

TOSHIBA CMOS Digital Integrated Circuit Silicon Monolithic

**TC74ACT540P,TC74ACT540F,TC74ACT540FT
TC74ACT541P,TC74ACT541F,TC74ACT541FT****Octal Bus Buffer****TC74ACT540P/F/FT**Inverting, 3-State
Outputs**TC74ACT541P/F/FT**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 C²MOS 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.

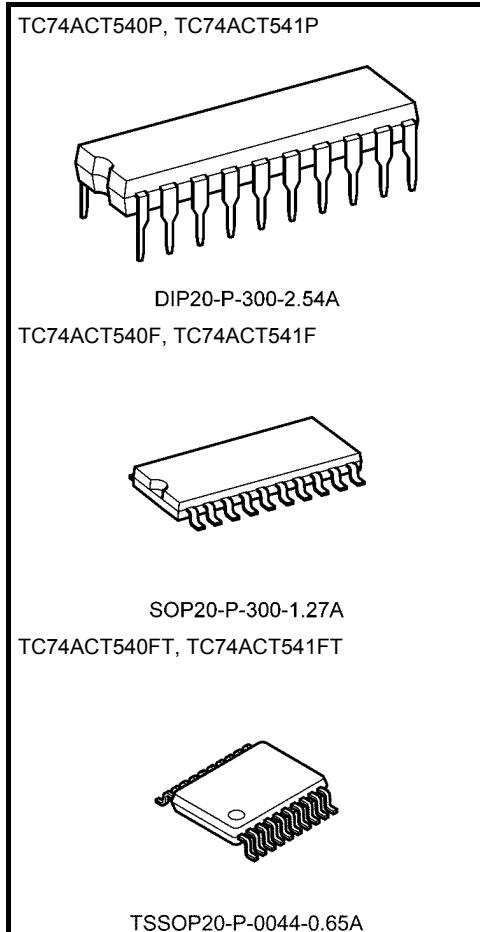
The TC74ACT540 is an inverting type, and the TC74ACT541 is a non-inverting type.

When either \bar{G}_1 or \bar{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.

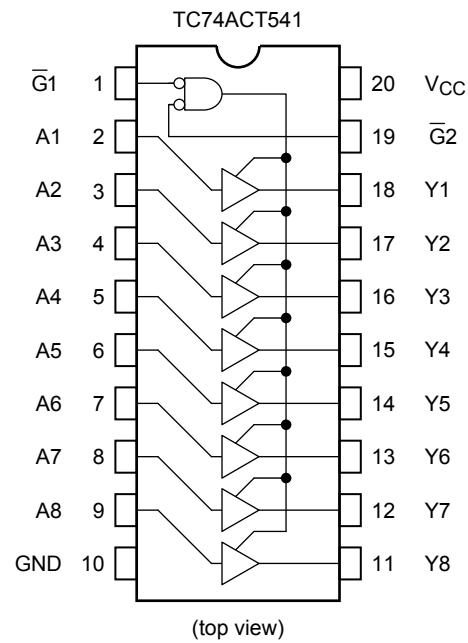
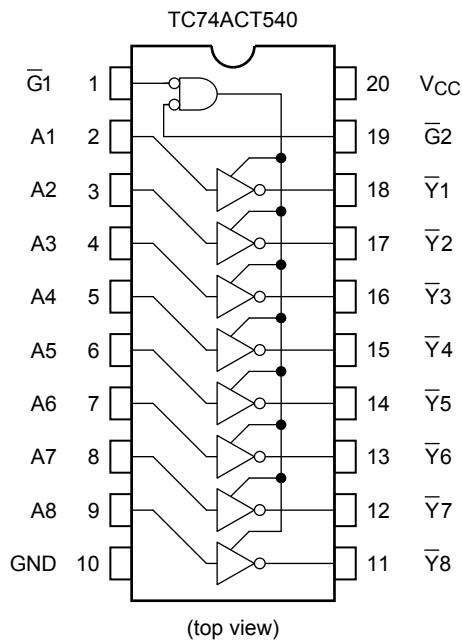
Features

