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

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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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HD151240

Octal Buffers/Line Drivers With 3 State Outputs

ADE-205-595 (Z)
1st. Edition
Dec. 2000

Description

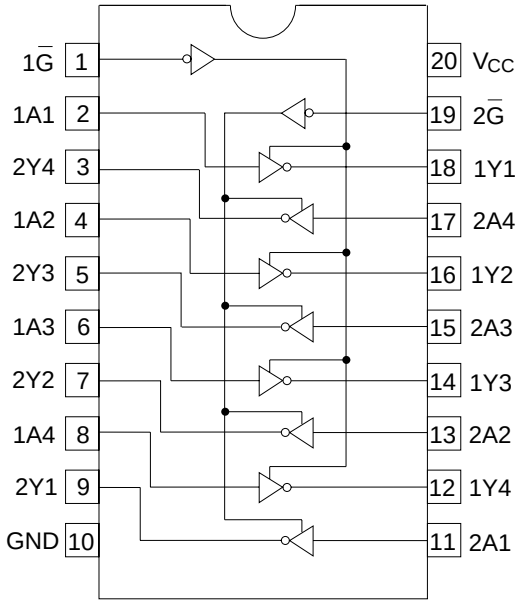
The HD151240 using CMOS process, provides high speed and high drivability equivalent to HD74LS240 with super low power dissipation. The device has eight inverter drivers (three state outputs) in 20 pin package. Each four drivers

construct a group and the two groups are controlled separately by $1\overline{G}$ and $2\overline{G}$ which enable the output at low level. Power up down protection function keeps the output in high impedance state at low V_{CC} regardless of the state in enable inputs.

Features

- High speed tpd = 10 ns (Typ)
- High output current I_{OH} = –15 mA
  I_{OL} = 24 mA
- Both input and output is TTL level
- Wide operating temperature: Ta = –40 to +85°C
- Both input and output is high impedance state at supply off
- The function provides power up down protection

Pin Arrangement



(Top view)

Function Table

Inputs		
G	**A**	**Output Y**
H	X	Z
L	H	L
L	L	H

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

Absolute Maximum Ratings (Ta = 25°C)

Item	Symbol	Ratings	Unit
Supply Voltage	V_{CC}	–0.5 to +7.0	V
Input Voltage ($\overline{G}$, A)	V_{IN}	–0.5 to +7.0	V
Output Voltage	V_{OUT}	–0.5 to +5.5	V
Power Dissipation	P_T	500	mW
Storage Temperature	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}	4.5	5.0	5.5	V
Output Current	I_{OH}	—	—	–25	mA
	I_{OL}	—	—	24	mA
Operating Temperature	Topr	–40	25	85	°C
Input Rise/Fall Time*[1]	t_r, t_f	0	—	250	ns

Note: 1. This item guarantees maximum limit when one input switches.
Waveform: Refer to test circuit of switching characteristics.

Electrical Characteristics (Ta = –40°C to +85°C)

