INTEGRATED CIRCUIT

TOSHIBA

TECHNICAL DATA

TOSHIBA CMOS DIGITAL INTEGRATED CIRCUIT

TC74ACT540P/F/FW/FS, TC74ACT541P/F/FW/FS

SILICON MONOLITHIC

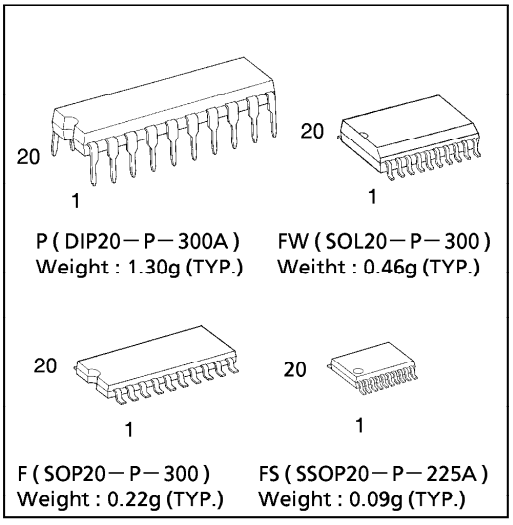
OCTAL BUS BUFFER

TC74ACT540P/F/FW/FS INVERTING, 3 – STATE OUTPUTS
TC74ACT541P/F/FW/FS NON – INVERTING, 3 – STATE OUTPUTS

The TC74ACT540 / TC74ACT541 are advanced high speed CMOS OCTAL BUS BUFFERs fabricated with silicon gate and double-layer metal wiring C^2MOS technology.
They achieve the high speed operation similar to equivalent Bipolar Schottky TTL while maintaining the CMOS low power dissipation.
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.
The TC74ACT540 is an inverting type, and the TC74ACT541 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} = 4.3ns (typ.) at V_{CC} = 5V
- Low Power Dissipation ····· I_{CC} = 8μA(Max.) at Ta = 25°C
- Compatible with TTL outputs ··· V_{IL} = 0.8V (Max.)
  V_{IH} = 2.0V (Min.)
- Symmetrical Output Impedance ··· $|I_{OH}| = I_{OL}$ = 24mA (Min.)
  Capability of driving 50Ω transmission lines.
- Balanced Propagation Delays ····· $t_{pLH} \simeq t_{pHL}$
- 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.)

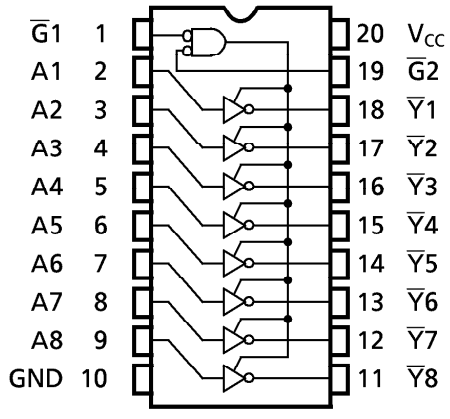
TRUTH TABLE

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 ····· ACT541
$\overline{Y}n$ ····· ACT540

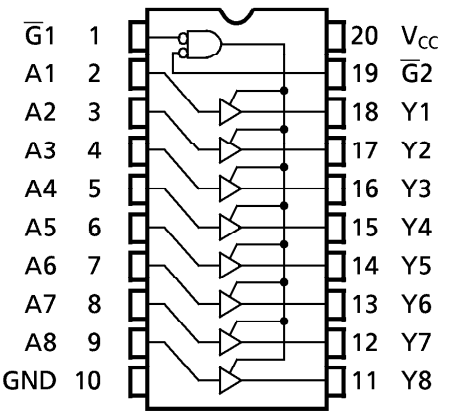
PIN ASSIGNMENT

TC74ACT540



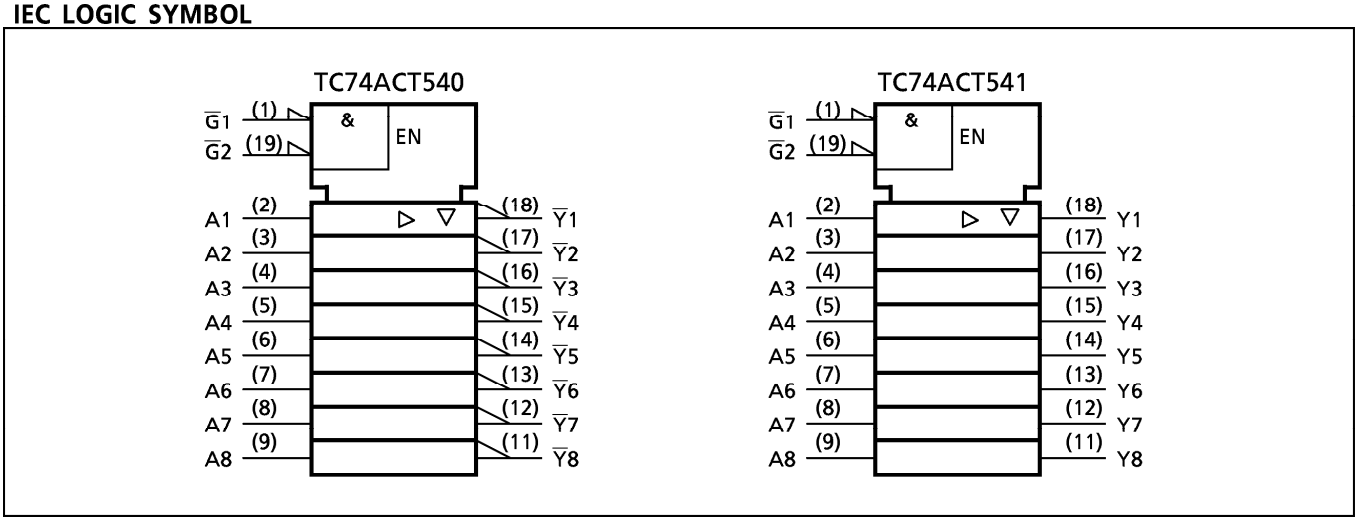
(TOP VIEW)

