OKI SEMICONDUCTOR

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October 1, 2008
OKI Semiconductor Co., Ltd.

**OKI SEMICONDUCTOR CO., LTD.**

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Discontinued Product

FEDR27V3202E-01-01

OKI Semiconductor

This version : Jul. 2000
Previous version: ----------

# MR27V3202E

**2,097,152–Word × 16–Bit or 4,194,304–Word × 8–Bit One Time PROM**

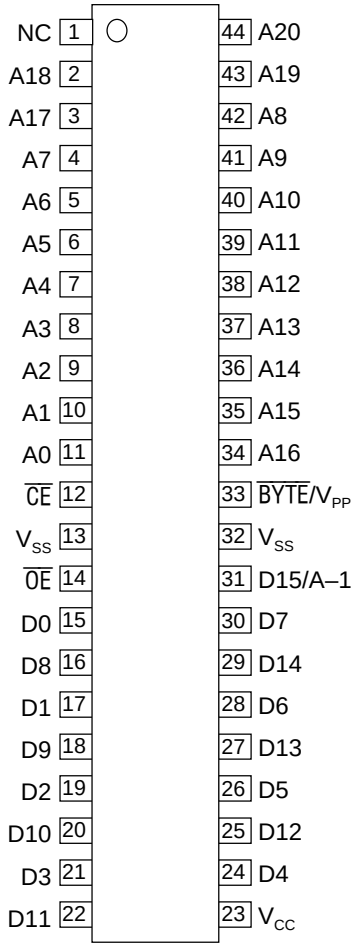
## GENERAL DESCRIPTION

The MR27V3202E is a 32 Mbit electrically One Time Programmable Read-Only Memory that can be electrically switched between 2,097,152-word × 16-bit and 4,194,304-word × 8-bit by the state of the $\overline{\text{BYTE}}$ pin. The MR27V3202E supports high speed asynchronous read operation using a single 3.3V power supply.

## FEATURES

· 2097,152-word × 16-bit/4,194,304-word × 8-bit electrically switchable configuration
· +3.3 V power supply
· Access time 90 ns MAX
· Operating current 50 mA MAX
· Standby current 50 µA MAX
· Input/Output TTL compatible
· Tri-state output
· Packages:
44-pin plastic SOP (SOP44-P-600-1.27-K) (Product Name : MR27V3202EMA)
44-pin plastic TSOP (TSOP II 44-P-400-0.80-K) (Product Name : MR27V3202ETP)

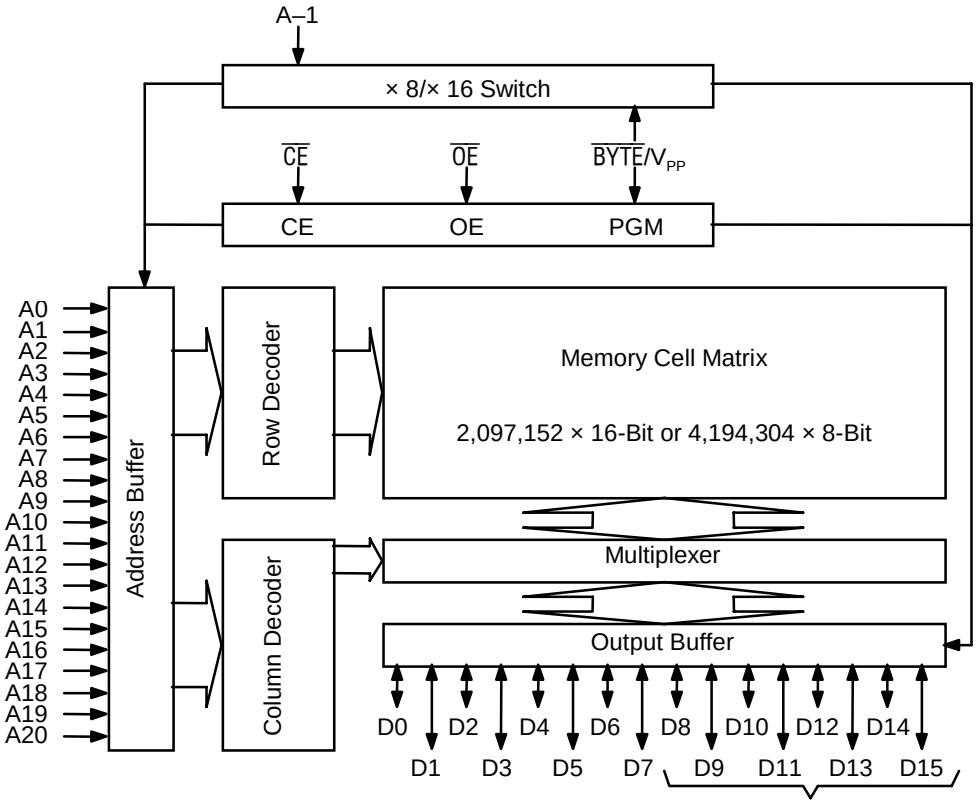
## PIN CONFIGURATION (TOP VIEW)




