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April 1st, 2010
Renesas Electronics Corporation

Issued by: Renesas Electronics Corporation (<http://www.renesas.com>)

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HD26LS32A

Quadruple Differential Line Receivers With 3 State Outputs

REJ03D0296-0200Z
 (Previous ADE-205-578 (Z))
 Rev.2.00
 Jul.16.2004

Description

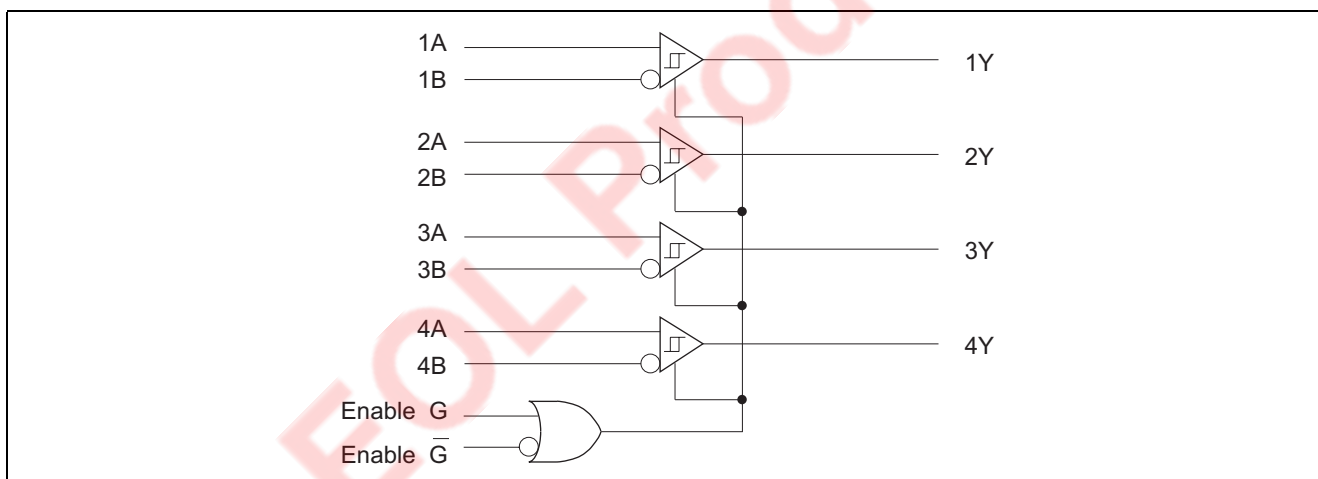
The HD26LS32A features quadruple line receivers designed to meet the specs of EIA standard RS-422A and RS-423. This device operates from a single 5 V power supply. The enable function is common to all four receivers and offers a choice of active high or active low input. Fail safe design ensures that if the inputs are open, the outputs will always be high.

