
HD29C3486

Quadruple Differential Line Receivers With 3 State Outputs

HITACHI

ADE-205-586 (Z)
1st. Edition
Dec. 2000

Description

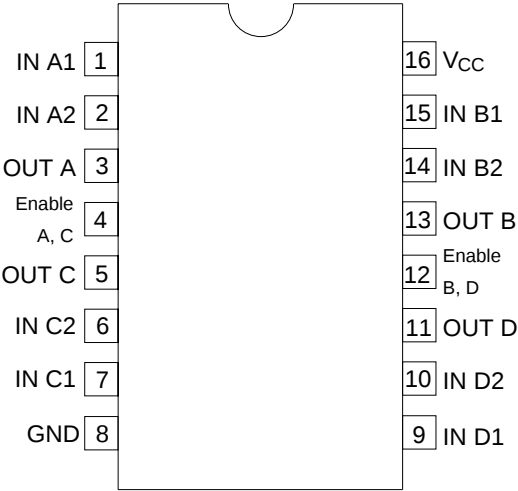
The HD29C3486 provides differential line receivers which realize low power dissipation by CMOS process. The device has four receivers which meet the requirements of EIA standard RS-422A and RS-423A in a 16 pin package.

The circuit provides two high enable terminals and each of the terminals can control two receivers. Fail safe design ensures that if the inputs are open the outputs will always be high.

Features

- Low power dissipation with CMOS process
- Meets EIA standard RS-422A/423A
- Input sensitivity: ± 0.2 V (In the range of ± 7 V of common mode input voltage)
- Propagation delay time: 19 ns typ
- Input hysteresis width: 60 mV typ
- Three state outputs
- Differential inputs are includes fail safe circuit
- Power up and power down protection
- Pin to pin compatible with HD293486

Pin Arrangement



(Top view)

Function Table

Differential Input	Enable	Output
$V_{ID} \geq V_{TH}$ or OPEN	H	H
$V_{TL} < V_{ID} < V_{TH}$	H	?
$V_{ID} \leq V_{TL}$	H	L
X	L	Z

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

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

Item	Symbol	Ratings	Unit
Supply Voltage* ²	V_{CC}	7	V
In Phase Input Voltage	V_{CM}	± 14	V
Differential Input Voltage* ³	V_{DIFF}	± 14	V
Enable Input Voltage	V_{IN}	7	V
Output Current	I_O	± 25	mA
Storage Temperature	Tstg	-65 to +150	$^{\circ}\text{C}$

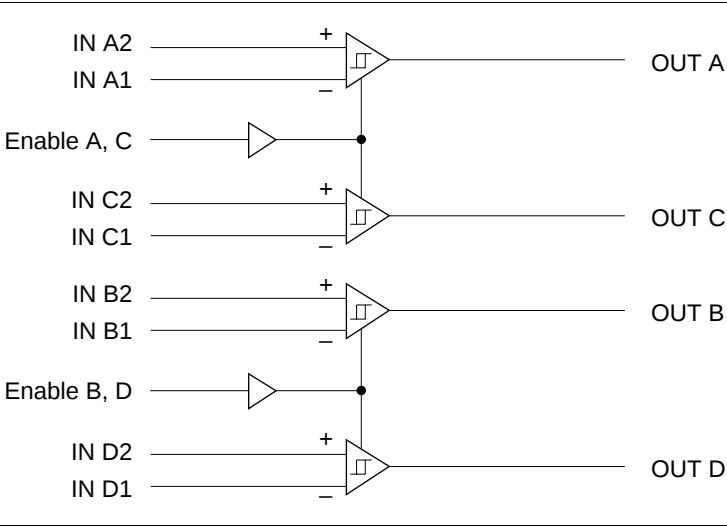
- Notes: 1. The absolute maximum ratings are values which must not individually be exceeded, and furthermore, no two of which may be realized at the same time.
2. All voltage values except for differential input voltage are with respect to network ground terminal.
3. Differential input voltage is measured at the noninverting input with respect to the corresponding inverting input.

