

OKI Semiconductor

1A

MSM27C1602CZ

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

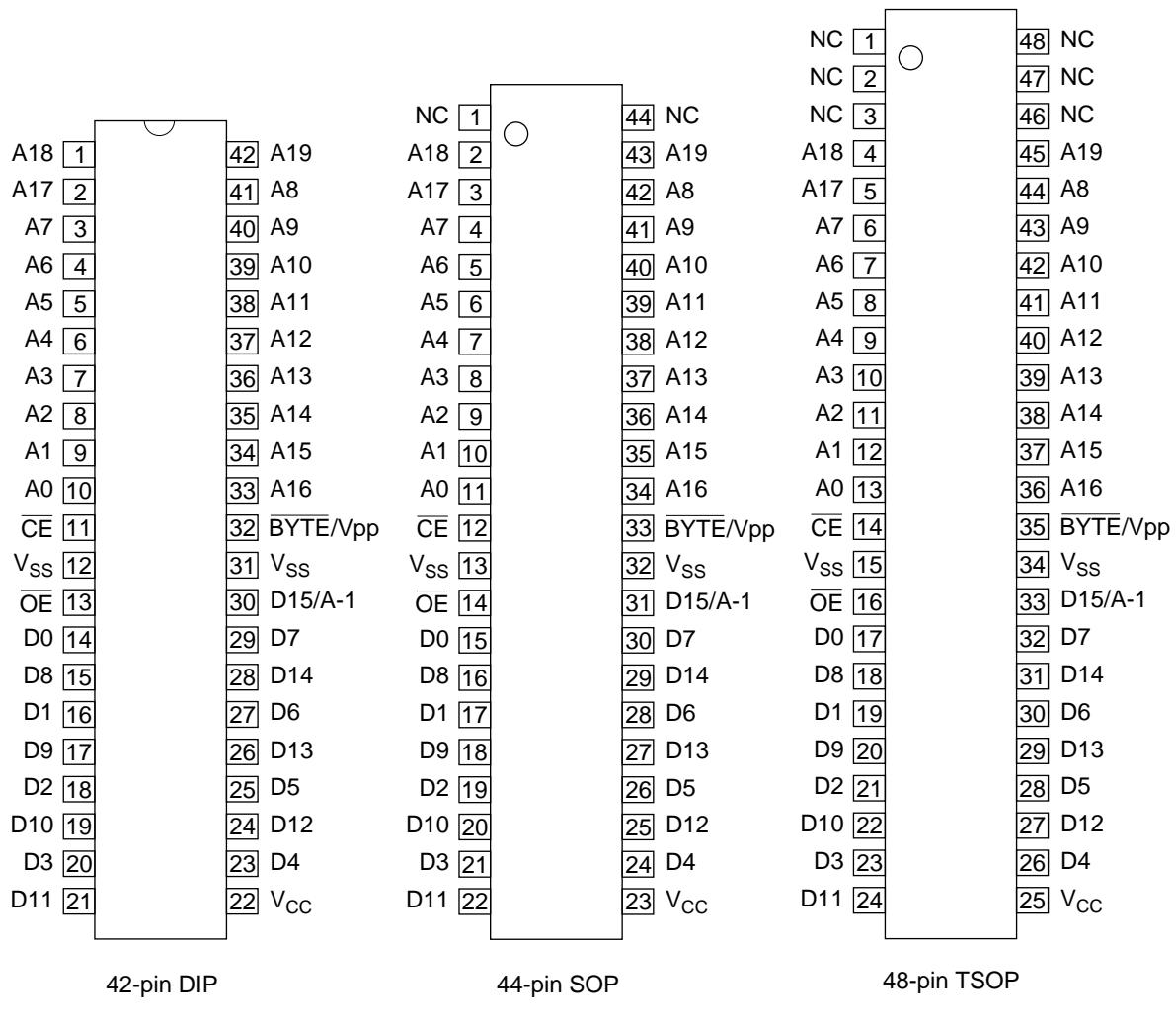
DESCRIPTION

The MSM27C1602CZ 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 8 bit. The MSM27C1602CZ operates on a single +5V power supply and is TTL compatible. Since the MSM27C1602CZ operates asynchronously , external clocks are not required , making this device easy-to-use. The MSM27C1602CZ 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 48-pin TSOP packages.

