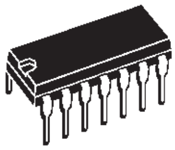
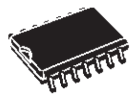
74AC14

HEX INVERTER

- HIGH SPEED: t_{PD} = 6 ns (TYP.) at V_{CC} = 3.3V
- LOW POWER DISSIPATION: I_{CC} = 4 μA (MAX.) at T_A = 25 ^oC
- HIGH NOISE IMMUNITY: V_{NIH} = V_{NIL} = 28% V_{CC} (MIN.)
- 50Ω TRANSMISSION LINE DRIVING CAPABILITY
- SYMMETRICAL OUTPUT IMPEDANCE: $|I_{OH}|$ = I_{OL} = 24 mA (MIN)
- BALANCED PROPAGATION DELAYS: $t_{PLH} \cong t_{PHL}$
- OPERATING VOLTAGE RANGE: V_{CC} (OPR) = 2V to 6V
- PIN AND FUNCTION COMPATIBLE WITH 74 SERIES 14
- IMPROVED LATCH-UP IMMUNITY



B
(Plastic Package)



M
(Micro Package)

ORDER CODES :

74AC14B   74AC14M

DESCRIPTION

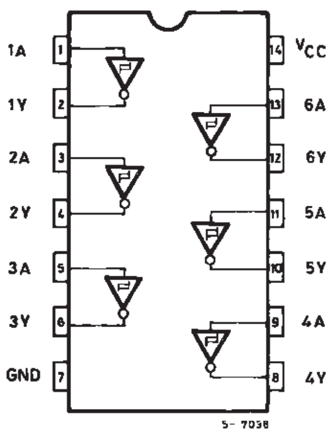
The AC14 is an advanced high-speed CMOS HEX INVERTER fabricated with sub-micron silicon gate and double-layer metal wiring C^2MOS technology. It is ideal for low power applications mantaining high speed operation similar to equivalent Bipolar Shottky TTL.

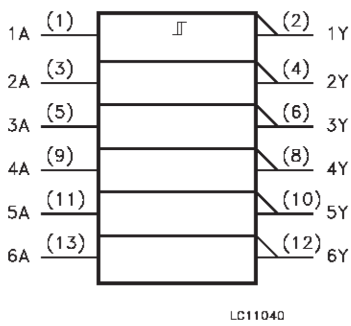
The internal circuit is composed of 3 stages including buffer output, which enables high noise immunity and stable output.

This together with its schmitt trigger function allows it to be used on line receivers with slow rise/fall input segnals.

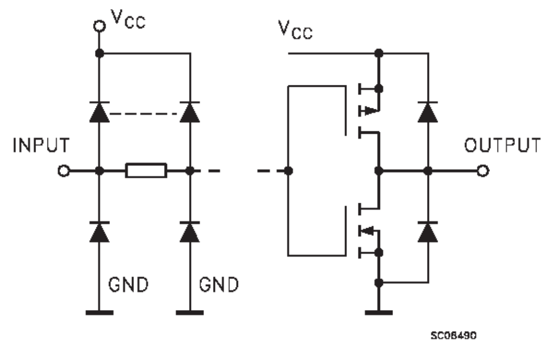
All inputs and outputs are equipped with protection circuits against static discharge, giving them 2KV ESD immunity and transient excess voltage.

PIN CONNECTION AND IEC LOGIC SYMBOLS





INPUT AND OUTPUT EQUIVALENT CIRCUIT



PIN DESCRIPTION

PIN No	SYMBOL	NAME AND FUNCTION
1, 3, 5, 9, 11, 13	1A to 6A	Data Inputs
2, 4, 6, 8, 10, 12	1Y to 6Y	Data Oututs
7	GND	Ground (0V)
14	V_{CC}	Positive Supply Voltage

TRUTH TABLE

A	Y
L	H
H	L

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{CC}	Supply Voltage	-0.5 to +7	V
V_I	DC Input Voltage	-0.5 to V_{CC} + 0.5	V
V_O	DC Output Voltage	-0.5 to V_{CC} + 0.5	V
I_{IK}	DC Input Diode Current	± 20	mA
I_{OK}	DC Output Diode Current	± 20	mA
I_O	DC Output Current	± 50	mA
I_{CC} or I_{GND}	DC V_{CC} or Ground Current	± 300	mA
T_{stg}	Storage Temperature	-65 to +150	^oC
T_L	Lead Temperature (10 sec)	300	^oC

Absolute Maximum Ratings are those values beyond which damage to the device may occur. Functional operation under these condition is not implied.

