OKI Semiconductor

MR27V852D

524,288-Word x 16-Bit or 1,048,576-Word x 8-Bit

8-Word x 16-Bit or 16-Word x 8-Bit Page Mode One Time PROM
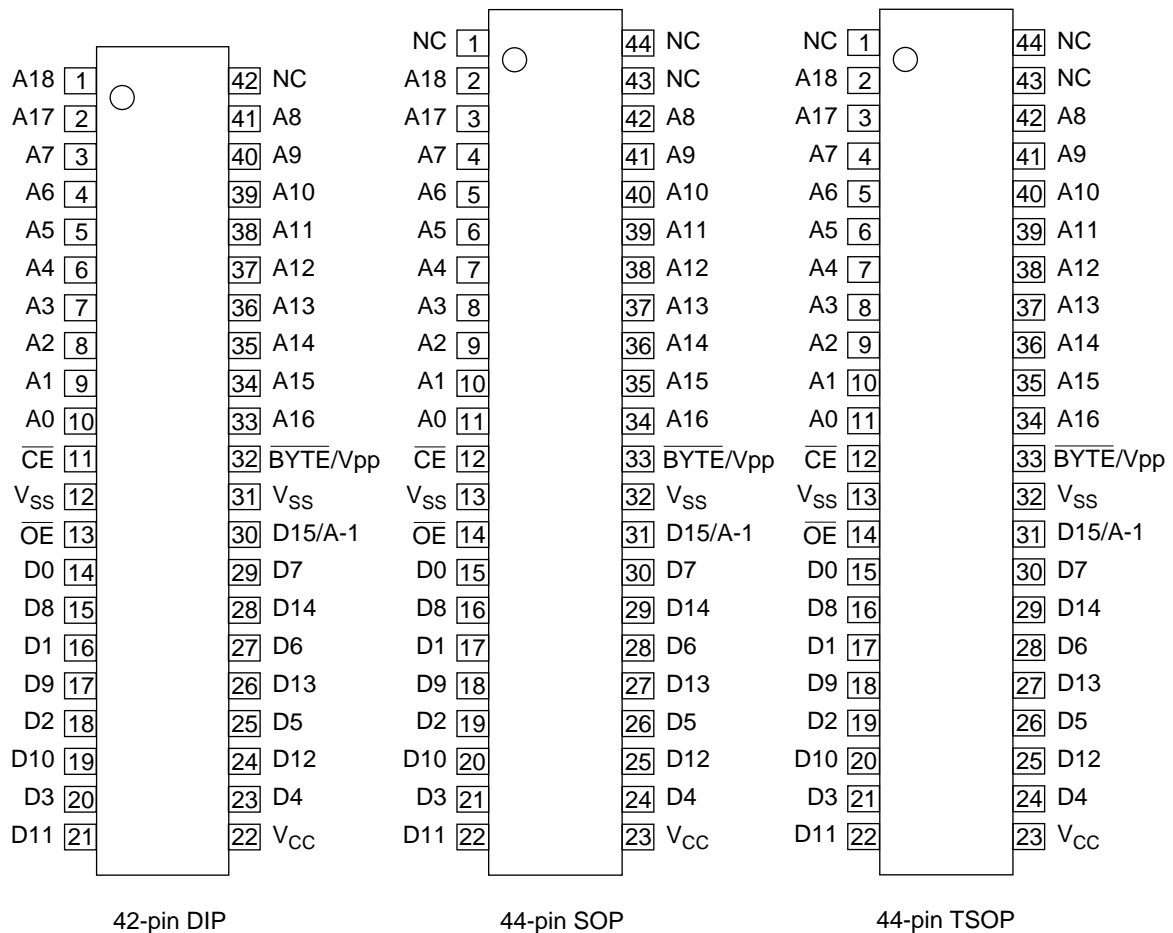
DESCRIPTION

The MR27V852D is a 8Mbit electrically Programmable Read-Only Memory with page mode. Its configuration can be electrically switched between 524,288 word x 16bit and 1,048,576 word x 8bit. The MR27V852D operates on a single +3.3V power supply and is TTL compatible. The MR27V852D provides Page mode which can greatly reduce the read access time. Since the MR27V852D operates asynchronously , external clocks are not required , making this device easy-to-use. The MR27V852D is suitable as large-capacity fixed memory for microcomputers and data terminals. It is manufactured using a CMOS double silicon gate technology and is offered in 42-pin DIP , 44-pin SOP or 44-pin TSOP packages.

