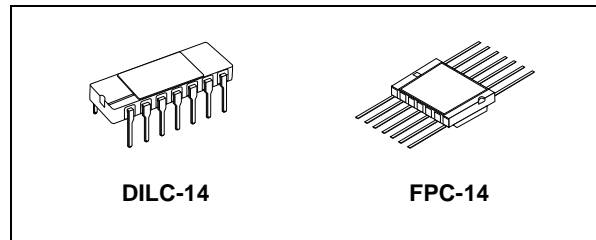


RAD-HARD HEX SCHMITT INVERTER

- HIGH SPEED:
 $t_{PD} = 12\text{ns}$ (TYP.) at $V_{CC} = 6\text{V}$
- LOW POWER DISSIPATION:
 $I_{CC} = 1\mu\text{A}$ (MAX.) at $T_A = 25^\circ\text{C}$
- HIGH NOISE IMMUNITY:
 $V_H = 1.2\text{V}$ (TYP.) AT $V_{CC} = 6\text{V}$
- SYMMETRICAL OUTPUT IMPEDANCE:
 $|I_{OH}| = I_{OL} = 4\text{mA}$ (MIN)
- BALANCED PROPAGATION DELAYS:
 $t_{PLH} \cong t_{PHL}$
- WIDE OPERATING VOLTAGE RANGE:
 V_{CC} (OPR) = 2V to 6V
- PIN AND FUNCTION COMPATIBLE WITH 54 SERIES 14
- SPACE GRADE-1: ESA SCC QUALIFIED
- 50 krad QUALIFIED, 100 krad AVAILABLE ON REQUEST
- NO SEL UNDER HIGH LET HEAVY IONS IRRADIATION
- DEVICE FULLY COMPLIANT WITH SCC-9409-007

DESCRIPTION

The M54HC14 is an high speed CMOS HEX SCHMITT INVERTER fabricated with silicon gate

