

TC7PA19FU

Chip Select Decoder

Features

Operating voltage range: $V_{CC} = 1.4\sim 3.6\text{ V}$

High-speed operation: $t_{pd} = 3.3\text{ ns (max)}$ at $V_{CC} = 3.0\sim 3.6\text{ V}$

$t_{pd} = 3.9\text{ ns (max)}$ at $V_{CC} = 2.3\sim 2.7\text{ V}$

$t_{pd} = 8.0\text{ ns (max)}$ at $V_{CC} = 1.65\sim 1.95\text{ V}$

$t_{pd} = 10.0\text{ ns (max)}$ at $V_{CC} = 1.4\sim 1.6\text{ V}$

High-level output current:

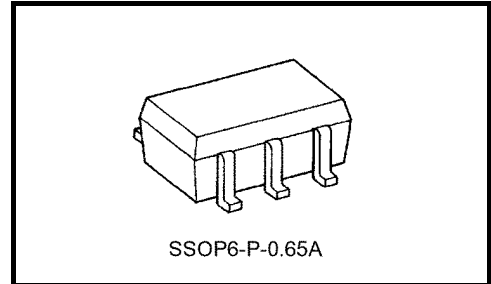
$I_{OH}/I_{OL} = \pm 24\text{ mA (min)}$ at $V_{CC} = 3.0\text{ V}$

$I_{OH}/I_{OL} = \pm 18\text{ mA (min)}$ at $V_{CC} = 2.3\text{ V}$

$I_{OH}/I_{OL} = \pm 4\text{ mA (min)}$ at $V_{CC} = 1.4\text{ V}$

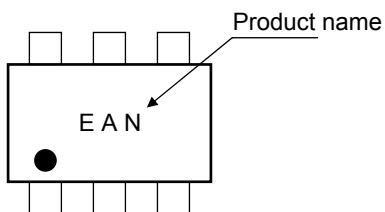
3.6 V tolerant inputs

3.6 V power down protection outputs

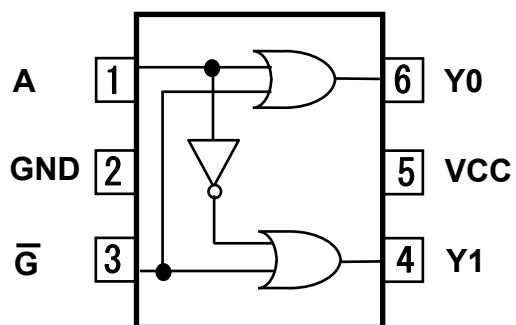


Weight: 0.0068 g (typ.)

Marking



Pin Assignment (top view)



Truth Table

| Inputs | | Outputs | | Selected Output |
|-----------|--------|---------|----|-----------------|
| Enable | Select | Y0 | Y1 | |
| \bar{G} | A | | | |
| H | X | H | H | None |
| L | L | L | H | Y0 |
| L | H | H | L | Y1 |

X: Don't care

Absolute Maximum Ratings

| Characteristics | Symbol | Value | Unit |
|-----------------------------|-----------|------------------------------|------|
| Power supply voltage | V_{CC} | -0.5~4.6 | V |
| DC input voltage | V_{IN} | -0.5~4.6 | V |
| DC output voltage | V_{OUT} | -0.5~4.6 (Note1) | V |
| | | -0.5~ $V_{CC} + 0.5$ (Note2) | |
| Input diode current | I_{IK} | -50 | mA |
| Output diode current | I_{OK} | -50 (Note3) | mA |
| DC output current | I_{OUT} | ±50 | mA |
| Power dissipation | PD | 200 | mW |
| DC V_{CC} /ground current | I_{CC} | ±100 | mA |
| Storage temperature | T_{stg} | -65~150 | °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).

Note1: $V_{CC} = 0$ V

Note2: High or Low state. The I_{OUT} absolute maximum rating must be adhered to.

