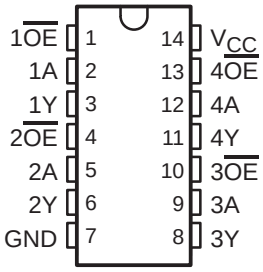
- **Qualification in Accordance With AEC-Q100†**
- **Qualified for Automotive Applications**
- **Customer-Specific Configuration Control Can Be Supported Along With Major-Change Approval**
- **3-State Outputs**
- **Separate Output Enable Inputs**
- **Fanout (Over Temperature Range)**
  - **Standard Outputs . . . 10 LSTTL Loads**
  - **Bus Driver Outputs . . . 15 LSTTL Loads**
- **Extended Temperature Performance of −40°C to 125°C**
- **Balanced Propagation Delay and Transition Times**
- **Significant Power Reduction, Compared to LSTTL Logic ICs**
- **2-V to 6-V V_{CC} Operation**
- **High Noise Immunity N_{IL} or N_{IH} = 30% of V_{CC} at V_{CC} = 5 V**

† Contact factory for details. Q100 qualification data available on request.

M OR PW PACKAGE
(TOP VIEW)



description/ordering information

The CD74HC125 contains four independent 3-state buffers, each having its own output enable input which, when HIGH, puts the output in the high-impedance state.

ORDERING INFORMATION

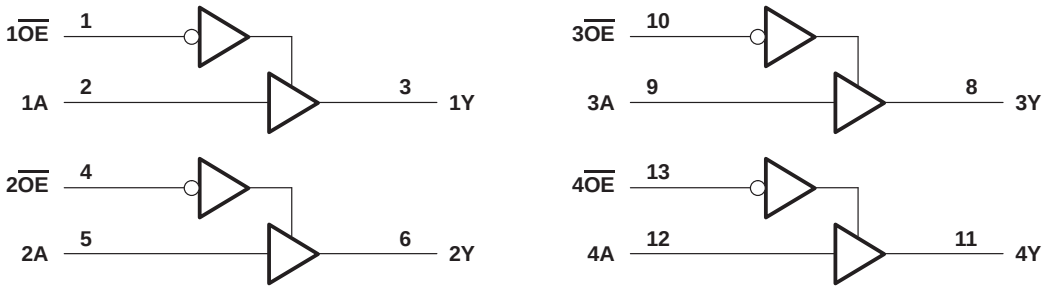
T_A	PACKAGE‡		ORDERABLE PART NUMBER	TOP-SIDE MARKING
−40°C to 125°C	SOIC − M	Reel of 2500	CD74HC125QM96Q1	HC125Q
	TSSOP − PW	Reel of 2000	CD74HC125QPWRQ1	HC125Q

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

FUNCTION TABLE
(each gate)

INPUTS		OUTPUT
A	$\overline{OE}$	Y
H	L	H
L	L	L
X	H	Z

logic diagram (positive logic)



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} ($V_I < -0.5$ V or $V_I > V_{CC} + 0.5$ V) (see Note 1) . . . . . ±20 mA
Output clamp current, I_{OK} ($V_O < -0.5$ V or $V_O > V_{CC} + 0.5$ V) (see Note 1) . . . . . ±20 mA
Continuous output current, I_O ($V_O > -0.5$ or $V_O < V_{CC} + 0.5$ V) . . . . . ±35 mA
Output source or sink current per output pin, I_O ($V_O > -0.5$ or $V_O < V_{CC} + 0.5$ V) . . . . . ±25 mA
Continuous current through V_{CC} or GND . . . . . ±70 mA
Package thermal impedance, θ_{JA} (see Note 2): M package . . . . . 86°C/W
PW package . . . . . 113°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)