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Value	Unit
V_{CC}	Supply Voltage	2 to 6	V
V_I	Input Voltage	0 to V_{CC}	V
V_O	Output Voltage	0 to V_{CC}	V
T_{op}	Operating Temperature:	-40 to +85	^oC
dt/dv	Input Rise and Fall Time V_{CC} = 3.0, 4.5 or 5.5 V(note 1)	8	ns/V

1) V_{IN} from 30% to 70% of V_{CC}

DC SPECIFICATIONS

Symbol	Parameter	Test Conditions			Value					Unit
		V_{CC} (V)			T_A = 25 °C			-40 to 85 °C		
					Min.	Typ.	Max.	Min.	Max.	
V_{t+}	High Level Input Voltage	3.0	T_A = Worst Case		2.2			2.2		V
		4.5			3.2			3.2		
		5.5			3.9			3.9		
V_{t-}	Low Level Input Voltage	3.0	T_A = Worst Case				0.5		0.5	V
		4.5					0.9		0.9	
		5.5					1.1		1.1	
V_h	Hysteresis Voltage	3.0	T_A = Worst Case		0.3		1.2	0.3	1.2	V
		4.5			0.4		1.4	0.4	1.4	
		5.5			0.5		1.6	0.5	1.6	
V_{OH}	High Level Output Voltage	3.0	V_I(*) = V_{IH} or V_{IL}	I_O=-50 µA	2.9	2.99		2.9		V
		4.5		I_O=-50 µA	4.4	4.49		4.4		
		5.5		I_O=-50 µA	5.4	5.49		5.4		
		3.0		I_O=-12 mA	2.56			2.46		
		4.5		I_O=-24 mA	3.86			3.76		
		5.5		I_O=-24 mA	4.86			4.76		
V_{OL}	Low Level Output Voltage	3.0	V_I(*) = V_{IH} or V_{IL}	I_O=50 µA		0.002	0.1		0.1	V
		4.5		I_O=50 µA		0.001	0.1		0.1	
		5.5		I_O=50 µA		0.001	0.1		0.1	
		3.0		I_O=12 mA			0.36		0.44	
		4.5		I_O=24 mA			0.36		0.44	
		5.5		I_O=24 mA			0.36		0.44	
I_I	Input Leakage Current	5.5	V_I = V_{CC} or GND				±0.1		±1	µA
I_{CC}	Quiescent Supply Current	5.5	V_I = V_{CC} or GND				4		40	µA
I_{OLD}	Dynamic Output Current (note 1, 2)	5.5	V_{OLD} = 1.65 V max						75	mA
I_{OHD}			V_{OHD} = 3.85 V min						-75	mA

1) Maximum test duration 2ms, one output loaded at time
2) Incident wave switching is guaranteed on transmission lines with impedances as low as 50 Ω.

AC ELECTRICAL CHARACTERISTICS (C_L = 50 pF, R_L = 500 Ω, Input t_r = t_f =3 ns)

Symbol	Parameter	Test Condition		Value					Unit
		V_{CC} (V)		T_A = 25 °C			-40 to 85 °C		
				Min.	Typ.	Max.	Min.	Max.	
t_{PLH} t_{PHL}	Propagation Delay Time	3.3(*)		1.5	6	11	1	13	ns
		5.0(**)		1.5	4.5	8	1	9	

