

# OKI Semiconductor

1A

## MR27V3255D

1,048,576-Double Word x 32-Bit or 2,097,152-Word x 16-Bit

8-Double Word x 32-Bit or 16-Word x 16-Bit Page Mode One Time PROM

### DESCRIPTION

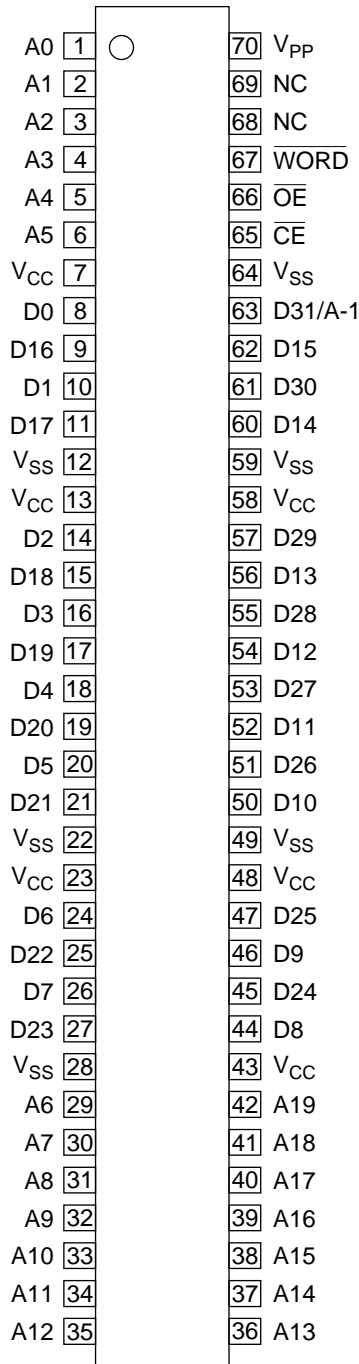
The MR27V3255D is a 32Mbit electrically Programmable Read-Only Memory with page mode. Its configuration can be electrically switched between 1,048,576 double word x 32bit and 2,097,152 word x 16bit. The MR27V3255D operates on a single +3.3V power supply and is TTL compatible. The MR27V3255D provides Page mode which can greatly reduce the read access time. Since the MR27V3255D operates asynchronously, external clocks are not required, making this device easy-to-use. The MR27V3255D 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 70-pin SSOP or 70-pin TSOP packages.

### FEATURES

- 1,048,576 double word x 32bit / 2,097,152 word x 16bit electrically switchable configuration
- Single +3.3V power supply
- Access time 80ns
  - Page mode access time 25ns
- Input / Output TTL compatible
- Three-state output
- Packages

70-pin plastic SSOP (SSOP70-P-500-0.80-K) (Product name : MR27V3255DMB)  
70-pin plastic TSOP (TSOP II 70-P-400-0.65-K) (Product name : MR27V3255DTA)

