

# HD75160A

## Octal General Purpose Interface Bus Transceivers

REJ03D0308-0200Z  
 (Previous ADE-205-590 (Z))  
 Rev.2.00  
 Jul.16.2004

### Description

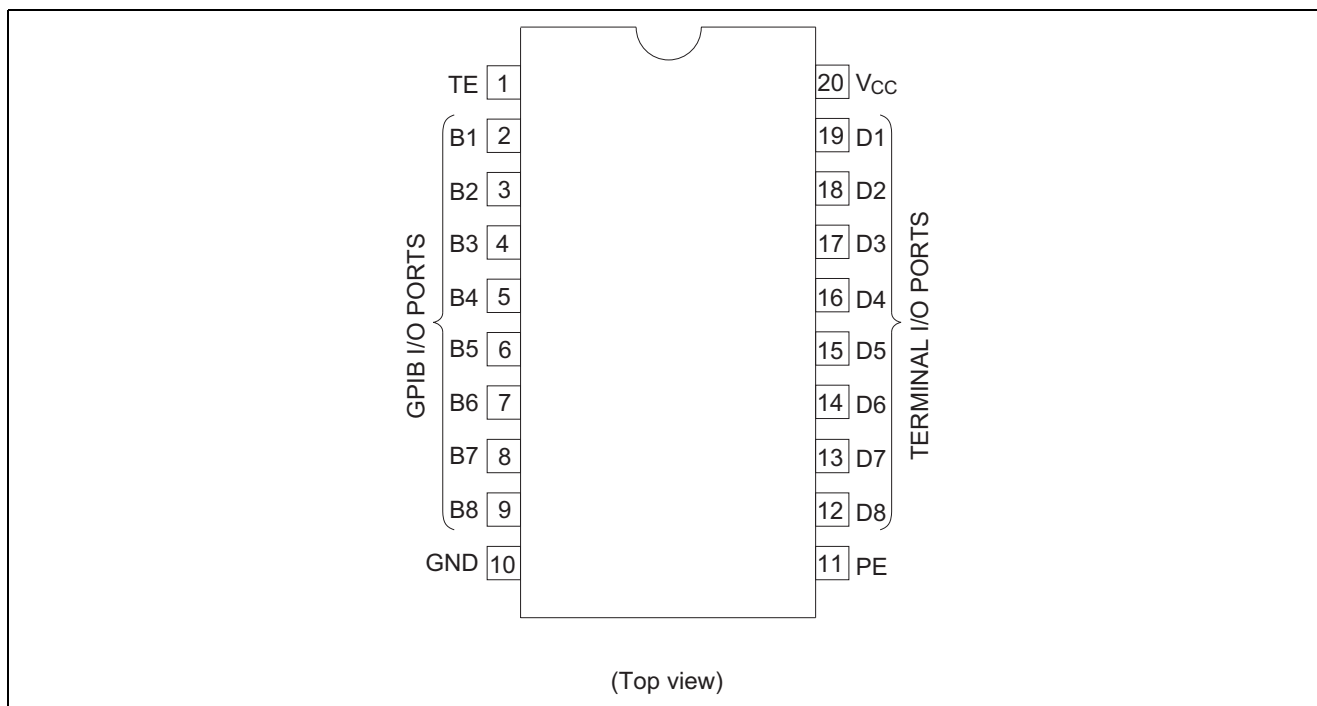
The HD75160A is an 8 channel general purpose interface bus transceiver designed to meet the requirements of IEEE standard 488-1978. The transceiver features driver outputs which can handle loads up to 48 mA of sink current if talk Enable (TE) is high, the ports have the characteristics of open collector outputs when pull up enable (PE) is low, and of three state outputs when PE is high. Taking TE low places the ports in the high impedance state. The device exhibits a high impedance to the bus when  $V_{CC} = 0\text{ V}$  since the bus terminating resistors are built in when combined with the HD75161A management bus transceivers, the pair provides the complete 16 wire interface for the IEEE-488 bus.

### Features

- Ordering Information

Part Name	Package Type	Package Code	Package Abbreviation	Taping Abbreviation (Quantity)
HD75160AP	DILP-20 pin	DP-20N, -20NEV	P	—

### Pin Arrangement



## Function Table

Drivers				Receivers			
Input			Output B	Input			Output D
D	TE	PE		B	TE	PE	
H	H	H	H	L	L	X	L
L	H	X	L	H	L	X	H
H	X	L	Z* <sup>1</sup>	X	H	X	Z
X	L	X	Z* <sup>1</sup>				

H : High level

L : Low level

X : Irrelevant

Z : High impedance

Note: 1. This is the high impedance state of a normal three state output modified by the internal resistors to  $V_{CC}$  and ground.

