1M BIT (65,536 WORD × 16 BIT) CMOS MASK ROM

## DESCRIPTION

The TC531024P/F is a 1,048,576 bits read only memory organized as 65,536 words by 16 bits.

The TC531024P/F is fabricated using Toshiba's advanced CMOS technology which provides the high speed and low power features with access time of 120ns/150ns, an operation current of 40mA at 8.3MHz and a standby current of 20μA.

The TC531024P/F is packaged in a standard 600mil 40pin DIP, or 525mil 40pin SOP.

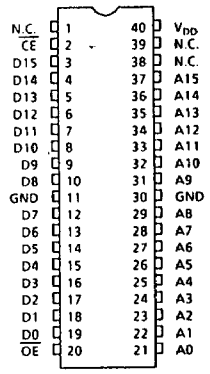
## FEATURES

| TC531024P/F | -12 | -15 |
|---|---|---|
| Power Supply | 5V ± 5% | 5V ± 10% |
| Access Time (Max.) | 120ns | 150ns |
| Power Dissipation : Operating Current (Max.) | 40mA | 35mA |
| Power Dissipation : Standby Current (Max.) | 20μA | 20μA |

- Single 5V Power Supply
- Fully Static Operation
- All Input and Output : TTL Compatible
- Three State Output
- 40pin 600mil width Plastic DIP
- 40pin 525mil width Plastic SOP

## PIN CONNECTION

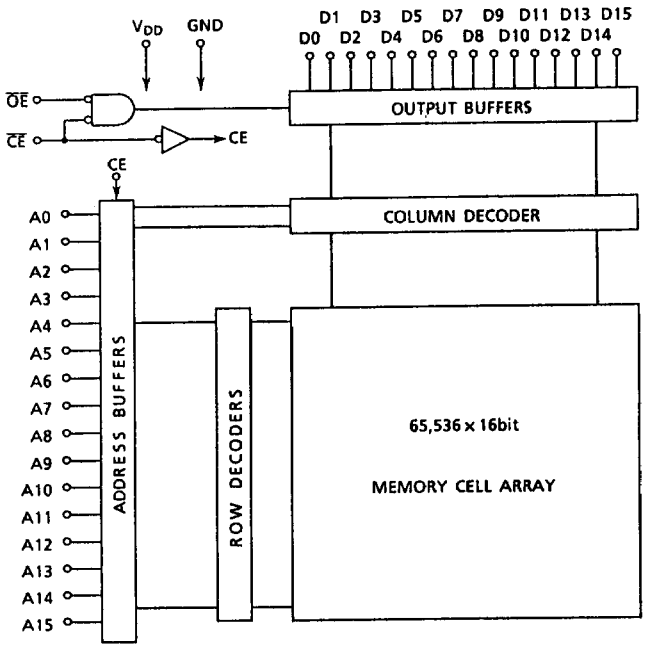
(TOP VIEW)




## PIN NAMES

| | |
|---|---|
| A0~A15 | Address inputs |
| D0~D15 | Data Outputs |
| $\overline{OE}$ | Output Enable Input |
| $\overline{CE}$ | Chip Enable Input |
| $V_{DD}$ | Power Supply |
| GND | Ground |
| N.C. | No Connection |

## BLOCK DIAGRAM



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 |
| $V_{OUT}$ | Output Voltage | 0~$V_{DD}$ | V |
| $P_D$ | Power Dissipation | 1.0/0.6* | W |
| $T_{STG}$ | Storage Temperature | −55~150 | °C |
| $T_{OPR}$ | Operating Temperature | 0~70 | °C |
| $T_{SOLDER}$ | Soldering Temperature · Time | 260 · 10 | °C · sec |

Note : * Plastic FP.

D.C. OPERATING CONDITIONS (Ta = 0~70°C)