Recommended Operating Conditions ($T_a = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$)

Item	Symbol	Min	Typ	Max	Unit
Supply Voltage	V_{CC}	4.5	5.0	5.5	V
In Phase Input Voltage	V_{CM}	—	—	± 7	V
Differential Input Voltage	V_{DIFF}	—	—	± 7	V
Output Current	I_O	—	—	± 6	mA
Operating Temperature	Topr	-40	—	85	$^{\circ}\text{C}$
Enable Input Rise/Fall Time	tr, tf	—	—	500	ns

Note: 1. This item guarantees maximum limit when one input switches.

Logic Diagram



Electrical Characteristics (Ta = -40°C to +85°C, V_{CC} = 5 V ± 10%)

Item	Symbol	Min	Typ	Max	Unit	Conditions
Differential Input Threshold Voltage	V _{TH}	—	—	0.2	V	V _{CM} = -7 to 7 V, V _{OUT} ≥ 3.8 V
	V _{TL}	—	—	-0.2	V	V _{CM} = -7 to 7 V, V _{OUT} ≤ 0.3 V
Input Hysteresis	V _{HYST}	—	60	—	mV	V _{CM} = 0 V
Enable Input Voltage	V _{IH}	2.0	—	—	V	
	V _{IL}	—	—	0.8	V	
Output Voltage	V _{OH}	3.8	4.2	—	V	V _{CC} = 4.5 V, V _{DIEF} = 1 V, I _{OUT} = -6.0 mA
	V _{OL}	—	0.2	0.3	V	V _{CC} = 5.5 V, V _{DIEF} = -1 V, I _{OUT} = 6.0 mA
Off State Output Current	I _{OZ}	—	0.5	5.0	mA	Enable = 0.8 V, V _{OUT} = V _{CC}
		—	-0.5	-5.0	mA	Enable = 0.8 V, V _{OUT} = GND
Input Current	I _{IN}	—	1.1	1.5	mA	V _{IN} = 10 V, Other Input = GND
		-0.1*1	—	0.6	mA	V _{IN} = 3 V, Other Input = GND
		0	—	-1.1	A	V _{IN} = -3 V, Other Input = GND
		—	-2.0	-2.5	mA	V _{IN} = -10 V, Other Input = GND
Enable Input Current	I ^I	—	—	1.0	μA	V _{IN} = V _{CC}
		—	—	-1.0	μA	V _{IN} = GND
Input Resistance	R _{IN}	5.8	6.8	10	KΩ	V _{CM} = -7 to 7 V (One Input AC GND)
Supply Current	I _{CC}	—	16	23	mA	V _{CC} = 5.5 V, V _{DIEF} = 1 V

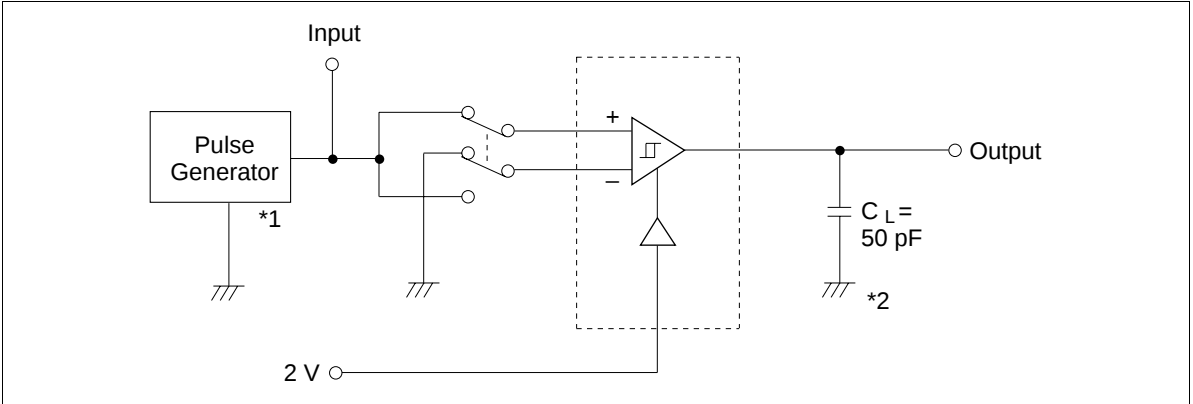
Note: 1. This specification is nonstandard of RS-422A.

