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## MSM27C3252CZ

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2,097,152-Word x 16-Bit or 4,194,304-Word x 8-Bit

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

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### DESCRIPTION

The MSM27C3252CZ is a 32Mbit electrically Programmable Read-Only Memory with page mode. Its configuration can be electrically switched between 2,097,152 word x 16bit and 4,194,304 word x 8bit. The MSM27C3252CZ operates on a single +5V power supply and is TTL compatible. The MSM27C3252CZ provides Page mode which can greatly reduce the read access time. Since the MSM27C3252CZ operates asynchronously, external clocks are not required, making this device easy-to-use. The MSM27C3252CZ 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 or 48-pin TSOP packages.

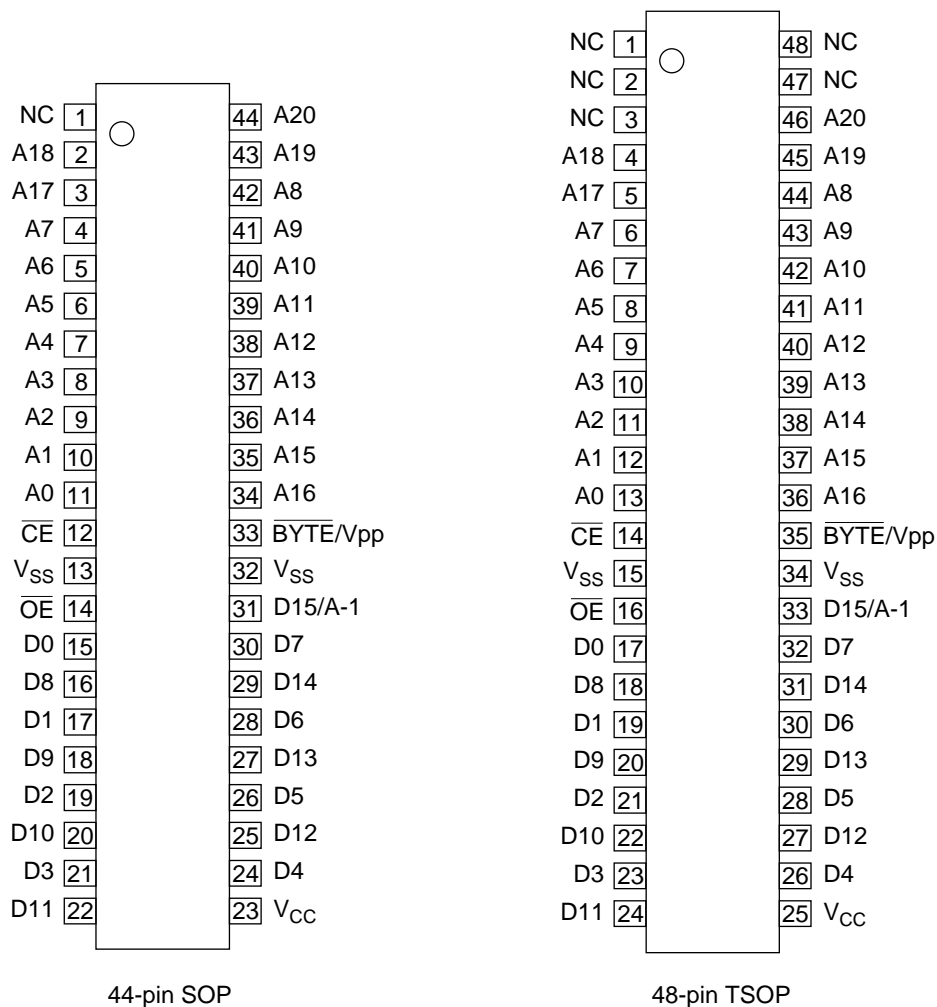
### FEATURES

- 2,097,152 word x 16bit / 4,194,304 word x 8bit electrically switchable configuration
- Single +5V power supply
- Access time 100ns  
Page mode access time 50ns
- Input / Output TTL compatible
- Three-state output
- Packages

