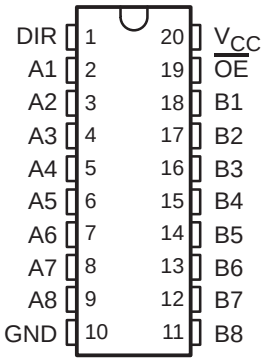
- **Qualification in Accordance With AEC-Q100†**
- **Qualified for Automotive Applications**
- **Customer-Specific Configuration Control Can Be Supported Along With Major-Change Approval**
- **ESD Protection Exceeds 1000 V Per MIL-STD-883, Method 3015; Exceeds 100 V Using Machine Model (C = 200 pF, R = 0)**
- **Operating Range 2-V to 5.5-V V_{CC}**

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

DW OR PW PACKAGE
(TOP VIEW)



description/ordering information

The SN74AHC245 octal bus transceiver is designed for asynchronous two-way communication between data buses. The control-function implementation minimizes external timing requirements.

This device allows data transmission from the A bus to the B bus or from the B bus to the A bus, depending on the logic level at the direction-control (DIR) input. The output-enable ($\overline{OE}$) input can be used to disable the device so that the buses effectively are isolated.

To ensure the high-impedance state during power up or power down, $\overline{OE}$ should be tied to V_{CC} through a pullup resistor; the minimum value of the resistor is determined by the current-sinking capability of the driver.

ORDERING INFORMATION

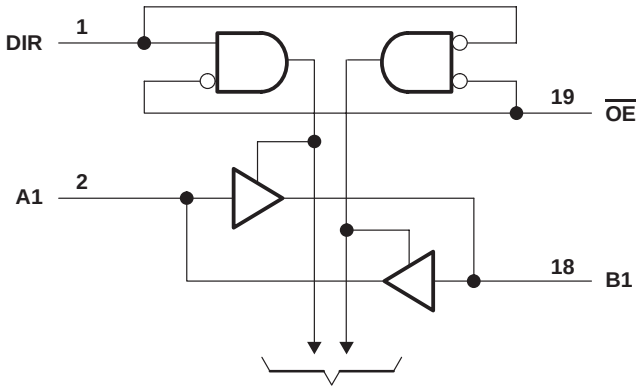
T_A	PACKAGE‡		ORDERABLE PART NUMBER	TOP-SIDE MARKING
–40°C to 125°C	SOIC – DW	Tape and reel	SN74AHC245QDWRQ1	AHC245Q1
	TSSOP – PW	Tape and reel	SN74AHC245QPWRQ1	AHC245Q1

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

FUNCTION TABLE
(each transceiver)

INPUTS		OPERATION
$\overline{OE}$	DIR	
L	L	B data to A bus
L	H	A data to B bus
H	X	Isolation