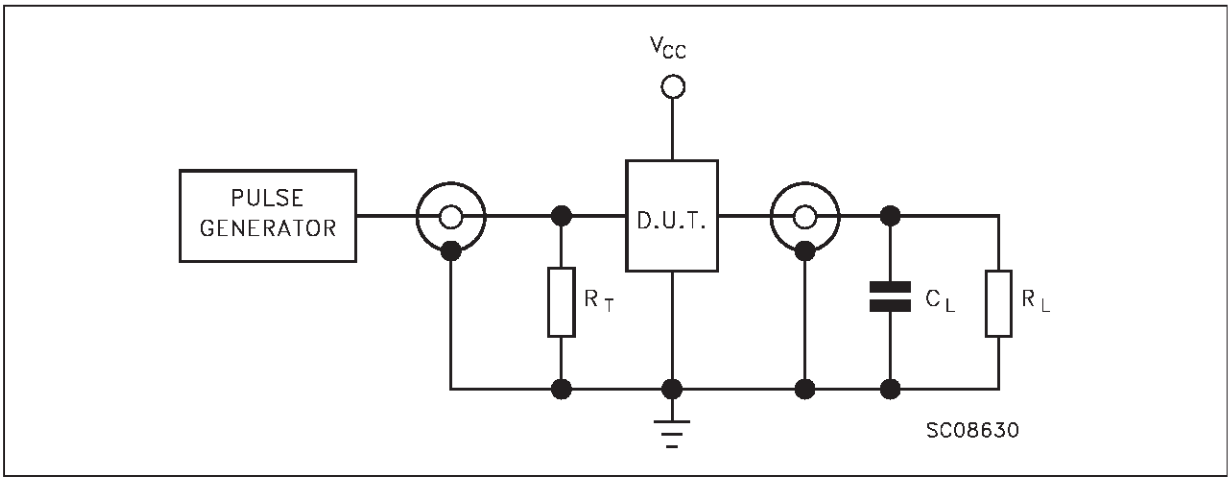
(*) Voltage range is 3.3V ± 0.3V
(**) Voltage range is 5V ± 0.5V

CAPACITIVE CHARACTERISTICS

Symbol	Parameter	Test Conditions		Value					Unit
		V_{CC} (V)		$T_A = 25\ ^oC$			-40 to 85 ^oC		
				Min.	Typ.	Max.	Min.	Max.	
C_{IN}	Input Capacitance	5.0			4				pF
C_{PD}	Power Dissipation Capacitance (note 1)	5.0			35				pF

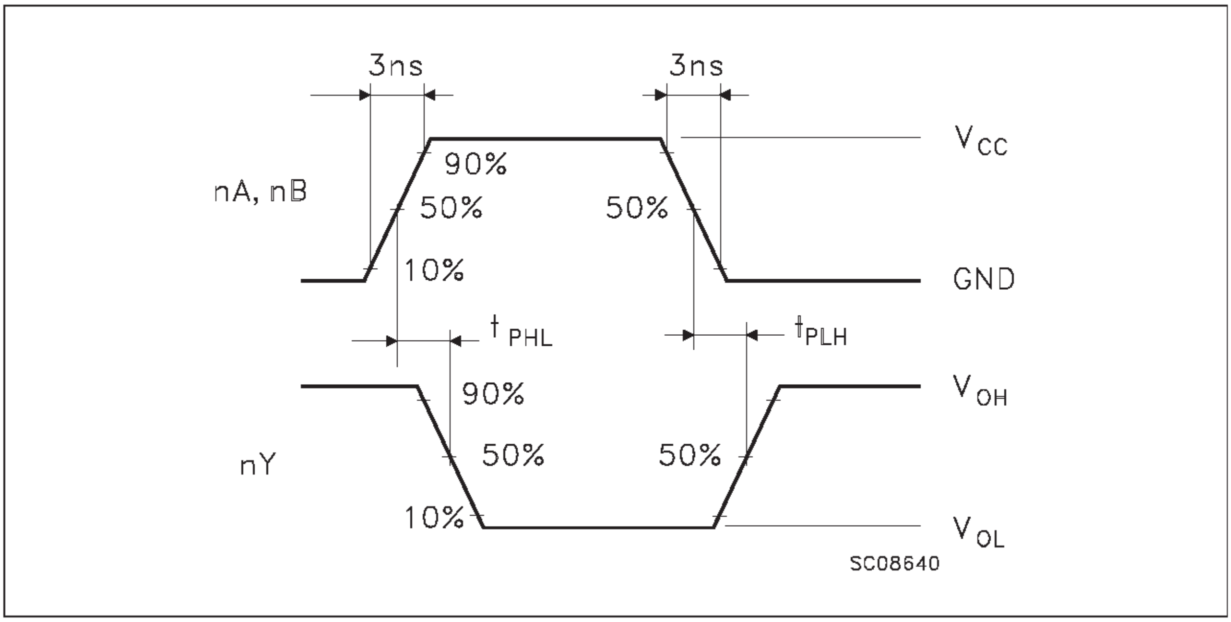
1) C_{PD} is defined as the value of the IC's internal equivalent capacitance which is calculated from the operating current consumption without load. (Refer to Test Circuit). Average operating current can be obtained by the following equation. $I_{CC}(opr) = C_{PD} \bullet V_{CC} \bullet f_{IN} + I_{CC}/n$ (per circuit)

