

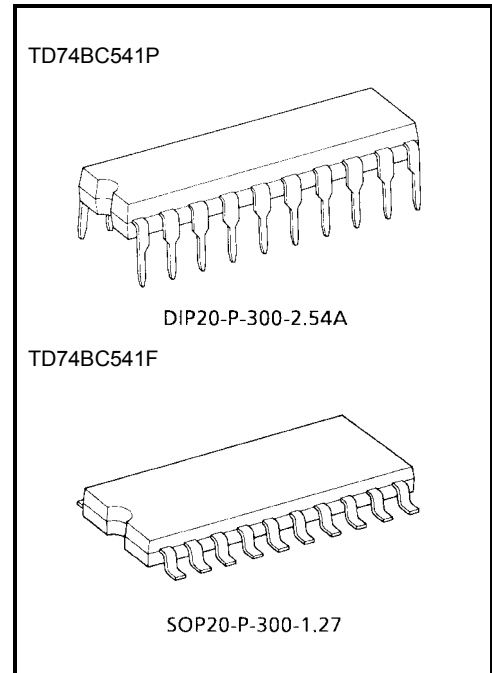
TD74BC541P, TD74BC541F

Octal Bus Buffer with 3-State Outputs (Non-Inverted)

The TD74BC541P/TD74BC541F is a high-speed octal 3-state buffer fabricated with silicon gate Bi-CMOS technology. It achieves the high-speed operation equivalent to the FAST family while maintaining the Bi-CMOS low-power dissipation. The TD74BC541P/F is a non-inverting buffer. It is controlled by two enable inputs ($\overline{OE}0$, $\overline{OE}1$). When either $\overline{OE}0$ and $\overline{OE}1$ are high, all eight outputs are in the high-impedance state, which facilitates the interface with bus lines. All inputs are equipped with resistors and diodes to protect against Electro Static Discharge (ESD).

Features

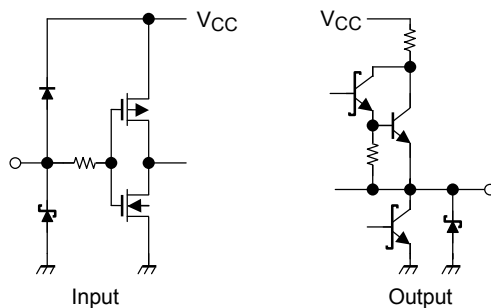
- High-speed operation $t_{pd} = 4.8 \text{ ns (typ.)}$
- Symmetrical output impedance $I_{OH} = -15 \text{ mA (max)}$
 $I_{OL} = 48 \text{ mA (max)}$
- Low power dissipation $I_{CCD} = 8 \text{ mA (typ.)}$
 $I_{CCZ} = 10 \mu\text{A (typ.)}$
- Operating temperature range $T_a = -40^\circ\text{C to } 85^\circ\text{C}$
- High ESD protection 2000 V (MIL standard)
- Pin and function compatible with FAST (74F541)



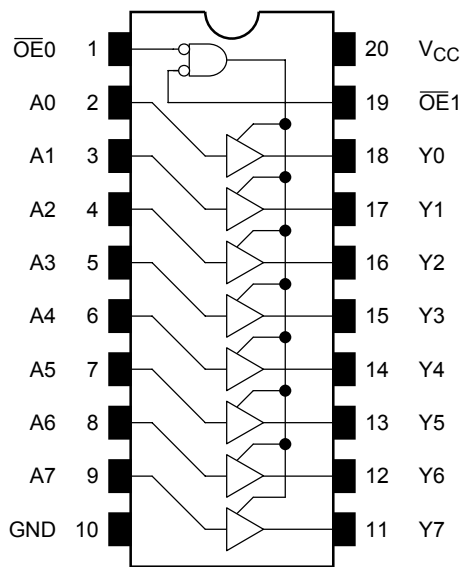
Weight

DIP20-P-300-2.54A : 1.48 g (typ.)
 SOP20-P-300-1.27 : 0.25 g (typ.)

