

HD75160A

Octal General Purpose Interface Bus Transceivers

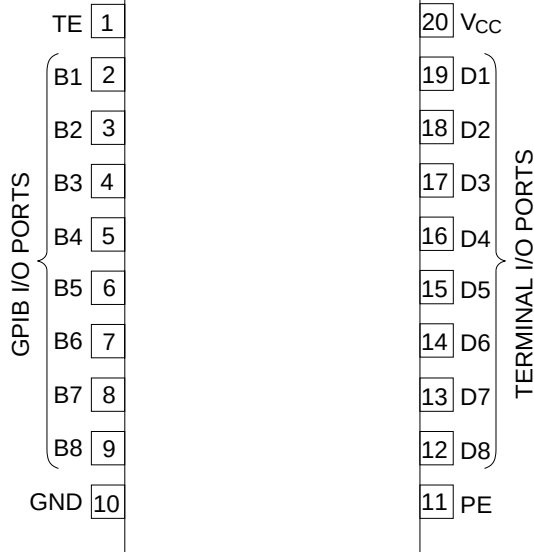
HITACHI

ADE-205-590 (Z)
1st. Edition
Dec. 2000

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 $V_{CC} = 0$ V since the bus terminating resistors are built in when combined with the HD75161A mangement bus transceivers, the pair provides the complete 16 wire interface for the IEEE-488 bus.

Pin Arrangement



(Top view)

Function Tables

Drivers				Receivers			
Input				Input			
D	TE	PE	Output B	B	TE	PE	Output D
H	H	H	H	L	L	X	L
L	H	X	L	H	L	X	H
H	X	L	Z ^{*1}	X	H	X	Z
X	L	X	Z ^{*1}				

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

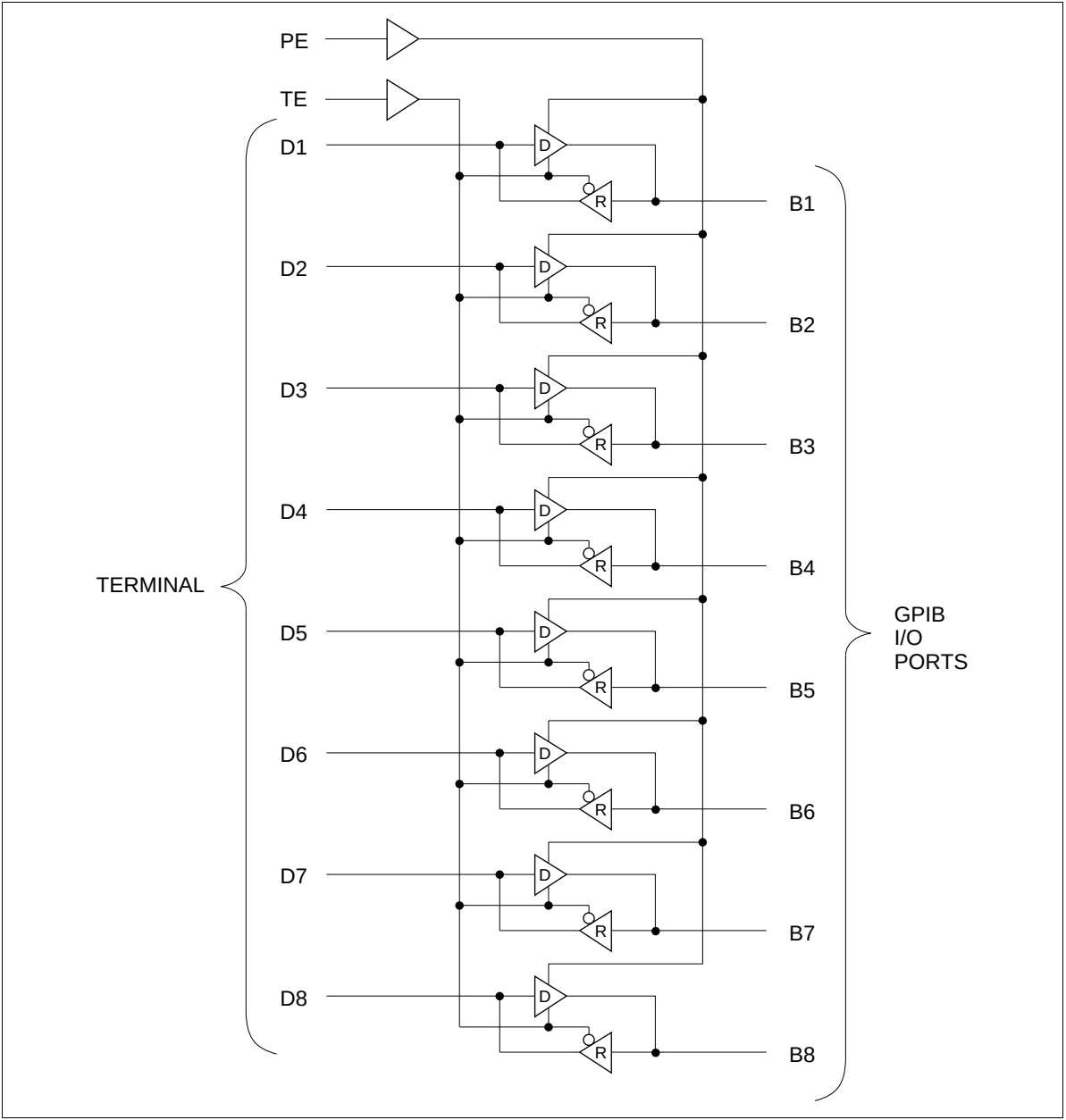
Item	Symbol	Rating	Unit
Supply Voltage	V _{CC}	7	V
Input Voltage	V _{IN}	5.5	V
Output Current	I _{OL}	100	mA
Power Dissipation (Ta = 25°C)	P _T	1150	mW
Operating temperature range	Topr	0 to 70	°C
Storage Temperature Range	Tstg	−65 to +150	°C

