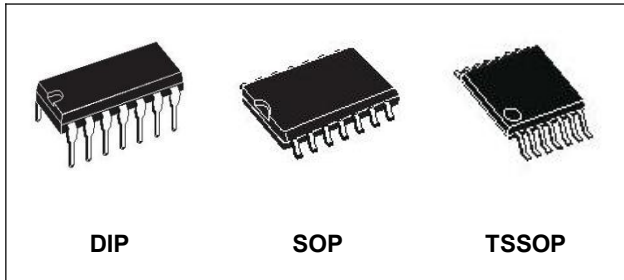


QUAD BUS BUFFER (3-STATE)



Datasheet - production data

$|I_{OH}| = I_{OL} = 6\text{mA (MIN.)}$

- BALANCED PROPAGATION DELAYS:
 $t_{PLH} \cong t_{PHL}$
- WIDE OPERATING VOLTAGE RANGE:
 $V_{CC(OPR.)} = 2\text{V to } 6\text{V}$

Description

The RD74HC125 is a high-speed CMOS QUAD BUFFER (3-STATE) fabricated with silicon gate CMOS technology.

The device requires the 3-STATE control input \overline{G} to be set high to place the output into the high impedance state.

All inputs are equipped with protection circuits against static discharge and transient excess voltage.

Features

- HIGH SPEED:
 $t_{PD} = 8\text{ns (TYP.) at } V_{CC} = 6\text{V}$
- LOW POWER DISSIPATION:
 $I_{CC} = 4\mu\text{A (MAX.) at } T_A = 25^\circ\text{C}$
- HIGH NOISE IMMUNITY:
 $V_{NIH} = V_{NIL} = 28\% V_{CC(MIN.)}$
- SYMMETRICAL OUTPUT IMPEDANCE:

Table 1. Device summary

PART NUMBER	PACKAGE
RD74HC125BDI	DIP14
RD74HC125BSO	SOP14
RD74HC125BTS	TSSOP14

1 Pin information

Figure 1. Pin connection and IEC logic symbols

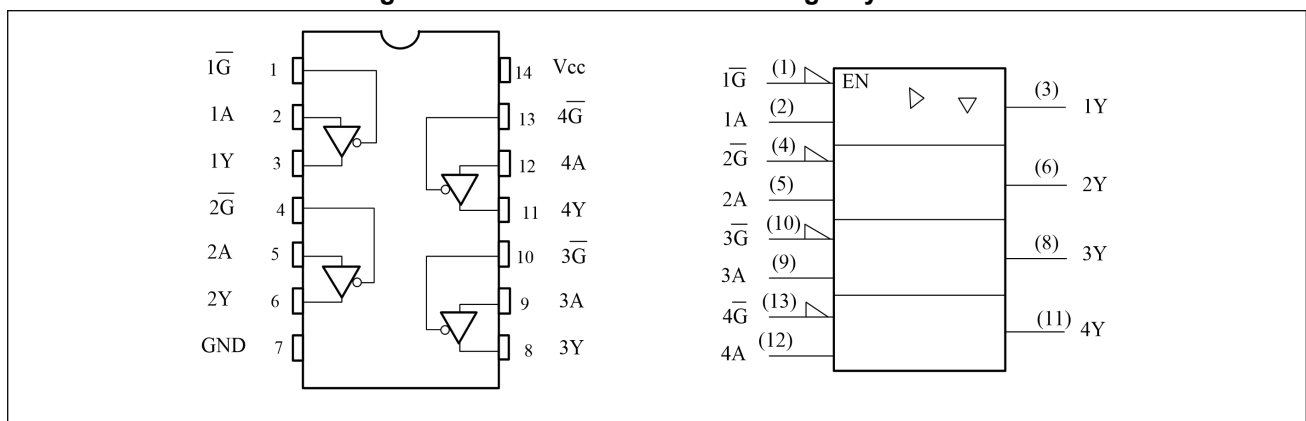


Table 2. Pin description

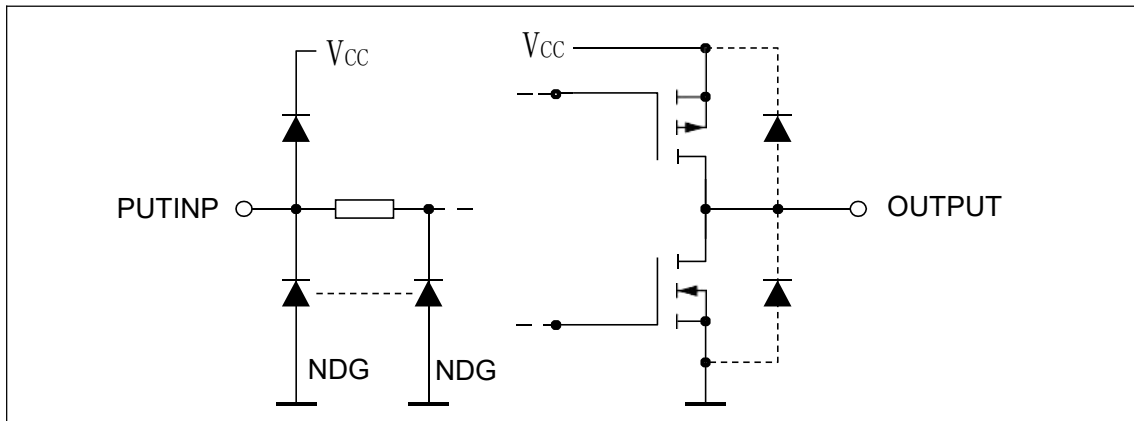
Pin No	Symbol	Name and function
1, 4, 10, 13	$\overline{1G}$ to $\overline{4G}$	Output Enable Input
2, 5, 9, 12	1A to 4A	Data Inputs
3, 6, 8, 11	1Y to 4Y	Data Outputs
7	GND	Ground (0V)
14	V _{CC}	Positive Supply Voltage

2 Functional description

Table 3. Truth table

A	\overline{G}	Y
X	H	Z
L	L	L
H	L	H

Figure 2. Input and output equivalent circuit



3 Electrical characteristics

Table 4. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V _{CC}	Supply Voltage	-0.5 to + 7.0	V
V _I	DC Input Voltage	-0.5 to V _{CC} + 0.5	V
V _O	DC Output Voltage	-0.5 to V _{CC} + 0.5	V
I _{IK}	DC Input Diode Current	± 20	mA
I _{OK}	DC Output Diode Current	± 20	mA
I _O	DC Output Current	± 35	mA
I _{CC} or I _{GND}	DC V _{CC} or Ground Current	± 70	mA
P _D	Power Dissipation	500 (*)	mW
T _{stg}	Storage Temperature	-65 to + 150	°C
T _L	Lead Temperature (10 sec)	300	°C

Absolute Maximum Ratings are those values beyond which damage to the device may occur. Functional operation under these conditions is not implied

(*) 500mW at 65 °C; derate to 300mW by 10mW/°C from 65°C to 85°C

Table 5. Recommended operating conditions

Symbol	Parameter	Value	Unit	
V_{CC}	Supply Voltage	2 to 6	V	
V_I	Input Voltage	0 to V_{CC}	V	
V_O	Output Voltage	0 to V_{CC}	V	
T_{op}	Operating Temperature	-40 to 85	°C	
t_r, t_f	Input Rise and Fall Time	$V_{CC} = 2.0V$	0 to 1000	ns
		$V_{CC} = 4.5V$	0 to 500	ns
		$V_{CC} = 6.0V$	0 to 400	ns