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

D.C. OPERATING CHARACTERISTICS (Ta = 0~70°C, $V_{DD}$ = 5V ± 10%)

| SYMBOL | PARAMETER | CONDITIONS | | MIN. | MAX. | UNIT |
|---|---|---|---|---|---|---|
| $I_{IL}$ | Input Leakage Current | $0V \leq V_{IN} \leq V_{DD}$ | | − | ±1.0 | μA |
| $I_{LO}$ | Output Leakage Current | $0V \leq V_{OUT} \leq V_{DD}$ | | − | ±5.0 | |
| $I_{OH}$ | Output High Current | $V_{OH}$ = 2.4V | | −1.0 | − | mA |
| $I_{OL}$ | Output Low Current | $V_{OL}$ = 0.4V | | 3.2 | − | |
| $I_{DDS1}$ | Standby Current | $\overline{CE}$ = 2.2V | | − | 2.0 | |
| $I_{DDS2}$ | | $\overline{CE}$ = $V_{DD}$ − 0.2V | | − | 20 | μA |
| $I_{DDO1}$ | Operating Current | $\overline{CE}$ = $V_{IL}$, $V_{IN}$ = $V_{IH}$ / $V_{IL}$, $I_{OUT}$ = 0mA | $t_{cycle}$ = 120ns | − | 50 | mA |
| | | | $t_{cycle}$ = 150ns | − | 45 | |
| $I_{DDO2}$ | | $\overline{CE}$ = 0.2V, $V_{IN}$ = $V_{DD}$ − 0.2V / 0.2V, $I_{OUT}$ = 0mA | $t_{cycle}$ = 120ns | − | 40 | |
| | | | $t_{cycle}$ = 150ns | − | 35 | |

CAPACITANCE

| SYMBOL | PARAMETER | CONDITIONS | MIN. | MAX. | UNIT |
|---|---|---|---|---|---|
| $C_{IN}$ | Input Capacitance | f = 1MHz, Ta = 25°C | − | 10 | pF |
| $C_{OUT}$ | Output Capacitance | f = 1MHz, Ta = 25°C | − | 10 | pF |

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

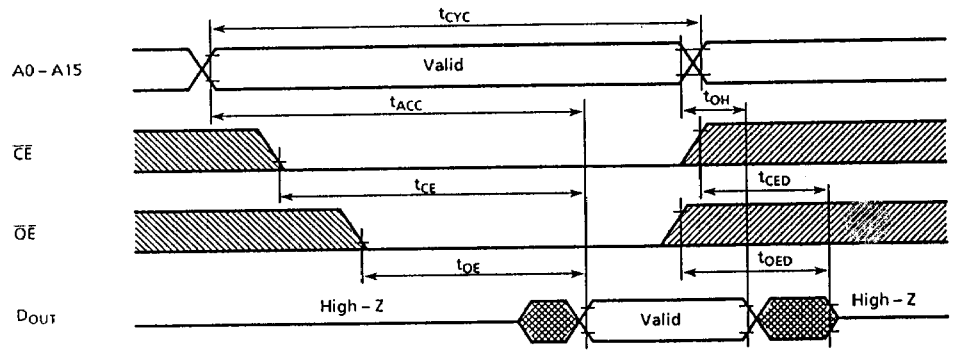
## A.C. CHARACTERISTICS (Ta = 0°C~70°C)

| SYMBOL | PARAMETER | $V_{DD}$ = 5V ± 5% | | $V_{DD}$ = 5V ± 10% | | UNIT |
|---|---|---|---|---|---|---|
| | | MIN. | MAX. | MIN. | MAX. | |
| $t_{ACC}$ | Access Time | – | 120 | – | 150 | ns |
| $t_{CE}$ | Chip Enable Access Time | – | 120 | – | 150 | ns |
| $t_{OE}$ | Output Enable Access Time | – | 70 | – | 70 | ns |
| $t_{CED}$ | Output Disable Time from $\overline{CE}$ | 0 | 60 | 0 | 60 | ns |
| $t_{OED}$ | Output Disable Time from $\overline{OE}$ | 0 | 60 | 0 | 60 | ns |
| $t_{OH}$ | Output Hold Time | 5 | – | 5 | – | ns |
| $t_{CYC}$ | Cycle Time | 120 | – | 150 | – | ns |

## A.C. TEST CONDITIONS

| | | |
|---|---|---|
| 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 (10%~90%) | | : 5ns |