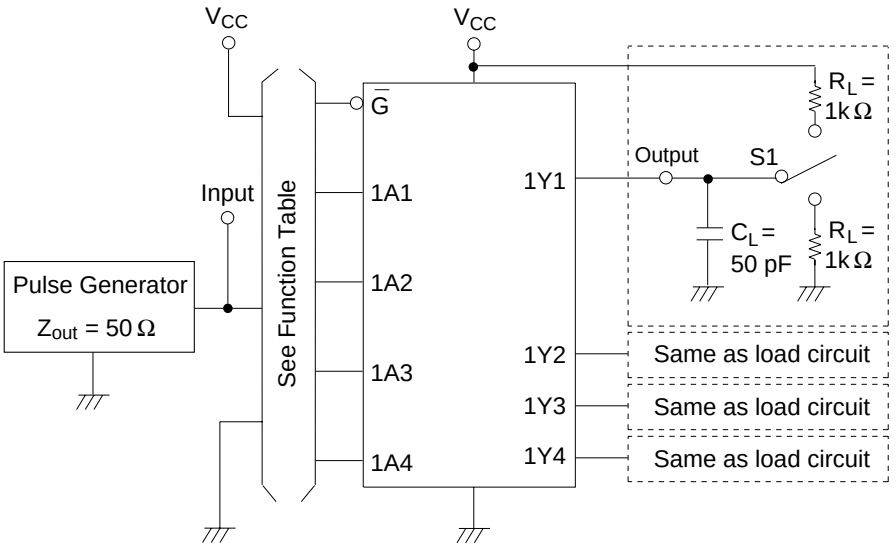
Item	Symbol	V_{CC} (V)	Min	Max	Unit	Conditions
Input Voltage	V_{IH}	—	2.0	—	V	
	V_{IL}	—	—	0.8	V	
Output Voltage	V_{OH}	4.5	2.4	—	V	I_{OH} = –3 mA, V_{IN} = V_{CC} – 2.1 V or 0.5 V
		4.5	2.0	—	V	I_{OH} = –15 mA, V_{IN} = V_{CC} – 2.1 V or 0.5 V
	V_{OL}	4.5	—	0.4	V	I_{OL} = 12 mA, V_{IN} = V_{CC} – 2.1 V or 0.5 V
		4.5	—	0.5	V	I_{OL} = 24 mA, V_{IN} = V_{CC} – 2.1 V or 0.5 V
Off State Output Current	I_{OZ}	5.5	—	±5.0	µA	V_{OUT} = V_{CC} or GND
	$I_{OZ(off)}$	0	—	±5.0	µA	V_{OUT} = 5.5 V
Input Current	I_{IN}	5.5	—	±1.0	µA	V_{IN} = V_{CC} or GND
	$I_{IN(off)}$	0	—	±1.0	µA	V_{IN} = 5.5 V
Short Circuit Output Current*[1]	I_{OS}	5.5	–40	–225	mA	
Supply Current	I_{CC}	5.5	—	0.5	mA	I_{OUT} = 0 mA, V_{IN} = V_{CC} or GND
	I_{CCT}*[2]	5.5	—	1.5	mA	V_{IN} = V_{CC} – 2.1 V or 0.5 V

Notes: 1. Not more than one output should be shorted at a time and duration of the short circuit should not exceed one second.
2. When input by the TTL level, it shows I_{CC} increase at per 1 pin.

Switching Characteristics (C_L = 50 pF)

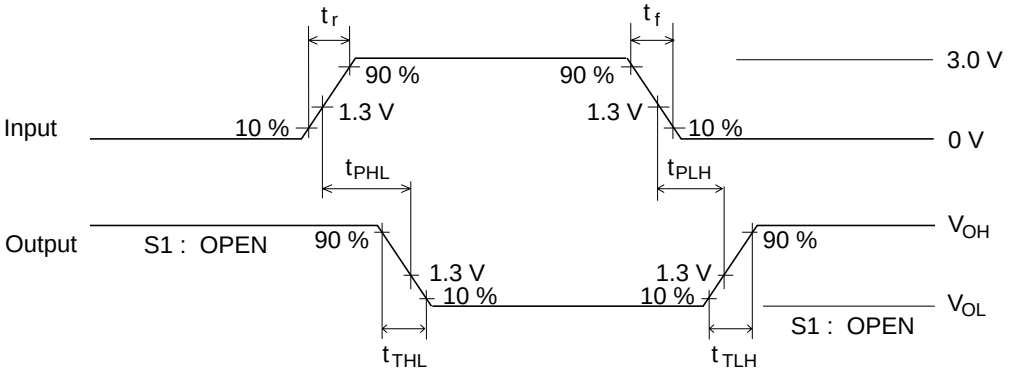
		Ta = 25°C, V_{CC} = 5		Ta = –40 to +85°C, V_{CC} = 5 V±10 %			
Item	**Symbol**	**Min**	**Max**	**Min**	**Max**	**Unit**	**Conditions**
Propagation Delay Time	t_{PLH}	3.0	15.0	3.0	18.0	ns	See next page
	t_{PHL}	3.0	15.0	3.0	18.0		
Output Rise Time	t_{TLH}	0.0	10.0	0.0	10.0	ns	
Output Fall Time	t_{THL}	0.0	10.0	0.0	10.0		
Output Enable Time	t_{ZH}	3.0	25.0	3.0	30.0	ns	
	t_{ZL}	3.0	25.0	3.0	30.0		
Output Disable Time	t_{HZ}	3.0	25.0	3.0	30.0	ns	
	t_{LZ}	3.0	25.0	3.0	30.0		
Input Capacitance	C_{IN}	5.0 (Typ)		—		pF	V_{IN} = V_{CC} or GND
Output Capacitance	C_O	12.0 (Typ)		—		pF	V_O = V_{CC} or GND

