# TC40H242P/F
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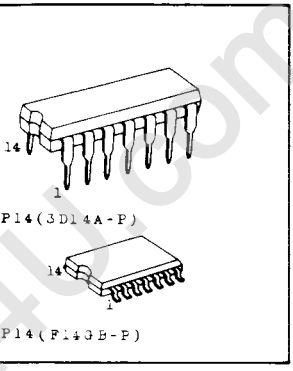
C²MOS DIGITAL INTEGRATED CIRCUIT
SILICON MONOLITHIC

QUAD BIDIRECTIONAL BUS BUFFER

TC40H242 INVERTED 3-STATE OUTPUTS
TC40H243 NONINVERTED 3-STATE OUTPUTS

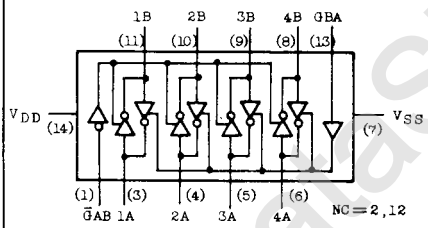



MAXIMUM RATINGS

| CHARACTERISTIC | SYMBOL | RATING | UNIT |
|---|---|---|---|
| Supply Voltage | $V_{DD}$ | $V_{SS}$-0.5 ∿ $V_{SS}$+10 | V |
| Input Voltage | $V_{IN}$ | $V_{SS}$-0.5 ∿ $V_{DD}$+0.5 | V |
| Output Voltage | $V_{OUT}$ | $V_{SS}$-0.5 ∿ $V_{SS}$+0.5 | V |
| Input Current | $I_{IN}$ | ±10 | mA |
| Power Dissipation | $P_D$ | 300(DIP)/180(MFP) | mW |
| Storage Temperature | $T_{stg}$ | -65 ∿ 150 | °C |
| Lead Temp./Time | $T_{sol}$ | 260°C • 10 sec | |

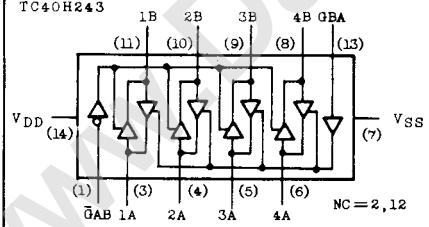
PIN CONNECTION AND TRUTH TABLE

TC40H242




| CONTROL INPUTS | | DATA PORT STATUS | | | | |
|---|---|---|---|---|---|---|
| ḠAB | GBA | A | | B | | |
| L | L | INPUT | L | OUTPUT | H | |
| | | | H | | L | |
| H | H | OUTPUT | L | INPUT | H | |
| | | | H | | L | |
| L | H | Don't use | | | | |
| H | L | High Impedance | | | | |

TC40H243




| CONTROL INPUTS | | DATA PORT STATUS | | | | |
|---|---|---|---|---|---|---|
| ḠAB | GBA | A | | B | | |
| L | L | INPUT | L | OUTPUT | L | |
| | | | H | | H | |
| H | H | OUTPUT | L | INPUT | L | |
| | | | H | | H | |
| L | H | Don't use | | | | |
| H | L | High Impedance | | | | |

RECOMMENDED OPERATING CONDITIONS

| CHARACTERISTIC | SYMBOL | TEST CONDITION | MIN. | TYP. | MAX. | UNIT |
|---|---|---|---|---|---|---|
| Supply Voltage | $V_{DD}$ | — | 2.0 | - | 8.0 | V |
| Input Voltage | $V_{IN}$ | — | 0 | - | $V_{DD}$ | V |
| Operating Temperature | $T_{opr}$ | — | -40 | - | 85 | °C |

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ELECTRICAL CHARACTERISTICS ($V_{SS}$=0V)

