

TOSHIBA CMOS DIGITAL INTEGRATED CIRCUIT SILICON MONOLITHIC

# TC74ACT240P, TC74ACT240F, TC74ACT240FW, TC74ACT240FT

## TC74ACT244P, TC74ACT244F, TC74ACT244FW, TC74ACT244FT

**OCTAL BUS BUFFER**

TC74ACT240P/F/FW/FT INVERTED, 3-STATE OUTPUTS

TC74ACT244P/F/FW/FT NON-INVERTED, 3-STATE OUTPUTS

The TC74ACT240 and 244 are advanced high speed CMOS OCTAL BUS BUFFERS fabricated with silicon gate and double-layer metal wiring C<sup>2</sup>MOS technology.

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

The 74ACT240 is an inverting 3-state buffer while the 74ACT244 is non-inverting. Both devices have two active-low output enables.

These devices are designed to be used in such applications as 3-state memory address drivers.

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

**FEATURES:**

- High Speed..... $t_{pd} = 5.0\text{ns}(\text{typ.})$  at  $V_{CC} = 5\text{V}$
- Low Power Dissipation..... $I_{CC} = 8\mu\text{A}(\text{Max.})$  at  $T_a = 25^\circ\text{C}$
- Compatible with TTL outputs.... $V_{IL} = 0.8\text{V}(\text{Max.})$   
 $V_{IH} = 2.0\text{V}(\text{Min.})$
- Symmetrical Output Impedance... $|I_{OH}| = |I_{OL}| = 24\text{mA}(\text{Min.})$   
 Capability of driving  $50\Omega$  transmission lines.
- Balanced Propagation Delays.... $t_{PLH} \approx t_{PHL}$
- Pin and Function Compatible with 74F240/244

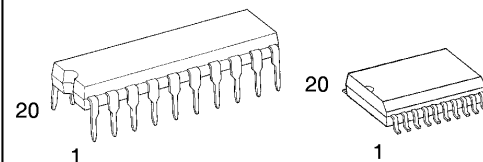
**TRUTH TABLE**

| INPUTS         |       | OUTPUTS    |                       |
|----------------|-------|------------|-----------------------|
| $\overline{G}$ | $A_n$ | $Y_n(244)$ | $\overline{Y}_n(240)$ |
| L              | L     | L          | H                     |
| L              | H     | H          | L                     |
| H              | X     | Z          | Z                     |

X : Don't Care

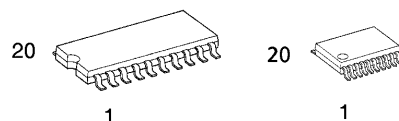
Z : High Impedance

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



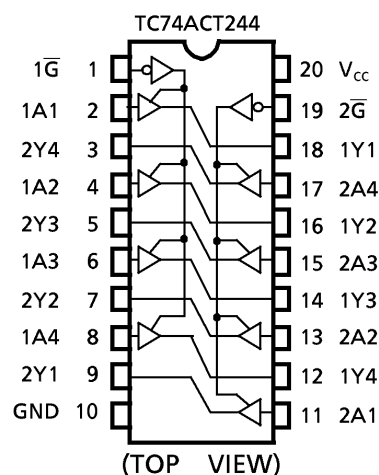
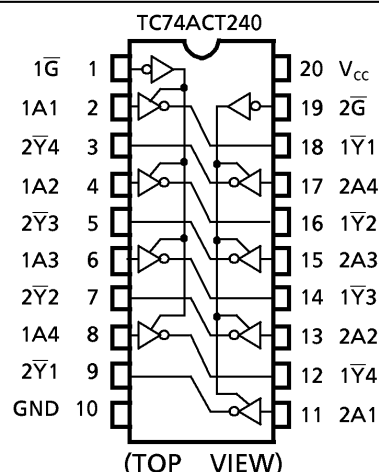
P (DIP20-P-300-2.54A)  
Weight : 1.30g (Typ.)