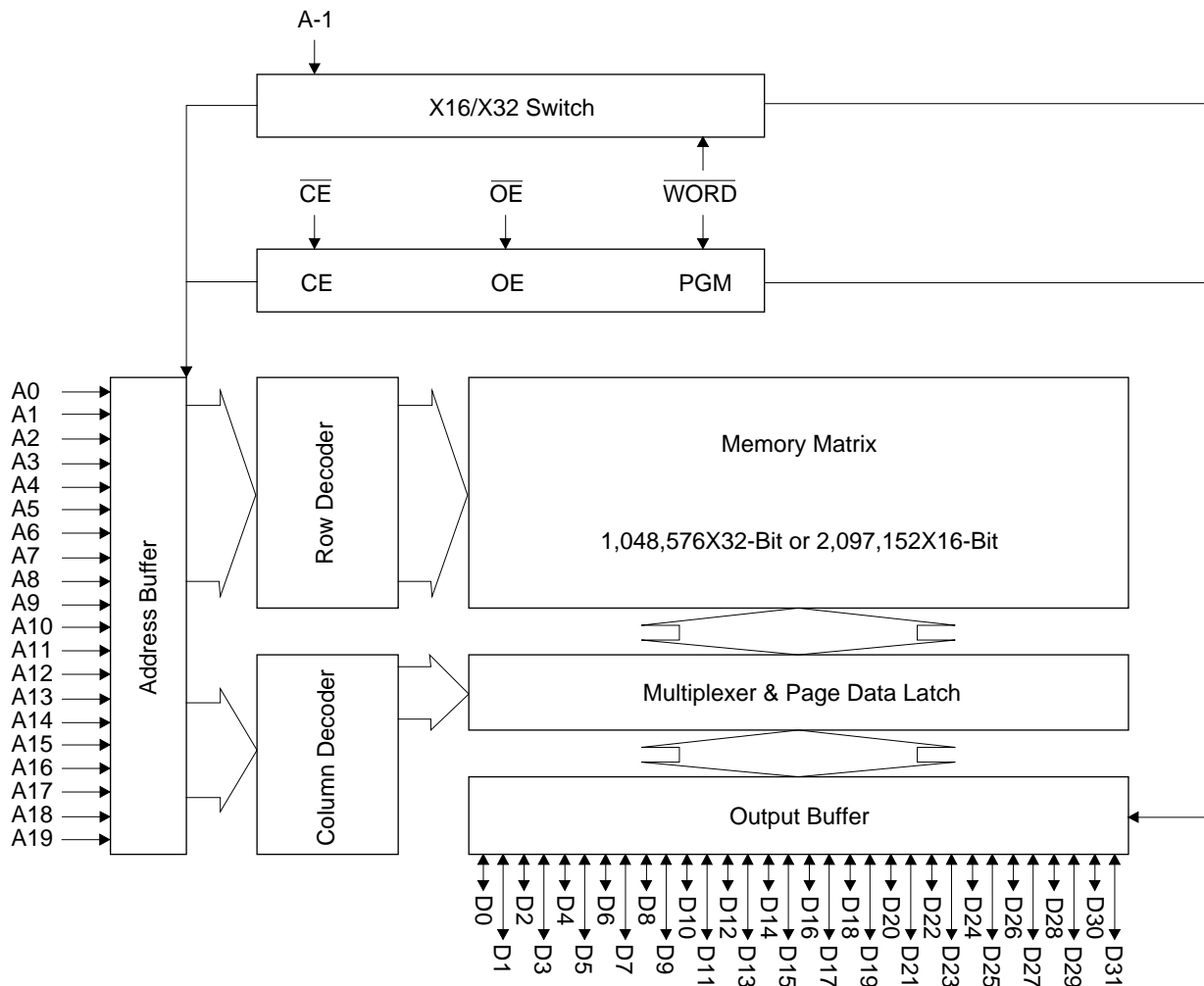
**PIN CONFIGURATION (TOP VIEW)**



PIN NAMES	FUNCTIONS
D31/A-1	Data output / Address input
A0 - A19	Address input
D0 - D30	Data output
CE	Chip enable
OE	Output enable
V <sub>CC</sub>	Power supply voltage
V <sub>SS</sub>	GND
WORD	Mode switch
V <sub>PP</sub>	Program power supply voltage
NC	Non connection

70-pin SSOP , TSOP (II)

**BLOCK DIAGRAM**



In 16-bit output mode, these pins are three-stated and pin D31 functions as the A-1 address pin.

**FUNCTION TABLE**

MODE	CE	OE	WORD	V <sub>PP</sub>	V <sub>CC</sub>	D0 - D15	D16 - D30	D31/A-1
READ (32-Bit)	L	L	H	*	3.3V	D <sub>OUT</sub>		
READ (16-Bit)	L	L	L			D <sub>OUT</sub>	Hi-Z	L/H
OUTPUT DISABLE	L	H	H			Hi-Z		*
			L			Hi-Z		*
STAND-BY	H	*	H	Hi-Z		*		
			L	Hi-Z		*		
PROGRAM	L	H	L	9.75V	4.0V	D <sub>IN</sub>	Hi-Z	L/H
PROGRAM INHIBIT	H	H				Hi-Z		
PROGRAM VERIFY	H	L				D <sub>OUT</sub>	Hi-Z	L/H

\* : Don't Care (H or L or Open)

**ABSOLUTE MAXIMUM RATINGS**

Parameter	Symbol	Condition	Value	Unit
Operating temperature under bias	$T_{opr}$	-	0 to 70	°C
Storage temperature	$T_{stg}$	-	-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 FOR READ**

(Ta=0 to 70°C)

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
$V_{CC}$ power supply voltage	$V_{CC}$	$V_{CC}=3.0V-3.6V$	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  $V_{SS}$ \* :  $V_{CC}+1.5V$  (Max.) when pulse width of overshoot is less than 10nS.