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	I _{OH}	—	—	−5.2	mA
	Terminal Ports		—	—	−800	μA
Output Current	Bus Ports	I _{OL}	—	—	48	mA
	Terminal Ports		—	—	16	
Operating Temperature		Topr	0	—	70	°C

Logic Diagram



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

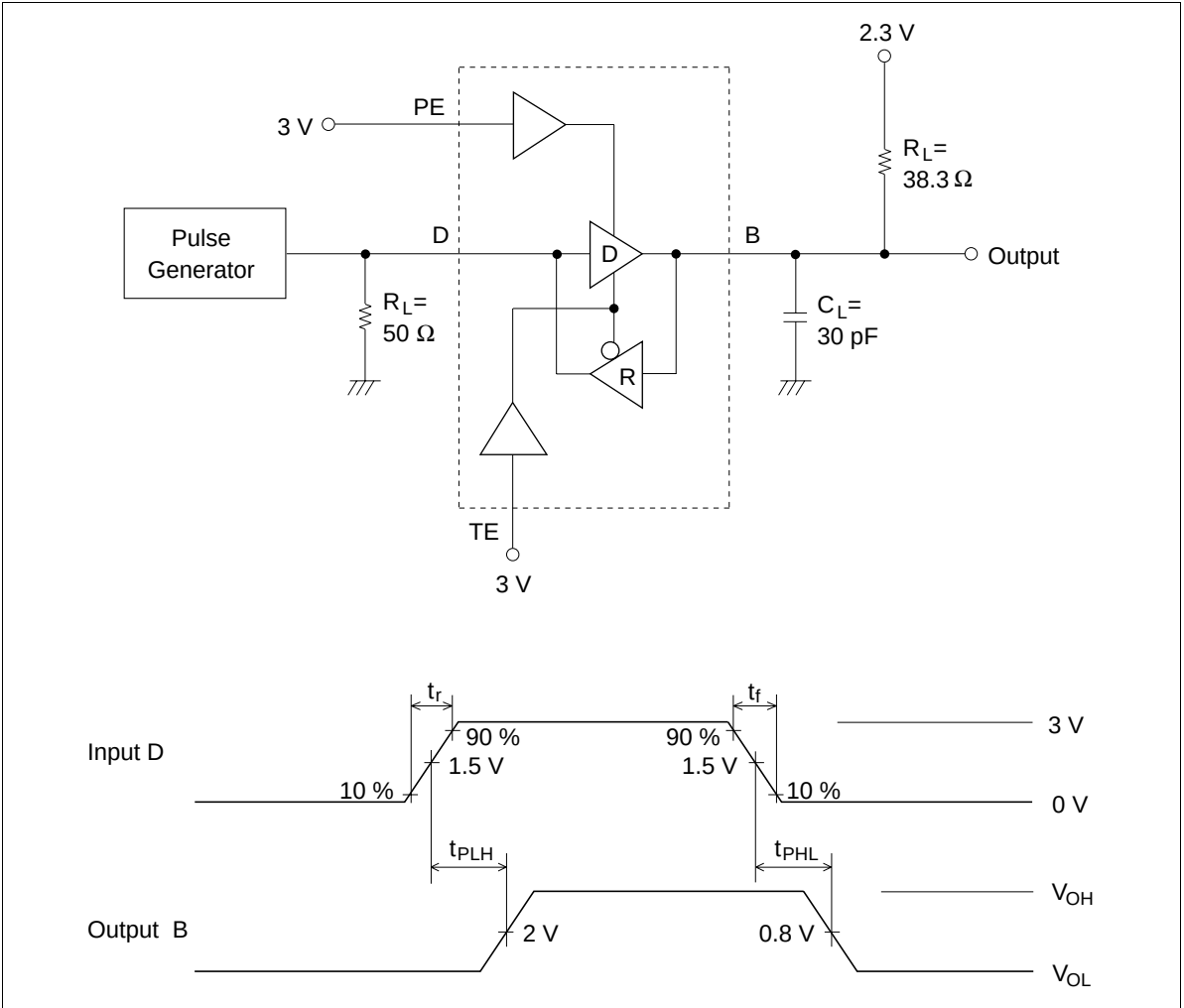
Item		Symbol	V _{CC}	Min	Max	Unit	Conditions
Input Voltage		V _{IH}	2	—	—	V	
		V _{IL}	—	—	0.8		
Input Clamp Voltage		V _{IK}	—	—	−1.5	V	II = −18 mA
Hysteresis	Bus	V _T ⁺ − V _T [−]	0.4	—	—	V	
IOOutput Voltage	Terminal	V _{OH}	2.7	—	—	V	I _{OH} = −800 μA, TE at 0.8 V
	Bus		2.5	—	—		I _{OH} = −5.2 mA,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