Table 6. DC specifications

Symbol	Parameter	Test Condition		Value					Unit
		V_{CC} (V)		$T_A = 25\text{ °C}$			-40 to 85°C		
				Min.	Typ.	Max.	Min.	Max.	
V_{IH}	High Level Input Voltage	2.0		1.5			1.5		V
		4.5		3.15			3.15		
		6.0		4.2			4.2		
V_{IL}	Low Level Input Voltage	2.0				0.5		0.5	V
		4.5				1.35		1.35	
		6.0				1.8		1.8	
V_{OH}	High Level Output Voltage	2.0	$I_O = -20\ \mu A$	1.9	2.0		1.9		V
		4.5	$I_O = -20\ \mu A$	4.4	4.5		4.4		
		6.0	$I_O = -20\ \mu A$	5.9	6.0		5.9		
		4.5	$I_O = -6.0\ mA$	4.18	4.31		4.13		
		6.0	$I_O = -7.8\ mA$	5.68	5.8		5.63		
V_{OL}	Low Level Output Voltage	2.0	$I_O = 20\ \mu A$		0.0	0.1		0.1	V
		4.5	$I_O = 20\ \mu A$		0.0	0.1		0.1	
		6.0	$I_O = 20\ \mu A$		0.0	0.1		0.1	
		4.5	$I_O = 6.0\ mA$		0.17	0.26		0.33	
		6.0	$I_O = 7.8\ mA$		0.18	0.26		0.33	
I_I	Input Leakage Current	6.0	$V_I = V_{CC}$ or GND			± 0.1		± 1	μA
I_{OZ}	High Impedance Output Leakage Current	6.0	$V_I = V_{IH}$ or V_{IL} $V_O = V_{CC}$ or GND			± 0.5		± 5	μA
I_{CC}	Quiescent Supply Current	6.0	$V_I = V_{CC}$ or GND			4		40	μA

Table 7. AC electrical characteristics (Input $t_r = t_f = 6\text{ns}$)

Symbol	Parameter	Test Condition		Value					Unit	
		V_{CC} (V)	C_L (pF)	$T_A = 25^\circ\text{C}$			-40 to 85°C			
				Min.	Typ.	Max.	Min.	Max.		
t_{TLH} t_{THL}	Output Transition Time	2.0	50		20	60		75	ns	
		4.5		6	12		15			
		6.0		5	10		13			
t_{PLH} t_{PHL}	Propagation Delay Time	2.0	50		36	75		95	ns	
		4.5		9	15		19			
		6.0		8	13		16			
		2.0	150		52	105		130	ns	
		4.5		13	21		26			
		6.0		11	18		22			
t_{PZL} t_{PZH}	High Impedance Output Enable Time	2.0	50	$R_L = 1\text{K}\Omega$		36	75		95	ns
		4.5			9	15		19		
		6.0			8	13		16		
		2.0	150	$R_L = 1\text{K}\Omega$		52	105		130	ns
		4.5			13	21		26		
		6.0			11	18		22		
t_{PLZ} t_{PHZ}	High Impedance Output Disable Time	2.0	50	$R_L = 1\text{K}\Omega$		48	80		100	ns
		4.5			12	16		20		
		6.0			10	14		17		