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

## ELECTRICAL CHARACTERISTICS (Read operation)

### DC Characteristics

( $V_{CC}=3.3V\pm 0.3V$ ,  $T_a=0$  to  $70^\circ C$ )

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Input leakage current	$I_{LI}$	$V_I=0$ to $V_{CC}$	-	-	10	$\mu A$
Output leakage current	$I_{LO}$	$V_O=0$ to $V_{CC}$	-	-	10	$\mu A$
$V_{CC}$ power supply current (Standby)	$I_{CS1}$	$\overline{CE}=V_{CC}$	-	-	50	$\mu A$
	$I_{CS2}$	$\overline{CE}=V_{IH}$	-	-	1	mA
$V_{CC}$ power supply current (Read)	$I_{CCA}$	$\overline{CE}=V_{IL}$ , $\overline{OE}=V_{IH}$ $t_c=80ns$	-	-	100	mA
$V_{PP}$ power supply current	$I_{PP}$	$V_{PP}=V_{CC}$	-	-	10	$\mu A$
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	$V_{OH}$	$I_{OH}=-400\mu A$	2.4	-	-	V
Output "L" level	$V_{OL}$	$I_{OL}=2.1mA$	-	-	0.4	V

Voltage is relative to  $V_{SS}$

\* :  $V_{CC}+1.5V$  (Max.) when pulse width of overshoot is less than 10nS.

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

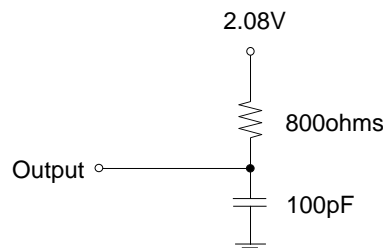
### AC Characteristics

( $V_{CC}=3.3V\pm 0.3V$ ,  $T_a=0$  to  $70^\circ C$ )

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	$T_{PC}$	-	25	-	ns
Page access time	$T_{PAC}$	-	-	25	ns
$\overline{CE}$ access time	$T_{CE}$	$\overline{OE}=V_{IL}$	-	80	ns
$\overline{OE}$ access time	$T_{OE}$	$\overline{CE}=V_{IL}$	-	25	ns
Output disable time	$T_{CHZ}$	$\overline{OE}=V_{IL}$	0	25	ns
	$T_{OHZ}$	$\overline{CE}=V_{IL}$	0	20	ns
Output hold time	$T_{OH}$	$\overline{CE}=\overline{OE}=V_{IL}$	0	-	ns

