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Renesas Technology Corp.
Customer Support Dept.
April 1, 2003

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Keep safety first in your circuit designs!

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Remember to give due consideration to safety when making your circuit designs, with appropriate measures such as (i) placement of substitutive, auxiliary circuits, (ii) use of nonflammable material or (iii) prevention against any malfunction or mishap.

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HD29468

Triple Line Drivers/Receivers

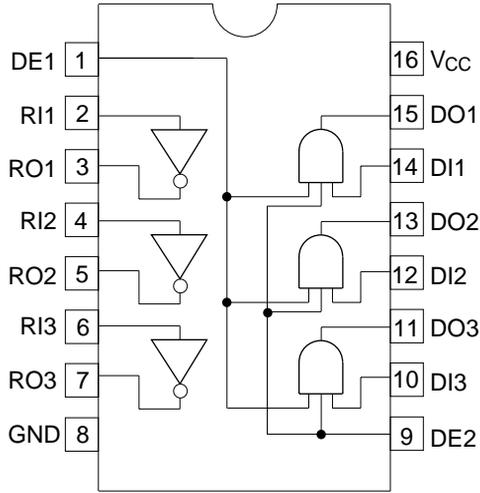


ADE-205-583 (Z)
1st. Edition
Dec. 2000

Description

The HD29468 features line drivers and receivers for unbalanced transmissions, which meet the specs of IBM 360 and 370. This device has three drivers and receivers in one package. Input of driver and output of receiver are compatible with low power schottky TTL circuit and operates from a single 5 V power supply. The driver has two types of enable inputs. Spurious noise can be prevented by grounding either input when power supply is throw or cut off. The outputs are protected from short circuit and the wired logic is available due to emitter follower from for party line data bus applications. The device operates at high speed. Low to high level and high to low level propagation delay times difference are 10 ns max.

Pin Arrangement



(Top view)

Function Table

Driver			Receiver		
Input			Output	Input	Output
DI	DE1	DE2	DO	RI	RO
L	X	X	L	L	H
X	L	X	L	H	L
X	X	L	L		
H	H	H	H		

H : High level

L : Low level

X : Immaterial

Absolute Maximum Ratings

Item	Symbol	Ratings	Unit
Supply Voltage	V_{CC}	+7	V
Driver Input Voltage	V_{ID}	-0.5 to +7	V
Driver Output Voltage	V_{OD}	-0.5 to +7	V
Receiver Input Voltage	V_{IR}	-0.5 to +7	V
Power Dissipation ($T_a = 25^{\circ}\text{C}$)* ¹	DP	1000	mW
	FP	785	
Operating Temperature	T_a	0 to +75	$^{\circ}\text{C}$
Storage Temperature	T_{stg}	-65 to +150	$^{\circ}\text{C}$

Notes: 1. The above data were taken by the ΔV_{BE} method, mounting on a glass epoxy board (40 × 40 × 1.6 mm) of 10% wiring density.

2. 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
Operating Temperature	T_a	0	—	75	$^{\circ}\text{C}$

Electrical Characteristics

Driver ($V_{CC} = 5.0 \text{ V} \pm 5 \%$, $T_a = 0 \text{ to } +75^\circ\text{C}$)

