

KS54AHCT 4049/4050
KS74AHCT

**Hex Logic Level
 Down Converters**

T-52-11

FEATURES

- Modified input structure allows voltages up to 15V
- High-Drive-current Outputs:
 $I_{OL} = 8mA @ V_{OL} = 0.5V$
- Low power consumption characteristic of CMOS
- Inputs and outputs interface directly with TTL, NMOS and CMOS devices.
- Wide operating voltage range: 4.5V to 5.5V
- Characterized for operation over industrial and military temperature ranges:
 KS74AHCT: -40°C to +85°C
 KS54AHCT: -55°C to +125°C
- Package options include plastic "small outline" packages, standard plastic and ceramic 300-mil DIPs

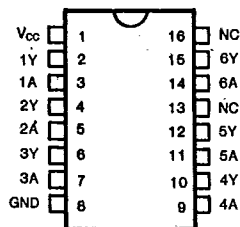
DESCRIPTION

The '4049 and '4050 have a modified input protection structure that enable them to be used as logic level translators which will convert high level logic to a low level logic while operating from the low logic supply. For example, 0-15V logic can be converted to 0-5V logic when using a 5V supply. The modified input protection has no diode connected to V_{CC} , thus allowing the input voltage to exceed the supply. The lower zener diode protects the input from both positive and negative static voltages. In addition the '4049 and '4050 can be used as simple buffers or inverters without level translation.

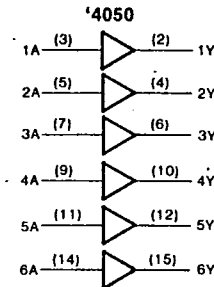
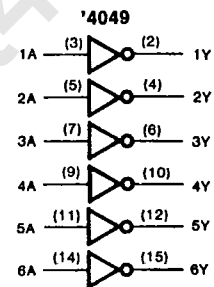
These devices provide speeds and drive capability equivalent to their ALSTTL counterparts and yet maintain CMOS power levels. The input and output voltage levels allow direct interface with TTL, NMOS and CMOS devices without any external components.

All inputs and outputs are protected from damage due to static discharge by internal diode clamps to V_{CC} and ground.

PIN CONFIGURATION



LOGIC DIAGRAMS



FUNCTION TABLE

Input A	Output Y	
	'4049	'4050
H	L	H
L	H	L

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Absolute Maximum Ratings*

Supply Voltage Range V_{CC} -0.5V to +7V
 DC Input Diode Current, I_{IK}
 ($V_I < -0.5V$ or $V_I > +15.5V$) ± 20 mA
 DC Output Diode Current, I_{OK}
 ($V_O < -0.5V$ or $V_O > V_{CC} + 0.5V$) ± 20 mA
 Continuous Output Current Per Pin, I_O
 (-0.5V < V_O < $V_{CC} + 0.5V$) ± 35 mA
 Continuous Current Through
 V_{CC} or GND pins ± 125 mA
 Storage Temperature Range, T_{stg} ... -65°C to +150°C
 Power Dissipation Per Package, P_{df} 500 mW

* Absolute Maximum Ratings are those values beyond which permanent damage to the device may occur. These are stress ratings only and functional operation of the device at or beyond them is not implied. Long exposure to these conditions may affect device reliability.

† Power Dissipation temperature derating:

Plastic Package (N): -12mW/°C from 65°C to 85°C
 Ceramic Package (J): -12mW/°C from 100°C to 125°C

Recommended Operating Conditions

Supply Voltage, V_{CC} 4.5V to 5.5V
 DC Input & Output Voltages*, V_{IN} , V_{OUT} .. 0V to V_{CC}
 Operating Temperature

Range KS74AHCT: -40°C to +85°C
 KS54AHCT: -55°C to +125°C

Input Rise & Fall Times, t_r , t_f Max 500 ns

* Unused inputs must always be tied to an appropriate logic voltage level (either V_{CC} or GND)

DC ELECTRICAL CHARACTERISTICS ($V_{CC}=5V \pm 10\%$ Unless Otherwise Specified)