FEATURES

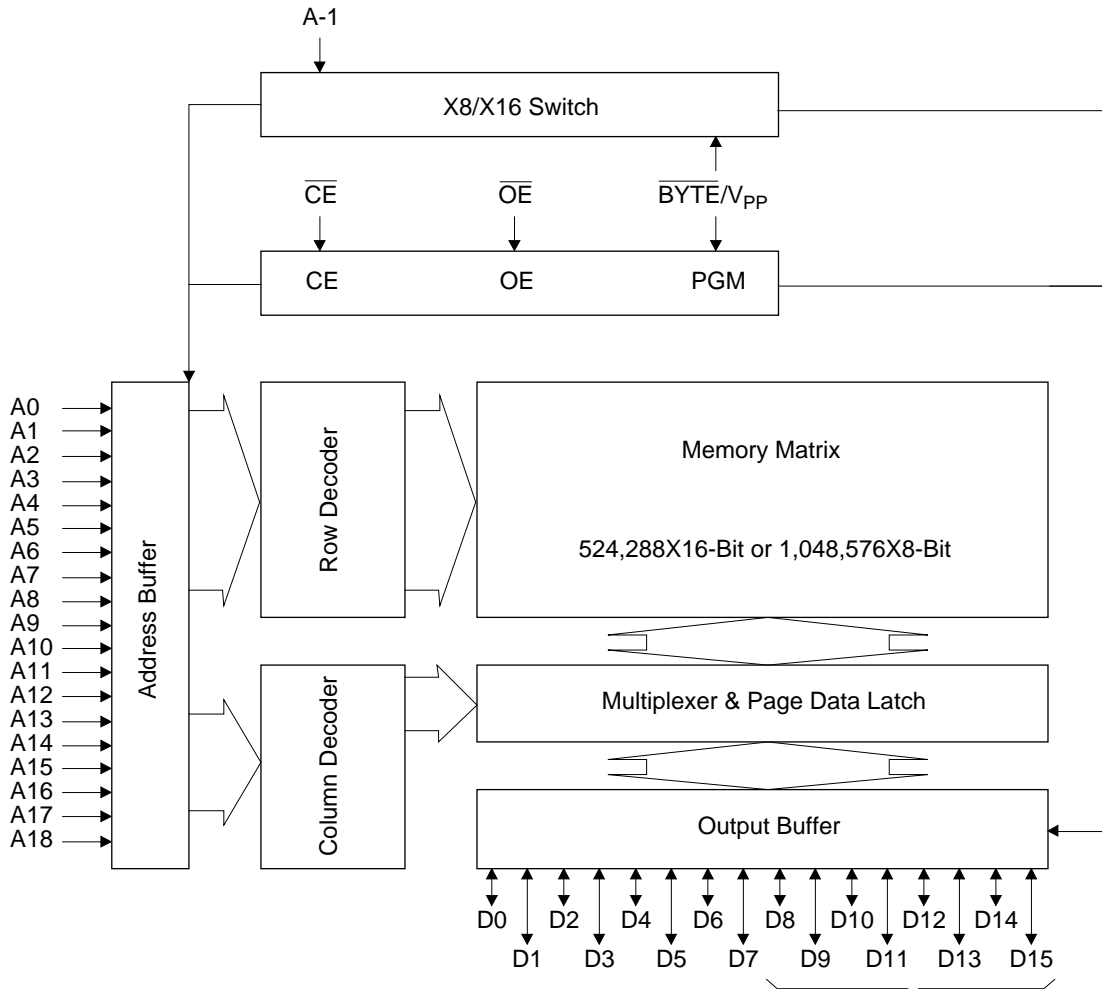- 524,288 word x 16bit / 1,048,576 word x 8bit electrically switchable configuration
- Single +3.3V power supply
- Access time 80ns
    Page mode access time 30ns
- Input / Output TTL compatible
- Three-state output
- Packages   42-pin plastic DIP (DIP42-P-600-2.54)
                              44-pin plastic SOP (SOP44-P-600-1.27-K)
                              44-pin plastic TSOP (TSOP II 44-P-400-0.80-K)

