

CD54/74AC139 CD54/74ACT139

MAXIMUM RATINGS, Absolute-Maximum Values:

DC SUPPLY-VOLTAGE (V_{CC})	-0.5 to 6 V
DC INPUT DIODE CURRENT, I_{IK} (for $V_I < -0.5$ V or $V_I > V_{CC} + 0.5$ V)	± 20 mA
DC OUTPUT DIODE CURRENT, I_{OK} (for $V_O < -0.5$ V or $V_O > V_{CC} + 0.5$ V)	± 50 mA
DC OUTPUT SOURCE OR SINK CURRENT per Output Pin, I_O (for $V_O > -0.5$ V or $V_O < V_{CC} + 0.5$ V)	± 50 mA
DC V_{CC} OR GROUND CURRENT (I_{CC} OR I_{GND})	± 100 mA*
POWER DISSIPATION PER PACKAGE (P_D):	
For $T_A = -55$ to $+100^\circ\text{C}$ (PACKAGE TYPE F)	500 mW
For $T_A = +100$ to $+125^\circ\text{C}$ (PACKAGE TYPE F)	Derate Linearly at 8 mW/ $^\circ\text{C}$ to 300 mW
For $T_A = -40$ to $+100^\circ\text{C}$ (PACKAGE TYPE E)	500 mW
For $T_A = +100$ to $+125^\circ\text{C}$ (PACKAGE TYPE E)	Derate Linearly at 8 mW/ $^\circ\text{C}$ to 300 mW
For $T_A = -40$ to $+70^\circ\text{C}$ (PACKAGE TYPE M)	400 mW
For $T_A = +70$ to $+125^\circ\text{C}$ (PACKAGE TYPE M)	Derate Linearly at 6 mW/ $^\circ\text{C}$ to 70 mW
OPERATING-TEMPERATURE RANGE (T_A):	
PACKAGE TYPE F	-55 to $+125^\circ\text{C}$
PACKAGE TYPE E, M	-40 to $+125^\circ\text{C}$
STORAGE TEMPERATURE (T_{stg})	
LEAD TEMPERATURE (DURING SOLDERING):	-65 to $+150^\circ\text{C}$
At distance $1/16 \pm 1/32$ in. (1.59 ± 0.79 mm) from case for 10 s maximum	$+265^\circ\text{C}$
Unit inserted into PC board min. thickness $1/16$ in. (1.59 mm) with solder contacting lead tips only	$+300^\circ\text{C}$

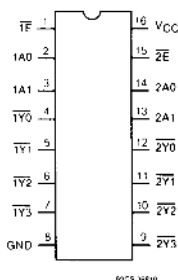
*(For up to 4 outputs per device; add ± 25 mA for each additional output.)

RECOMMENDED OPERATING CONDITIONS:

For maximum reliability, normal operating conditions should be selected so that operation is always within the following ranges:

CHARACTERISTIC	LIMITS		UNITS
	MIN.	MAX.	
Supply-Voltage Range, V_{CC} *: (For $T_A =$ Full Package-Temperature Range)			
AC Types	1.5	5.5	V
ACT Types	4.5	5.5	V
DC Input or Output Voltage, V_I, V_O	0	V_{CC}	V
Operating Temperature, T_A :			
CD74 Types	-40	$+125$	$^\circ\text{C}$
CD54 Types	-55	$+125$	$^\circ\text{C}$
Input Rise and Fall Slew Rate, dt/dv			
at 1.5 V to 3 V (AC Types)	0	50	ns/V
at 3.6 V to 5.5 V (AC Types)	0	20	ns/V
at 4.5 V to 5.5 V (ACT Types)	0	10	ns/V

*Unless otherwise specified, all voltages are referenced to ground.