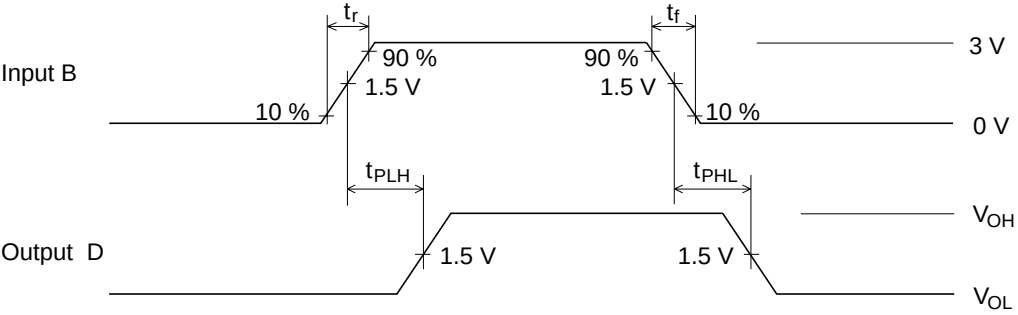
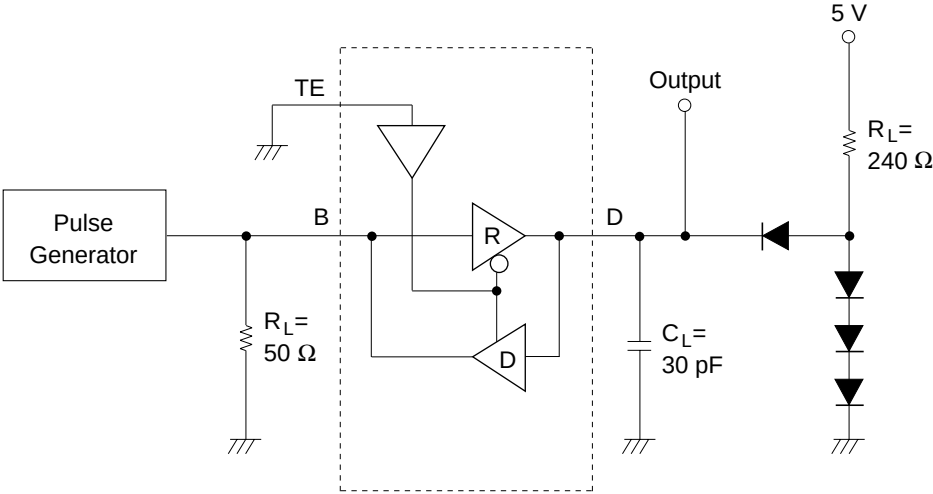
Note: 1. V_{CC} = 5 V, Ta = 25°C