Table 8. Capacitive characteristics

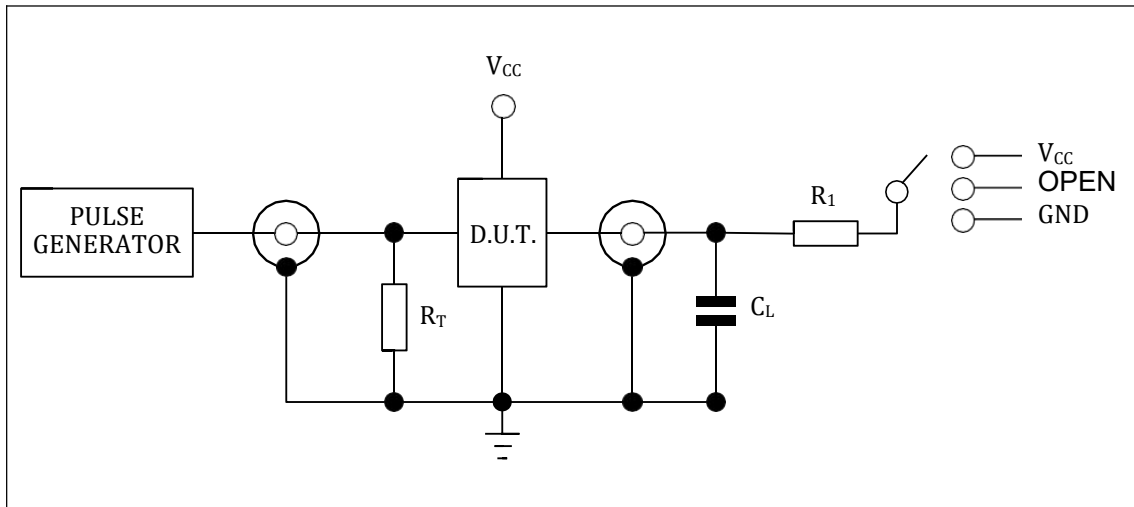
Symbol	Parameter	Test Condition		Value					Unit
		V_{CC} (V)		$T_A = 25^\circ\text{C}$			-40 to 85°C		
				Min.	Typ.	Max.	Min.	Max.	
C_{IN}	Input Capacitance	5.0			5	10		10	pF
C_{PD}	Power Dissipation Capacitance ⁽¹⁾	5.0			35				pF

1. C_{PD} is defined as the value of the IC's internal equivalent capacitance which is calculated from the operating current consumption without load. (Refer to test circuit). Average operating current can be obtained by the following equation:

$$I_{CC(oper)} = C_{PD} \times V_{CC} \times f_{IN} + I_{CC}/4 \text{ (per buffer)}$$

4 Test circuit

Figure 3. Test circuit



TEST	SWITCH
t_{PLH} , t_{PHL}	OPEN
t_{PZL} , t_{PLZ}	V_{CC}
t_{PZH} , t_{PHZ}	GND

C_L = 50pF/150pF or equivalent (includes jig and probe capacitance)

R_1 = 1K Ω or equivalent

R_T = Z_{OUT} of pulse generator (typically 50 Ω)

Figure 4. Waveform 1: propagation delay times (f = 1MHz; 50% duty cycle)

