TOSHIBA CMOS DIGITAL INTEGRATED CIRCUIT   SILICON MONOLITHIC

TC74HC540AP, TC74HC540AF, TC74HC540AFW
TC74HC541AP, TC74HC541AF, TC74HC541AFW

OCTAL BUS BUFFER
TC74HC540AP / AF / AFW INVERTING , 3 – STATE OUTPUTS
TC74HC541AP / AF / AFW NON – INVERTING , 3 – STATE OUTPUTS

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

The TC74HC540A/TC74HC541A are high speed CMOS OCTAL BUS BUFFERs fabricated with silicon gate C^2MOS technology.

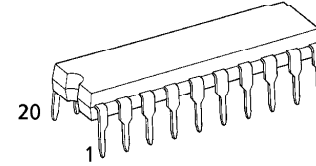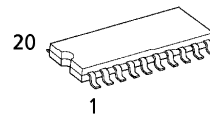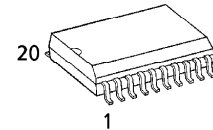They achieve the high speed operation similar to equivalent LSTTL while maintaining the CMOS low power dissipation.

The TC74HC540A is a non‑inverting type, and the TC74HC541A is an inverting type.

When either $\overline{G1}$ or $\overline{G2}$ are high, the terminal outputs are in the high‑impedance state.

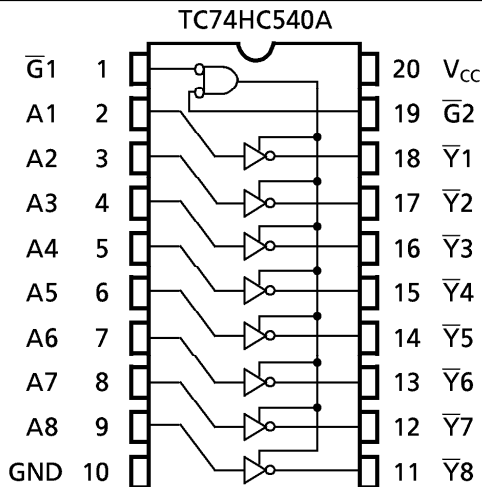All inputs are equipped with protection circuits against static discharge or transient excess voltage.

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.)

FEATURES :
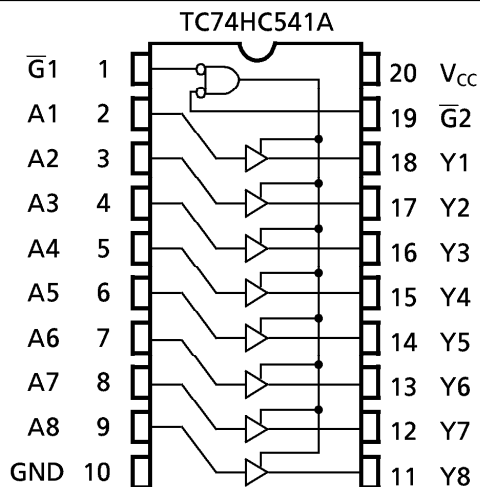- High Speed····························t_{pd} = 10ns(typ.) at V_{CC} = 5V
- Low Power Dissipation················I_{CC} = 4μA(Max.) at Ta = 25°C
- High Noise Immunity················V_{NIH} = V_{NIL} = 28% V_{CC} (Min.)
- Output Drive Capability ············ 15 LSTTL Loads
- Symmetrical Output Impedance···| I_{OH} | = I_{OL} = 6mA(Min.)
- Balanced Propagation Delays····· $t_{pLH} \simeq t_{pHL}$
- Wide Operating Voltage Range···· V_{CC} (opr.) = 2V~6V
- Pin and Function Compatible with 74LS540/541

TRUTH TABLE

INPUTS			OUTPUTS	
$\overline{G1}$	$\overline{G2}$	An	Yn *	$\overline{Yn}$ *
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 ······ HC541
  $\overline{Yn}$ ······ HC540