| CHARACTERISTIC | | SYMBOL | TEST CONDITION | $V_{DD}$ (V) | -40°C | | 25°C | | | 85°C | | UNIT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | MIN. | MAX. | MIN. | TYP. | MAX. | MIN. | MAX. | |
| High Level Output Voltage | | $V_{OH}$ | $\|I_{OUT}\|$<1μA $V_{IN}$=$V_{SS}$,$V_{DD}$ | 5 | 4.95 | - | 4.95 | 5.0 | - | 4.95 | - | V |
| Low Level Output Voltage | | $V_{OL}$ | $\|I_{OUT}\|$<1μA $V_{IN}$=$V_{SS}$,$V_{DD}$ | 5 | - | 0.05 | - | 0.0 | 0.05 | - | 0.05 | V |
| High Level Output Current | | $I_{OH}$ | $V_{OUT}$=4.6V $V_{IN}$=$V_{SS}$,$V_{DD}$ | 5 | -0.95 | - | -0.88 | - | - | -0.8 | - | mA |
| High Level Output Current | | $I_{OL}$ | $V_{OUT}$=0.4V $V_{IN}$=$V_{SS}$,$V_{DD}$ | 5 | 4.7 | - | 4.4 | - | - | 4.0 | - | mA |
| Input Voltage | "H" Level | $V_{IH}$ | $\|I_{OUT}\|$<1μA $V_{OUT}$=0.5V $V_{OUT}$=4.5V | 5 | 4.0 | - | 4.0 | - | - | 4.0 | - | V |
| | "L" Level | $V_{IL}$ | | 5 | - | 1.0 | - | - | 1.0 | - | 1.0 | V |
| Input Current | "H" Level | $I_{IH}$ | $V_{IN}$=8.0V | 8 | - | 0.5 | - | $10^{-4}$ | 0.5 | - | 5 | μA |
| | "L" Level | $I_{IL}$ | $V_{IN}$=0.0V | 8 | - | -0.5 | - | $-10^{-4}$ | -0.5 | - | -5 | μA |
| Output Disable Current | "H" Level | $I_{DH}$ | $V_{DH}$=8.0V | 8 | - | 0.5 | - | $10^{-4}$ | 0.5 | - | 5 | μA |
| | "L" Level | $I_{DL}$ | $V_{DL}$=0.0V | 8 | - | -0.5 | - | $-10^{-4}$ | -0.5 | - | -5 | μA |
| Quiescent Supply Current | | $I_{DD}$ | *$V_{IN}$=$V_{SS}$,$V_{DD}$ | 5 | - | 5.0 | - | 0.005 | 5.0 | - | 25 | μA |

*All valid input combinations.

SWITCHING CHARACTERISTICS (Ta=25°C, $V_{SS}$=0V, $V_{DD}$=5V, $C_L$=50pF, $R_L$=1kΩ)

| CHARACTERISTIC | | SYMBOL | TEST CONDITION | TC40H242 | | | TC40H243 | | | UNIT |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | MIN. | TYP. | MAX. | MIN. | TYP. | MAX. | |
| Output Rise Time | | $t_{or}$ | Fig. 1 | - | 15 | 30 | - | 15 | 30 | ns |
| Output Fall Time | | $t_{of}$ | | - | 14 | 30 | - | 14 | 30 | ns |
| Propagation Delay Time | (Low-High) | $t_{pLH}$ | Fig. 1 | - | 23 | 35 | - | 22 | 35 | ns |
| | (High-Low) | $t_{pHL}$ | | - | 26 | 39 | - | 25 | 39 | ns |
| Output Disable Time | "H" Level | $t_{pHZ}$ | Fig. 3 | - | 32 | 48 | - | 32 | 48 | ns |
| | "L" Level | $t_{pLZ}$ | Fig. 2 | - | 29 | 44 | - | 29 | 44 | ns |
| Output Enable Time | "H" Level | $t_{pZH}$ | Fig. 3 | - | 29 | 44 | - | 29 | 44 | ns |
| | "L" Level | $t_{pZL}$ | Fig. 2 | - | 32 | 48 | - | 32 | 48 | ns |
| Input Capacitance | | $C_{IN}$ | | - | 5 | | - | 5 | | pF |
| Output Capacitance | | $C_{OUT}$ | | - | 19 | | - | 19 | | pF |

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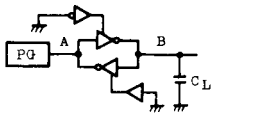
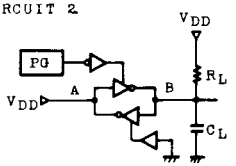
## SWITCHING TIME TEST CIRCUIT AND WAVEFORM

TC40H242

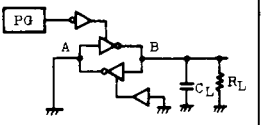
CIRCUIT 1.

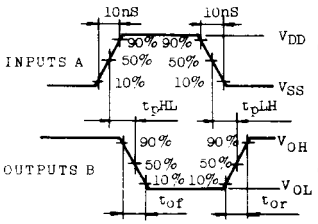


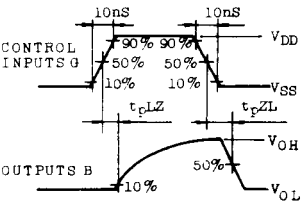

CIRCUIT 2.

