PEDR27V1602E-01-01

OKI Semiconductor

This version : Dec. 1999
Previous version: ----------

MR27V1602E

Preliminary

1,048,576–Word × 16–Bit or 2,097,152–Word × 8–Bit One Time PROM

GENERAL DESCRIPTION

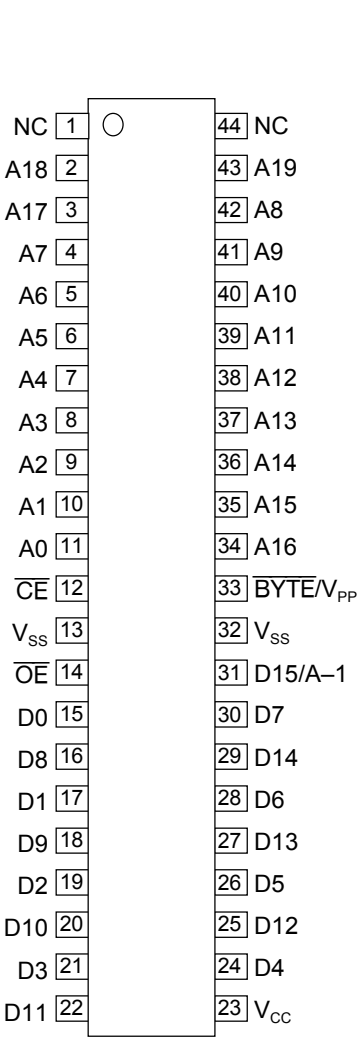
The MR27V1602E is a 16 Mbit electrically Programmable Read-Only Memory that can be electrically switched between 1,048,576-word × 16-bit and 2,097,152-word × 8-bit configurations. This device operates on a single +3.3V power supply, and all inputs and outputs are TTL compatible. Because of its asynchronous operation, it requires no external clocks, making this device easy-to-use.
The MR27V1602E 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 44-pin SOP, 44-pin TSOP(II) or 48-pin TSOP(I) packages.

FEATURES

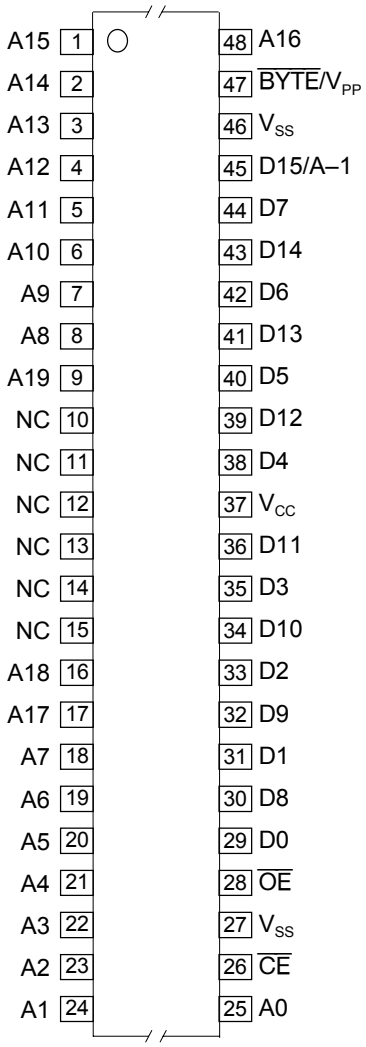
· 1,048,576-word × 16-bit/2,097,152-word × 8-bit electrically switchable configuration
· +3.3 V power supply
· Access time 90 nS MAX
· Operating current 30 mA MAX
· Standby current 50 µA MAX
· Input/Output TTL compatible
· Three-state output
· Packages:

44-pin plastic SOP (SOP44-P-600-1.27-K)	(Product Name : MR27V1602EMA)
44-pin plastic TSOP (TSOP II 44-P-400-0.80-K)	(Product Name : MR27V1602ETP)
48-pin plastic TSOP (TSOP I 48-P-1220-0.50-K)	(Product Name : MR27V1602ETN)

PIN CONFIGURATION (TOP VIEW)