FW (SOL20-P-300-1.27)  
Weight : 0.46g (Typ.)

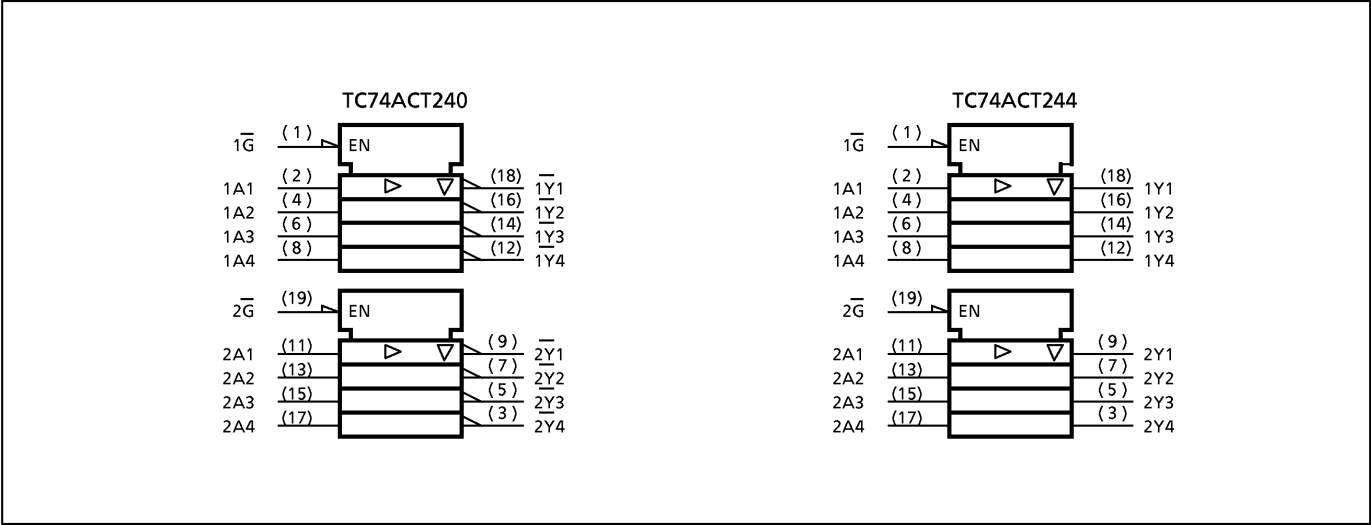


F (SOP20-P-300-1.27)  
Weight : 0.22g (Typ.)

FT (TSSOP20-P-0044-0.65)  
Weight : 0.08g (Typ.)

**PIN ASSIGNMENT**

IEC LOGIC SYMBOL



ABSOLUTE MAXIMUM RATINGS

| PARAMETER                   | SYMBOL    | VALUE                        | UNIT        |
|-----------------------------|-----------|------------------------------|-------------|
| Supply Voltage Range        | $V_{CC}$  | $-0.5 \sim 7.0$              | 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         | $I_{IK}$  | $\pm 20$                     | mA          |
| Output Diode Current        | $I_{OK}$  | $\pm 50$                     | mA          |
| DC Output Current           | $I_{OUT}$ | $\pm 50$                     | mA          |
| DC $V_{CC}$ /Ground Current | $I_{CC}$  | $\pm 200$                    | mA          |
| Power Dissipation           | $P_D$     | 500 (DIP)* / 180 (SOP/TSSOP) | mW          |
| Storage Temperature         | $T_{stg}$ | $-65 \sim 150$               | $^{\circ}C$ |

\*500mW in the range of  $T_a = -40^{\circ}C \sim 65^{\circ}C$ . From  $T_a = 65^{\circ}C$  to  $85^{\circ}C$  a derating factor of  $-10mW/^{\circ}C$  should be applied up to 300mW.