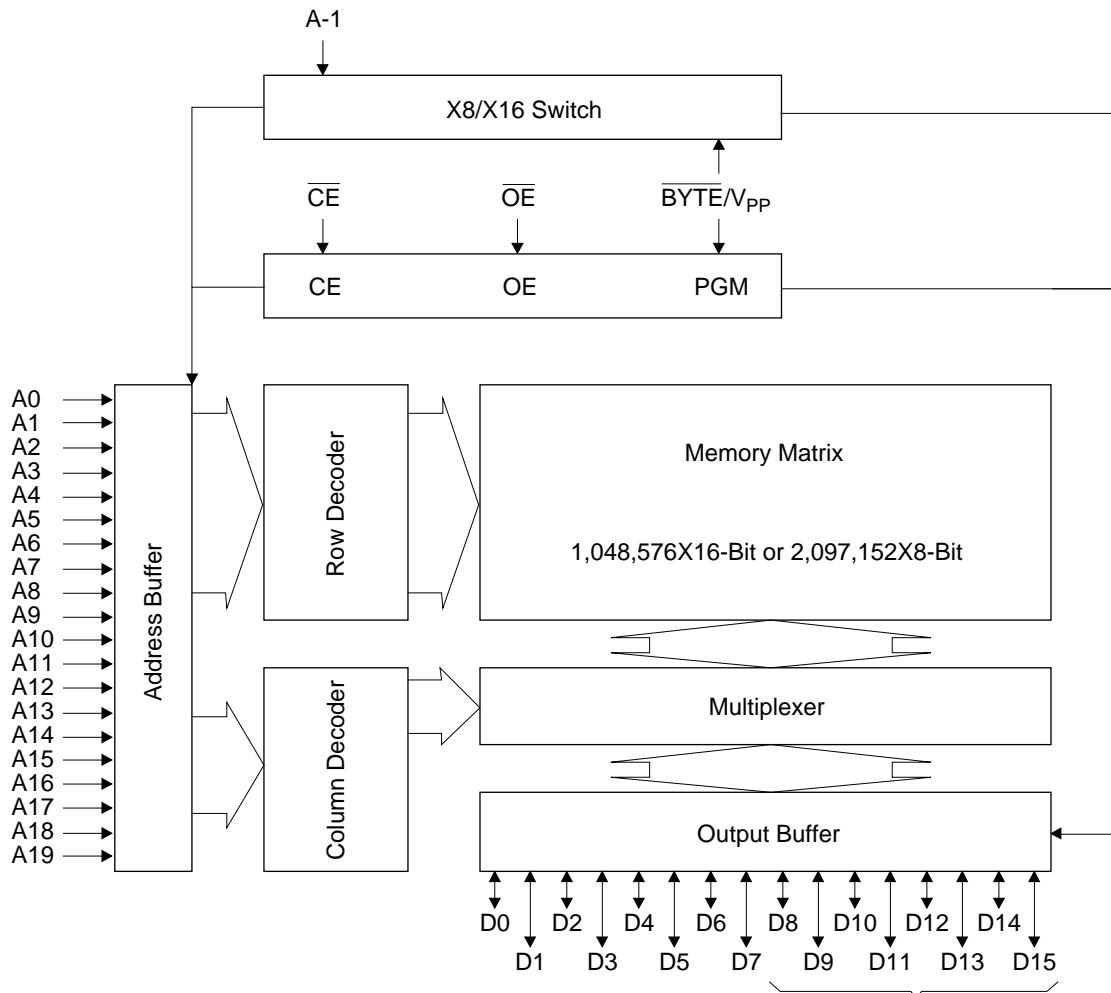
FEATURES

- 1,048,576 word x 16bit / 2,097,152 word x 8bit electrically switchable configuration
- Single +5V power supply
- Access time 80ns
- 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)
 - 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 - A19	Address Input
D0 - D14	Data Output
CE	Chip Enable
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	CE	OE	BYTE/V _{PP}	V _{CC}	D0 - D7	D8 - D14	D15/A-1
READ (16-Bit)	L	L	H	5.0V	D _{OUT}		
READ (8-Bit)	L	L	L		D _{OUT}	Hi-Z	L/H
OUTPUT DISABLE	L	H	H	11.5V	Hi-Z		*
			L		Hi-Z		*
STAND-BY	H	*	H	6.25V	D _{IN}		
			L		Hi-Z		
PROGRAM	L	H			D _{OUT}		
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	-	0.6	V

Voltage is relative to V_{SS}

ELECTRICAL CHARACTERISTICS (Read operation)**DC Characteristics**(V_{CC}=5V±0.5V, Ta=0 to 70°C)