Features

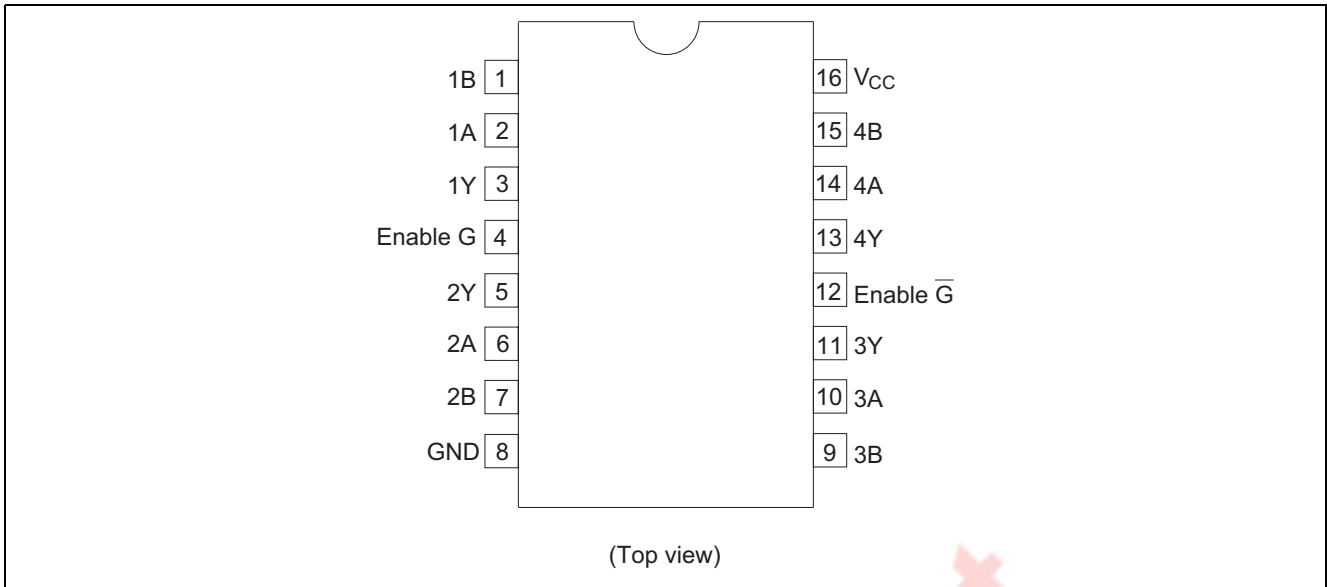
- Ordering Information

Part Name	Package Type	Package Code	Package Abbreviation	Taping Abbreviation (Quantity)
HD26LS32AP	DILP-16 pin (JEITA)	DP-16E, -16FV	P	—

Logic Diagram



Pin Arrangement



Function Table

Differential Input A – B	Enable		Output Y
	G	Ḡ	
$V_{ID} \geq V_{TH}$	H X	X L	H H
$V_{TL} < V_{ID} < V_{TH}$	H X	X L	? ?
$V_{ID} \leq V_{TL}$	H X	X L	L L
X	L	H	Z

- H : High level
- L : Low level
- X : Immaterial
- ? : Irrelevant
- Z : High impedance

Absolute Maximum Ratings

Item	Symbol	Ratings	Unit
Supply Voltage	V_{CC}^{*1}	7.0	V
Input Voltage A or B	V_{IN}	± 25	V
Differential Input Voltage	V_{ID}^{*2}	± 25	V
Enable Input Voltage	V_{IN}	7	V
Output Sink Current	I_{out}	50	mA
Continuous Total Dissipation	P_T	1	W
Operating Temperature	T_{opr}	0 to +70	°C
Storage Temperature	T_{stg}	-65 to 150	°C

- Notes:
1. All voltage values except for differential input voltage are with respect to network ground terminal.
 2. Differential input voltage is measured at the noninverting input with respect to the corresponding inverting input.
 3. 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.

Recommended Operating Conditions

Item	Symbol	Min	Typ	Max	Unit
Supply Voltage	V _{CC}	4.75	5.00	5.25	V
In Phase Input Voltage	V _{IC}	—	—	±7.0	V
Output Current	I _{OH}	—	—	-440	μA
	I _{OL}	—	—	8	mA
Operating Temperature	Topr	0	—	70	°C

Electrical Characteristics (Ta = 0 to +70°C)