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 voltage range, V_I (see Note 1): Control inputs	–0.5 V to 7 V
I/O, output voltage range, V_O (see Note 1)	–0.5 V to V_{CC} + 0.5 V
Input clamp current, I_{IK} (V_I < 0): Control inputs	–20 mA
I/O, output clamp current, I_{OK} (V_O < 0 or V_O > V_{CC})	±20 mA
Continuous output current, I_O (V_O = 0 to V_{CC})	±25 mA
Continuous current through V_{CC} or GND	±75 mA
Package thermal impedance, θ_{JA} (see Note 2): DW package	58°C/W
PW package	83°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	MAX	UNIT
V_{CC}	Supply voltage		2	5.5	V
V_{IH}	High-level input voltage	V_{CC} = 2 V	1.5		V
		V_{CC} = 3 V	2.1		
		V_{CC} = 5.5 V	3.85		
V_{IL}	Low-level input voltage	V_{CC} = 2 V		0.5	V
		V_{CC} = 3 V		0.9	
		V_{CC} = 5.5 V		1.65	
V_I	Input voltage	$\overline{OE}$ or DIR	0	5.5	V
V_O	Output voltage	A or B	0	V_{CC}	V
I_{OH}	High-level output current	V_{CC} = 2 V		–50	μA
		V_{CC} = 3.3 V ± 0.3 V		–4	mA
		V_{CC} = 5 V ± 0.5 V		–8	
I_{OL}	Low-level output current	V_{CC} = 2 V		50	μA
		V_{CC} = 3.3 V ± 0.3 V		4	mA
		V_{CC} = 5 V ± 0.5 V		8	
$\Delta t/\Delta v$	Input transition rise or fall rate	V_{CC} = 3.3 V ± 0.3 V		100	ns/V
		V_{CC} = 5 V ± 0.5 V		20	
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	V_{CC}	T_A = 25°C			MIN	MAX	UNIT
				MIN	TYP	MAX			
V_{OH}		I_{OH} = –50 μA	2 V	1.9	2		1.9		V
			3 V	2.9	3		2.9		
			4.5 V	4.4	4.5		4.4		
		I_{OH} = –4 mA	3 V	2.58			2.48		
		I_{OH} = –8 mA	4.5 V	3.94			3.8		
V_{OL}		I_{OL} = 50 μA	2 V			0.1		0.1	V
			3 V			0.1		0.1	
			4.5 V			0.1		0.1	
		I_{OL} = 4 mA	3 V			0.36		0.5	
		I_{OL} = 8 mA	4.5 V			0.36		0.5	
I_I	A or B inputs	V_I = 5.5 V or GND	5.5 V			±0.1		±1	μA
	$\overline{OE}$ or DIR		0 V to 5.5 V			±0.1		±1	
I_{OZ}†		$V_O = V_{CC}$ or GND, V_I ($\overline{OE}$) = V_{IL} or V_{IH}	5.5 V			±0.25		±2.5	μA
I_{CC}		$V_I = V_{CC}$ or GND, I_O = 0	5.5 V			4		40	μA
C_i	$\overline{OE}$ or DIR	$V_I = V_{CC}$ or GND	5 V		2.5	10			pF
C_{io}	A or B inputs	$V_I = V_{CC}$ or GND	5 V		4				pF

† The parameter I_{OZ} includes the input leakage current.

switching characteristics over recommended operating free-air temperature range, V_{CC} = 3.3 V ± 0.3 V (unless otherwise noted) (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	LOAD CAPACITANCE	T_A = 25°C			MIN	MAX	UNIT
				MIN	TYP	MAX			
t_{PLH}	A or B	B or A	C_L = 15 pF		5.8	8.4	1	10	ns
t_{PHL}					5.8	8.4	1	10	
t_{PZH}	$\overline{OE}$	A or B	C_L = 15 pF		8.5	13.2	1	15.5	ns
t_{PZL}					8.5	13.2	1	15.5	
t_{PHZ}	$\overline{OE}$	A or B	C_L = 15 pF		8.9	12.5	1	15.5	ns
t_{PLZ}					8.9	12.5	1	15.5	
t_{PLH}	A or B	B or A	C_L = 50 pF		8.3	11.9	1	13.5	ns
t_{PHL}					8.3	11.9	1	13.5	
t_{PZH}	$\overline{OE}$	A or B	C_L = 50 pF		11	16.7	1	19	ns
t_{PZL}					11	16.7	1	19	
t_{PHZ}	$\overline{OE}$	A or B	C_L = 50 pF		11.5	15.8	1	18	ns
t_{PLZ}					11.5	15.8	1	18	

switching characteristics over recommended operating free-air temperature range, V_{CC} = 5 V ± 0.5 V (unless otherwise noted) (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	LOAD CAPACITANCE	T_A = 25°C			MIN	MAX	UNIT
				MIN	TYP	MAX			
t_{PLH}	A or B	B or A	C_L = 15 pF		4	5.5	1	6.5	ns
t_{PHL}					4	5.5	1	6.5	
t_{PZH}	$\overline{OE}$	A or B	C_L = 15 pF		5.8	8.5	1	10	ns
t_{PZL}					5.8	8.5	1	10	
t_{PHZ}	$\overline{OE}$	A or B	C_L = 15 pF		5.6	7.8	1	9.2	ns
t_{PLZ}					5.6	7.8	1	9.2	
t_{PLH}	A or B	B or A	C_L = 50 pF		5.5	7.5	1	8.5	ns
t_{PHL}					5.5	7.5	1	8.5	
t_{PZH}	$\overline{OE}$	A or B	C_L = 50 pF		7.3	10.6	1	12	ns
t_{PZL}					7.3	10.6	1	12	
t_{PHZ}	$\overline{OE}$	A or B	C_L = 50 pF		7	9.7	1	11	ns
t_{PLZ}					7	9.7	1	11	