RECOMMENDED OPERATING CONDITIONS

| PARAMETER                | SYMBOL    | VALUE           | UNIT        |
|--------------------------|-----------|-----------------|-------------|
| Supply Voltage           | $V_{CC}$  | $4.5 \sim 5.5$  | V           |
| Input Voltage            | $V_{IN}$  | $0 \sim V_{CC}$ | V           |
| Output Voltage           | $V_{OUT}$ | $0 \sim V_{CC}$ | V           |
| Operating Temperature    | $T_{opr}$ | $-40 \sim 85$   | $^{\circ}C$ |
| Input Rise and Fall Time | $dt/dV$   | $0 \sim 10$     | ns/V        |

## DC ELECTRICAL CHARACTERISTICS

| PARAMETER                            | SYMBOL          | TEST CONDITION                                                                                    | V <sub>CC</sub><br>(V)   | Ta = 25°C |      |       | Ta = -40~85°C |       | UNIT |
|--------------------------------------|-----------------|---------------------------------------------------------------------------------------------------|--------------------------|-----------|------|-------|---------------|-------|------|
|                                      |                 |                                                                                                   |                          | MIN.      | TYP. | MAX.  | MIN.          | MAX.  |      |
| High - Level Input Voltage           | V <sub>IH</sub> |                                                                                                   | 4.5<br>} 5.5             | 2.0       | —    | —     | 2.0           | —     | V    |
| Low - Level Input Voltage            | V <sub>IL</sub> |                                                                                                   | 4.5<br>} 5.5             | —         | —    | 0.8   | —             | 0.8   | V    |
| High - Level Output Voltage          | V <sub>OH</sub> | V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub>                                              | I <sub>OH</sub> = -50μA  | 4.5       | 4.4  | 4.5   | —             | 4.4   | V    |
|                                      |                 |                                                                                                   | I <sub>OH</sub> = -24mA  | 4.5       | 3.94 | —     | —             | 3.80  |      |
|                                      |                 |                                                                                                   | I <sub>OH</sub> = -75mA* | 5.5       | —    | —     | —             | 3.85  |      |
| Low - Level Output Voltage           | V <sub>OL</sub> | V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub>                                              | I <sub>OL</sub> = 50μA   | 4.5       | —    | 0.0   | 0.1           | —     | V    |
|                                      |                 |                                                                                                   | I <sub>OL</sub> = 24mA   | 4.5       | —    | —     | 0.36          | —     |      |
|                                      |                 |                                                                                                   | I <sub>OL</sub> = 75mA*  | 5.5       | —    | —     | —             | 0.1   |      |
| 3 - State Output Off - State Current | I <sub>OZ</sub> | V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub><br>V <sub>OUT</sub> = V <sub>CC</sub> or GND | 5.5                      | —         | —    | ± 0.5 | —             | ± 5.0 | μA   |
| Input Leakage Current                | I <sub>IN</sub> | V <sub>IN</sub> = V <sub>CC</sub> or GND                                                          | 5.5                      | —         | —    | ± 0.1 | —             | ± 1.0 |      |
| Quiescent Supply Current             | I <sub>CC</sub> | V <sub>IN</sub> = V <sub>CC</sub> or GND                                                          | 5.5                      | —         | —    | 8.0   | —             | 80.0  |      |
|                                      | I <sub>C</sub>  | PER INPUT : V <sub>IN</sub> = 3.4V<br>OTHER INPUT : V <sub>CC</sub> 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<sub>L</sub> = 50pF, R<sub>L</sub> = 500Ω, Input t<sub>r</sub> = t<sub>f</sub> = 3ns)