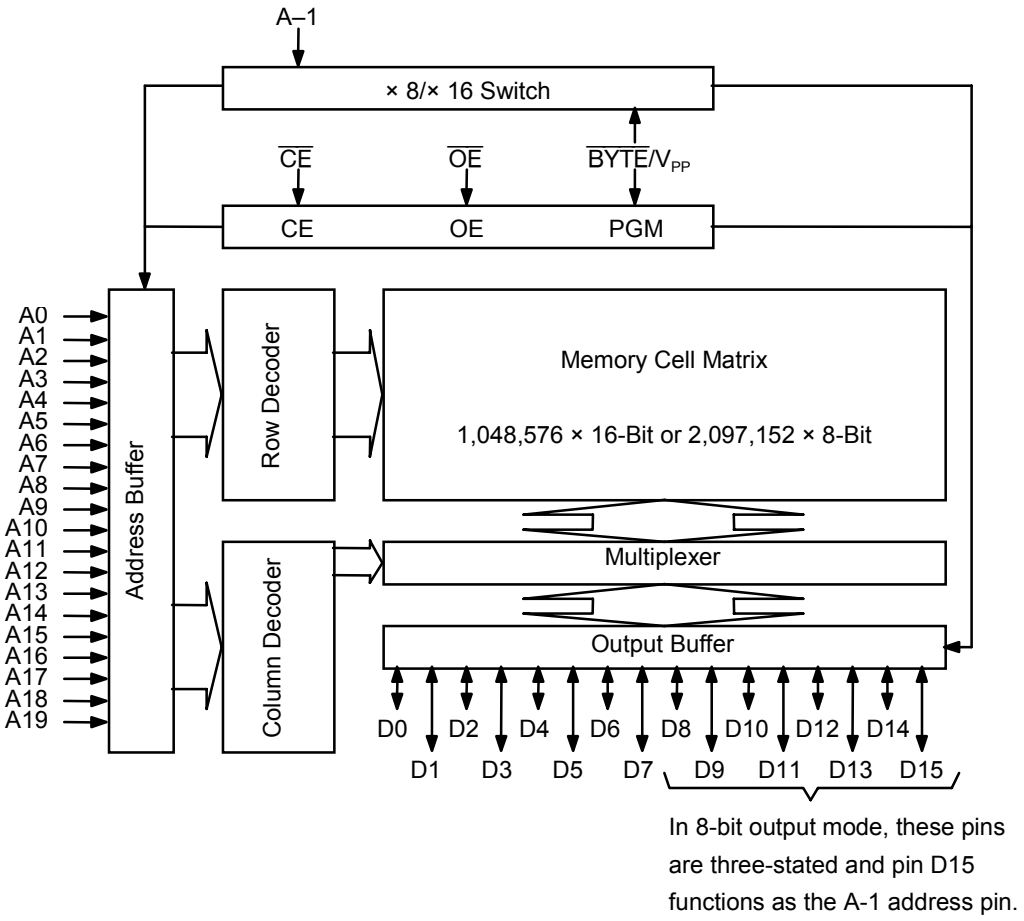
44-pin SOP, TSOP(II)



48-pin TSOP(I)

Pin name	Functions
D15/A–1	Data output/Address input
A0 to A19	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



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	—	—	30	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.

