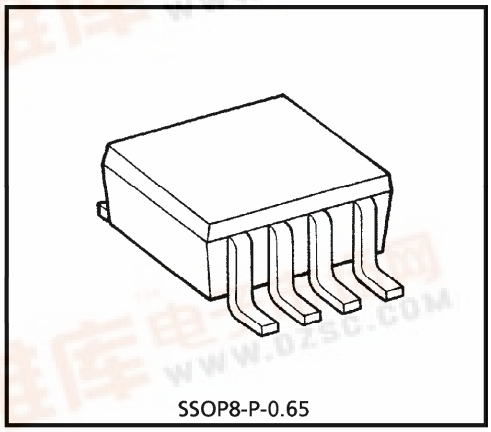
TOSHIBA CMOS DIGITAL INTEGRATED CIRCUIT SILICON MONOLITHIC

# TC7WT240FU

## INVERTED, 3-STATE OUTPUT

The TC7WT240FU is a high speed CMOS DUAL BUS BUFFERS fabricated with silicon gate CMOS technology.
It achieves the high speed operation similar to equivalent Bipolar Schottky TTL while maintaining the CMOS low power dissipation.
The input threshold levels are compatible with TTL output voltage.
It is an inverting 3-state buffer having two active-low output enables.
All inputs are equipped with protection circuits against static discharge or transient excess voltage.

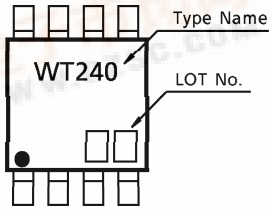



Weight : 0.02g (Typ.)

### FEATURES

- High Speed ..... $t_{pd}$ = 13ns (Typ.) at $V_{CC}$ = 5V
- Low Power Dissipation ..... $I_{CC}$ = 2$\mu$A (Max.) at Ta = 25°C
- Compatible with TTL outputs ..... $V_{IL}$ = 0.8V (Max.), $V_{IH}$ = 2.0V (Min.)
- Output Drive Capability ..... 15 LSTTL Loads
- Symmetrical Output Impedance ... $|I_{OH}| = I_{OL}$ = 6mA (Min.)

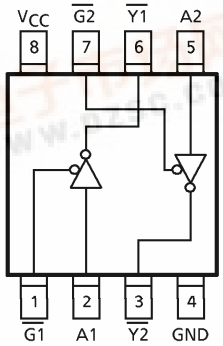
### MARKING



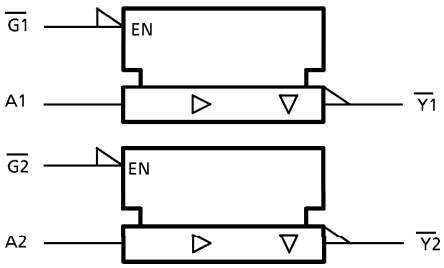

### MAXIMUM RATINGS (Ta = 25°C)

| CHARACTERISTIC | SYMBOL | RATING | UNIT |
|---|---|---|---|
| Supply Voltage Range | $V_{CC}$ | −0.5~7 | 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 | $I_{OK}$ | ±20 | mA |
| DC Output Current | $I_{OUT}$ | ±35 | mA |
| DC $V_{CC}$ / Ground Current | $I_{CC}$ | ±37.5 | mA |
| Power Dissipation | $P_D$ | 300 | mW |
| Storage Temperature | $T_{stg}$ | −65~150 | °C |
| Lead Temperature (10 s) | $T_L$ | 260 | °C |

### PIN ASSIGNMENT (TOP VIEW)



**LOGIC DIAGRAM**




**TRUTH TABLE**

| INPUTS | | OUTPUTS |
|---|---|---|
| $\overline{G}$ | A | $\overline{Y}$ |
| L | L | H |
| L | H | L |
| H | × | Z |

× : Don't Care
Z : High Impedance

**RECOMMENDED OPERATING CONDITIONS**

| CHARACTERISTIC | SYMBOL | RATING | 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 | $t_r$, $t_f$ | 0~500 | ns |

**DC ELECTRICAL CHARACTERISTICS**

| CHARACTERISTIC | 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 | $V_{OH}$ | $V_{IN}$ = $V_{IL}$ | $I_{OH}$ = −20μA | 4.5 | 4.4 | 4.5 | — | 4.4 | — | V |
| | | | $I_{OH}$ = −6mA | 4.5 | 4.18 | 4.31 | — | 4.13 | — | |
| Low-Level Output Voltage | $V_{OL}$ | $V_{IN}$ = $V_{IH}$ or $V_{IL}$ | $I_{OL}$ = 20μA | 4.5 | — | 0.0 | 0.10 | — | 0.10 | V |
| | | | $I_{OL}$ = 6mA | 4.5 | — | 0.17 | 0.26 | — | 0.33 | |
| 3-State Output Off-State Current | $I_{OZ}$ | $V_{IN}$ = = $V_{IH}$ or $V_{IL}$<br>$V_{OUT}$ = $V_{CC}$ 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 | — | — | 2.0 | — | 20.0 | μA |
| | $I_{CCT}$ | PER INPUT : $V_{IN}$ = 0.5V or 2.4V<br>OTHER INPUT: $V_{CC}$ or GND | | 5.5 | — | — | 2.0 | — | 2.9 | mA |