PIN ASSIGNMENT

TC74HC540A

$\overline{G1}$	1		20	V_{CC}
A1	2		19	$\overline{G2}$
A2	3		18	$\overline{Y1}$
A3	4		17	$\overline{Y2}$
A4	5		16	$\overline{Y3}$
A5	6		15	$\overline{Y4}$
A6	7		14	$\overline{Y5}$
A7	8		13	$\overline{Y6}$
A8	9		12	$\overline{Y7}$
GND	10		11	$\overline{Y8}$

TC74HC541A

$\overline{G1}$	1		20	V_{CC}
A1	2		19	$\overline{G2}$
A2	3		18	Y1
A3	4		17	Y2
A4	5		16	Y3
A5	6		15	Y4
A6	7		14	Y5
A7	8		13	Y6
A8	9		12	Y7
GND	10		11	Y8

(TOP VIEW)

961001EBA2

IEC LOGIC SYMBOL

TC74HC540A

$\overline{G}1$	(1)	&
$\overline{G}2$	(19)	EN

A1	(2)	▷ ▽	(18)	$\overline{Y}1$
A2	(3)		(17)	$\overline{Y}2$
A3	(4)		(16)	$\overline{Y}3$
A4	(5)		(15)	$\overline{Y}4$
A5	(6)		(14)	$\overline{Y}5$
A6	(7)		(13)	$\overline{Y}6$
A7	(8)		(12)	$\overline{Y}7$
A8	(9)		(11)	$\overline{Y}8$

TC74HC541A

$\overline{G}1$	(1)	&
$\overline{G}2$	(19)	EN

A1	(2)	▷ ▽	(18)	Y1
A2	(3)		(17)	Y2
A3	(4)		(16)	Y3
A4	(5)		(15)	Y4
A5	(6)		(14)	Y5
A6	(7)		(13)	Y6
A7	(8)		(12)	Y7
A8	(9)		(11)	Y8

961001EBA2'

ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	VALUE	UNIT
Supply Voltage Range	V_{CC}	$-0.5 \sim 7$	V
DC Input Voltage	V_{IN}	$-0.5 \sim V_{CC} + 0.5$	V
DC Output Voltage	V_{OUT}	$-0.5 \sim V_{CC} + 0.5$	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}	$-65 \sim 150$	°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}	$2 \sim 6$	V
Input Voltage	V_{IN}	$0 \sim V_{CC}$	V
Output Voltage	V_{OUT}	$0 \sim V_{CC}$	V
Operating Temperature	T_{opr}	$-40 \sim 85$	°C
Input Rise and Fall Time	t_r, t_f	$0 \sim 1000$ ($V_{CC} = 2.0$V) $0 \sim 500$ ($V_{CC} = 4.5$V) $0 \sim 400$ ($V_{CC} = 6.0$V)	ns

DC ELECTRICAL CHARACTERISTICS

PARAMETER	SYMBOL	TEST CONDITION		V_{CC} (V)	Ta = 25°C			Ta = $-40 \sim 85$°C		UNIT
					MIN.	TYP.	MAX.	MIN.	MAX.	
High - Level Input Voltage	V_{IH}			2.0 4.5 6.0	1.50 3.15 4.20	— — —	— — —	1.50 3.15 4.20	— — —	V
Low - Level Input Voltage	V_{IL}			2.0 4.5 6.0	— — —	— — —	0.50 1.35 1.80	— — —	0.50 1.35 1.80	V
High - Level Output Voltage	V_{OH}	$V_{IN} =$ V_{IH} or V_{IL}	$I_{OH} = -20\mu$A	2.0 4.5 6.0	1.9 4.4 5.9	2.0 4.5 6.0	— — —	1.9 4.4 5.9	— — —	V
			$I_{OH} = -6$ mA $I_{OH} = -7.8$mA	4.5 6.0	4.18 5.68	4.31 5.80	— —	4.13 5.63	— —	
Low - Level Output Voltage	V_{OL}	$V_{IN} =$ V_{IH} or V_{IL}	$I_{OL} = 20\mu$A	2.0 4.5 6.0	— — —	0.0 0.0 0.0	0.1 0.1 0.1	— — —	0.1 0.1 0.1	V
			$I_{OL} = 6$ mA $I_{OL} = 7.8$mA	4.5 6.0	— —	0.17 0.18	0.26 0.26	— —	0.33 0.33	
3 - State Output Off - State Current	I_{OZ}	$V_{IN} = V_{IH}$ or V_{IL} $V_{OUT} = V_{CC}$ or GND		6.0	—	—	± 0.5	—	± 5.0	μA
Input Leakage Current	I_{IN}	$V_{IN} = V_{CC}$ or GND		6.0	—	—	± 0.1	—	± 1.0	
Quiescent Supply Current	I_{CC}	$V_{IN} = V_{CC}$ or GND		6.0	—	—	4.0	—	40.0	

