

**KS54AHCT 239**  
**KS74AHCT**

**Dual 1-of-4 Decoder/Demultiplexers**

T-67-21-55

**FEATURES**

- Designed specifically for high-speed memory decoders and data transmission systems
- Incorporates 2 enable inputs to simplify cascading and/or data reception
- Function, pin-out, speed and drive compatibility with 54/74ALS logic family
- Low power consumption characteristic of CMOS
- High-Drive-Current outputs:  
 $I_{OL} = 8 \text{ mA} @ V_{OL} = 0.5V$
- 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:  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$   
 KS54AHCT:  $-55^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$
- Package options include plastic "small outline" packages, standard plastic and ceramic 300-mil DIPs

**DESCRIPTION**

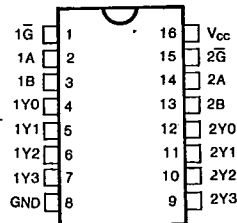
These devices are designed to be used in high-performance memory-decoding or data-routing applications requiring very short propagation delay times in high-performance memory systems, these decoders can be used to minimize the effects of system decoding. When used with high-speed memories utilizing a fast-enable circuit, the delay times of these decoders and the enable time of the memory are usually less than the typical access time of the memory.

This means that the effective system delay introduced by the decoder is negligible.

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**



**FUNCTION TABLE**

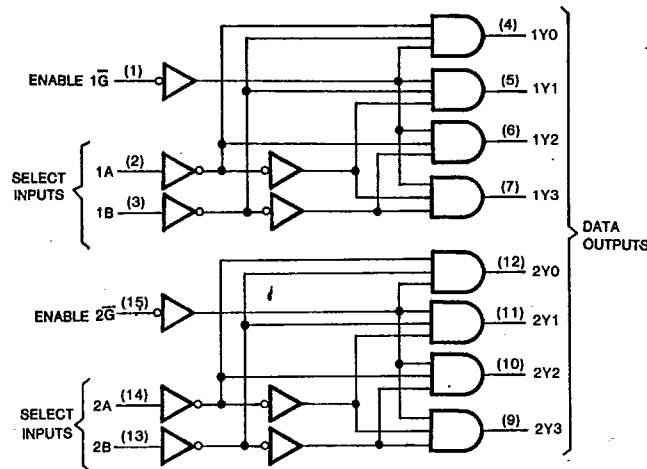
Inputs			Outputs			
Enable	Select		Y0	Y1	Y2	Y3
$\bar{G}$	B	A				
H	X	X	L	L	L	L
L	L	L	H	L	L	L
L	L	H	L	H	L	L
L	H	L	L	L	H	L
L	H	H	L	L	L	H



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**LOGIC DIAGRAM**

**Absolute Maximum Ratings\***

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

$\dagger$  Power Dissipation temperature derating:

Plastic Package (N):  $-12mW/^\circ C$  from  $65^\circ C$  to  $85^\circ C$   
 Ceramic Package (J):  $-12mW/^\circ C$  from  $100^\circ C$  to  $125^\circ C$

**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:  $-40^\circ C$  to  $+85^\circ C$   
 KS54AHCT:  $-65^\circ C$  to  $+125^\circ C$   
 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)

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

Characteristic	Symbol	Test Conditions	$T_a = 25^\circ\text{C}$			KS74AHCT $T_a = -40^\circ\text{C to } +85^\circ\text{C}$		KS54AHCT $T_a = -55^\circ\text{C to } +125^\circ\text{C}$		Unit
			Typ	Guaranteed Limits						
Minimum High-Level Input Voltage	$V_{IH}$			2.0	2.0	2.0	2.0	2.0	V	
Maximum Low-Level Input Voltage	$V_{IL}$			0.8	0.8	0.8	0.8	0.8	V	
Minimum High-Level Output Voltage	$V_{OH}$	$V_{IN}=V_{IH}$ or $V_{IL}$ $I_O=-20\mu\text{A}$ $I_O=-4\text{mA}$	$V_{CC}$ 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 $V_{IL}$ $I_O=20\mu\text{A}$ $I_O=4\text{mA}$ $I_O=8\text{mA}$	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		$\pm 0.1$	$\pm 1.0$	$\pm 1.0$			$\mu\text{A}$	
Maximum Quiescent Supply Current	$I_{CC}$	$V_{IN}=V_{CC}$ or GND $I_{OUT}=0\mu\text{A}$		8.0	80.0	160.0			$\mu\text{A}$	
Additional Worst Case Supply Current	$\Delta I_{CC}$	per input pin $V_I=2.4\text{V}$ other inputs: at $V_{CC}$ or GND $I_{OUT}=0\mu\text{A}$		2.7	2.9	3.0			mA	

AC ELECTRICAL CHARACTERISTICS (Input  $t_r, t_f \leq 2$  ns, AHCT239)

