FEDR27V401E-02-02

# OKI Semiconductor

This version : Sep. 2001
Previous version: Jan. 2001

# MR27V401E

**524,288-Word × 8-Bit Production Programmed Read Only Memory (P2ROM)**

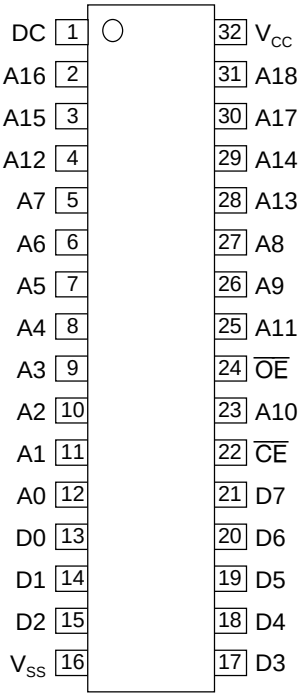
## GENERAL DESCRIPTION

The MR27V401E is a 4 Mbit Production Programmed Read-Only Memory (P2ROM ) organaized as 524,288-word × 8-bit. The MR27V401E supports high speed asynchronous read operation using a single 3.3V power supply.

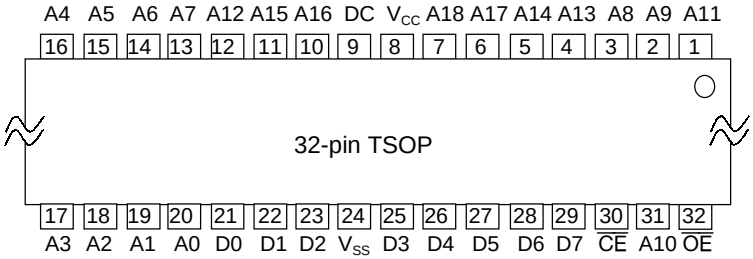
## FEATURES

· 524,288-word × 8-bit
· +3.3 V power supply
· Access time 70 nS MAX
· Operating current 25 mA MAX
· Standby current 50 µA MAX
· Input/Output TTL compatible
· Three-state output
· Packages:
32-pin plastic SOP (SOP32-P-525-1.27-K) (Product Name : MR27V401E-xxxMA)
32-pin plastic TSOP (TSOP(1)32-P-814-0.50-K) (Product Name : MR27V401E-xxxTA)

