TOSHIBA CMOS DIGITAL INTEGRATED CIRCUIT SILICON MONOLITHIC

TC74HCT540AP, TC74HCT540AF, TC74HCT540AFW
TC74HCT541AP, TC74HCT541AF, TC74HCT541AFW

OCTAL BUS BUFFER WITH TTL INPUT LEVEL
TC74HCT540AP/AF/AFW INVERTING, 3-STATE OUTPUTS
TC74HCT541AP/AF/AFW NON-INVERTING, 3-STATE OUTPUTS

(Note) The JEDEC SOP (FW) is not available in Japan.

The TC74HCT540A / TC74HCT541A are high speed CMOS OCTAL BUS BUFFERs fabricated with silicon gate C^2MOS technology.

These devices may be used as a level converter for interfacing TTL or NMOS to High Speed CMOS. The inputs are compatible with TTL, NMOS and CMOS output voltage levels.

They achive the high speed operation similar to equivalent LSTTL while maintaing the CMOS low power dissipation.

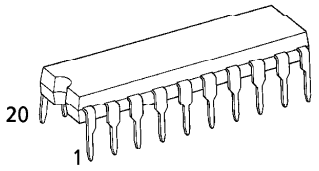
The TC74HCT540A is a non-inverting type, and the TC74HCT541A is an inverting type.

When either $\overline{G}1$ or $\overline{G}2$ are high, the terminal outputs are in the high-impedance state.

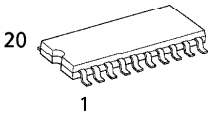
All inputs are equipped with protection circuits against static discharge or transient excess voltage.

FEATURES:

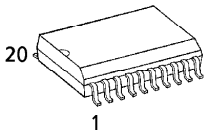
- High Speed ····· t_{pd} = 10ns (typ.) at V_{CC} = 5V
- Low Power Dissipation ····· I_{CC} = 4μA(Max.) at Ta = 25°C
- Compatible with TTL outputs ··· V_{IL} = 0.8V (Max.)
  V_{IH} = 2.0V (Min.)
- Wide Interfacing ability ····· LSTTL, NMOS, CMOS
- Output Drive Capability ····· 15 LSTTL Loads
- Symmetrical Output Impedance··· $|I_{OH}| = I_{OL}$ = 6mA (Min.)
- Balanced Propagation Delays ····· $t_{pLH} \simeq t_{pHL}$
- Pin and Function Compatible with 74LS540/541



P (DIP20-P-300-2.54A)
Weight : 1.30g (Typ.)



F (SOP20-P-300-1.27)
Weight : 0.22g (Typ.)



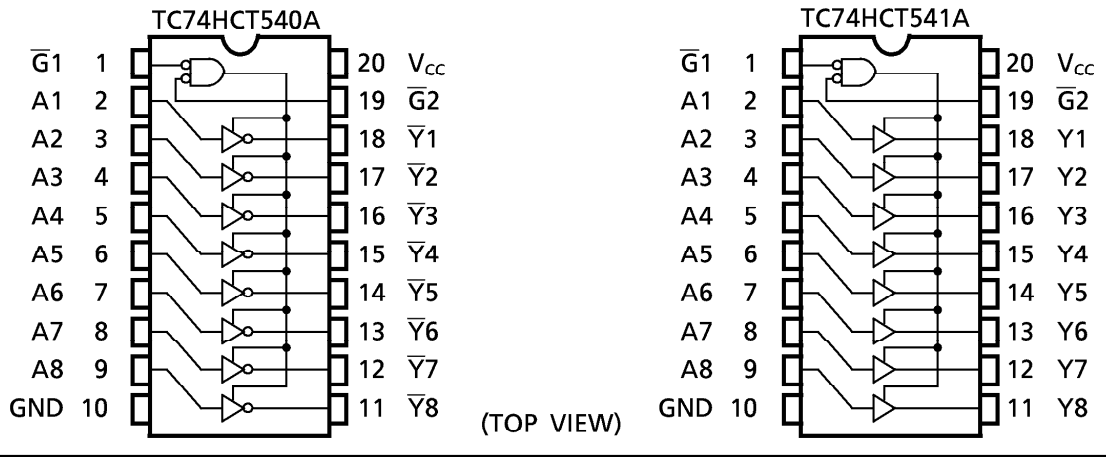
FW (SOL20-P-300-1.27)
Weight : 0.46g (Typ.)