TEST CIRCUIT



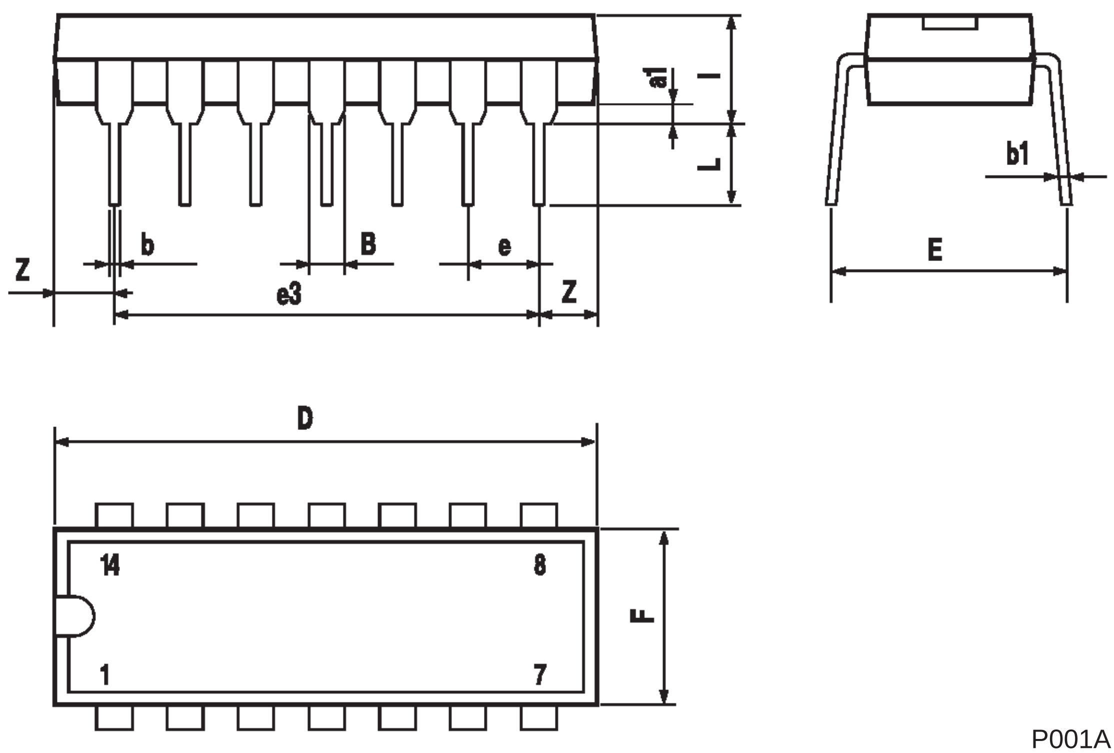
C_L = 50 pF or equivalent (includes jig and probe capacitance)
$R_L = R_1 = 500\Omega$ or equivalent
$R_T = Z_{OUT}$ of pulse generator (typically 50Ω)

WAVEFORM: PROPAGATION DELAYS (f=1MHz)



