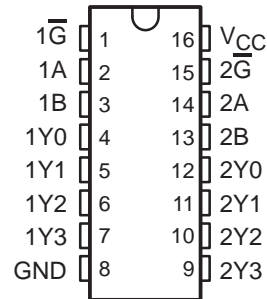


SN54HCT139, SN74HCT139 DUAL 2-LINE TO 4-LINE DECODERS/DEMULTIPLEXERS

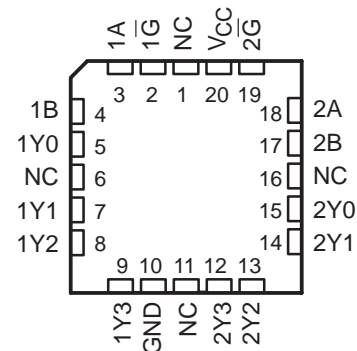
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- Operating Voltage Range of 4.5 V to 5.5 V
- Outputs Can Drive Up To 10 LSTTL Loads
- Low Power Consumption, 80- μ A Max I_{CC}
- Typical $t_{pd} = 10$ ns
- ± 4 -mA Output Drive at 5 V
- Low Input Current of 1 μ A Max
- Inputs Are TTL-Voltage Compatible
- Designed Specifically for High-Speed Memory Decoders and Data-Transmission Systems
- Incorporate Two Enable Inputs to Simplify Cascading and/or Data Reception

SN54HCT139 . . . J OR W PACKAGE
SN74HCT139 . . . D, DB, N, OR PW PACKAGE
(TOP VIEW)



SN54HCT139 . . . FK PACKAGE
(TOP VIEW)



NC – No internal connection

description/ordering information

The 'HCT139 devices are designed for high-performance memory-decoding or data-routing applications requiring very short propagation delay times. In high-performance memory systems, these decoders can minimize the effects of system decoding. When employed with high-speed memories utilizing a fast enable circuit, the delay time of these decoders and the enable time of the memory usually are less than the typical access time of the memory. This means that the effective system delay introduced by the decoders is negligible.

ORDERING INFORMATION

T _A	PACKAGE†		ORDERABLE PART NUMBER	TOP-SIDE MARKING
-40°C to 85°C	PDIP – N	Tube of 25	SN74HCT139N	SN74HCT139N
	SOIC – D	Tube of 40	SN74HCT139D	HCT139
		Reel of 2500	SN74HCT139DR	
		Reel of 250	SN74HCT139DT	
	SSOP – DB	Reel of 2000	SN74HCT139DBR	HT139
	TSSOP – PW	Reel of 2000	SN74HCT139PWR	HT139
Reel of 250		SN74HCT139PWT		
-55°C to 125°C	CDIP – J	Tube of 25	SNJ54HCT139J	SNJ54HCT139J
	CFP – W	Tube of 150	SNJ54HCT139W	SNJ54HCT139W
	LCCC – FK	Tube of 55	SNJ54HCT139FK	SNJ54HCT139FK

† Package drawings, standard packing quantities, thermal data, symbolization, and PCB design guidelines are available at www.ti.com/sc/package.



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 **TEXAS
INSTRUMENTS**

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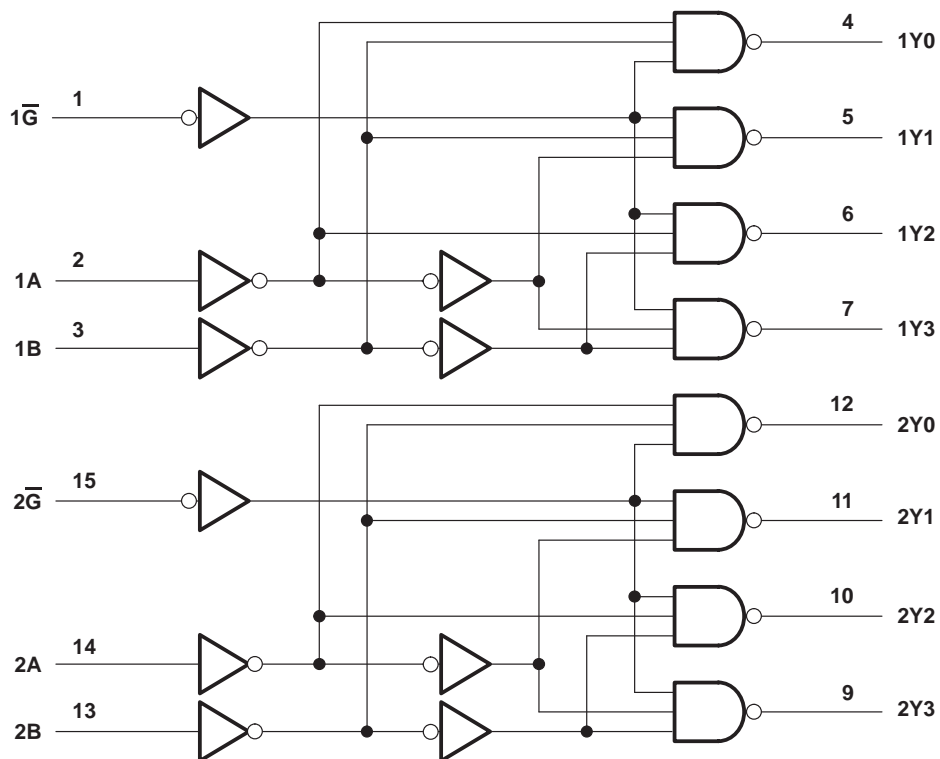
description/ordering information (continued)