Item	Symbol	Min	Max	Unit	Conditions
High Level Input Voltage	V_{IH}	2.0	—	V	
Low Level Input Voltage	V_{IL}	—	0.8	V	
Input Clamp Voltage	V_{IK}	—	-1.5	V	$V_{CC} = 4.75 \text{ V}$, $I_{IN} = -18 \text{ mA}$
High Level Output Voltage	V_{OH}	3.11	—	V	$V_{CC} = 4.75 \text{ V}$, $V_{IH} = 2.0 \text{ V}$ $I_{OH} = -59.3 \text{ mA}$ ($T_a = 25^\circ\text{C}$)
		—	4.1		$V_{CC} = 5.25 \text{ V}$, $V_{IH} = 2.0 \text{ V}$ $I_{OH} = -78.1 \text{ mA}$
Low Level Output Voltage	V_{OL}	—	0.15	V	$V_{CC} = 5.25 \text{ V}$, $V_{IL} = 0.8 \text{ V}$ $I_{OL} = -0.24 \text{ mA}$, $V_{IH} = 4.5 \text{ V}$
High Level Input Current	DI I_{IH}	—	20	μA	$V_{CC} = 5.25 \text{ V}$, $V_{IH} = 2.7 \text{ V}$
	DE	—	60		$V_{CC} = 5.25 \text{ V}$, $V_{IH} = 2.7 \text{ V}$
Low Level Input Current	DI I_{IL}	—	-400	μA	$V_{CC} = 5.25 \text{ V}$, $V_{IL} = 0.4 \text{ V}$
	DE	—	-1200		$V_{CC} = 5.25 \text{ V}$, $V_{IL} = 0.4 \text{ V}$
High Level Output Current	I_{OH}	—	100	μA	$V_{CC} = 4.75 \text{ V}$, $V_{IL} = 0 \text{ V}$, $V_{OH} = 5.0 \text{ V}$
		—	100		$V_{CC} = 4.75 \text{ V}$, $V_{IH} = 4.5 \text{ V}$, $V_{OH} = 5.0 \text{ V}$
Short Circuit Output Current	I_{OS}	—	-30	mA	$V_{CC} = 5.25 \text{ V}$, $V_{IH} = 4.5 \text{ V}$

Receiver ($T_a = 0 \text{ to } +75^\circ\text{C}$)

Item	Symbol	Min	Max	Unit	Conditions
High Level Output Threshold Voltage	V_{OTH}	2.7	—	V	$V_{CC} = 4.75 \text{ V}$, $V_{IL} = 1.15 \text{ V}$ $I_{OH} = -400 \mu\text{A}$
Low Level Output Threshold Voltage	V_{OTL}	—	0.5	V	$V_{CC} = 5.25 \text{ V}$, $V_{IH} = 1.55 \text{ V}$ $I_{OL} = 8 \text{ mA}$
High Level Output Voltage	V_{OH}	2.7	—	V	$V_{CC} = 4.75 \text{ V}$, V_{IN} : Open $I_{OH} = -400 \mu\text{A}$
Low Level Output Voltage	V_{OL}	—	0.5	V	$V_{CC} = 4.75 \text{ V}$ $I_{OL} = 8 \text{ mA}$
		—	0.4		$V_{IH} = 1.55 \text{ V}$ $I_{OL} = 4 \text{ mA}$
Input Resistance	R_{IN}	7.4	0	$\text{K}\Omega$	$V_{CC} = 0 \text{ V}$
High Level Input Current	I_{IH}	—	0.42	mA	$V_{CC} = 4.75 \text{ V}$, $V_{IH} = 3.11 \text{ V}$
Low Level Input Current	I_{IL}	0.04	-0.24	mA	$V_{CC} = 5.25 \text{ V}$, $V_{IL} = 0.15 \text{ V}$
Short Circuit Output Current	I_{OS}	-20	-100	mA	$V_{CC} = 5.25 \text{ V}$, $V_{IL} = 0 \text{ V}$

Driver/Receiver (Ta = 0 to +75°C)

Item	Symbol	Min	Max	Unit	Conditions
Supply Voltage	I_{CCH}	—	37	mA	$V_{CC} = 5.25\text{ V}, V_{IH} = 4.5\text{ V}$
	I_{CCL}	—	55		$V_{CC} = 5.25\text{ V}, V_{IL} = 0\text{ V}$

Switching Characteristics

Driver ($V_{CC} = 5.0\text{ V}, T_a = 25^\circ\text{C}$)

Item	Symbol	Min	Max	Unit	Conditions
Rise Propagation Delay Time	t_{PLH}	6.5	18.5	ns	$R_L = 47.5\ \Omega$
Fall Propagation Delay Time	t_{PHL}	6.5	18.5	ns	
Propagation Delay Time Difference*1	Δt_{PD}	—	10	ns	