noise characteristics, V_{CC} = 5 V, C_L = 50 pF, T_A = 25°C (see Note 4)

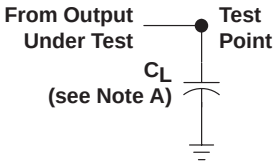
PARAMETER		MIN	TYP	MAX	UNIT
$V_{OL(P)}$	Quiet output, maximum dynamic V_{OL}		0.9		V
$V_{OL(V)}$	Quiet output, minimum dynamic V_{OL}		–0.9		V
$V_{OH(V)}$	Quiet output, minimum dynamic V_{OH}		4.3		V
$V_{IH(D)}$	High-level dynamic input voltage	3.5			V
$V_{IL(D)}$	Low-level dynamic input voltage			1.5	V

NOTE 4: Characteristics are for surface-mount packages only.

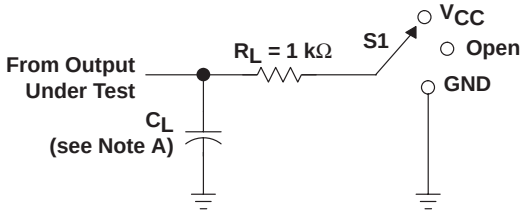
operating characteristics, V_{CC} = 5 V, T_A = 25°C

PARAMETER		TEST CONDITIONS	TYP	UNIT
C_{pd}	Power dissipation capacitance	No load, f = 1 MHz	14	pF

PARAMETER MEASUREMENT INFORMATION

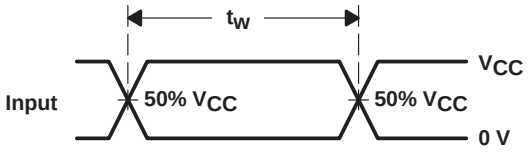


LOAD CIRCUIT FOR
TOTEM-POLE OUTPUTS

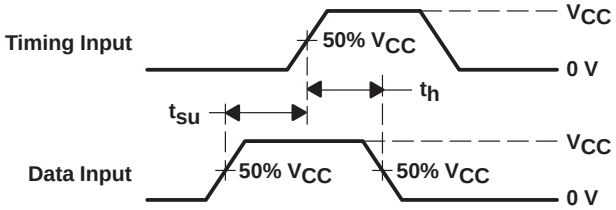


LOAD CIRCUIT FOR
3-STATE AND OPEN-DRAIN OUTPUTS

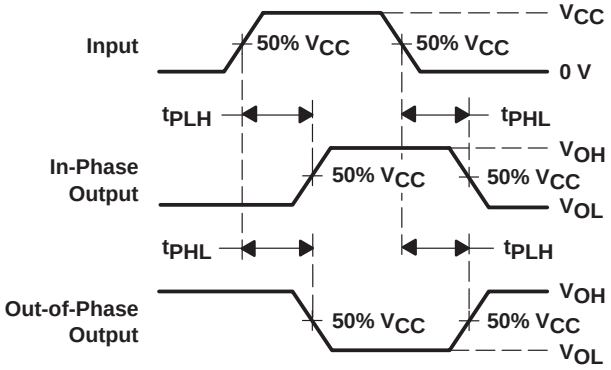
TEST	S1
t_{PLH}/t_{PHL}	Open
t_{PLZ}/t_{PZL}	V_{CC}
t_{PHZ}/t_{PZH}	GND
Open Drain	V_{CC}