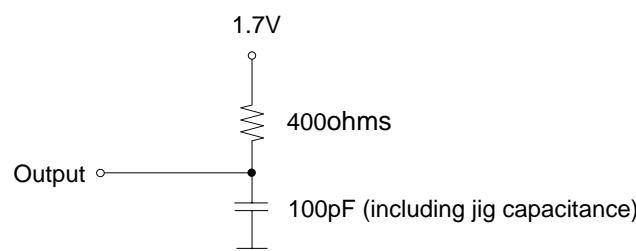
Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Input leakage current	I _{LI}	V _I =0 to V _{CC}	-	-	10	µA
Output leakage current	I _{LO}	V _O =0 to V _{CC}	-	-	10	µA
V _{CC} power supply current (Standby)	I _{CS1}	CĒ=V _{CC}	-	-	50	µA
	I _{CS2}	CĒ=V _{IH}	-	-	1	mA
V _{CC} power supply current (Read)	I _{CCA}	CĒ=V _{IL} , OĒ=V _{IH} tc=80ns	-	-	70	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	-	0.8	V
Output "H" level	V _{OH}	I _{OH} =-400µA	2.4	-	-	V
Output "L" level	V _{OL}	I _{OL} =2.1mA	-	-	0.45	V

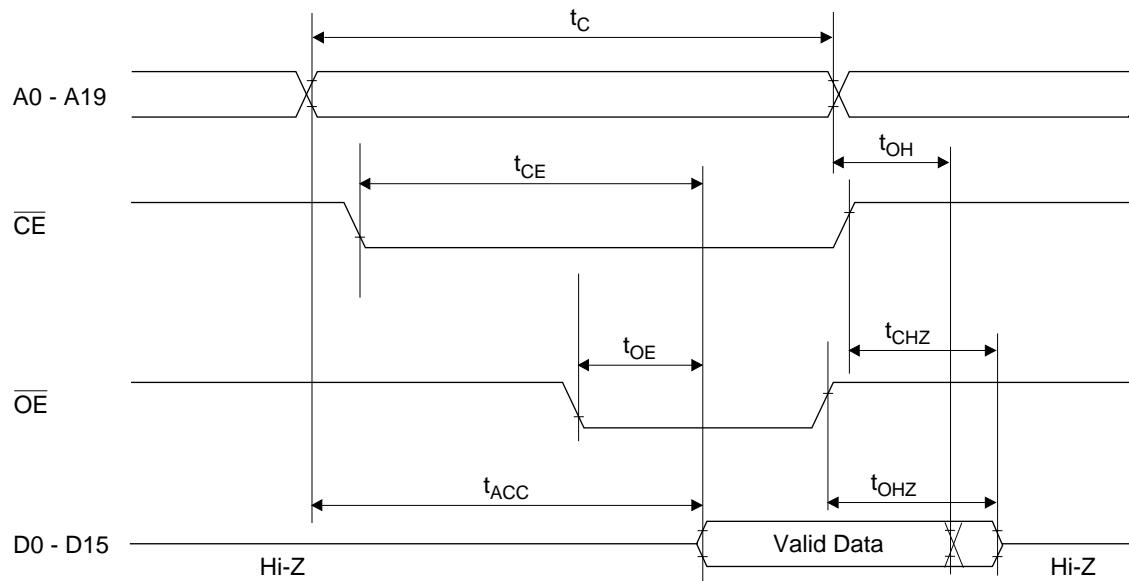
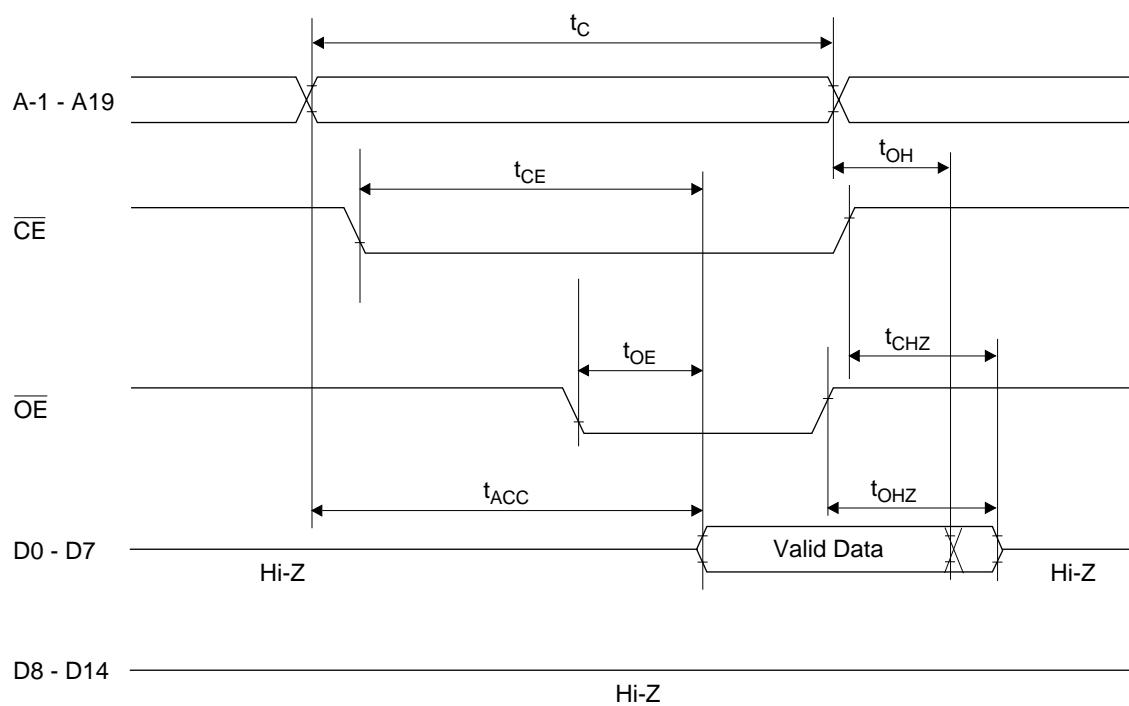
Voltage is relative to V_{SS}**AC Characteristics**(V_{CC}=5V±0.5V, Ta=0 to 70°C)