**AC ELECTRICAL CHARACTERISTICS** (Input $t_r = t_f = 6ns$)

| CHARACTERISTIC | SYMBOL | TEST CONDITION | | | Ta = 25°C | | | Ta = −40~85°C | | UNIT |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | $C_L$ | $V_{CC}$ | MIN. | TYP. | MAX. | MIN. | MAX. | |
| Output Transition Time | $t_{TLH}$ $t_{THL}$ | — | 50 | 4.5 | — | 7 | 12 | — | 15 | ns |
| | | | | 5.5 | — | 6 | 11 | — | 14 | |
| Propagation Delay Time | $t_{pLH}$ $t_{pHL}$ | — | 50 | 4.5 | — | 15 | 25 | — | 31 | ns |
| | | | | 5.5 | — | 13 | 22 | — | 28 | |
| | | | 150 | 4.5 | — | 21 | 33 | — | 41 | |
| | | | | 5.5 | — | 18 | 29 | — | 37 | |
| Output Enable Time | $t_{pZL}$ $t_{pZH}$ | $R_L = 1k\Omega$ | 50 | 4.5 | — | 17 | 30 | — | 38 | ns |
| | | | | 5.5 | — | 14 | 27 | — | 34 | |
| | | | 150 | 4.5 | — | 23 | 38 | — | 48 | |
| | | | | 5.5 | — | 20 | 34 | — | 43 | |
| Output Disable Time | $t_{pLZ}$ $t_{pHZ}$ | $R_L = 1k\Omega$ | 50 | 4.5 | — | 16 | 30 | — | 38 | ns |
| | | | | 5.5 | — | 13 | 27 | — | 34 | |
| Input Capacitance | $C_{IN}$ | — | — | — | — | 5 | 10 | — | 10 | pF |
| Output Capacitance | $C_{OUT}$ | — | — | — | — | 10 | — | — | — | pF |
| Power Dissipation Capacitance | $C_{PD}$ | (Note 1) | — | — | — | 32 | — | — | — | pF |

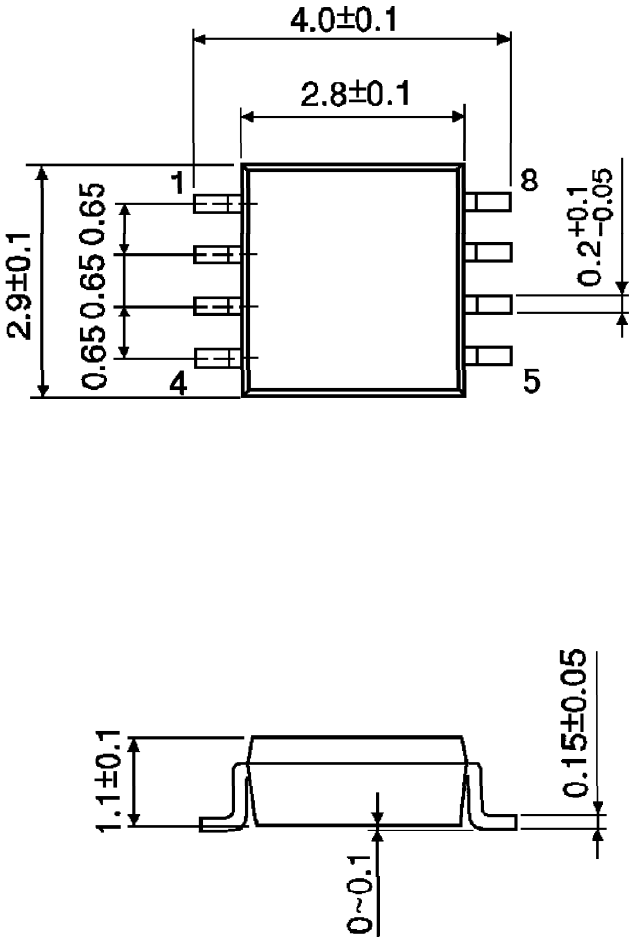
(Note 1) : $C_{PD}$ is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption without load.
Average operating current can be obtained by the equation :

$$I_{CC\,(opr)} = C_{PD} \cdot V_{CC} \cdot f_{IN} + I_{CC} / 2 \quad \text{(per Gate)}$$

**PACKAGE DIMENSIONS**

SSOP8-P-0.65

Unit : mm




Weight : 0.02g (Typ.)

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