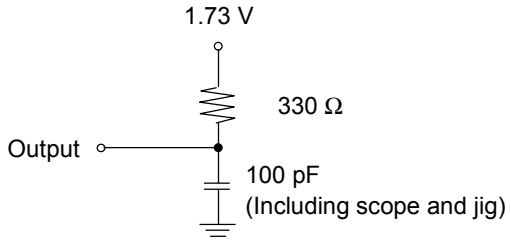
AC Characteristics

(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

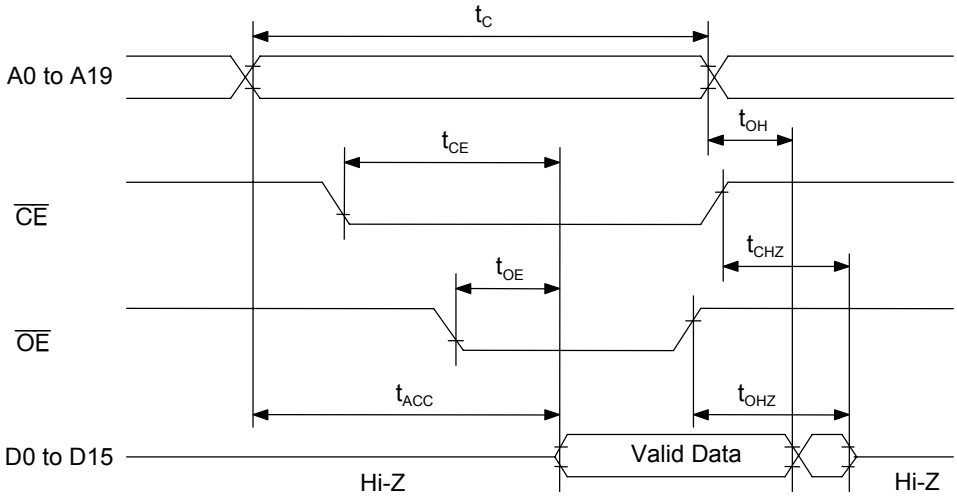
Measurement conditions

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

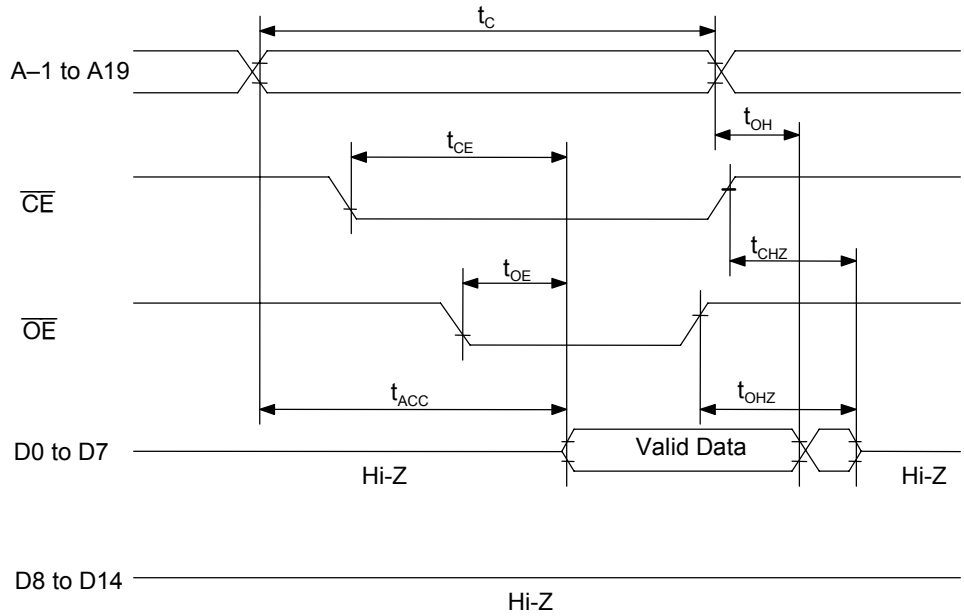


TIMING CHART (READ CYCLE)

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

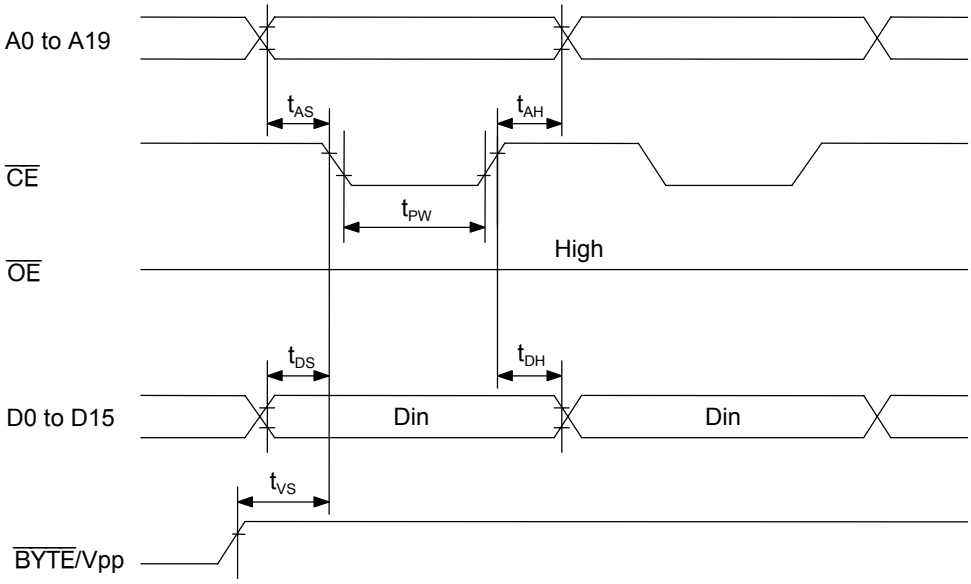
Pin Check Function is to check contact between each device-pin and each socket-lead with EPROM programmer. Setting up address as following condition call the preprogrammed codes on device outputs.