			MIN	NOM	MAX	UNIT
V_{CC}	Supply voltage		2	5	6	V
V_{IH}	High-level input voltage	V_{CC} = 2 V	1.5			V
		V_{CC} = 4.5 V	3.15			
		V_{CC} = 6 V	4.2			
V_{IL}	Low-level input voltage	V_{CC} = 2 V			0.5	V
		V_{CC} = 4.5 V			1.35	
		V_{CC} = 6 V			1.8	
V_I	Input voltage		0		V_{CC}	V
V_O	Output voltage		0		V_{CC}	V
t_t	Input transition rise/fall time	V_{CC} = 2 V			1000	ns
		V_{CC} = 4.5 V			500	
		V_{CC} = 6 V			400	
T_A	Operating free-air temperature		−40		125	°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		I_O (mA)	V_{CC}	T_A = 25°C			MIN	MAX	UNIT
					MIN	TYP	MAX			
V_{OH}	$V_I = V_{IH}$ or V_{IL}	CMOS loads	−0.02	2 V	1.9			1.9		V
			−0.02	4.5 V	4.4			4.4		
			−0.02	6 V	5.9			5.9		
		TTL loads	−6	4.5 V	3.98			3.7		
			−7.8	6 V	5.48			5.2		
V_{OL}	$V_I = V_{IH}$ or V_{IL}	CMOS loads	0.02	2 V			0.1		0.1	V
			0.02	4.5 V			0.1		0.1	
			0.02	6 V			0.1		0.1	
		TTL loads	6	4.5 V			0.26		0.4	
			7.8	6 V			0.26		0.4	
I_I	$V_I = V_{CC}$ or GND			6 V			±0.1		±1	µA
I_{CC}	$V_I = V_{CC}$ or GND		0	6 V			8		160	µA
I_{OZ}	$V_I = V_{IL}$ or V_{IH}			6 V			±0.5		±10	µA
C_I							10		10	pF
C_O	3−state						20		20	pF

switching characteristics over recommended operating free-air temperature range (unless otherwise noted) (see Figure 1)

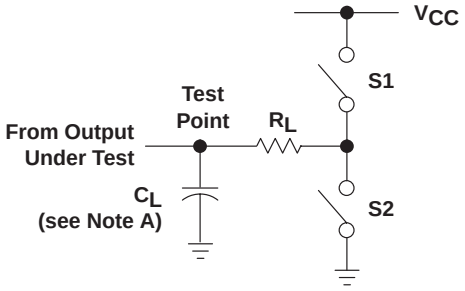
PARAMETER	FROM (INPUT)	TO (OUTPUT)	CONDITIONS	V_{CC}	T_A = 25°C			MIN	MAX	UNIT
					MIN	TYP	MAX			
t_{pd}	A	Y	C_L = 15 pF	5 V		8				ns
			C_L = 50 pF	2 V			100		150	
				4.5 V			20		30	
				6 V			17		26	
t_{en}	$\overline{OE}$	Y	C_L = 15 pF	5 V		10				ns
			C_L = 50 pF	2 V			125		190	
				4.5 V			25		38	
				6 V			21		32	
t_{dis}	$\overline{OE}$	Y	C_L = 15 pF	5 V		10				ns
			C_L = 50 pF	2 V			125		190	
				4.5 V			25		38	
				6 V			21		32	
t_t		Y	C_L = 50 pF	2 V			60		90	ns
				4.5 V			12		18	
				6 V			10		15	

operating characteristics, T_A = 25°C, V_{CC} = 5V

PARAMETER		TEST CONDITIONS	TYP	UNIT
C_{pd}	Power dissipation capacitance per gate (see Note 4)	No load	29	pF

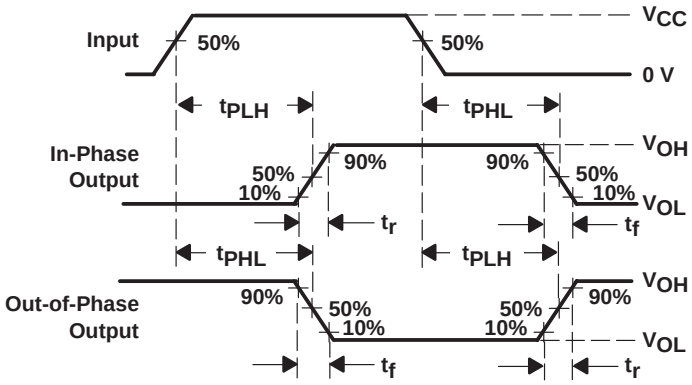
NOTE 4: C_{pd} is used to determine the dynamic power consumption, per channel.
$P_D = V_{CC}^2 f_I (C_{pd} + C_L)$
f_I = input frequency
C_L = output load capacitance
V_{CC} = supply voltage