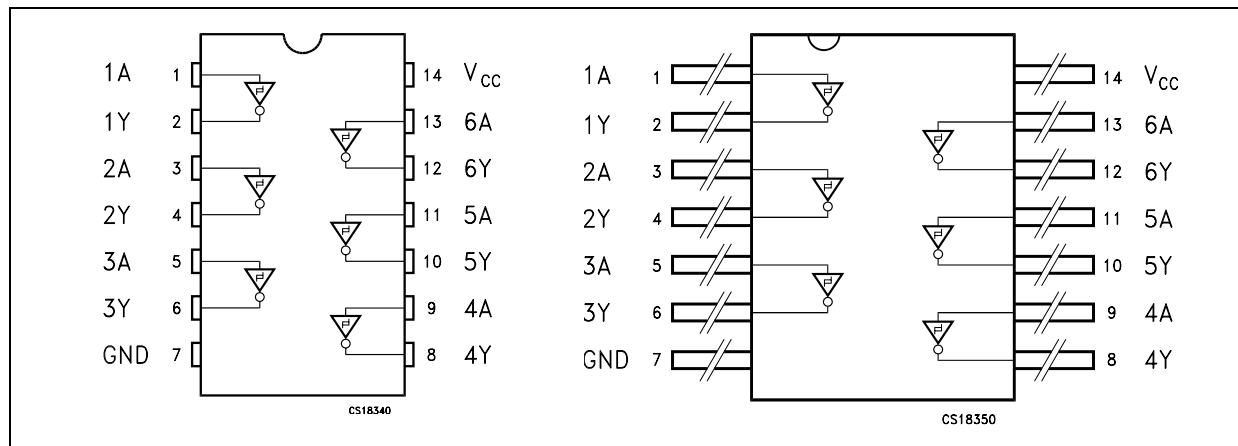


ORDER CODES

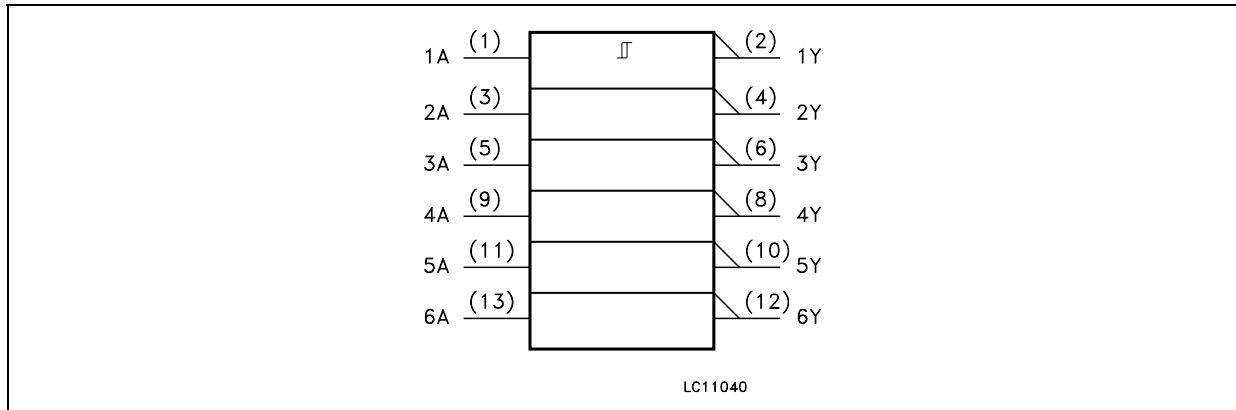
PACKAGE	FM	EM
DILC	M54HC14D	M54HC14D1
FPC	M54HC14K	M54HC14K1

C²MOS technology. Pin configuration and function are the same as those of the M54HC04 but all inputs have 20% V_{CC} hysteresis level. This, together with its schmitt trigger function, allows it to be used on line receivers with slow rise/fall input signals. All inputs are equipped with protection circuits against static discharge and transient excess voltage.

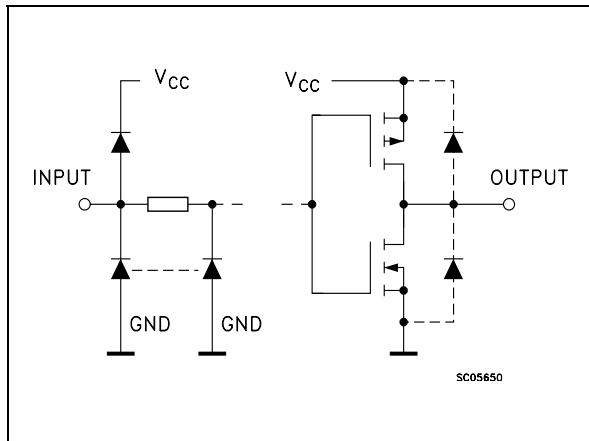
PIN CONNECTION



IEC LOGIC SYMBOLS



INPUT AND OUTPUT EQUIVALENT CIRCUIT



PIN DESCRIPTION

PIN N°	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 Outputs
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	± 25	mA
I _{CC} or I _{GND}	DC V _{CC} or Ground Current	± 50	mA
P _D	Power Dissipation	300	mW
T _{stg}	Storage Temperature	-65 to +150	°C
T _L	Lead Temperature (10 sec)	265	°C

Absolute Maximum Ratings are those values beyond which damage to the device may occur. Functional operation under these conditions 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	-55 to 125	°C

DC SPECIFICATIONS

Symbol	Parameter	Test Condition		Value						Unit	
		V_{CC} (V)		$T_A = 25^\circ\text{C}$			$-40 \text{ to } 85^\circ\text{C}$		$-55 \text{ to } 125^\circ\text{C}$		
				Min.	Typ.	Max.	Min.	Max.	Min.		Max.
V_{t+}	High Level Input Voltage	2.0		1.0	1.28	1.5	1.0	1.5	1.0	1.5	V
		4.5		2.3	2.8	3.15	2.3	3.15	2.3	3.15	
		6.0		3.0	3.7	4.2	3.0	4.2	3.0	4.2	
V_{t-}	Low Level Input Voltage	2.0		0.3	0.74	0.9	0.3	0.9	0.3	0.9	V
		4.5		1.13	1.8	2.0	1.13	2.0	1.13	2.0	
		6.0		1.5	2.4	2.6	1.5	2.6	1.5	2.6	
V_H	Hysteresis Voltage	2.0		0.3	0.54	1.0	0.3	1.0	0.3	1.0	V
		4.5		0.6	1.0	1.4	0.6	1.4	0.6	1.4	
		6.0		0.8	1.3	1.4	0.8	1.7	0.8	1.7	
V_{OH}	High Level Output Voltage	2.0	$I_O = -20 \mu\text{A}$	1.9	2.0		1.9		1.9		V
		4.5	$I_O = -20 \mu\text{A}$	4.4	4.5		4.4		4.4		
		6.0	$I_O = -20 \mu\text{A}$	5.9	6.0		5.9		5.9		
		4.5	$I_O = -4.0\text{mA}$	4.18	4.31		4.13		4.10		
		6.0	$I_O = -5.2 \text{mA}$	5.68	5.8		5.63		5.60		
V_{OL}	Low Level Output Voltage	2.0	$I_O = -20 \mu\text{A}$		0.0	0.1		0.1		0.1	V
		4.5	$I_O = -20 \mu\text{A}$		0.0	0.1		0.1		0.1	
		6.0	$I_O = -20 \mu\text{A}$		0.0	0.1		0.1		0.1	
		4.5	$I_O = -4.0\text{mA}$		0.17	0.26		0.33		0.40	
		6.0	$I_O = -5.2 \text{mA}$		0.18	0.26		0.33		0.40	
I_I	Input Leakage Current	6.0	$V_I = V_{CC}$ or GND			± 0.1		± 1		± 1	μA
I_{CC}	Quiescent Supply Current	6.0	$V_I = V_{CC}$ or GND			1		10		20	μA