Note: 1. $\Delta t_{PD} = |t_{PLH} - t_{PHL}|$

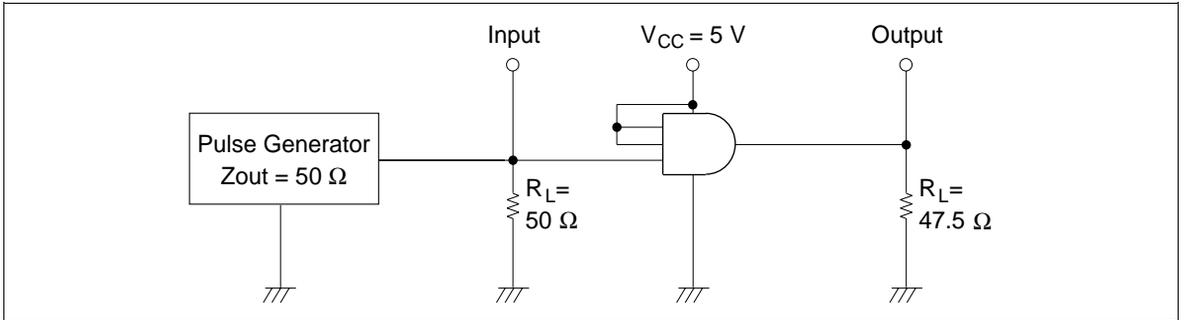
Receiver ($V_{CC} = 5.0\text{ V}, T_a = 25^\circ\text{C}$)

Item	Symbol	Min	Max	Unit	Conditions
Rise Propagation Delay Time	t_{PLH}	7.5	19.5	ns	$R_L = 2\text{ K}\Omega, C_L = 15\text{ pF}$
Fall Propagation Delay Time	t_{PHL}	7.5	19.5	ns	$R_L = 2\text{ K}\Omega, C_L = 15\text{ pF}$
Propagation Delay Time Difference*1	Δt_{PD}	10	ns		$R_L = 2\text{ K}\Omega, C_L = 15\text{ pF}$

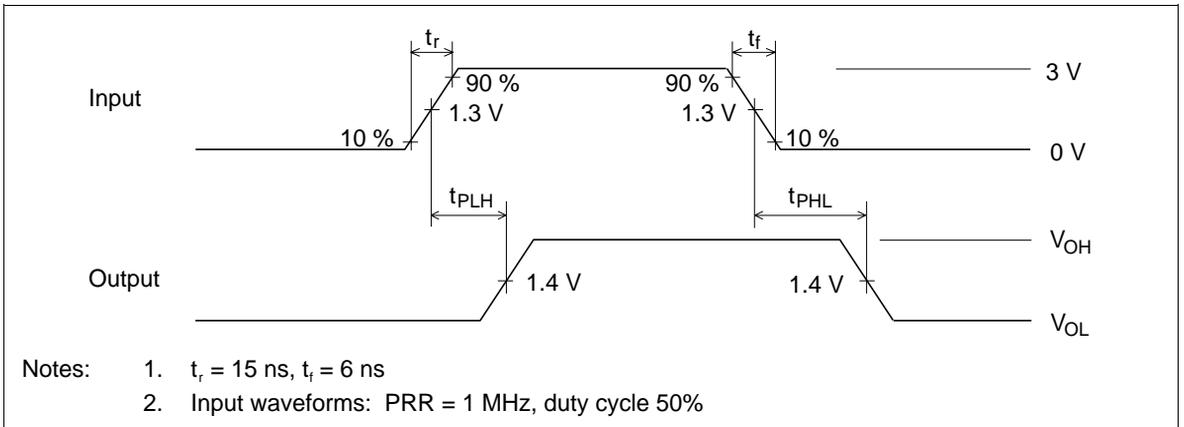
Note: 1. $\Delta t_{PD} = |t_{PLH} - t_{PHL}|$

