

OKI Semiconductor

1A

MR27V1602D

1,048,576-Word x 16-Bit or 2,097,152-Word x 8-Bit One Time PROM

DESCRIPTION

The MR27V1602D is a 16Mbit electrically Programmable Read-Only Memory whose configuration can be electrically switched between 1,048,576 word x 16bit and 2,097,152 word x 8bit. The MR27V1602D operates on a single +3V-3.3V power supply and is TTL compatible. Since the MR27V1602D operates asynchronously, external clocks are not required, making this device easy-to-use. The MR27V1602D 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, 44-pin TSOP or 48-pin TSOP packages.

FEATURES

- 1,048,576 word x 16bit / 2,097,152 word x 8bit electrically switchable configuration
- Single +3V-3.3V power supply
- Access time
 - 100ns access time ($V_{CC}=+3V$)
 - 80ns access time ($V_{CC}=+3.3V$)
- Input / Output TTL compatible
- Three-state output
- Packages

42-pin plastic DIP (DIP42-P-600-2.54)

(Product name : MR27V1602DRA)

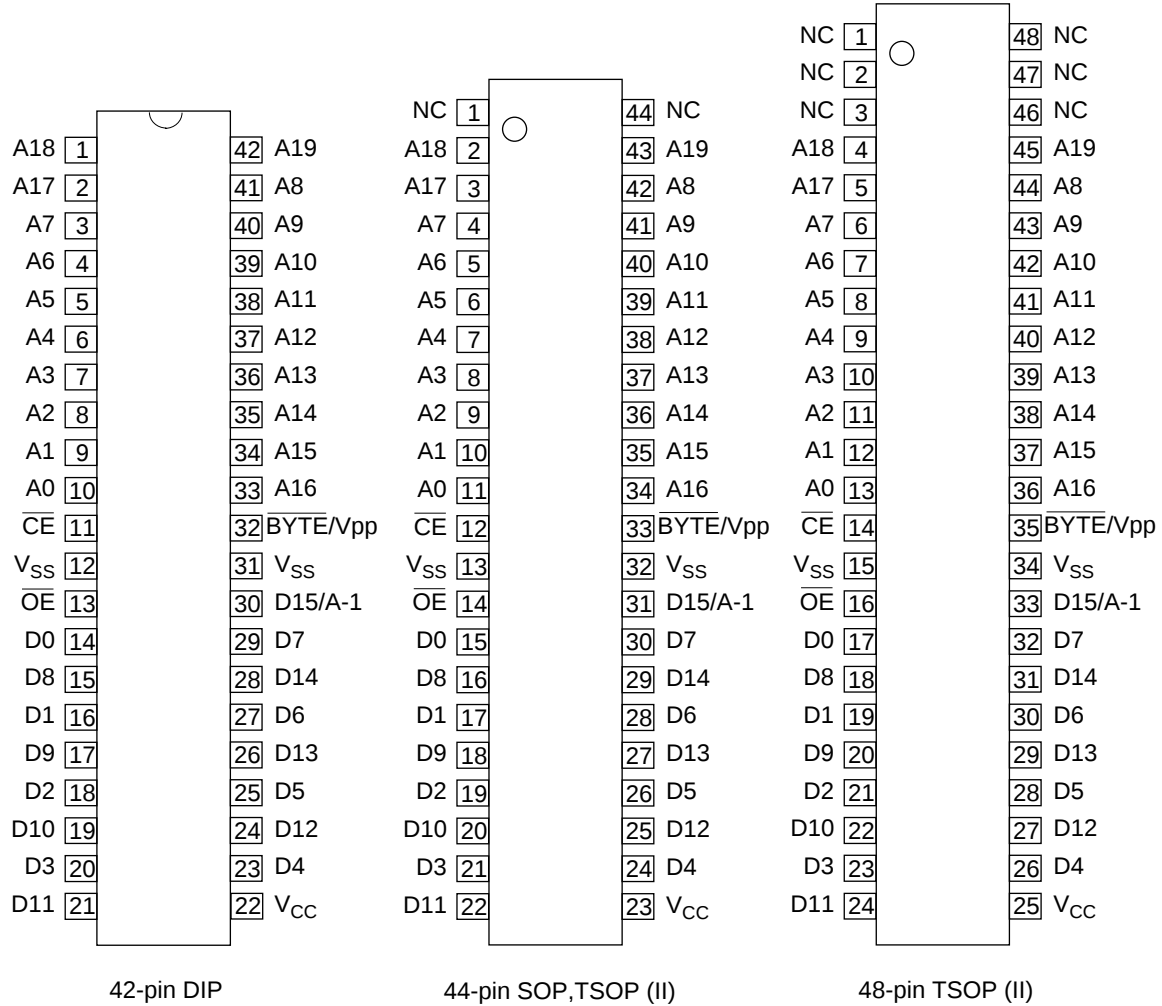
44-pin plastic SOP (SOP44-P-600-1.27-K)