The 'HCT139 devices comprise two individual 2-line to 4-line decoders in a single package. The active-low enable (\overline{G}) input can be used as a data line in demultiplexing applications. These decoders/demultiplexers feature fully buffered inputs, each of which represents only one normalized load to its driving circuit.

FUNCTION TABLE

\overline{G}	INPUTS		OUTPUTS			
	B	A	Y0	Y1	Y2	Y3
H	X	X	H	H	H	H
L	L	L	L	H	H	H
L	L	H	H	L	H	H
L	H	L	H	H	L	H
L	H	H	H	H	H	L

logic diagram (positive logic)



Pin numbers shown are for the D, DB, J, N, PW, and W packages.

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absolute maximum ratings over operating free-air temperature range (unless otherwise noted)†

Supply voltage range, V_{CC}	-0.5 V to 7 V
Input clamp current, I_{IK} ($V_I < 0$ or $V_I > V_{CC}$) (see Note 1)	± 20 mA
Output clamp current, I_{OK} ($V_O < 0$ or $V_O > V_{CC}$) (see Note 1)	± 20 mA
Continuous output current, I_O ($V_O = 0$ to V_{CC})	± 25 mA
Continuous current through V_{CC} or GND	± 50 mA
Package thermal impedance, θ_{JA} (see Note 2): D package	73°C/W
DB package	82°C/W
N package	67°C/W
PW package	108°C/W
Storage temperature range, T_{stg}	-65°C to 150°C

† Stresses beyond those listed under "absolute maximum ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under "recommended operating conditions" is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

- NOTES: 1. The input and output voltage ratings may be exceeded if the input and output current ratings are observed.
2. The package thermal impedance is calculated in accordance with JESD 51-7.

recommended operating conditions (see Note 3)

		SN54HCT139			SN74HCT139			UNIT
		MIN	NOM	MAX	MIN	NOM	MAX	
V_{CC}	Supply voltage	4.5	5	5.5	4.5	5	5.5	V
V_{IH}	High-level input voltage	$V_{CC} = 4.5$ V to 5.5 V		2	2		V	
V_{IL}	Low-level input voltage	$V_{CC} = 4.5$ V to 5.5 V		0.8		0.8	V	
V_I	Input voltage	0	V_{CC}		0	V_{CC}		V
V_O	Output voltage	0	V_{CC}		0	V_{CC}		V
t_t	Input transition (rise and fall) time	500		500		ns		
T_A	Operating free-air temperature	-55	125		-40	85		°C

NOTE 3: All unused inputs of the device must be held at V_{CC} or GND to ensure proper device operation. Refer to the TI application report, *Implications of Slow or Floating CMOS Inputs*, literature number SCBA004.

electrical characteristics over recommended operating free-air temperature range (unless otherwise noted)

PARAMETER	TEST CONDITIONS	V_{CC}	$T_A = 25^\circ\text{C}$			SN54HCT139		SN74HCT139		UNIT
			MIN	TYP	MAX	MIN	MAX	MIN	MAX	
V_{OH}	$V_I = V_{IH}$ or V_{IL}	4.5 V	$I_{OH} = -20 \mu\text{A}$		4.4	4.499	4.4	4.4	V	
			$I_{OH} = -4 \text{ mA}$		3.98	4.3	3.7	3.84		
V_{OL}	$V_I = V_{IH}$ or V_{IL}	4.5 V	$I_{OL} = 20 \mu\text{A}$		0.001	0.1	0.1	0.1	V	
			$I_{OL} = 4 \text{ mA}$		0.17	0.26	0.4	0.33		
I_I	$V_I = V_{CC}$ or 0	5.5 V	± 0.1	± 100	± 1000	± 1000	nA			
I_{CC}	$V_I = V_{CC}$ or 0, $I_O = 0$	5.5 V	8		160	80	μA			
ΔI_{CC}^\ddagger	One input at 0.5 V or 2.4 V, Other inputs at 0 or V_{CC}	5.5 V	1.4	2.4	3	2.9	mA			
C_i		4.5 V to 5.5 V	3	10	10	10	pF			

‡ This is the increase in supply current for each input that is at one of the specified TTL voltage levels, rather than 0 V or V_{CC} .