Item	Symbol	Min	Typ*1	Max	Unit	Conditions
Differential Input High Threshold Voltage	V _{TH}	—	—	0.2	V	V _{IC} = -7 to +7 V V _{OH} = 2.7V, I _{OH} = -440 μA V _{OL} = 0.4 V, I _{OL} = 4 mA V _{OL} = 0.45 V, I _{OL} = 8 mA
Differential Input Low Threshold Voltage	V _{TL}	—	—	-0.2		
		—	—	-0.2		
Input Hysteresis*2	V _{TH} - V _{TL}	—	50	—	mV	
Enable Input Voltage	V _{IH}	2.0	—	—	V	V _{CC} = 4.75 V, I _{IN} = -18 mA V _{CC} = 4.75 V V _{IL} (\bar{G}) = 0.8 V V _{ID} = 1 V, I _{OH} = -440 μA V _{ID} = -1 V, I _{OL} = 4 mA V _{ID} = -1 V, I _{OL} = 8 mA
	V _{IL}	—	—	0.8		
Enable Input Clamp Voltage	V _{IK}	—	—	-1.5		
Output Voltage	V _{OH}	2.7	—	—		
	V _{OL}	—	—	0.4		
		—	—	0.45		
Off State (High Impedance) Output Current	I _{OZ}	—	—	20	μA	V _{CC} = 5.25 V V _O = 2.4 V V _O = 0.4 V
		—	—	-20		
Line Input Current	I _I	—	—	1.2	mA	V _I = 15 V, Other Inputs -10 to +15 V V _I = -15 V, Other Inputs -15 to +10 V
		—	—	-1.7		
Enable Input Current	I _I (EN)	—	—	100	μA	V _I = 5.5 V
	I _{IH}	—	—	20		V _I = 2.7 V
	I _{IL}	—	—	-0.36	mA	V _I = 0.4 V
Input Resistance	r _i	12	15	—	kΩ	V _{IC} = -15 to +15 V (Other Inputs AC GND)
Short Circuit Output Current	I _{OS} *3	-15	—	-85	mA	V _{CC} = 5.25 V
Supply Current	I _{CC}	—	52	70		V _{CC} = 5.25 V, V _I = 0 V (All Outputs Disable)

Notes: 1. All typical values are at V_{CC} = 5 V, Ta = 25°C, V_{IC} = 0.

2. Hysteresis is the differential between the positive going input threshold voltage and the negative going input threshold voltage.

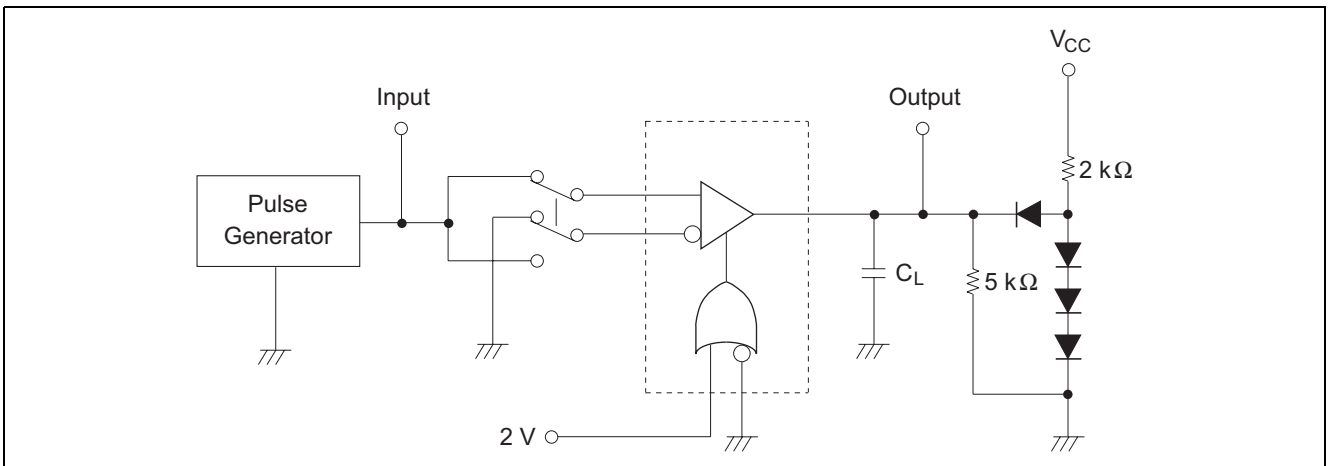
3. Not more than one output should be shorted at a time.