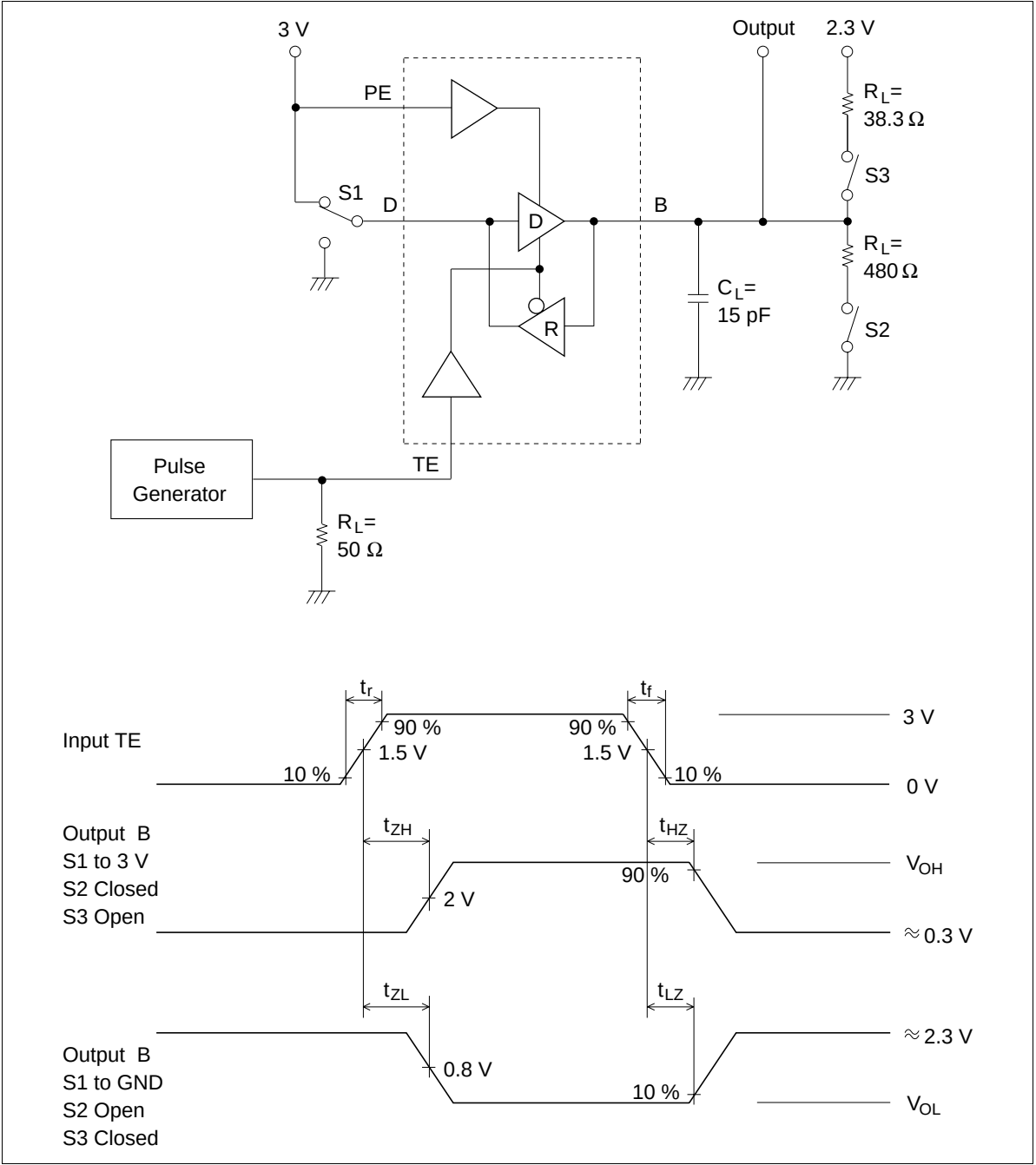
Switching Characteristics ($V_{CC} = 5\text{ V}$, $T_a = 25^\circ\text{C}$)