## Absolute Maximum Ratings

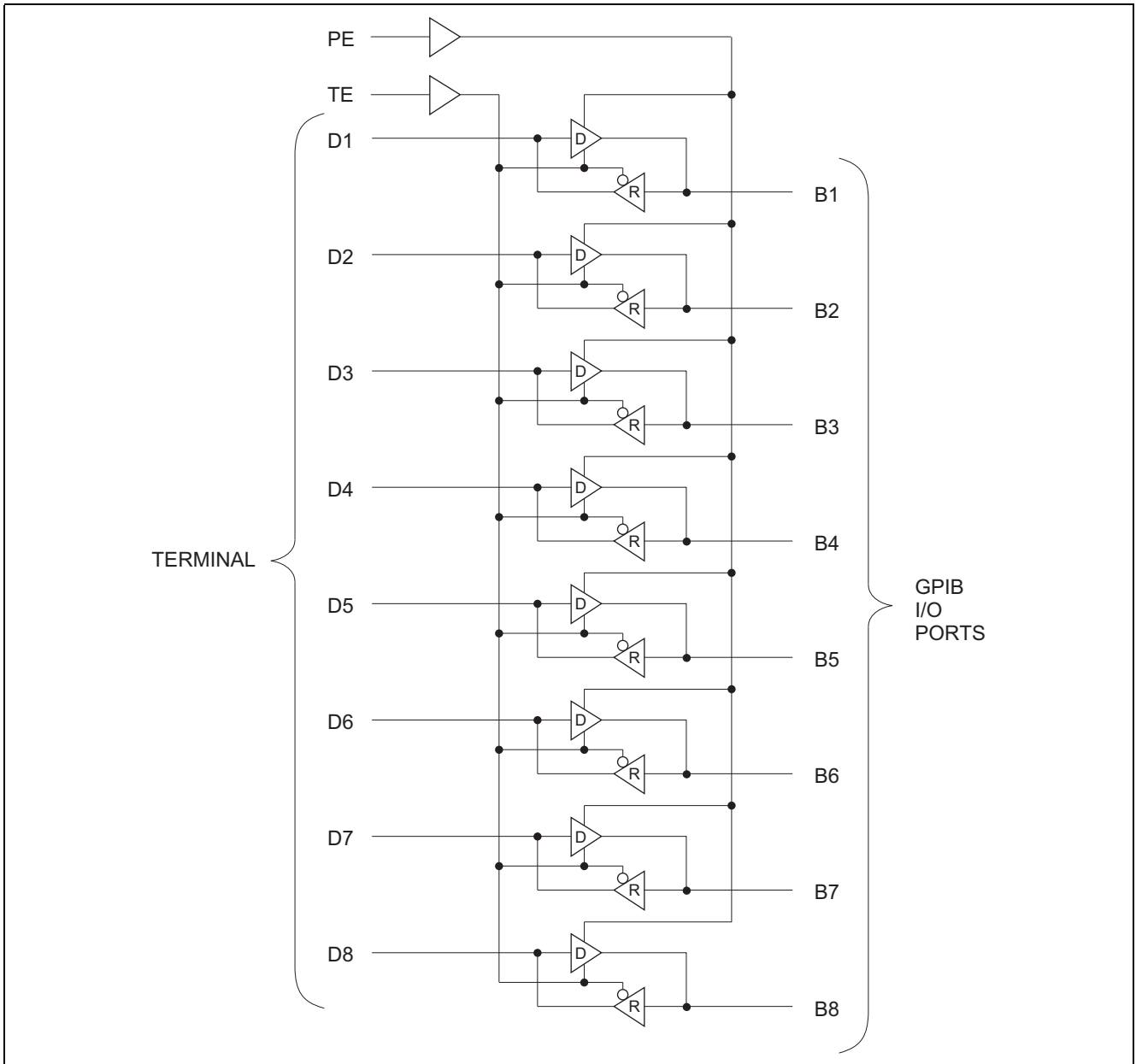
Item	Symbol	Rating	Unit
Supply Voltage	$V_{CC}$	7	V
Input Voltage	$V_{IN}$	5.5	V
Output Current	$I_{OL}$	100	mA
Power Dissipation ( $T_a = 25^\circ\text{C}$ )	$P_T$	1150	mW
Operating temperature range	$T_{opr}$	0 to 70	$^\circ\text{C}$
Storage Temperature Range	$T_{stg}$	-65 to +150	$^\circ\text{C}$

Note: 1. 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
Output Current	Bus Ports With Pull Ups Active	—	—	-5.2	mA
	Terminal Ports	—	—	-800	$\mu\text{A}$
Output Current	Bus Ports	—	—	48	mA
	Terminal Ports	—	—	16	
Operating Temperature	$T_{opr}$	0	—	70	$^\circ\text{C}$

Logic Diagram



**DC Electrical Characteristics (Ta = 0 to 70°C)**

Item	Symbol	V <sub>CC</sub>	Min	Max	Unit	Conditions		
Input Voltage	V <sub>IH</sub>	2	—	—	V			
	V <sub>IL</sub>	—	—	0.8				
Input Clamp Voltage	V <sub>IK</sub>	—	—	-1.5	V	I <sub>I</sub> = -18 mA		
Hysteresis	Bus	V <sub>T</sub> <sup>+</sup> - V <sub>T</sub> <sup>-</sup>	0.4	—	V			
Output Voltage	Terminal	V <sub>OH</sub>	2.7	—	—	V	I <sub>OH</sub> = -800 μA, TE at 0.8 V	
	Bus		2.5	—	—		I <sub>OH</sub> = -5.2 mA, PE and TE at 2 V	
	Terminal	V <sub>OL</sub>	—	—	0.5	V	I <sub>OL</sub> = 16 mA, TE at 0.8 V	
	Bus		—	—	0.5		I <sub>OL</sub> = 48 mA, TE at 2 V	
Input Current	Terminal	I <sub>I</sub>	—	—	100	μA	V <sub>I</sub> = 5.5 V	
			I <sub>IH</sub>	—	—	20		V <sub>I</sub> = 2.7 V
			I <sub>IL</sub>	—	—	-100		V <sub>I</sub> = 0.5 V
Voltage At Bus Port	V <sub>I/O (bus)</sub>	2.5	—	3.7	V	Driver	I <sub>I(bus)</sub> = 0	
		—	—	-1.5		Disabled	I <sub>I(bus)</sub> = -12 mA	
Current Into Bus Port	V <sub>CC</sub> ON	I <sub>I/O (bus)</sub>	-1.3	—	—	mA	Driver	V <sub>I(bus)</sub> = -1.5 V to 0.4 V
			0	—	-3.2		Disabled	V <sub>I(bus)</sub> = 0.4 V to 2.5 V
			—	—	+2.5			V <sub>I(bus)</sub> = 2.5 V to 3.7 V
			—	—	-3.2			
			0	—	2.5			V <sub>I(bus)</sub> = 3.7 V to 5 V
			0.7	—	2.5			V <sub>I(bus)</sub> = 5 V to 5.5 V
		—	—	40	μA	V <sub>CC</sub> = 0, V <sub>I(bus)</sub> = 0 V to 2.5 V		
Short circuit Output Current	Terminal	I <sub>OS</sub>	-15	—	-75	mA		
	Bus		-25	—	-125			
Supply Voltage	I <sub>CC</sub>	—	60	80	mA	No Load, Receivers Low and Enabled		
		—	75	100		No Load, Drivers Low and Enabled		
Busport Capacitance	C <sub>I/O (bus)</sub>	—	30	—	pF	V <sub>CC</sub> = 5 V or 0 V, V <sub>I/O</sub> = 0 to 2 V, f = 1 MHz		