(Product name : MR27V1602DMA)

44-pin plastic TSOP (TSOP II 44-P-400-0.80-K) (Product name : MR27V1602DTP)

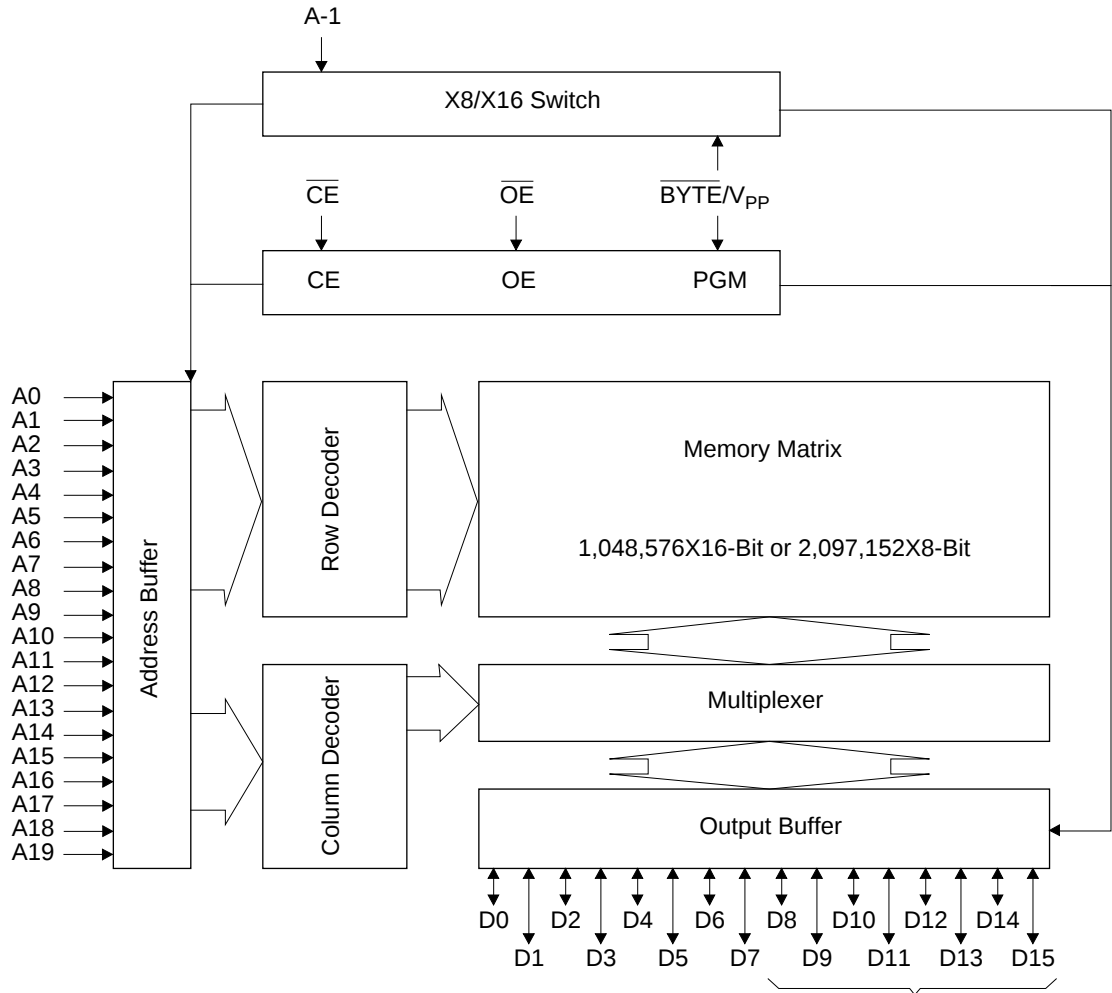
48-pin plastic TSOP (TSOP II 48-P-550-0.80-K) (Product name : MR27V1602DTA)