## PIN CONFIGURATION (TOP VIEW)



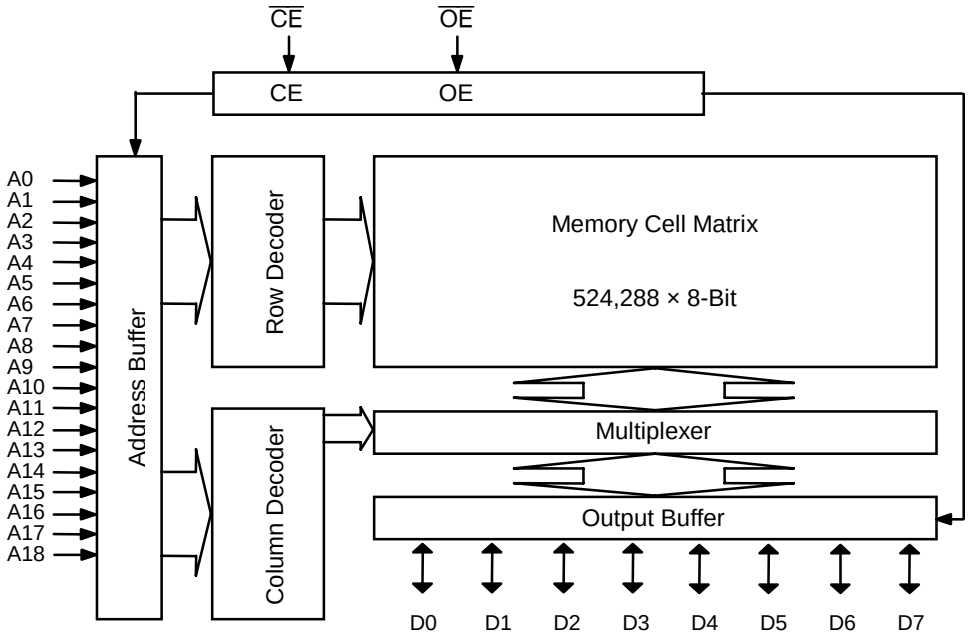

32-pin SOP




| Pin name | Functions |
|---|---|
| A0 to A18 | Address input |
| D0 to D7 | Data output |
| $\overline{CE}$ | Chip enable |
| $\overline{OE}$ | Output enable |
| $V_{CC}$ | Power supply voltage |
| $V_{SS}$ | GND |
| DC | Don't Care* |

* : Logical input level is ignored, However the pin is connected to internal circuit.

## BLOCK DIAGRAM




## FUNCTION TABLE

| Mode | $\overline{CE}$ | $\overline{OE}$ | DC | $V_{CC}$ | D0 to D7 |
|---|---|---|---|---|---|
| Read (16-Bit) | L | L | ** | 3.3 V | $D_{OUT}$ |
| Output disable | L | H | | | Hi–Z |
| Standby | H | * | | | Hi–Z |

*: Don’t Care (H or L)
**: Don’t Care (H or L or OPEN)

## ABSOLUTE MAXIMUM RATINGS

| Parameter | Symbol | Condition | Value | Unit |
|---|---|---|---|---|
| Operating temperature under bias | Ta | — | 0 to 70 | °C |
| Storage temperature | Tstg | | –55 to 125 | °C |
| Input voltage | $V_I$ | relative to $V_{SS}$ | –0.5 to $V_{CC}$+0.5 | V |
| Output voltage | $V_O$ | | –0.5 to $V_{CC}$+0.5 | V |
| Power supply voltage | $V_{CC}$ | | –0.5 to 5 | V |
| Power dissipation per package | $P_D$ | — | 1.0 | W |

## RECOMMENDED OPERATING CONDITIONS

(Ta = 0 to 70°C)

| Parameter | Symbol | Condition | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $V_{CC}$ power supply voltage | $V_{CC}$ | $V_{CC}$ = 3.0 to 3.6 V | 3.0 | — | 3.6 | V |
| Input “H” level | $V_{IH}$ | | 2.2 | — | $V_{CC}$+0.5* | V |
| Input “L” level | $V_{IL}$ | | –0.5** | — | 0.6 | V |

Voltage is relative to $V_{SS}$.

* : Vcc+1.5V(Max.) when pulse width of overshoot is less than 10ns.

** : -1.5V(Min.) when pulse width of undershoot is less than 10ns.

## ELECTRICAL CHARACTERISTICS

### DC Characteristics

($V_{CC}$ = 3.3 V ± 0.3 V, Ta = 0 to 70°C)

| parameter | Symbol | Condition | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| Input leakage current | $I_{LI}$ | $V_I$ = 0 to $V_{CC}$ | — | — | 10 | µA |
| Output leakage current | $I_{LO}$ | $V_O$ = 0 to $V_{CC}$ | — | — | 10 | µA |
| $V_{CC}$ power supply current (Standby) | $I_{CCSC}$ | $\overline{CE}$ = $V_{CC}$ | — | — | 50 | µA |
| | $I_{CCST}$ | $\overline{CE}$ = $V_{IH}$ | — | — | 1 | mA |
| $V_{CC}$ power supply current (Read) | $I_{CCA}$ | $\overline{CE}$ = $V_{IL}$, $\overline{OE}$ = $V_{IH}$ tc = 70 ns | — | — | 25 | mA |
| Input "H" level | $V_{IH}$ | — | 2.2 | — | $V_{CC}$+0.5* | V |
| Input "L" level | $V_{IL}$ | — | –0.5** | — | 0.6 | V |
| Output "H" level | $V_{OH}$ | $I_{OH}$ = –400 µA | 2.4 | — | — | V |
| Output "L" level | $V_{OL}$ | $I_{OL}$ = 2.1 mA | — | — | 0.4 | V |

Voltage is relative to $V_{SS}$.

