

KS54AHCT 4049/4050
KS74AHCT**Hex Logic Level
Down Converters**

T-52-11

FEATURES

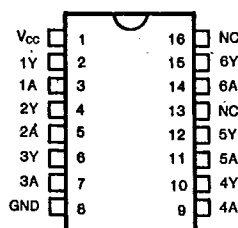
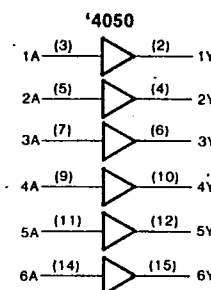
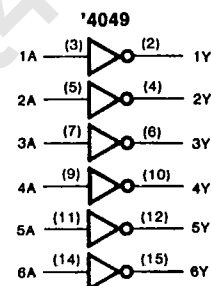
- Modified input structure allows voltages up to 15V
- High-Drive-current Outputs:
 $I_{OL} = 8\text{mA}$ @ $V_{OL} = 0.5\text{V}$
- Low power consumption characteristic of CMOS
- Inputs and outputs interface directly with TTL, NMOS and CMOS devices.
- Wide operating voltage range: 4.5V to 5.5V
- Characterized for operation over industrial and military temperature ranges:
KS74AHCT: -40°C to $+85^{\circ}\text{C}$
KS54AHCT: -55°C to $+125^{\circ}\text{C}$
- 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



SAMSUNG SEMICONDUCTOR

KS54AHCT 4049/4050
KS74AHCT
Hex Logic Level
Down Converters
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_d † 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°C		KS74AHCT	KS54AHCT	Unit
					T _a = -40°C to +85°C	T _a = -55°C to +125°C	
			Typ				Guaranteed Limits
Minimum High-Level Input Voltage	V _{IH}			2.0	2.0	2.0	V
Maximum Low-Level Input Voltage	V _{IL}			0.8	0.8	0.8	V
Minimum High-Level Output Voltage	V _{OH}	V _{IN} =V _{IH} or V _{IL} I _O =-20μA 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
Maximum Low-Level Output Voltage	V _{OL}	V _{IN} =V _{IH} or V _{IL} I _O =20μA I _O =4mA I _O =8mA	0	0.1 0.26 0.39	0.1 0.33 0.5	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	μA
Maximum Quiescent Supply Current	I _{CC}	V _{IN} =V _{CC} or GND I _{OUT} =0μA		2.0	20.0	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} =0μA		2.7	2.9	3.0	mA

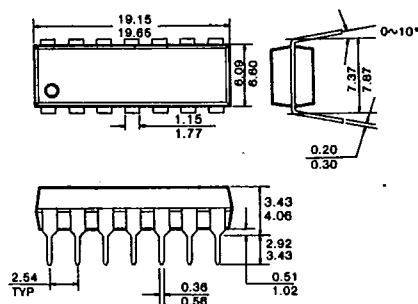
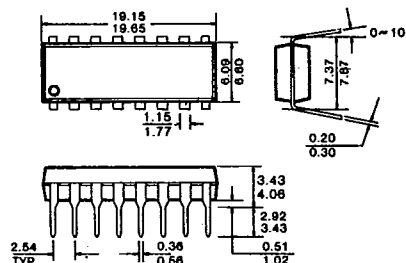
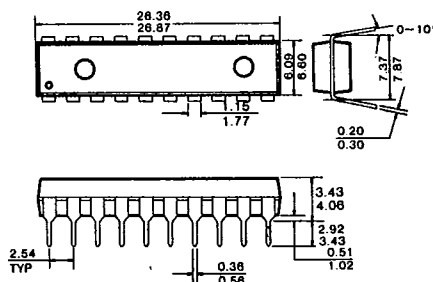
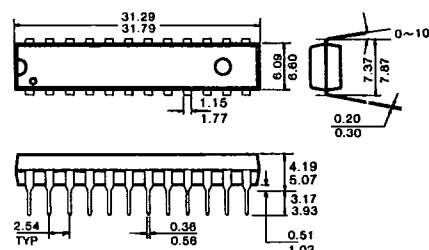
AC ELECTRICAL CHARACTERISTICS (Input t_r , $t_f \leq 2$ ns), AHCT4049, AHCT4050

Characteristic	Symbol	Conditions†	$T_A = 25^\circ\text{C}$ $V_{CC}=5.0V$	KS74AHCT $T_A = -40^\circ\text{C}$ to $+85^\circ\text{C}$ $V_{CC}=5.0V \pm 10\%$		KS54AHCT $T_A = -55^\circ\text{C}$ to $+125^\circ\text{C}$ $V_{CC}=5.0V \pm 10\%$		Unit
			Typ	Min	Max	Min	Max	
Propagation Delay	t_{PLH}	$C_L=50\text{pF}$	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*T-90-20***1. PLASTIC PACKAGES****14-Pin Plastic DIP Units: mm****16-Pin Plastic DIP Units: mm****20-Pin Plastic DIP Units: mm****24-Pin Plastic DIP Units: mm**