44-pin SOP, TSOP(II)

| Pin name | Functions |
|---|---|
| D15/A–1 | Data output/Address input |
| A0 to A20 | Address input |
| D0 to D14 | Data output |
| $\overline{CE}$ | Chip enable |
| $\overline{OE}$ | Output enable |
| $\overline{BYTE}/V_{PP}$ | Mode switch/Program power supply voltage |
| $V_{CC}$ | Power supply voltage |
| $V_{SS}$ | GND |
| NC | Non connection |

## BLOCK DIAGRAM




In 8-bit output mode, these pins are placed in a high-Z state and pin D15 functions as the A-1 address pin.

## FUNCTION TABLE

| Mode | $\overline{CE}$ | $\overline{OE}$ | $\overline{BYTE}/V_{PP}$ | $V_{CC}$ | D0 to D7 | D8 to D14 | D15/A–1 |
|---|---|---|---|---|---|---|---|
| Read (16-Bit) | L | L | H | 3.3 V | $D_{OUT}$ | | |
| Read (8-Bit) | L | L | L | | $D_{OUT}$ | Hi–Z | L/H |
| Output disable | L | H | H | | Hi–Z | | |
| | | | L | | | | * |
| Standby | H | * | H | | Hi–Z | | |
| | | | L | | | | * |
| Program | L | H | 9.75 V | 4.0 V | $D_{IN}$ | | |
| Program inhibit | H | H | | | Hi–Z | | |
| Program verify | H | L | | | $D_{OUT}$ | | |

*: Don't Care (H or L)

## 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 |
| Program power supply voltage | $V_{PP}$ | | –0.5 to 11.5 | 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 |
| $V_{PP}$ power supply voltage | $V_{PP}$ | | –0.5 | — | $V_{CC}$+0.5 | 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 = 90 ns | — | — | 50 | mA |
| $V_{PP}$ power supply current | $I_{PP}$ | $V_{PP}$ = $V_{CC}$ | — | — | 10 | µA |
| 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 | $V_{OH}$ | $I_{OH}$ = –2 mA | 2.4 | — | — | V |
| Output "L" level | $V_{OL}$ | $I_{OL}$ = 4 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.

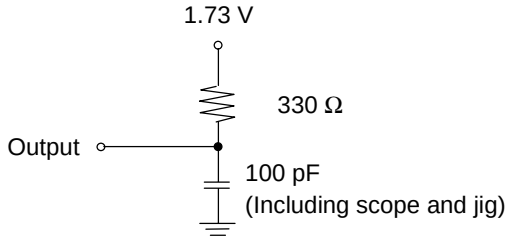
### AC Characteristics

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

| Parameter | Symbol | Condition | Min. | Max. | Unit |
|---|---|---|---|---|---|
| Address cycle time | $t_C$ | — | 90 | — | ns |
| Address access time | $t_{ACC}$ | $\overline{CE}$ = $\overline{OE}$ = $V_{IL}$ | — | 90 | ns |
| $\overline{CE}$ access time | $t_{CE}$ | $\overline{OE}$ = $V_{IL}$ | — | 90 | ns |
| $\overline{OE}$ access time | $t_{OE}$ | $\overline{CE}$ = $V_{IL}$ | — | 45 | 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 |