PIN CONFIGURATION (TOP VIEW)

42-pin DIP

A18	1	42	NC
A17	2	41	A8
A7	3	40	A9
A6	4	39	A10
A5	5	38	A11
A4	6	37	A12
A3	7	36	A13
A2	8	35	A14
A1	9	34	A15
A0	10	33	A16
$\overline{CE}$	11	32	$\overline{BYTE}$/Vpp
V_{SS}	12	31	V_{SS}
$\overline{OE}$	13	30	D15/A-1
D0	14	29	D7
D8	15	28	D14
D1	16	27	D6
D9	17	26	D13
D2	18	25	D5
D10	19	24	D12
D3	20	23	D4
D11	21	22	V_{CC}

44-pin SOP

NC	1	44	NC
A18	2	43	NC
A17	3	42	A8
A7	4	41	A9
A6	5	40	A10
A5	6	39	A11
A4	7	38	A12
A3	8	37	A13
A2	9	36	A14
A1	10	35	A15
A0	11	34	A16
$\overline{CE}$	12	33	$\overline{BYTE}$/Vpp
V_{SS}	13	32	V_{SS}
$\overline{OE}$	14	31	D15/A-1
D0	15	30	D7
D8	16	29	D14
D1	17	28	D6
D9	18	27	D13
D2	19	26	D5
D10	20	25	D12
D3	21	24	D4
D11	22	23	V_{CC}

44-pin TSOP

NC	1	44	NC
A18	2	43	NC
A17	3	42	A8
A7	4	41	A9
A6	5	40	A10
A5	6	39	A11
A4	7	38	A12
A3	8	37	A13
A2	9	36	A14
A1	10	35	A15
A0	11	34	A16
$\overline{CE}$	12	33	$\overline{BYTE}$/Vpp
V_{SS}	13	32	V_{SS}
$\overline{OE}$	14	31	D15/A-1
D0	15	30	D7
D8	16	29	D14
D1	17	28	D6
D9	18	27	D13
D2	19	26	D5
D10	20	25	D12
D3	21	24	D4
D11	22	23	V_{CC}

PIN NAMES	FUNCTIONS
D15/A-1	Data output / Address input
A0 - A18	Address input
D0 - D14	Data output
$\overline{CE}$	Chip enable
$\overline{OE}$	Output enable
V_{CC}	Power supply voltage
V_{SS}	GND
$\overline{BYTE}$/V_{PP}	Mode switch / Program power supply voltage
NC	Non connection

BLOCK DIAGRAM

In 8-bit output mode, these pins are three-stated and pin D15 functions as the A-1 address pin.

FUNCTION TABLE

MODE	$\overline{\text{CE}}$	$\overline{\text{OE}}$	$\overline{\text{BYTE}}/V_{PP}$	V_{CC}	D0 - D7	D8 - D14	D15/A-1
READ (16-Bit)	L	L	H	3.3V	D_{OUT}		
READ (8-Bit)	L	L	L		D_{OUT}	Hi-Z	L/H
OUTPUT DISABLE	L	H	H			Hi-Z	
			L				*
STAND-BY	H	*	H			Hi-Z	
			L				*
PROGRAM	L	H	9.75V	4.0V	D_{IN}		
PROGRAM INHIBIT	H	H			Hi-Z		
PROGRAM VERIFY	H	L			D_{OUT}		

* : Don't Care

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ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Condition	Value	Unit
Operating temperature under bias	Topr	-	0 to 70	°C
Storage temperature	T_{stg}		-55 to 125	°C
Input voltage	V_I		-0.5 to V_{CC} + 0.5	V
Output voltage	V_O	relative to V_{SS}	-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 FOR READ

(Ta=0 to 70°C)