| PARAMETER                     | SYMBOL                               | TEST CONDITION | V <sub>CC</sub> (V) | Ta = 25°C |      |      | Ta = -40~85°C |      | UNIT |
|-------------------------------|--------------------------------------|----------------|---------------------|-----------|------|------|---------------|------|------|
|                               |                                      |                |                     | MIN.      | TYP. | MAX. | MIN.          | MAX. |      |
| Propagation Delay Time        | t <sub>pLH</sub><br>t <sub>pHL</sub> |                | 5.0 ± 0.5           | —         | 5.7  | 8.0  | 1.0           | 9.0  | ns   |
| Output Enable Time            | t <sub>pZL</sub><br>t <sub>pZH</sub> |                | 5.0 ± 0.5           | —         | 6.0  | 9.0  | 1.0           | 10.5 |      |
| Output Disable Time           | t <sub>pLZ</sub><br>t <sub>pHZ</sub> |                | 5.0 ± 0.5           | —         | 5.9  | 8.5  | 1.0           | 10.0 |      |
| Input Capacitance             | C <sub>IN</sub>                      |                |                     | —         | 5    | 10   | —             | 10   | pF   |
| Output Capacitance            | C <sub>OUT</sub>                     |                |                     | —         | 10   | —    | —             | —    |      |
| Power Dissipation Capacitance | C <sub>PD</sub> (1)                  | TC74ACT240     |                     | —         | 25   | —    | —             | —    |      |
|                               |                                      | TC74ACT244     |                     | —         | 29   | —    | —             | —    |      |

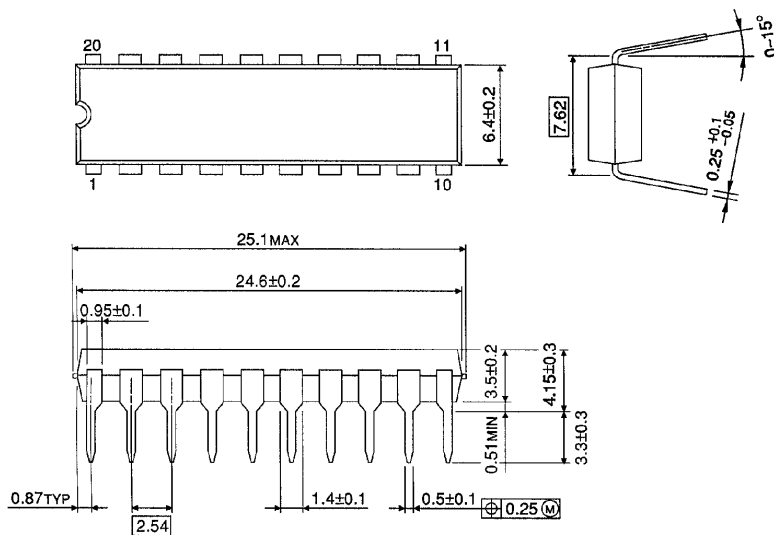
Note (1) C<sub>PD</sub> is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption without load.

Average operating current can be obtained by the equation :

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

## DIP 20PIN PACKAGE DIMENSIONS (DIP20-P-300-2.54A)

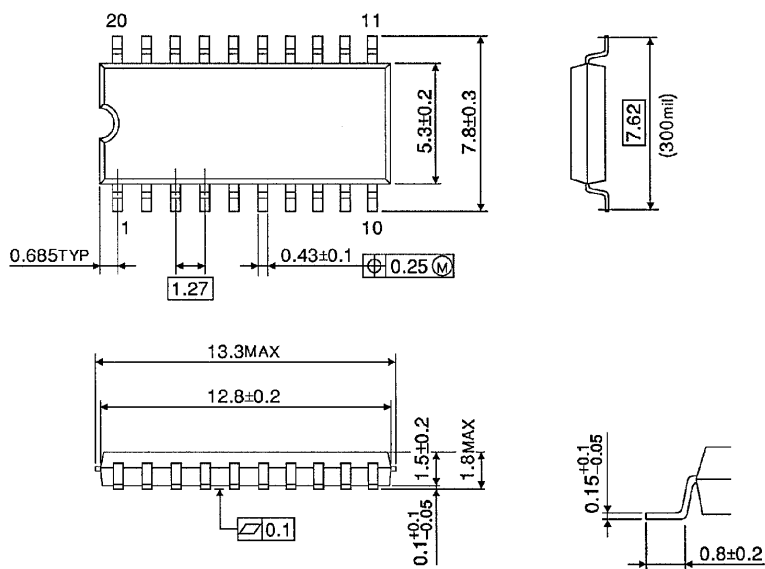
Unit in mm



Weight : 1.30g (Typ.)