Test Circuit 1



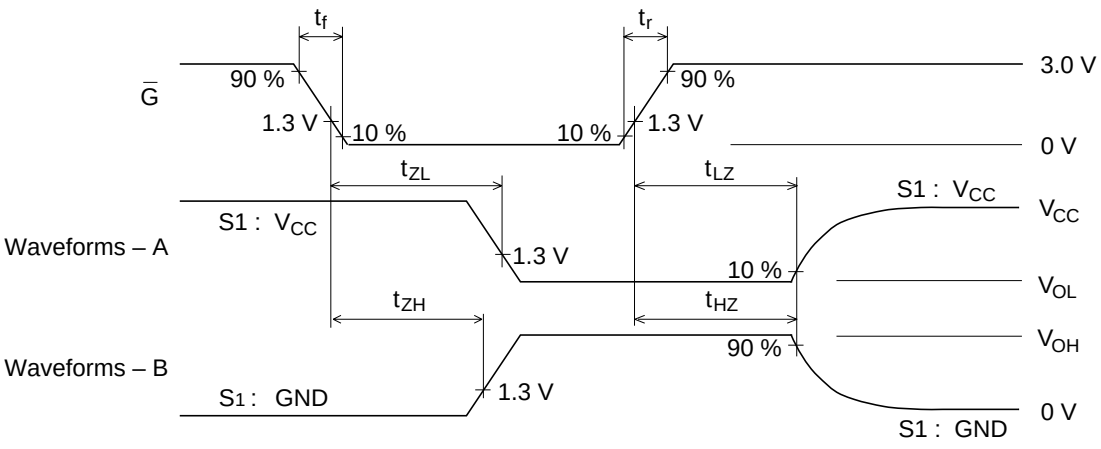
Notes: 1. C_L includes probe and jig capacitance.
2. 2G, 2A1-2A4 to 2Y1-2Y4 are idential to above load circuit.
3. S1 is a input/output switch.

Waveforms 1



Notes: 1. t_r = 6.0 ns, t_f = 6.0 ns
2. Input waveforms: PRR = 1 MHz, duty cycle 50%

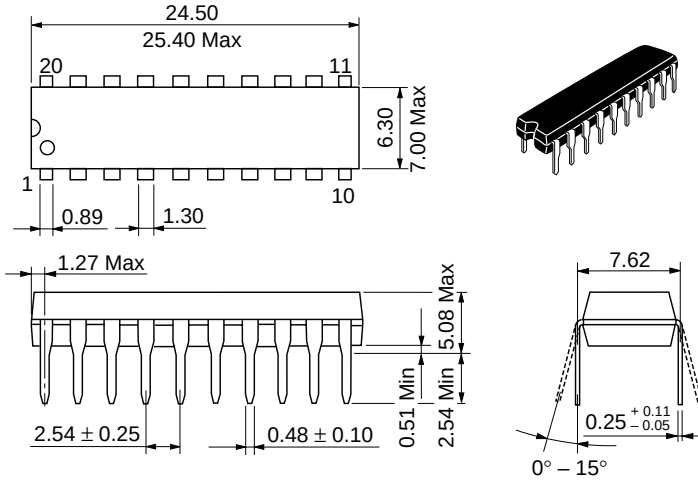
Waveforms 2



Notes:
1. t_r = 6.0 ns, t_f = 6.0 ns
2. Input waveforms: PRR = 1 MHz, duty cycle 50%
3. Waveform – A shows input conditions such that the output is low level when enable by the output control.
4. Waveform – B shows input conditions such that the output is high level when enable by the output control.