PIN CONFIGURATION (TOP VIEW)



PIN NAMES	FUNCTIONS
D15/A-1	Data output / Address input
A0-A19	Address input
D0-D14	Data output
$\overline{CE}$	Chip enable
$\overline{OE}$	Output enable
V _{CC}	Power supply voltage
V _{SS}	GND
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	$\overline{\text{CE}}$	$\overline{\text{OE}}$	BYTE/ V_{PP}	V_{CC}	D0 - D7	D8 - D14	D15/A-1
READ (16-Bit)	L	L	H	3.0V to 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

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

(Ta=0 to 70°C)

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
V_{CC} power supply voltage	V_{CC}	$V_{CC}=2.7V-3.6V$	2.7	-	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 1

($V_{CC}=3V\pm0.3V$, $T_a=0$ to $70^{\circ}C$)

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Input leakage current	I_{LI}	$V_I=0$ to V_{CC}	-	-	10	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}	$\overline{CE}=V_{IL}$, $\overline{OE}=V_{IH}$ $t_c=100ns$	-	-	35	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}	$I_{OH}=-400\mu A$	2.4	-	-	V
Output "L" level	V_{OL}	$I_{OL}=2.1mA$	-	-	0.4	V

Voltage is relative to Vss

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

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

DC Characteristics 2

($V_{CC}=3.3V\pm0.3V$, $T_a=0$ to $70^{\circ}C$)

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Input leakage current	I_{LI}	$V_I=0$ to V_{CC}	-	-	10	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}	$\overline{CE}=V_{IL}$, $\overline{OE}=V_{IH}$ $t_c=80ns$	-	-	40	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}	$I_{OH}=-400\mu A$	2.4	-	-	V
Output "L" level	V_{OL}	$I_{OL}=2.1mA$	-	-	0.4	V

Voltage is relative to Vss

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

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

AC Characteristics 1(V_{CC}=3V±0.3V, Ta=0 to 70°C)

Parameter	Symbol	Condition	Min.	Max.	Unit
Address cycle time	T _C	-	100	-	ns
Address access time	T _{ACC}	$\overline{CE}=\overline{OE}=V_{IL}$	-	100	ns
$\overline{CE}$ access time	T _{CE}	$\overline{OE}=V_{IL}$	-	100	ns
$\overline{OE}$ access time	T _{OE}	$\overline{CE}=V_{IL}$	-	50	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

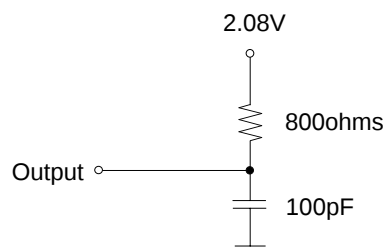
Input signal level	-----	0V/3V
Input timing reference level	-----	0.8V/2.0V
Output load	-----	100pF
Output timing reference level	-----	0.8V/2.0V

AC Characteristics 2(V_{CC}=3.3V±0.3V, Ta=0 to 70°C)