M54HC14

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

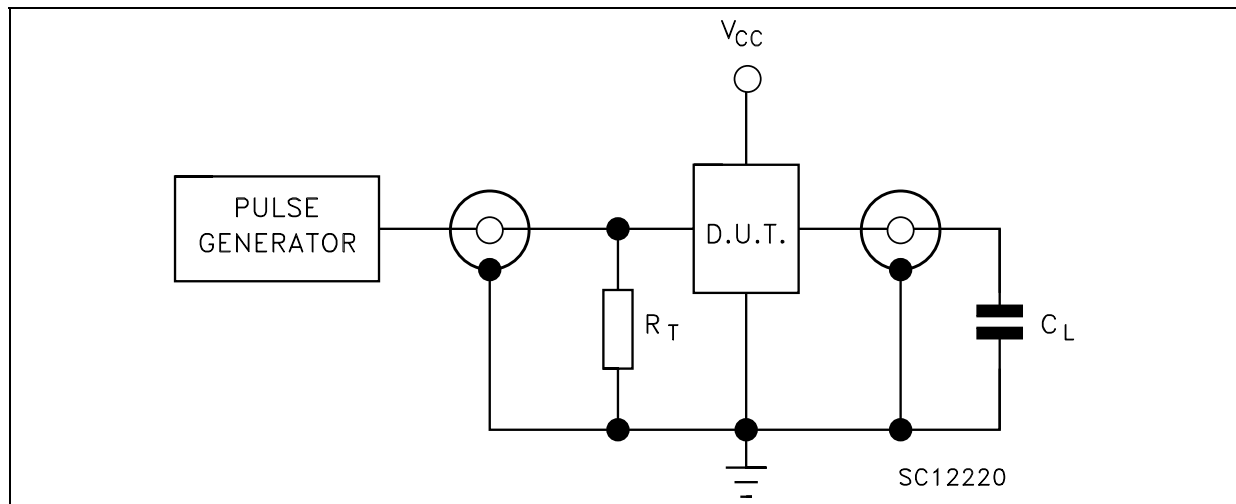
Symbol	Parameter	Test Condition		Value						Unit	
		V_{CC} (V)		$T_A = 25^\circ\text{C}$			$-40 \text{ to } 85^\circ\text{C}$		$-55 \text{ to } 125^\circ\text{C}$		
				Min.	Typ.	Max.	Min.	Max.	Min.		Max.
t_{TLH} t_{THL}	Output Transition Time	2.0			30	75		95		110	ns
		4.5			8	15		19		22	
		6.0			7	13		16		19	
t_{PLH} t_{PHL}	Propagation Delay Time	2.0			42	125		155		190	ns
		4.5			14	25		31		38	
		6.0			12	21		16		32	