Driver

Test Circuit

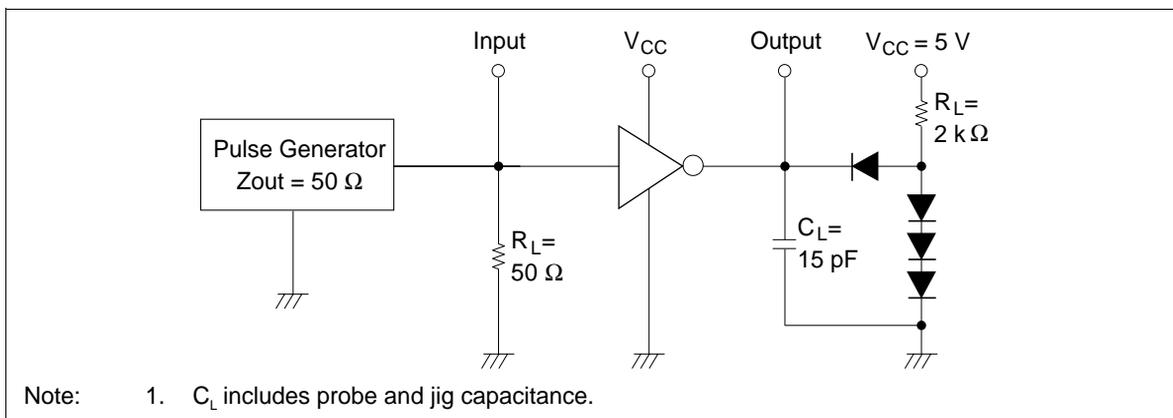


Waveforms

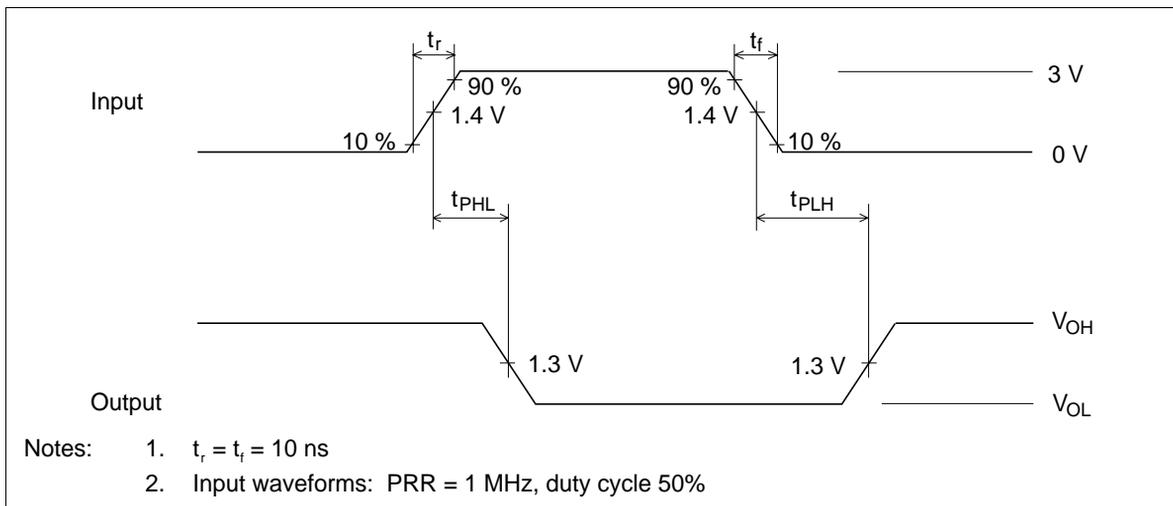


Driver

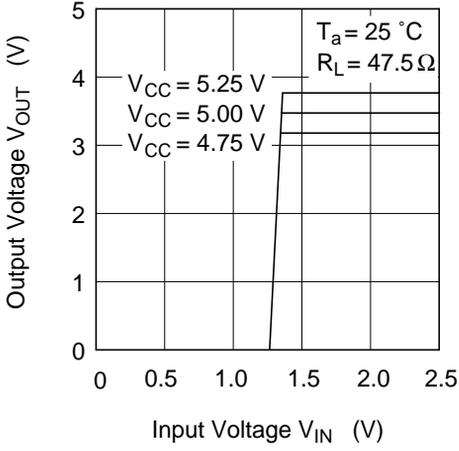
Test Circuit



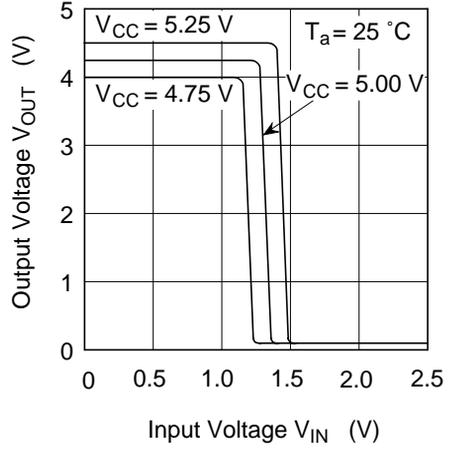
Waveforms



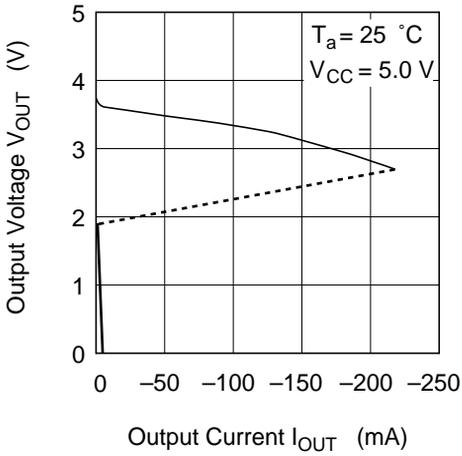
Driver $V_{IN} - V_{OUT}$



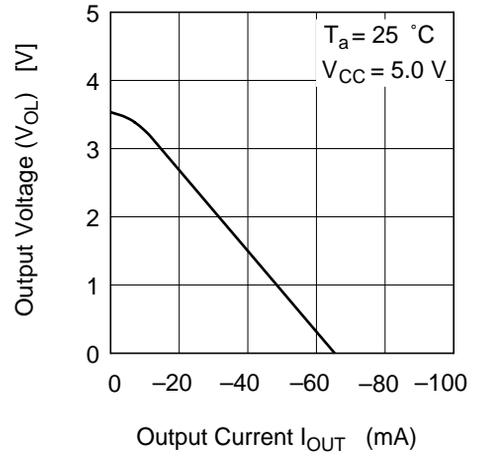