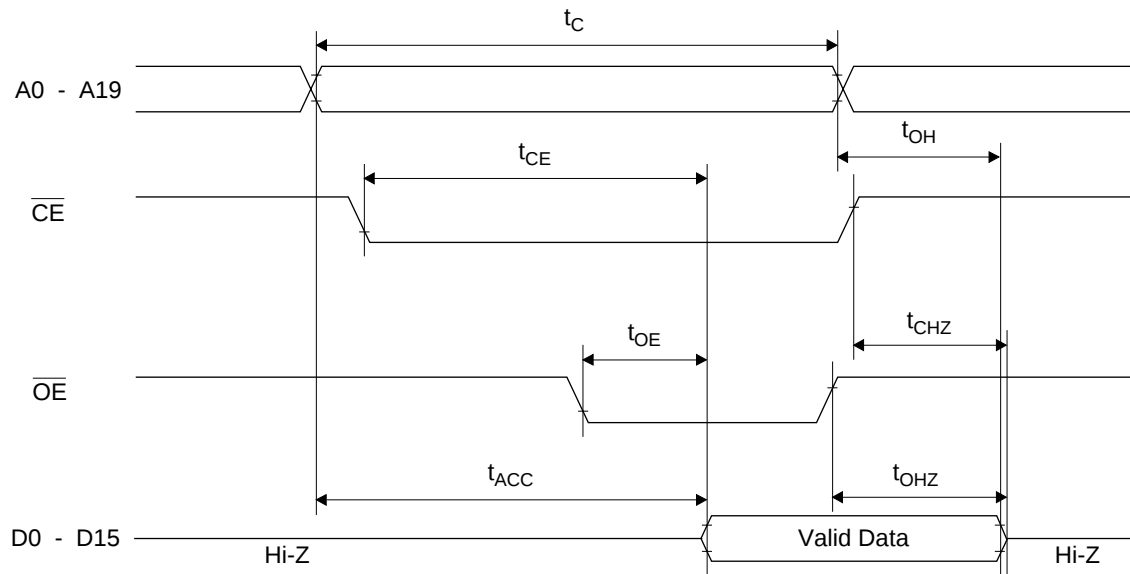
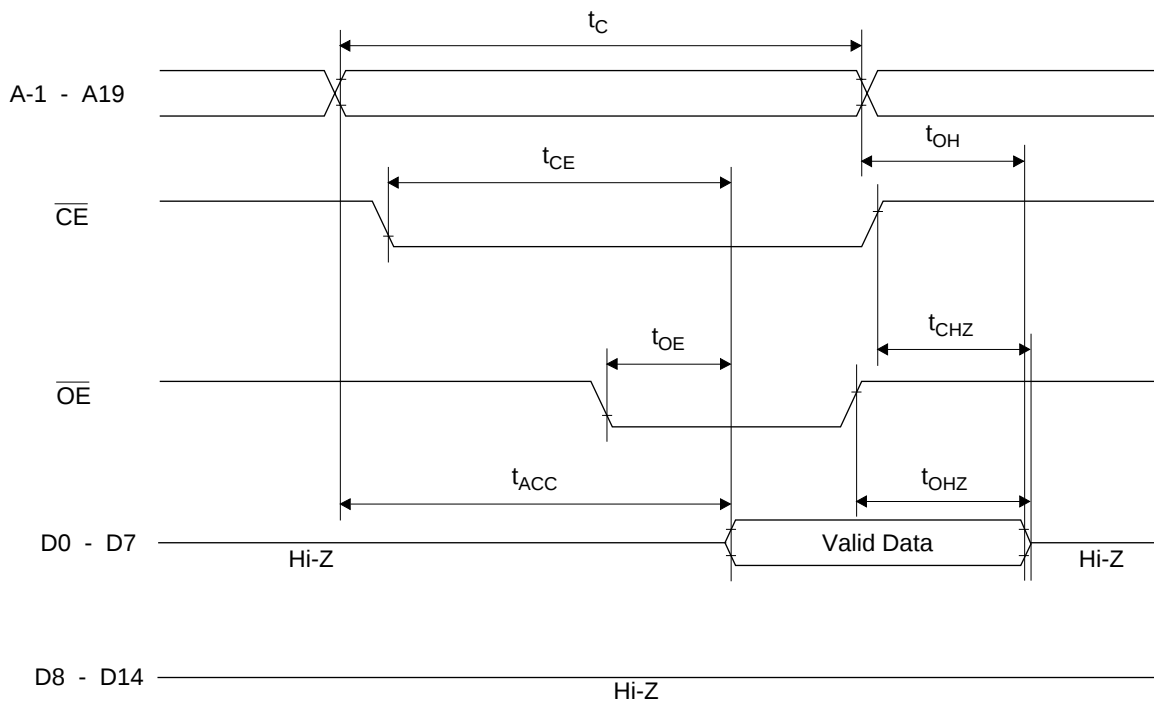
Parameter	Symbol	Condition	Min.	Max.	Unit
Address cycle time	T _C	-	80	-	ns
Address access time	T _{ACC}	$\overline{CE}=\overline{OE}=V_{IL}$	-	80	ns
$\overline{CE}$ access time	T _{CE}	$\overline{OE}=V_{IL}$	-	80	ns
$\overline{OE}$ access time	T _{OE}	$\overline{CE}=V_{IL}$	-	40	ns
Output disable time	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