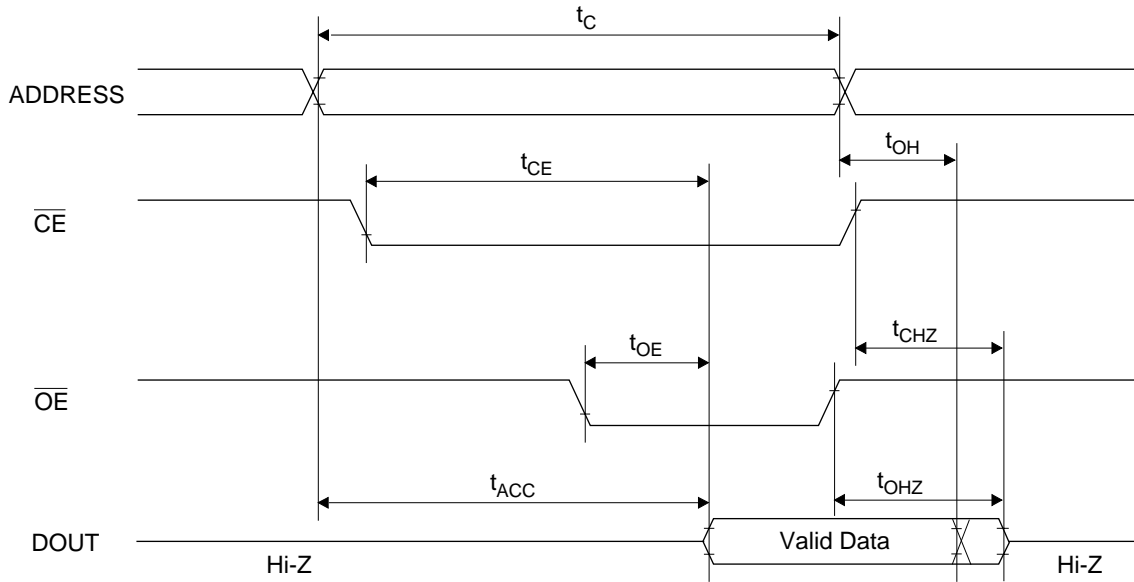
#### Measurement conditions

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

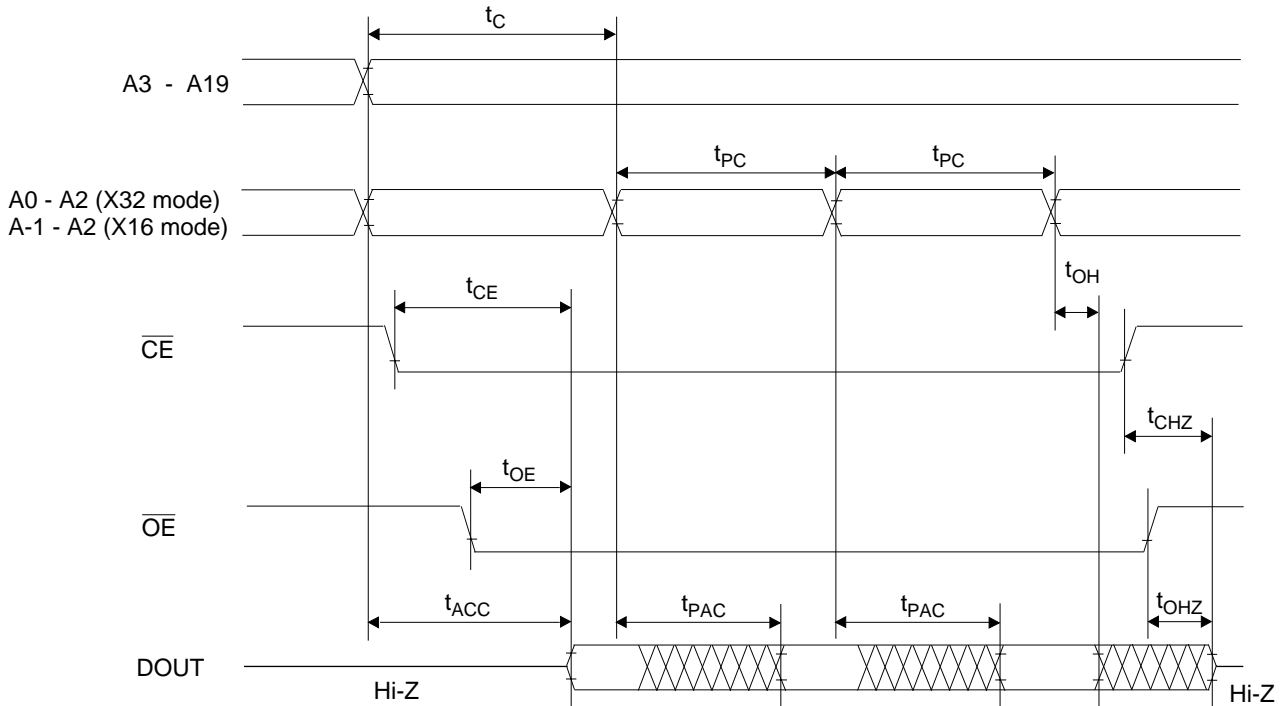


**TIMING CHART**

**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 <sub>LI</sub>	V <sub>I</sub> =V <sub>CC</sub> +0.5V	-	-	10	μA
V <sub>PP</sub> power supply current (Program)	I <sub>PP2</sub>	$\overline{CE}=V_{IL}$	-	-	50	mA
V <sub>CC</sub> power supply current	I <sub>CC</sub>	-	-	-	80	mA
Input "H" level	V <sub>IH</sub>	-	3.0	-	V <sub>CC</sub> +0.5	V
Input "L" level	V <sub>IL</sub>	-	-0.5	-	0.8	V
Output "H" level	V <sub>OH</sub>	I <sub>OH</sub> =-400μA	2.4	-	-	V