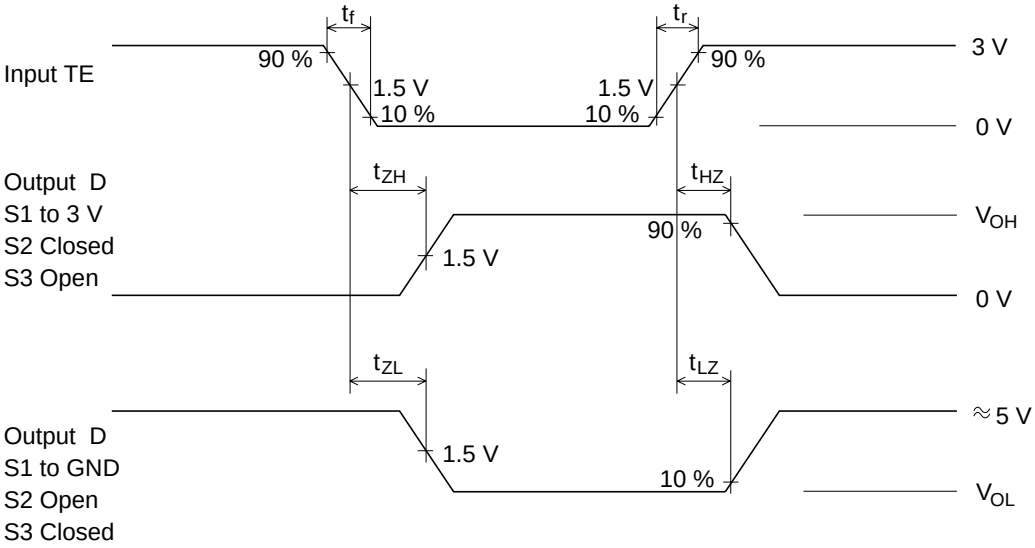
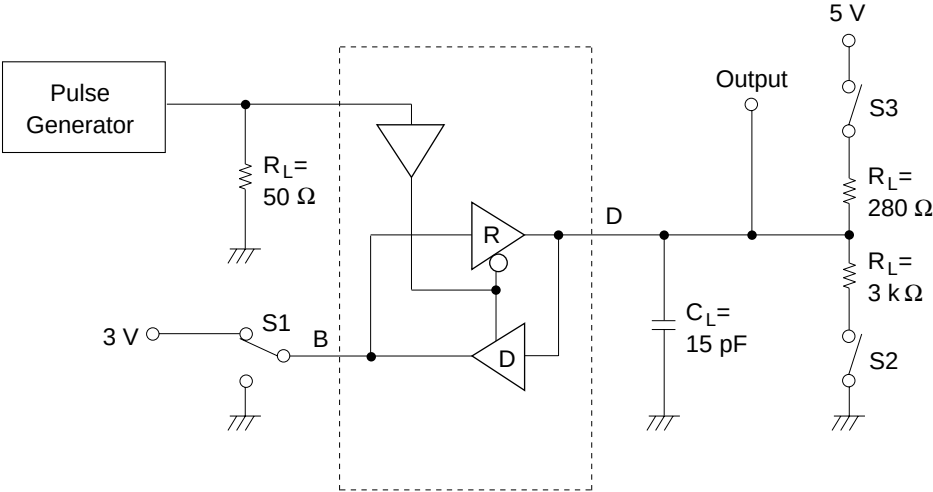
Item	Symbol	Input	Output	Min	Typ	Max	Unit	Test Circuit	Conditions
Propagation Delay Time	t_{PLH}	Terminal	BUS	—	14	20	ns	1	$C_L = 30\text{ pF}$
	t_{PHL}			—	14	20			$R_L = 38.3\text{ }\Omega$ to 2.3 V
	t_{PLH}	BUS	Terminal	—	12	20		2	$C_L = 30\text{ pF}$
	t_{PHL}			—	16	22			$R_L = 240\text{ }\Omega$ to 5 V
Output Enable Time	t_{ZH}	TE	BUS	—	25	35		3	$C_L = 15\text{ pF}$
Output Disable Time	t_{HZ}			—	13	22			$R_L = 480\text{ }\Omega$ to 0 V
Output Enable Time	t_{ZL}			—	22	35			$C_L = 15\text{ pF}$
Output Disable Time	t_{LZ}			—	22	32			$R_L = 38.3\text{ }\Omega$ to 2.3 V
Output Enable Time	t_{ZH}	TE	Terminal	—	20	30		4	$C_L = 15\text{ pF}$
Output Disable Time	t_{HZ}			—	12	20			$R_L = 3\text{ k}\Omega$ to 0 V
Output Enable Time	t_{ZL}			—	23	32			$C_L = 15\text{ pF}$
Output Disable Time	t_{LZ}			—	19	30			$R_L = 280\text{ }\Omega$ to 5 V
Output Pull up Enable Time	t_{en}	PE	BUS	—	15	22		5	$C_L = 15\text{ pF}$
Output Pull up Disable Time	t_{dis}			—	13	20			$R_L = 480\text{ }\Omega$ to 0 V