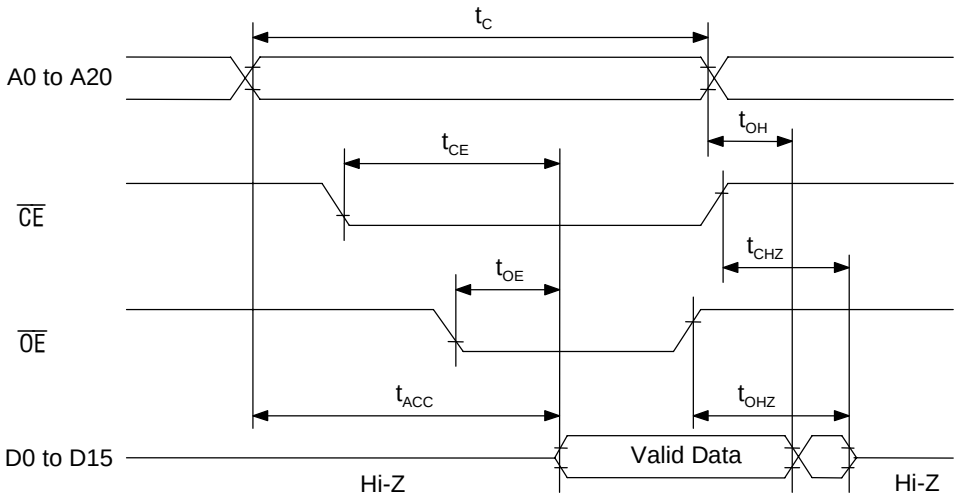
Measurement conditions

Input signal level---------- 0 V/3 V
Input timing reference level ---------- 0.8 V/2.0 V
Output load ---------- 100 pF
Output timing reference level---------- 0.8 V/2.0 V

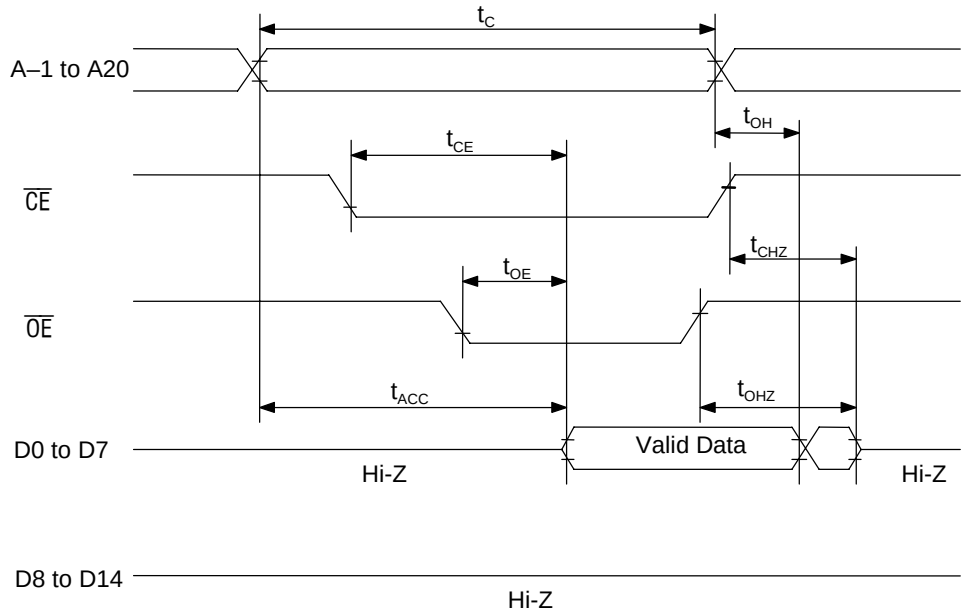


## Timing Chart (Read Cycle)

**16-Bit Read Mode ($\overline{BYTE}$ = $V_{IH}$)**




**8-Bit Read Mode ($\overline{BYTE}$ = $V_{IL}$)**



## ELECTRICAL CHARACTERISTICS (PROGRAMMING OPERATION)

### DC Characteristics

(Ta = 25°C ± 5°C)