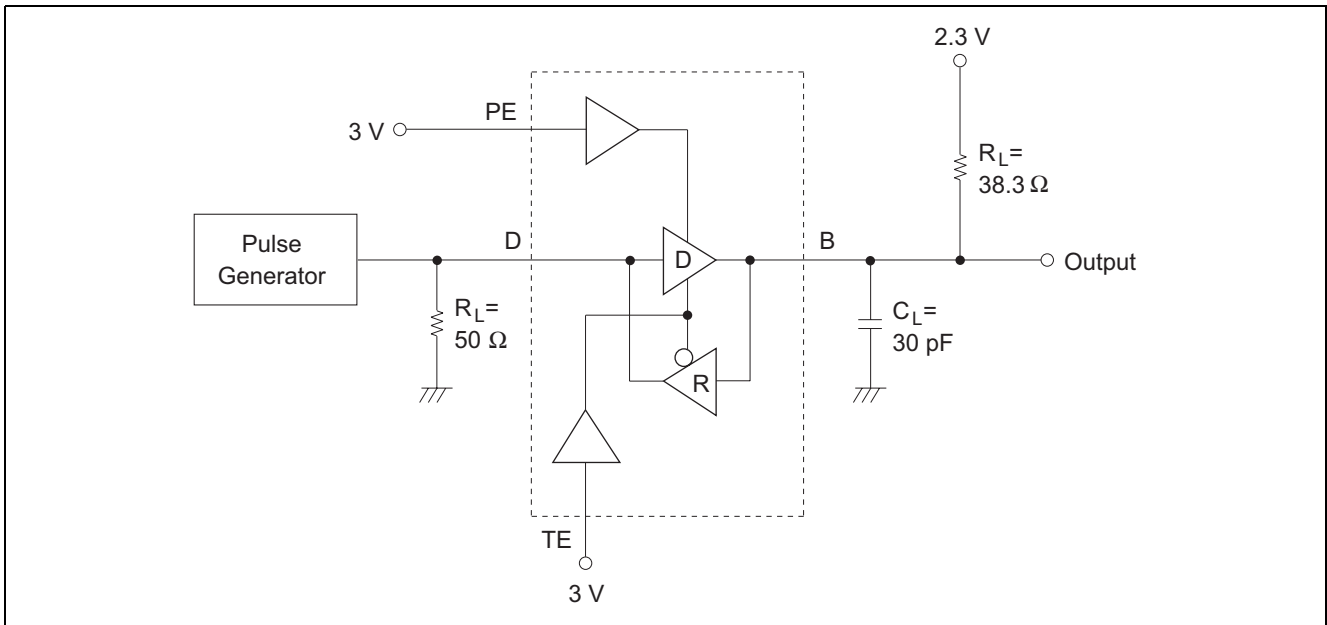
Note: 1. V<sub>CC</sub> = 5 V, Ta = 25°C