- High speed: $t_{pd} = 4.3$ ns (typ.) at $V_{CC} = 5$ V
- Low power dissipation: $I_{CC} = 8 \mu A$ (max) at $T_a = 25^\circ C$
- Compatible with TTL outputs
: $V_{IL} = 0.8$ V (max) $V_{IH} = 2.0$ V (min)
- Symmetrical output impedance
: $|I_{OH}| = I_{OL} = 24$ mA (min)
Capability of driving 50Ω transmission lines.
- Balanced propagation delays: $t_{pLH} \approx t_{pHL}$
- Pin and function compatible with 74F540/541

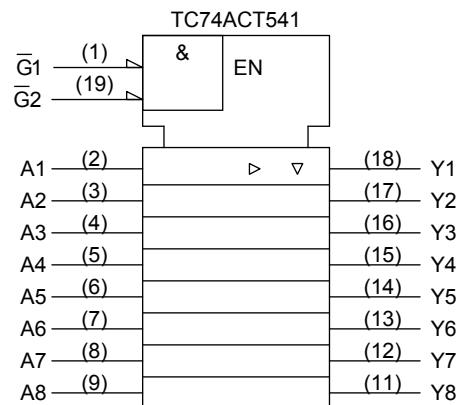
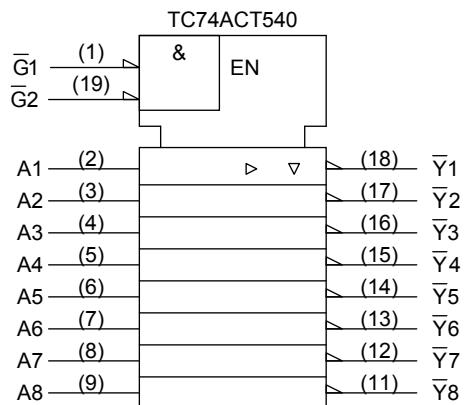
**Weight**

DIP20-P-300-2.54A	: 1.30 g (typ.)
SOP20-P-300-1.27A	: 0.22 g (typ.)
TSSOP20-P-0044-0.65A	: 0.08 g (typ.)

Pin Assignment



IEC Logic Symbol



Truth Table

Inputs			Outputs	
G1	G2	A _n	Y _n	Ȳ _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: ACT541

Ȳ_n: ACT540

Absolute Maximum Ratings (Note 1)

Characteristics	Symbol	Rating	Unit
Supply voltage range	V _{CC}	–0.5 to 7.0	V
DC input voltage	V _{IN}	–0.5 to V _{CC} + 0.5	V
DC output voltage	V _{OUT}	–0.5 to 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) (Note 2)/180 (SOP/TSSOP)	mW
Storage temperature	T _{STG}	–65 to 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 should be applied up to 300 mW.

Operating Ranges (Note)

Characteristics	Symbol	Rating	Unit
Supply voltage	V _{CC}	4.5 to 5.5	V
Input voltage	V _{IN}	0 to V _{CC}	V
Output voltage	V _{OUT}	0 to V _{CC}	V
Operating temperature	T _{opr}	–40 to 85	°C
Input rise and fall time	dt/dV	0 to 10	ns/V

Note: The operating ranges must be maintained to ensure the normal operation of the device.
Unused inputs must be tied to either VCC or GND.

Electrical Characteristics

DC Characteristics

Characteristics	Symbol	Test Condition		V _{CC} (V)	Ta = 25°C			Ta = -40 to 85°C		Unit
					Min	Typ.	Max	Min	Max	
High-level input voltage	V _{IH}	—		4.5 to 5.5	2.0	—	—	2.0	—	V
Low-level input voltage	V _{IL}	—		4.5 to 5.5	—	—	0.8	—	0.8	V
High-level output voltage	V _{OH}	V _{IN} = V _{IH} or V _{IL}	I _{OH} = -50 µA I _{OH} = -24 mA I _{OH} = -75 mA (Note)	4.5 4.5 5.5	4.4 3.94 —	4.5 — —	— — —	4.4 3.80 3.85	— — —	V
Low-level output voltage	V _{OL}	V _{IN} = V _{IH} or V _{IL}	I _{OL} = 50 µA I _{OL} = 24 mA I _{OL} = 75 mA (Note)	4.5 4.5 5.5	— — —	0.0 — —	0.1 0.36 —	— — —	0.1 0.44 1.65	V
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	—	—	8.0	—	80.0	µA
	I _C	Per input: V _{IN} = 3.4 V Other input: V _{CC} or GND		5.5	—	—	1.35	—	1.5	mA

Note: This spec indicates the capability of driving 50 Ω transmission lines.