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
V_{CC} power supply voltage	V_{CC}		3.0	-	3.6	V
V_{PP} power supply voltage	V_{PP}	V_{CC}=3.0V-3.6V	-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 Vss

ELECTRICAL CHARACTERISTICS (Read operation)

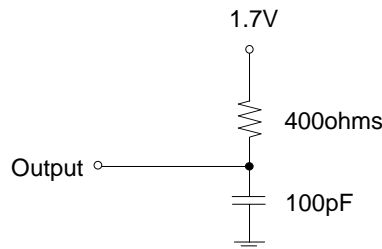### DC Characteristics

$(V_{CC}=3.3V\pm0.3V, Ta=0$ to $70°C)$

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Input leakage current	I_{LI}	$V_I=0$ to Vcc	-	-	10	μA
Output leakage current	I_{LO}	$V_O=0$ to Vcc	-	-	10	μA
V_{CC} power supply current (Standby)	I_{CS1}	$\overline{CE}=V_{CC}$	-	-	50	μA
	I_{CS2}	$\overline{CE}=V_{IH}$	-	-	1	mA
V_{CC} power supply current (Read)	I_{CCA}	$\overline{CE}=V_{IL}, \overline{OE}=V_{IH}$ tc=80ns	-	-	80	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}	$I_{OH}=-200μA$	$V_{CC}-0.4$	-	-	V
Output "L" level	V_{OL}	$I_{OL}=1mA$	-		0.4	V

Voltage is relative to Vss

AC Characteristics

$(V_{CC}=3.3V\pm0.3V, Ta=0$ to $70°C)$

Parameter	Symbol	Condition	Min.	Max.	Unit
Address access cycle time	T_C	-	80	-	ns
Address access time	T_{ACC}	$\overline{CE}=\overline{OE}=V_{IL}$	-	80	ns
Page access cycle time	T_{PC}	-	30	-	ns
Page access time	T_{PAC}	-	-	30	ns
$\overline{CE}$ access time	T_{CE}	$\overline{OE}=V_{IL}$	-	80	ns
$\overline{OE}$ 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 -------------------- 0V/3V
Input timing reference level ---------- 0.8V/2.0V
Output load ------------------------- 100pF
Output timing reference level ---------- 0.8V/2.0V