**Switching Characteristics (V<sub>CC</sub> = 5 V, Ta = 25°C)**

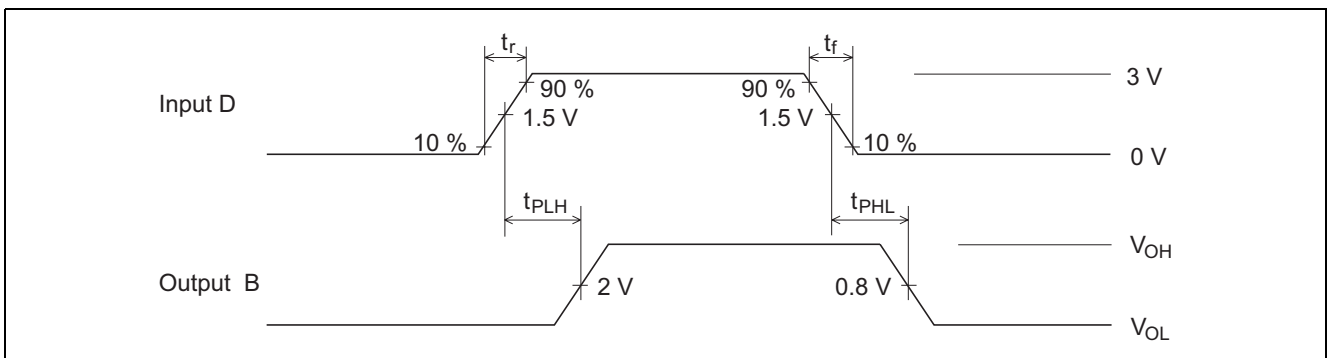
Item	Symbol	Input	Output	Min	Typ	Max	Unit	Test Circuit	Conditions
Propagation Delay Time	t <sub>PLH</sub>	Terminal	BUS	—	14	20	ns	1	C <sub>L</sub> = 30 pF R <sub>L</sub> = 38.3 Ω to 2.3 V
	t <sub>PHL</sub>			—	14	20			
	t <sub>PLH</sub>	BUS	Terminal	—	12	20			
	t <sub>PHL</sub>			—	16	22			
Output Enable Time	t <sub>ZH</sub>	TE	BUS	—	25	35	3	C <sub>L</sub> = 15 pF R <sub>L</sub> = 480 Ω to 0 V	
Output Disable Time	t <sub>HZ</sub>			—	13	22			
Output Enable Time	t <sub>ZL</sub>			—	22	35			
Output Disable Time	t <sub>LZ</sub>			—	22	32			
Output Enable Time	t <sub>ZH</sub>	TE	Terminal	—	20	30	4	C <sub>L</sub> = 15 pF R <sub>L</sub> = 3 kΩ to 0 V	
Output Disable Time	t <sub>HZ</sub>			—	12	20			
Output Enable Time	t <sub>ZL</sub>			—	23	32			
Output Disable Time	t <sub>LZ</sub>			—	19	30			
Output Pull up Enable Time	t <sub>en</sub>	PE	BUS	—	15	22	5	C <sub>L</sub> = 15 pF R <sub>L</sub> = 480 Ω to 0 V	
Output Pull up Disable Time	t <sub>dis</sub>			—	13	20			

