INTEGRATED CIRCUIT

TOSHIBA

TECHNICAL DATA

TOSHIBA CMOS DIGITAL INTEGRATED CIRCUIT

TC74AC540P/F/FW/FS, TC74AC541P/F/FW/FS

SILICON MONOLITHIC

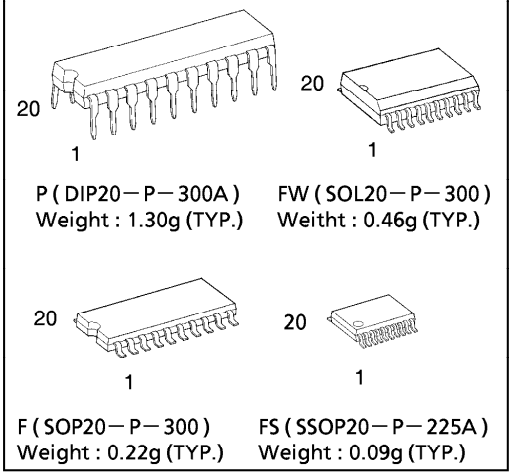
OCTAL BUS BUFFER

TC74AC540P/F/FW/FS INVERTING, 3 – STATE OUTPUTS
TC74AC541P/F/FW/FS NON – INVERTING, 3 – STATE OUTPUTS

The TC74AC540/TC74AC541 are advanced high speed CMOS OCTAL BUS BUFFERs fabricated with silicon gate and double - layer metal wiring C²MOS technology.
They achieve the high speed operation similar to equivalent Bipolar Schottky TTL while maintaining the CMOS low power dissipation.
The TC74AC540 is an inverting type, and the TC74AC541 is a non - 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} = 4.0ns(typ.) at V_{CC} = 5V
- Low Power Dissipation ····· I_{CC} = 8μA(Max.)at Ta = 25°C
- High Noise Immunity ····· $V_{NIH} = V_{NIL}$ = 28% V_{CC} (Min.)
- Symmetrical Output Impedance ··· $|I_{OH}| = I_{OL}$ = 24mA(Min.)
  Capability of driving 50Ω tansmission lines.
- Balanced Propagation Delays ····· $t_{pLH} \simeq t_{pHL}$
- Wide Operating Voltage Range ···· V_{CC} (opr) = 2V ~ 5.5V
- Pin and Function Compatible with 74F540/541



P (DIP20 – P – 300A)
Weight : 1.30g (TYP.)

FW (SOL20 – P – 300)
Weitht : 0.46g (TYP.)

F (SOP20 – P – 300)
Weight : 0.22g (TYP.)

FS (SSOP20 – P – 225A)
Weight : 0.09g (TYP.)

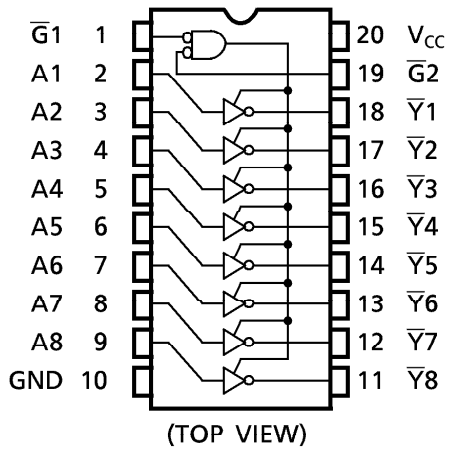
TRUTH TABLE

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 ····· AC541
$\overline{Y}n$ ····· AC540