Characteristic	Symbol	Conditions <sup>†</sup>	$T_a = 25^\circ\text{C}$	KS74AHCT $T_a = -40^\circ\text{C to } +85^\circ\text{C}$		KS54AHCT $T_a = -55^\circ\text{C to } +125^\circ\text{C}$		Unit
			$V_{CC}=5.0\text{V}$	$V_{CC}=5.0\text{V} \pm 10\%$		$V_{CC}=5.0\text{V} \pm 10\%$		
			Typ.	Min	Max	Min	Max	
Propagation Delay, A or B to any Y	$t_{PLH}$	$C_L=50\text{pF}$	12		20		24	ns
	$t_{PHL}$		12		20		24	
Propagation Delay, G to any Y	$t_{PLH}$		10		17		20	ns
	$t_{PHL}$		10		17		20	
Input Capacitance	$C_{IN}$		5				pF	
Power Dissipation Capacitance*	$C_{PD}$		50				pF	

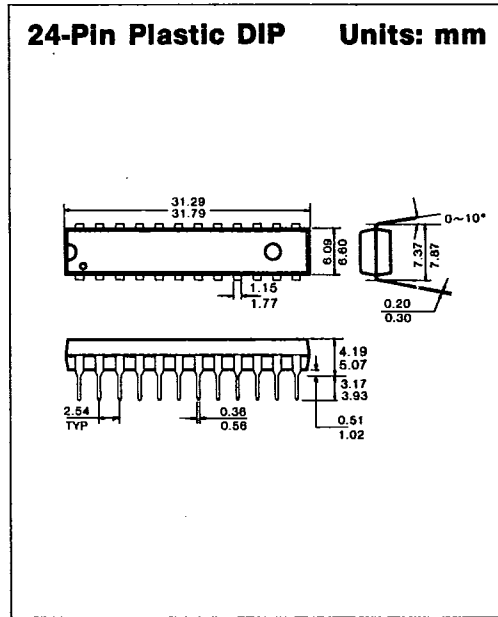
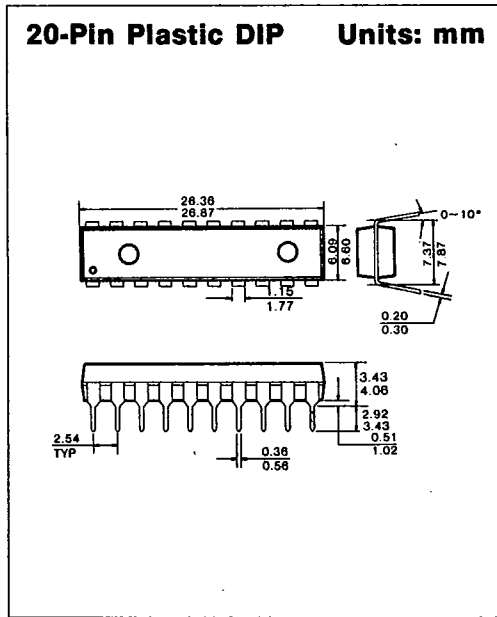
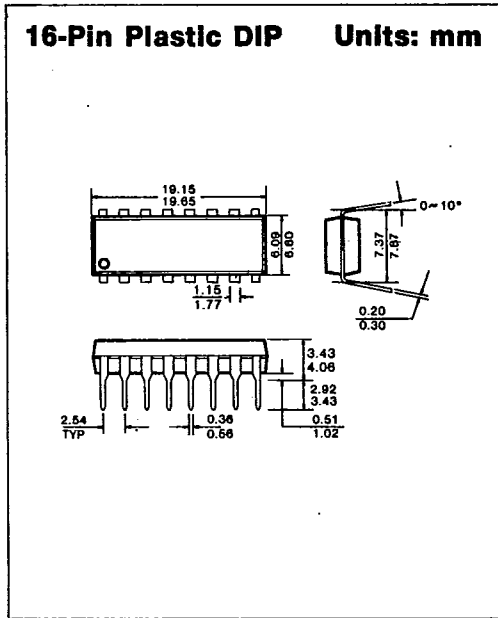
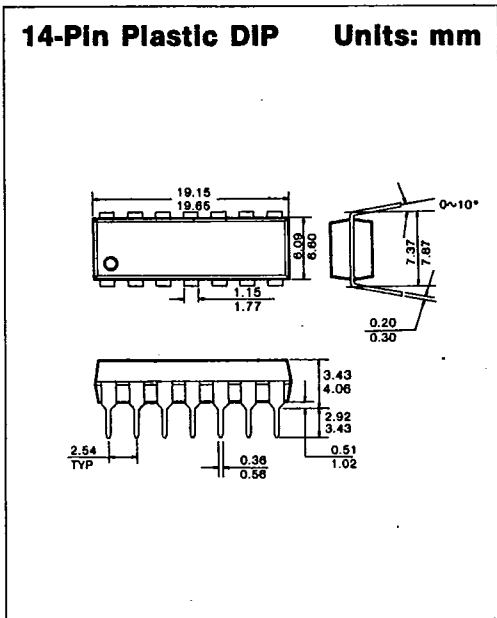
\*  $C_{PD}$  determines the no-load dynamic power dissipation:  $P_D = C_{PD} V_{CC}^2 f + I_{CC} V_{CC}$ .  
<sup>†</sup> For AC switching test circuits and timing waveforms see section 2.