Note3: $V_{OUT} < GND$

Operating Ranges

| Characteristics | Symbol | Value | Unit |
|--------------------------|-----------------|---------------------|------|
| Power supply voltage | V_{CC} | 1.4~3.6 | V |
| | | 1.2~3.6 (Note4) | |
| Input voltage | V_{IN} | -0.3~3.6 | V |
| Output voltage | V_{OUT} | 0~3.6 (Note5) | V |
| | | 0~ V_{CC} (Note6) | |
| Output Current | I_{OH}/I_{OL} | ±24 (Note7) | mA |
| | | ±18 (Note8) | |
| | | ±4 (Note9) | |
| Operating temperature | T_{opr} | -40~85 | °C |
| Input rise and fall time | dt/dv | 0~10 (Note10) | ns/V |

Note4: Data retention only

Note5: $V_{CC} = 0$ V

Note6: High or Low state

Note7: $V_{CC} = 3.0\sim 3.6$ V

Note8: $V_{CC} = 2.3\sim 2.7$ V

Note9: $V_{CC} = 1.4\sim 1.9$ V

Note10: $V_{IN} = 0.8\sim 2.0$ V, $V_{CC} = 3.0$ V

DC Electrical Characteristics (Ta = -40~85°C, 2.7 V < VCC ≤ 3.6 V)

| Characteristics | Symbol | Test Condition | | VCC (V) | Min | Max | Unit |
|---------------------------------------|------------------|--|---------------------------|---------|-----------------------|-------|------|
| | | | | | | | |
| High-Level Input Voltage | V _{IH} | — | | 2.7~3.6 | 2.0 | — | V |
| Low-Level Input Voltage | V _{IL} | — | | 2.7~3.6 | — | 0.8 | |
| High-Level Output Voltage | V _{OH} | V _{IN} = V _{IH} or V _{IL} | I _{OH} = -100 μA | 2.7~3.6 | V _{CC} - 0.2 | — | V |
| | | | I _{OH} = -12 mA | 2.7 | 2.2 | — | |
| | | | I _{OH} = -18 mA | 3.0 | 2.4 | — | |
| | | | I _{OH} = -24 mA | 3.0 | 2.2 | — | |
| Low-Level Output Voltage | V _{OL} | V _{IN} = V _{IH} or V _{IL} | I _{OL} = 100 μA | 2.7~3.6 | — | 0.2 | V |
| | | | I _{OL} = 12 mA | 2.7 | — | 0.4 | |
| | | | I _{OL} = 18 mA | 3.0 | — | 0.4 | |
| | | | I _{OL} = 24 mA | 3.0 | — | 0.55 | |
| Input Leakage Current | I _{IN} | V _{IN} = 0~3.6 V | | 2.7~3.6 | — | ±10.0 | μA |
| Power-off Leakage Current | I _{OFF} | V _{IN} or V _{OUT} = 0~3.6 V | | 0 | — | 10.0 | μA |
| Quiescent Supply Current | I _{CC} | V _{IN} = V _{CC} or GND | | 2.7~3.6 | — | 20.0 | μA |
| | | V _{CC} ≤ V _{IN} ≤ 3.6 V | | 2.7~3.6 | — | ±20.0 | |
| Increase in I _{CC} per Input | ΔI _{CC} | V _{IH} = V _{CC} - 0.6 V | | 2.7~3.6 | — | 750 | |

DC Electrical Characteristics (Ta = -40~85°C, 2.3 V ≤ VCC ≤ 2.7 V)

| Characteristics | Symbol | Test Condition | | VCC (V) | Min | Max | Unit |
|---------------------------|------------------|--|---------------------------|---------|-----------------------|-------|------|
| | | | | | | | |
| High-Level Input Voltage | V _{IH} | — | | 2.3~2.7 | 1.6 | — | V |
| Low-Level Input Voltage | V _{IL} | — | | 2.3~2.7 | — | 0.7 | |
| High-Level Output Voltage | V _{OH} | V _{IN} = V _{IH} or V _{IL} | I _{OH} = -100 μA | 2.3~2.7 | V _{CC} - 0.2 | — | V |
| | | | I _{OH} = -6 mA | 2.3 | 2.0 | — | |
| | | | I _{OH} = -12 mA | 2.3 | 1.8 | — | |
| | | | I _{OH} = -18 mA | 2.3 | 1.7 | — | |
| Low-Level Output Voltage | V _{OL} | V _{IN} = V _{IH} or V _{IL} | I _{OL} = 100 μA | 2.3~2.7 | — | 0.2 | V |
| | | | I _{OL} = 12 mA | 2.3 | — | 0.4 | |
| | | | I _{OL} = 18 mA | 2.3 | — | 0.6 | |
| Input Leakage Current | I _{IN} | V _{IN} = 0~3.6 V | | 2.3~2.7 | — | ±10.0 | μA |
| Power-off Leakage Current | I _{OFF} | V _{IN} or V _{OUT} = 0~3.6 V | | 0 | — | 10.0 | μA |
| Quiescent Supply Current | I _{CC} | V _{IN} = V _{CC} or GND | | 2.3~2.7 | — | 20.0 | μA |
| | | V _{CC} ≤ V _{IN} ≤ 3.6 V | | 2.3~2.7 | — | ±20.0 | |