Switching Characteristics (Ta = -40°C to +85°C, V_{CC} = 5 ± 10%)

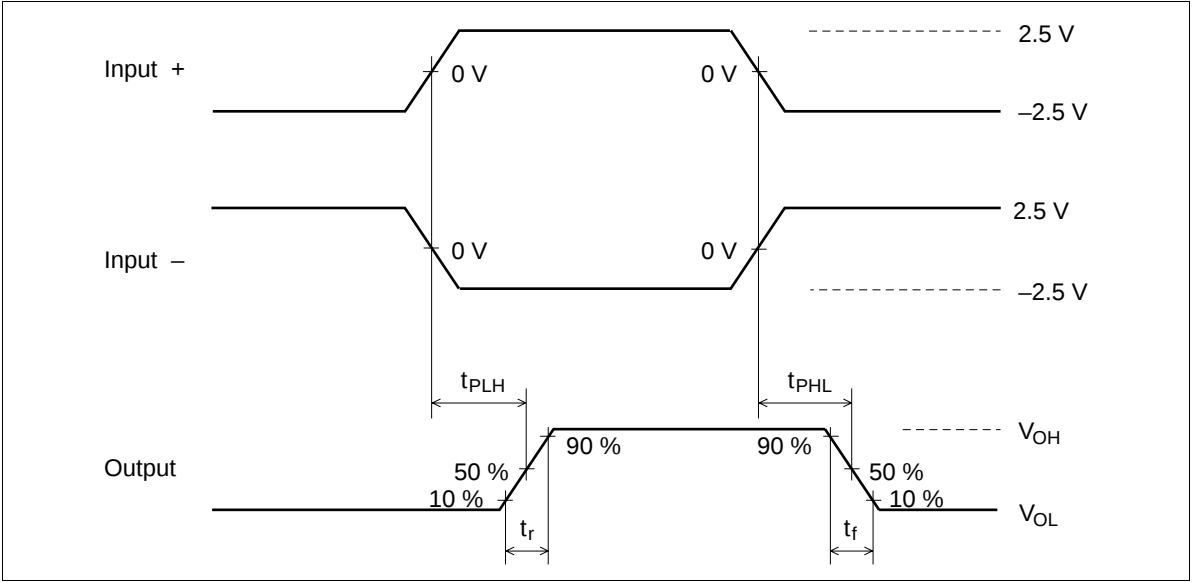
Item	Symbol	Min	Typ	Max	Unit	Conditions
Propagation Delay Time	t _{PLH}	7	16	25	ns	C _L = 50pF, V _{DIEF} = 2.5 V, V _{CM} = 0 V
	t _{PHL}	7	16	25	ns	
Output Rise/Fall Time	t _{RISE}	—	4	9	ns	C _L = 50pF, V _{DIEF} = 2.5 V, V _{CM} = 0 V
	t _{FALL}	—	4	9	ns	
Output Disable Time	t _{LZ}	—	13	22	ns	C _L = 50pF, R _L = 1000 Ω
	t _{HZ}	—	13	22	ns	V _{DIEF} = 2.5 V
Output Enable Time	t _{ZL}	—	13	22	ns	C _L = 50pF, R _L = 1000 Ω
	t _{ZH}	—	13	22	ns	V _{DIEF} = 2.5 V

