	V_p	—	2.0	1.0	1.25	1.5	1.0	1.5	V
			4.5	2.3	2.7	3.15	2.3	3.15	
			6.0	3.0	3.5	4.2	3.0	4.2	
Negative Threshold Voltage	V_N	—	2.0	0.3	0.65	0.9	0.3	0.9	V
			4.5	1.13	1.6	2.0	1.13	2.0	
			6.0	1.5	2.3	2.6	1.5	2.6	
Hysteresis Voltage	V_H	—	2.0	0.3	0.6	1.0	0.3	1.0	V
			4.5	0.6	1.1	1.4	0.6	1.4	
			6.0	0.8	1.2	1.7	0.8	1.7	
High-Level Output Voltage	V_{OH}	$V_{IN} = V_{IL}$	$I_{OH} = -20\mu\text{A}$	2.0	1.9	2.0	—	1.9	V
				4.5	4.4	4.5	—	4.4	
			$I_{OH} = -4\text{mA}$ $I_{OH} = -5.2\text{mA}$	6.0	5.9	6.0	—	5.9	
				4.5	4.18	4.31	—	4.13	
Low-Level Output Voltage	V_{OL}	$V_{IN} = V_{IH}$	$I_{OL} = 20\mu\text{A}$	2.0	—	0.0	0.1	—	V
				4.5	—	0.0	0.1	—	
			$I_{OL} = 4\text{mA}$ $I_{OL} = 5.2\text{mA}$	6.0	—	0.0	0.1	—	
				4.5	—	0.17	0.26	—	
Input Leakage Current	I_{IN}	$V_{IN} = V_{CC}$ or GND	6.0	—	—	± 0.1	—	± 1.0	μA
Quiescent Supply Current	I_{CC}	$V_{IN} = V_{CC}$ or GND	6.0	—	—	1.0	—	10.0	

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AC ELECTRICAL CHARACTERISTICS ($C_L = 15\text{pF}$, $V_{CC} = 5\text{V}$, $T_a = 25^\circ\text{C}$)

CHARACTERISTIC	SYMBOL	TEST CONDITION	$T_a = 25^\circ\text{C}$			UNIT
			MIN.	TYP.	MAX.	
Output Transition Time	t_{TLH} t_{THL}	—	—	4	8	ns
Propagation Delay Time	t_{pLH} t_{pHL}	—	—	11	21	ns

AC ELECTRICAL CHARACTERISTICS ($C_L = 50\text{pF}$, Input $t_r = t_f = 6\text{ns}$)

CHARACTERISTIC	SYMBOL	TEST CONDITION	Ta = 25°C				Ta = - 40~85°C		UNIT
			VCC	MIN.	TYP.	MAX.	MIN.	MAX.	
Output Transition Time	tTLH tTHL	—	2.0	—	30	75	—	95	ns
			4.5	—	8	15	—	19	
			6.0	—	7	13	—	16	
Propagation Delay Time	tPLH tPHL	—	2.0	—	42	125	—	155	ns
			4.5	—	14	25	—	31	
			6.0	—	12	21	—	26	
Input Capacitance	CIN	—	—	5	10	—	10	pF	
Power Dissipation Capacitance	CPD	(Note 1)	—	28	—	—	—		

Note 1 : C_{PD} is defined as the value of internal equivalent capacitance of IC which is calculated from the operating current consumption without load (refer to Test Circuit).

Average operating current can be obtained by the equation hereunder.

$$I_{CC}(\text{opr}) = C_{PD} \cdot V_{CC} \cdot f_{IN} + I_{CC} / 2 \text{ (per gate)}$$