## Switching Time Test Method

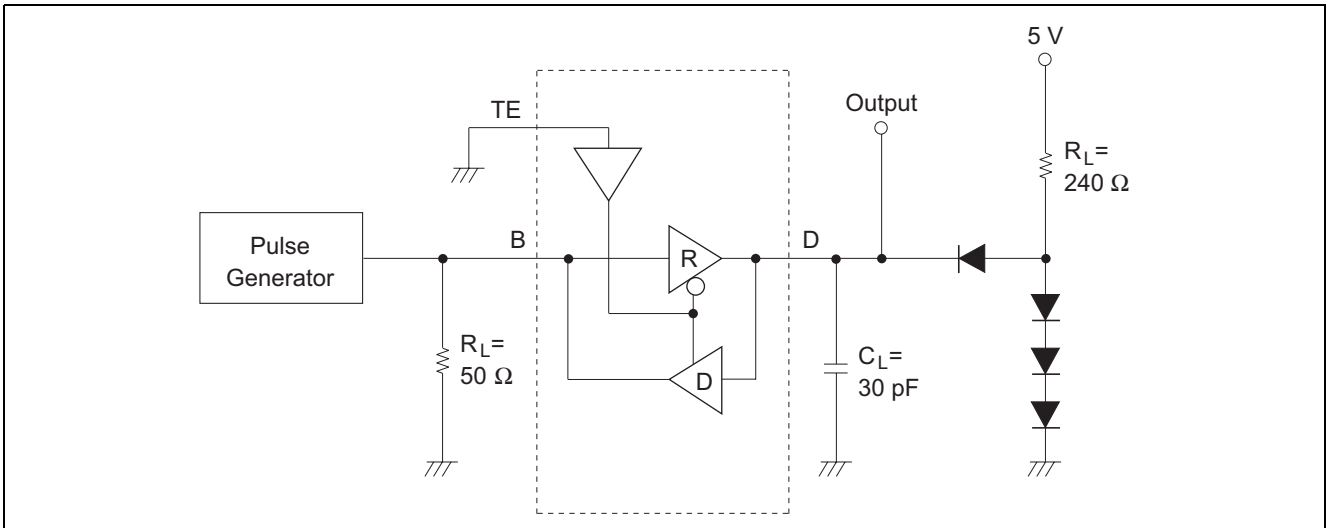
### 1. $t_{PLH}$ , $t_{PHL}$



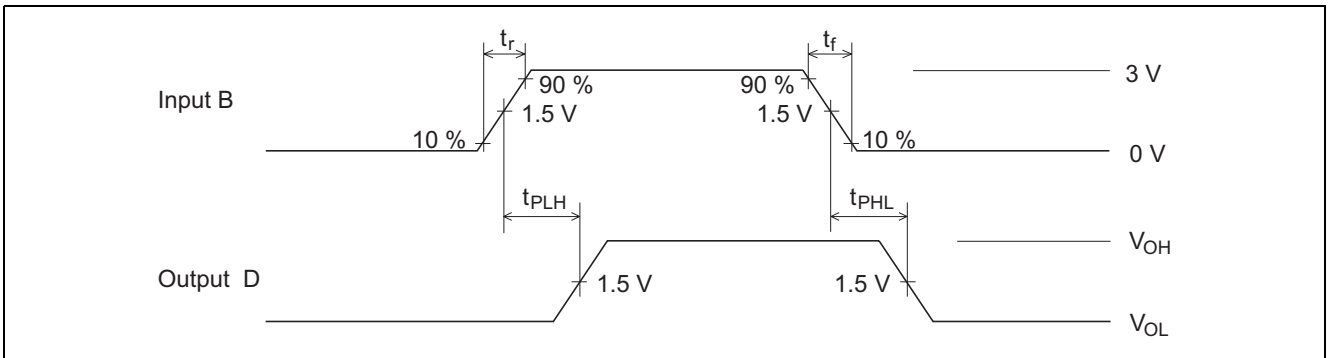
### Waveforms-1



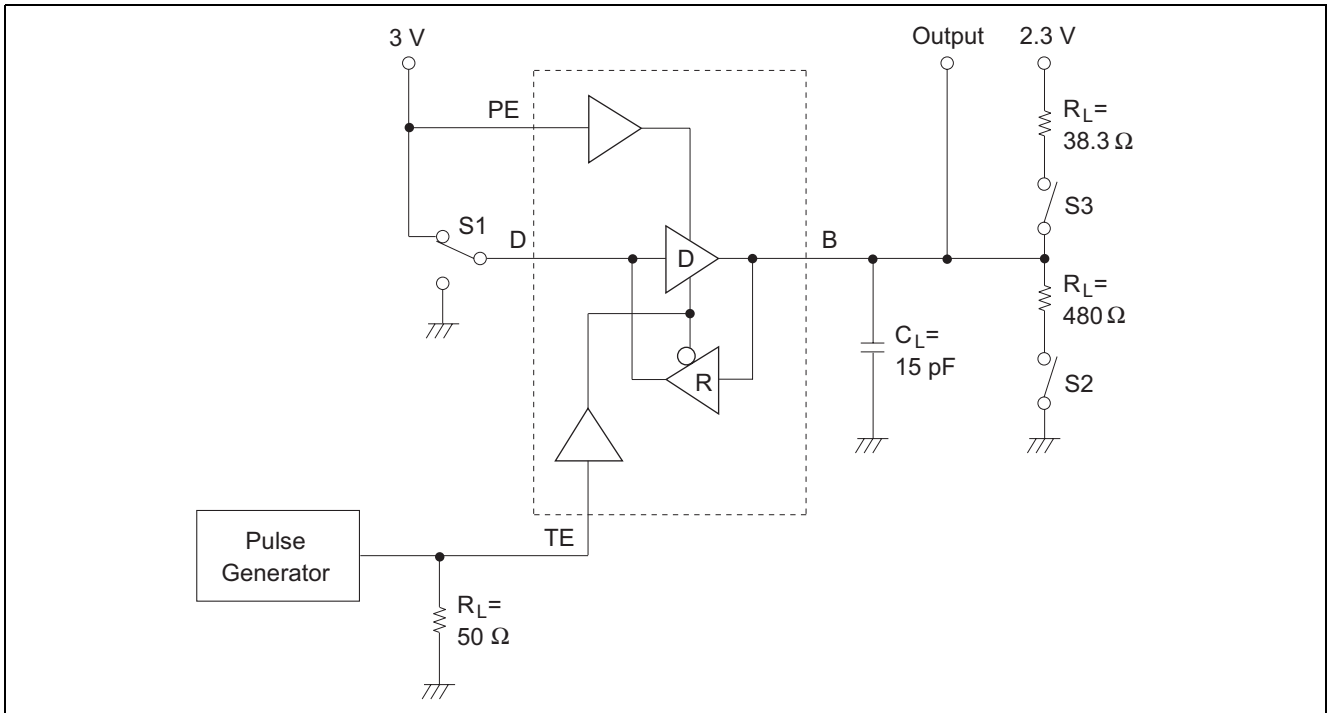