Characteristic	Symbol	Test Conditions	$T_a = 25^\circ C$		KS74AHCT $T_a = -40^\circ C$ to $+85^\circ C$		KS54AHCT $T_a = -55^\circ C$ to $+125^\circ C$		Unit
			Typ	Guaranteed Limits					
Minimum High-Level Input Voltage	V_{IH}			2.0	2.0	2.0	2.0	V	
Maximum Low-Level Input Voltage	V_{IL}			0.8	0.8	0.8	0.8	V	
Minimum High-Level Output Voltage	V_{OH}	$V_{IN}=V_{IH}$ or V_{IL} $I_O=-20\mu A$ $I_O=-4mA$	V_{CC} 4.2	$V_{CC}-0.1$ 3.98	$V_{CC}-0.1$ 3.84	$V_{CC}-0.1$ 3.7	$V_{CC}-0.1$ 3.7	V	
Maximum Low-Level Output Voltage	V_{OL}	$V_{IN}=V_{IH}$ or V_{IL} $I_O=20\mu A$ $I_O=4mA$ $I_O=8mA$	0	0.1 0.26 0.39	0.1 0.33 0.5	0.1 0.4	0.1 0.4	V	
Maximum Input Current	I_{IN}	$V_{IN}=V_{CC}$ or GND $V_{IN}=15V$		± 0.1	± 1.0 ± 10.0	± 1.0 ± 10.0	± 1.0 ± 10.0	μA	
Maximum Quiescent Supply Current	I_{CC}	$V_{IN}=V_{CC}$ or GND $I_{OUT}=0\mu A$		2.0	20.0	40.0	40.0	μA	
Additional Worst Case Supply Current	ΔI_{CC}	per input pin $V_I=2.4V$ other inputs: at V_{CC} or GND $I_{OUT}=0\mu A$		2.7	2.9	3.0	3.0	mA	

AC ELECTRICAL CHARACTERISTICS (Input t_r , $t_f \leq 2$ ns, AHCT4049, AHCT4050)

Characteristic	Symbol	Conditions†	$T_a = 25^\circ C$ $V_{CC}=5.0V$		KS74AHCT $T_a = -40^\circ C$ to $+85^\circ C$ $V_{CC}=5.0V \pm 10\%$		KS54AHCT $T_a = -55^\circ C$ to $+125^\circ C$ $V_{CC}=5.0V \pm 10\%$		Unit
			Typ	Min	Max	Min	Max		
Propagation Delay	t_{PLH}	$C_L=50pF$	7		12		14	ns	
	t_{PHL}		7		12		14		
Input Capacitance	C_{IN}		5					pF	
Power Dissipation Capacitance*	C_{PD}	(per gate)	15					pF	

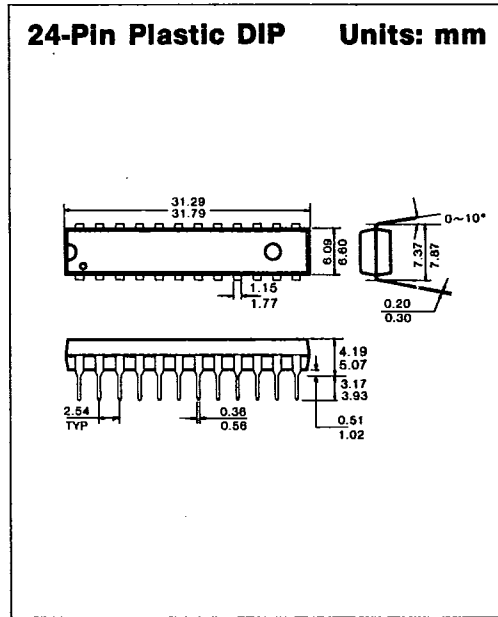
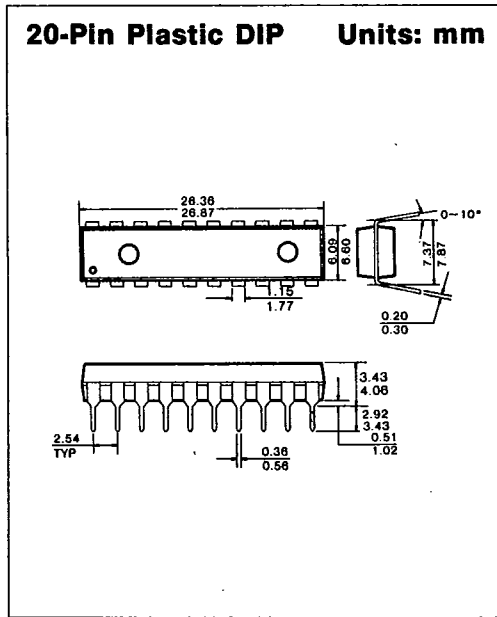
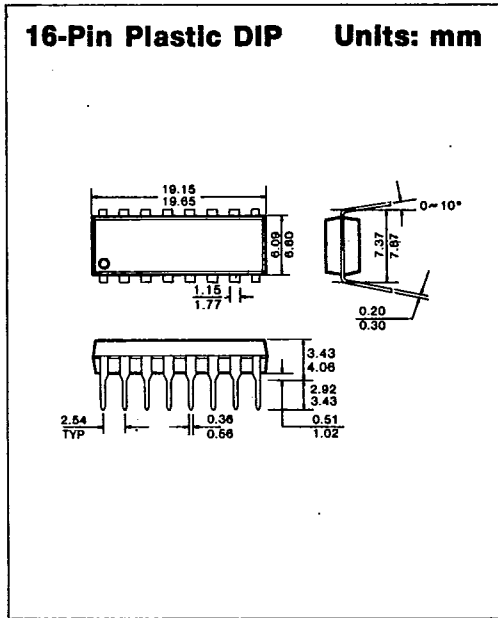
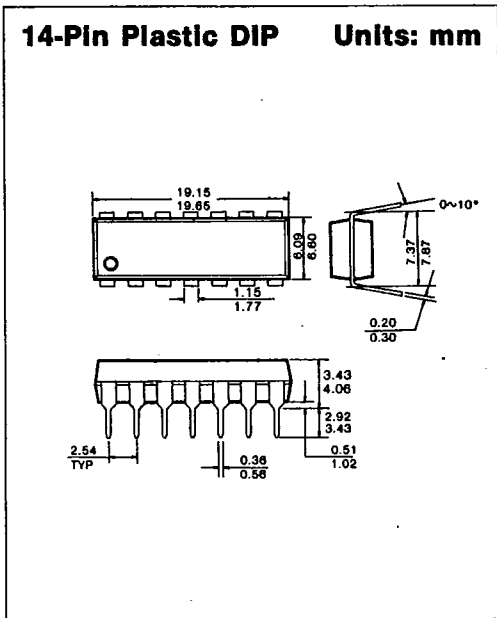
* C_{PD} determines the no-load dynamic power dissipation: $P_D=C_{PD} V_{CC}^2 f + I_{CC} V_{CC}$.

