



HD74ALVC2G245

Dual Bus Transceivers with 3-state Output

REJ03D0176-0400Z
(Previous ADE-205-641C (Z))
Rev.4.00
Dec.18.2003

Description

The HD74ALVC2G245 has two buffers with three state output in an 8 pin package. When DIR is high, data is transferred from the A inputs to the B outputs, and when DIR is low, data is transferred from the B inputs to the A outputs. The A and B buses are separated by making the enable input (\overline{OE}) high level. Low voltage and high-speed operation is suitable for the battery powered products (e.g., notebook computers), and the low power consumption extends the battery life.

Features

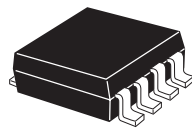
- The basic gate function is lined up as Renesas uni logic series.
- Supplied on emboss taping for high-speed automatic mounting.
- Supply voltage range : 1.2 to 3.6 V
Operating temperature range: -40 to +85°C
- All inputs V_{IH} (Max.) = 3.6 V (@ V_{CC} = 0 V to 3.6 V)
All outputs V_O (Max.) = 3.6 V (@ V_{CC} = 0 V)
- Output current ± 2 mA (@ V_{CC} = 1.2 V)
 ± 4 mA (@ V_{CC} = 1.4 V to 1.6 V)
 ± 6 mA (@ V_{CC} = 1.65 V to 1.95 V)
 ± 18 mA (@ V_{CC} = 2.3 V to 2.7 V)
 ± 24 mA (@ V_{CC} = 3.0 V to 3.6 V)

- Ordering Information

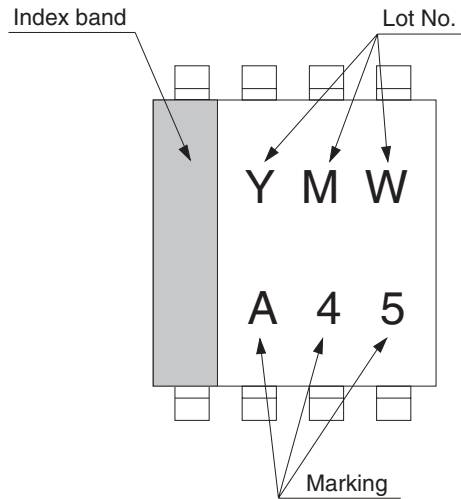
Part Name	Package Type	Package Code	Package Abbreviation	Taping Abbreviation (Quantity)
HD74ALVC2G245USE	SSOP-8 pin	TTP-8DBV	US	E (3,000 pcs/reel)

