

1M BIT (128K WORD x 8 BIT) CMOS MASK ROM  
SILICON GATE CMOS

## DESCRIPTION

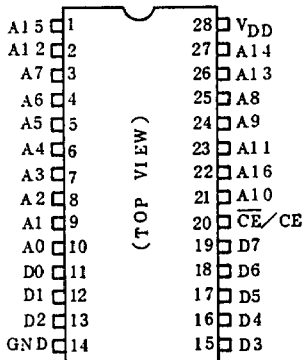
The TC531000CP/CF is a 1,048,576 bits read only memory organized as 131,072 words by 8 bits with a low bit cost, thus being suitable for use in program memory of micro-processor, especially character generator. The TC531000CP/CF using CMOS technology is most suitable for low power applications where battery operation are required. The TC531000CP/CF has one chip enable input  $\overline{CE}/CE$ , programmable for device selection.

## FEATURES

| TC531000CP/CF                                 | 120ns<br>Version | 150ns<br>Version |
|-----------------------------------------------|------------------|------------------|
| Access Time (max.)                            | 120ns            | 150ns            |
| Power Dissipation<br>Operation Current (max.) | 40mA             | 35mA             |
| Power Dissipation<br>Standby Current (max.)   | 20μA             | 20μA             |

- Single 5V Power Supply
- All Inputs and Outputs: TTL Compatible
- Three State Outputs
- Fully Static Operation
- Programmable Chip Enable
- Package
  - Plastic DIP: TC531000CP
  - Plastic FP : TC531000CF

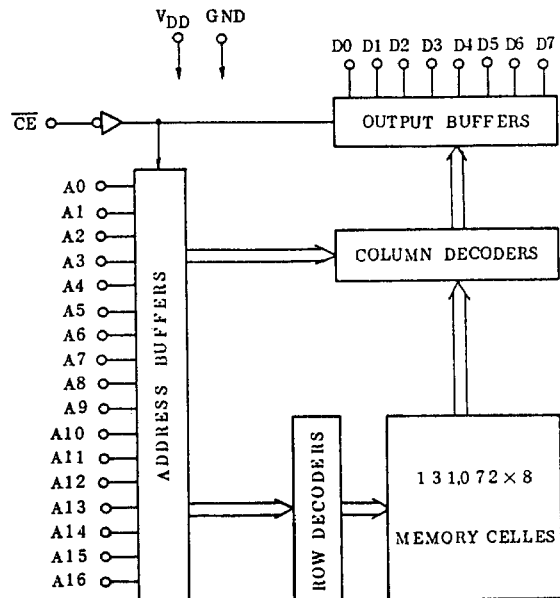
## PIN CONNECTION



## PIN NAMES

|                    |                   |
|--------------------|-------------------|
| A0 ~ A16           | Address Inputs    |
| D0 ~ D7            | Data Outputs      |
| $\overline{CE}/CE$ | Chip Enable Input |
| VDD                | Power Supply      |
| GND                | Ground            |

## BLOCK DIAGRAM



# TC531000CP/CF-12/15

## MAXIMUM RATINGS

| SYMBOL       | ITEM                         | RATING          | UNIT   |
|--------------|------------------------------|-----------------|--------|
| $V_{DD}$     | Power Supply Voltage         | -0.5 ~ 7.0      | V      |
| $V_{IN}$     | Input Voltage                | -0.5 ~ $V_{DD}$ |        |
| $V_{OUT}$    | Output Voltage               | 0 ~ $V_{DD}$    |        |
| $P_D$        | Power Dissipation            | 1.0/0.6 *       | W      |
| $T_{STG}$    | Storage Temperature          | -55 ~ 150       | °C     |
| $T_{OPR}$    | Operating Temperature        | -40 ~ 70        |        |
| $T_{SOLDER}$ | Soldering Temperature • Time | 260 • 10        | °C•sec |

Note: \* Plastic FP

## DC OPERATING CONDITIONS ( $T_a = -40 \sim 70^\circ\text{C}$ )

| SYMBOL   | PARAMETER            | MIN. | TYP. | MAX.         | UNIT |
|----------|----------------------|------|------|--------------|------|
| $V_{DD}$ | Power Supply Voltage | 4.5  | 5.0  | 5.5          | V    |
| $V_{IH}$ | Input High Voltage   | 2.2  | -    | $V_{DD}+0.3$ |      |
| $V_{IL}$ | Input Low Voltage    | -0.3 | -    | 0.8          |      |