| Parameter | Symbol | Condition | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| Input leakage current | $I_{LI}$ | $V_I = V_{CC}+0.5$ V | — | — | 10 | µA |
| $V_{PP}$ power supply current (Program) | $I_{PP2}$ | $\overline{CE} = V_{IL}$ | — | — | 50 | mA |
| $V_{CC}$ power supply current | $I_{CC}$ | — | — | — | 50 | mA |
| Input "H" level | $V_{IH}$ | — | 3.0 | — | $V_{CC}+0.5$ | V |
| Input "L" level | $V_{IL}$ | — | –0.5 | — | 0.8 | V |
| Output "H" level | $V_{OH}$ | $I_{OH}$ = –400 µA | 2.4 | — | — | V |
| Output "L" level | $V_{OL}$ | $I_{OL}$ = 2.1 mA | — | — | 0.45 | V |
| Program voltage | $V_{PP}$ | — | 9.5 | 9.75 | 10.0 | V |
| $V_{CC}$ power supply voltage | $V_{CC}$ | — | 3.9 | 4.0 | 4.1 | V |

Voltage is relative to $V_{SS}$.

### AC Characteristics

($V_{CC}$ = 4.0 V ± 0.1 V, $\overline{BYTE}/V_{PP}$ = 9.75 V ± 0.25 V, Ta = 25°C ± 5°C)

| Parameter | Symbol | Condition | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| Address set-up time | $t_{AS}$ | — | 100 | — | — | ns |
| $\overline{OE}$ set-up time | $t_{OES}$ | — | 2 | — | — | µs |
| Data set-up time | $t_{DS}$ | — | 100 | — | — | ns |
| Address hold time | $t_{AH}$ | — | 2 | — | — | µs |
| Data hold time | $t_{DH}$ | — | 100 | — | — | ns |
| Output float delay time from $\overline{OE}$ | $t_{OHZ}$ | — | 0 | — | 100 | ns |
| $V_{PP}$ voltage set-up time | $t_{VS}$ | — | 2 | — | — | µs |
| Program pulse width | $t_{PW}$ | — | 9 | 10 | 11 | µs |
| Data valid from $\overline{OE}$ | $t_{OE}$ | — | — | — | 100 | ns |
| Address hold from $\overline{OE}$ high | $t_{AOH}$ | — | 0 | — | — | ns |

### Pin Check Function

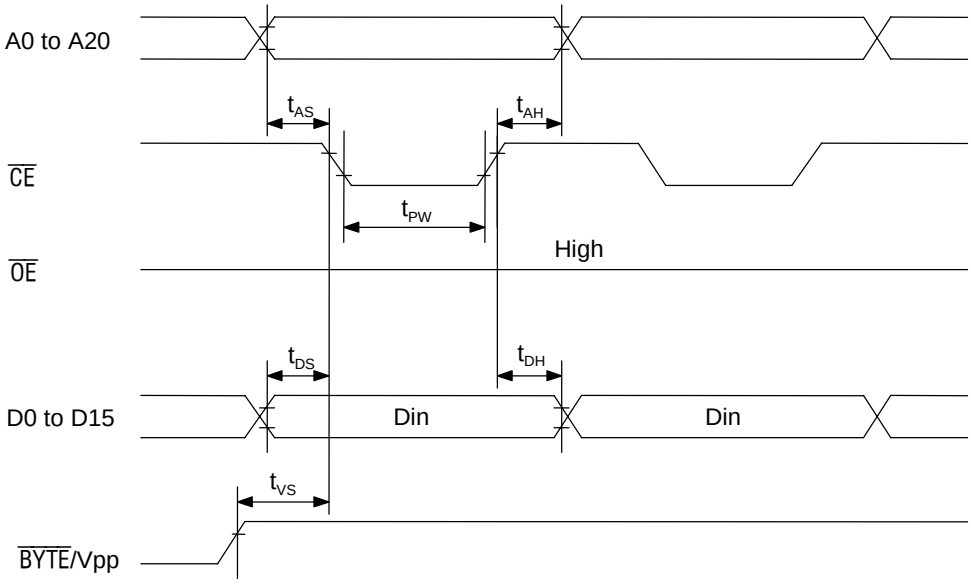
Pin Check Function is to check contact between each device-pin and each socket-lead with EPROM programmer. Setting up address as following condition call the preprogrammed codes on device outputs.