TC74ACT541



(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}	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	dt / dV	0~10	ns / V

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} = −50μA	4.5	4.4	4.5	—	4.4	—	V
			I_{OH} = −24mA	4.5	3.94	—	—	3.80	—	
			I_{OH} = −75mA*	5.5	—	—	—	3.85	—	
Low - Level Output Voltage	V_{OL}	V_{IN} = V_{IH} or V_{IL}	I_{OL} = 50μA	4.5	—	0.0	0.1	—	0.1	V
			I_{OL} = 24mA	4.5	—	—	0.36	—	0.44	
			I_{OL} = 75mA*	5.5	—	—	—	—	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	
	I_C	PER INPUT : V_{IN} = 3.4V OTHER INPUT : V_{CC} or GND		5.5	—	—	1.35	—	1.5	mA

* : 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)

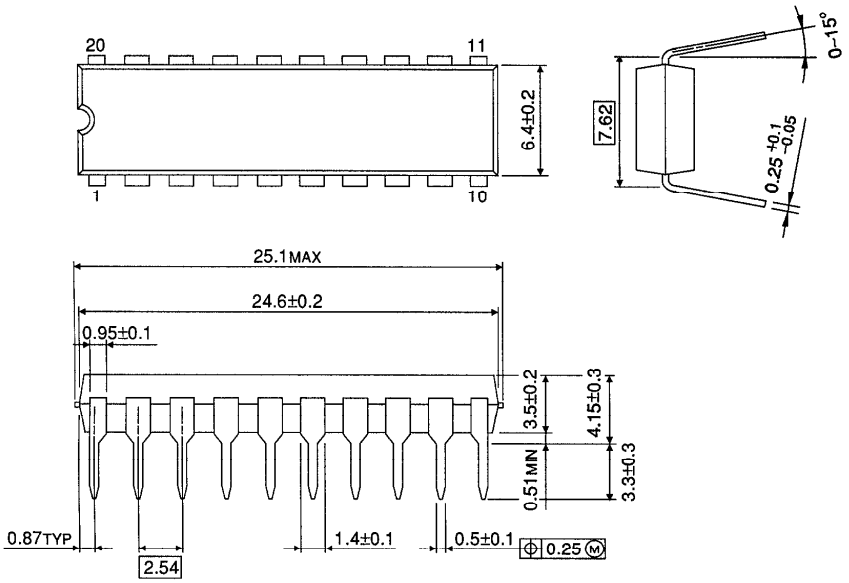
PARAMETER	SYMBOL	TEST CONDITION	V_{CC} (V)	Ta = 25°C			Ta = −40~85°C		UNIT
				MIN.	TYP.	MAX.	MIN.	MAX.	
Propagation Delay Time *	t_{pLH} t_{pHL}		5.0 ± 0.5	—	5.0	8.3	1.0	9.5	ns
Propagation Delay Time**	t_{pLH} t_{pHL}		5.0 ± 0.5	—	5.0	8.3	1.0	9.5	
Output Enable Time	t_{pZL} t_{pZH}		5.0 ± 0.5	—	7.3	11.4	1.0	13.0	
Output Disable Time	t_{pLZ} t_{pHZ}		5.0 ± 0.5	—	5.9	9.2	1.0	10.5	
Input Capacitance	C_{IN}			—	5	10	—	10	pF
Output Capacitance	C_{OUT}			—	10	—	—	—	
Power Dissipation Capacitance	C_{PD} (1)	TC74ACT540		—	24	—	—	—	
		TC74ACT541		—	27	—	—	—	

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 :