* : Vcc+1.5V(Max.) when pulse width of overshoot is less than 10ns.

** : -1.5V(Min.) when pulse width of undershoot is less than 10ns.

### AC Characteristics

($V_{CC}$ = 3.3 V ± 0.3 V, Ta = 0 to 70°C)

| Parameter | Symbol | Condition | Min. | Max. | Unit |
|---|---|---|---|---|---|
| Address cycle time | $t_C$ | — | 70 | — | ns |
| Address access time | $t_{ACC}$ | $\overline{CE}$ = $\overline{OE}$ = $V_{IL}$ | — | 70 | ns |
| CE# access time | $t_{CE}$ | $\overline{OE}$ = $V_{IL}$ | — | 70 | ns |
| OE# access time | $t_{OE}$ | $\overline{CE}$ = $V_{IL}$ | — | 30 | ns |
| Output disable time | $t_{CHZ}$ | $\overline{OE}$ = $V_{IL}$ | 0 | 30 | ns |
| | $t_{OHZ}$ | $\overline{CE}$ = $V_{IL}$ | 0 | 25 | ns |
| Output hold time | $t_{OH}$ | $\overline{CE}$ = $\overline{OE}$ = $V_{IL}$ | 0 | — | ns |

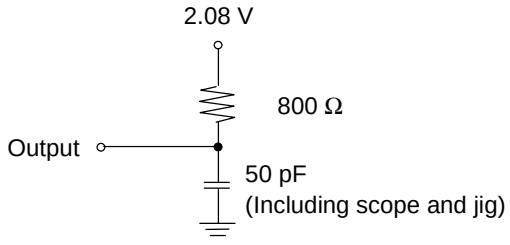
Measurement conditions

Input signal level---------- 0 V/3 V

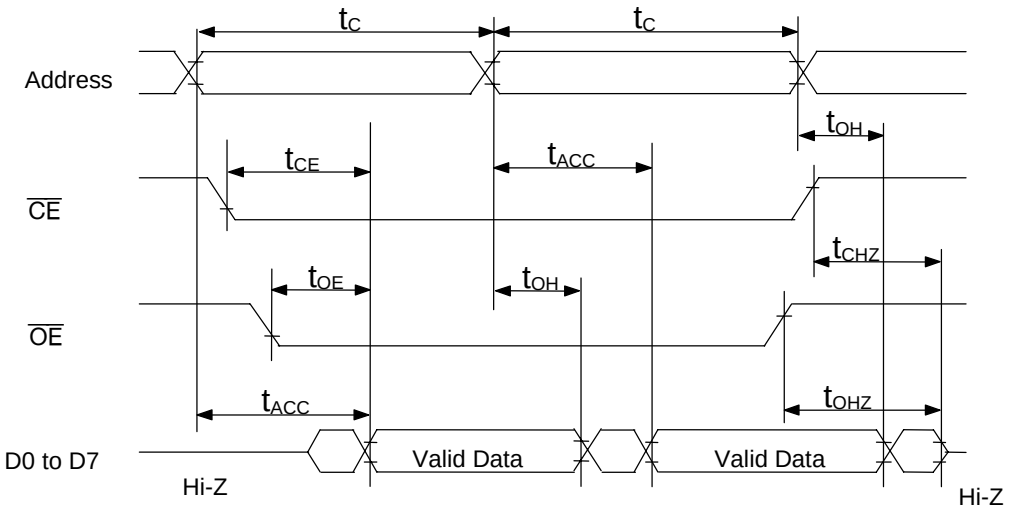
Input timing reference level ---------- 0.8 V/2.0 V