TERMINAL ASSIGNMENT

Technical Data

CD54/74AC139
CD54/74ACT139

STATIC ELECTRICAL CHARACTERISTICS: AC Series

CHARACTERISTICS	TEST CONDITIONS		V _{CC} (V)	AMBIENT TEMPERATURE (T _A) - °C						UNITS
				+25		0 to +70 -40 to +85		-40 to +125(74) -55 to +125(54)		
				MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	
High-Level Input Voltage V _{IH}			1.5	1.2	—	1.2	—	1.2	—	V
			3	2.1	—	2.1	—	2.1	—	
			5.5	3.85	—	3.85	—	3.85	—	
Low-Level Input Voltage V _{IL}			1.5	—	0.3	—	0.3	—	0.3	V
			3	—	0.9	—	0.9	—	0.9	
			5.5	—	1.65	—	1.65	—	1.65	
High-Level Output Voltage V _{OH}	V _{IH} or V _{IL}	-0.05	1.5	1.4	—	1.4	—	1.4	—	V
		-0.05	3	2.9	—	2.9	—	2.9	—	
		-0.05	4.5	4.4	—	4.4	—	4.4	—	
		-4	3	2.58	—	2.48	—	2.4	—	
		-24	4.5	3.94	—	3.8	—	3.7	—	
		#	5.5	—	—	3.85	—	—	—	
Low-Level Output Voltage V _{OL}	V _{IH} or V _{IL}	0.05	1.5	—	0.1	—	0.1	—	0.1	V
		0.05	3	—	0.1	—	0.1	—	0.1	
		0.05	4.5	—	0.1	—	0.1	—	0.1	
		12	3	—	0.36	—	0.44	—	0.5	
		24	4.5	—	0.36	—	0.44	—	0.5	
		#	5.5	—	—	—	1.65	—	—	
Input Leakage Current I _I	V _{CC} or GND		5.5	—	±0.1	—	±1	—	±1	μA
Quiescent Supply Current, MSI I _{CC}	V _{CC} or GND	0	5.5	—	8	—	80	—	160	μA

#Test one output at a time for a 1-second maximum duration. Measurement is made by forcing current and measuring voltage to minimize power dissipation.

*Test verifies a minimum 50-ohm transmission-line-drive capability for 74AC/ACT Series, 75 ohms for 54AC/ACT Series.

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STATIC ELECTRICAL CHARACTERISTICS: ACT Series

CHARACTERISTICS	TEST CONDITIONS	V_{CC} (V)	AMBIENT TEMPERATURE (T_A) - °C						UNITS		
			+25		0 to +70 -40 to +85		-40 to +125(74) -55 to +125(54)				
			MIN.	MAX.	MIN.	MAX.	MIN.	MAX.			
High-Level Input Voltage	V_{IH}		4.5 to 5.5	2	—	2	—	2	—	V	
Low-Level Input Voltage	V_{IL}		4.5 to 5.5	—	0.8	—	0.8	—	0.8	V	
High-Level Output Voltage	V_{OH}	V_{IH} or V_{IL} # *	-0.05	4.5	4.4	—	4.4	—	4.4	—	V
			-24	4.5	3.94	—	3.8	—	3.7	—	
			-75	5.5	—	—	3.85	—	—	—	
			-50	5.5	—	—	—	—	3.85	—	
Low-Level Output Voltage	V_{OL}	V_{IH} or V_{IL} # *	0.05	4.5	—	0.1	—	0.1	—	0.1	V
			24	4.5	—	0.36	—	0.44	—	0.5	
			75	5.5	—	—	—	1.65	—	—	
			50	5.5	—	—	—	—	—	1.65	
Input Leakage Current	I_I	V_{CC} or GND	5.5	—	± 0.1	—	± 1	—	± 1	μA	
Quiescent Supply Current, MSI	I_{CC}	V_{CC} or GND	0	5.5	—	8	—	80	—	160	μA
Additional Quiescent Supply Current per Input Pin, TTL Inputs High, 1 Unit Load	ΔI_{CC}	$V_{CC}-2.1$	4.5 to 5.5		2.4	—	2.8	—	3	mA	

#Test one output at a time for a 1-second maximum duration. Measurement is made by forcing current and measuring voltage to minimize power dissipation.

*Test verifies a minimum 50-ohm transmission-line-drive capability for 74AC/ACT Series, 75 ohms for 54AC/ACT Series.

ACT INPUT LOADING TABLE

INPUT	UNIT LOADS*
A0, A1	1
\bar{E}	0.67

*Unit load is ΔI_{CC} limit specified in Static Characteristic Chart, e.g., 2.4 mA max. @ 25°C.