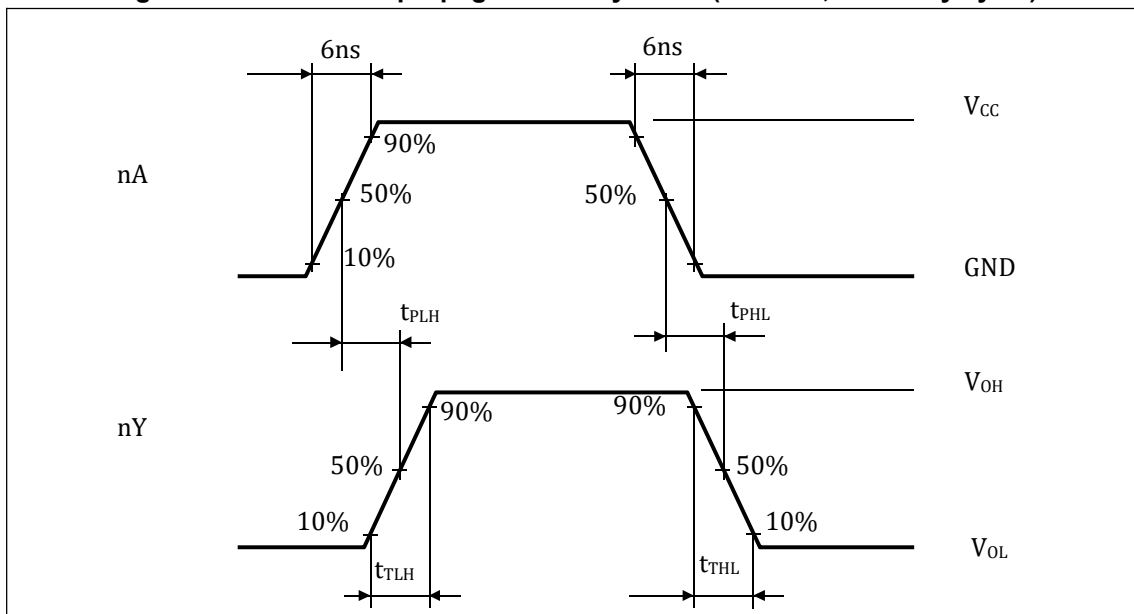
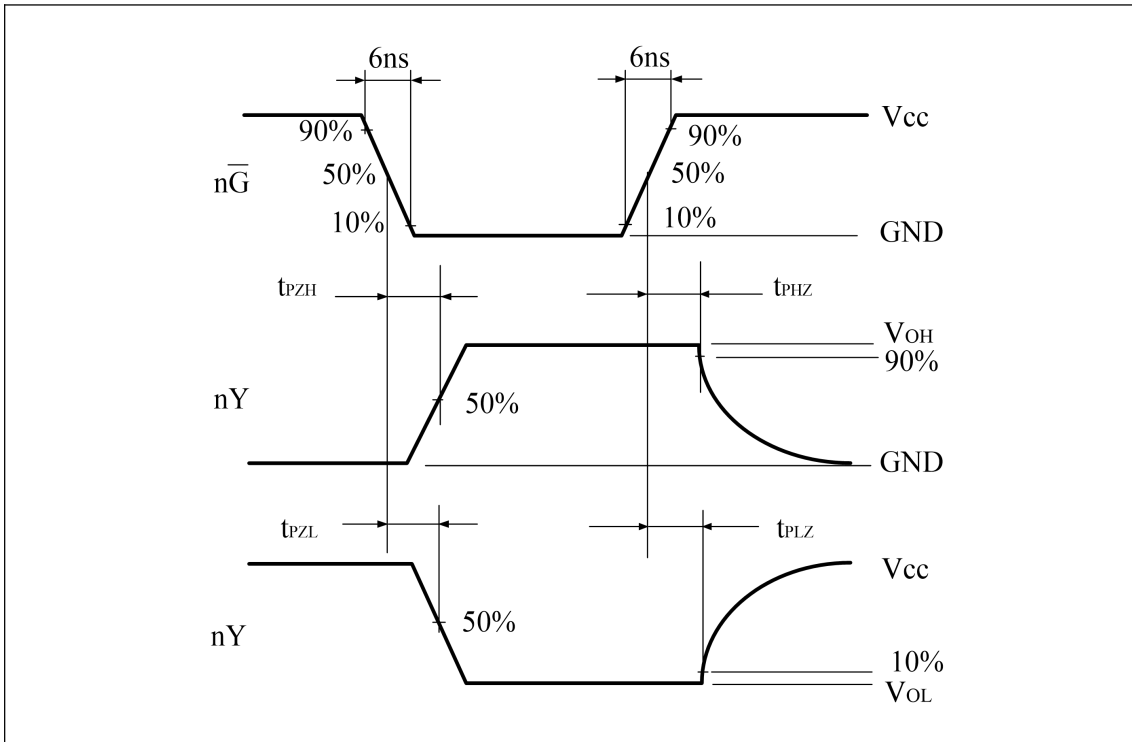


Figure 5. Waveform 2: output enable and disable times ($f = 1\text{MHz}$; 50% duty cycle)

5 Ordering information

Table 9. Device summary

Order code	Package	Packing
RD74HC125BDI	DIP14	Tape and reel
RD74HC125BSO	SOP14	
RD74HC125BTS	TSSOP14	
RD74HC125B		Wafer

6 Revision history

Table 10. Document revision history ⁽¹⁾

Date	Revision	Changes
18-Jan-2022	1	Initial release

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