PARAMETER MEASUREMENT INFORMATION

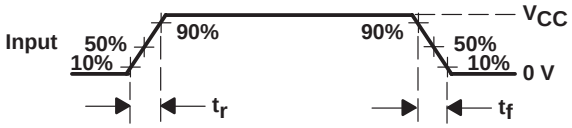


LOAD CIRCUIT

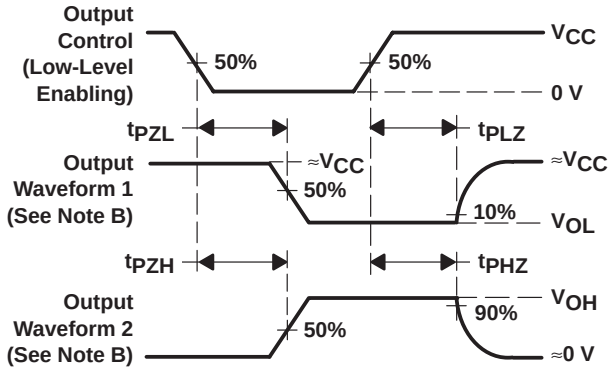
PARAMETER		R_L	C_L	S1	S2
t_{en}	t_{PZH}	1 kΩ	50 pF	Open	Closed
	t_{PZL}			Closed	Open
t_{dis}	t_{PHZ}	1 kΩ	50 pF	Open	Closed
	t_{PLZ}			Closed	Open
t_{pd} or t_t		––	50 pF	Open	Open