## TIMING WAVEFORMS




## OPERATION MODE

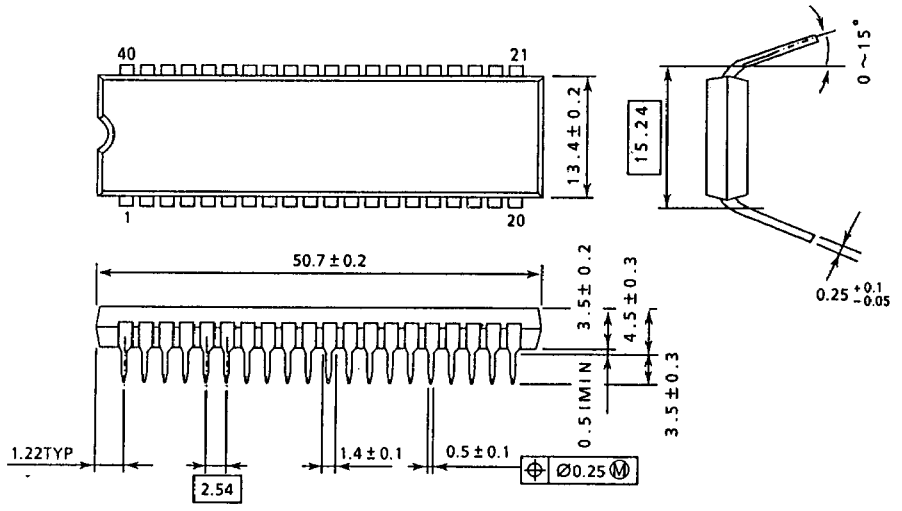
| MODE | $\overline{CE}$ | $\overline{OE}$ | A0~A15 | Outputs | Power |
|---|---|---|---|---|---|
| Read | L | L | Valid | Data Out | Operating |
| Standby | H | * | * | High-Z | Standby |
| Output Deselect | L | H | * | High-Z | Operating |

H : VIH  L : VIL  * : VIH or VIL

## OUTLINE DRAWINGS

Plastic DIP ( DIP40–P–600 )

単位 : mm

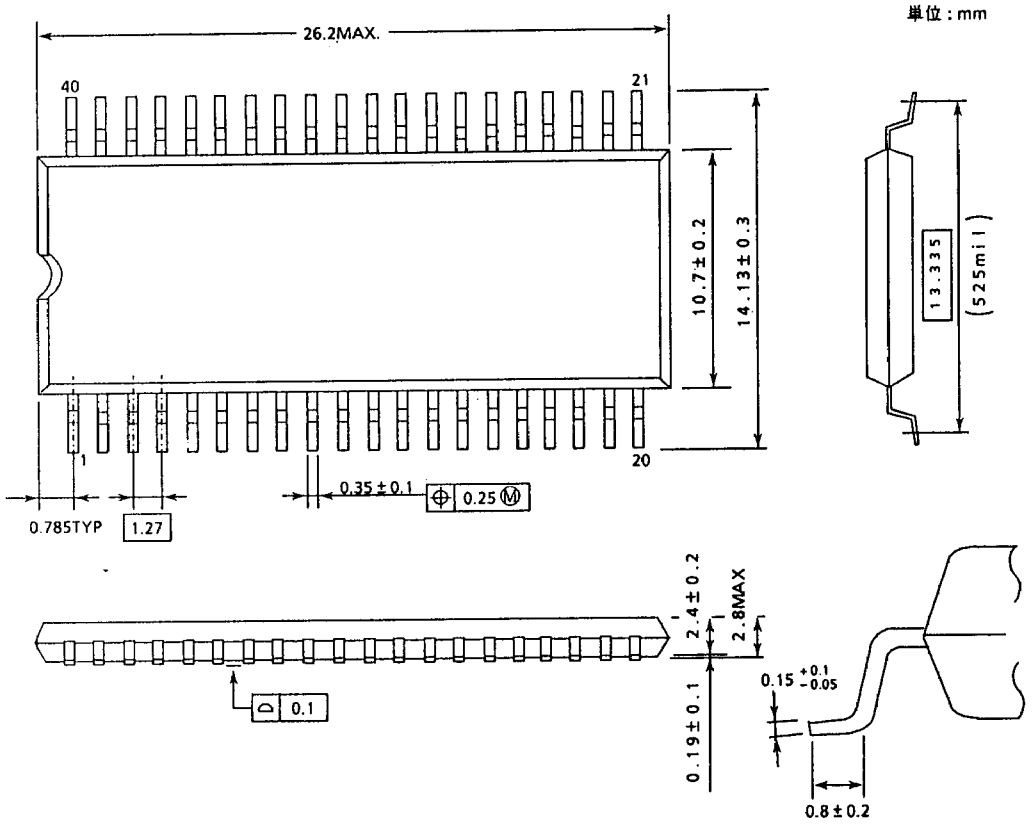



Note : Package width and length do not include mold protrusion, allowable mold protrusion is 0.15mm.

## OUTLINE DRAWINGS

Plastic FP (SOP40-P-525)

単位：mm




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