TC74LVQ14F/FN/FS

HEX SCHMITT INVERTER

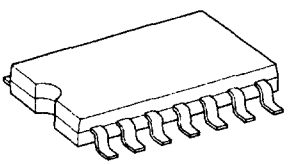
The TC74LVQ14 is a high speed CMOS SCHMITT INVERTER fabricated with silicon gate and double-layer metal wiring C^2MOS technology.

Designed for use in 3.3 Volt systems, it achieves high speed operation while maintaining the CMOS low power dissipation.

Pin configuration and function are the same as the TC74LVQ04 but the inputs have hysteresis and with its schmitt trigger function, the TC74LVQ14 can be used as a line receivers which will receive slow input signals.

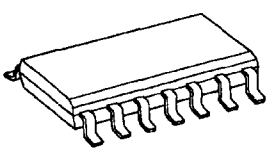
All inputs are equipped with protection circuits against static discharge or transient excess voltage.

TC74LVQ14F



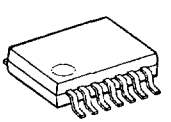
SOP14-P-300

TC74LVQ14FN



SOL14-P-150

TC74LVQ14FS



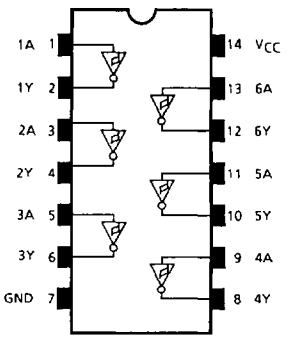
SSOP14-P-225

Weight SOP14-P-300 : 0.18g (Typ.)
SOL14-P-150 : 0.12g (Typ.)
SSOP14-P-225 : 0.07g (Typ.)

FEATURES

- High speed : $t_{pd} = 6.1ns$ (Typ.) ($V_{CC} = 3.3V$)
- Low power dissipation : $I_{CC} = 2.5\mu A$ (Max.) ($Ta = 25°C$)
- Symmetrical output impedance
  : $|I_{OH}| = I_{OL} = 12mA$ (Min.)
- Balanced propagation delays
  : $t_{pLH} \simeq t_{pHL}$
- Pin and function compatible with 74HC14

PIN ASSIGNMENT

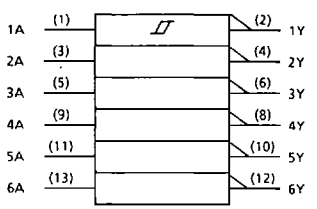


(TOP VIEW)

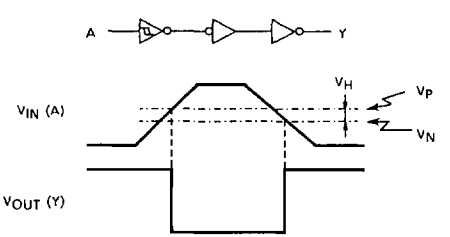
TRUTH TABLE

INPUTS	OUTPUTS
A	Y
L	H
H	L

IEC LOGIC SYMBOL



SYSTEM DIAGRAM, WAVEFORM



MAXIMUM RATINGS

PARAMETER	SYMBOL	RATING	UNIT
Supply Voltage Range	V_{CC}	−0.5~7.0	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}	±50	mA
DC Output Current	I_{OUT}	±50	mA
DC V_{CC} / Ground Current	I_{CC}	±150	mA
Power Dissipation	P_D	180	mW
Storage Temperature	T_{stg}	−65~150	°C
Lead Temperature 10s	T_L	300	°C

RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	RATING	UNIT
Supply Voltage	V_{CC}	2.0~3.6	V
Input Voltage	V_{IN}	0~V_{CC}	V
Output Voltage	V_{OUT}	0~V_{CC}	V
Operating Temperature	T_{opr}	−40~85	°C

ELECTRICAL CHARACTERISTICS

DC characteristics

PARAMETER		SYMBOL	TEST CONDITION		V_{CC} (V)	Ta = 25°C			Ta = −40~85°C		UNIT
						MIN.	TYP.	MAX.	MIN.	MAX.	
Threshold Voltage	"H" Level	V_P			3.0	—	—	2.2	—	2.2	V
	"L" Level	V_N			3.0	0.9	—	—	0.9	—	
Hysteresis Voltage		V_H			3.0	0.3	—	1.2	0.3	1.2	V
Output Voltage	"H" Level	V_{OH}	V_{IN} = V_{IL}	I_{OH} = −50μA	3.0	2.9	3.0	—	2.9	—	V
				I_{OH} = −12mA	3.0	2.58	—	—	2.48	—	
	"L" Level	V_{OL}	V_{IN} = V_{IH}	I_{OL} = 50μA	3.0	—	0.0	0.1	—	0.1	
				I_{OL} = 12mA	3.0	—	—	0.36	—	0.44	
Input Leakage Current		I_{IN}	V_{IN} = V_{CC} or GND		3.6	—	—	±0.1	—	±1.0	μA
Quiescent Supply Current		I_{CC}	V_{IN} = V_{CC} or GND		3.6	—	—	2.5	—	25.0	μA

AC characteristics (Input $t_r = t_f = 3ns$, $C_L = 50pF$, $R_L = 500\Omega$)

PARAMETER	SYMBOL	TEST CONDITION		Ta = 25°C			Ta = −40~85°C		UNIT
			V_{CC} (V)	MIN.	TYP.	MAX.	MIN.	MAX.	
Propagation Delay Time	t_{pLH} t_{pHL}		2.7	—	8.4	19.0	1.0	22.0	ns
			3.3 ± 0.3	—	7.0	13.5	1.0	15.0	
Output To Output Skew	t_{osLH} t_{osHL}	(Note 1)	2.7	—	—	1.5	—	1.5	ns
			3.3 ± 0.3	—	—	1.5	—	1.5	
Input Capacitance	C_{IN}	(Note 2)		—	5	10	—	10	pF
Power Dissipation Capacitance	C_{PD}	(Note 3)		—	29	—	—	—	pF

(Note 1) Parameter guaranteed by design.
($t_{osLH} = |t_{pLHm} - t_{pLHn}|$, $t_{osHL} = |t_{pHLm} - t_{pHLn}|$)

(Note 2) Parameter guaranteed by design.

(Note 3) C_{PD} is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption.
Average operating current can be obtained by the equation :
$I_{CC (opr.)} = C_{PD} \cdot V_{CC} \cdot f_{IN} + I_{CC} / 6$ (per gate)

Noise characteristics (Ta = 25°C, Input $t_r = t_f = 3ns$, $C_L = 50pF$, $R_L = 500\Omega$)

PARAMETER	SYMBOL	TEST CONDITION	V_{CC} (V)	TYP.	LIMIT	UNIT
Quiet Output Maximum Dynamic V_{OL}	V_{OLP}		3.3	0.5	0.8	V
Quiet Output Minimum Dynamic V_{OL}	V_{OLV}		3.3	−0.5	−0.8	V
Minimum High Level Dynamic Input Voltage	V_{IHD}		3.3	—	2.2	V
Maximum Low Level Dynamic Input Voltage	V_{ILD}		3.3	—	0.9	V