DC Electrical Characteristics (Ta = -40~85°C, 1.4 V ≤ VCC < 2.3 V)

| Characteristics | Symbol | Test Condition | | VCC (V) | Min | Max | Unit |
|---------------------------|------------------|--|---------------------------|---------|-----------------------|------------------------|------|
| | | | | | | | |
| High-Level Input Voltage | V _{IH} | — | | 1.4~2.3 | V _{CC} × 0.7 | — | V |
| Low-Level Input Voltage | V _{IL} | — | | 1.4~2.3 | — | V _{CC} × 0.13 | |
| High-Level Output Voltage | V _{OH} | V _{IN} = V _{IH} or V _{IL} | I _{OH} = -100 μA | 1.4 | V _{CC} - 0.2 | — | V |
| | | | I _{OH} = -4 mA | 1.4 | 1.0 | — | |
| Low-Level Output Voltage | V _{OL} | V _{IN} = V _{IH} or V _{IL} | I _{OL} = 100 μA | 1.4 | — | 0.2 | V |
| | | | I _{OL} = 4 mA | 1.4 | — | 0.3 | |
| Input Leakage Current | I _{IN} | V _{IN} = 0~3.6 V | | 1.4 | — | ±10.0 | μA |
| Power-off Leakage Current | I _{OFF} | V _{IN} or V _{OUT} = 0~3.6 V | | 0 | — | 10.0 | μA |
| Quiescent Supply Current | I _{CC} | V _{IN} = V _{CC} or GND | | 1.4 | — | 20.0 | μA |
| | | V _{CC} ≤ V _{IN} ≤ 3.6 V | | 1.4 | — | ±20.0 | |

AC Electrical Characteristics (Ta = -40~85°C, input t_r = t_f = 2.0 ns)

| Characteristics | Symbol | Test Condition | | VCC (V) | Min | Max | Unit | |
|--|--------------------------------------|------------------|--|---|------------|------|------|----|
| | | | | | | | | |
| Propagation delay time (A or \overline{G} - Y0 or Y1) | t _{pLH} t _{pHL} | (Figure 1 and 2) | C _L =15pF, R _L =1MΩ | 1.5 ± 0.1 | 1.8 | 10.0 | ns | |
| | | | | 1.8 ± 0.15 | 1.5 | 8.0 | | |
| | | | | 2.5 ± 0.2 | 0.8 | 3.9 | | |
| | | | | 3.3 ± 0.3 | 0.6 | 3.3 | | |
| | | | | C _L =30pF, R _L =500Ω | 1.5 ± 0.1 | 2.0 | 13.0 | ns |
| | | | | | 1.8 ± 0.15 | 1.8 | 9.5 | |
| | | | | | 2.5 ± 0.2 | 1.2 | 5.0 | |
| | | | | | 3.3 ± 0.3 | 1.0 | 4.0 | |

For C_L = 50 pF, add approximately 300 ps to the AC maximum specification.

Capacitive Characteristics (Ta = 25°C)

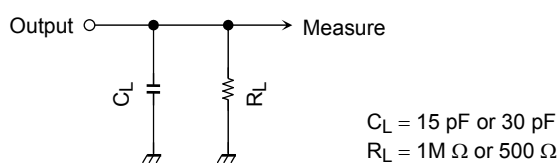
| Characteristics | Symbol | Test Condition | | VCC (V) | TYP. | Unit |
|-------------------------------|-----------------|--------------------------|-----------|---------------|------|------|
| | | | | | | |
| Input Capacitance | C _{IN} | — | | 1.8, 2.5, 3.3 | 6 | pF |
| Power Dissipation Capacitance | C _{PD} | f _{IN} = 10 MHz | (Note 11) | 1.8, 2.5, 3.3 | 20 | pF |

Note 11: C_{PD} is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption without load.

