

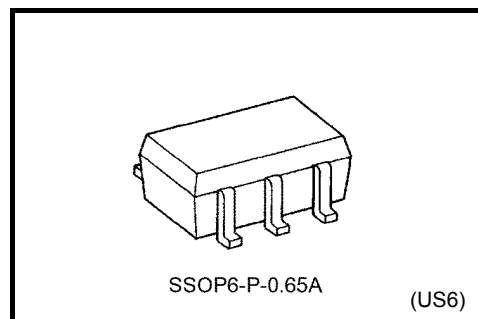
TOSHIBA CMOS Digital Integrated Circuit Silicon Monolithic

TC7PG17FU

Dual Schmitt Buffer

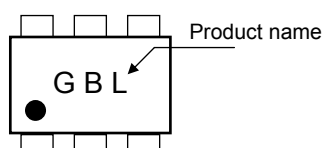
Features

- High output current : ± 8 mA (min) at $V_{CC} = 3$ V
- Super high speed operation : $t_{pd} = 3.7$ ns (typ.)
at $V_{CC} = 3.3$ V, 15pF
- Operating voltage range : $V_{CC} = 0.9$ to 3.6 V
- 5.5-V tolerant inputs
- 3.6-V power down protection outputs

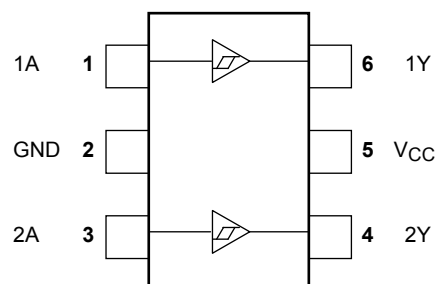


Weight: 0.0068 g (typ.)

Marking



Pin Assignment (top view)



Absolute Maximum Ratings ($T_a = 25^\circ\text{C}$)

| Characteristics | Symbol | Rating | Unit |
|--------------------------|-----------|---------------------------------|------------------|
| Supply voltage | V_{CC} | -0.5 to 4.6 | V |
| DC input voltage | V_{IN} | -0.5 to 7.0 | V |
| DC output voltage | V_{OUT} | -0.5 to 4.6 (Note 1) | V |
| | | -0.5 to $V_{CC} + 0.5$ (Note 2) | |
| Input diode current | I_{IK} | -20 | mA |
| Output diode current | I_{OK} | -20 (Note 3) | mA |
| DC output current | I_{OUT} | ± 25 | mA |
| DC V_{CC} /GND current | I_{CC} | ± 100 | mA |
| Power dissipation | P_D | 200 | mW |
| Storage temperature | T_{stg} | -65 to 150 | $^\circ\text{C}$ |

Note: 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).

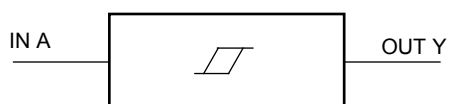
Note 1: $V_{CC} = 0$ V

Note 2: High or Low State. Do not exceed I_{OUT} of absolute maximum ratings.

Note 3: $V_{OUT} < \text{GND}$

Start of commercial production
2007-03

IEC Logic Symbol



Truth Table

| A | Y |
|---|---|
| L | L |
| H | H |

Operating Ranges

| Characteristics | Symbol | Rating | Unit |
|-----------------------|-------------------|------------------------|------|
| Supply voltage | V_{CC} | 0.9 to 3.6 | V |
| Input voltage | V_{IN} | 0 to 5.5 | V |
| Output voltage | V_{OUT} | 0 to 3.6 (Note 4) | V |
| | | 0 to V_{CC} (Note 5) | |
| Output Current | I_{OH} / I_{OL} | ± 8.0 (Note 6) | mA |
| | | ± 4.0 (Note 7) | |
| | | ± 3.0 (Note 8) | |
| | | ± 1.7 (Note 9) | |
| | | ± 0.3 (Note 10) | |
| | | ± 0.02 (Note 11) | |
| Operating temperature | T_{opr} | -40 to 85 | °C |

Note 4: $V_{CC} = 0V$

Note 5: High or Low State. I_{OUT} absolute maximum rating must be observed.