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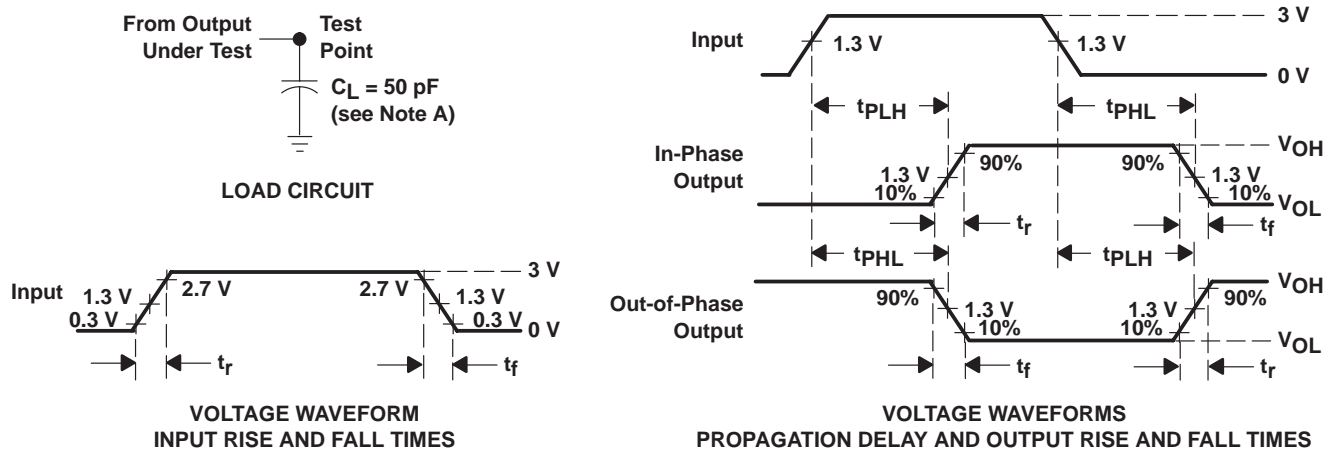
switching characteristics over recommended operating free-air temperature range, $C_L = 50$ pF (unless otherwise noted) (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V_{CC}	$T_A = 25^\circ\text{C}$			SN54HCT139		SN74HCT139		UNIT
				MIN	TYP	MAX	MIN	MAX	MIN	MAX	
t_{pd}	A or B	Y	4.5 V	14	34	51	43	ns			
			5.5 V	12	30	50	40				
	\bar{G}	Y	4.5 V	11	34	51	43				
			5.5 V	10	30	50	40				
t_t		Y	4.5 V	8	15	22	19	ns			
			5.5 V	6	14	21	17				

operating characteristics, $T_A = 25^\circ\text{C}$

PARAMETER	TEST CONDITIONS	TYP	UNIT
C_{pd} Power dissipation capacitance per decoder	No load	25	pF