One output should be tested at a time for a 10 ms maximum duration.

AC Characteristics ($C_L = 50 \text{ pF}$, $R_L = 500 \Omega$, input: $t_r = t_f = 3 \text{ ns}$)

Characteristics	Symbol	Test Condition	Ta = 25°C			Ta = -40 to 85°C		Unit	
			V _{CC} (V)	Min	Typ.	Max	Min		
Propagation delay time (Note 2)	t_{pLH} t_{pHL}	—	5.0 ± 0.5	—	5.0	8.3	1.0	9.5	ns
Propagation delay time (Note 3)	t_{pLH} t_{pHL}	—	5.0 ± 0.5	—	5.0	8.3	1.0	9.5	ns
Output enable time	t_{pZL} t_{pZH}	—	5.0 ± 0.5	—	7.3	11.4	1.0	13.0	ns
Output disable time	t_{pLZ} t_{pHZ}	—	5.0 ± 0.5	—	5.9	9.2	1.0	10.5	ns
Input capacitance	C _{IN}	—	—	—	5	10	—	10	pF
Output capacitance	C _{OUT}	—	—	—	10	—	—	—	pF
Power dissipation capacitance	CPD (Note 1)	TC74ACT540	—	24	—	—	—	—	pF
		TC74ACT541	—	27	—	—	—	—	

Note 1: CPD 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:

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

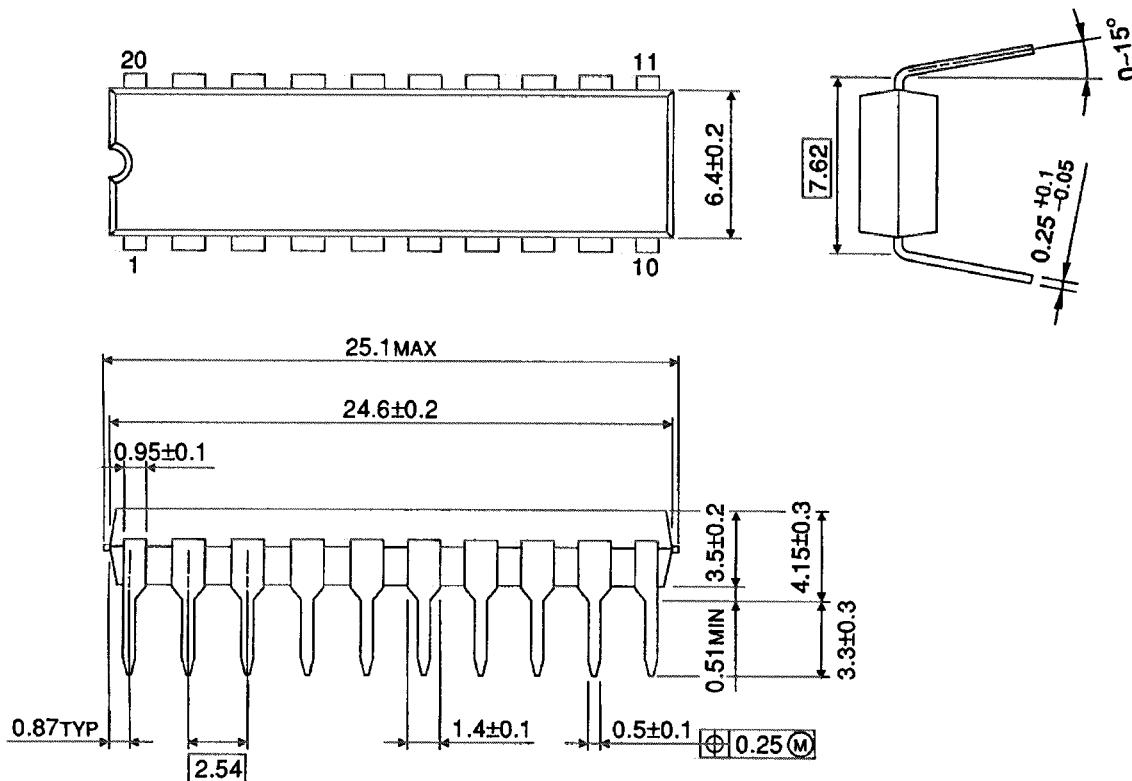
Note 2: For TC74ACT540 only

Note 3: For TC74ACT541 only

Package Dimensions

DIP20-P-300-2.54A

Unit : mm

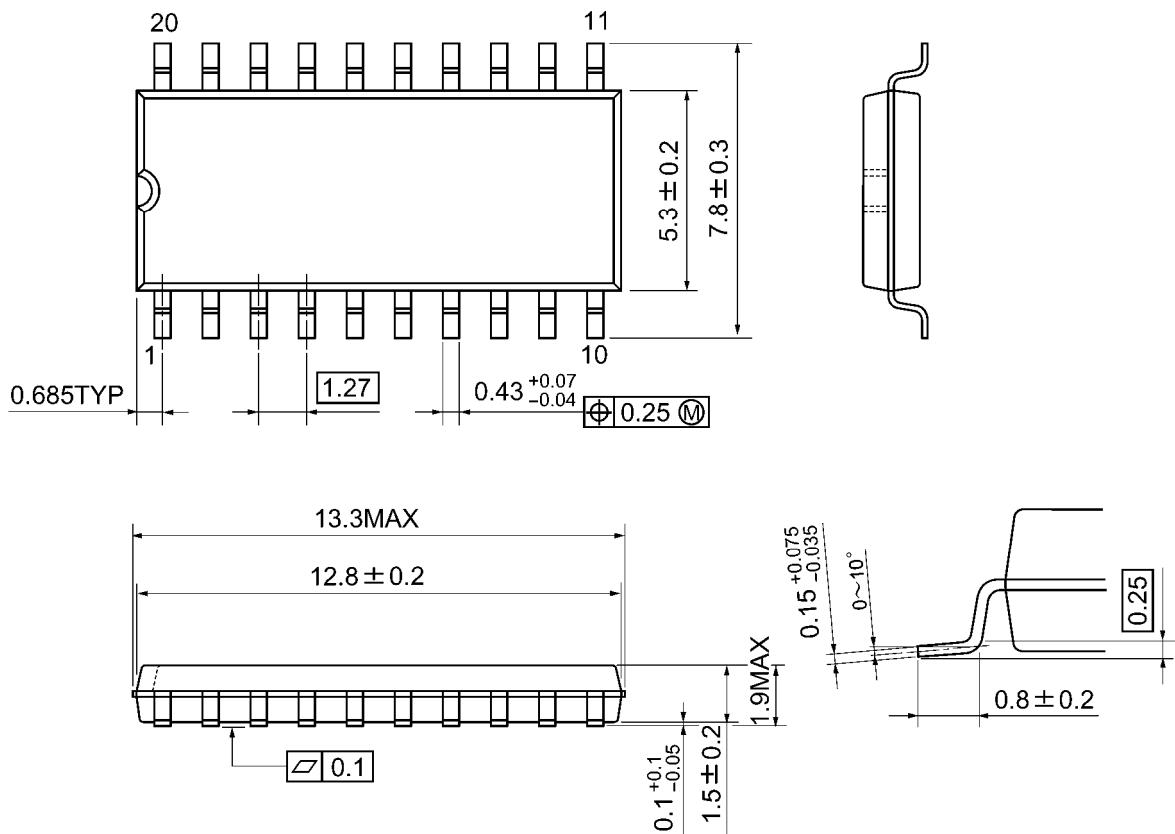


Weight: 1.30 g (typ.)