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

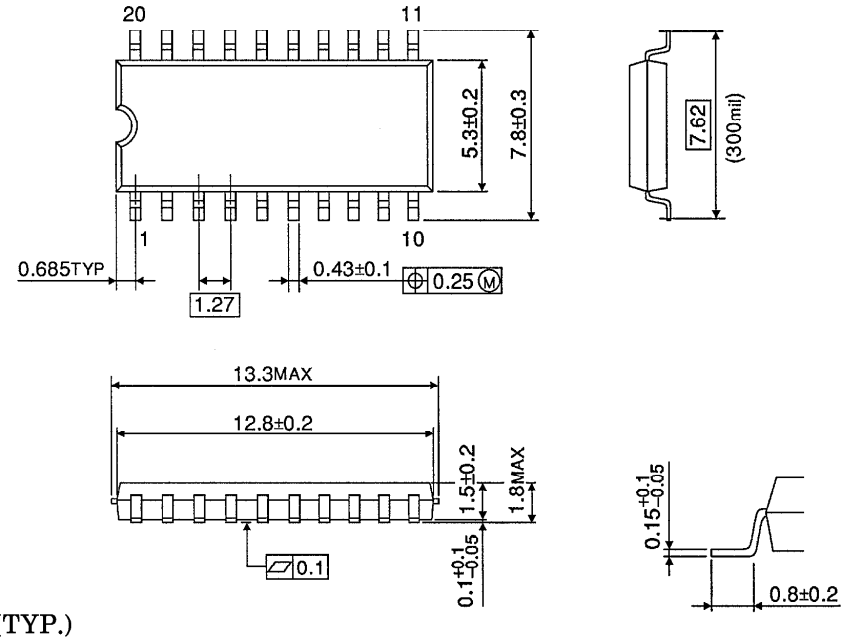
(2) * for TC74ACT540 only
** for TC74ACT541 only

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



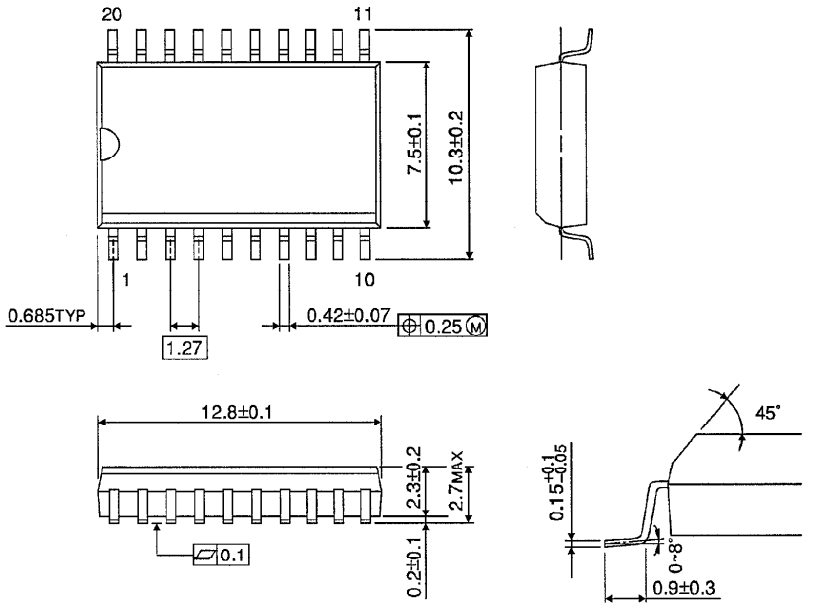
Weight : 1.30g (TYP.)

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



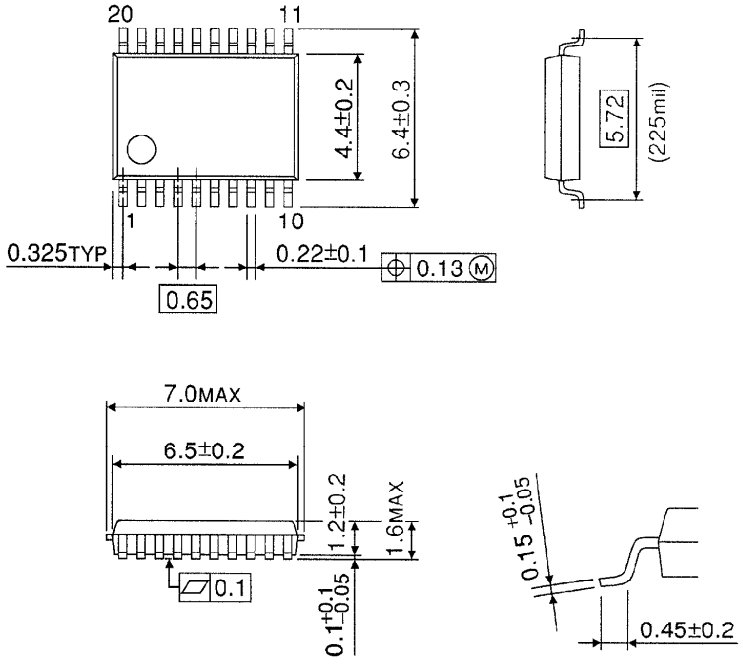
Weight : 0.22g (TYP.)

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.)