Outline and Article Indication

• HD74ALVC2G245



SSOP-8



Y : Year code
(the last digit of year)
M : Month code
W : Week code

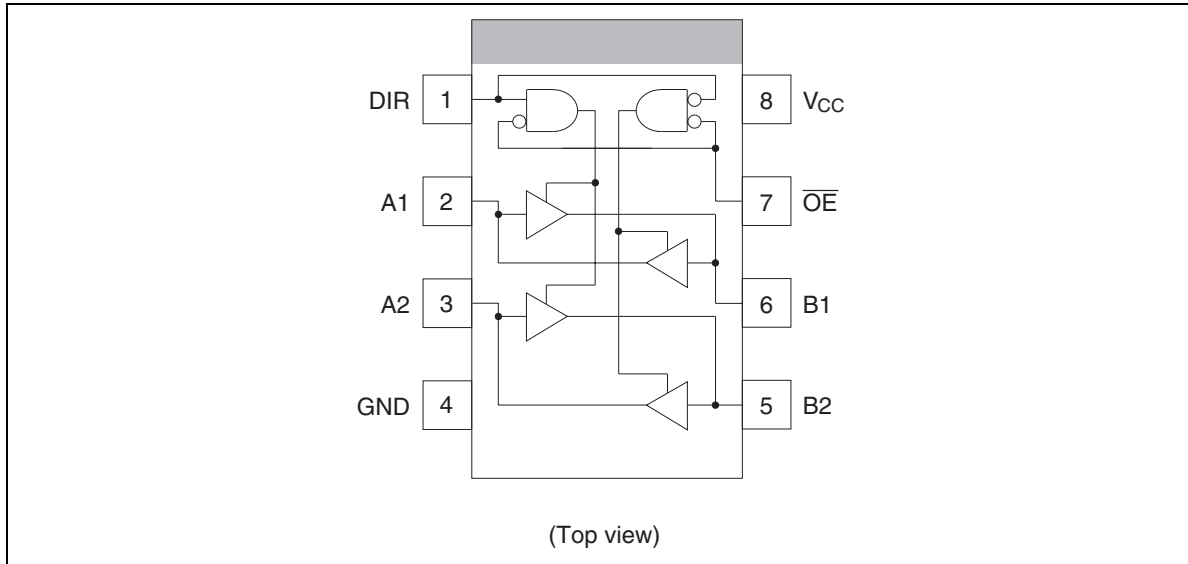
Function Table

Inputs

\overline{OE}	DIR	Operation
L	L	B data to A bus
L	H	A data to B bus
H	X	Isolation

H: High level
L: Low level
X: Immaterial

Pin Arrangement



Absolute Maximum Ratings

Item	Symbol	Ratings	Unit	Conditions
Supply voltage range	V_{CC}	-0.5 to 4.6	V	
Input voltage range ^{*1}	V_I	-0.5 to 4.6	V	
Output voltage range ^{*1, 2}	V_O	-0.5 to $V_{CC}+0.5$ -0.5 to 4.6	V	Output : H or L or Z V_{CC} : OFF
Input clamp current	I_{IK}	-50	mA	$V_I < 0$
Output clamp current	I_{OK}	± 50	mA	$V_O < 0$ or $V_O > V_{CC}$
Continuous output current	I_O	± 50	mA	$V_O = 0$ to V_{CC}
Continuous current through V_{CC} or GND	I_{CC} or I_{GND}	± 100	mA	
Maximum power dissipation at $T_a = 25^\circ\text{C}$ (in still air) ^{*3}	P_T	200	mW	
Storage temperature	T_{stg}	-65 to 150	$^\circ\text{C}$	

Notes: The absolute maximum ratings are values, which must not individually be exceeded, and furthermore, no two of which may be realized at the same time.

1. The input and output voltage ratings may be exceeded if the input and output clamp-current ratings are observed.
2. This value is limited to 4.6 V maximum.
3. The maximum package power dissipation was calculated using a junction temperature of 150 $^\circ\text{C}$.

Recommended Operating Conditions

Item	Symbol	Min	Max	Unit	Conditions
Supply voltage range	V_{CC}	1.2	3.6	V	
Input voltage range	V_I	0	3.6	V	
Output voltage range	V_O	0	V_{CC}	V	
Output current	I_{OH}	—	–2	mA	$V_{CC} = 1.2\text{ V}$
		—	–4		$V_{CC} = 1.4\text{ V}$
		—	–6		$V_{CC} = 1.65\text{ V}$
		—	–18		$V_{CC} = 2.3\text{ V}$
		—	–24		$V_{CC} = 3.0\text{ V}$
	I_{OL}	—	2		$V_{CC} = 1.2\text{ V}$
		—	4		$V_{CC} = 1.4\text{ V}$
		—	6		$V_{CC} = 1.65\text{ V}$
		—	18		$V_{CC} = 2.3\text{ V}$
		—	24		$V_{CC} = 3.0\text{ V}$
Input transition rise or fall rate	$\Delta t / \Delta v$	0	20	ns / V	$V_{CC} = 1.2\text{ to }2.7\text{ V}$
		0	10		$V_{CC} = 3.3\pm 0.3\text{ V}$
Operating free-air temperature	T_a	–40	85	°C	

Note: Unused or floating inputs must be held high or low.