TRUTH TABLE

INPUTS			OUTPUTS	
$\overline{G}1$	$\overline{G}2$	An	Yn *	$\overline{Y}n$ *
H	X	X	Z	Z
X	H	X	Z	Z
L	L	H	H	L
L	L	L	L	H

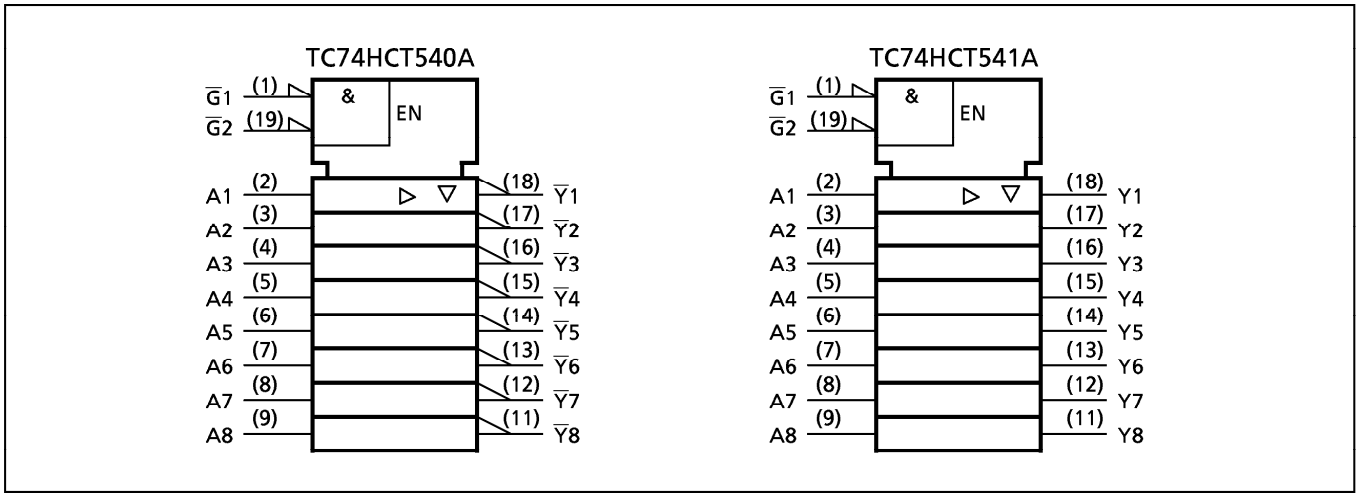
X : Don't Care
Z : High Impedance
* : Yn ····· HCT541A
$\overline{Y}n$ ····· HCT540A

PIN ASSIGNMENT



961001EBA2

IEC LOGIC SYMBOL



ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	VALUE	UNIT
Supply Voltage Range	V_{CC}	−0.5~7	V
DC Input Voltage	V_{IN}	−0.5~V_{CC}+0.5	V
DC Output Voltage	V_{OUT}	−0.5~V_{CC}+0.5	V
Input Diode Current	I_{IK}	±20	mA
Output Diode Current	I_{OK}	±20	mA
DC Output Current	I_{OUT}	±35	mA
DC V_{CC}/Ground Current	I_{CC}	±75	mA
Power Dissipation	P_D	500 (DIP)* / 180 (SOP)	mW
Storage Temperature	T_{stg}	−65~150	°C

*500mW in the range of Ta= −40°C~65°C. From Ta=65°C to 85 °C a derating factor of −10mW/°C shall be applied until 300mW.

RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	VALUE	UNIT
Supply Voltage	V_{CC}	4.5~5.5	V
Input Voltage	V_{IN}	0~V_{CC}	V
Output Voltage	V_{OUT}	0~V_{CC}	V
Operating Temperature	T_{opr}	−40~85	°C
Input Rise and Fall Time	t_r, t_f	0~500	ns

DC ELECTRICAL CHARACTERISTICS

PARAMETER	SYMBOL	TEST CONDITION		V_{CC} (V)	Ta = 25°C			Ta = −40~85°C		UNIT
					MIN.	TYP.	MAX.	MIN.	MAX.	
High - Level Input Voltage	V_{IH}			4.5 ~ 5.5	2.0	—	—	2.0	—	V
Low - Level Input Voltage	V_{IL}			4.5 ~ 5.5	—	—	0.8	—	0.8	V
High - Level Output Voltage	V_{OH}	V_{IN} = V_{IH} or V_{IL}	I_{OH} = −20 μA	4.5	4.4	4.5	—	4.4	—	V
			I_{OH} = −6 mA	4.5	4.18	4.31	—	4.13	—	
Low - Level Output Voltage	V_{OL}	V_{IN} = V_{IH} or V_{IL}	I_{OL} = 20 μA	4.5	—	0.0	0.1	—	0.1	V
			I_{OL} = 6 mA	4.5	—	0.17	0.26	—	0.33	
3 - State Output Off - State Current	I_{OZ}	V_{IN} = V_{IH} or V_{IL}, V_{OUT} = V_{CC} or GND		5.5	—	—	±0.5	—	±5.0	μA
Input Leakage Current	I_{IN}	V_{IN} = V_{CC} or GND		5.5	—	—	±0.1	—	±1.0	μA
Quiescent Supply Current	I_{CC}	V_{IN} = V_{CC} or GND		5.5	—	—	4.0	—	40.0	
	I_C	Per input: V_{IN} = 0.5V or 2.4V, Other input: V_{CC} or GND		5.5	—	—	2.0	—	2.9	mA

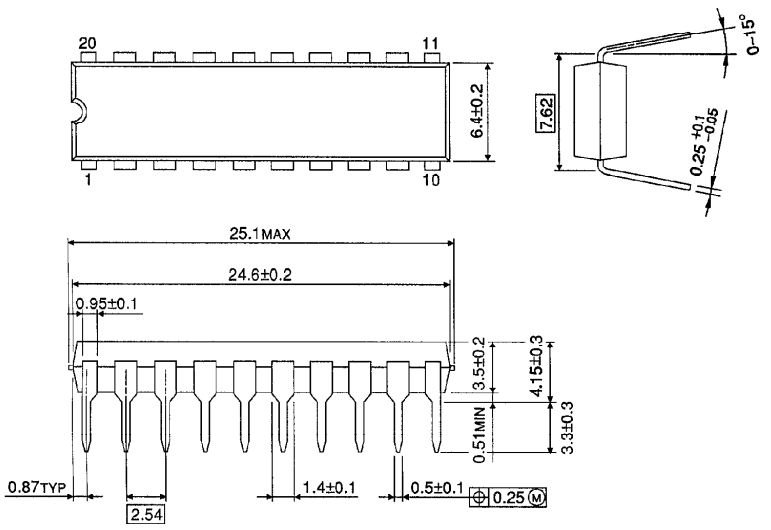
AC ELECTRICAL CHARACTERISTICS (Input $t_r = t_f = 6ns$)

PARAMETER	SYMBOL	TEST CONDITION	CL (pF)	V_{CC} (V)	Ta = 25°C MIN.	Ta = 25°C TYP.	Ta = 25°C MAX.	Ta = −40~85°C MIN.	Ta = −40~85°C MAX.	UNIT
Output Transition Time	t_{TLH}		50	4.5	—	7	12	—	15	ns
	t_{THL}			4.5	—	6	11	—	14	
Propagation Delay Time (TC74HCT540A)	t_{pLH}		50	4.5	—	12	20	—	25	
				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	
				5.5	—	11	21	—	27	
	t_{pHL}		150	4.5	—	19	29	—	36	
				5.5	—	16	27	—	33	
Output Enable time	t_{pZL}	$R_L = 1k\Omega$	50	4.5	—	18	30	—	38	
				5.5	—	16	27	—	35	
	t_{pZH}		150	4.5	—	23	36	—	45	
				5.5	—	21	33	—	41	
Output Disable time	t_{pLZ}	$R_L = 1k\Omega$	50	4.5	—	18	30	—	38	
	t_{pHZ}			5.5	—	16	27	—	35	
Input Capacitance	C_{IN}				—	5	10	—	10	pF
Output Capacitance	C_{OUT}				—	10	—	—	—	
Power Dissipation Capacitance	C_{PD} (1)	TC74HCT540A			—	35	—	—	—	
		TC74HCT541A			—	31	—	—	—	