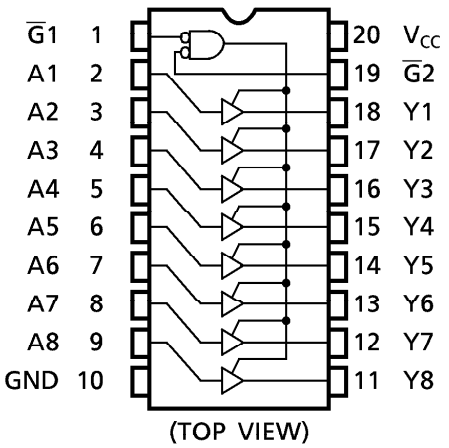
PIN ASSIGNMENT

TC74AC540



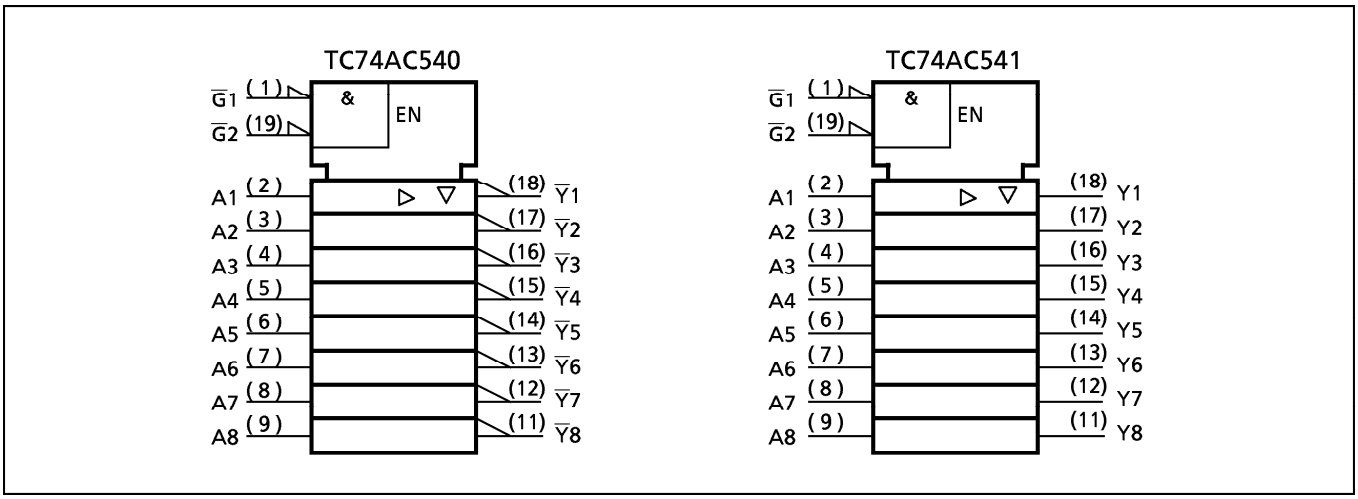
(TOP VIEW)

TC74AC541



(TOP VIEW)

IEC LOGIC SYMBOL



ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	VALUE	UNIT
Supply Voltage Range	V_{CC}	−0.5~7.0	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}	±50	mA
DC Output Current	I_{OUT}	±50	mA
DC V_{CC}/Ground Current	I_{CC}	±200	mA
Power Dissipation	P_D	500 (DIP)*/ 180 (SOP/SSOP)	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 should be applied up to 300mW.

RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	VALUE	UNIT
Supply Voltage	V_{CC}	2.0~5.5	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	dt / dV	0~ 100 (Vcc = 3.3 ± 0.3V) 0~ 20 (Vcc = 5 ± 0.5V)	ns / V

DC ELECTRICAL CHARACTERISTICS

PARAMETER	SYMBOL	TEST CONDITION		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
High - Level Input Voltage	V_{IH}			2.0 3.0 5.5	1.50 2.10 3.85	— — —	— — —	1.50 2.10 3.85	— — —	V
Low - Level Input Voltage	V_{IL}			2.0 3.0 5.5	— — —	— — —	0.50 0.90 1.65	— — —	0.50 0.90 1.65	V
High - Level Output Voltage	V_{OH}	V_{IN} = V_{IH} or V_{IL}	I_{OH} = −50μA	2.0 3.0 4.5	1.9 2.9 4.4	2.0 3.0 4.5	— — —	1.9 2.9 4.4	— — —	V
			I_{OH} = −4mA I_{OH} = −24mA I_{OH} = −75mA*	3.0 4.5 5.5	2.58 3.94 —	— — —	— — —	2.48 3.80 3.85	— — —	
Low - Level Output Voltage	V_{OL}	V_{IN} = V_{IH} or V_{IL}	I_{OL} = 50μA	2.0 3.0 4.5	— — —	0.0 0.0 0.0	0.1 0.1 0.1	— — —	0.1 0.1 0.1	V
			I_{OL} = 12mA I_{OL} = 24mA I_{OL} = 75mA*	3.0 4.5 5.5	— — —	— — —	0.36 0.36 —	— — —	0.44 0.44 1.65	
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	
Quiescent Supply Current	I_{CC}	V_{IN} = V_{CC} or GND		5.5	—	—	8.0	—	80.0	

* : This spec indicates the capability of driving 50Ω transmission lines.
One output should be tested at a time for a 10ms maximum duration.