TIMING CHART (READ CYCLE)

16-Bit Read Mode ($\overline{\text{BYTE}}=\text{V}_{\text{IH}}$)8-Bit Read Mode ($\overline{\text{BYTE}}=\text{V}_{\text{IL}}$)

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} +0.5V	-	-	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} =-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.

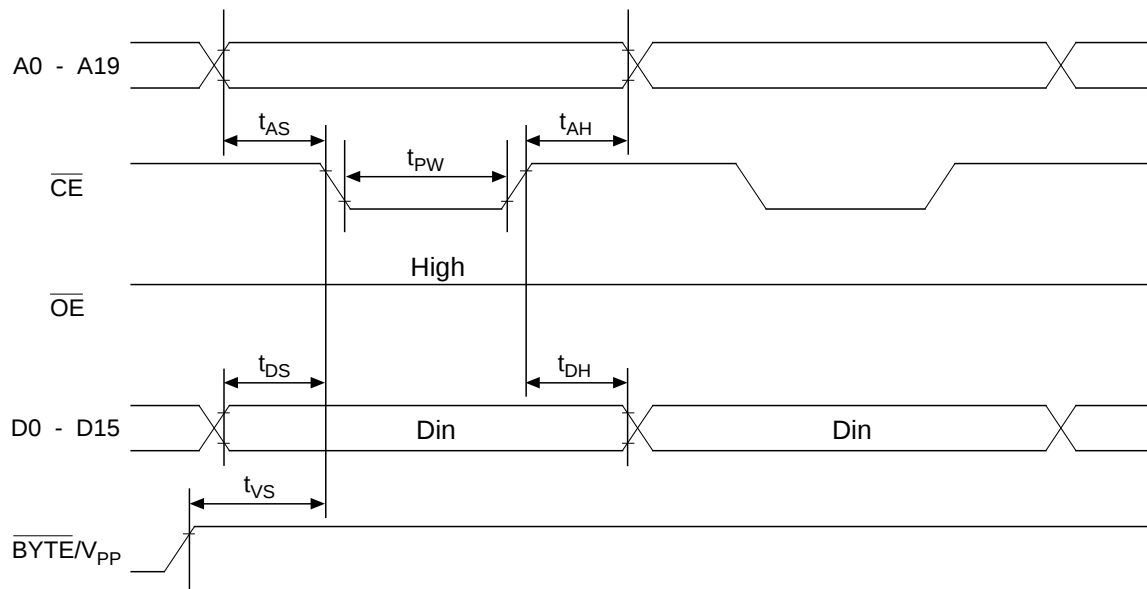
Setting up address as the following condition call the preprogrammed codes on device outputs.