Output "L" level	V <sub>OL</sub>	I <sub>OL</sub> =2.1mA	-	-	0.45	V
Program voltage	V <sub>PP</sub>	-	9.5	9.75	10.0	V
V <sub>CC</sub> power supply voltage	V <sub>CC</sub>	-	3.9	4.0	4.1	V

Voltage is relative to V<sub>SS</sub>

### AC Characteristics

(V<sub>CC</sub>=4.0V±0.1V, V<sub>PP</sub>=9.75V±0.25V, Ta=25°C±5°C)

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

### Pin Check Function

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

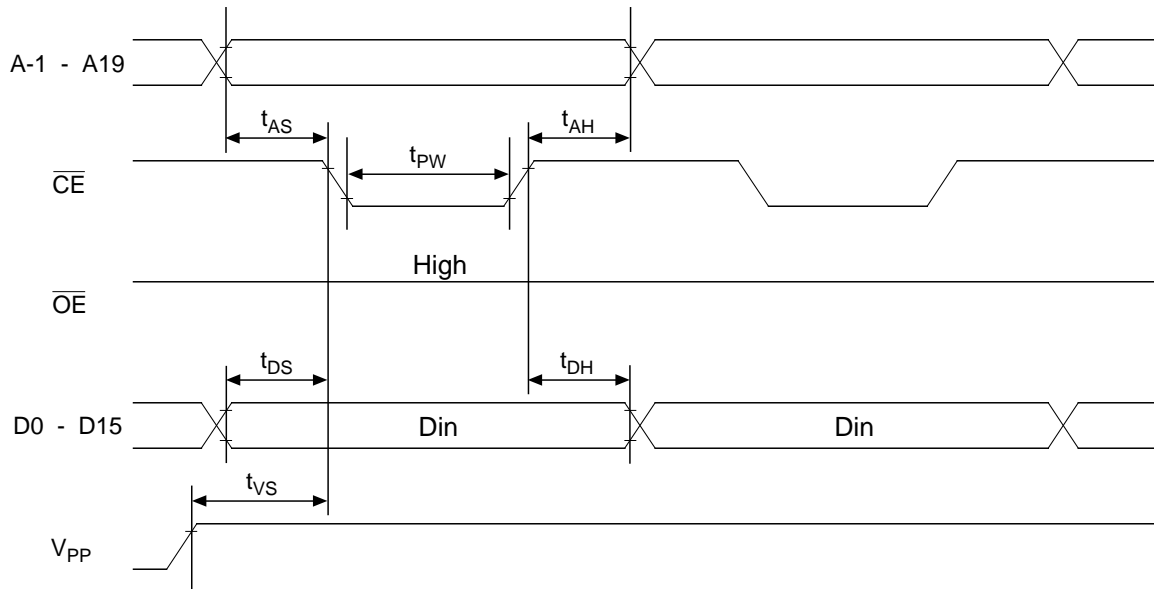
Setting up address as the following condition call the preprogrammed codes on device outputs.

(V<sub>CC</sub>=3.3V±0.3V,  $\overline{CE}=\overline{OE}=V_{IL}$ ,  $\overline{WORD}=V_{IL}$ , Ta=25°C±5°C)