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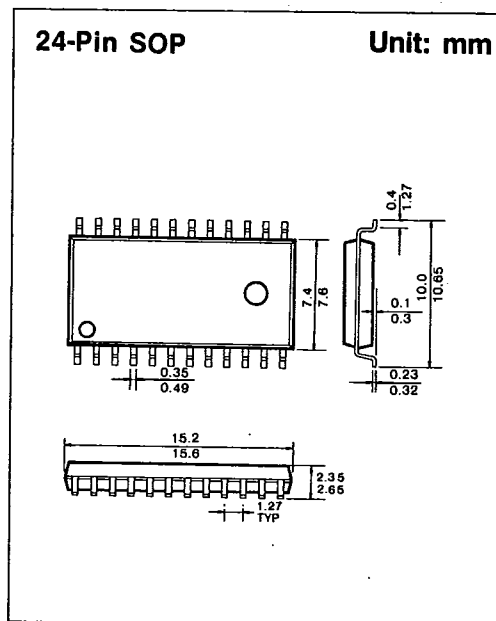
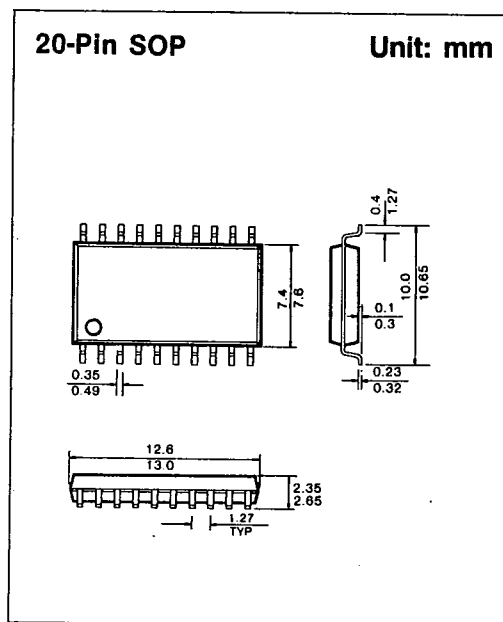
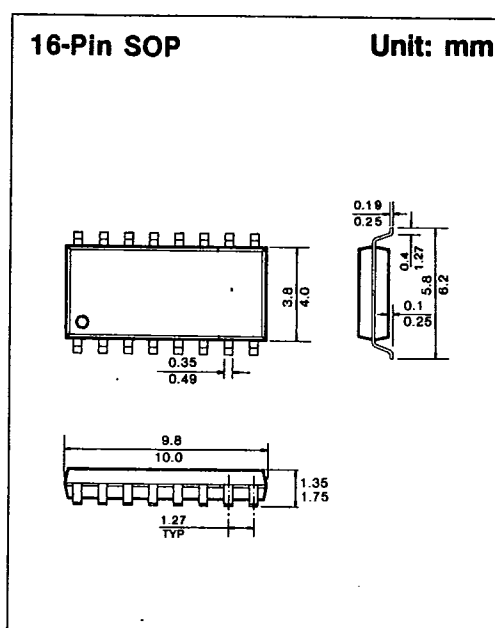
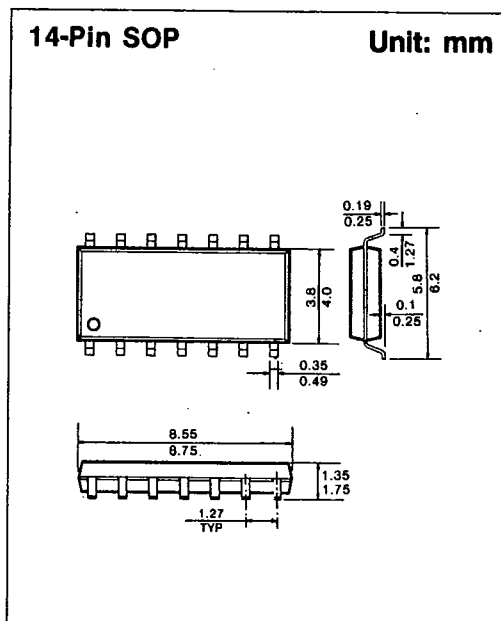
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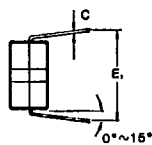
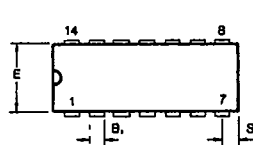
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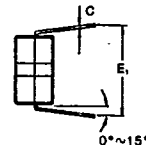
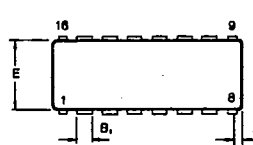


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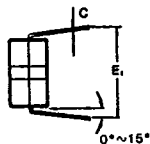
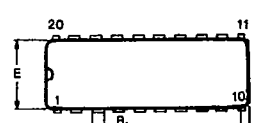
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2. CERAMIC PACKAGES**14-Pin Ceramic DIP Units: mm**

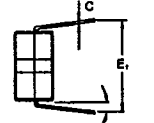
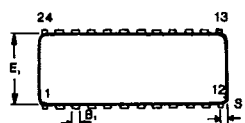
DIM	Millimeters	
	Min	Max
A	—	5.08
B	0.38	0.58
B ₁	1.40	1.78
C	0.20	0.38
D	18.16	19.56
E	8.10	7.49
E ₁	7.62	10.03
F	2.54	
L	3.18	4.19
Q	0.51	1.02
S	1.91	2.29

16-Pin Ceramic DIP Units: mm

DIM	Millimeters	
	Min	Max
A	—	5.08
B	0.38	0.58
B ₁	1.40	1.78
C	0.20	0.38
D	19.05	19.94
E	8.10	7.49
E ₁	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
B ₁	1.14	1.52
C	0.20	0.38
D	25.78	26.93
E	8.10	8.60
E ₁	7.77	7.98
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
B ₁	1.14	1.52
C	0.20	0.38
D	31.50	32.84
E	7.24	7.75
E ₁	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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