Electrical Characteristics

(Ta = -40 to 85°C)

Item	Symbol	V _{CC} (V) *	Min	Typ	Max	Unit	Test conditions
Input voltage	V _{IH}	1.2	V _{CC} ×0.75	—	—	V	
		1.4 to 1.6	V _{CC} ×0.7	—	—		
		1.65 to 1.95	V _{CC} ×0.7	—	—		
		2.3 to 2.7	1.7	—	—		
		3.0 to 3.6	2.0	—	—		
	V _{IL}	1.2	—	—	V _{CC} ×0.25		
		1.4 to 1.6	—	—	V _{CC} ×0.3		
		1.65 to 1.95	—	—	V _{CC} ×0.3		
		2.3 to 2.7	—	—	0.7		
		3.0 to 3.6	—	—	0.8		
Output voltage	V _{OH}	Min to Max	V _{CC} -0.2	—	—	V	I _{OH} = -100 μA
		1.2	0.9	—	—		I _{OH} = -2 mA
		1.4	1.1	—	—		I _{OH} = -4 mA
		1.65	1.2	—	—		I _{OH} = -6 mA
		2.3	1.7	—	—		I _{OH} = -18 mA
		3.0	2.2	—	—		I _{OH} = -24 mA
	V _{OL}	Min to Max	—	—	0.2		I _{OL} = 100 μA
		1.2	—	—	0.3		I _{OL} = 2 mA
		1.4	—	—	0.3		I _{OL} = 4 mA
		1.65	—	—	0.3		I _{OL} = 6 mA
		2.3	—	—	0.55		I _{OL} = 18 mA
		3.0	—	—	0.55		I _{OL} = 24 mA
Input current	I _{IN}	3.6	—	—	±5	μA	V _{IN} = 3.6 V or GND
Off state output current	I _{OZ}	3.6	—	—	±5	μA	V _O = V _{CC} or GND
Quiescent supply current	I _{CC}	3.6	—	—	10	μA	V _{IN} = V _{CC} or GND, I _O = 0
Output leakage current	I _{OFF}	0	—	—	5	μA	V _{IN} or V _O = 0 to 3.6 V
Input capacitance	C _{IN}	3.3	—	4.5	—	pF	V _{IN} = V _{CC} or GND
Output capacitance	C _O	3.3	—	6.5	—	pF	V _O = V _{CC} or GND

Note: For conditions shown as Min or Max, use the appropriate values under recommended operating conditions.

Switching Characteristics

(Ta = -40 to 85°C)

V_{CC} = 1.2 V

Item	Symbol	Min	Typ	Max	Unit	Test conditions	FROM (Input)	TO (Output)
Propagation delay time	t _{PLH} t _{PHL}	—	7.0	—	ns	C _L = 15 pF	A or B	B or A
Enable time	t _{ZH} t _{ZL}	—	8.5	—	ns	C _L = 15 pF	$\overline{\text{OE}}$	A or B
Disable time	t _{HZ} t _{LZ}	—	7.0	—	ns	C _L = 15 pF	$\overline{\text{OE}}$	A or B

V_{CC} = 1.5±0.1 V

Item	Symbol	Min	Typ	Max	Unit	Test conditions	FROM (Input)	TO (Output)
Propagation delay time	t _{PLH} t _{PHL}	2.0	—	8.0	ns	C _L = 15 pF	A or B	B or A
Enable time	t _{ZH} t _{ZL}	2.0	—	11.0	ns	C _L = 15 pF	$\overline{\text{OE}}$	A or B
Disable time	t _{HZ} t _{LZ}	2.0	—	10.0	ns	C _L = 15 pF	$\overline{\text{OE}}$	A or B

V_{CC} = 1.8±0.15 V

Item	Symbol	Min	Typ	Max	Unit	Test conditions	FROM (Input)	TO (Output)
Propagation delay time	t _{PLH} t _{PHL}	1.5	—	6.0	ns	C _L = 30 pF	A or B	B or A
Enable time	t _{ZH} t _{ZL}	1.5	—	8.0	ns	C _L = 30 pF	$\overline{\text{OE}}$	A or B
Disable time	t _{HZ} t _{LZ}	1.5	—	7.5	ns	C _L = 30 pF	$\overline{\text{OE}}$	A or B