1.7V

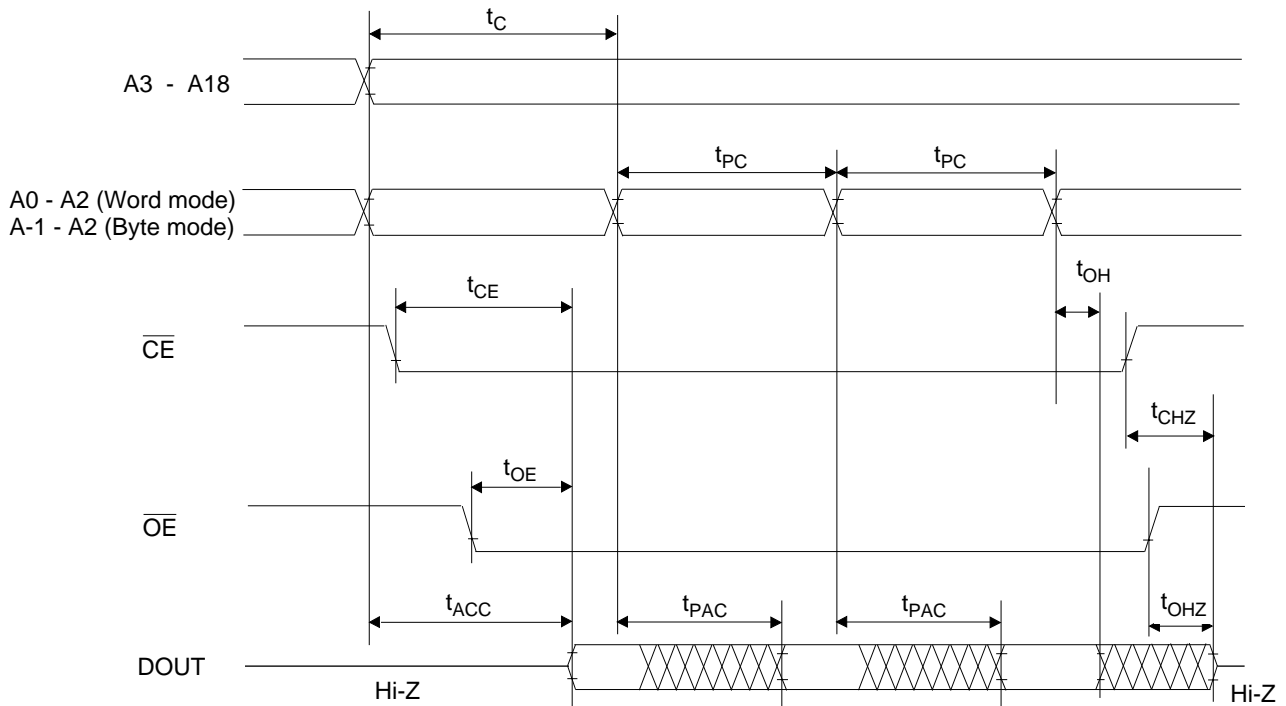400ohms

Output

100pF

TIMING CHART

NORMAL MODE READ CYCLE

PAGE MODE READ CYCLE

ELECTRICAL CHARACTERISTICS (Programming operation)

DC Characteristics

(Ta=25°C±5°C)

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Input leakage current	I_{LI}	$V_I=V_{CC}+0.5V$	-	-	10	μA
V_{PP} power supply current (Program)	I_{PP2}	$\overline{CE}=V_{IL}$	-	-	50	mA
V_{CC} power supply current	I_{CC}	-	-	-	80	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}	$I_{OH}=-400μA$	2.4	-	-	V
Output "L" level	V_{OL}	$I_{OL}=2.1mA$	-	-	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 Vss

AC Characteristics

($V_{CC}=4.0V±0.1V, V_{pp}=9.75V±0.25V, Ta=25°C±5°C$)

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 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_{AHO}	-	0	-	-	ns

Pin Check Function

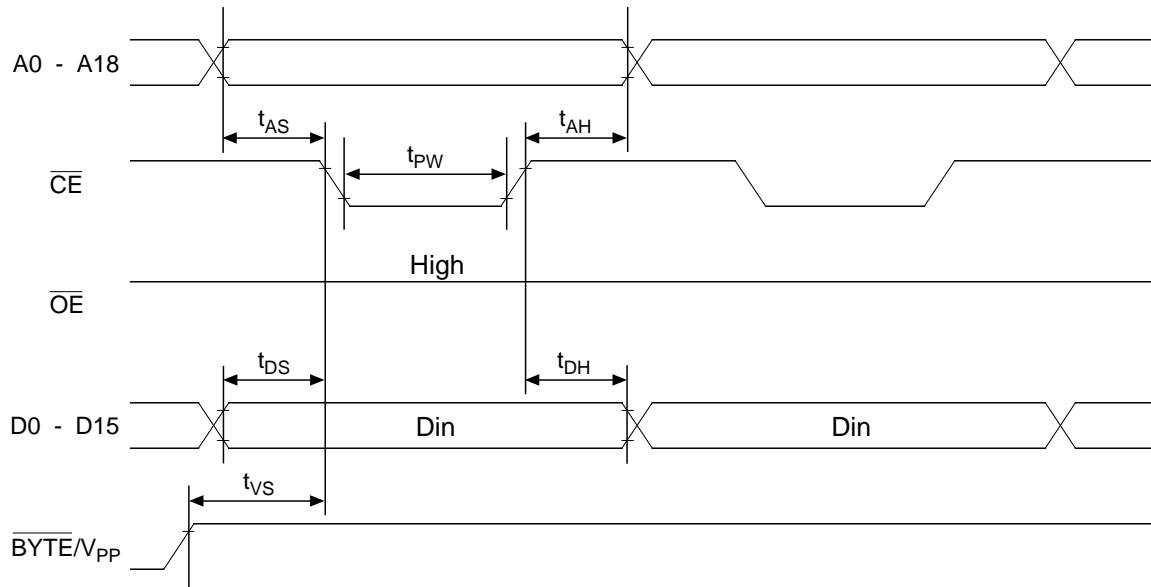Pin Check Function is to check contact between each device-pin and each socket-lead with EPROM programmer.