2.  $t_{PLH}$ ,  $t_{PHL}$



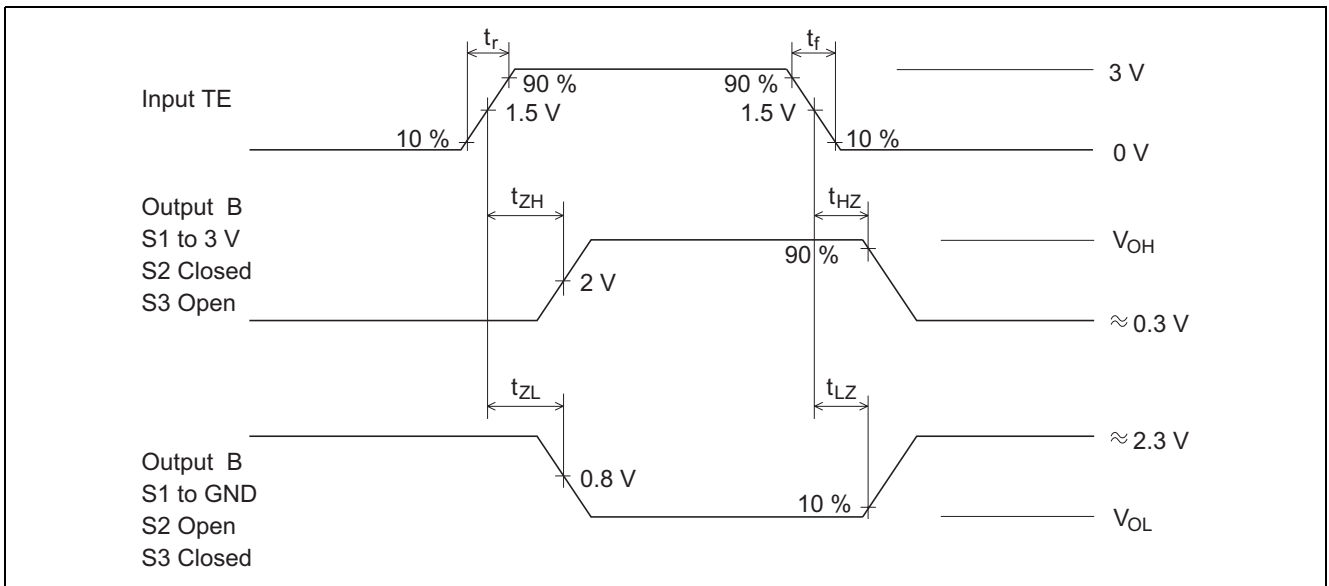
Waveforms-2



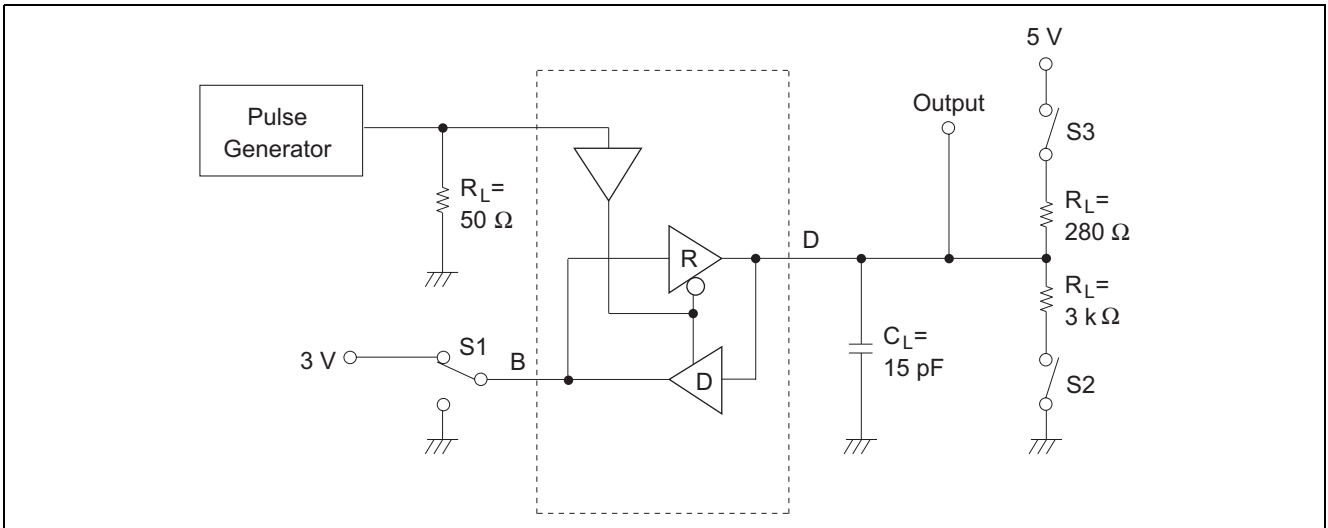
3.  $t_{ZH}$ ,  $t_{HZ}$ ,  $t_{ZL}$ ,  $t_{LZ}$