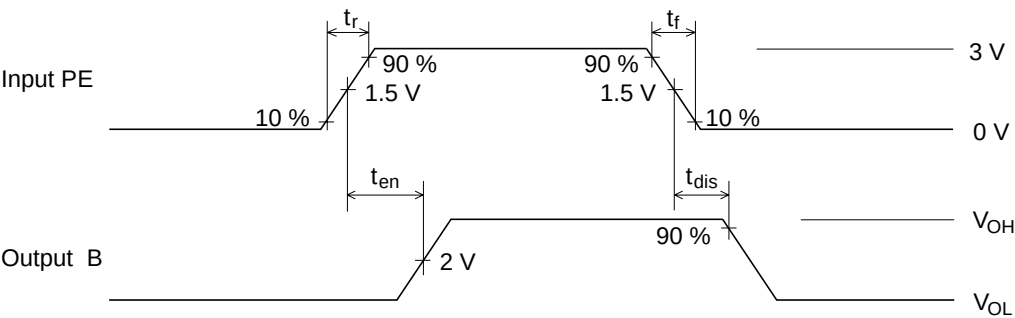
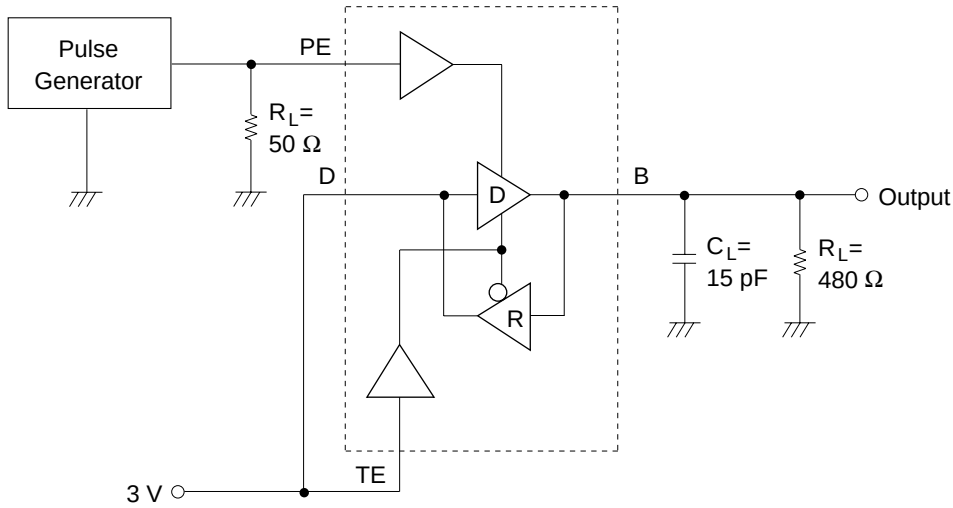
Switching Time Test Method