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

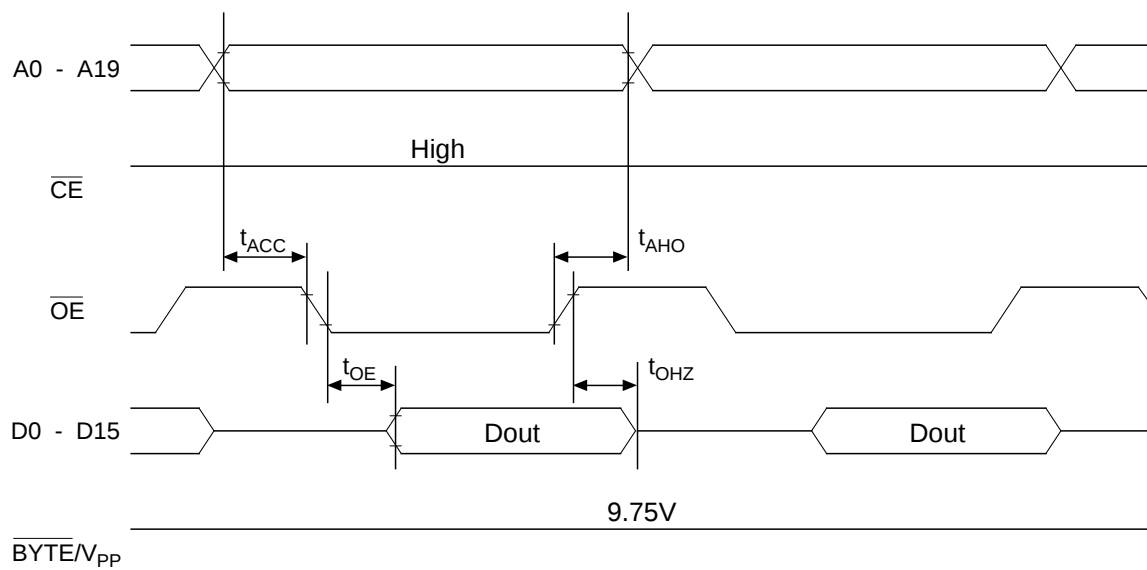
A0	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	A14	A15	A16	A17	A18	A19	DATA
0	1	0	1	0	1	0	1	0	VH*	0	1	0	1	0	1	0	0	1	1	FF00
1	0	1	0	1	0	1	0	1	VH*	1	0	1	0	1	0	1	1	0	0	00FF
Other conditions																				FFFF