AC ELECTRICAL CHARACTERISTICS (C_L = 50pF, R_L = 500Ω, Input $t_r = t_f$ = 3ns)

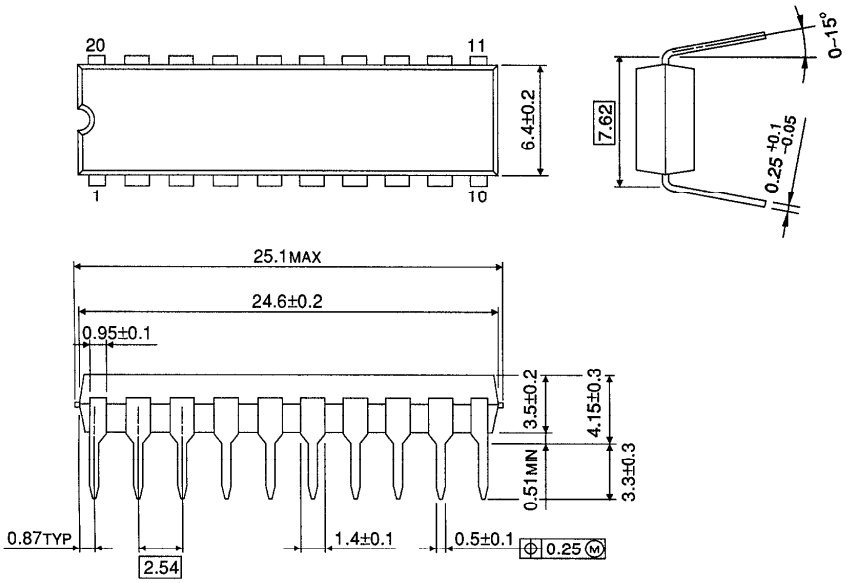
PARAMETER	SYMBOL	TEST CONDITION	V_{CC} (V)	Ta = 25°C MIN.	Ta = 25°C TYP.	Ta = 25°C MAX.	Ta = −40~85°C MIN.	Ta = −40~85°C MAX.	UNIT
Propagation Delay Time*	t_{pLH} t_{pHL}		3.3 ± 0.3 5.0 ± 0.5	— —	6.8 4.7	10.5 7.0	1.0 1.0	12.0 8.0	ns
Propagation Delay Time**	t_{pLH} t_{pHL}		3.3 ± 0.3 5.0 ± 0.5	— —	6.8 4.7	11.4 7.5	1.0 1.0	13.0 8.5	
Output Enable Time	t_{pZL} t_{pZH}		3.3 ± 0.3 5.0 ± 0.5	— —	9.6 6.4	15.8 10.0	1.0 1.0	18.0 11.4	
Output Disable Time	t_{pLZ} t_{pHZ}		3.3 ± 0.3 5.0 ± 0.5	— —	7.7 6.4	12.3 9.2	1.0 1.0	14.0 10.5	
Input Capacitance	C_{IN}			—	5	10	—	10	pF
Output Capacitance	C_{OUT}			—	10	—	—	—	
Power Dissipation Capacitance	C_{PD} (1)	TC74AC540		—	25	—	—	—	
		TC74AC541		—	28	—	—	—	

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 :

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

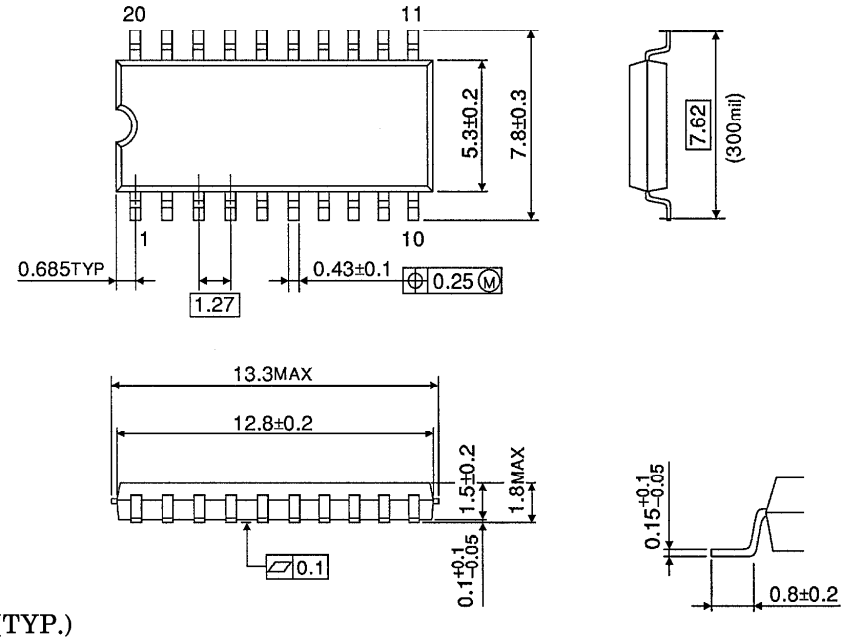
(2) * for TC74AC540 only
** for TC74AC541 only

