

CMOS DIGITAL INTEGRATED CIRCUIT  
SILICON MONOLITHIC

## TC40H155P/F

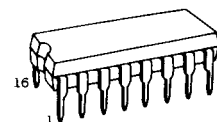
## TC40H155 DUAL 2-TO-4-LINE DECODER/DEMULTIPLEXER

The TC40H155 is a dual decoder/demultiplexer.

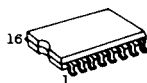
When STROBE="L", arbitrary one of four outputs can be selected by two common binary inputs A and B. The selected output goes to "L" level.

When the STROBE is set to "H" level, the output selection is inhibited, all the outputs go to "H" level regardless of other input signals.

Further, the TC40H155 can be used as 3-to-8-line decoder or 1-to-8-line demultiplexer by a combination of each input.



DIP16 (3D16A-P)

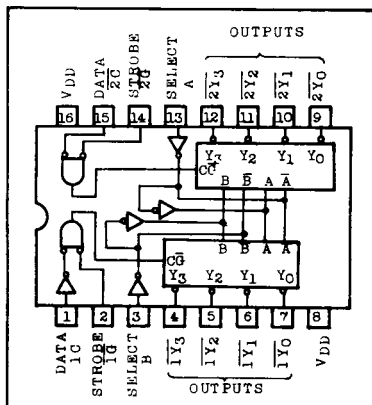


MFP16 (F16GC-P)

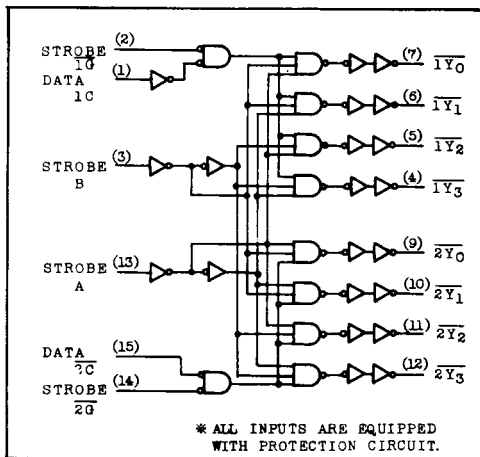
## MAXIMUM RATING

| CHARACTERISTIC      | SYMBOL           | RATING                                      | UNIT |
|---------------------|------------------|---------------------------------------------|------|
| Supply Voltage      | V <sub>DD</sub>  | V <sub>SS</sub> -0.5 ~ V <sub>SS</sub> +10  | V    |
| Input Voltage       | V <sub>IN</sub>  | V <sub>SS</sub> -0.5 ~ V <sub>DD</sub> +0.5 | V    |
| Output Voltage      | V <sub>OUT</sub> | V <sub>SS</sub> -0.5 ~ V <sub>DD</sub> +0.5 | V    |
| Input Current       | I <sub>IN</sub>  | ±10                                         | mA   |
| Power Dissipation   | P <sub>d</sub>   | 300 (DIP) / 180 (MFP)                       | mW   |
| Storage Temperature | T <sub>stg</sub> | -65 ~ 150                                   | °C   |
| Lead Temp./Time     | T <sub>sol</sub> | 260°C • 10 sec                              |      |

## PIN CONNECTION



## LOGIC DIAGRAM

RECOMMENDED OPERATING CONDITIONS (V<sub>SS</sub>=0.0V)

| CHARACTERISTIC        | SYMBOL           | MIN. | TYP. | MAX.            | UNIT |
|-----------------------|------------------|------|------|-----------------|------|
| Supply Voltage        | V <sub>DD</sub>  | 2.0  | -    | 8.0             | V    |
| Input Voltage         | V <sub>IN</sub>  | 0    | -    | V <sub>DD</sub> | V    |
| Operating Temperature | T <sub>opr</sub> | -40  | -    | 85              | °C   |

## TC40H155P/F

TRUTH TABLE 1. 2-TO-4-LINE DECODER or 1-TO-4-LINE DEMULTIPLEXER

| INPUTS |      |        |                 | OUTPUTS          |                  |                  |                  |
|--------|------|--------|-----------------|------------------|------------------|------------------|------------------|
| SELECT | DATA | STROBE |                 | $\overline{1Y0}$ | $\overline{1Y1}$ | $\overline{1Y2}$ | $\overline{1Y3}$ |
| A      | B    | 1C     | $\overline{1G}$ |                  |                  |                  |                  |
| X      | X    | X      | H               | H                | H                | H                | H                |
| L      | L    | H      | L               | L                | H                | H                | H                |
| H      | L    | H      | L               | H                | L                | H                | H                |
| L      | H    | H      | L               | H                | H                | L                | H                |
| H      | H    | H      | L               | H                | H                | H                | L                |
| X      | X    | L      | X               | H                | H                | H                | H                |