Note (1) C_{PD} 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:

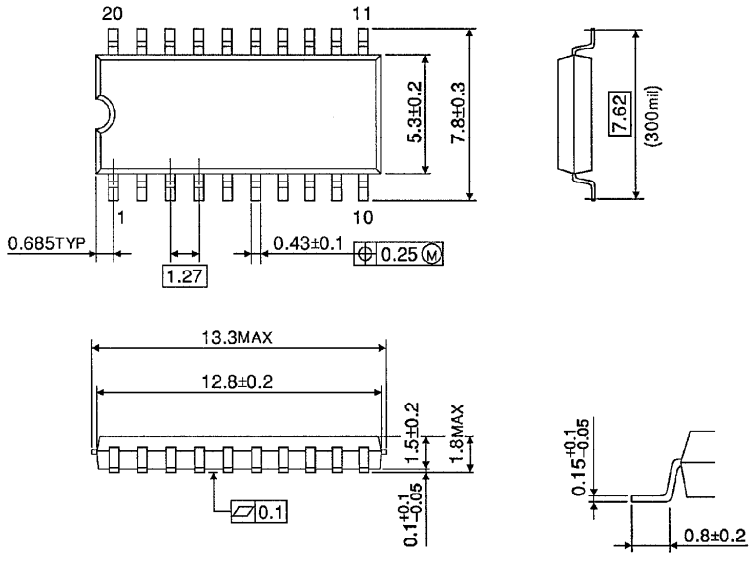
$$I_{CC}(opr) = C_{PD} \cdot V_{CC} \cdot f_{IN} + I_{CC} / 8 \text{ (per bit)}$$

DIP 20PIN OUTLINE DRAWING (DIP20-P-300-2.54A) Unit in mm



Weight : 1.30g (Typ.)

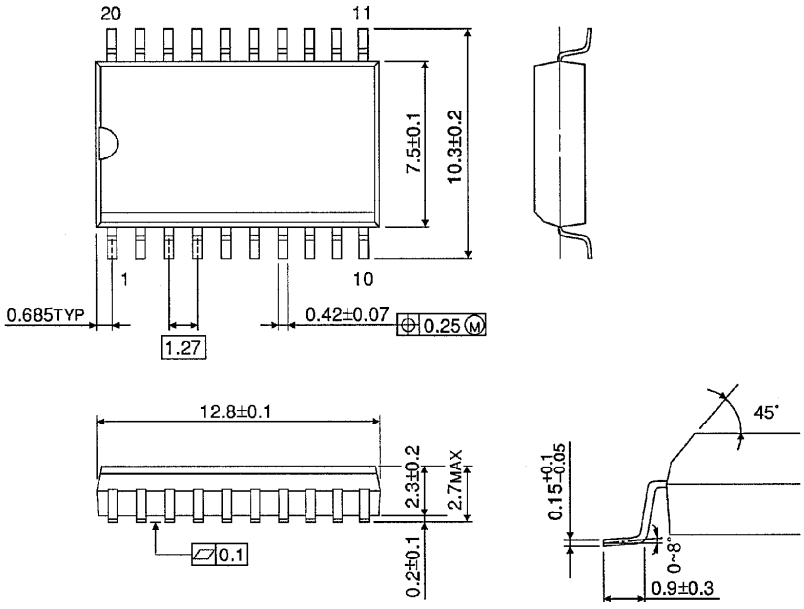
SOP 20PIN (200mil BODY) OUTLINE DRAWING (SOP20-P-300-1.27) Unit in mm



Weight : 0.22g (Typ.)

SOP 20PIN (300mil BODY) OUTLINE DRAWING (SOL20-P-300-1.27) Unit in mm

(Note) This package is not available in Japan.



Weight : 0.46g (Typ.)