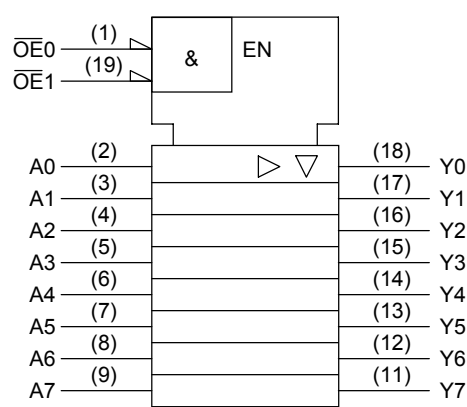
Input Protection Circuit and Output Equivalent Circuit



Pin Assignment (top view)



Logic Symbol



Truth Table

Inputs			Outputs
OE0	OE1	An	Yn
H	X	X	Z
X	H	X	Z
L	L	H	H
L	L	L	L

X: Don't care
Z: High impedance

Absolute Maximum Ratings

Characteristics		Symbol	Rating	Unit
Power supply voltage		V _{CC}	−0.5 to 7.0	V
Input voltage		V _{IN}	−1.2 to V _{CC} + 0.5	V
Output voltage		V _O	−0.5 to V _{CC} + 0.5	V
Input clamp diode current		I _{IK}	±30	mA
Output clamp diode current		I _{OK}	−30	mA
Output current (output low state)		I _{OL}	96	mA
Power dissipation	BC541P	P _D	1380 (Note 1)	mW
	BC541F		860 (Note 1)	
Storage temperature		T _{stg}	−65 to 150	°C

Note 1: Ta = 25°C

Recommended Operating Conditions

Characteristics		Symbol	Min	Typ.	Max	Unit
Power supply voltage		V_{CC}	4.5	5.0	5.5	V
Input voltage		V_{IN}	0	—	V_{CC}	V
Output voltage		V_O	0	—	V_{CC}	V
Output current	High level	I_{OH}	—	—	–15	mA
	Low level	I_{OL}	—	—	48	
Operating temperature		T_{opr}	–40	25	85	°C

Electrical Characteristics

DC Characteristics (unless otherwise specified, $V_{CC} = 4.5\text{ V to }5.5\text{ V}$, $T_a = -40^\circ\text{C to }85^\circ\text{C}$)

Characteristics		Symbol	Test Condition	V _{CC}	Min	Typ. (Note 1)	Max	Unit
Input voltage	High level	V _{IH}	—	—	2.0	—	—	V
	Low level	V _{IL}	—	—	—	—	0.8	
Input clamp voltage		V _{IK}	I _{IK} = −18 mA	4.5	—	—	−1.2	V
Output voltage	High level	V _{OH}	I _{OH} = −3.0 mA	4.5	2.4	3.4	—	V
			I _{OH} = −3.0 mA	4.75	2.7	3.4	—	
			I _{OH} = −15 mA	4.5	2.0	—	—	
	Low level	V _{OL}	I _{OL} = 24 mA	4.5	—	—	0.5	
			I _{OL} = 48 mA	4.5	—	—	0.55	
Input current (all input pins)		I _I	V _{IN} = V _{CC}	5.5	—	—	±1.0	μA
		I _{IH}	V _{IN} = 2.7 V	5.5	—	—	±1.0	
		I _{IL}	V _{IN} = 0.5 V or GND	5.5	—	—	±1.0	
3-state OFF leakage current		I _{OZH}	V _O = 2.7 V	5.5	—	—	50	μA
		I _{OZL}	V _O = 0.5 V	5.5	—	—	−50	
Output short current (Note 2)		I _{OS}	V _O = GND	5.5	−100	—	−255	mA
Quiescent supply current (total)		I _{CCL}	V _{IN} = V _{CC} or ground All outputs are low.	5.5	—	20	27	mA
		I _{CCH}	V _{IN} = V _{CC} or ground All outputs are high.	5.5	—	10	50	
		I _{CCZ}	V _{IN} = V _{CC} or ground All outputs are in the high-impedance state.	5.5	—	10	50	
Quiescent supply current (each bit)		ΔI _{CC1}	One input: V _{IN} = 0.5 V Other inputs: V _{CC} or GND	—	—	—	1.5	mA
		ΔI _{CC2}	One input: V _{IN} = V _{CC} − 2.1 V Other inputs: V _{CC} or GND	—	—	—	1.5	

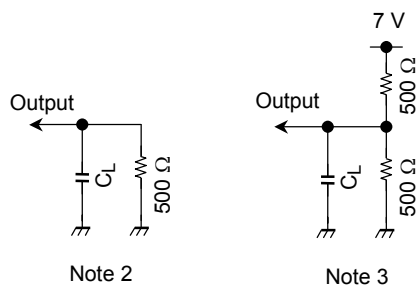
Note 1: Typical value is measured at $V_{CC} = 5.0\text{ V}$ and $T_a = 25^\circ\text{C}$.

Note 2: Only one output at a time should be shorted. Duration should not exceed one second.