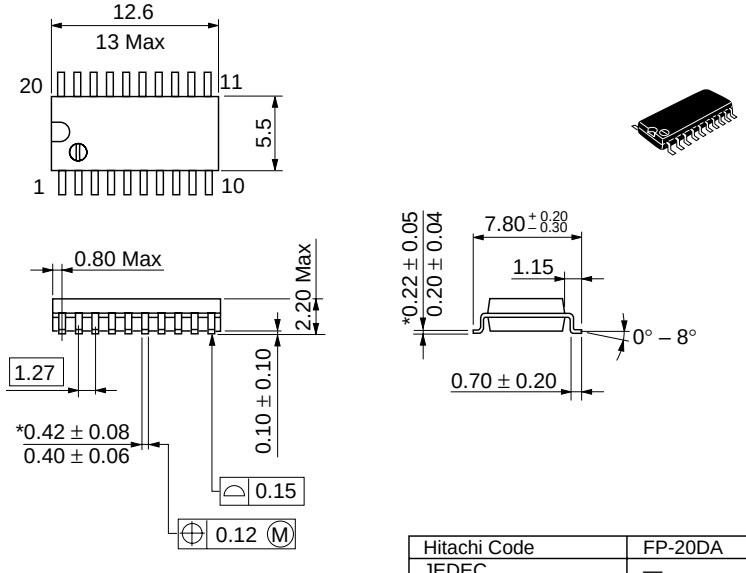
Package Dimensions

Unit: mm



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

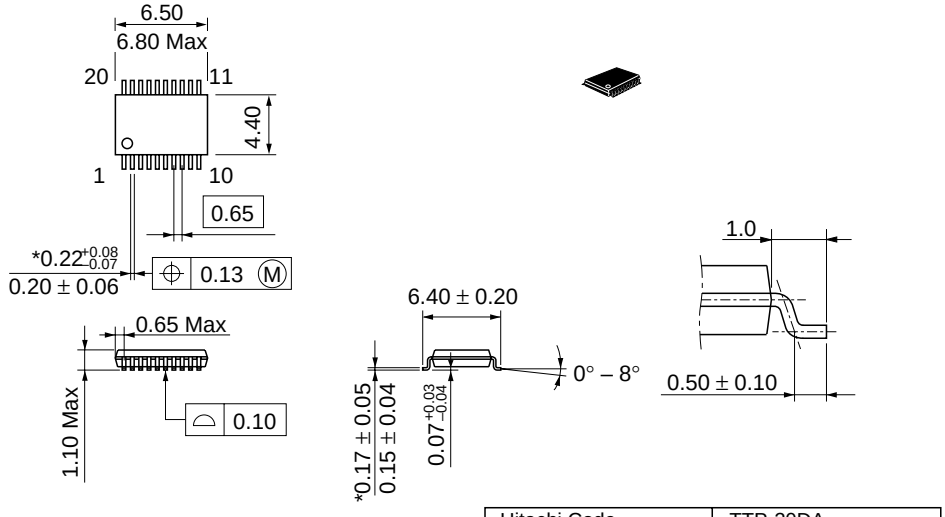
Unit: mm



*Dimension including the plating thickness
Base material dimension

Hitachi Code	FP-20DA
JEDEC	—
EIAJ	Conforms
Mass (reference value)	0.31 g

Unit: mm



*Dimension including the plating thickness
Base material dimension

Hitachi Code	TTP-20DA
JEDEC	—
EIAJ	—
Mass (reference value)	0.07 g

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