(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)

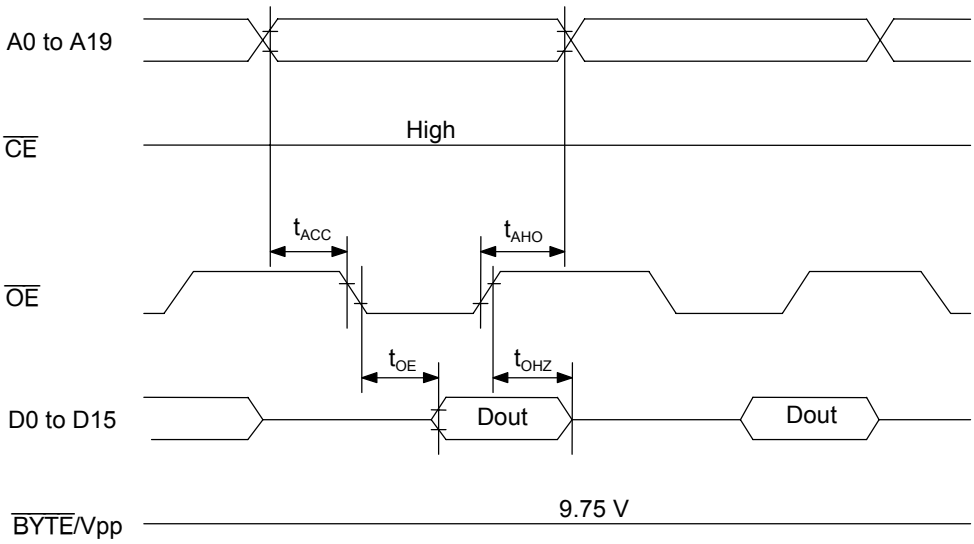
A0	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	A14	A15	A16	A17	A18	A19	DATA
0	1	0	1	0	1	0	1	0	VH*	0	1	0	1	0	1	0	0	1	1	FF00
1	0	1	0	1	0	1	0	1	VH*	1	0	1	0	1	0	1	1	0	0	00FF
Other conditions																				FFFF