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Switching Characteristics (cont)

$$V_{CC} = 2.5 \pm 0.2 \text{ V}$$

Item	Symbol	Min	Typ	Max	Unit	Test conditions	FROM (Input)	TO (Output)
Propagation delay time	t_{PLH} t_{PHL}	1.0	—	4.0	ns	$C_L = 30 \text{ pF}$	A or B	B or A
Enable time	t_{ZH} t_{ZL}	1.0	—	5.0	ns	$C_L = 30 \text{ pF}$	\overline{OE}	A or B
Disable time	t_{HZ} t_{LZ}	1.0	—	4.5	ns	$C_L = 30 \text{ pF}$	\overline{OE}	A or B

$$V_{CC} = 3.3 \pm 0.3 \text{ V}$$

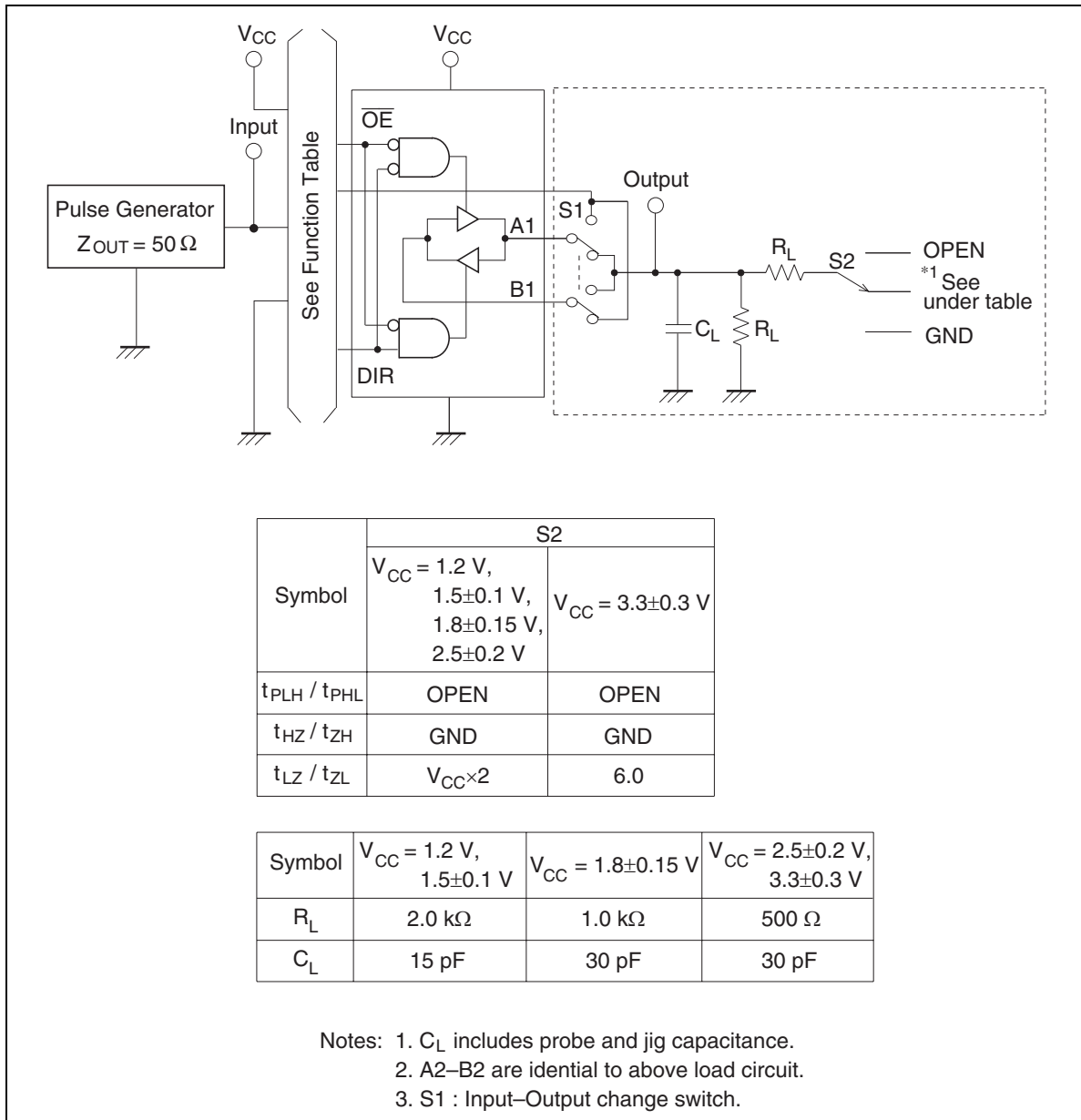
Item	Symbol	Min	Typ	Max	Unit	Test conditions	FROM (Input)	TO (Output)
Propagation delay time	t_{PLH} t_{PHL}	1.0	—	3.0	ns	$C_L = 30 \text{ pF}$	A or B	B or A
Enable time	t_{ZH} t_{ZL}	1.0	—	4.0	ns	$C_L = 30 \text{ pF}$	\overline{OE}	A or B
Disable time	t_{HZ} t_{LZ}	1.0	—	4.0	ns	$C_L = 30 \text{ pF}$	\overline{OE}	A or B