CAPACITIVE CHARACTERISTICS

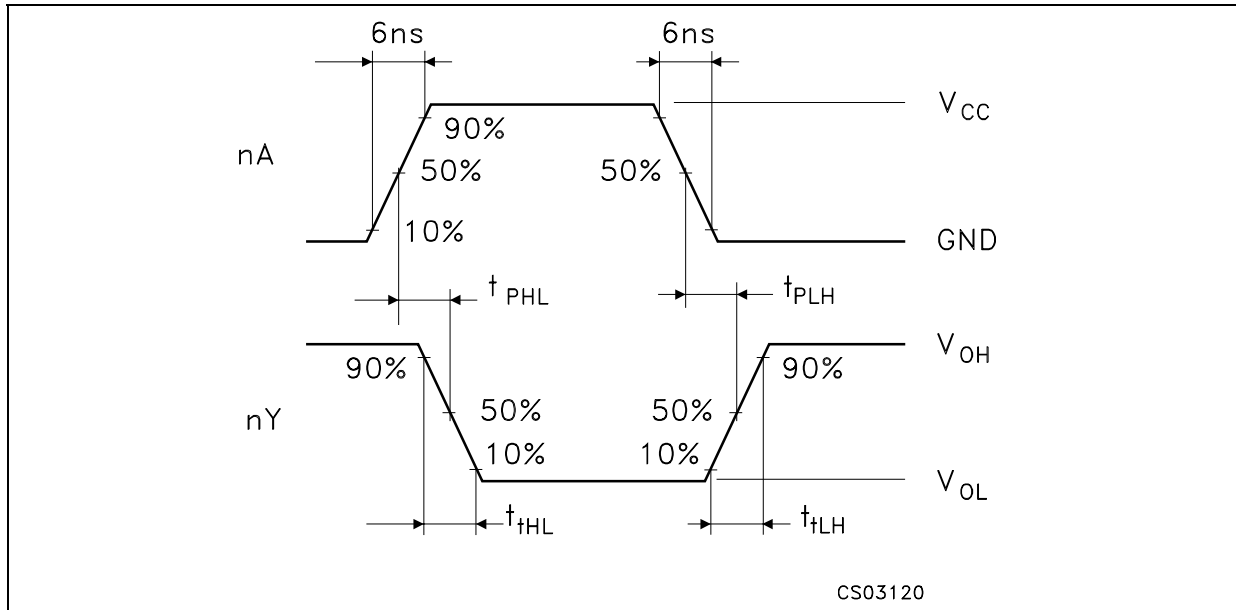
Symbol	Parameter	Test Condition		Value						Unit	
		V_{CC} (V)		$T_A = 25^\circ\text{C}$			$-40 \text{ to } 85^\circ\text{C}$		$-55 \text{ to } 125^\circ\text{C}$		
				Min.	Typ.	Max.	Min.	Max.	Min.		Max.
C_{IN}	Input Capacitance	5.0			5	10		10		10	pF
C_{PD}	Power Dissipation Capacitance (note 1)	5.0	$f_{IN} = 10 \text{ MHz}$		28						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. $I_{CC(opr)} = C_{PD} \times V_{CC} \times f_{IN} + I_{CC}/6$ (per gate)

TEST CIRCUIT

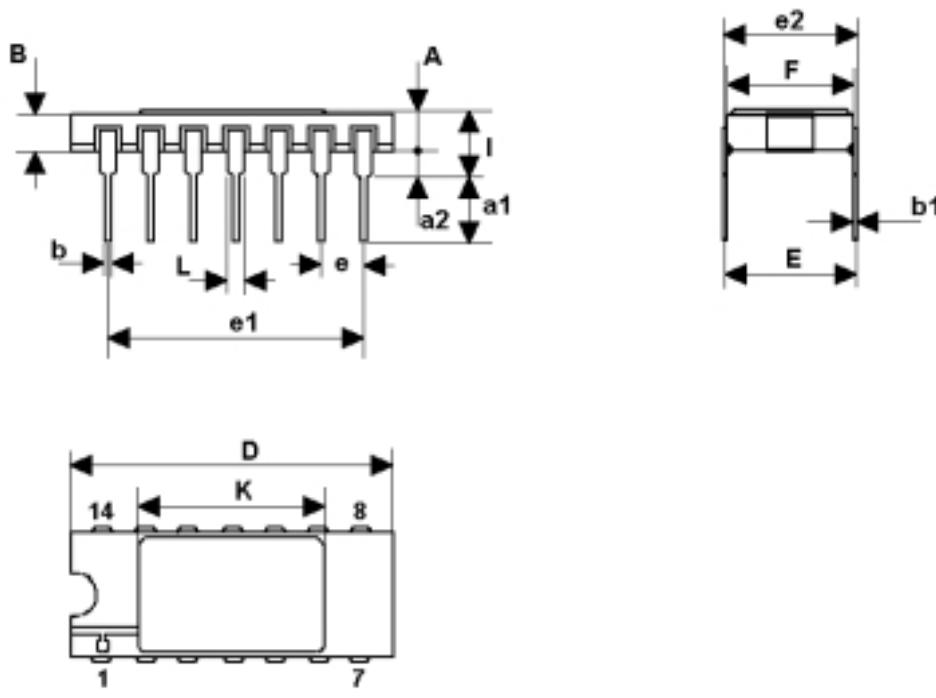


$C_L = 50 \text{ pF}$ or equivalent (includes jig and probe capacitance)
 $R_T = Z_{OUT}$ of pulse generator (typically 50Ω)

WAVEFORM: PROPAGATION DELAY TIMES ($f=1\text{MHz}$; 50% duty cycle)