† For AC switching test circuits and timing waveforms see section 2.

PACKAGE DIMENSIONS

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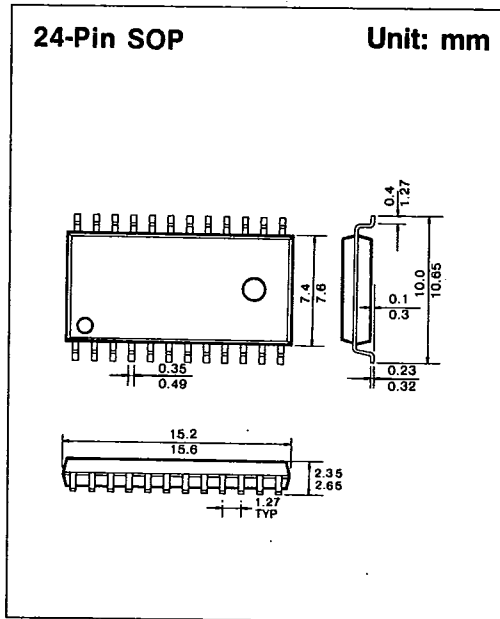
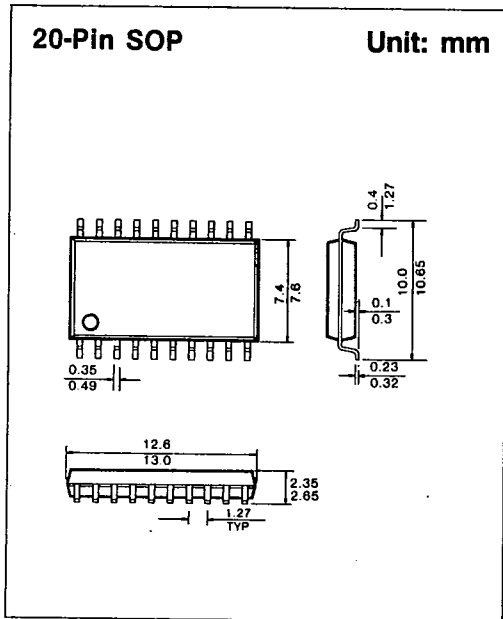
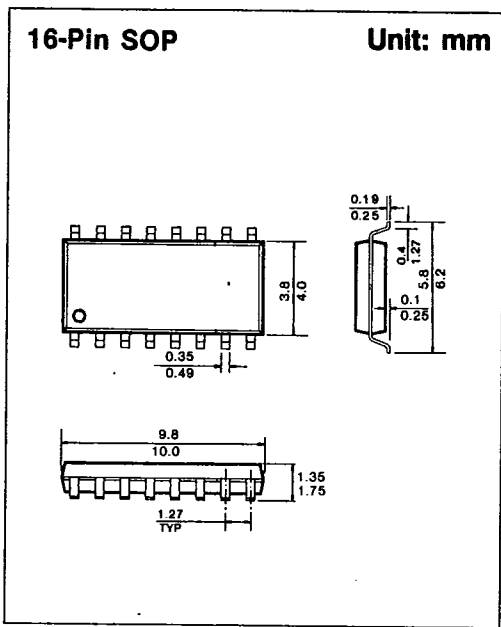
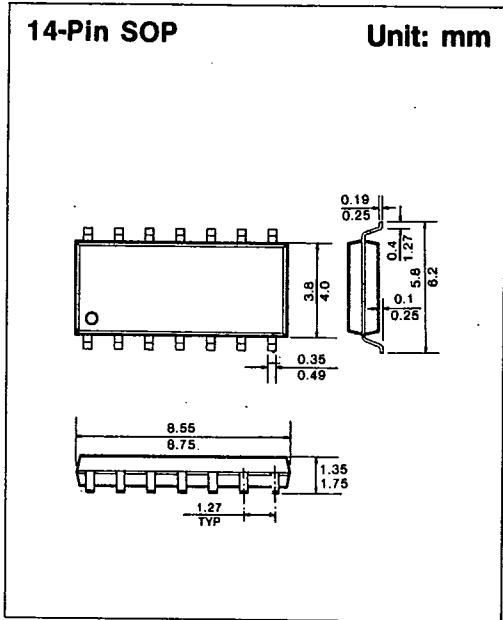
1. PLASTIC PACKAGES