Operating Characteristics

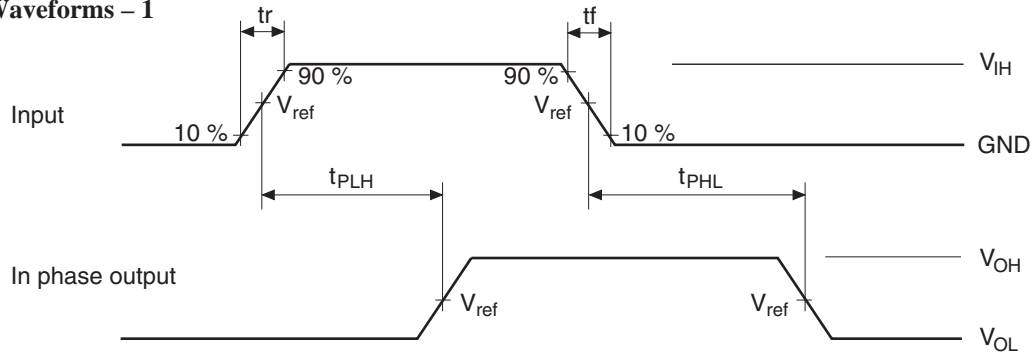
$$(T_a = 25^\circ\text{C})$$

Item	Symbol	V_{CC} (V)	Min	Typ	Max	Unit	Test conditions
Power dissipation capacitance	C_{PD}	1.5	—	13.0	—	pF	$f = 10 \text{ MHz}$
		1.8	—	13.0	—		
		2.5	—	14.0	—		
		3.3	—	17.0	—		