Switching Characteristics (V_{CC} = 5 V, Ta = 25°C)

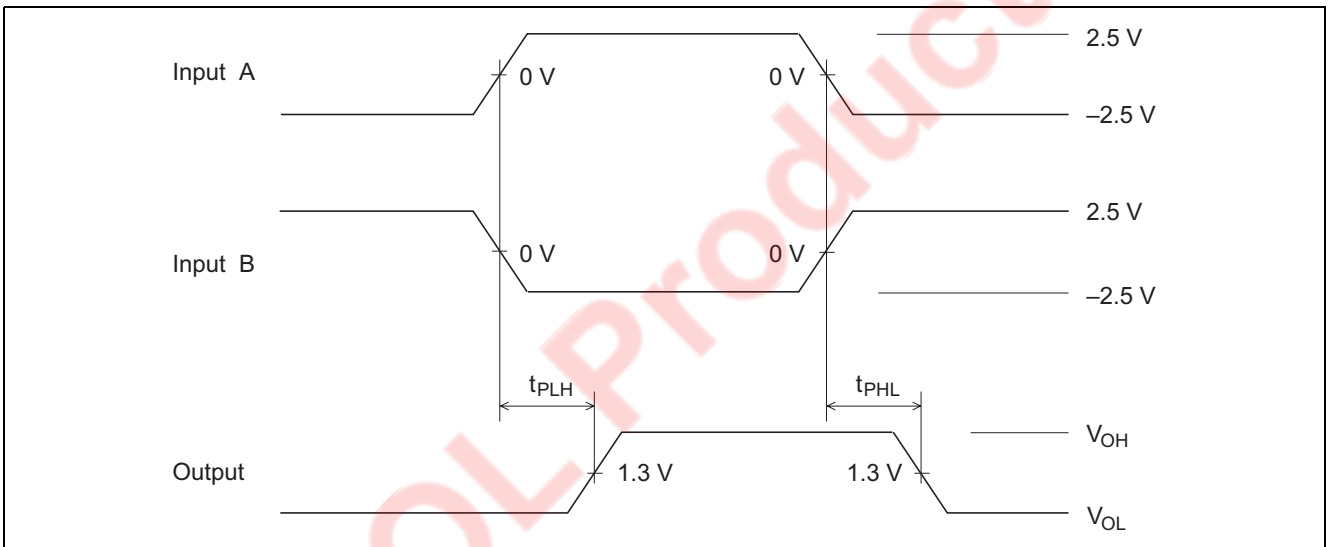
Item	Symbol	Min	Typ	Max	Unit	Conditions
Propagation Delay Time	t _{PLH}	—	20	35	ns	C _L = 15 pF
	t _{PHL}	—	22	35		
Output Enable Time	t _{ZH}	—	17	22	ns	C _L = 15 pF
	t _{ZL}	—	20	25		
Output Disable Time	t _{HZ}	—	21	30	ns	C _L = 5 pF
	t _{LZ}	—	30	40		