CD54/74AC139

CD54/74ACT139

SWITCHING CHARACTERISTICS: AC Series; $t_r, t_f = 3 \text{ ns}$, $C_L = 50 \text{ pF}$

CHARACTERISTICS	SYMBOL	V _{CC} (V)	0 to +70°C -40 to +85°C		-40 to +125°C(74) -55 to +125°C(54)		UNITS
			MIN.	MAX.	MIN.	MAX.	
Propagation Delays: A0, A1 to Outputs	t _{PLH}	1.5	—	129	—	144	ns
	t _{PHL}	3.3*	3.1	14.2	2.9	16.1	
\bar{E} to Outputs	t _{PLH}	1.5	—	120	—	134	ns
	t _{PHL}	3.3	2.9	13.4	2.7	15	
Power Dissipation Capacitance	C _{PD} §	—	83 Typ.		83 Typ.		pF
Input Capacitance	C _I	—	—	10	—	10	pF

SWITCHING CHARACTERISTICS: ACT Series; $t_r, t_f = 3 \text{ ns}$, $C_L = 50 \text{ pF}$

CHARACTERISTICS	SYMBOL	V _{CC} (V)	0 to +70°C -40 to +85°C		-40 to +125°C(74) -55 to +125°C(54)		UNITS
			MIN.	MAX.	MIN.	MAX.	
Propagation Delays: A0, A1 to Outputs	t _{PLH}	5†	2.7	13.2	2.5	14.7	ns
	t _{PHL}	5†	2.7	13.2	2.5	14.7	
\bar{E} to Outputs	t _{PLH}	5	2.7	13.2	2.5	14.7	ns
	t _{PHL}	5	2.7	13.2	2.5	14.7	
Power Dissipation Capacitance	C _{PD} §	—	126 Typ.		126 Typ.		pF
Input Capacitance	C _I	—	—	10	—	10	pF

*3.3 V: min. is @ 3.6 V
max. is @ 3 V

†5 V: min. is @ 5.5 V
max. is @ 4.5 V

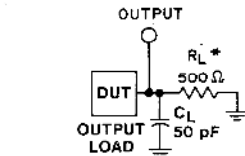
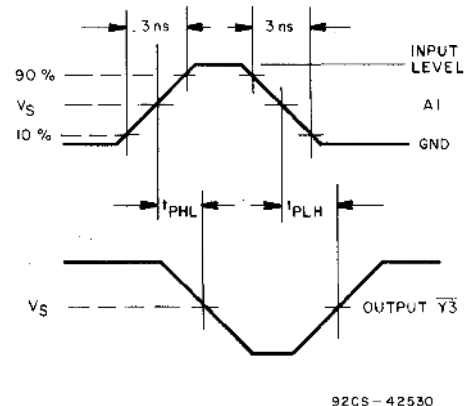
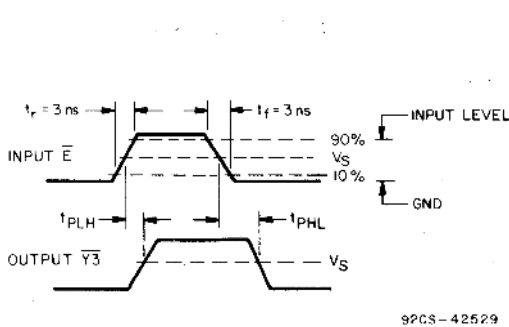
5 V: min. is @ 5.25 V for 0 to +70°C
max. is @ 4.75 V for 0 to +70°C

§C_{PD} is used to determine the dynamic power consumption, per decoder/demultiplexer.

For AC series: $P_D = V_{CC}^2 f_i (C_{PD} + C_L)$

For ACT series: $P_D = V_{CC}^2 f_i (C_{PD} + C_L) + V_{CC} \Delta I_{CC}$ where f_i = input frequency

C_L = output load capacitance
V_{CC} = supply voltage.



*FOR AC SERIES ONLY: WHEN
V_{CC} = 1.5 V, R_L = 1 kΩ

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	CD54/74AC	CD54/74ACT
Input Level	V _{CC}	3 V
Input Switching Voltage, V _s	0.5 V _{CC}	1.5 V
Output Switching Voltage, V _s	0.5 V _{CC}	0.5 V _{CC}

Fig. 1 - Propagation delay times and test circuit.