Plastic DIP-14 MECHANICAL DATA

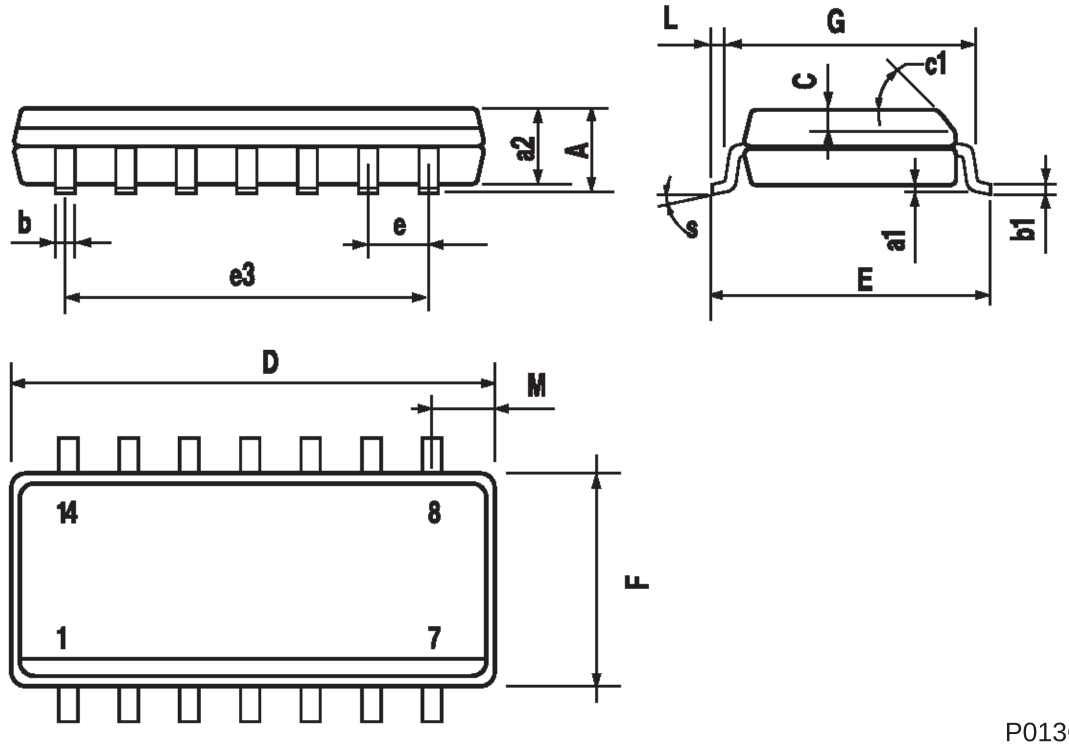
DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
a1	0.51			0.020		
B	1.39		1.65	0.055		0.065
b		0.5			0.020	
b1		0.25			0.010	
D			20			0.787
E		8.5			0.335	
e		2.54			0.100	
e3		15.24			0.600	
F			7.1			0.280
I			5.1			0.201
L		3.3			0.130	
Z	1.27		2.54	0.050		0.100



P001A

SO-14 MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A			1.75			0.068
a1	0.1		0.2	0.003		0.007
a2			1.65			0.064
b	0.35		0.46	0.013		0.018
b1	0.19		0.25	0.007		0.010
C		0.5			0.019	
c1	45 (typ.)					
D	8.55		8.75	0.336		0.344
E	5.8		6.2	0.228		0.244
e		1.27			0.050	
e3		7.62			0.300	
F	3.8		4.0	0.149		0.157
G	4.6		5.3	0.181		0.208
L	0.5		1.27	0.019		0.050
M			0.68			0.026
S	8 (max.)					



P013G

SGS-THOMSON Microelectronics GROUP OF COMPANIES
Australia - Brazil - Canada - China - France - Germany - Hong Kong - Italy - Japan - Korea - Malaysia - Malta - Morocco - The Netherlands - Singapore - Spain - Sweden - Switzerland - Taiwan - Thailand - United Kingdom - U.S.A