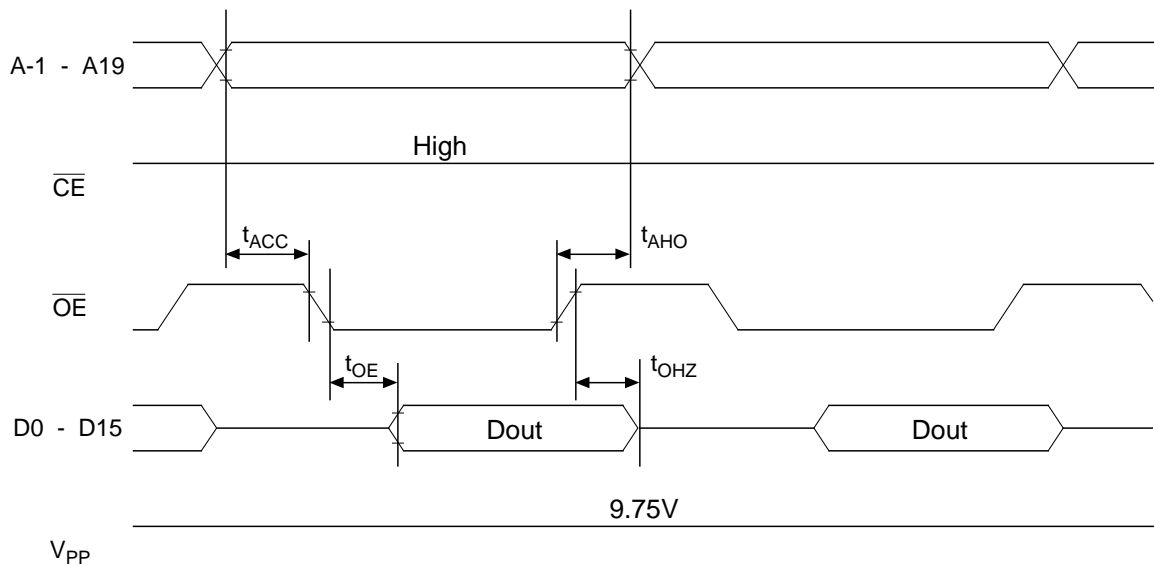
PA0	PA1	PA2	PA3	PA4	PA5	PA6	PA7	PA8	PA9	PA10	PA11	PA12	PA13	PA14	PA15	PA16	PA17	PA18	PA19	PA20	DATA
A-1	A0	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	A14	A15	A16	A17	A18	A19	
0	1	0	1	0	1	0	1	0	1	VH*	1	0	1	0	1	0	1	0	1	0	AAAA
1	0	1	0	1	0	1	0	1	0	VH*	0	1	0	1	0	1	0	1	0	1	5555
Other conditions																				FFFF	