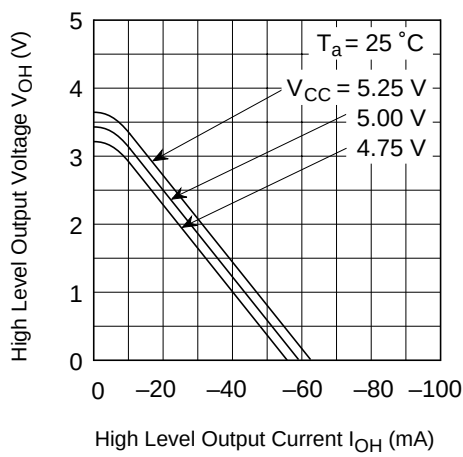




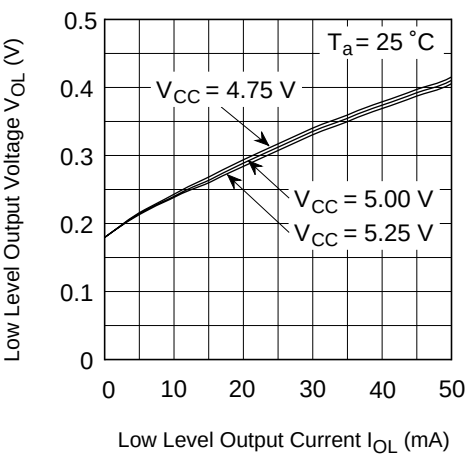
- Notes:
1. The pulse generator has the following characteristics:
PRR = 1 MHz, 50% duty cycle, $t_r \leq 6\text{ ns}$, $t_f \leq 6\text{ ns}$, $Z_{out} = 50\ \Omega$
 2. C_L includes probe and jig capacitance.
 3. All diodes are 1S2074(H).