## DC and OPERATING CHARACTERISTICS ( $T_a = -40 \sim 70^\circ\text{C}$ , $V_{DD} = 5V \pm 10\%$ )

| SYMBOL            | PARAMETER              | CONDITIONS                                                 |                           | MIN. | MAX. | UNIT |
|-------------------|------------------------|------------------------------------------------------------|---------------------------|------|------|------|
| I <sub>IL</sub>   | Input Leakage Current  | V <sub>IN</sub> =0 ~ V <sub>DD</sub>                       |                           | -    | ±1.0 | μA   |
| I <sub>LO</sub>   | Output Leakage Current | CE=V <sub>IH</sub> , V <sub>OUT</sub> =0 ~ V <sub>DD</sub> |                           | -    | ±5.0 |      |
| I <sub>OH</sub>   | Output High Current    | V <sub>OH</sub> =2.4V                                      |                           | -1.0 | -    | mA   |
| I <sub>OL</sub>   | Output Low Current     | V <sub>OL</sub> =0.4V                                      |                           | 3.2  | -    |      |
| I <sub>DDS1</sub> | Standby Current        | CE=0.8V (CE=2.2V)                                          |                           | -    | 2    | μA   |
| I <sub>DDS2</sub> | Standby Current        | CE=0.2V (CE=V <sub>DD</sub> -0.2V)                         |                           | -    | 20   |      |
| I <sub>DDO1</sub> | Operating Current      | V <sub>IN</sub> =V <sub>IH</sub> /V <sub>IL</sub>          | t <sub>cycle</sub> =120ns | -    | 50   | mA   |
|                   |                        | I <sub>OUT</sub> =0mA                                      | t <sub>cycle</sub> =150ns | -    | 45   |      |
| I <sub>DDO2</sub> |                        | V <sub>IN</sub> =V <sub>DD</sub> -0.2V/0.2V                | t <sub>cycle</sub> =120ns | -    | 40   |      |
|                   |                        | I <sub>OUT</sub> =0mA                                      | t <sub>cycle</sub> =150ns | -    | 35   |      |

## CAPACITANCE

| SYMBOL    | PARAMETER          | CONDITIONS                                   | MIN. | MAX. | UNIT |
|-----------|--------------------|----------------------------------------------|------|------|------|
| $C_{IN}$  | Input Capacitance  | $f = 1\text{MHz}$ , $T_a = 25^\circ\text{C}$ | -    | 10   | pF   |
| $C_{OUT}$ | Output Capacitance | $f = 1\text{MHz}$ , $T_a = 25^\circ\text{C}$ | -    | 10   |      |

Note: This parameter is periodically sampled and is not 100% tested.

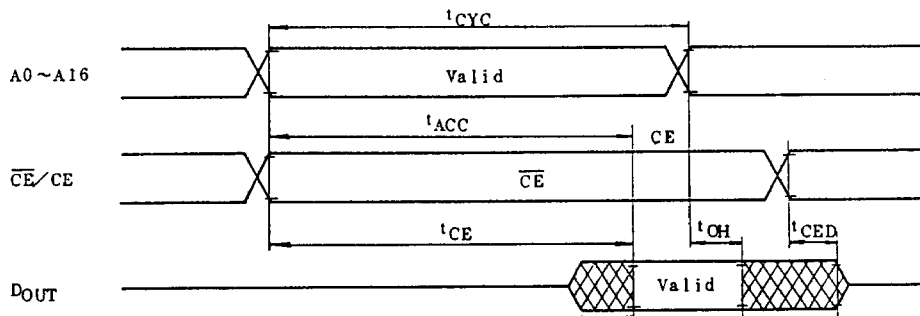
AC CHARACTERISTICS ( $V_{DD}=5V \pm 10\%$ ,  $T_a = -40 \sim 70^\circ C$ )

| SYMBOL      | PARAMETER               | 120ns Version |      | 150ns Version |      | UNIT |
|-------------|-------------------------|---------------|------|---------------|------|------|
|             |                         | MIN.          | MAX. | MIN.          | MAX. |      |
| $t_{cycle}$ | Cycle Time              | 120           | -    | 150           | -    | ns   |
| $t_{ACC}$   | Access Time             | -             | 120  | -             | 150  |      |
| $t_{CE}$    | Chip Enable Access Time | -             | 120  | -             | 150  |      |
| $t_{CED}$   | Output Disable Time     | -             | 50   | -             | 50   |      |
| $t_{OH}$    | Output Hold Time        | 5             | -    | 5             | -    |      |

AC TEST CONDITION

- Output Load : 100pF + 1TTL
- Input Levels : 0.6V, 2.4V
- Timing Measurement Reference Levels
  - Input : 0.8V, 2.2V
  - Output: 0.8V, 2.0V
- Input Rise and Fall Time : 5ns

TIMING WAVEFORMS



OPERATING MODE

| MODE    | $\overline{CE}(CE)$ | $A0 \sim 16$ | Outputs  | Power     |
|---------|---------------------|--------------|----------|-----------|
| Read    | L(H)                | Valid        | Data Out | Operating |
| Standby | H(L)                | *            | High-Z   | Standby   |