Parameter	Symbol	Condition	Min.	Max.	Unit
Access cycle time	T _C	-	80	-	ns
Address access time	T _{ACC}	CĒ=OĒ=V _{IL}	-	80	ns
CE access time	T _{CE}	OĒ=V _{IL}	-	80	ns
OE access time	T _{OE}	CĒ=V _{IL}	-	50	ns
Output disable time	T _{CHZ}	OĒ=V _{IL}	0	40	ns
	T _{OHZ}	CĒ=V _{IL}	0	35	ns
Output hold time	T _{OH}	CĒ=OĒ=V _{IL}	0	-	ns

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 (READ CYCLE)**16-Bit Read Mode ($\overline{\text{BYTE}}=V_{IH}$)****8-Bit Read Mode ($\overline{\text{BYTE}}=V_{IL}$)**

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

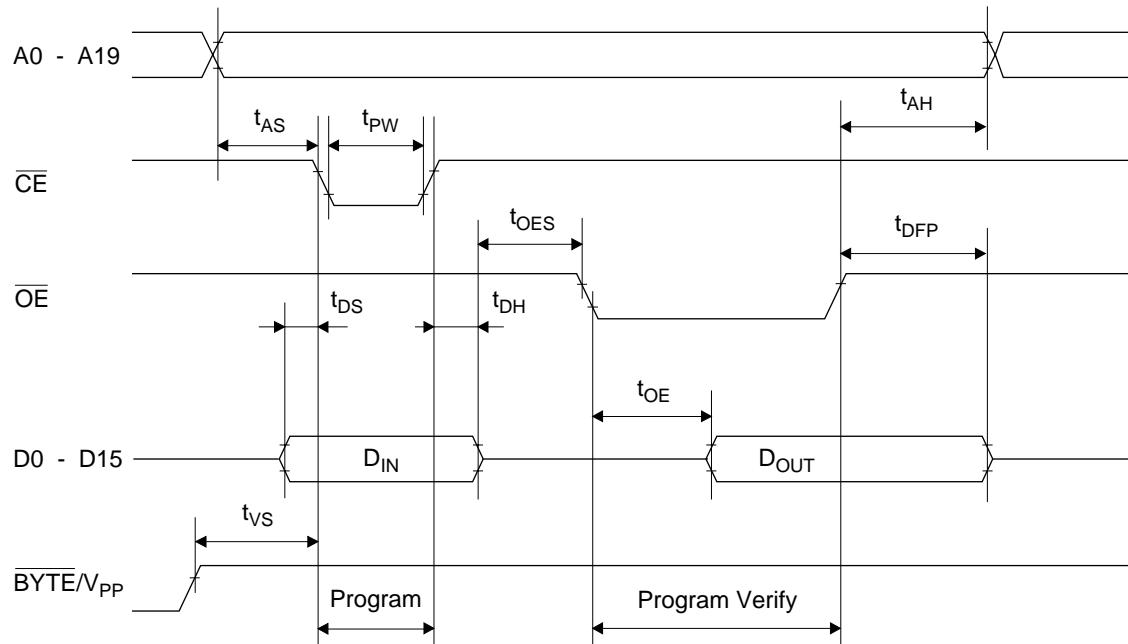
(Ta=25°C±5°C)