**PACKAGE DIMENSIONS**

T-90-20

**1. PLASTIC PACKAGES**



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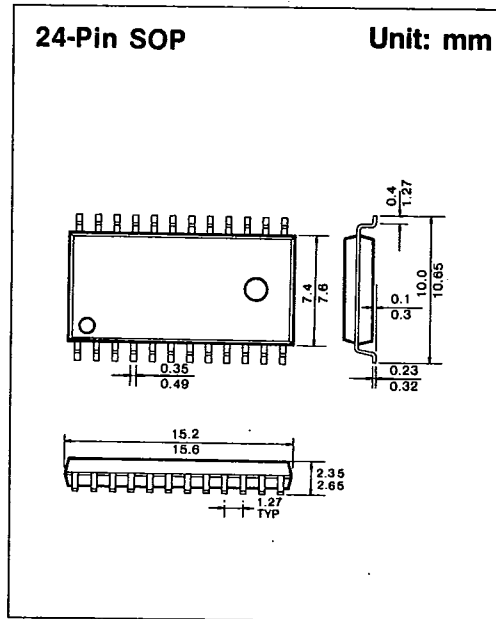
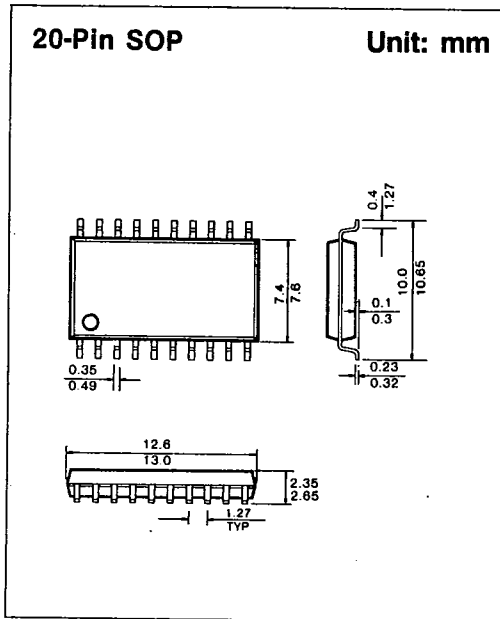
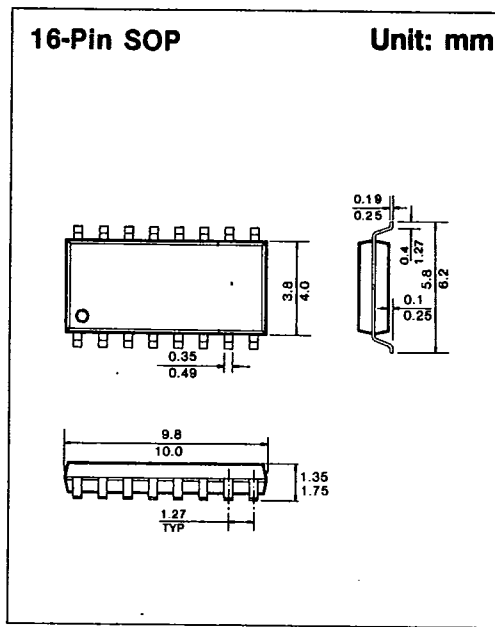
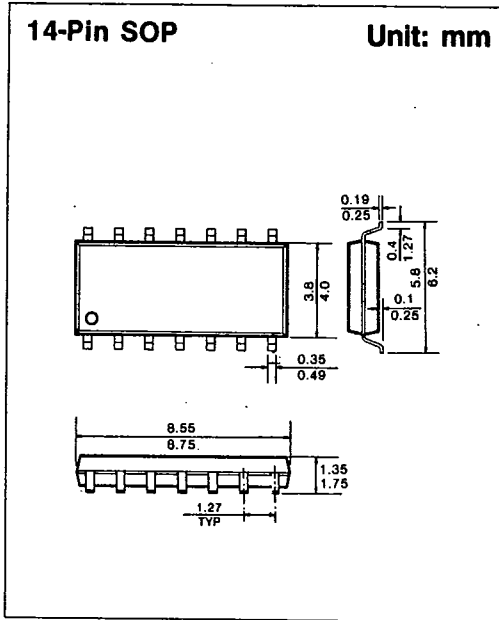
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**PACKAGE DIMENSIONS**

T-90-20



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T-90-20

**2. CERAMIC PACKAGES**

**14-Pin Ceramic DIP Units: mm**

Dim	Millimeters	
	Min	Max
A	—	5.08
B	0.38	0.58
B <sub>1</sub>	1.40	1.78
C	0.20	0.38
D	18.16	19.58
E	8.10	7.49
E <sub>1</sub>	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 <sub>1</sub>	1.40	1.78
C	0.20	0.38
D	19.05	19.94
E	8.10	7.49
E <sub>1</sub>	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 <sub>1</sub>	1.14	1.52
C	0.20	0.38
D	25.78	26.93
E	8.10	8.60
E <sub>1</sub>	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
B <sub>1</sub>	1.14	1.52
C	0.20	0.38
D	31.50	32.84
E	7.24	7.75
E <sub>1</sub>	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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