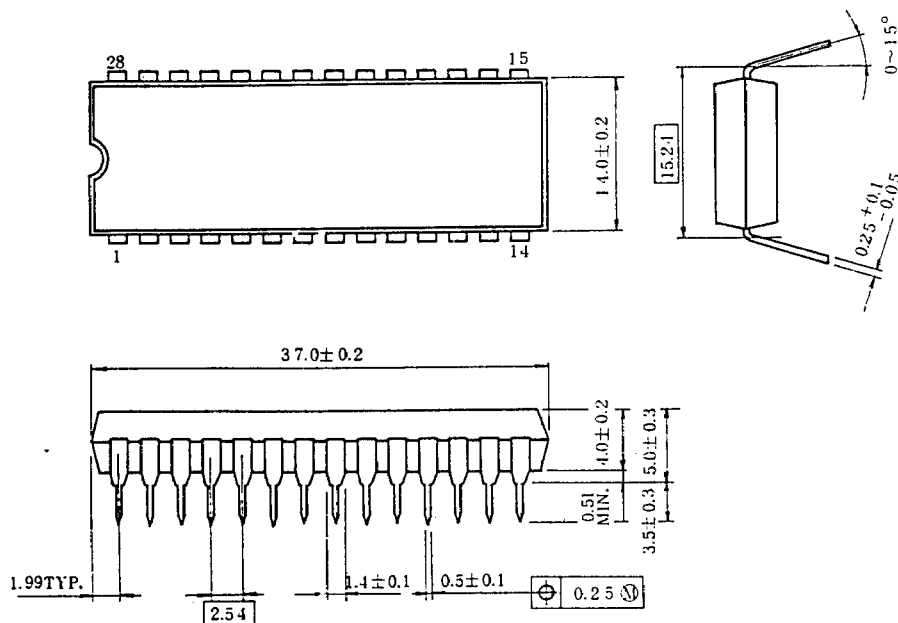
H:  $V_{IH}$ , L:  $V_{IL}$ , \*:  $V_{IH}$  or  $V_{IL}$

# TC531000CP/CF-12/15

## OUTLINE DRAWINGS

Plastic DIP (DIP28-P-600)

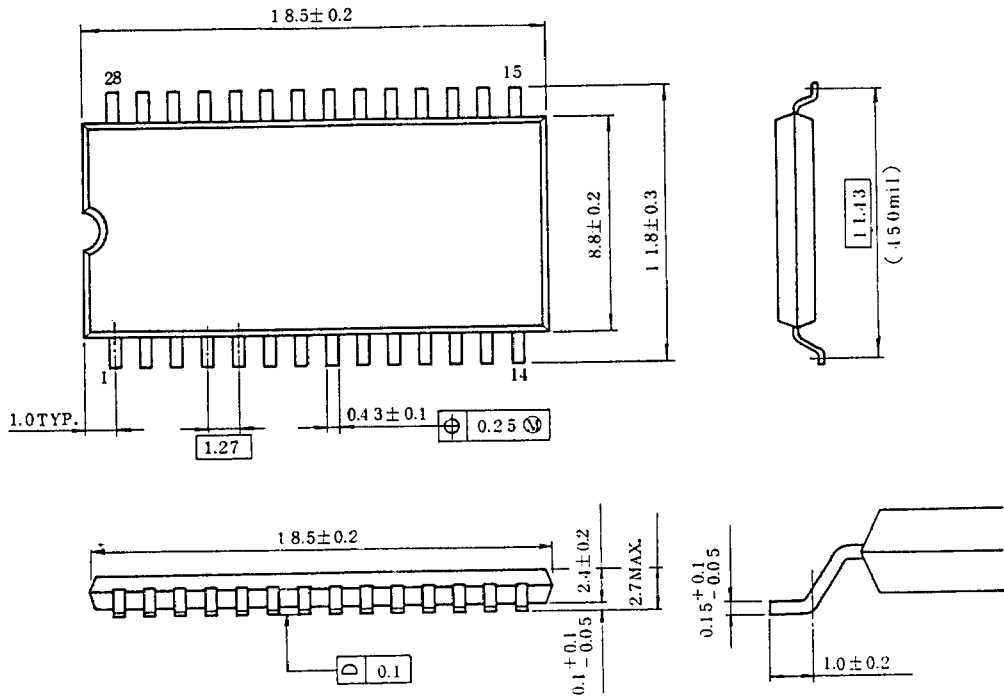
Unit in mm



Note: Package width and length do not include mold protrusion, allowable mold protrusion is 0.15mm.

Plastic FP (SOP28-P-450)

unit in mm



Note: Package width and length do not include mold protrusion, allowable mold protrusion is 0.15mm.