Setting up address as the following condition call the preprogrammed codes on device outputs.

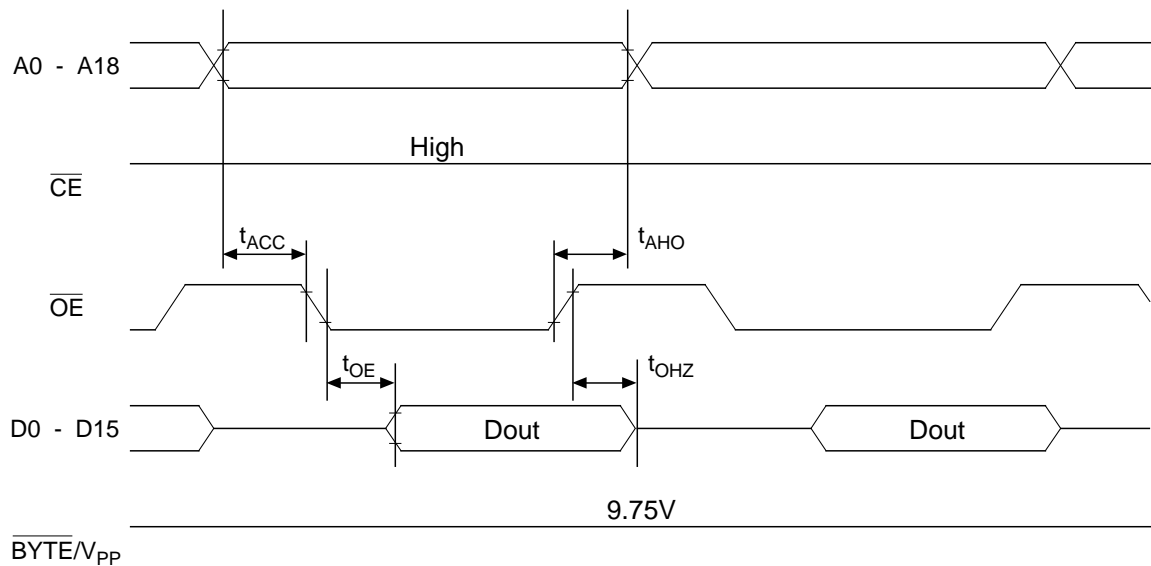($V_{CC}=3.3V±0.3V, \overline{CE}=\overline{OE}=V_{IL}, \overline{BYTE}/V_{pp}=V_{IH}, Ta=25°C±5°C$)

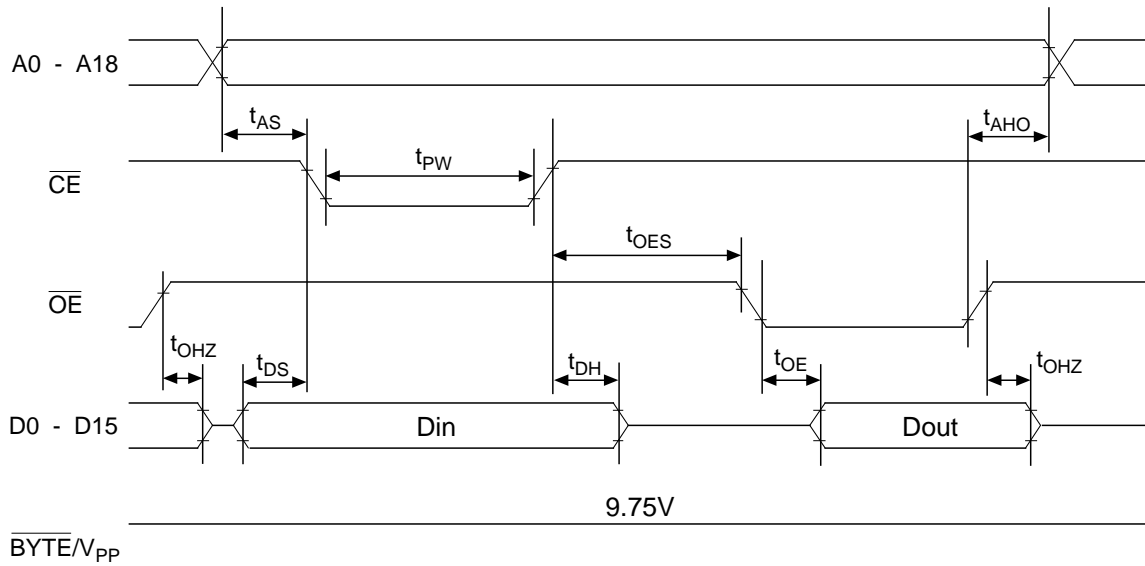| A0	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	A14	A15	A16	A17	A18	DATA
0	1	0	1	0	1	0	1	0	VH*	0	1	0	1	0	1	0	0	1	FF00
1	0	1	0	1	0	1	0	1	VH*	1	0	1	0	1	0	1	1	0	00FF
Other conditions																			FFFF