VOLTAGE WAVEFORMS
PROPAGATION DELAY AND OUTPUT TRANSITION TIMES



VOLTAGE WAVEFORM
INPUT RISE AND FALL TIMES

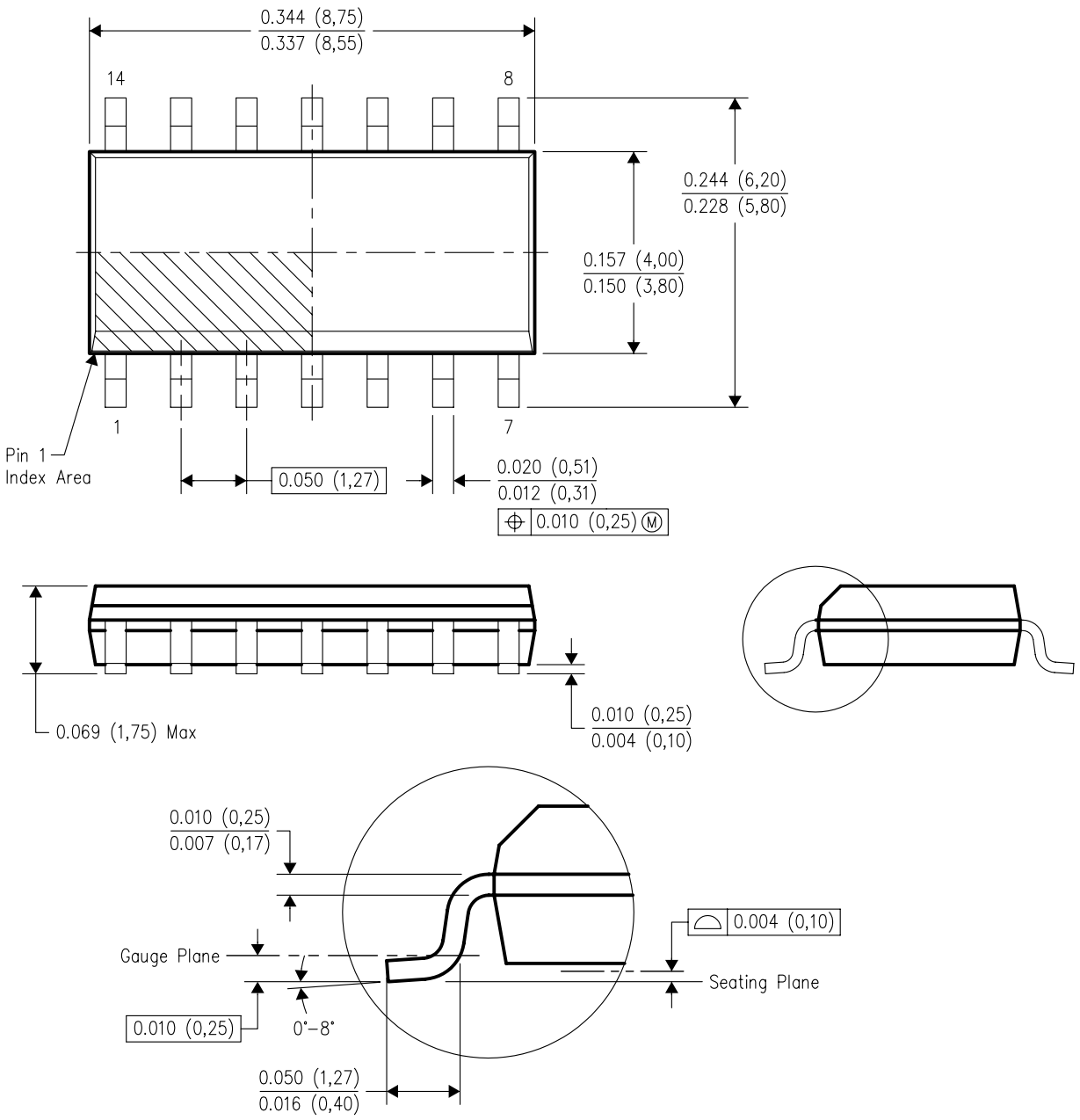


VOLTAGE WAVEFORMS
ENABLE AND DISABLE TIMES FOR 3-STATE OUTPUTS

NOTES: A. C_L includes probe and test-fixture capacitance.
B. Waveform 1 is for an output with internal conditions such that the output is low, except when disabled by the output control. Waveform 2 is for an output with internal conditions such that the output is high, except when disabled by the output control.
C. Phase relationships between waveforms were chosen arbitrarily. All input pulses are supplied by generators having the following characteristics: PRR ≤ 1 MHz, Z_O = 50 Ω, t_r = 6 ns, t_f = 6 ns.
D. The outputs are measured one at a time, with one input transition per measurement.
E. t_{PLZ} and t_{PHZ} are the same as t_{dis}.
F. t_{PZL} and t_{PZH} are the same as t_{en}.
G. t_{PLH} and t_{PHL} are the same as t_{pd}.

Figure 1. Load Circuit and Voltage Waveforms

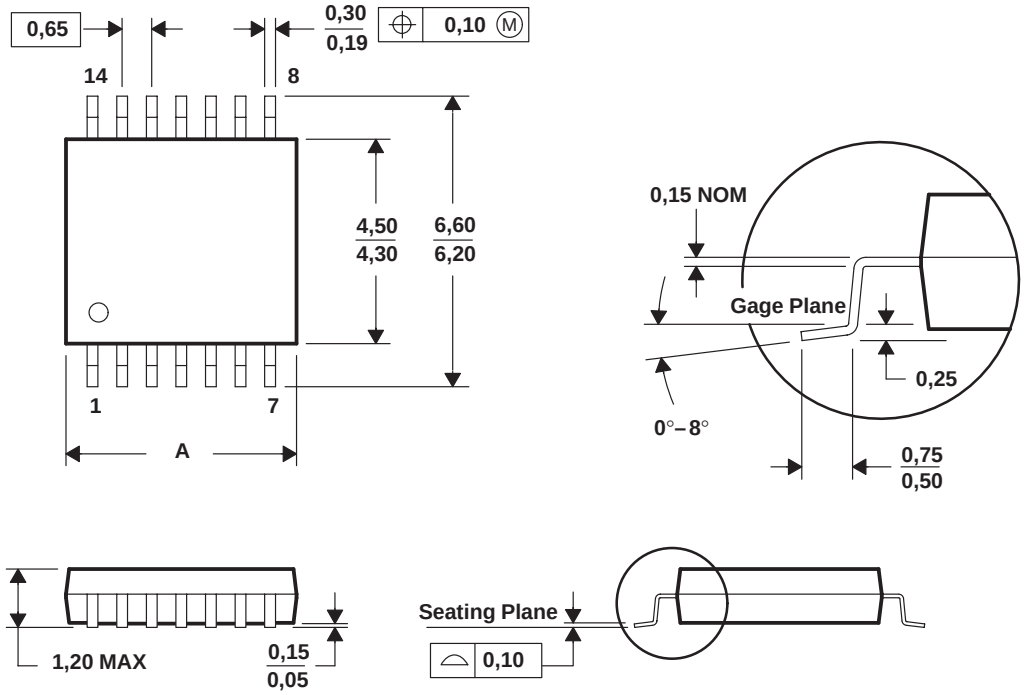
D (R–PDSO–G14) PLASTIC SMALL–OUTLINE PACKAGE



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 variation AB.

PW (R-PDSO-G)** **PLASTIC SMALL-OUTLINE PACKAGE**

14 PINS SHOWN



DIM \ PINS **	8	14	16	20	24	28
A MAX	3,10	5,10	5,10	6,60	7,90	9,80
A MIN	2,90	4,90	4,90	6,40	7,70	9,60

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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