($V_{CC}$ = 3.3 V ± 0.3 V, $\overline{CE} = V_{IL}$, $\overline{OE} = V_{IL}$, $\overline{BYTE}/V_{PP} = V_{IH}$, Ta = 25°C ± 5°C)

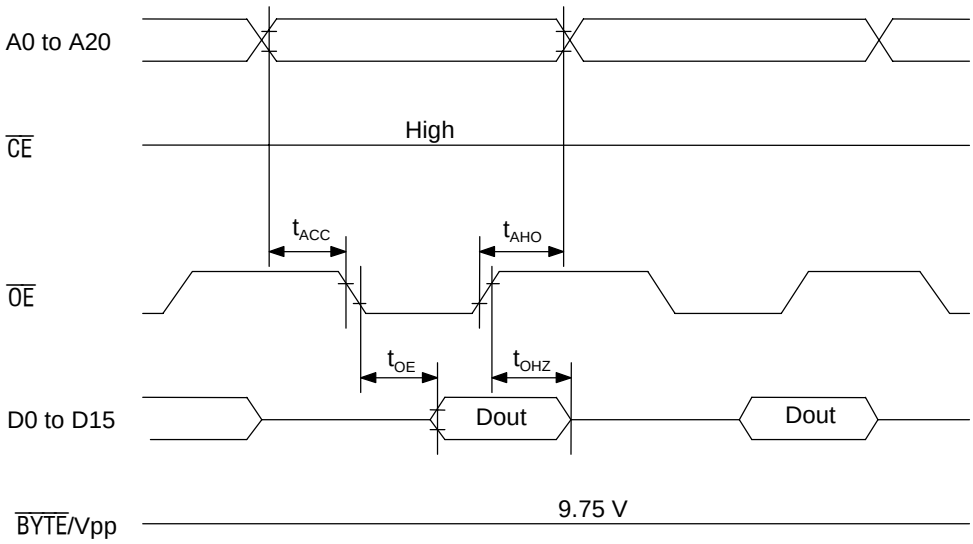
| A0 | A1 | A2 | A3 | A4 | A5 | A6 | A7 | A8 | A9 | A10 | A11 | A12 | A13 | A14 | A15 | A16 | A17 | A18 | A19 | A20 | DATA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | VH* | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | FF00 |
| 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | VH* | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 00FF |
| Other conditions | | | | | | | | | | | | | | | | | | | | | FFFF |