Receiver $V_{IN} - V_{OUT}$



Driver $I_{OUT} - V_{OUT}$

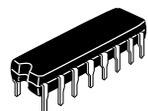
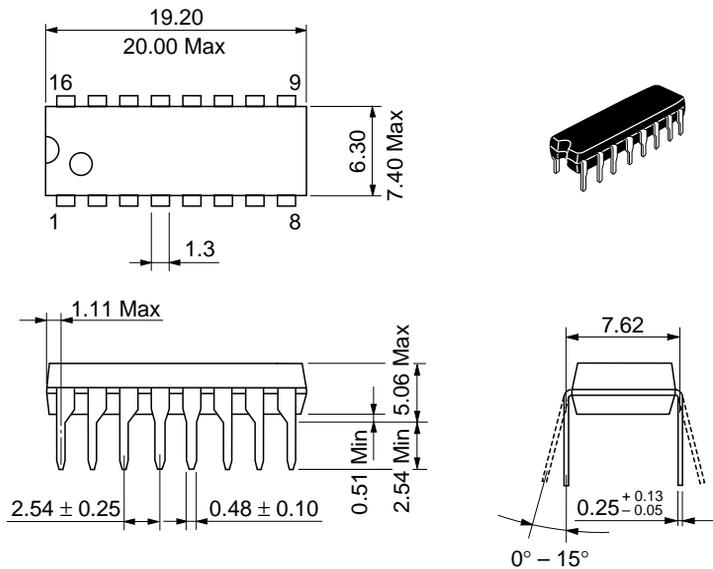


Receiver $I_{OUT} - V_{OUT}$



Package Dimensions

Unit: mm



Hitachi Code	DP-16
JEDEC	Conforms
EIAJ	Conforms
Mass (reference value)	1.07 g

Cautions

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