1. t_{PLH} , t_{PHL}

Test circuit

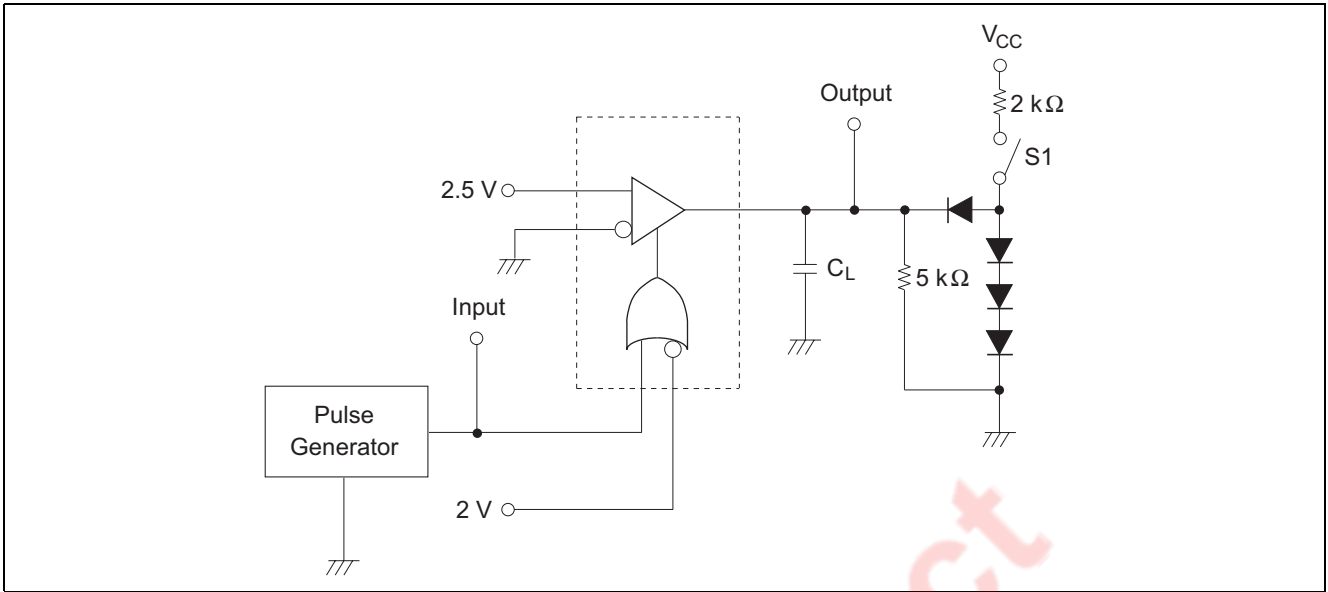


Waveforms

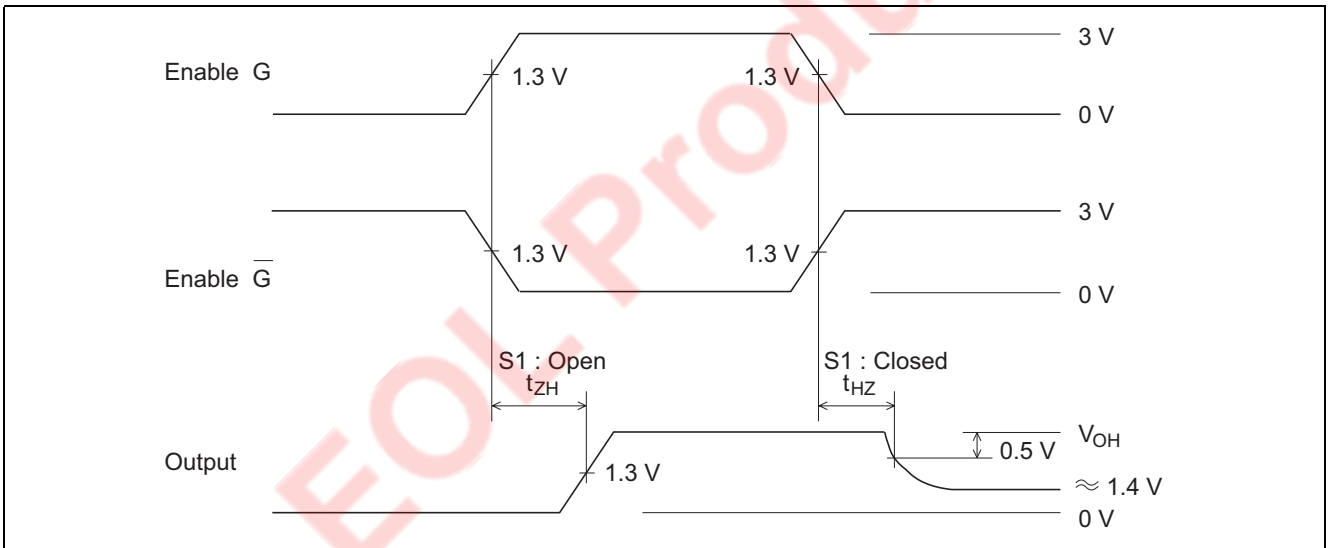


2. t_{HZ} , t_{ZH}