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

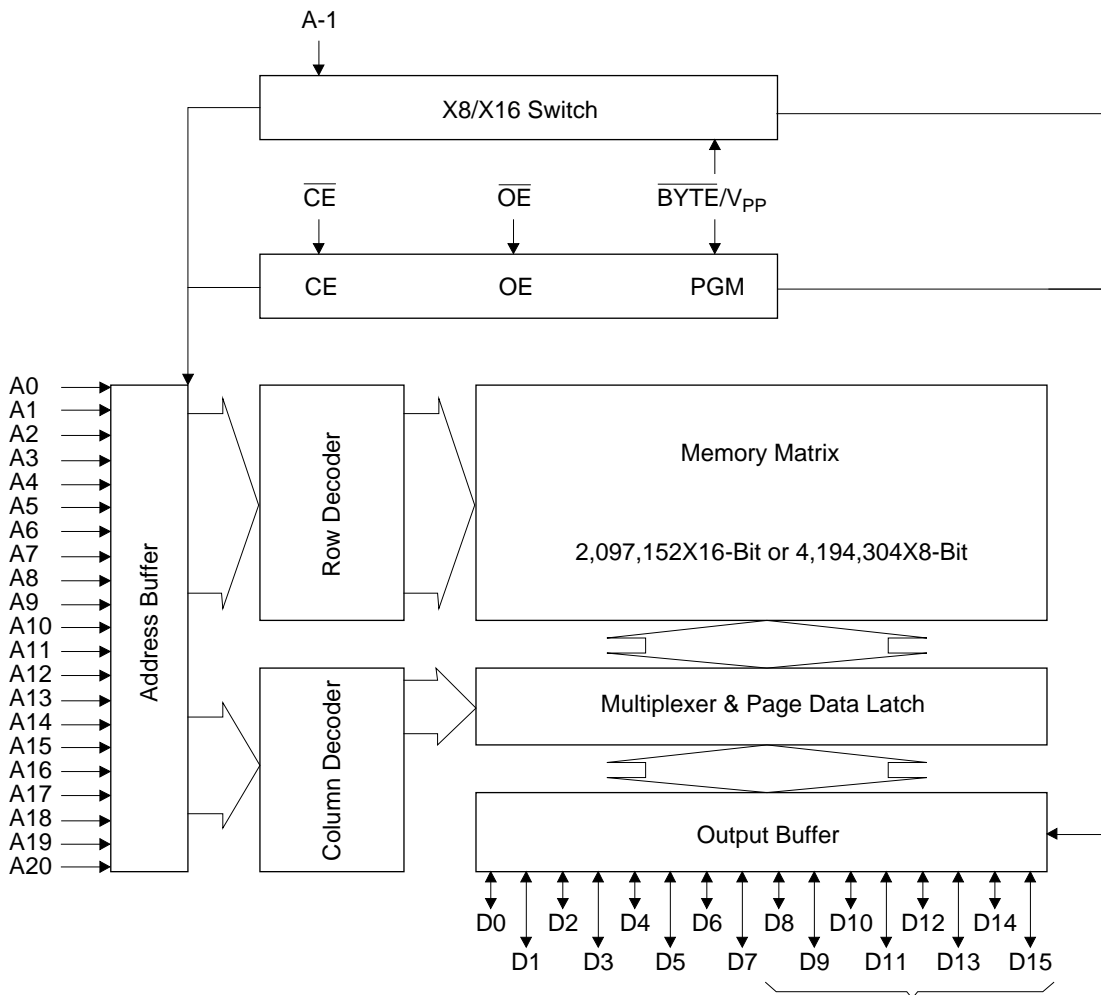
48-pin plastic TSOP (TSOP II 48-P-550-0.80-K)

## PIN CONFIGURATION (TOP VIEW)



PIN NAMES	FUNCTIONS
D15/A-1	Data output / Address input
A0 - A20	Address input
D0 - D14	Data output
$\overline{CE}$	Chip enable
$\overline{OE}$	Output enable
V <sub>CC</sub>	Power supply voltage
V <sub>SS</sub>	GND
BYTE/V <sub>PP</sub>	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	$\overline{CE}$	$\overline{OE}$	BYTE/ $V_{PP}$	$V_{CC}$	D0 - D7	D8 - D14	D15/A-1
READ (16-Bit)	L	L	H	4.5V to 5.5V	$D_{OUT}$		
READ (8-Bit)	L	L	L		$D_{OUT}$	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	11.5V	6.25V	$D_{IN}$		
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 7	V
Program power supply voltage	$V_{PP}$		-0.5 to 12.5	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	$V_{CC}$	$V_{CC}=4.5V - 5.5V$	4.5	-	5.5	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	-	0.8	V