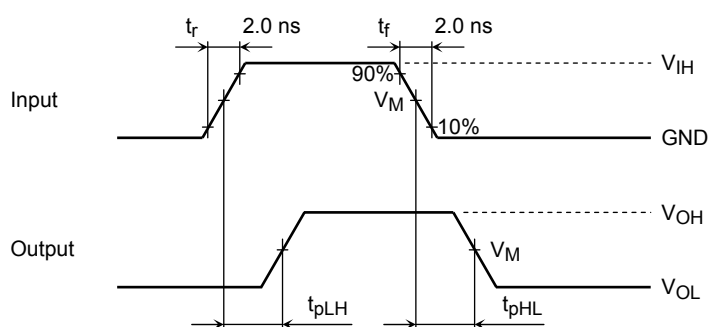
Average operating current can be obtained by the equation:

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

AC test circuit Figure 1



AC wave forms Figure 2 t_{pLH} , t_{pHL}

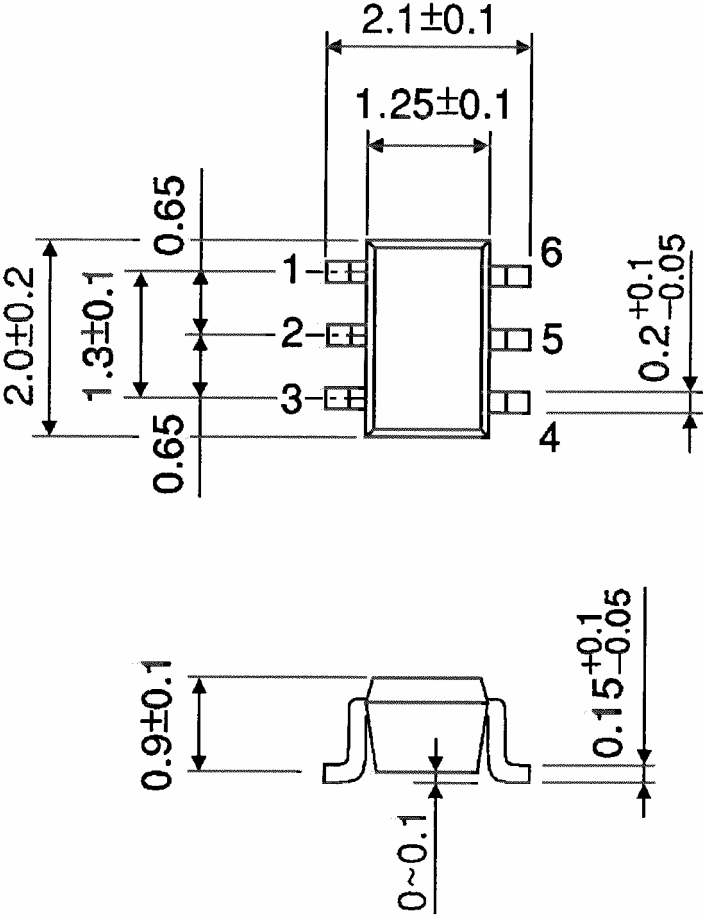


| Symbol | V_{CC} | | | |
|----------|-------------------------|-------------------------|--------------------------|-------------------------|
| | $3.3 \pm 0.3 \text{ V}$ | $2.5 \pm 0.2 \text{ V}$ | $1.8 \pm 0.15 \text{ V}$ | $1.5 \pm 0.1 \text{ V}$ |
| V_{IH} | 2.7 V | V_{CC} | V_{CC} | V_{CC} |
| V_M | 1.5 V | $V_{CC}/2$ | $V_{CC}/2$ | $V_{CC}/2$ |

Package Dimensions

SSOP6-P-0.65A

Unit: mm



Weight: 0.0068 g (typ.)

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20070701-EN GENERAL

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