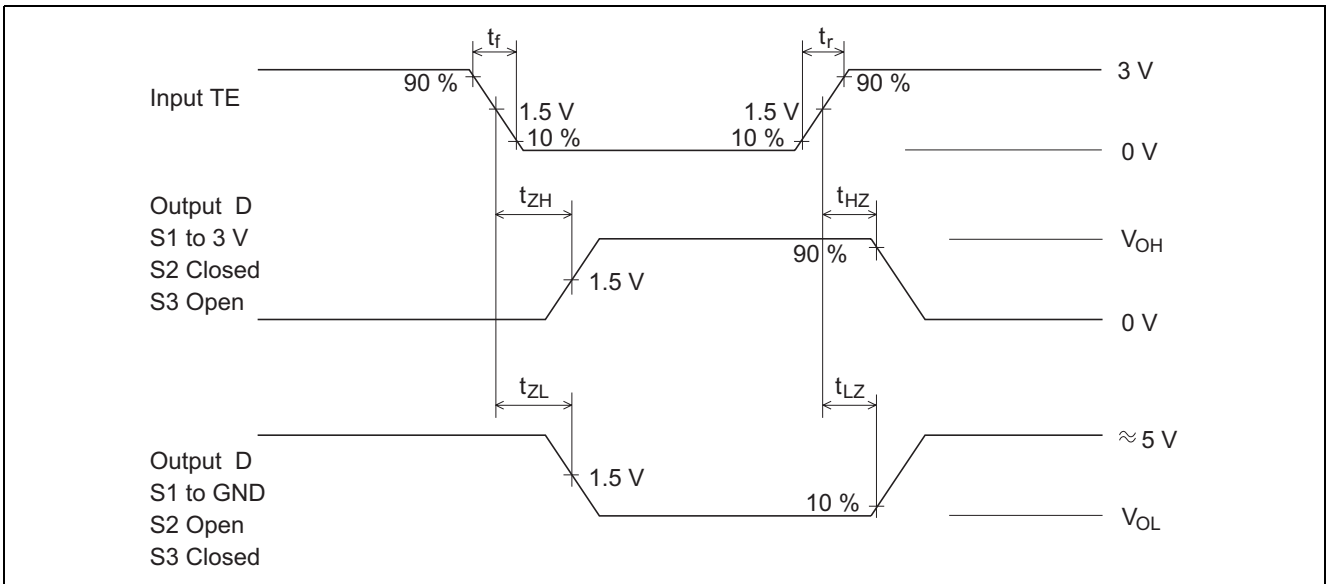
Waveforms-3



4.  $t_{ZH}$ ,  $t_{HZ}$ ,  $t_{ZL}$ ,  $t_{LZ}$

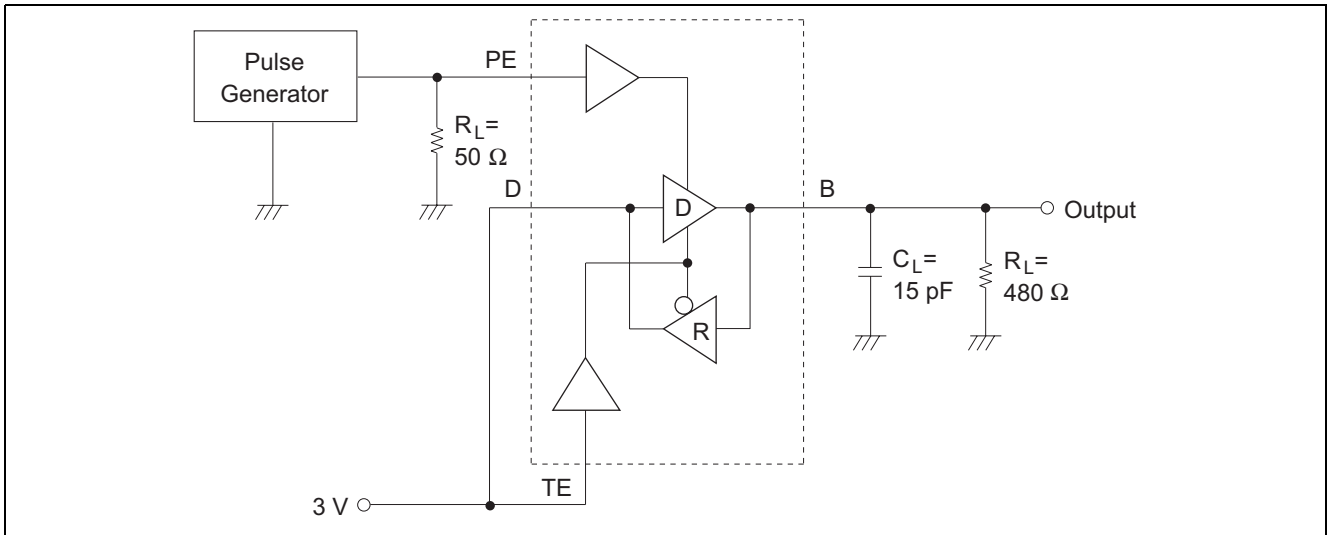


Waveforms-4

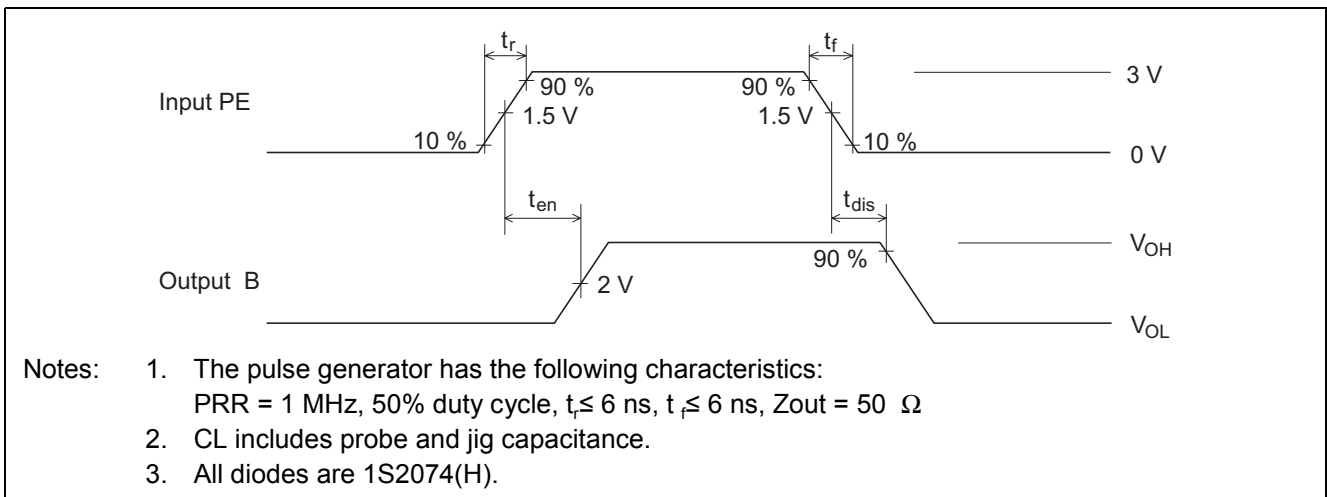




5.  $t_{en}$ ,  $t_{dis}$

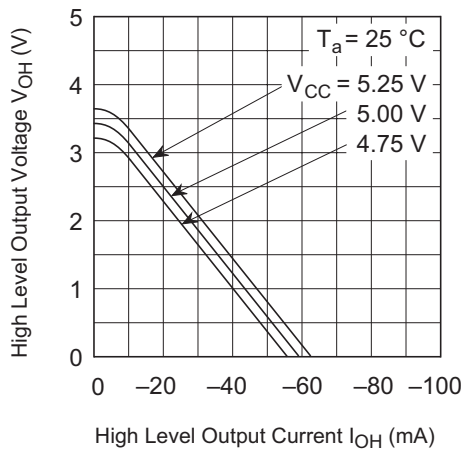


Waveforms-5

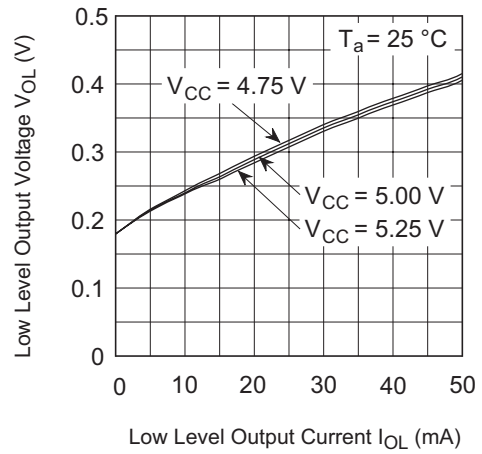


Characteristics Of Driver And Receiver

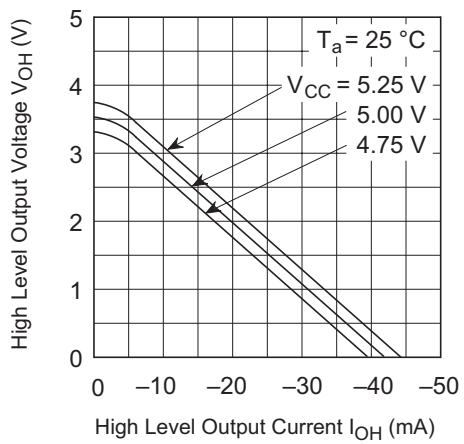
(a) Driver Output



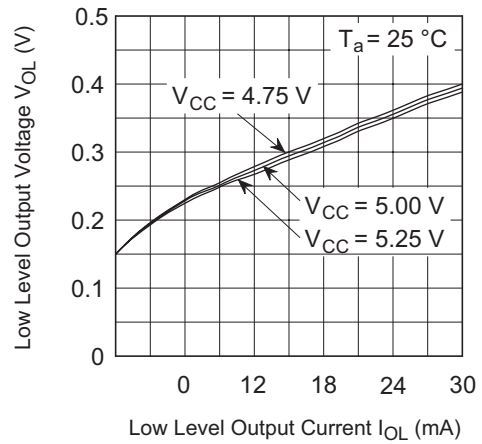
(b) Driver Output