Test circuit

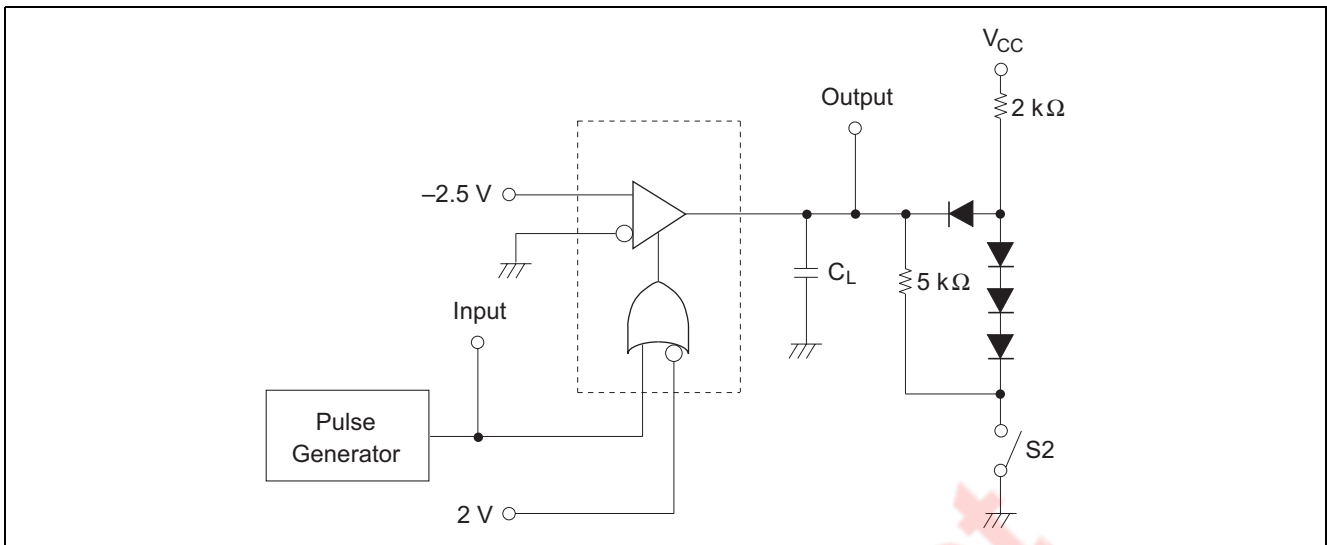


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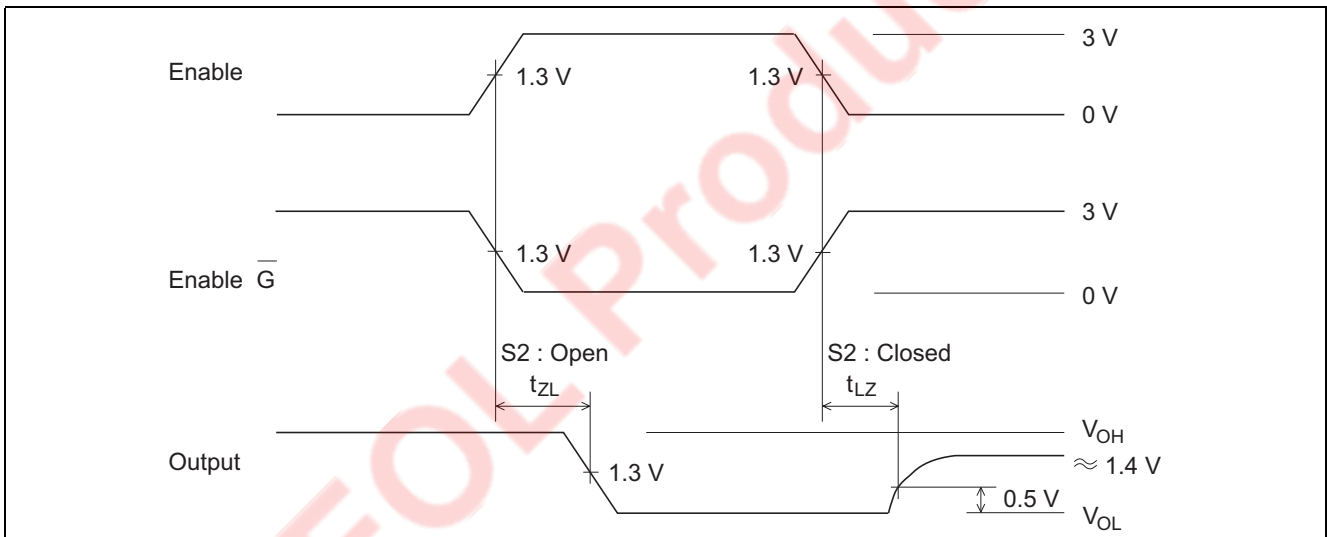


