

HD75153

Quadruple Differential Line Drivers With 3 State Outputs

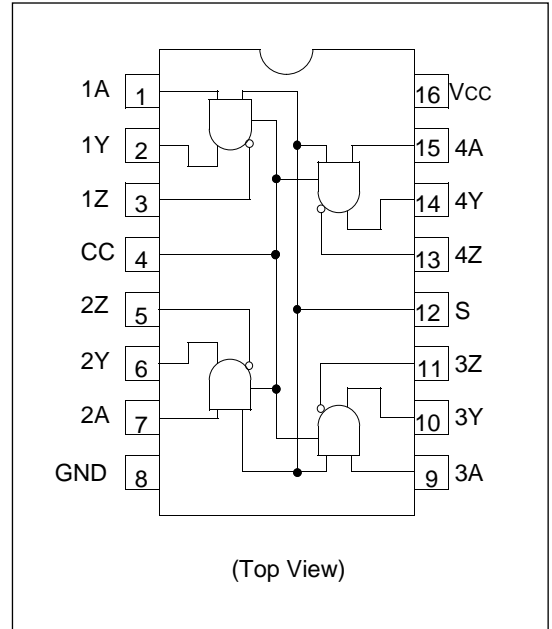
HD75153 features line drivers which satisfy the requirements of EIA RS 422 A and Federal Standard 1020. This device is designed to provide differential signals with high current capability on bus lines. The circuit provides strobe and enable inputs to control all four drivers. The output circuit has active pull up and pull down and is capable of sinking or sourcing 40 mA.

Function Table

Input			Output	
Enable CC	Strobe S	Data A	Y	Z
L	X	X	Z	Z
H	L	X	L	H
H	X	L	L	H
H	H	H	H	L

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

Pin Arrangement



Absolute Maximum Ratings

Item	Symbol	Rating	Unit	
Supply Voltage	V _{CC}	7	V	
Input Voltage	V _{IN}	5.5	V	
Power Dissipation (T _a = 25 °C)	PT	DP	1000	mW
		FP	785	
Operating Temperature Range	Topr	0 to +70	°C	
Storage Temperature Range	Tstg	-60 to +150	°C	

Note: 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	500	5.25	V
Common Mode Output Voltage	V _{out C}	-0.25		6	V
Output Current	I _{OH}	—	—	-40	mA
Output Current	I _{OL}	—	—	40	mA
Operating Temperature	Topr	0	—	70	°C

Electrical Characteristics (T_a = 0 to 70 °C)

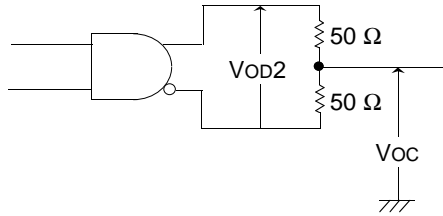
Item	Symbol	Conditions	Min	Typ ^{*1}	Max	Unit	
Input Voltage	V _{IH}		2	—	—	V	
	V _{IL}		—	—	0.8		
Input Clamp Voltage	V _{IK}	V _{CC} = 4.75 V	CC, S	—	—	-2	V
		I _I = -12 mA	All Others	—	-0.9	-1.5	
Output Voltage	V _{OH}	V _{CC} = 4.75 V, V _{IL} = 0.8 V	I _{OH} = -20 mA	2.5	—	—	V
		V _{IH} = 2 V	I _{OH} = -40 mA	2.4	—	—	
	V _{OL}	V _{CC} = 4.75 V, V _{IL} = 0.8 V, V _{IH} = 2 V, I _{OL} = 40 mA	—	—	0.5		
Differential Output Voltage	V _{OD1}	V _{CC} = 5.25 V, I _O = 0	—	3.4	2 V _{OD2}	V	
	V _{OD2}	V _{CC} = 4.75 V	R _L = 100 Ω ^{*5}	2	2.8	—	
Change In Magnitude Of Differential Output Voltage	Δ V _{OD}	*2 V _{CC} = 4.75 V	—	0.01	0.4	V	
Common Mode Output Voltage	V _{OC} *3	V _{CC} = 5.25 V	—	1.8	3	V	
		V _{CC} = 4.75 V	—	1.6	3		
Change In Magnitude Of Common Mode Output Voltage	Δ V _{OC}	*2 V _{CC} = 4.75 V or 5.25 V	—	0.02	0.4	V	
Off State (High Impedance State) Output Current	I _{OZ}	V _{CC} = 5.25 V Enable = 0.8 V	V _O = 0.5 V	—	—	-20	μA
			V _O = 2.5 V	—	—	20	
			V _O = V _{CC}	—	—	20	