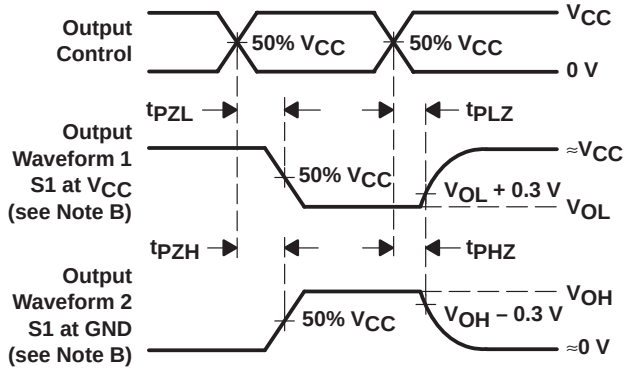
VOLTAGE WAVEFORMS
PULSE DURATION



VOLTAGE WAVEFORMS
SETUP AND HOLD TIMES



VOLTAGE WAVEFORMS
PROPAGATION DELAY TIMES
INVERTING AND NONINVERTING OUTPUTS

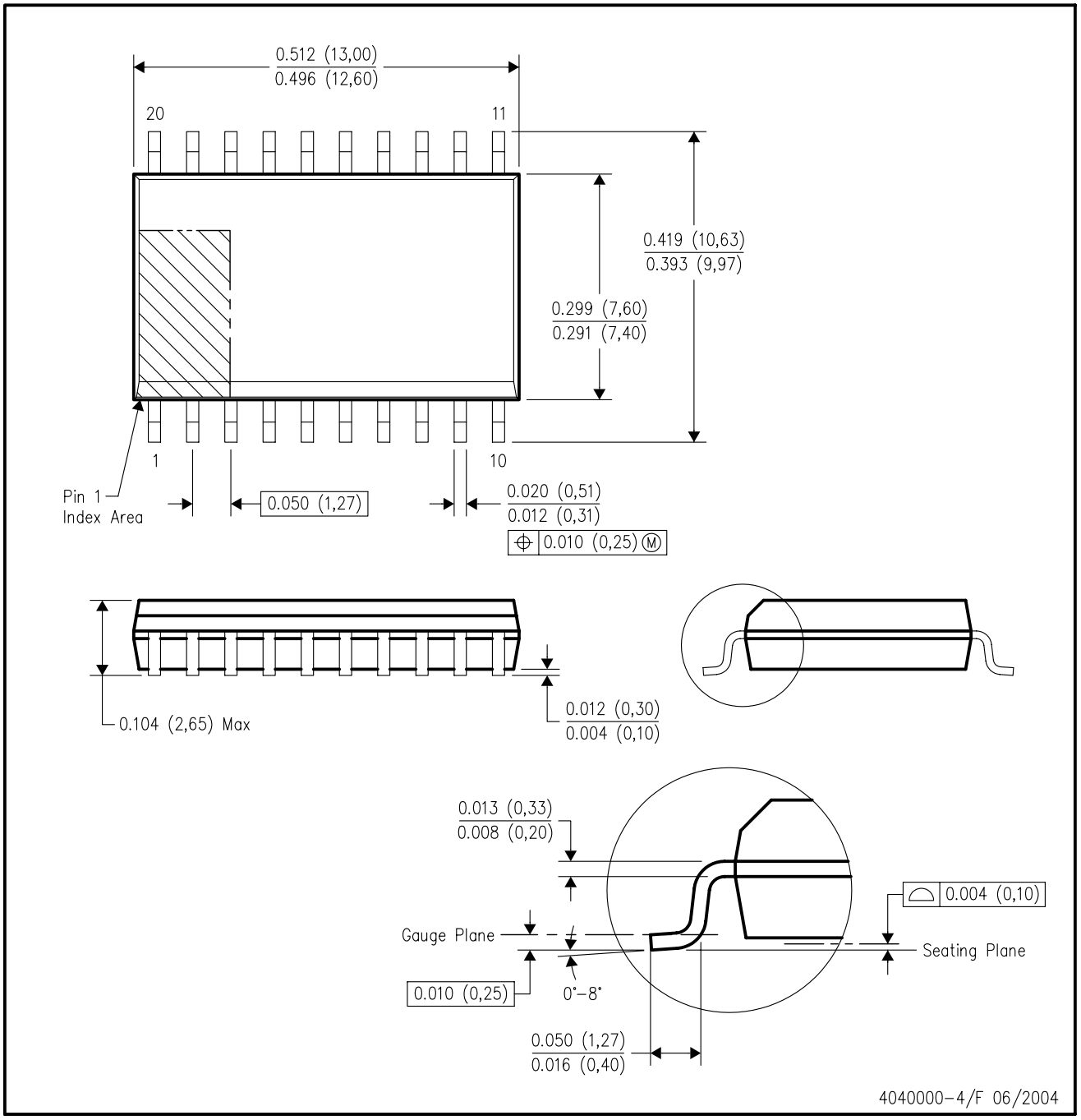


VOLTAGE WAVEFORMS
ENABLE AND DISABLE TIMES
LOW- AND HIGH-LEVEL ENABLING

NOTES: A. C_L includes probe and jig 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. All input pulses are supplied by generators having the following characteristics: PRR ≤ 1 MHz, Z_O = 50 Ω, t_r ≤ 3 ns, t_f ≤ 3 ns.