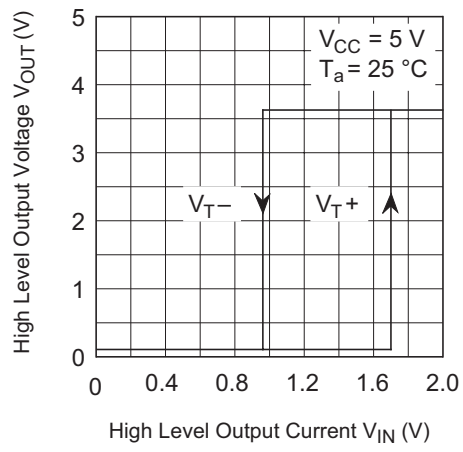
(c) Receiver Output



(d) Receiver Output

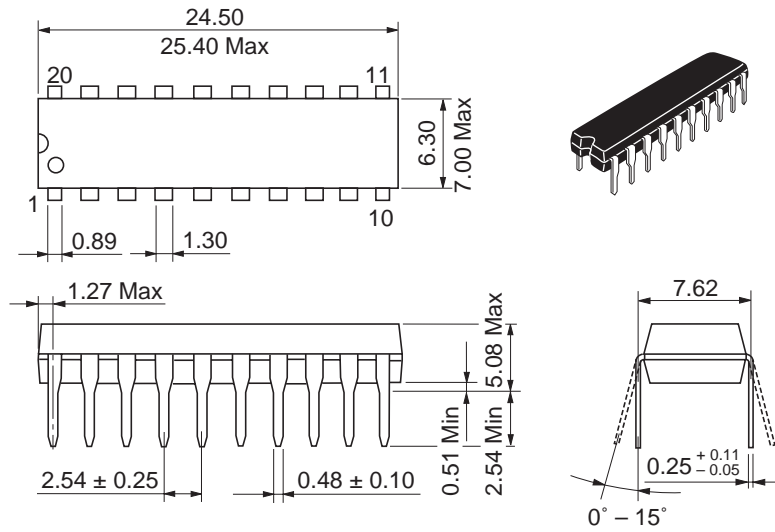


(e) Input / Output Characteristics at Receiver



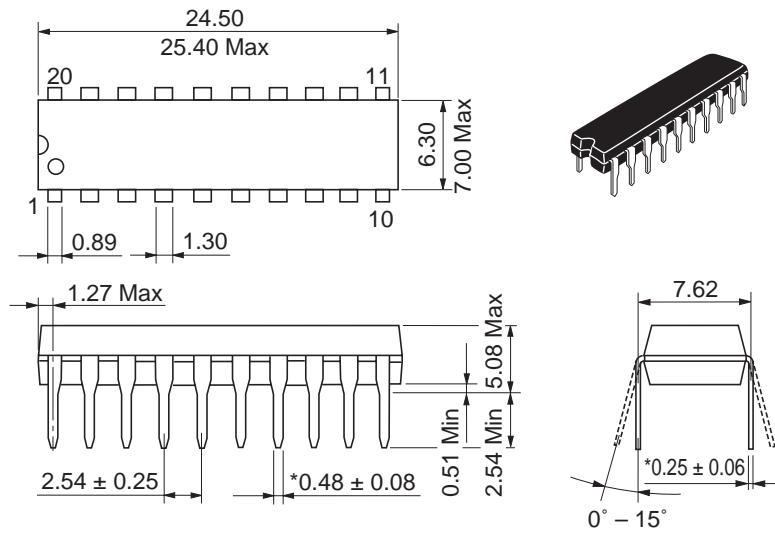
Package Dimensions

As of January, 2003  
Unit: mm



Package Code	DP-20N
JEDEC	—
JEITA	Conforms
Mass (reference value)	1.26 g

Unit: mm



\*Ni/Pd/AU Plating

Package Code	DP-20NEV
JEDEC	—
JEITA	Conforms
Mass (reference value)	1.26 g

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