Item	Symbol	Conditions	Min	Typ *1	Max	Unit	
Output Current With Power Off	I _O	V _{CC} = 0 V	V _O = 6 V	—	0.1	100	μA
			V _O = -0.25 V	—	-0.1	-100	
			V _O = -0.25 V to 6 V	—	—	±100	
Input Current	I _I	V _{CC} = 5.25 V, V _I = 5.5 V	—	—	0.1	mA	
	I _{IH}	V _{CC} = 5.25 V	A	—	—	20	μA
		V _I = 2.4 V	CC, S	—	—	80	
I _{IL}	V _{CC} = 5.25 V	A	—	—	-0.36	mA	
	V _I = 0.4 V	CC,S	—	—	-1.6		
Short Circuit Output Current	I _{OS} *4	V _{CC} = 5.25 V	-50	-90	-150	mA	
Supply Current	I _{CC}	V _{CC} = 5.25 V No Load	Outputs Disabled	—	30	60	mA
			Outputs Enabled	—	60	84	

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

ΔV_{OD} and ΔV_{OC} are the changes in magnitudes of V_{OD} and V_{OC}, respectively, that occur when the input is changed from a high level to a low level.

- In EIA standard RS-422A, V_{OC}, which is the average of the two output voltages with respect to ground, is called output offset voltage, V_{OS}.
- Only one output should be shorted at a time, and duration of the short circuit should not exceed one second.
- Differential and common mode output voltages.



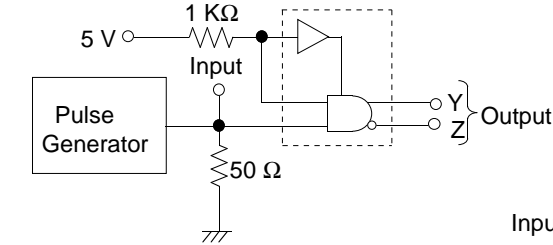
Switching Characteristics (V_{CC} = 5.0 V, T_a = 25°C)

Item	Symbol	Conditions	Min	Typ	Max	Unit
Propagation Delay Time	t _{PLH}	C _L = 30 pF, R _L = 100 Ω	—	15	30	ns
	t _{PHL}	Termination A	—	15	30	
	t _{PLH}	C _L = 30 pF	—	13	25	
	t _{PHL}	Termination B	—	13	25	
Transition Time	t _{TLH}	C _L = 30 pF, R _L = 100 Ω	—	12	20	ns
	t _{THL}	Termination A	—	12	20	
Output Enable Time	t _{ZH}	C _L = 30 pF, R _L = 60 Ω	—	18	35	ns
	t _{ZL}	C _L = 30 pF, R _L = 111 Ω	—	20	35	
Output Disable Time	t _{HZ}	C _L = 30 pF, R _L = 60 Ω	—	19	30	ns
	t _{LZ}	C _L = 30 pF, R _L = 111 Ω	—	13	30	
Overshoot Factor		R _L = 100 Ω Termination C	—	—	10	%

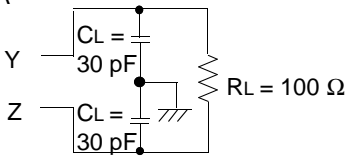
Switching Time Test Method

• Test circuit

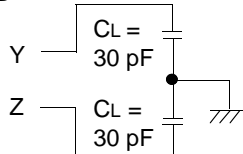
1. tPLH, tPHL, tTLH, tTHL, and overshoot factor



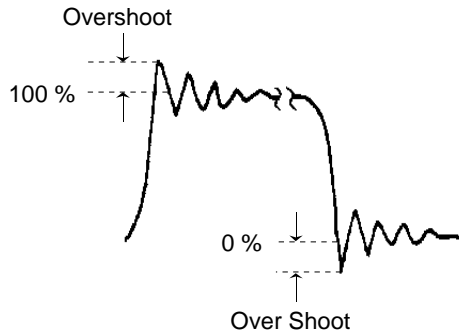
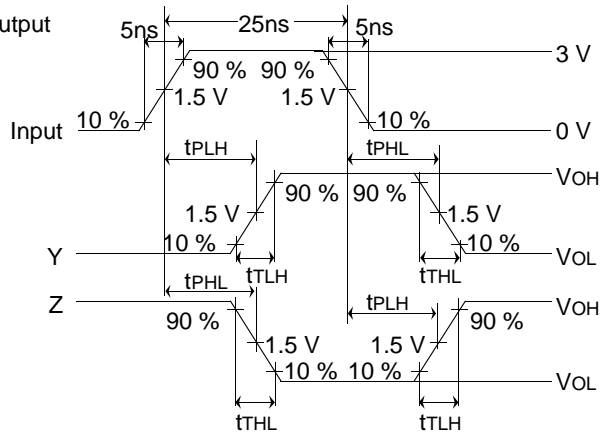
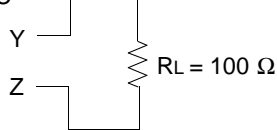
Termination A