| INPUTS |      |                 |                 | OUTPUTS          |                  |                  |                  |
|--------|------|-----------------|-----------------|------------------|------------------|------------------|------------------|
| SELECT | DATA | STROBE          |                 | $\overline{2Y0}$ | $\overline{2Y1}$ | $\overline{2Y2}$ | $\overline{2Y3}$ |
| A      | B    | $\overline{2C}$ | $\overline{2G}$ |                  |                  |                  |                  |
| X      | X    | X               | H               | H                | H                | H                | H                |
| L      | L    | L               | L               | L                | H                | H                | H                |
| H      | L    | L               | L               | H                | L                | H                | H                |
| L      | H    | L               | L               | H                | H                | L                | H                |
| H      | H    | L               | L               | H                | H                | H                | L                |
| X      | X    | H               | X               | H                | H                | H                | H                |

X=Don't care

TRUTH TABLE 2. 3-TO-8-LINE DECODER or 1-TO-8-LINE DEMULTIPLEXER

| INPUTS |      |        |      | OUTPUTS          |                  |                  |                  |                  |                  |                  |                  |
|--------|------|--------|------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|
| SELECT | DATA | STROBE |      | (0)              | (1)              | (2)              | (3)              | (4)              | (5)              | (6)              | (7)              |
| A      | B    | * C    | ** G | $\overline{2Y0}$ | $\overline{2Y1}$ | $\overline{2Y2}$ | $\overline{2Y3}$ | $\overline{1Y0}$ | $\overline{1Y1}$ | $\overline{1Y2}$ | $\overline{1Y3}$ |
| X      | X    | X      | H    | H                | H                | H                | H                | H                | H                | H                | H                |
| L      | L    | L      | L    | L                | H                | H                | H                | H                | H                | H                | H                |
| H      | L    | L      | L    | H                | L                | H                | H                | H                | H                | H                | H                |
| L      | H    | L      | L    | H                | H                | L                | H                | H                | H                | H                | H                |
| H      | H    | L      | L    | H                | H                | H                | L                | H                | H                | H                | H                |
| L      | L    | H      | L    | H                | H                | H                | H                | L                | H                | H                | H                |
| H      | L    | H      | L    | H                | H                | H                | H                | H                | L                | H                | H                |
| L      | H    | H      | L    | H                | H                | H                | H                | H                | L                | H                | H                |
| H      | H    | H      | L    | H                | H                | H                | H                | H                | H                | L                | H                |

\* C=1C+ $\overline{2C}$  \*\* G=1G+ $\overline{2G}$  X=Don't CareELECTRICAL CHARACTERISTICS ( $V_{SS}=0.0V$ )

| CHARACTERISTIC            | SYMBOL                | TEST CONDITION                                  | $V_{DD}$<br>(V) | -40°C |      | 25°C  |            |      | 85°C  |      | UNIT    |
|---------------------------|-----------------------|-------------------------------------------------|-----------------|-------|------|-------|------------|------|-------|------|---------|
|                           |                       |                                                 |                 | MIN.  | MAX. | MIN.  | TYP.       | MAX. | MIN.  | MAX. |         |
| High Level Output Voltage | $V_{OH}$              | $ I_{OUT}  < 1\mu A$<br>$V_{IN}=V_{SS}, V_{DD}$ | 5               | 4.95  | -    | 4.95  | 5.0        | -    | 4.95  | -    | V       |
| Low Level Output Voltage  | $V_{OL}$              | $ I_{OUT}  < 1\mu A$<br>$V_{IN}=V_{SS}, V_{DD}$ | 5               | -     | 0.05 | -     | 0.0        | 0.05 | -     | 0.05 |         |
| High Level Output Current | $I_{OH}$              | $V_{OH}=4.6V$<br>$V_{IN}=V_{SS}, V_{DD}$        | 5               | -0.52 | -    | -0.44 |            | -    | -0.36 | -    | mA      |
| Low Level Output Current  | $I_{OL}$              | $V_{OL}=0.4V$<br>$V_{IN}=V_{SS}, V_{DD}$        | 5               | 1.4   | -    | 1.1   |            | -    | 0.8   | -    |         |
| Input Voltage             | "H" Level<br>$V_{IH}$ | $ I_{OUT}  < 1\mu A$<br>$V_{OUT}=0.5V$          | 5               | 4.0   | -    | 4.0   |            | -    | 4.0   | -    | V       |
|                           | "L" Level<br>$V_{IL}$ | $V_{OUT}=4.5V$                                  | 5               | -     | 1.0  | -     |            | 1.0  | -     | 1.0  |         |
| Input Current             | "H" Level<br>$I_{IH}$ | $V_{IH}=8.0V$                                   | 8               | -     | 0.3  | -     | $10^{-5}$  | 0.3  | -     | 1.0  | $\mu A$ |
|                           | "L" Level<br>$I_{IL}$ | $V_{IL}=0.0V$                                   | 8               | -     | -0.3 | -     | $-10^{-5}$ | -0.5 | -     | -1.0 |         |
| Quiescent Supply Current  | $I_{DD}$              | $*V_{IN}=V_{SS}, V_{DD}$                        |                 | -     | 12.5 | -     | $10^{-3}$  | 12.5 | -     | 75   | $\mu A$ |