1. t_{PLH} , t_{PHL} , t_{RISE} , t_{FALL}

Test Circuit

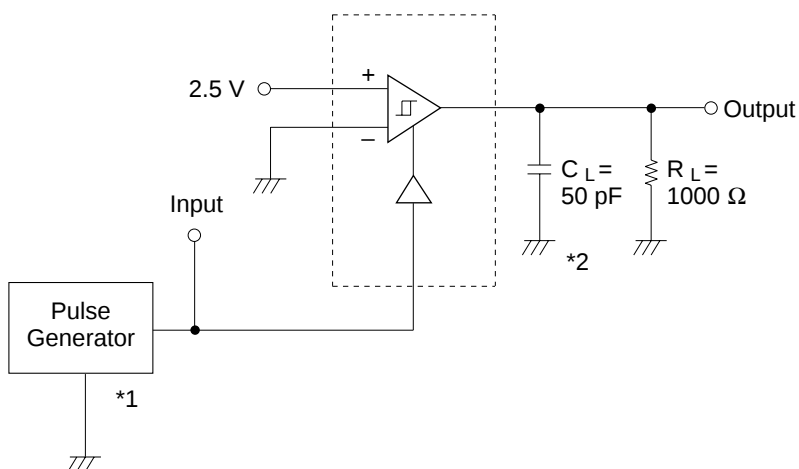


Waveforms

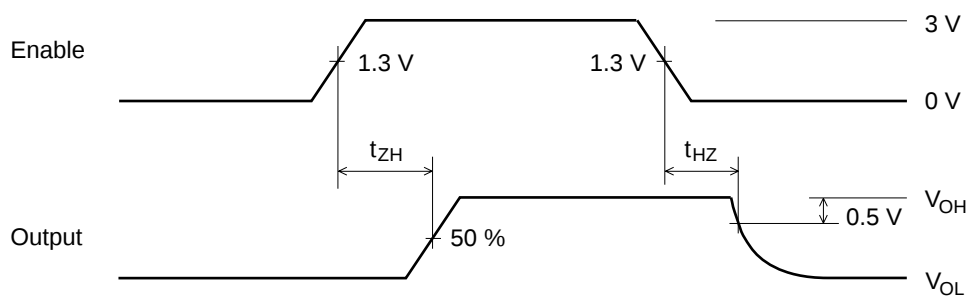


2. t_{HZ} , t_{ZH}

Test Circuit

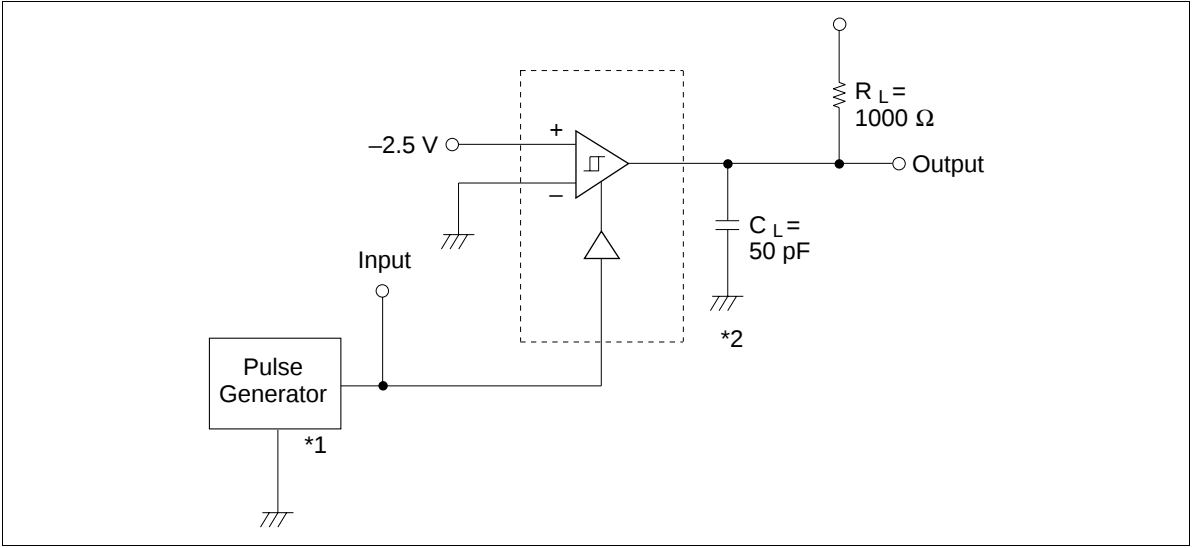


Waveforms

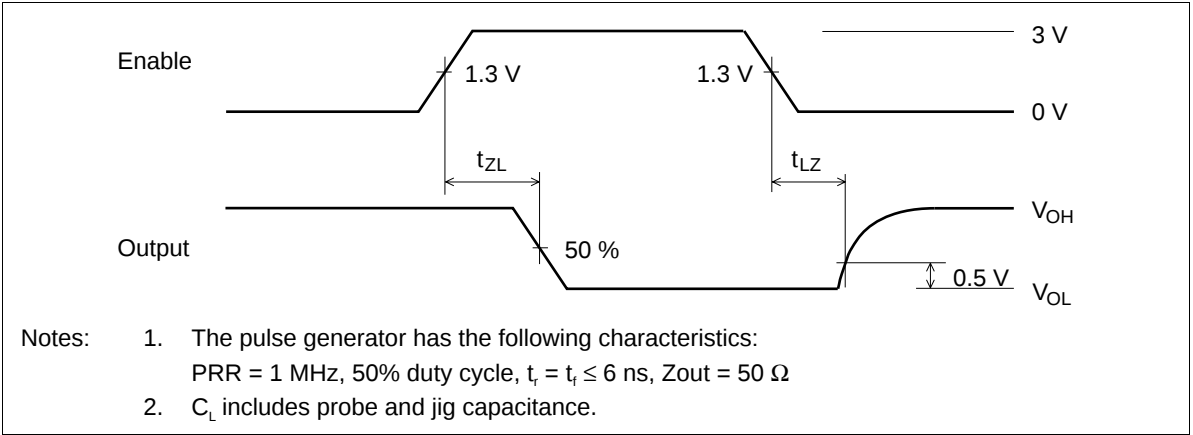


3. t_{LZ} , t_{ZL}

Test Circuit

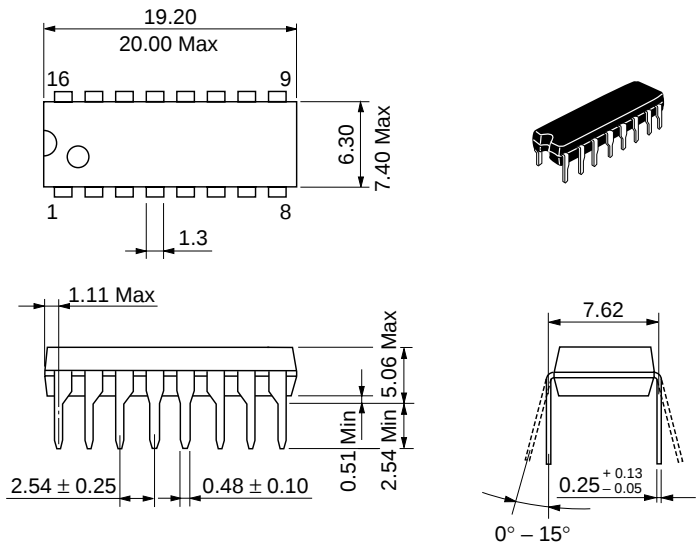