PARAMETER MEASUREMENT INFORMATION



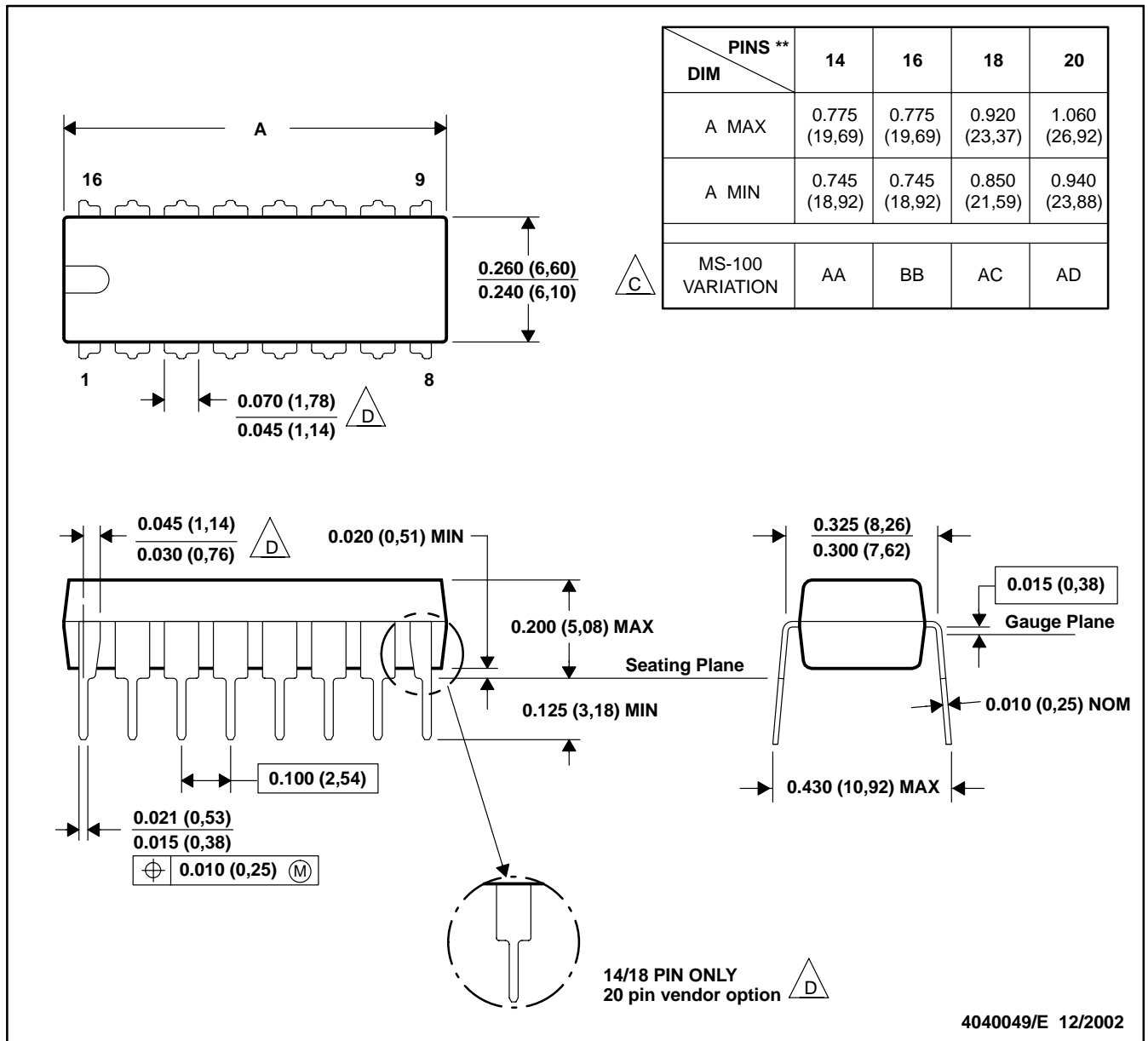
- NOTES:
- C_L includes probe and test-fixture capacitance.
 - Phase relationships between waveforms were chosen arbitrarily. All input pulses are supplied by generators having the following characteristics: $PRR \leq 1$ MHz, $Z_O = 50 \Omega$, $t_r = 6$ ns, $t_f = 6$ ns.
 - The outputs are measured one at a time with one input transition per measurement.
 - t_{PLH} and t_{PHL} are the same as t_{pd} .

Figure 1. Load Circuit and Voltage Waveforms

N (R-PDIP-T**)

PLASTIC DUAL-IN-LINE PACKAGE

16 PINS SHOWN



- NOTES: A. All linear dimensions are in inches (millimeters).
 B. This drawing is subject to change without notice.
 C Falls within JEDEC MS-001, except 18 and 20 pin minimum body length (Dim A).
 D The 20 pin end lead shoulder width is a vendor option, either half or full width.

D (R-PDSO-G**)

PLASTIC SMALL-OUTLINE PACKAGE

8 PINS SHOWN



- NOTES: A. All linear dimensions are in inches (millimeters).
 B. This drawing is subject to change without notice.
 C. Body dimensions do not include mold flash or protrusion, not to exceed 0.006 (0,15).
 D. Falls within JEDEC MS-012

DB (R-PDSO-G**)

PLASTIC SMALL-OUTLINE

28 PINS SHOWN



- NOTES: A. All linear dimensions are in millimeters.
 B. This drawing is subject to change without notice.
 C. Body dimensions do not include mold flash or protrusion not to exceed 0,15.
 D. Falls within JEDEC MO-150

PW (R-PDSO-G**)

PLASTIC SMALL-OUTLINE PACKAGE

14 PINS SHOWN



4040064/F 01/97

- NOTES: A. All linear dimensions are in millimeters.
 B. This drawing is subject to change without notice.
 C. Body dimensions do not include mold flash or protrusion not to exceed 0,15.
 D. Falls within JEDEC MO-153

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