DILC-14 MECHANICAL DATA

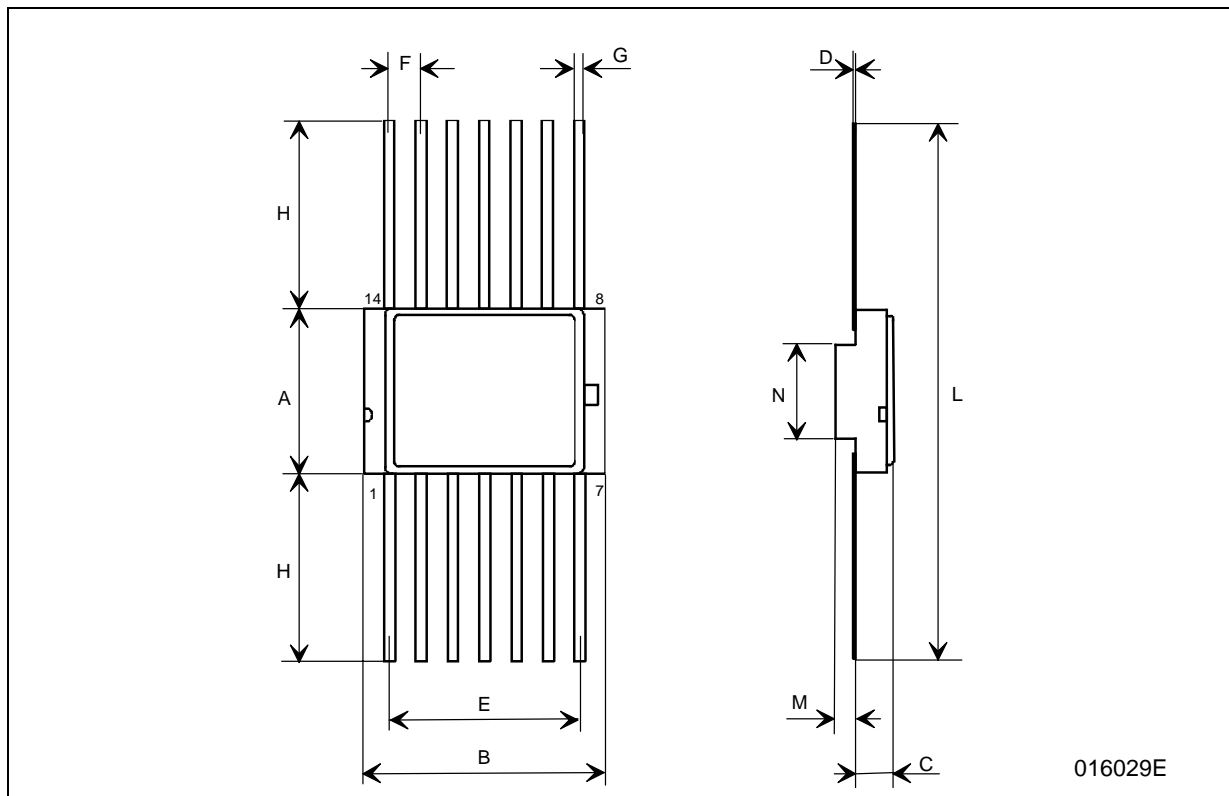
DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A	2.1		22.54	0.083		0.100
a1	3.00		3.70	0.118		0.146
a2	0.63	0.88	1.14	0.025	0.035	0.045
B	1.82	2.03	2.39	0.072	0.080	0.094
b	0.40	0.45	0.50	0.016	0.018	0.020
b1	0.20	0.254	0.30	0.008	0.010	0.012
D	18.79	19.00	19.20	0.740	0.748	0.756
e	7.36	7.62	7.87	0.290	0.300	0.310
e1		2.54			0.100	
e2	15.11	15.24	15.37	0.595	0.600	0.605
e3	7.62	7.87	8.12	0.300	0.310	0.320
F	7.11		7.75	0.280		0.305
I			3.70			0.146
K	10.90		12.1	0.429		0.476
L	1.14	1.27	1.5	0.045	0.050	0.059



0016173H

FPC-14 MECHANICAL DATA

DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A	6.75	6.91	7.06	0.266	0.272	0.278
B	9.76	9.95	10.14	0.384	0.392	0.399
C	1.49		1.95	0.059		0.077
D	0.10	0.127	0.15	0.004	0.005	0.006
E	7.50	7.62	7.75	0.295	0.300	0.305
F		1.27			0.050	
G	0.38	0.43	0.48	0.015	0.017	0.019
H		6.0			0.236	
L	18.75		22.0	0.738		0.866
M		0.38			0.015	
N		4.31			0.170	



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