* :VH=8V±0.25V

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Consecutive Programming Waveforms

Consecutive Program Verify Waveforms
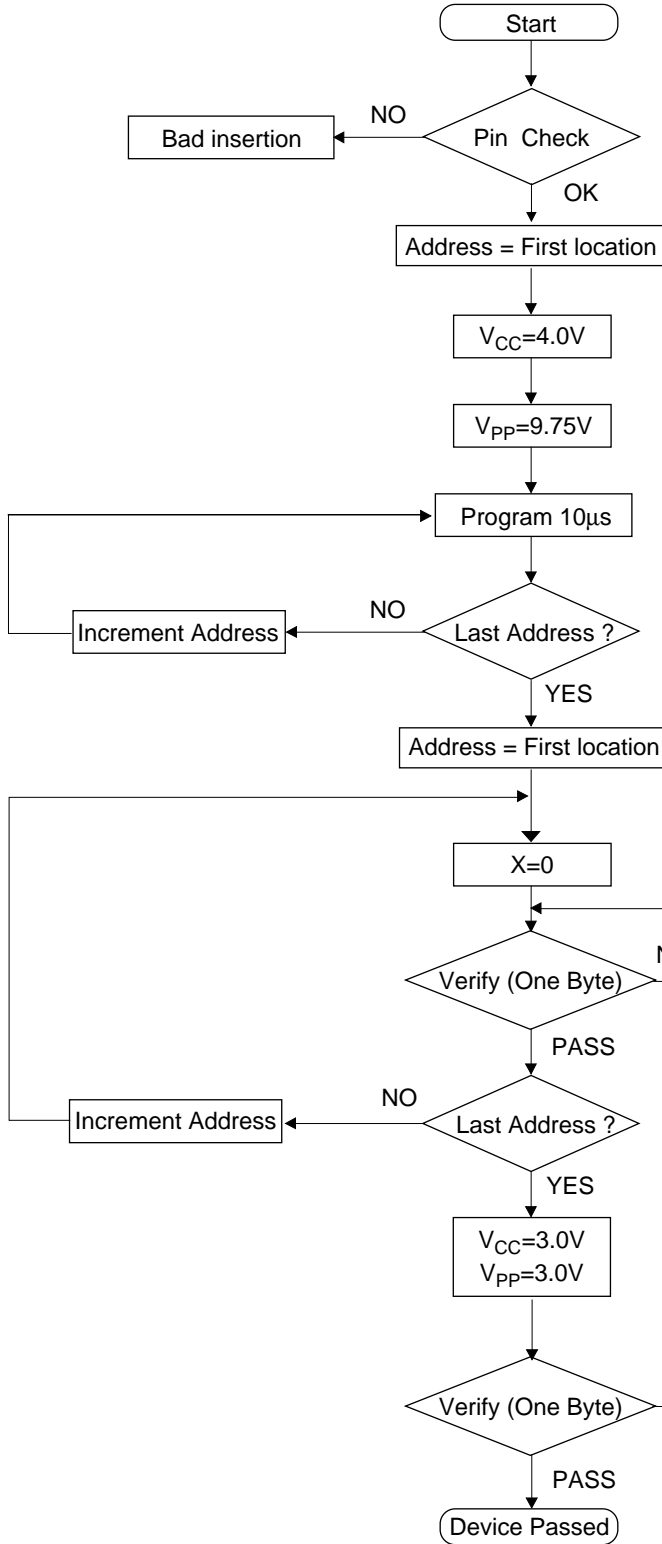
Program and Program Verify Cycle Waveforms