D. The outputs are measured one at a time with one input transition per measurement.

Figure 1. Load Circuit and Voltage Waveforms

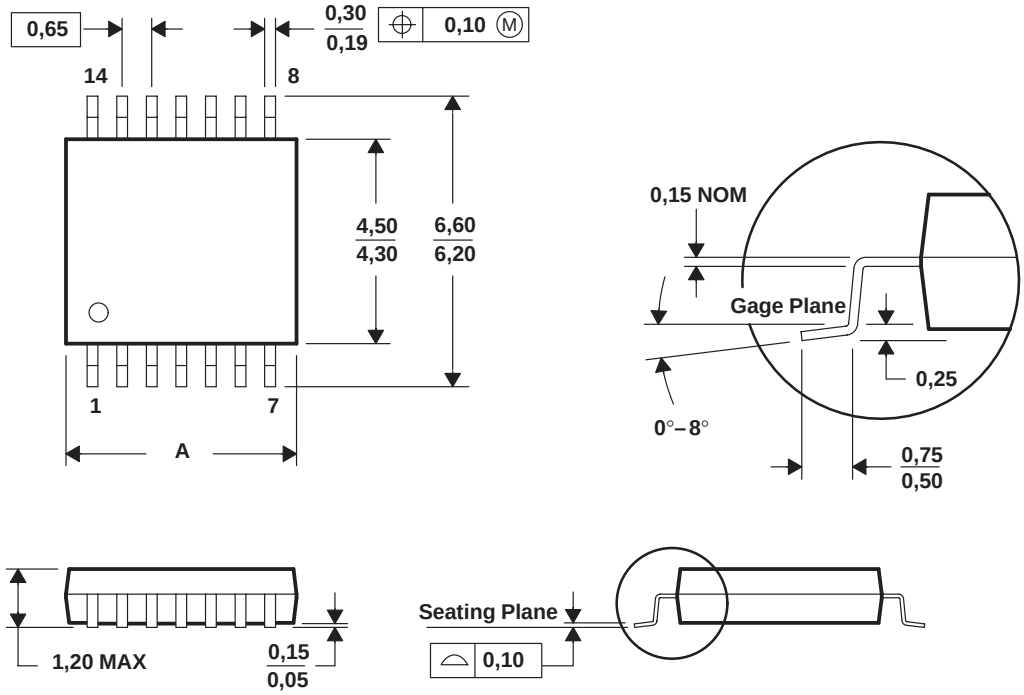
DW (R–PDSO–G20) PLASTIC SMALL–OUTLINE PACKAGE



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–013 variation AC.

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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