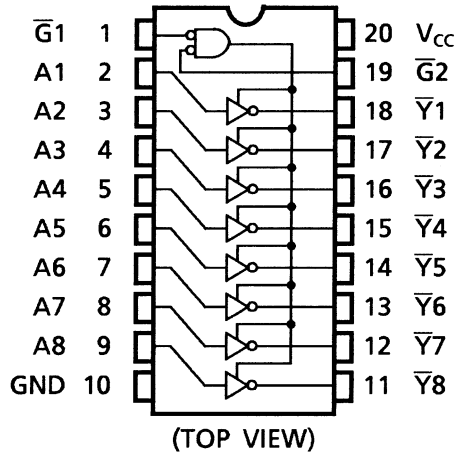


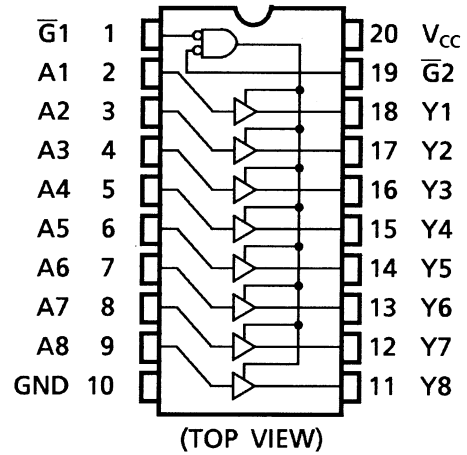


## Pin Assignment

### TC74HCT540A

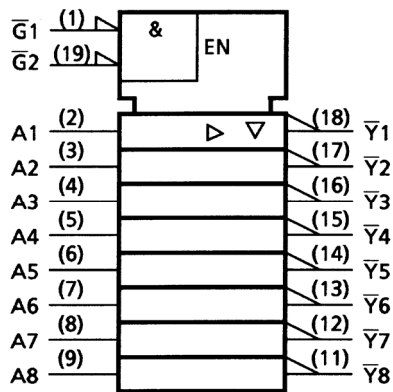


### TC74HCT541A

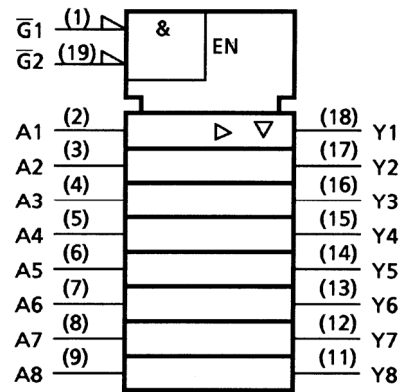


## IEC Logic Symbol

### TC74HCT540A



### TC74HCT541A



## Truth Table

Inputs			Outputs	
$\bar{G}1$	$\bar{G}2$	$A_n$	$Y_n^*$	$\bar{Y}_n^*$
H	X	X	Z	Z
X	H	X	Z	Z
L	L	H	H	L
L	L	L	L	H

X: Don't care

Z: High impedance

\*:  $Y_n$ ..... HCT541A

$\bar{Y}_n$  ..... HCT540A

## Absolute Maximum Ratings (Note 1)

Characteristics	Symbol	Rating	Unit
Supply voltage range	V <sub>CC</sub>	-0.5~7	V
DC input voltage	V <sub>IN</sub>	-0.5~V <sub>CC</sub> + 0.5	V
DC output voltage	V <sub>OUT</sub>	-0.5~V <sub>CC</sub> + 0.5	V
Input diode current	I <sub>IK</sub>	±20	mA
Output diode current	I <sub>OK</sub>	±20	mA
DC output current	I <sub>OUT</sub>	±35	mA
DC V <sub>CC</sub> /ground current	I <sub>CC</sub>	±75	mA
Power dissipation	P <sub>D</sub>	500 (DIP) (Note 2)/180 (SOP)	mW
Storage temperature	T <sub>stg</sub>	-65~150	°C

Note 1: Exceeding any of the absolute maximum ratings, even briefly, lead to deterioration in IC performance or even destruction.

Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings and the operating ranges.

Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/"Derating Concept and Methods") and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

Note 2: 500 mW in the range of Ta = -40 to 65°C. From Ta = 65 to 85°C a derating factor of -10 mW/°C shall be applied until 300 mW.

## Operating Ranges (Note)

Characteristics	Symbol	Rating	Unit
Supply voltage	V <sub>CC</sub>	4.5~5.5	V
Input voltage	V <sub>IN</sub>	0~V <sub>CC</sub>	V
Output voltage	V <sub>OUT</sub>	0~V <sub>CC</sub>	V
Operating temperature	T <sub>opr</sub>	-40~85	°C
Input rise and fall time	t <sub>r</sub> , t <sub>f</sub>	0~500	ns

Note: The operating ranges must be maintained to ensure the normal operation of the device. Unused inputs must be tied to either V<sub>CC</sub> or GND.

## Electrical Characteristics

### DC Characteristics

Characteristics	Symbol	Test Condition	Ta = 25°C			Ta = -40~85°C		Unit		
			V <sub>CC</sub> (V)	Min	Typ.	Max	Min		Max	
High-level input voltage	V <sub>IH</sub>	—	4.5~5.5	2.0	—	—	2.0	—	V	
Low-level input voltage	V <sub>IL</sub>	—	4.5~5.5	—	—	0.8	—	0.8	V	
High-level output voltage	V <sub>OH</sub>	V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub>	I <sub>OH</sub> = -20 μA	4.5	4.4	4.5	—	4.4	—	V
			I <sub>OH</sub> = -6 mA	4.5	4.18	4.31	—	4.13	—	
Low-level output voltage	V <sub>OL</sub>	V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub>	I <sub>OL</sub> = 20 μA	4.5	—	0.0	0.1	—	0.1	V
			I <sub>OL</sub> = 6 mA	4.5	—	0.17	0.26	—	0.33	
3-state output off-state current	I <sub>OZ</sub>	V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub> V <sub>OUT</sub> = V <sub>CC</sub> or GND	5.5	—	—	±0.5	—	±5.0	μA	
Input leakage current	I <sub>IN</sub>	V <sub>IN</sub> = V <sub>CC</sub> or GND	5.5	—	—	±0.1	—	±1.0	μA	
Quiescent supply current	I <sub>CC</sub>	V <sub>IN</sub> = V <sub>CC</sub> or GND	5.5	—	—	4.0	—	40.0	μA	
	I <sub>C</sub>	Per input: V <sub>IN</sub> = 0.5 V or 2.4 V Other input: V <sub>CC</sub> or GND	5.5	—	—	2.0	—	2.9	mA	

## AC Characteristics (input: $t_r = t_f = 6 \text{ ns}$ )

Characteristics	Symbol	Test Condition		Ta = 25°C			Ta = -40~85°C		Unit	
		CL (pF)	V <sub>CC</sub> (V)	Min	Typ.	Max	Min	Max		
Output transition time	$t_{TLH}$	—	50	4.5	—	7	12	—	15	ns
	$t_{THL}$			5.5	—	6	11	—	14	
Propagation delay time (TC74HCT540A)	$t_{pLH}$	—	50	4.5	—	12	20	—	25	ns
				5.5	—	9	18	—	23	
	$t_{pHL}$		150	4.5	—	17	26	—	33	
				5.5	—	14	24	—	30	
Propagation delay time (TC74HCT541A)	$t_{pLH}$	—	50	4.5	—	14	23	—	29	ns
				5.5	—	11	21	—	27	
	$t_{pHL}$		150	4.5	—	19	29	—	36	
				5.5	—	16	27	—	33	
Output enable time	$t_{pZL}$	$R_L = 1 \text{ k}\Omega$	50	4.5	—	18	30	—	38	ns
				5.5	—	16	27	—	35	
	$t_{pZH}$		150	4.5	—	23	36	—	45	
				5.5	—	21	33	—	41	
Output disable time	$t_{pLZ}$	$R_L = 1 \text{ k}\Omega$	50	4.5	—	18	30	—	38	ns
	$t_{pHZ}$			5.5	—	16	27	—	35	
Input capacitance	C <sub>IN</sub>	—		—	5	10	—	10	pF	
Output capacitance	C <sub>OUT</sub>	—		—	10	—	—	—	pF	
Power dissipation capacitance	CPD (Note)	TC74HCT540A		—	35	—	—	—	pF	
		TC74HCT541A		—	31	—	—	—		