Waveforms



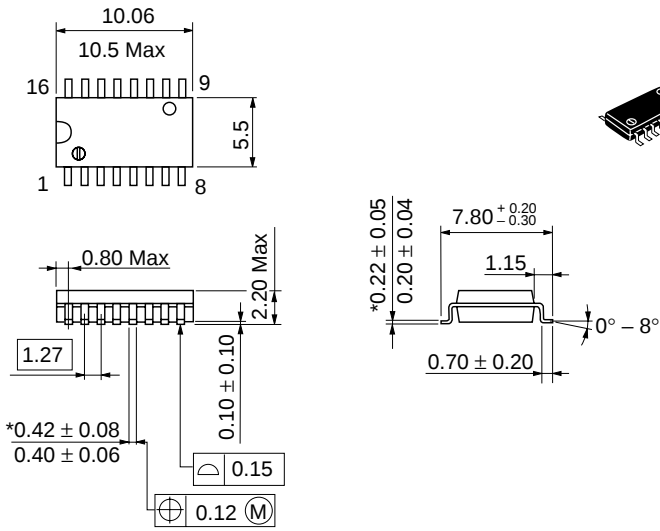
Package Dimensions

Unit: mm



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

Unit: mm



Hitachi Code	FP-16DA
JEDEC	—
EIAJ	Conforms
Mass (reference value)	0.24 g

*Dimension including the plating thickness
Base material dimension

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