*: VH = 8 V ± 0.25 V

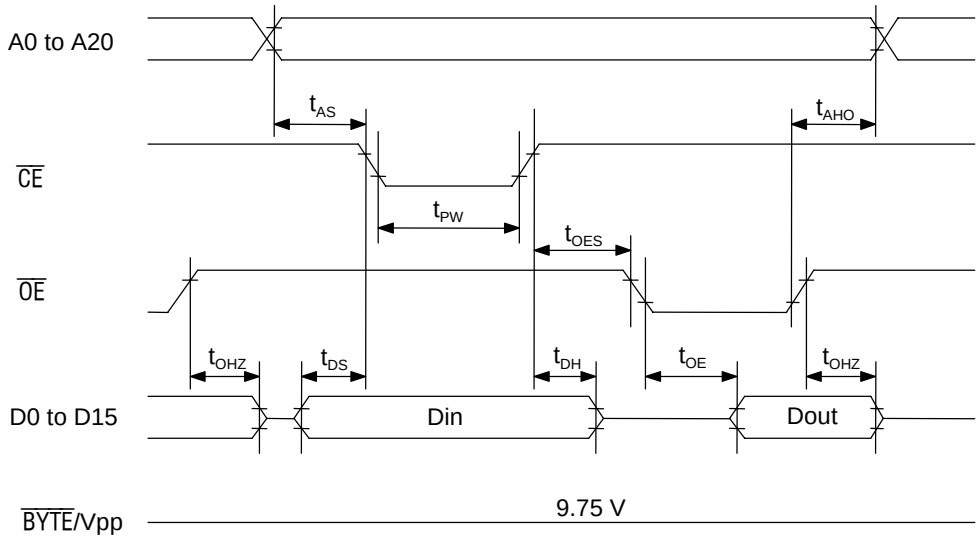
**Consecutive Programming Waveforms**




**Consecutive Program Verify Waveforms**



**Program and Program Verify Cycle Waveforms**

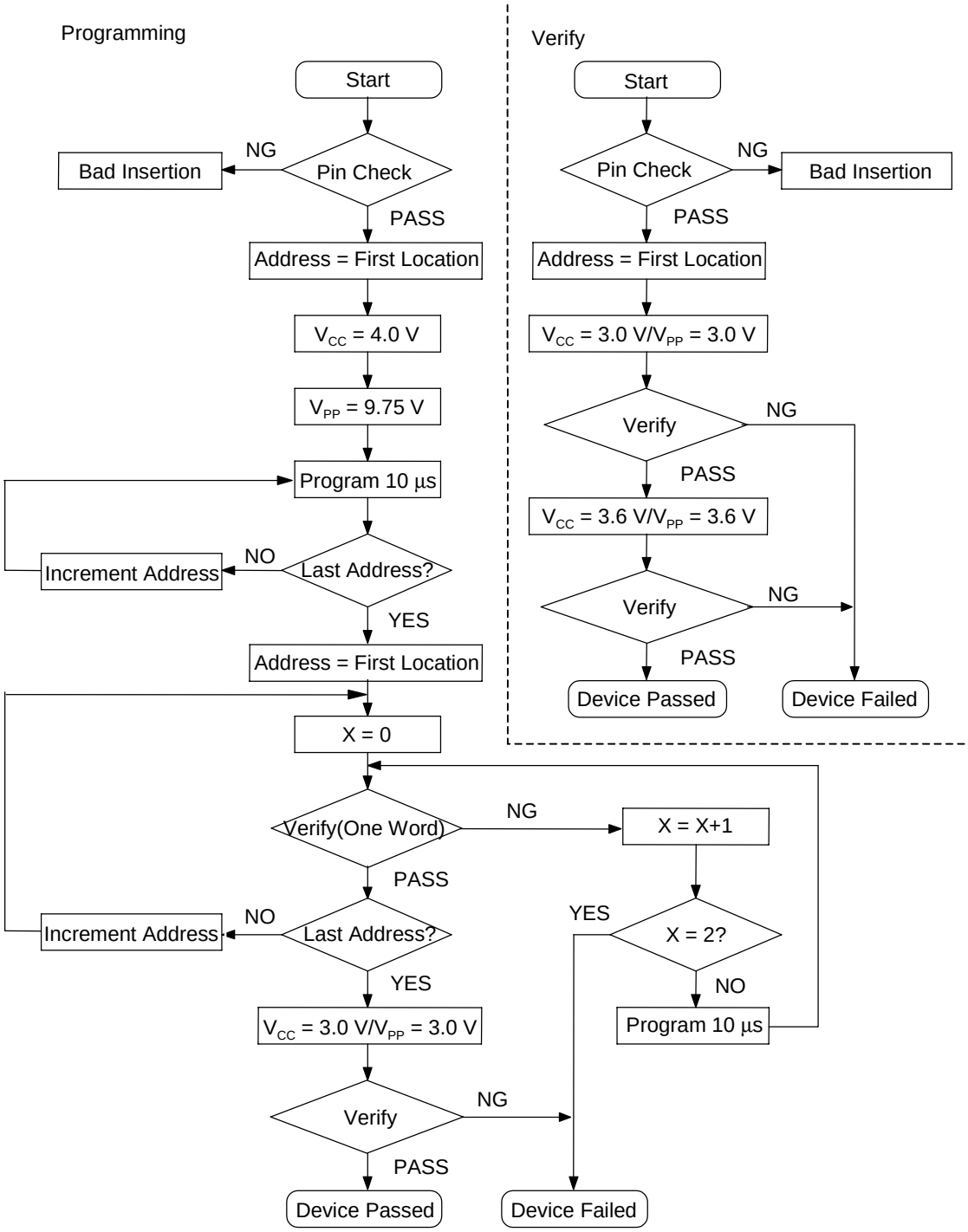



**Pin Capacitance**

($V_{CC}$ = 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 |
| $\overline{BYTE}/V_{PP}$ | $C_{IN2}$ | | — | — | 120 | |
| Output | $C_{OUT}$ | $V_O$ = 0 V | — | — | 10 | |

**Programming/Verify Flow Chart**



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