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



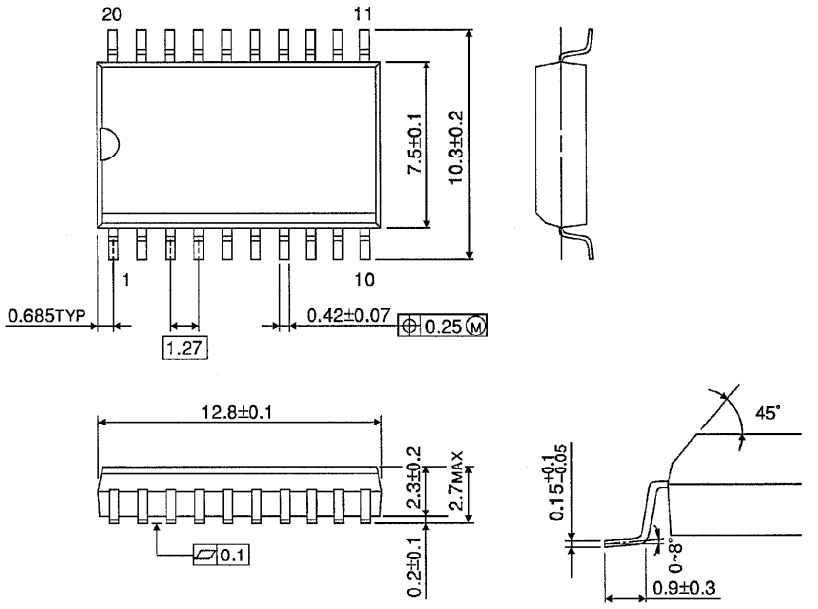
Weight : 1.30g (TYP.)

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



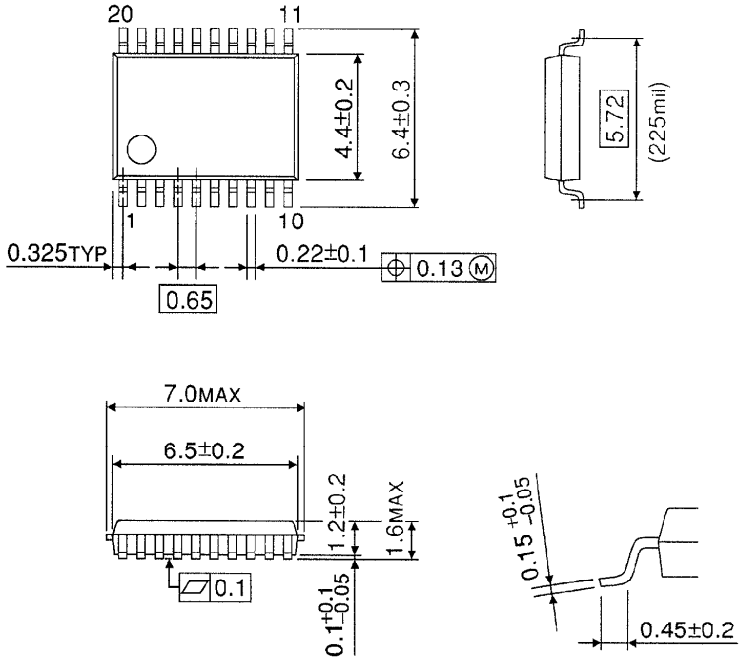
Weight : 0.22g (TYP.)

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



Weight : 0.46g (TYP.)

SSOP 20PIN OUTLINE DRAWING (SSOP20−P−225A) Unit in mm



Weight : 0.09g (TYP.)