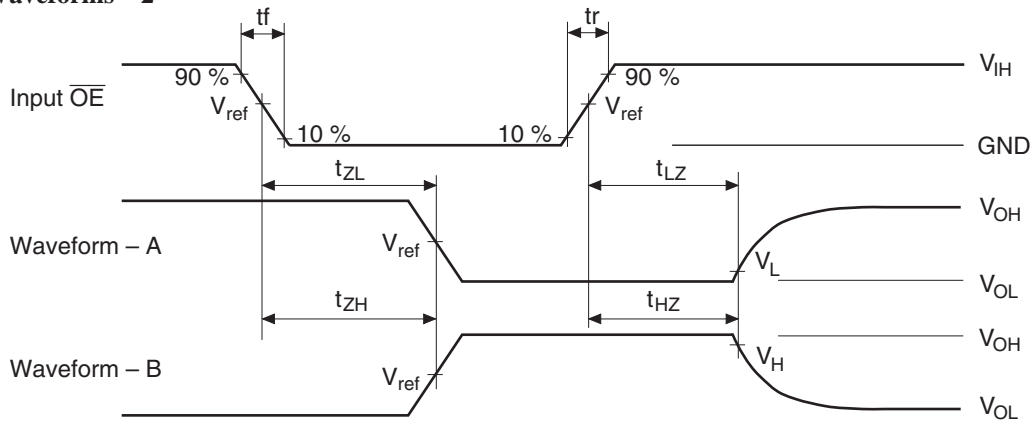
Test Circuit



• Waveforms – 1



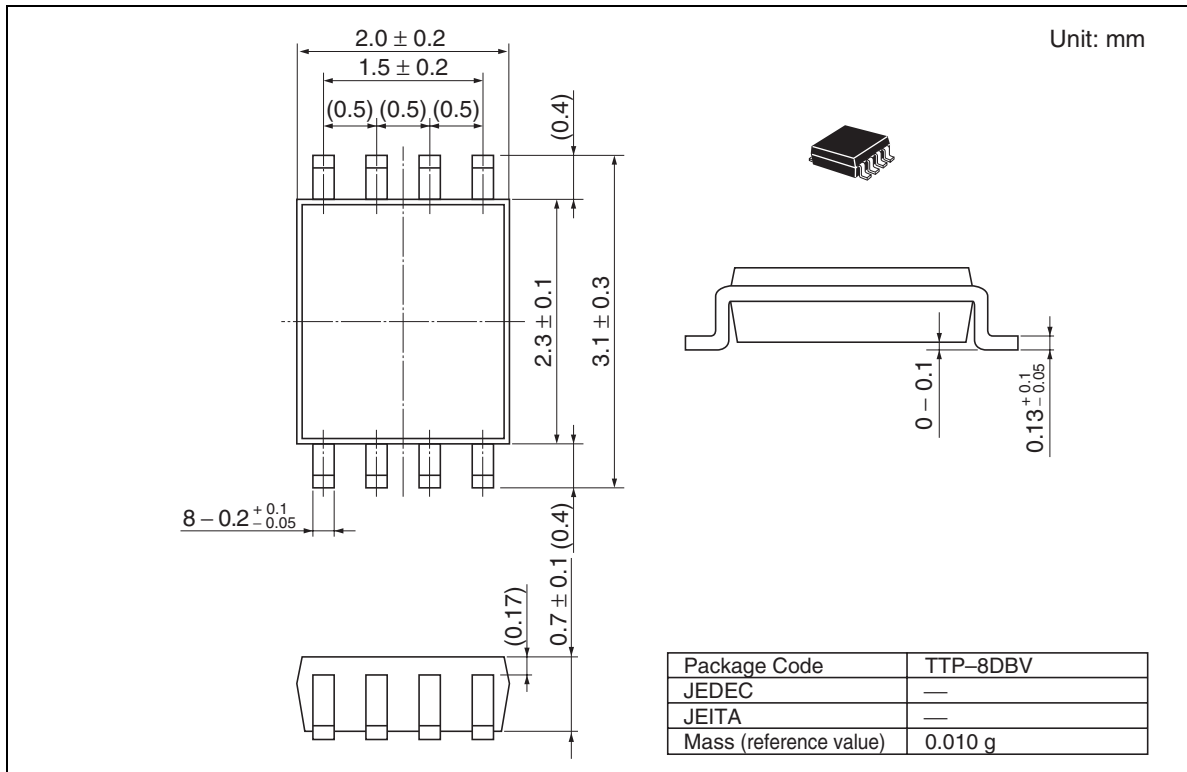
• Waveforms – 2



Symbol	$V_{CC} = 1.2 \text{ V},$ $1.5 \pm 0.1 \text{ V}$	$V_{CC} = 1.8 \pm 0.15 \text{ V}$	$V_{CC} = 2.5 \pm 0.2 \text{ V}$	$V_{CC} = 3.3 \pm 0.3 \text{ V}$
t_r / t_f	2.0 ns	2.0 ns	2.5 ns	2.5 ns
V_{IH}	V_{CC}	V_{CC}	V_{CC}	2.7 V
V_{ref}	50%	50%	50%	1.5 V
V_H / V_L	$V_H = V_{OH} - 0.1 \text{ V}$ $V_L = V_{OL} + 0.1 \text{ V}$	$V_H = V_{OH} - 0.15 \text{ V}$ $V_L = V_{OL} + 0.15 \text{ V}$	$V_H = V_{OH} - 0.15 \text{ V}$ $V_L = V_{OL} + 0.15 \text{ V}$	$V_H = V_{OH} - 0.3 \text{ V}$ $V_L = V_{OL} + 0.3 \text{ V}$

- Notes:
1. Input waveform : PRR $\leq 10 \text{ MHz}$, $Z_o = 50 \Omega$, duty cycle 50%.
 2. Waveform – A is for an output with internal conditions such that the output is low except when disabled by the output control.
 3. Waveform – B is for an output with internal conditions such that the output is high except when disabled by the output control.
 4. The output are measured one at a time with one transition per measurement.

Package Dimensions



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