Output load ---------- 50 pF

Output timing reference level---------- 0.8 V/2.0 V



## TIMING CHART (READ CYCLE)




### Pin Capacitance

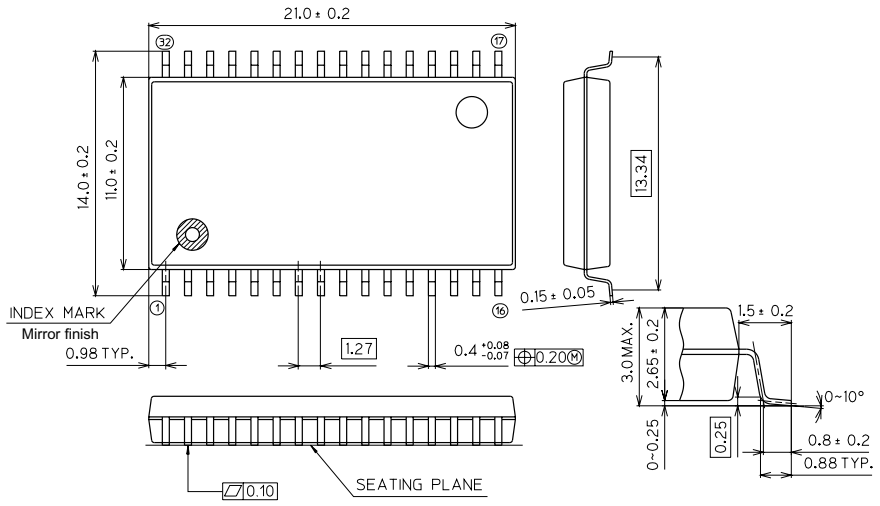
($V_{CC}$ = 3.3 V, Ta = 25°C, f = 1 MHz)

| Parameter | Symbol | Condition | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| Input | $C_{IN1}$ | $V_I$ = 0 V | — | — | 8 | pF |
| Output | $C_{OUT}$ | $V_O$ = 0 V | — | — | 10 | |

## PACKAGE DIMENSIONS

(Unit: mm)

SOP32-P-525-1.27-K




| | |
|---|---|
| Package material | Epoxy resin |
| Lead frame material | 42 alloy |
| Pin treatment | Solder plating (≥5µm) |
| Package weight (g) | 1.32 TYP. |
| Rev. No./Last Revised | 5/Fev. 10, 1997 |

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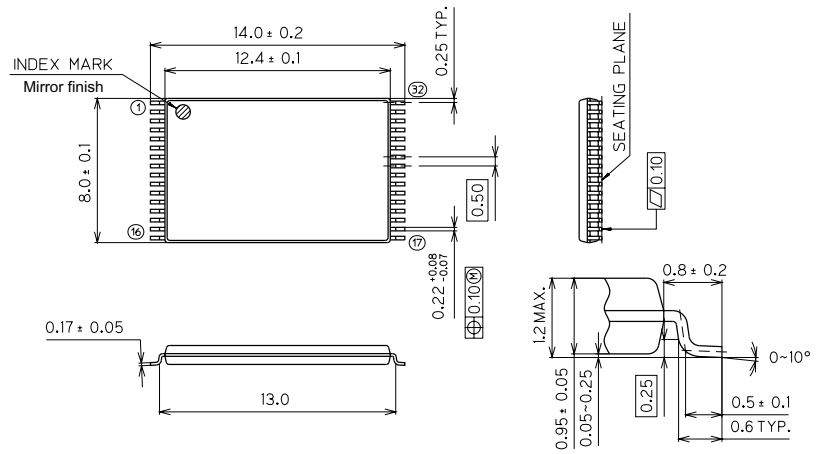
Notes for Mounting the Surface Mount Type Package

The surface mount type packages are very susceptible to heat in reflow mounting and humidity absorbed in storage.
Therefore, before you perform reflow mounting, contact Oki's responsible sales person for the product name, package name, pin number, package code and desired mounting conditions (reflow method, temperature and times).

(Unit: mm)

TSOP(1)32-P-0814-0.50-1K




| | |
|---|---|
| Package material | Epoxy resin |
| Lead frame material | 42 alloy |
| Pin treatment | Solder plating (≥5µm) |
| Package weight (g) | 0.27 TYP. |
| Rev. No./Last Revised | 3/Dec. 10, 1996 |

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