Voltage is relative to  $V_{SS}$

**ELECTRICAL CHARACTERISTICS (Read operation)****DC Characteristics**(V<sub>CC</sub>=5V±0.5V, T<sub>a</sub>=0 to 70°C)

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Input leakage current	I <sub>LI</sub>	V <sub>I</sub> =0 to V <sub>CC</sub>	-	-	10	μA
Output leakage current	I <sub>LO</sub>	V <sub>O</sub> =0 to V <sub>CC</sub>	-	-	10	μA
V <sub>CC</sub> power supply current (Standby)	I <sub>CS1</sub>	$\overline{CE}=V_{CC}$	-	-	50	μA
	I <sub>CS2</sub>	$\overline{CE}=V_{IH}$	-	-	1	mA
V <sub>CC</sub> power supply current (Read)	I <sub>CCA</sub>	$\overline{CE}=V_{IL}$ , $\overline{OE}=V_{IH}$ tc=100ns	-	-	100	mA
V <sub>PP</sub> power supply current	I <sub>PP</sub>	V <sub>PP</sub> =V <sub>CC</sub>	-	-	10	μA
Input "H" level	V <sub>IH</sub>	-	2.2	-	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

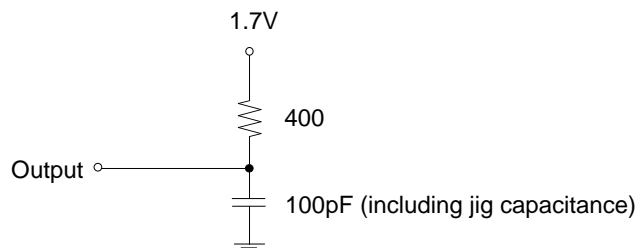
Voltage is relative to V<sub>SS</sub>**AC Characteristics**(V<sub>CC</sub>=5V±0.5V, T<sub>a</sub>=0 to 70°C)

Parameter	Symbol	Condition	Min.	Max.	Unit
Random access cycle time	T <sub>C</sub>	-	100	-	ns
Address access time	T <sub>ACC</sub>	$\overline{CE}=\overline{OE}=V_{IL}$	-	100	ns
Page set up time	T <sub>PSET</sub>	NOTE(1)	120	-	ns
Page access cycle time	T <sub>PC</sub>	-	50	-	ns
Page access time	T <sub>PAC</sub>	-	-	50	ns
$\overline{CE}$ access time	T <sub>CE</sub>	$\overline{OE}=V_{IL}$	-	100	ns
$\overline{OE}$ access time	T <sub>OE</sub>	$\overline{CE}=V_{IL}$	-	50	ns
Output disable time	T <sub>CHZ</sub>	$\overline{OE}=V_{IL}$	0	40	ns
	T <sub>OHZ</sub>	$\overline{CE}=V_{IL}$	0	35	ns
Output hold time	T <sub>OH</sub>	$\overline{CE}=\overline{OE}=V_{IL}$	0	-	ns

NOTE(1) T<sub>PSET</sub> is defined as the end of either  $\overline{CE}$  trailing edge or address transition in random access term until the first page address transition.