## SOP 20PIN (200mil BODY) PACKAGE DIMENSIONS (SOP20-P-300-1.27)

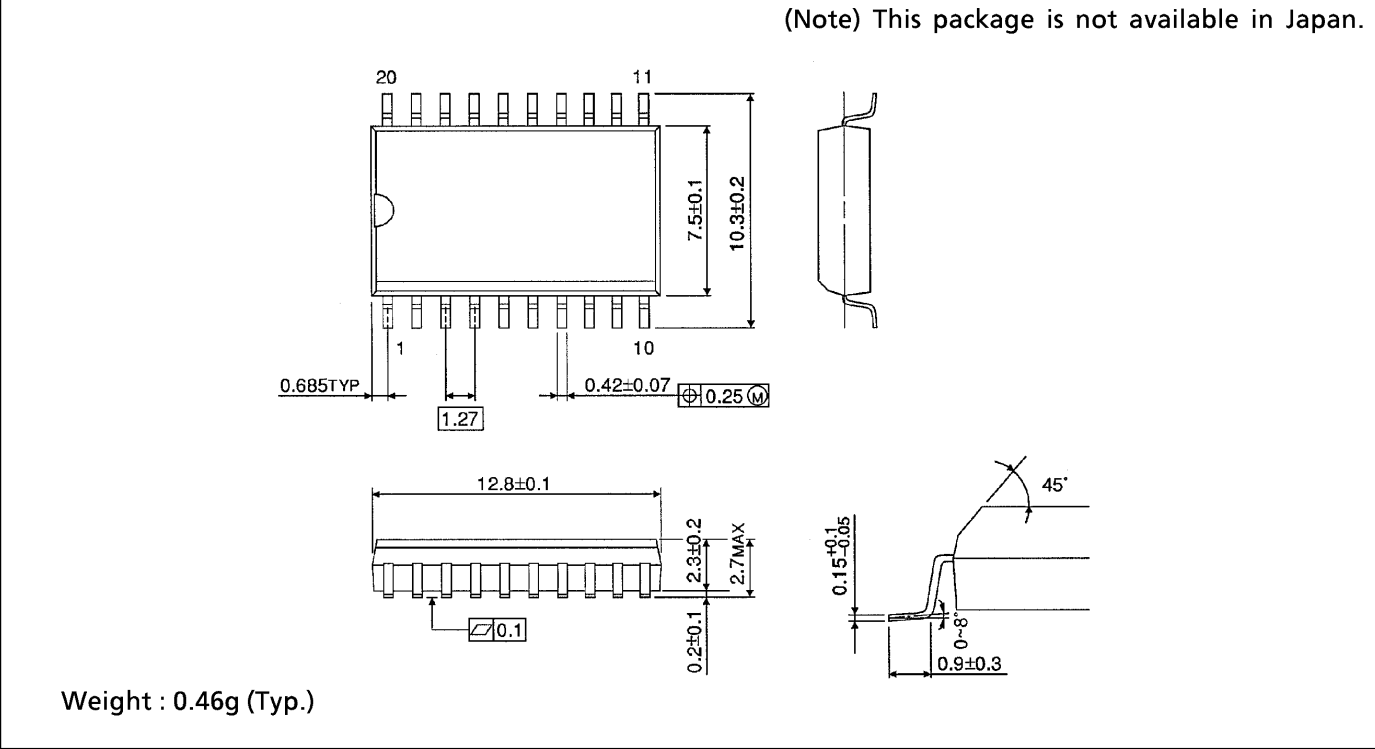
Unit in mm



Weight : 0.22g (Typ.)