*: VH = 8 V ± 0.25 V

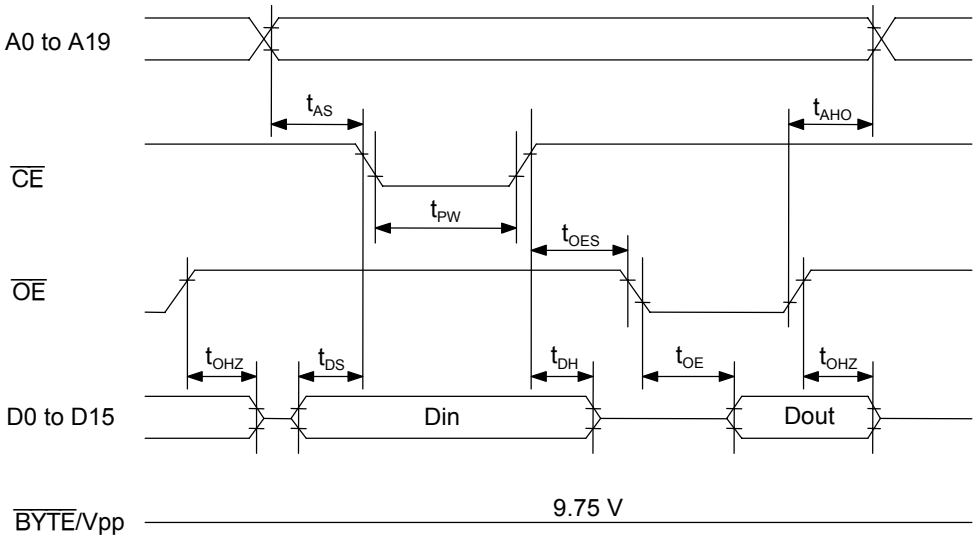
Consecutive Programming Waveforms



Consecutive Program Verify Waveforms



Program and Program Verify Cycle Waveforms

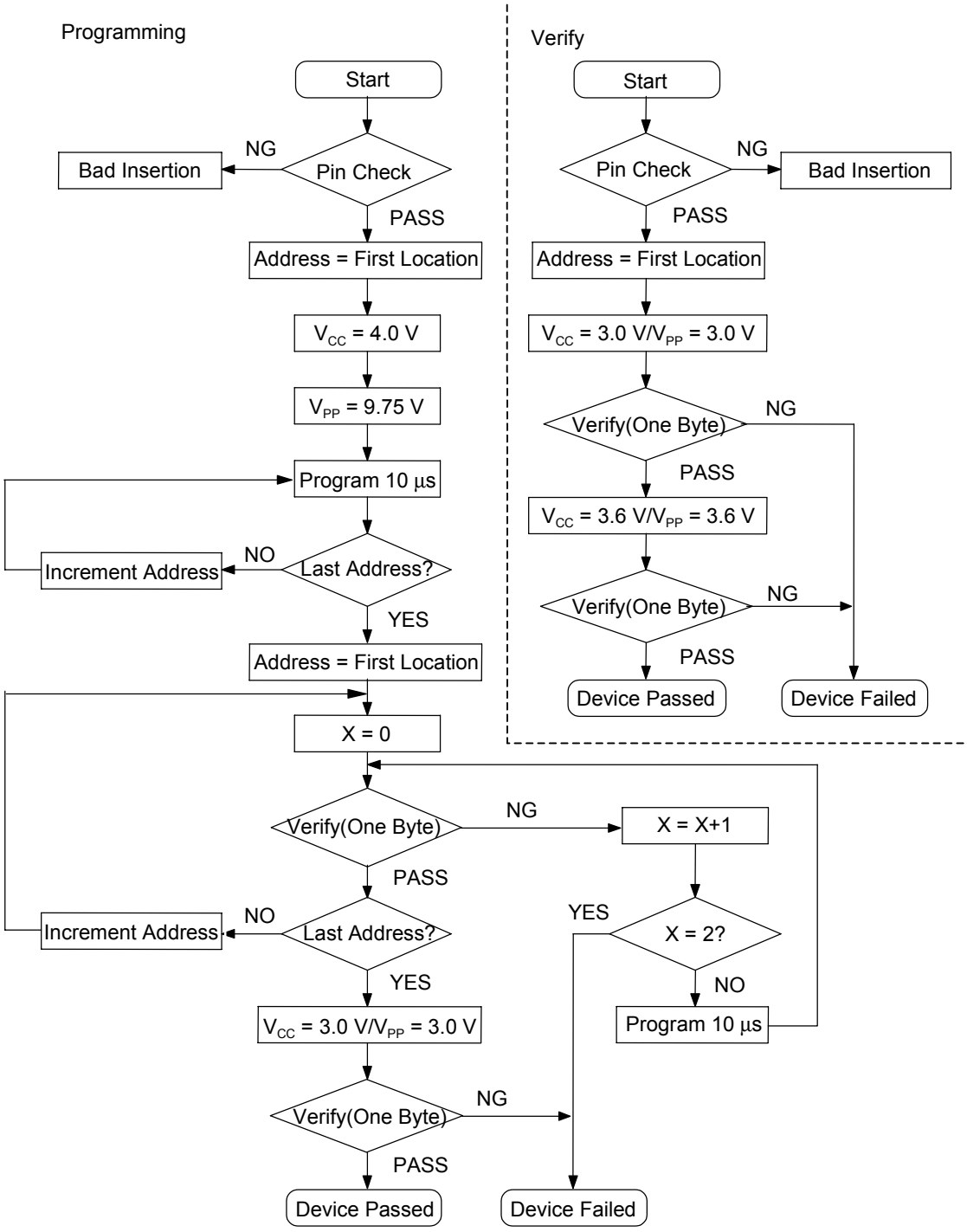


Pin Capacitance

(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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