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PACKAGE DIMENSIONS

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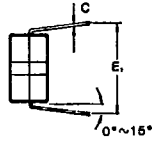
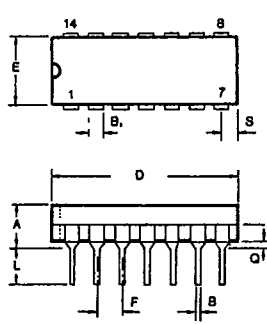


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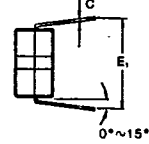
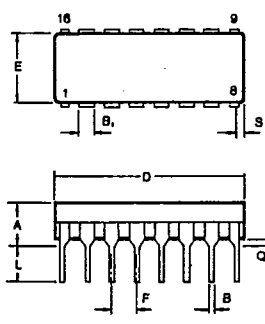
2. CERAMIC PACKAGES

14-Pin Ceramic DIP Units: mm



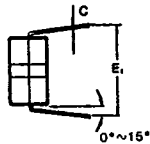
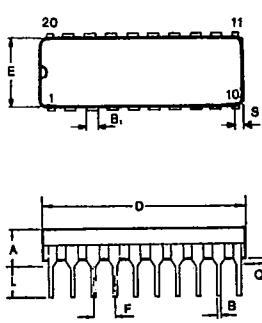
Dim	Millimeters	
	Min	Max
A	—	5.08
B	0.38	0.58
B1	1.40	1.78
C	0.20	0.38
D	18.16	19.58
E	8.10	7.49
E1	7.62	10.03
F	2.54	
L	3.18	4.19
Q	0.51	1.02
S	1.91	2.29

16-Pin Ceramic DIP Units: mm



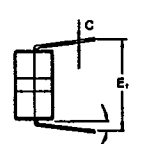
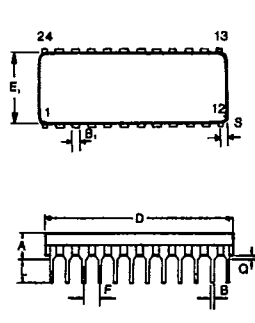
Dim	Millimeters	
	Min	Max
A	—	5.08
B	0.38	0.58
B1	1.40	1.78
C	0.20	0.38
D	19.05	19.94
E	8.10	7.49
E1	7.62	10.03
F	2.54	
L	3.18	4.19
Q	0.51	1.02
S	0.51	1.14

20-Pin Ceramic DIP Units: mm



Dim	Millimeters	
	Min	Max
A	4.06	5.08
B	0.38	0.53
B1	1.14	1.52
C	0.20	0.38
D	25.78	26.93
E	8.10	8.60
E1	7.77	7.88
F	2.54	
L	3.73	4.01
Q	0.38	0.89
S	0.51	1.14

24-Pin Ceramic DIP Units: mm



Dim	Millimeters	
	Min	Max
A	4.06	5.08
B	0.38	0.53
B1	1.14	1.52
C	0.20	0.38
D	31.50	32.84
E	7.24	7.75
E1	7.77	7.98
F	2.54	
L	3.73	4.01
Q	0.508	1.778
S	1.85	1.93

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