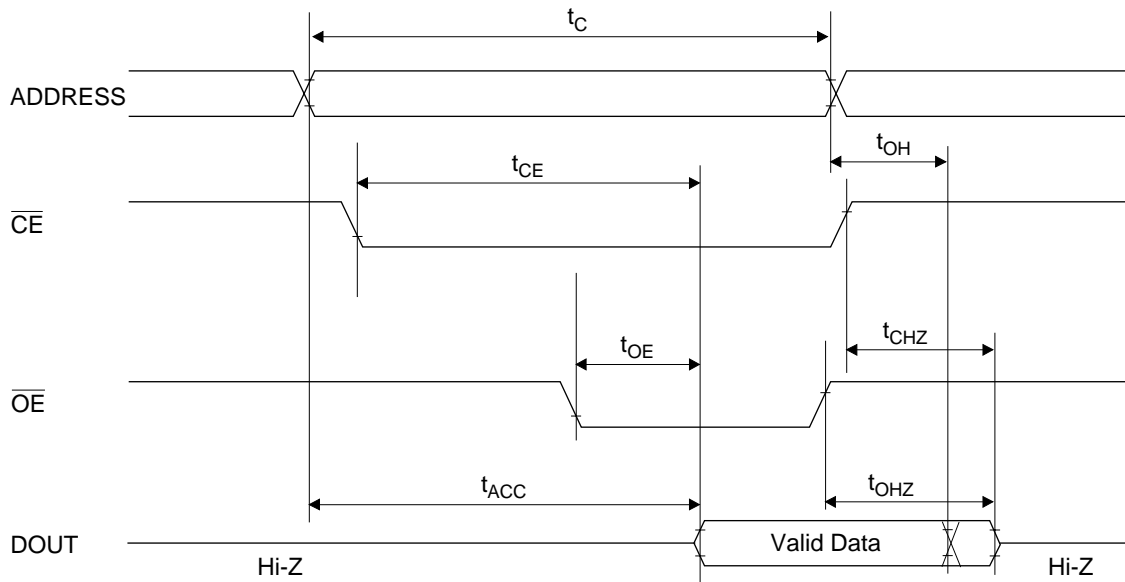
## Measurement conditions

Input signal level	-----	0V/3V
Input timing reference level	-----	0.8V/2.0V
Output load	-----	1TTL gate + 100pF
Output timing reference level	-----	0.8V/2.0V