PIN Capacitance

(V_{CC}=3.3V, Ta=25°C, f=1MHz)

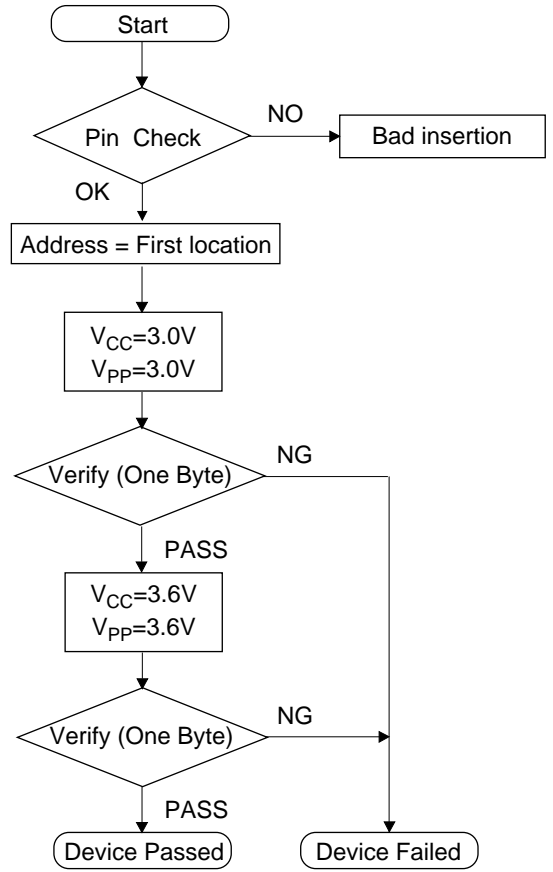| Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Input	C_{IN1}	V_I=0V	-	-	12	
$\overline{BYTE}$/V_{PP}	C_{IN2}		-	-	120	pF
Output	C_{OUT}	V_O=0V	-	-	15	

Programming / Verify Flow Chart

Programming

```
              ┌─────────┐
              │  Start  │
              └─────────┘
                   │
                   ▼
Bad insertion ◄──◆ Pin Check
         NO        │ OK
                   ▼
         Address = First location
                   │
                   ▼
              V_CC=4.0V
                   │
                   ▼
              V_PP=9.75V
                   │
                   ▼
         Program 10µs ◄──────┐
                   │         │
                   ▼         │
Increment Address ◄─◆ Last Address?
             NO    │ YES
                   ▼
         Address = First location
                   │
                   ▼
                 X=0
                   │
                   ▼
         Verify (One Byte) ─NG─► X=X+1
                   │ PASS        │
                   ▼             ▼
Increment Address ◄─◆ Last Address?  X=2?
             NO    │ YES    YES/NO
                   ▼
              V_CC=3.0V
              V_PP=3.0V
                   │
                   ▼
         Verify (One Byte) ─NG─► Device Failed
                   │ PASS
                   ▼
            Device Passed
```

Verify

```
              ┌─────────┐
              │  Start  │
              └─────────┘
                   │
                   ▼
              ◆ Pin Check ─NO─► Bad insertion
                   │ OK
                   ▼
         Address = First location
                   │
                   ▼
              V_CC=3.0V
              V_PP=3.0V
                   │
                   ▼
         Verify (One Byte) ─NG─┐
                   │ PASS      │
                   ▼           │
              V_CC=3.6V        │
              V_PP=3.6V        │
                   │           │
                   ▼           │
         Verify (One Byte) ─NG─►
                   │ PASS      │
                   ▼           ▼
            Device Passed  Device Failed
```

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