AC Characteristics (Input $t_r = t_f = 2.5$ ns)

Characteristics	Symbol	Test Condition	Ta = 25°C V _{CC} = 5.0 V			Ta = -40°C to 85°C V _{CC} = 5.0 V ± 10 %		Unit
			Min	Typ.	Max	Min	Max	
Propagation delay time	A-Y	t_{pLH}	2.0	5.0	6.3	2.0	7.5	ns
		t_{pHL}	2.0	4.5	5.8	2.0	6.8	
3-state output enable time	\overline{OE} -Y	t_{pZH}	2.0	8.0	9.5	2.0	11.0	ns
		t_{pZL}	2.0	6.5	9.5	2.0	11.0	
3-state output disable time	\overline{OE} -Y	t_{pHZ}	2.0	6.0	9.5	2.0	10.0	ns
		t_{pLZ}	2.0	5.0	8.5	2.0	9.5	
Dynamic supply current	I _{CCD}	f = 1 MHz Output open	—	8	13	—	16	mA

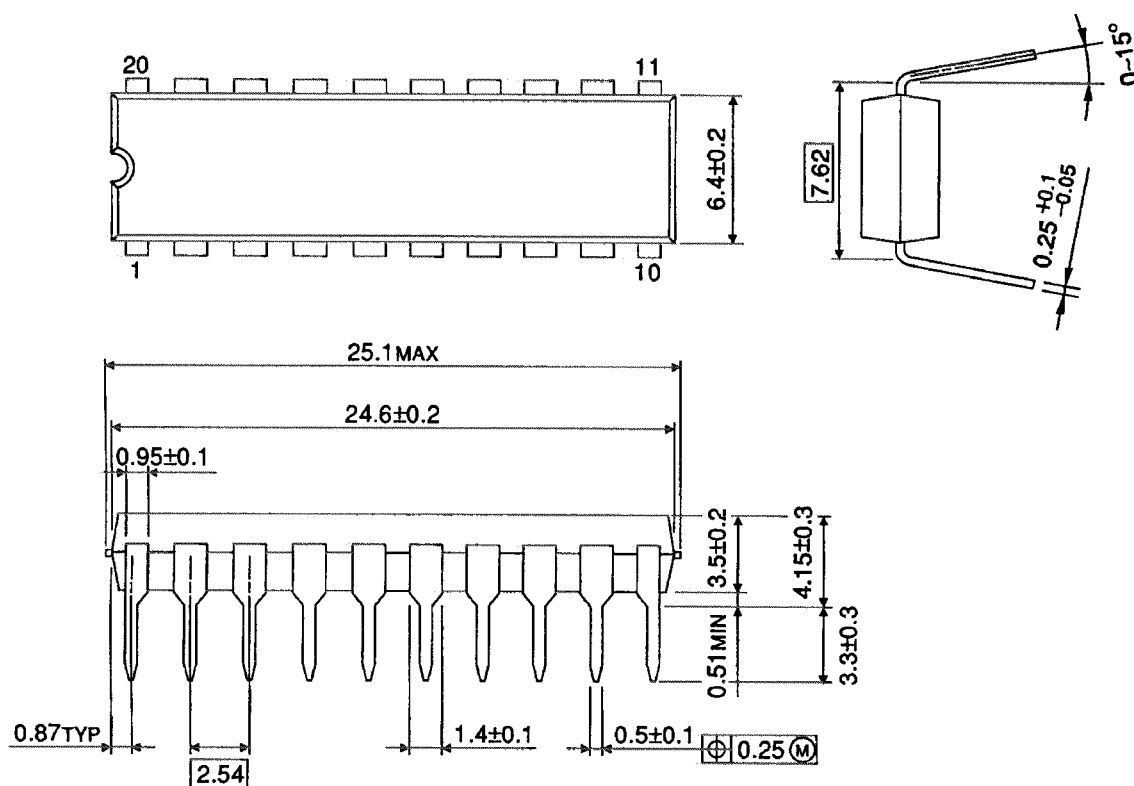
Note 1: When measuring t_{pLH} , t_{pHL} , t_{pZH} and t_{pHZ} , the output pin should be connected as shown in Note 2.
When measuring t_{pZL} , and t_{pLZ} , the output pin should be connected as shown in Note 3.