\* :VH=8V±0.25V

### Consecutive Programming Waveforms

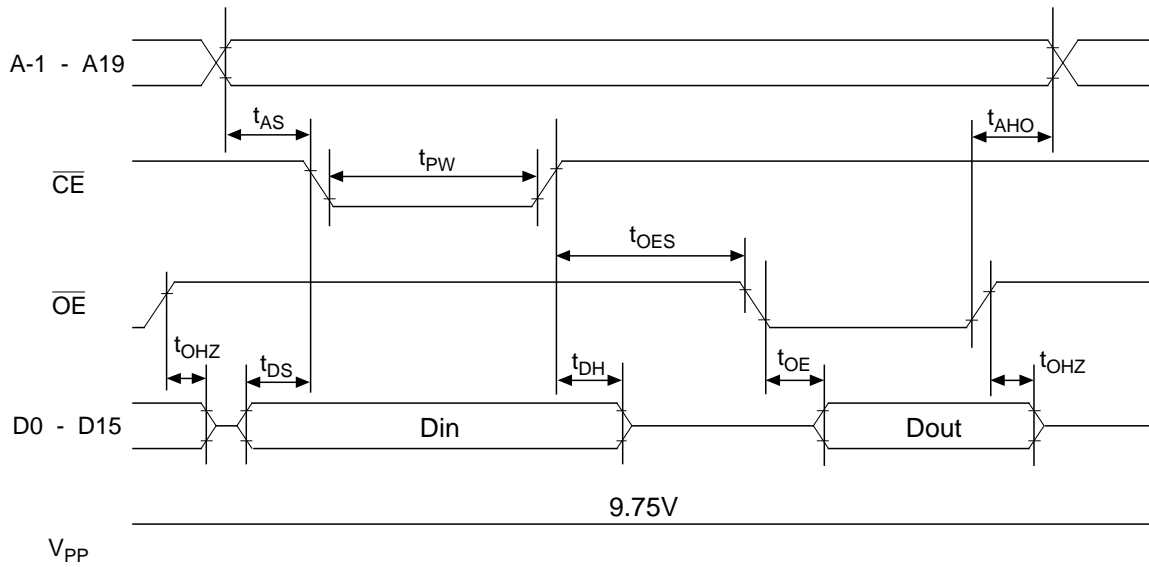


### Consecutive Program Verify Waveforms





### Program and Program Verify Cycle Waveforms



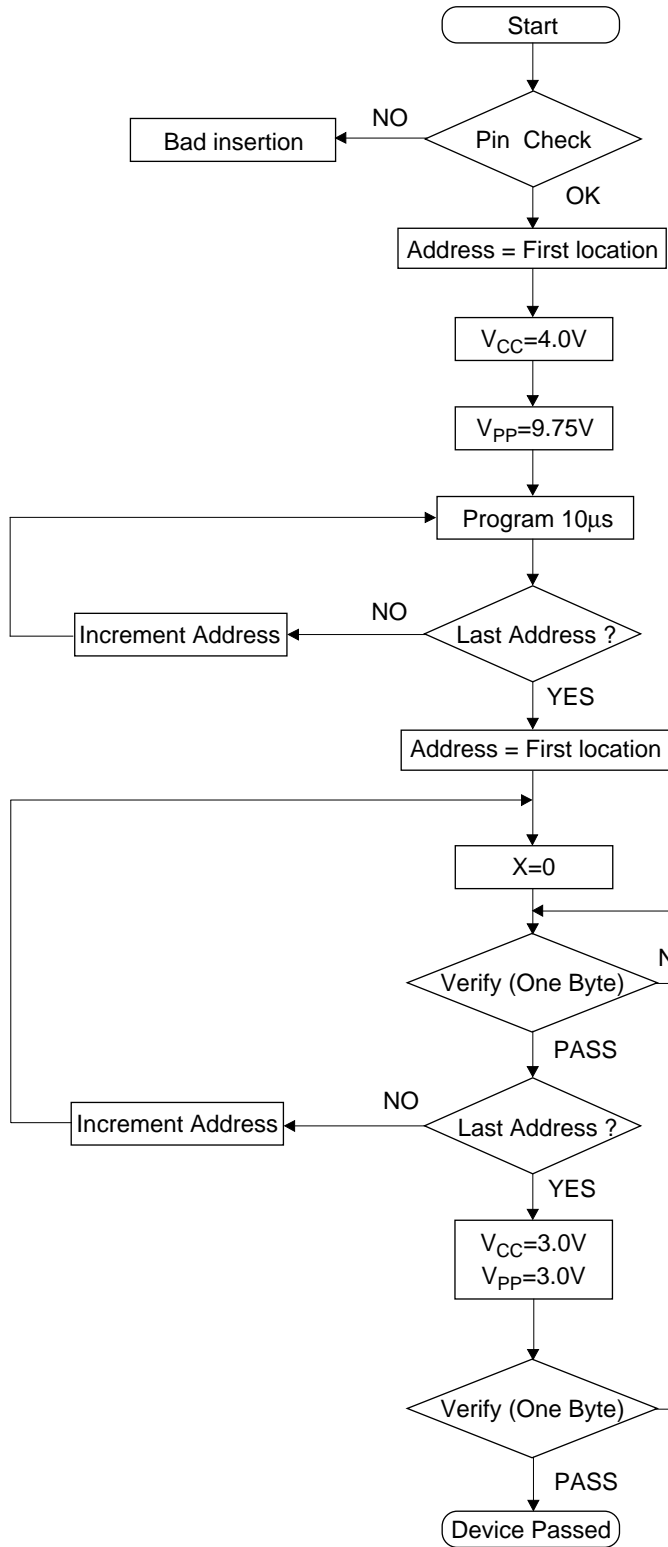
### PIN Capacitance

( $V_{CC}=3.3V$ ,  $T_a=25^\circ C$ ,  $f=1MHz$ )

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

Programming / Verify Flow Chart

Programming



Verify