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

PARAMETER	SYMBOL	TEST CONDITION	CL (pF)	V_{CC} (V)	Ta = 25°C			Ta = −40~85°C		UNIT
					MIN.	TYP.	MAX.	MIN.	MAX.	
Output Transition Time	t_{TLH} t_{THL}		50	2.0	—	25	60	—	75	ns
				4.5	—	7	12	—	15	
				6.0	—	6	10	—	13	
Propagation Delay Time	t_{pLH}		50	2.0	—	36	90	—	115	
				4.5	—	12	18	—	23	
				6.0	—	10	15	—	20	
	t_{pHL}		150	2.0	—	51	130	—	165	
				4.5	—	17	26	—	33	
				6.0	—	14	22	—	28	
Output Enable Time	t_{pZL}	$R_L = 1k\Omega$	50	2.0	—	45	125	—	155	
				4.5	—	14	25	—	31	
				6.0	—	12	21	—	26	
	t_{pZH}		150	2.0	—	60	165	—	205	
				4.5	—	19	33	—	41	
				6.0	—	16	28	—	35	
Output Disable time	t_{pLZ} t_{pHZ}	$R_L = 1k\Omega$	50	2.0	—	40	125	—	155	
				4.5	—	16	25	—	31	
				6.0	—	14	21	—	26	
Input Capacitance	C_{IN}				—	5	10	—	10	pF
Output Capacitance	C_{OUT}				—	10	—	—	—	
Power Dissipation Capacitance	C_{PD} (1)	TC74HC540A			—	32	—	—	—	
		TC74HC541A			—	35	—	—	—	

Note (1) C_{PD} is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption without load.
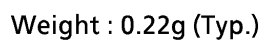
Average operating current can be obtained by the equation :

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

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)
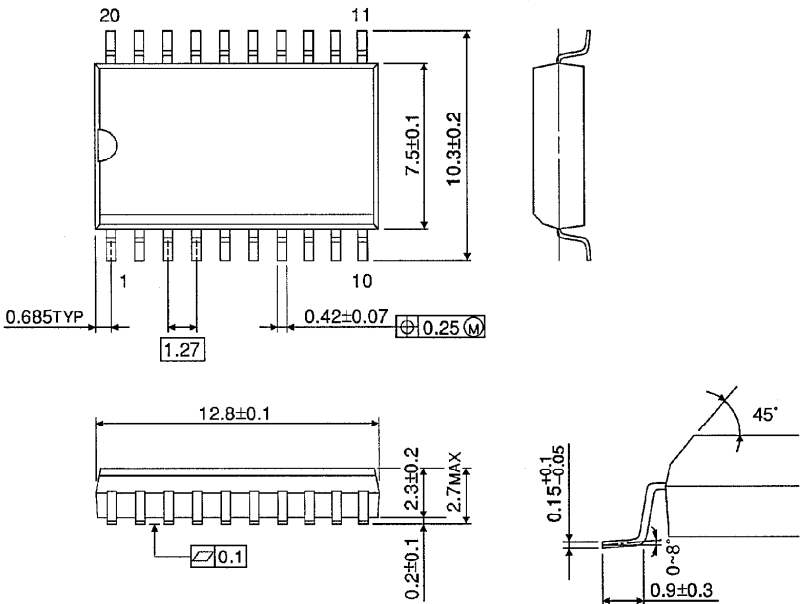
Unit in mm

Weight : 0.22g (Typ.)
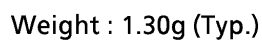
SOP 20PIN (300mil BODY) OUTLINE DRAWING (SOL20-P-300-1.27)   Unit in mm

(Note) This package is not available in Japan.

Weight : 0.46g (Typ.)