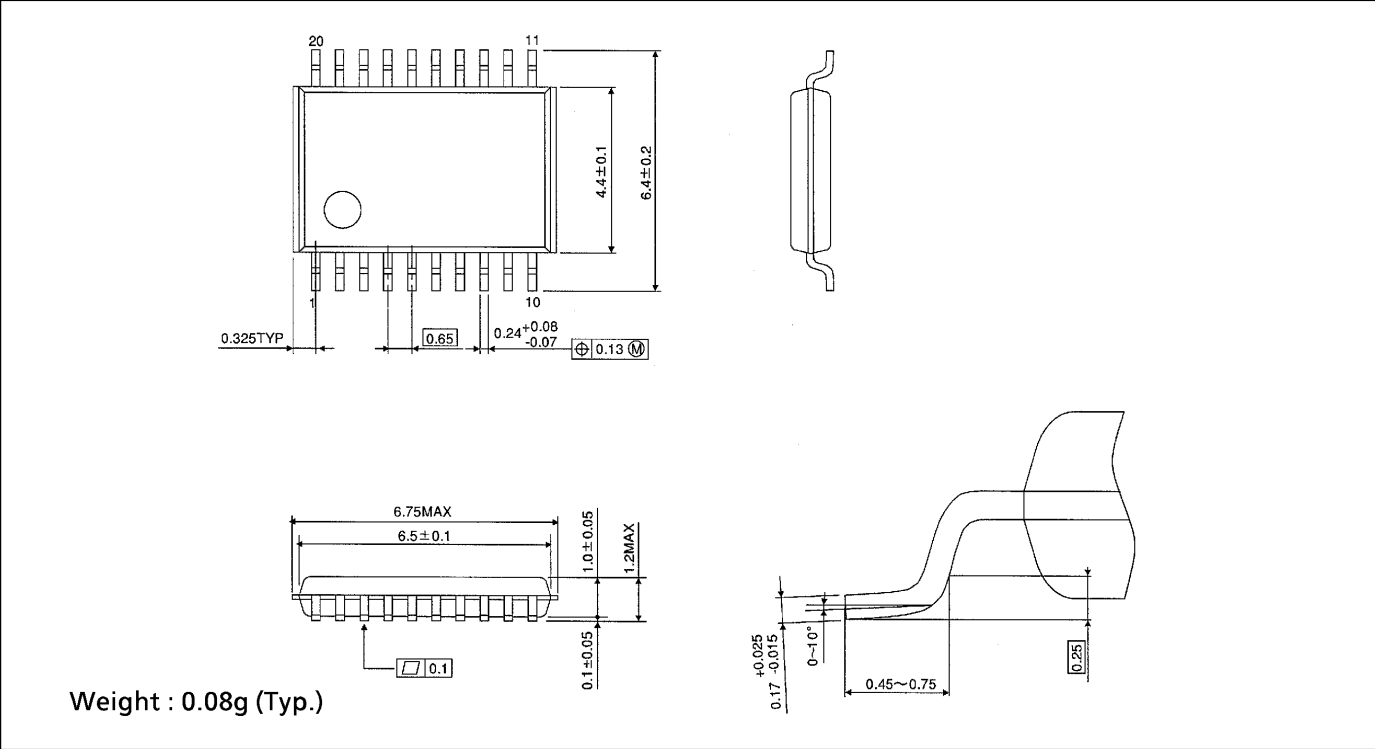
SOP 20PIN (300mil BODY) PACKAGE DIMENSIONS (SOL20-P-300-1.27)

Unit in mm



TSSOP 20PIN PACKAGE DIMENSIONS (TSSOP20-P-0044-0.65)

Unit in mm



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