3. t_{LZ} , t_{ZL}

Test circuit



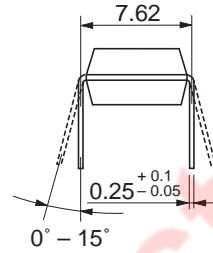
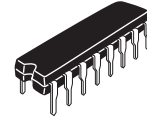
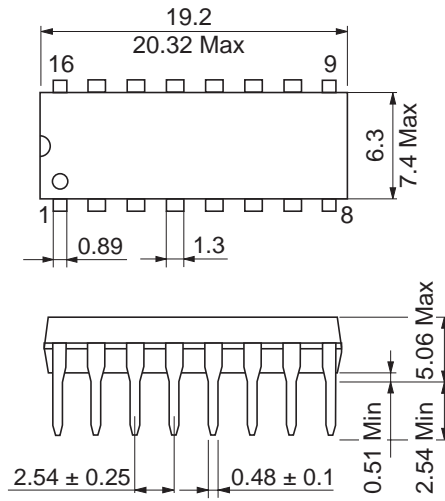
Waveforms



- Notes:
1. The pulse generator has the following characteristics:
 $PRR = 1 \text{ MHz}$, 50% duty cycle, $t_r \leq 6 \text{ ns}$, $t_f \leq 6 \text{ ns}$, $Z_{out} = 50 \Omega$.
 2. C_L includes probe and jig capacitance.
 3. All diodes are 1S2074(H).
 4. To test G input, ground G input and apply an inverted input waveform.

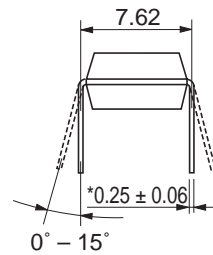
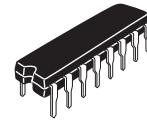
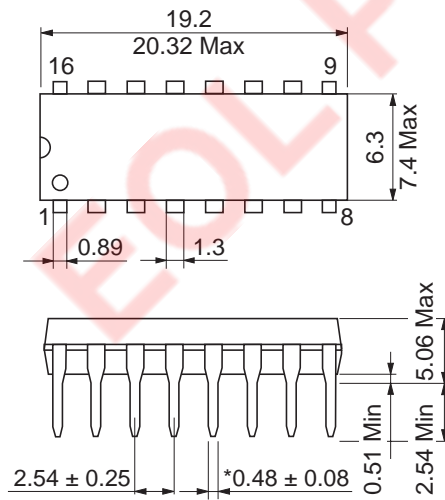
Package Dimensions

As of January, 2003
Unit: mm



Package Code	DP-16E
JEDEC	Conforms
JEITA	Conforms
Mass (reference value)	1.05 g

Unit: mm



*Ni/Pd/AU Plating

Package Code	DP-16FV
JEDEC	Conforms
JEITA	Conforms
Mass (reference value)	1.05 g

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