Note: C<sub>PD</sub> is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption without load.

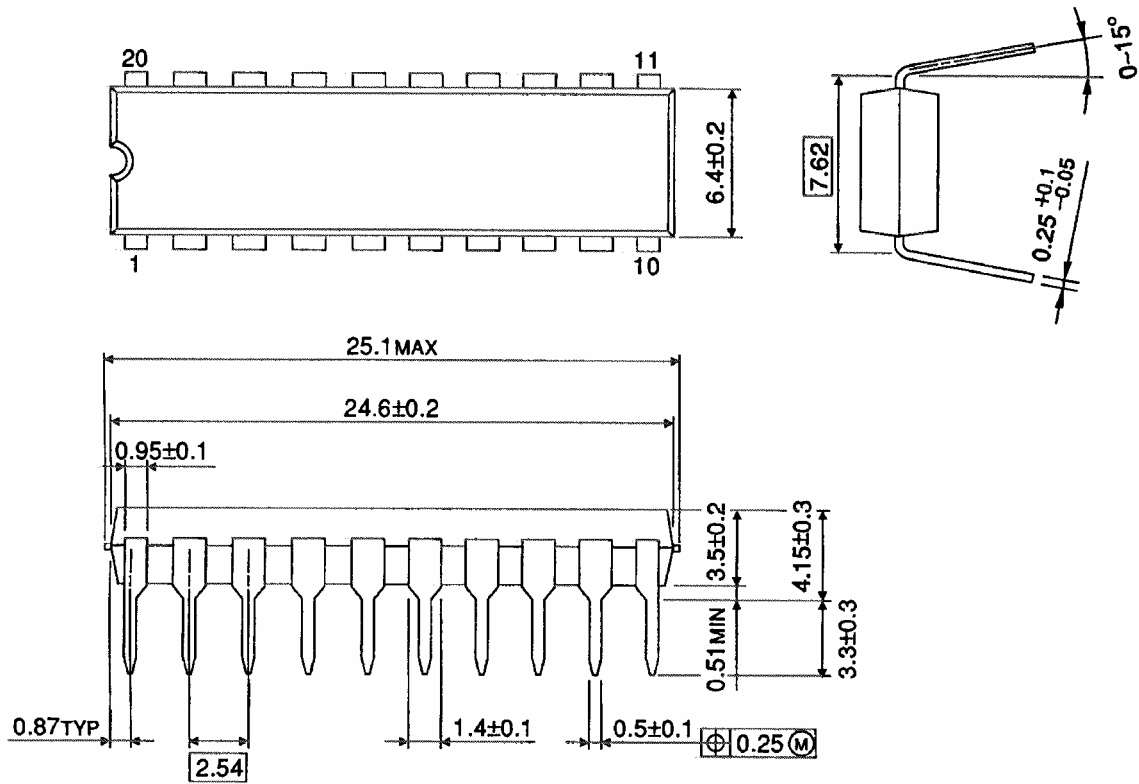
Average operating current can be obtained by the equation:

$$I_{CC}(\text{opr}) = C_{PD} \cdot V_{CC} \cdot f_{IN} + I_{CC}/8 \text{ (per bit)}$$

## Package Dimensions

DIP20-P-300-2.54A

Unit : mm



Weight: 1.30 g (typ.)

**Package Dimensions**

SOP20-P-300-1.27A

Unit: mm



Weight: 0.22 g (typ.)

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20070701-EN GENERAL

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