Package Dimensions

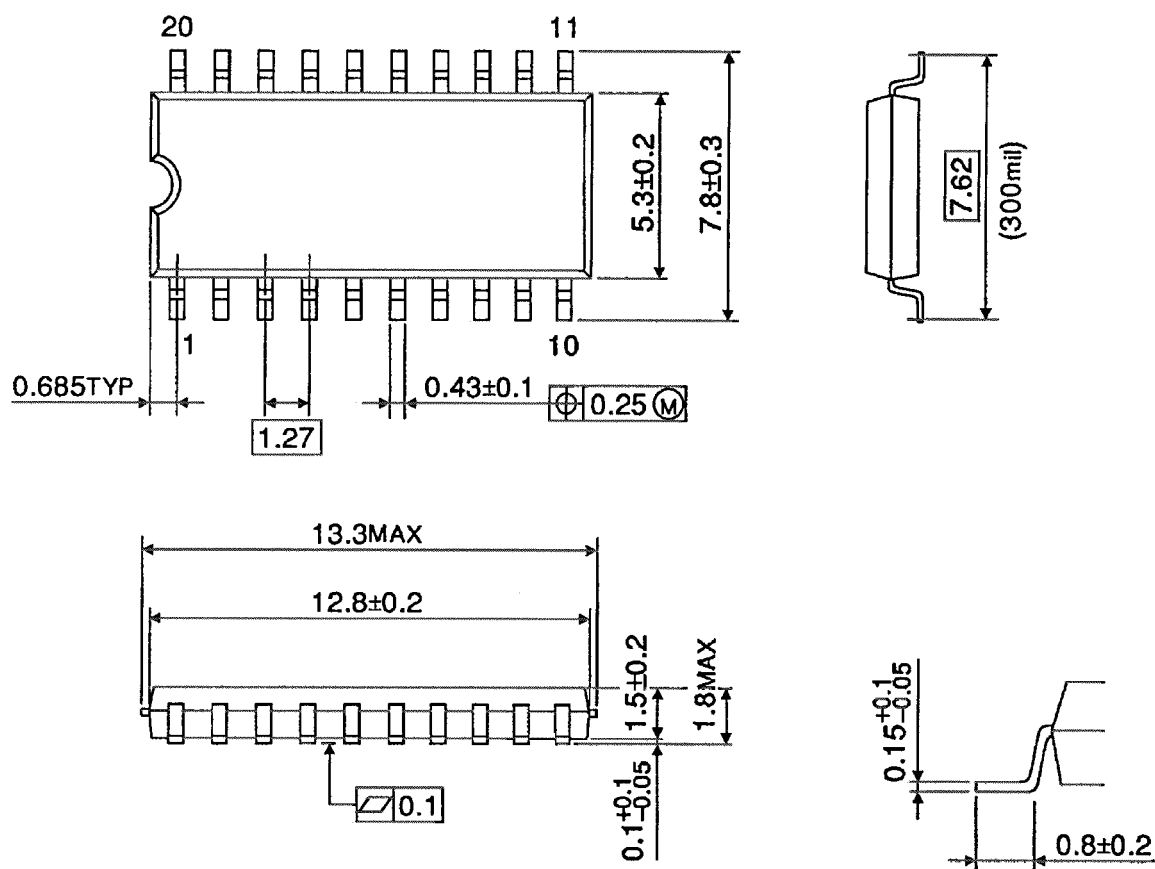
DIP20-P-300-2.54A

Unit : mm



Weight: 1.48 g (typ.)

Unit : mm



Weight: 0.25 g (typ.)

RESTRICTIONS ON PRODUCT USE

000707EBA

- TOSHIBA is continually working to improve the quality and reliability of its products. Nevertheless, semiconductor devices in general can malfunction or fail due to their inherent electrical sensitivity and vulnerability to physical stress. It is the responsibility of the buyer, when utilizing TOSHIBA products, to comply with the standards of safety in making a safe design for the entire system, and to avoid situations in which a malfunction or failure of such TOSHIBA products could cause loss of human life, bodily injury or damage to property.
In developing your designs, please ensure that TOSHIBA products are used within specified operating ranges as set forth in the most recent TOSHIBA products specifications. Also, please keep in mind the precautions and conditions set forth in the "Handling Guide for Semiconductor Devices," or "TOSHIBA Semiconductor Reliability Handbook" etc..
- The TOSHIBA products listed in this document are intended for usage in general electronics applications (computer, personal equipment, office equipment, measuring equipment, industrial robotics, domestic appliances, etc.). These TOSHIBA products are neither intended nor warranted for usage in equipment that requires extraordinarily high quality and/or reliability or a malfunction or failure of which may cause loss of human life or bodily injury ("Unintended Usage"). Unintended Usage include atomic energy control instruments, airplane or spaceship instruments, transportation instruments, traffic signal instruments, combustion control instruments, medical instruments, all types of safety devices, etc.. Unintended Usage of TOSHIBA products listed in this document shall be made at the customer's own risk.
- The products described in this document are subject to the foreign exchange and foreign trade laws.
- The information contained herein is presented only as a guide for the applications of our products. No responsibility is assumed by TOSHIBA CORPORATION for any infringements of intellectual property or other rights of the third parties which may result from its use. No license is granted by implication or otherwise under any intellectual property or other rights of TOSHIBA CORPORATION or others.
- The information contained herein is subject to change without notice.