Termination B

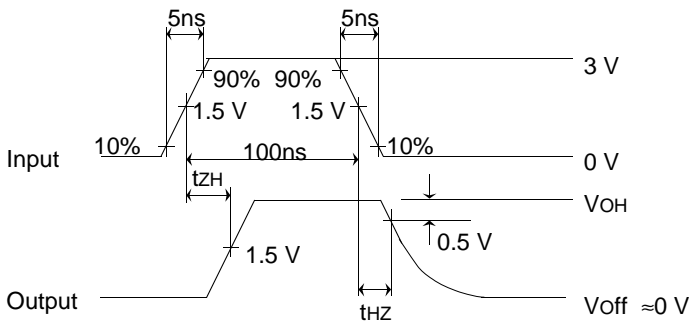
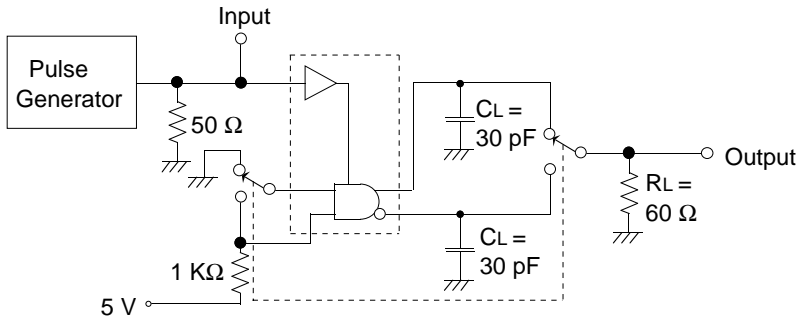


Termination C

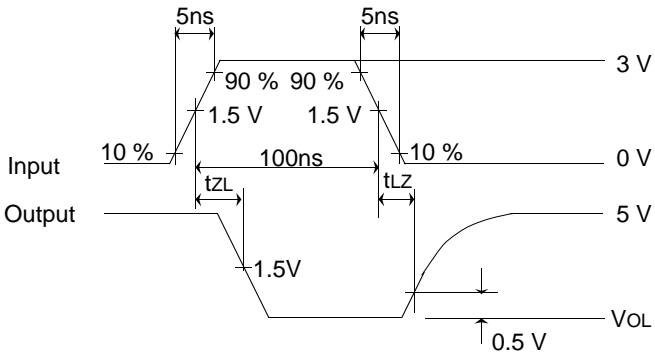
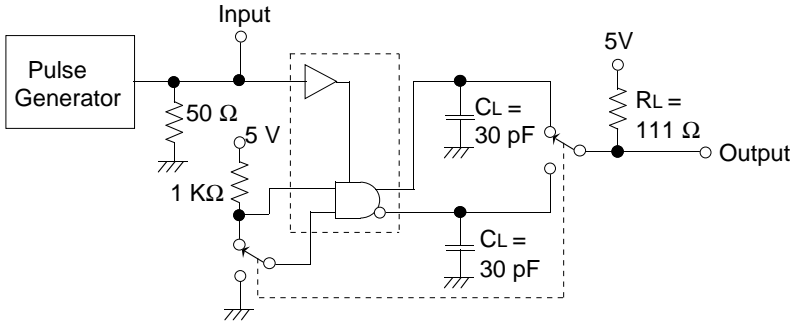


- Notes: 1. The pulse generator has the following characteristics:
 Zout = 50 Ω, PRR = 10 MHz
 2. CL includes probe and jig capacitance.

2. t_{ZH} , t_{HZ}



3. t_{ZL}, t_{LZ}



- Notes: 1. The pulse generator has the following characteristics:
Z_{out} = 50 Ω, PRR = 500 kHz
- 2. C_L includes probe and jig capacitance.