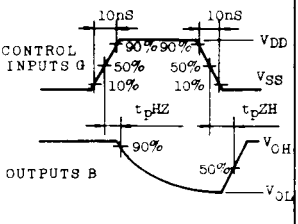



CIRCUIT 3.



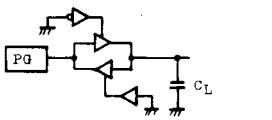



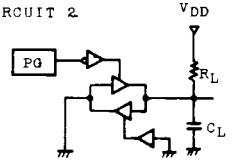




TC40H243

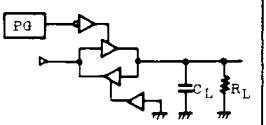
CIRCUIT 1.

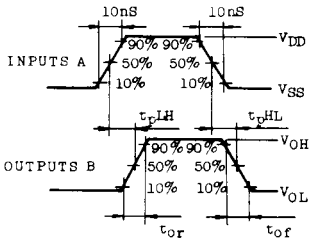


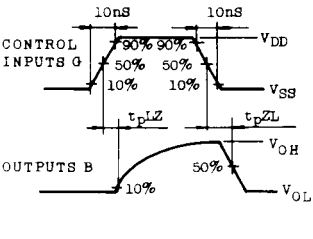

CIRCUIT 2.

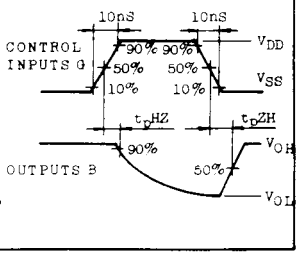



CIRCUIT 3.



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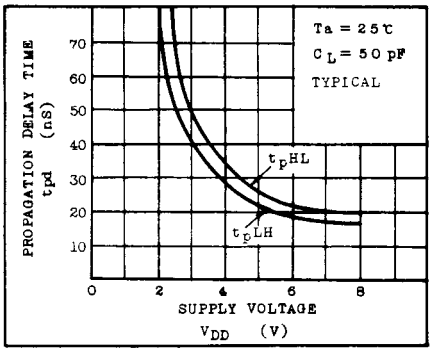
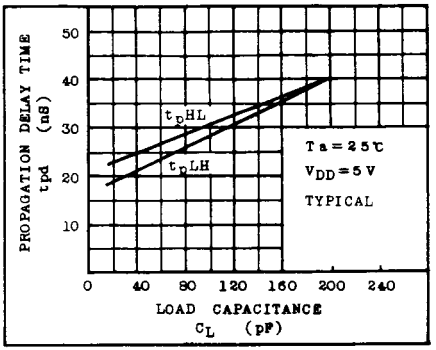
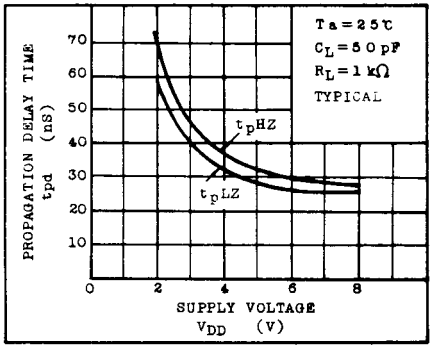
$t_{pd}$ - $V_{DD}$



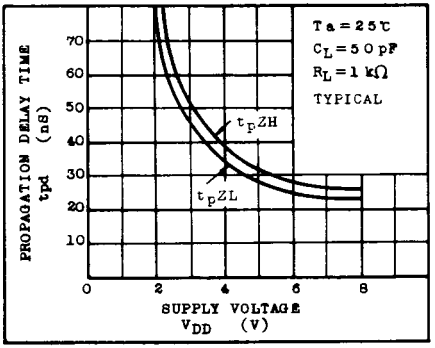

$t_{pd}$ - $C_L$



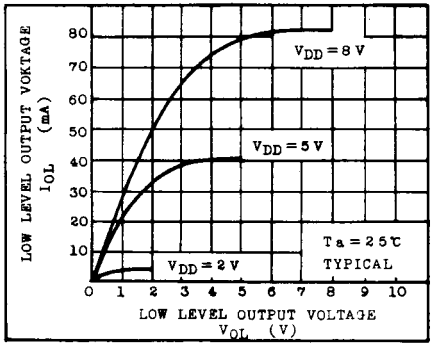

$t_{pd}$ - $V_{DD}$




$t_{pd}$ - $V_{DD}$




$I_{OL}$ - $V_{OL}$




$I_{OH}$ - ($V_{DD}$ - $V_{OH}$)