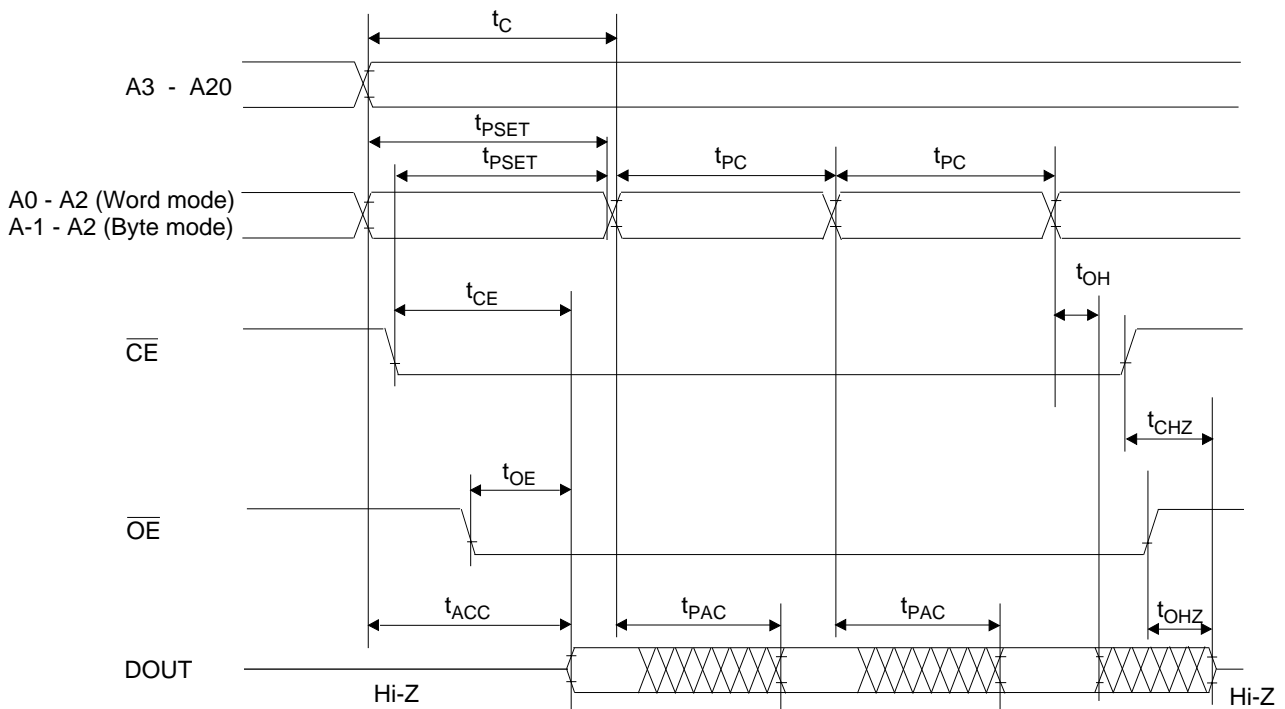


## TIMING CHART

## NORMAL MODE READ CYCLE



## PAGE MODE READ CYCLE



**ELECTRICAL CHARACTERISTICS (Programming operation)****DC Characteristics**

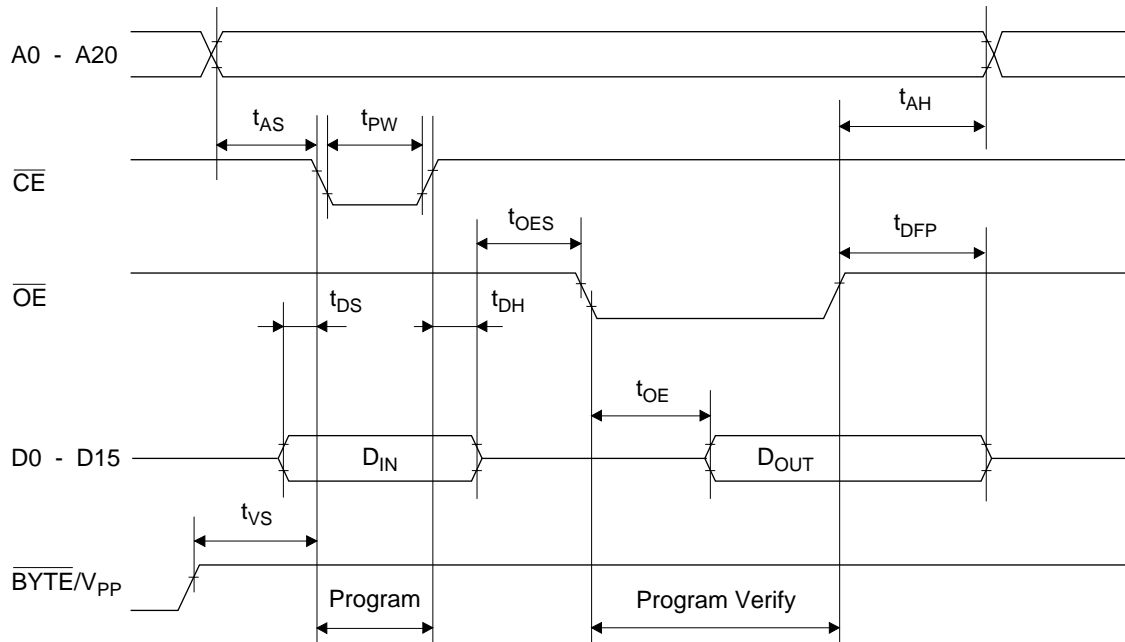
(Ta=25°C±5°C)

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>	-	-	-	100	mA
Input "H" level	V <sub>IH</sub>	-	2.2	-	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>	-	11.25	11.5	11.75	V
V <sub>CC</sub> power supply voltage	V <sub>CC</sub>	-	6.0	6.25	6.5	V

Voltage is relative to V<sub>SS</sub>**AC Characteristics**(V<sub>CC</sub>=6.25V±0.25V, V<sub>pp</sub>=11.5V±0.25V, Ta=25°C±5°C)

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Address set-up time	T <sub>AS</sub>	-	2	-	-	μs
$\overline{OE}$ set-up time	T <sub>OES</sub>	-	2	-	-	μs
Data set-up time	T <sub>DS</sub>	-	2	-	-	μs
Address hold time	T <sub>AH</sub>	-	0	-	-	μs
Data hold time	T <sub>DH</sub>	-	2	-	-	μs
Output float delay from $\overline{OE}$	T <sub>DFP</sub>	-	0	-	130	ns
V <sub>PP</sub> voltage set-up time	T <sub>VS</sub>	-	2	-	-	μs
Program pulse width	T <sub>PW</sub>	-	23	25	27	μs
Data valid from $\overline{OE}$	T <sub>OE</sub>	-	-	-	150	ns