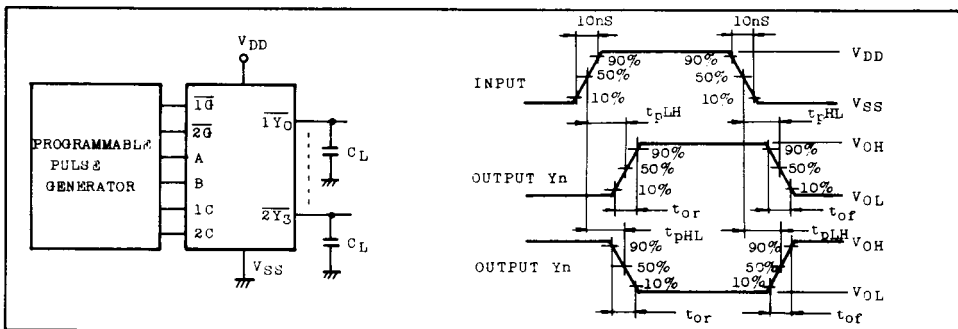
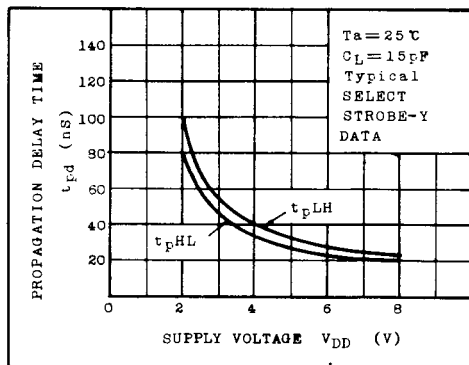
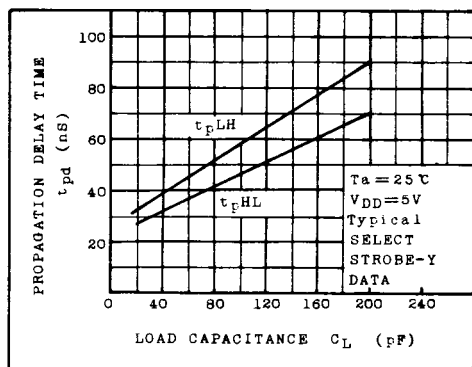
\* All valid input combinations.

## TC40H155P/F

SWITCHING CHARACTERISTIC ( $T_a=25^\circ\text{C}$ ,  $V_{SS}=0\text{V}$ ,  $V_{DD}=5\text{V}$ ,  $C_L=15\text{pF}$ )

| CHARACTERISTIC         |            | SYMBOL    | TEST CONDITION                                       | MIN. | TYP. | MAX. | UNIT |
|------------------------|------------|-----------|------------------------------------------------------|------|------|------|------|
| Output Rise Time       |            | $t_{or}$  |                                                      | -    | 17   | 35   | ns   |
| Output Fall Time       |            | $t_{of}$  |                                                      | -    | 14   | 30   |      |
| Propagation Delay Time | (Low-High) | $t_{pLH}$ | SELECT A - $\bar{Y}$<br>SELECT B - $\bar{Y}$         | -    | 32   | 48   | ns   |
|                        | (High-Low) | $t_{pHL}$ |                                                      | -    | 28   | 42   |      |
| Propagation Delay Time | (Low-High) | $t_{pLH}$ | STROBE $\bar{1G} - \bar{Y}$<br>STROBE $2C - \bar{Y}$ | -    | 30   | 46   | ns   |
|                        | (High-Low) | $t_{pHL}$ |                                                      | -    | 26   | 42   |      |
| Propagation Delay Time | (Low-High) | $t_{pLH}$ | DATA $1C - \bar{Y}$                                  | -    | 30   | 46   | ns   |
|                        | (High-Low) | $t_{pHL}$ |                                                      | -    | 26   | 42   |      |
| Propagation Delay Time | (Low-High) | $t_{pLH}$ | DATA $2C - \bar{Y}$                                  | -    | 30   | 46   | ns   |
|                        | (High-Low) | $t_{pHL}$ |                                                      | -    | 26   | 42   |      |
| Input Capacitance      |            | $C_{IN}$  |                                                      | -    | 5    | -    | pF   |

## SWITCHING TIME TEST CIRCUIT AND WAVEFORM

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

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