Characteristics Of Driver And Receiver

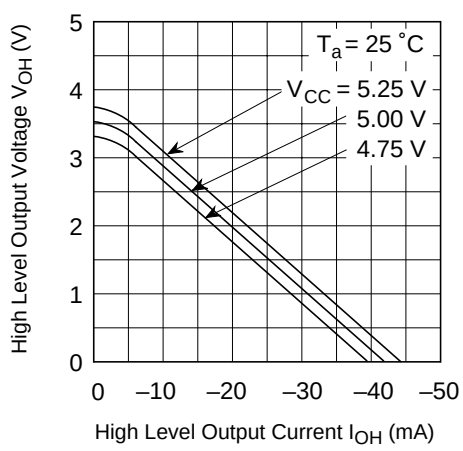
(a) Driver Output



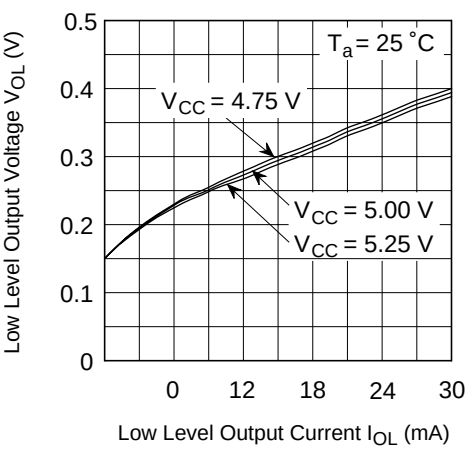
(b) Driver Output



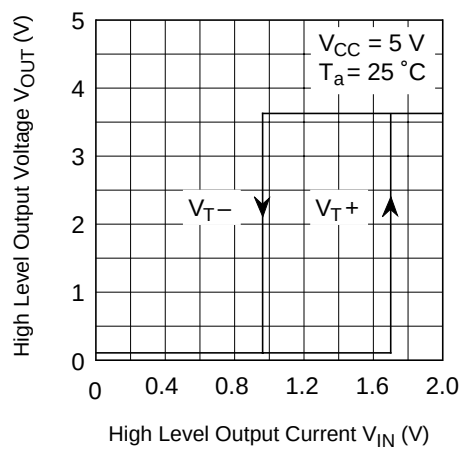
(c) Receiver Output



(d) Receiver Output

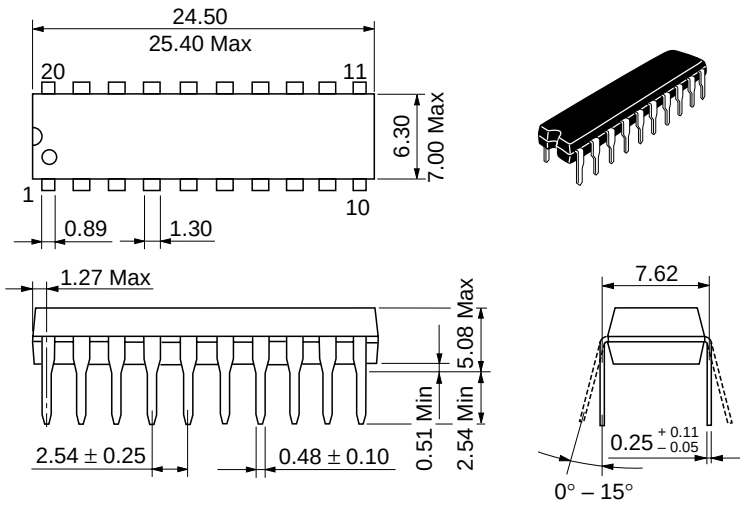


(e) Input / Output Characteristics at Receiver



Package Dimensions

Unit: mm



Hitachi Code	DP-20N
JEDEC	—
EIAJ	Conforms
Mass (reference value)	1.26 g

Cautions

1. Hitachi neither warrants nor grants licenses of any rights of Hitachi’s or any third party’s patent, copyright, trademark, or other intellectual property rights for information contained in this document. Hitachi bears no responsibility for problems that may arise with third party’s rights, including intellectual property rights, in connection with use of the information contained in this document.

2. Products and product specifications may be subject to change without notice. Confirm that you have received the latest product standards or specifications before final design, purchase or use.

3. Hitachi makes every attempt to ensure that its products are of high quality and reliability. However, contact Hitachi’s sales office before using the product in an application that demands especially high quality and reliability or where its failure or malfunction may directly threaten human life or cause risk of bodily injury, such as aerospace, aeronautics, nuclear power, combustion control, transportation, traffic, safety equipment or medical equipment for life support.

4. Design your application so that the product is used within the ranges guaranteed by Hitachi particularly for maximum rating, operating supply voltage range, heat radiation characteristics, installation conditions and other characteristics. Hitachi bears no responsibility for failure or damage when used beyond the guaranteed ranges. Even within the guaranteed ranges, consider normally foreseeable failure rates or failure modes in semiconductor devices and employ systemic measures such as fail-safes, so that the equipment incorporating Hitachi product does not cause bodily injury, fire or other consequential damage due to operation of the Hitachi product.

5. This product is not designed to be radiation resistant.

6. No one is permitted to reproduce or duplicate, in any form, the whole or part of this document without written approval from Hitachi.

7. Contact Hitachi’s sales office for any questions regarding this document or Hitachi semiconductor products.

HITACHI

Hitachi, Ltd.

Semiconductor & Integrated Circuits.
Nippon Bldg., 2-6-2, Ohite-machi, Chiyoda-ku, Tokyo 100-0004, Japan
Tel: Tokyo (03) 3270-2111 Fax: (03) 3270-5109

URL	NorthAmerica	:	http://semiconductor.hitachi.com/
	Europe	:	http://www.hitachi-eu.com/hel/ecg
	Asia	:	http://sicapac.hitachi-asia.com
	Japan	:	http://www.hitachi.co.jp/Sicd/indx.htm

For further information write to:

Hitachi Semiconductor (America) Inc. 179 East Tasman Drive, San Jose, CA 95134 Tel: <1> (408) 433-1990 Fax: <1> (408) 433-0223	Hitachi Europe GmbH Electronic Components Group Dornacher Straße 3 D-85622 Feldkirchen, Munich Germany Tel: <49> (89) 9 9180-0 Fax: <49> (89) 9 29 30 00 Hitachi Europe Ltd. Electronic Components Group. Whitebrook Park Lower Cookham Road Maidenhead Berkshire SL6 8YA, United Kingdom Tel: <44> (1628) 585000 Fax: <44> (1628) 585160	Hitachi Asia Ltd. Hitachi Tower 16 Collyer Quay #20-00, Singapore 049318 Tel: <65>-538-6533/538-8577 Fax: <65>-538-6933/538-3877 URL: http://www.hitachi.com.sg Hitachi Asia Ltd. (Taipei Branch Office) 4/F, No. 167, Tun Hwa North Road, Hung-Kuo Building, Taipei (105), Taiwan Tel: <886>-(2)-2718-3666 Fax: <886>-(2)-2718-8180 Telex: 23222 HAS-TP URL: http://www.hitachi.com.tw	Hitachi Asia (Hong Kong) Ltd. Group III (Electronic Components) 7/F., North Tower, World Finance Centre, Harbour City, Canton Road Tsim Sha Tsui, Kowloon, Hong Kong Tel: <852>-(2)-735-9218 Fax: <852>-(2)-730-0281 URL: http://www.hitachi.com.hk
--	---	--	--

Copyright © Hitachi, Ltd., 2000. All rights reserved. Printed in Japan.
Colophon 2.0