### Programming Waveform



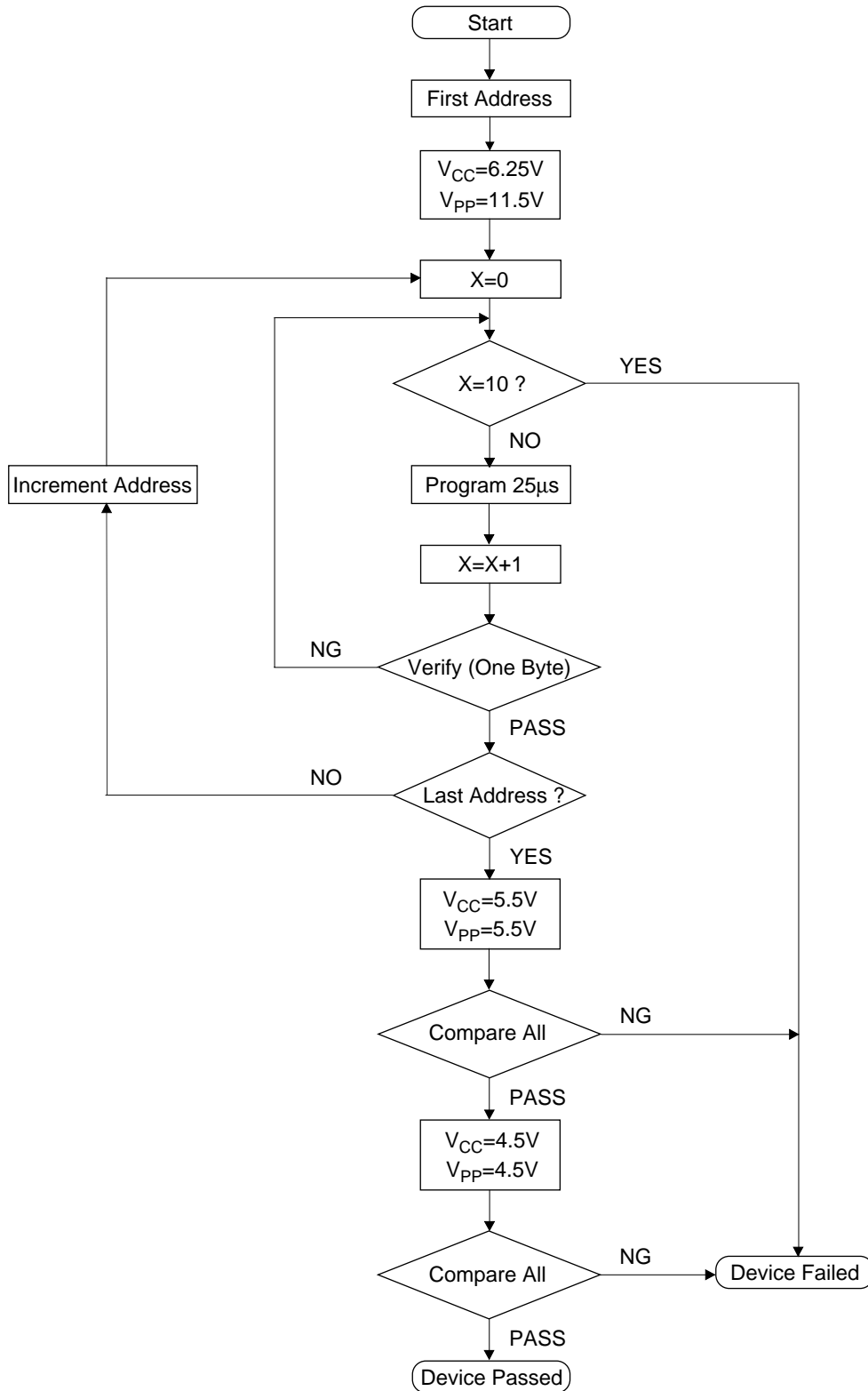
### PIN Capacitance

( $V_{CC}=5V$ ,  $T_a=25^{\circ}C$ ,  $f=1MHz$ )