*: VH=8V±0.25V

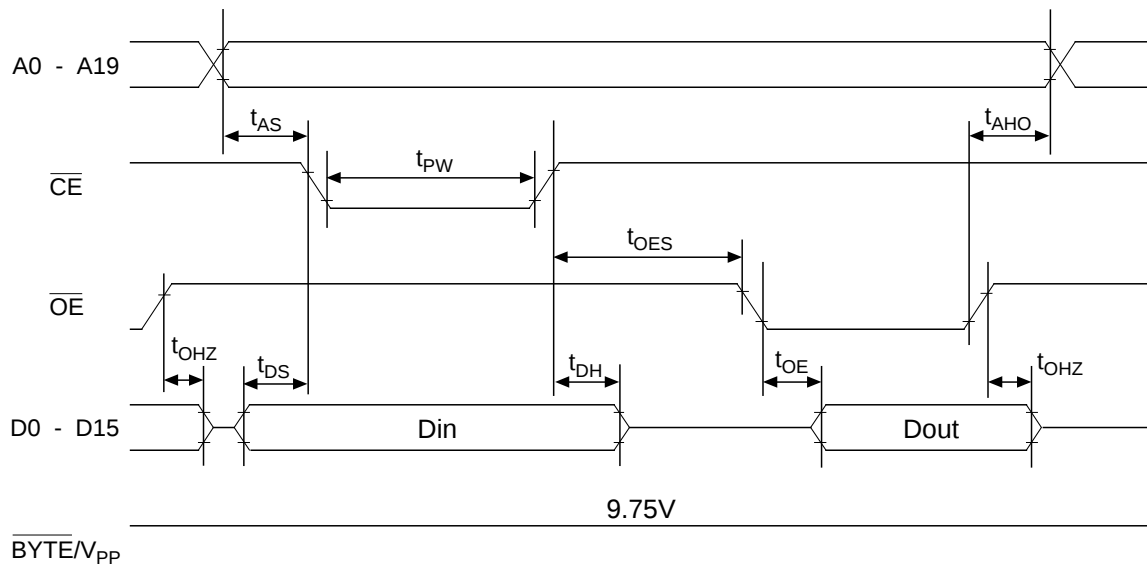
Consecutive Programming Waveforms



Consecutive Program Verify Waveforms



Program and Program Verify Cycle Waveforms



PIN Capacitance

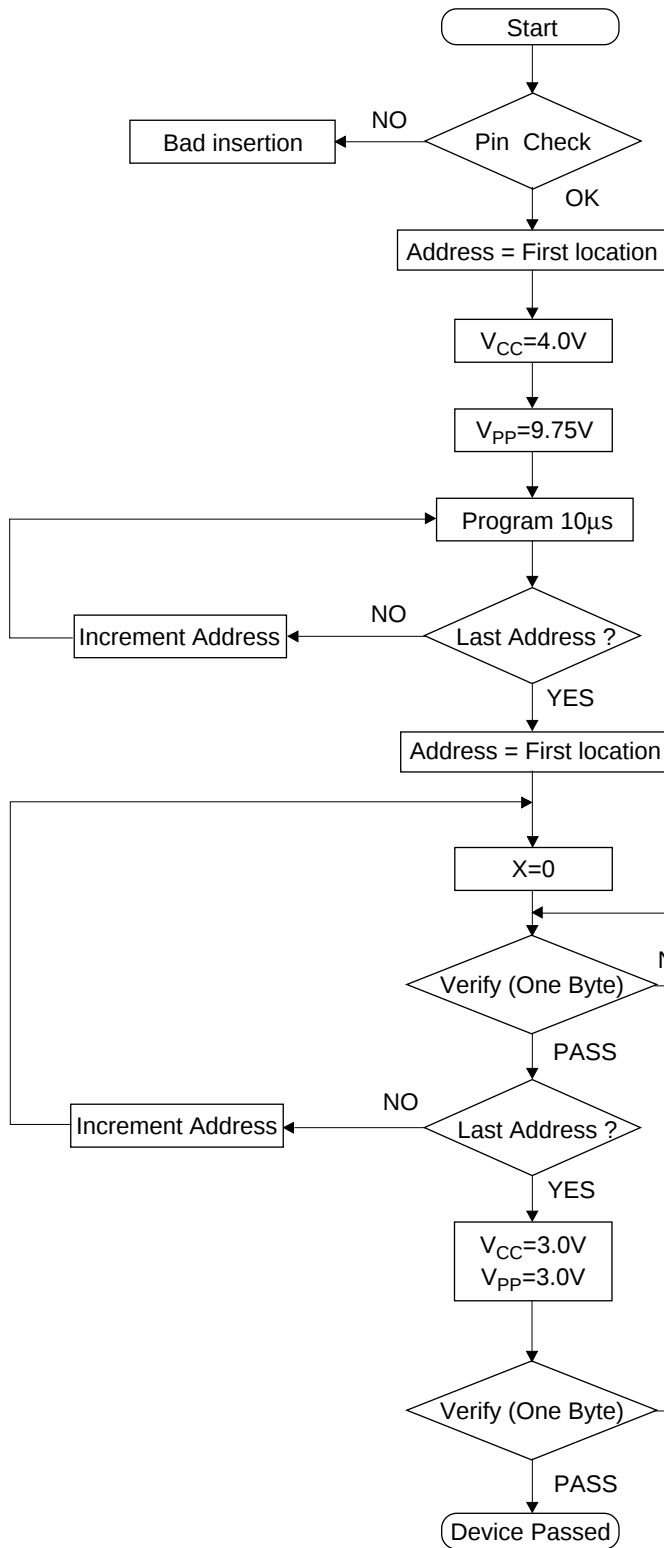
($V_{CC}=3.3V$, $T_a=25^{\circ}C$, $f=1MHz$)

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Input	C_{IN1}	$V_I=0V$	-	-	8 (10)	pF
$\overline{BYTE}/V_{PP}$	C_{IN2}		-	-	120	
Output	C_{OUT}	$V_O=0V$	-	-	10 (12)	

() : DIP only

Programming / Verify Flow Chart

Programming



Verify