Note 6: $V_{CC} = 3.0$ to 3.6 V

Note 7: $V_{CC} = 2.3$ to 2.7 V

Note 8: $V_{CC} = 1.65$ to 1.95 V

Note 9: $V_{CC} = 1.4$ to 1.6 V

Note 10: $V_{CC} = 1.1$ to 1.3 V

Note 11: $V_{CC} = 0.9$ V

Electrical Characteristics

DC Characteristics

| Characteristics | | Symbol | Test Condition | | Ta = 25°C | | | Ta = -40 to 85°C | | Unit | |
|---------------------------|----------------------------|--------|---------------------------|----------------|--------------|------------|------|------------------|------------|------------|-----|
| | | | | | VCC (V) | Min | Typ. | Max | Min | | Max |
| Threshold Voltage | Positive threshold voltage | VP | — | 0.9 | — | — | 0.73 | — | 0.80 | V | |
| | | | | 1.1 | — | — | 0.86 | — | 0.93 | | |
| | | | | 1.4 | — | — | 1.07 | — | 1.12 | | |
| | | | | 1.65 | — | — | 1.23 | — | 1.25 | | |
| | | | | 2.3 | — | — | 1.66 | — | 1.68 | | |
| | | | | 3.0 | — | — | 2.14 | — | 2.15 | | |
| | Negative threshold voltage | VN | — | 0.9 | 0.18 | — | — | 0.07 | — | | |
| | | | | 1.1 | 0.26 | — | — | 0.18 | — | | |
| | | | | 1.4 | 0.36 | — | — | 0.31 | — | | |
| | | | | 1.65 | 0.45 | — | — | 0.41 | — | | |
| | | | | 2.3 | 0.69 | — | — | 0.64 | — | | |
| | | | | 3.0 | 0.96 | — | — | 0.91 | — | | |
| Hysteresis Voltage | | VH | — | 0.9 | 0.20 | — | 0.38 | 0.15 | 0.53 | V | |
| | | | | 1.1 | 0.25 | — | 0.41 | 0.21 | 0.53 | | |
| | | | | 1.4 | 0.35 | — | 0.48 | 0.34 | 0.57 | | |
| | | | | 1.65 | 0.42 | — | 0.56 | 0.40 | 0.60 | | |
| | | | | 2.3 | 0.60 | — | 0.74 | 0.60 | 0.76 | | |
| | | | | 3.0 | 0.79 | — | 0.93 | 0.79 | 0.94 | | |
| Output voltage | High level | VOH | VIN = VIH | IOH = -0.02 mA | 0.9 | 0.75 | — | — | 0.75 | — | V |
| | | | | IOH = -0.3 mA | 1.1 to 1.3 | VCC × 0.75 | — | — | VCC × 0.75 | — | |
| | | | | IOH = -1.7 mA | 1.4 to 1.6 | VCC × 0.75 | — | — | VCC × 0.75 | — | |
| | | | | IOH = -3.0 mA | 1.65 to 1.95 | VCC -0.45 | — | — | VCC -0.45 | — | |
| | | | | IOH = -4.0 mA | 2.3 to 2.7 | 2.0 | — | — | 2.0 | — | |
| | | | | IOH = -8.0 mA | 3.0 to 3.6 | 2.48 | — | — | 2.48 | — | |
| | Low level | VOL | VIN = VIL | IOL = 0.02 mA | 0.9 | — | — | 0.1 | — | 0.1 | |
| | | | | IOL = 0.3 mA | 1.1 to 1.3 | — | — | VCC × 0.25 | — | VCC × 0.25 | |
| | | | | IOL = 1.7 mA | 1.4 to 1.6 | — | — | VCC × 0.25 | — | VCC × 0.25 | |
| | | | | IOL = 3.0 mA | 1.65 to 1.95 | — | — | 0.45 | — | 0.45 | |
| | | | | IOL = 4.0 mA | 2.3 to 2.7 | — | — | 0.4 | — | 0.4 | |
| | | | | IOL = 8.0 mA | 3.0 to 3.6 | — | — | 0.4 | — | 0.4 | |
| Input leakage current | | IIN | VIN = 0 to 5.5V | 0 to 3.6 | — | — | ±0.1 | — | ±1.0 | μA | |
| Power off leakage current | | IOFF | VIN = 5.5V or VOUT = 3.6V | 0 | — | — | 1.0 | — | 10.0 | μA | |
| Quiescent supply current | | ICC | VIN = VCC or GND | 3.6 | — | — | 1.0 | — | 10.0 | μA | |