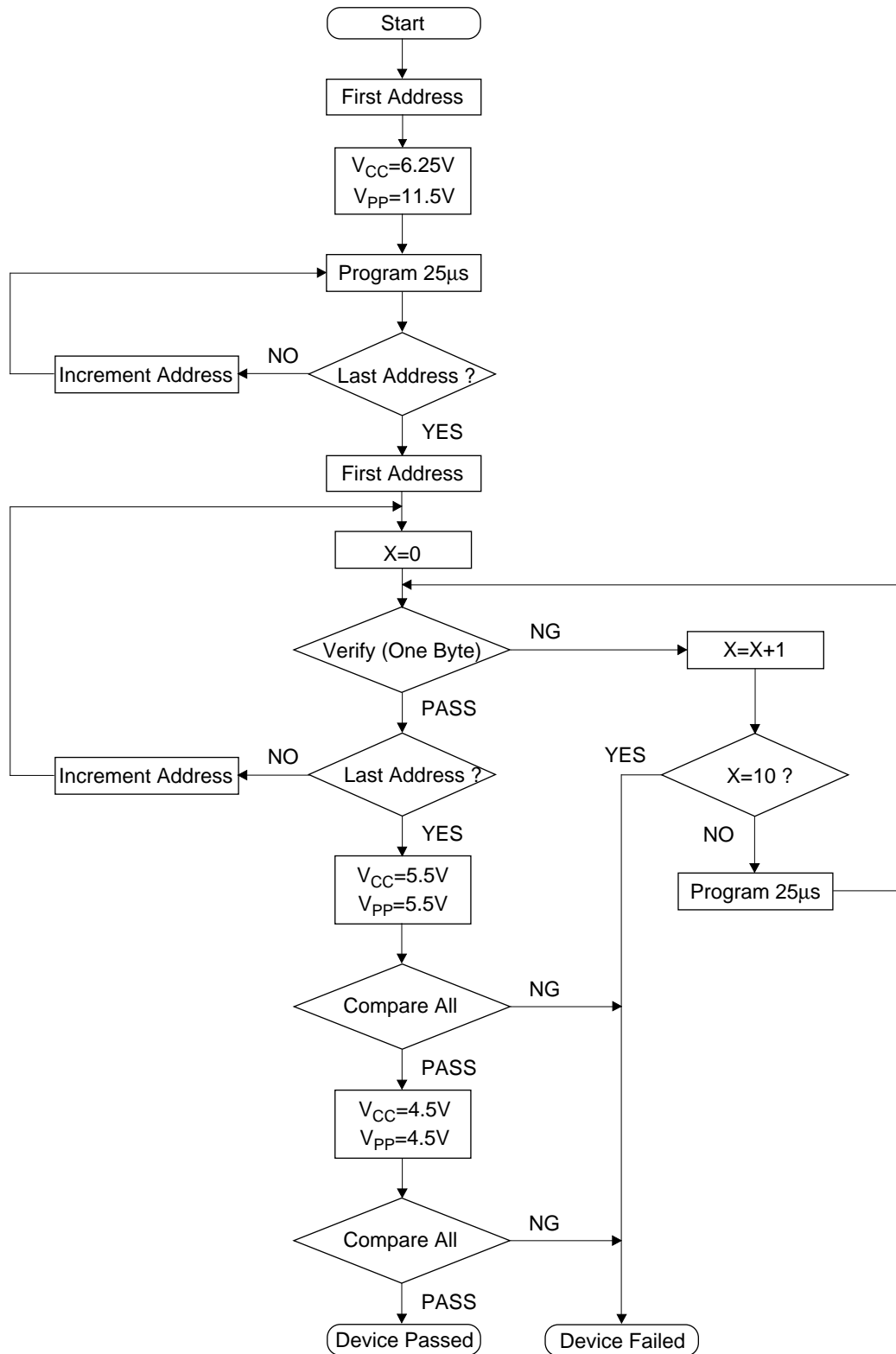
Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Input	$C_{IN1}$	$V_I=0V$	-	-	12	pF
BYTE/V <sub>PP</sub>	$C_{IN2}$		-	-	60	
Output	$C_{OUT}$	$V_O=0V$	-	-	15	



## High Speed Programming Algorithm ( I )



## High Speed Programming Algorithm ( II )



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