Package Dimensions

SOP20-P-300-1.27A

Unit: mm

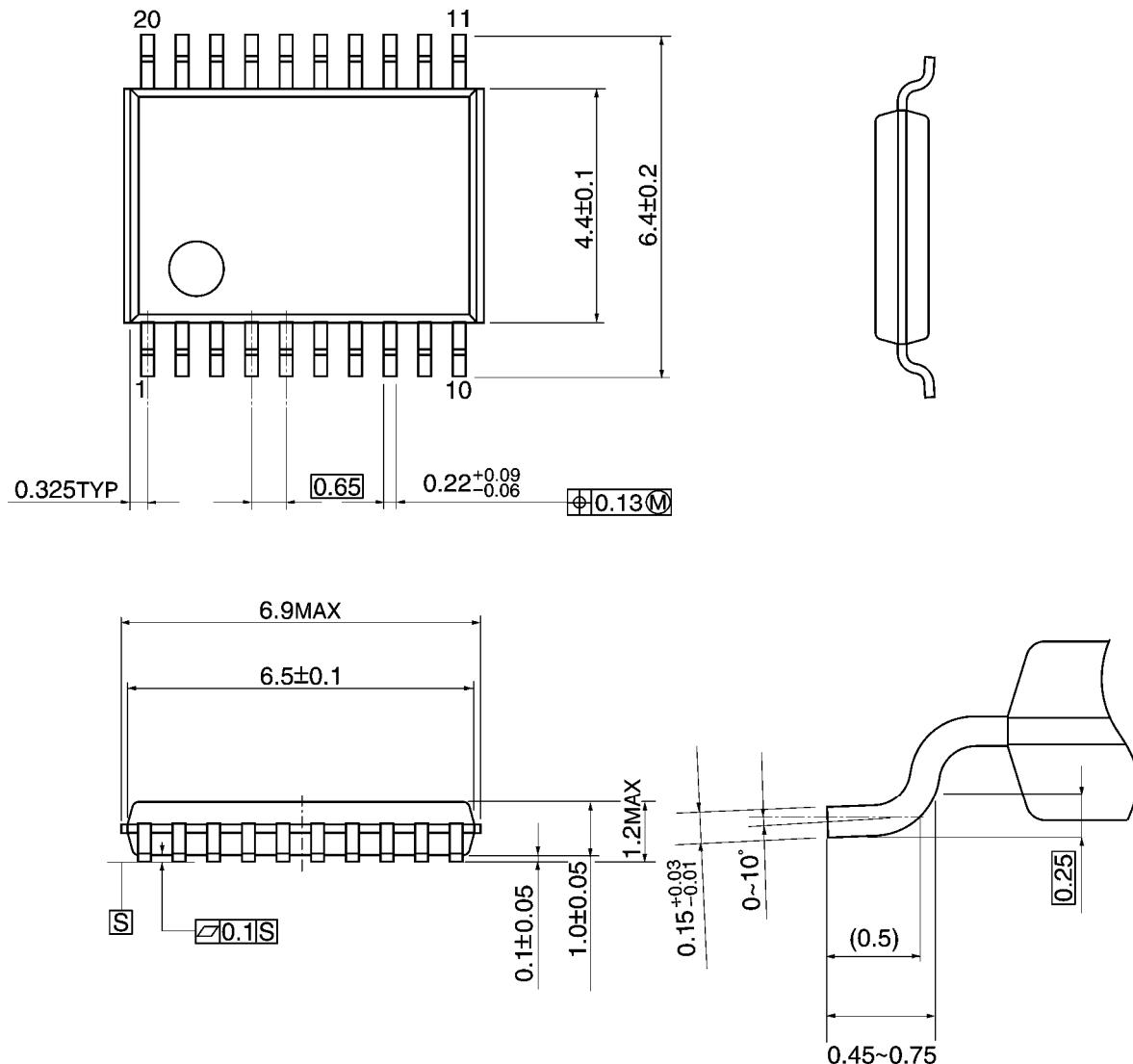


Weight: 0.22 g (typ.)

Package Dimensions

TSSOP20-P-0044-0.65A

Unit: mm



Weight: 0.08 g (typ.)

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