AC Characteristics (unless otherwise specified, Input: $t_r = t_f = 3$ ns)

| Characteristics | Symbol | Test Condition | Ta = 25°C | | | | Ta = −40 to 85°C | | Unit |
|-------------------------------|--------------------------------------|--|--------------|-----|------|------|------------------|------|------|
| | | | VCC (V) | Min | Typ. | Max | Min | Max | |
| Propagation delay time | t _{pLH} t _{pHL} | C _L = 10 pF, R _L = 1 MΩ | 0.9 | — | 27.3 | — | — | — | ns |
| | | | 1.1 to 1.3 | — | 13.0 | 24.5 | 1.0 | 39.2 | |
| | | | 1.4 to 1.6 | — | 7.5 | 11.8 | 1.0 | 12.7 | |
| | | | 1.65 to 1.95 | — | 6.0 | 8.5 | 1.0 | 9.0 | |
| | | | 2.3 to 2.7 | — | 4.3 | 5.4 | 1.0 | 5.8 | |
| | | | 3.0 to 3.6 | — | 3.5 | 4.4 | 1.0 | 4.6 | |
| | | C _L = 15 pF, R _L = 1 MΩ | 0.9 | — | 29.5 | — | — | — | |
| | | | 1.1 to 1.3 | — | 14.3 | 26.7 | 1.0 | 44.7 | |
| | | | 1.4 to 1.6 | — | 8.0 | 12.7 | 1.0 | 14.0 | |
| | | | 1.65 to 1.95 | — | 6.3 | 9.1 | 1.0 | 9.5 | |
| | | | 2.3 to 2.7 | — | 4.6 | 5.7 | 1.0 | 6.1 | |
| | | | 3.0 to 3.6 | — | 3.7 | 4.6 | 1.0 | 5.0 | |
| | | C _L = 30 pF, R _L = 1 MΩ | 0.9 | — | 40.5 | — | — | — | |
| | | | 1.1 to 1.3 | — | 19.6 | 35.7 | 1.0 | 58.1 | |
| | | | 1.4 to 1.6 | — | 10.7 | 15.8 | 1.0 | 17.6 | |
| | | | 1.65 to 1.95 | — | 7.8 | 10.7 | 1.0 | 11.7 | |
| | | | 2.3 to 2.7 | — | 5.4 | 6.9 | 1.0 | 8.1 | |
| | | | 3.0 to 3.6 | — | 4.3 | 5.2 | 1.0 | 6.1 | |
| Input capacitance | C _{IN} | — | 3.6 | — | 3 | — | — | pF | |
| Power dissipation capacitance | C _{PD} | (Note 12) | 0.9 to 3.6 | — | 9 | — | — | pF | |

Note 12: C_{PD} is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption without load.

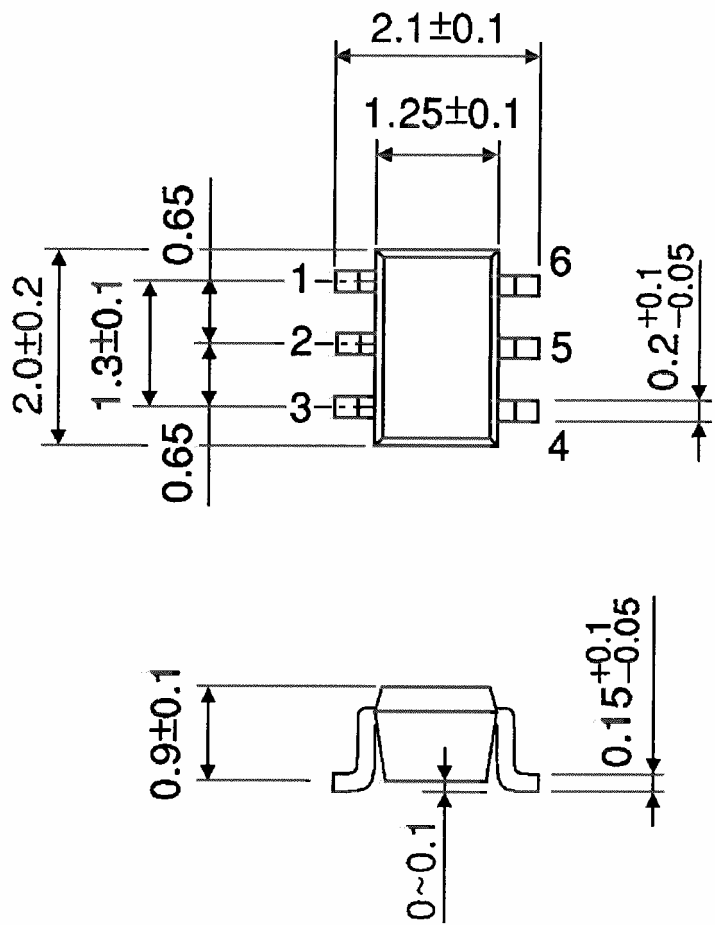
Average operating current can be obtained by the equation:

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

Package Dimensions

SSOP6-P-0.65A

Unit: mm



Weight: 0.0068 g (typ.)

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