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Input leakage current	I _{LI}	V _I =V _{CC} +0.5V	-	-	10	µA
V _{PP} power supply current (Program)	I _{PP2}	CE=V _{IL}	-	-	50	mA
V _{CC} power supply current	I _{CC}	-	-	-	70	mA
Input "H" level	V _{IH}	-	2.2	-	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}	-	11.25	11.5	11.75	V
V _{CC} power supply voltage	V _{CC}	-	6.0	6.25	6.5	V

Voltage is relative to Vss

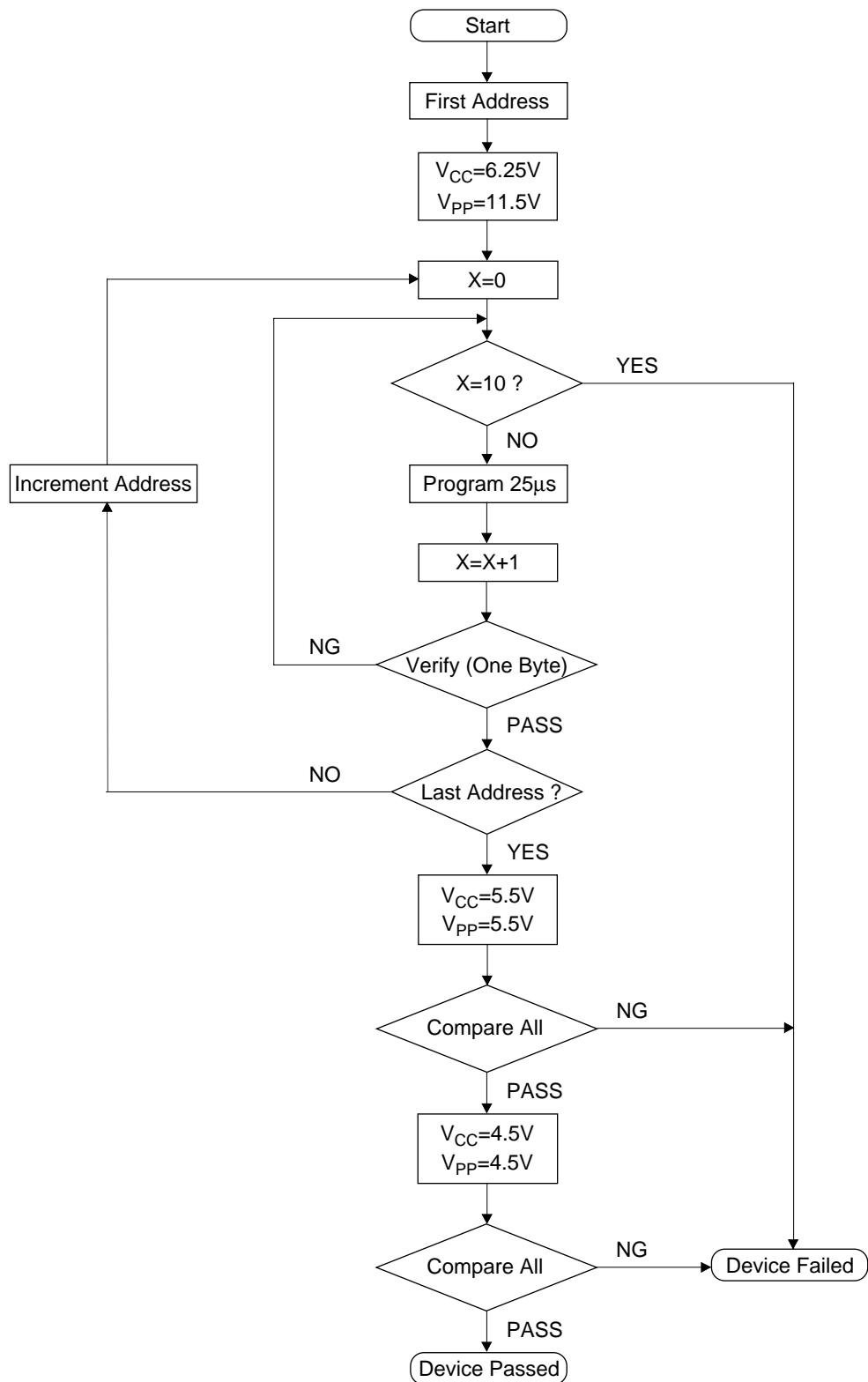
AC Characteristics(V_{CC}=6.25V±0.25V, V_{PP}=11.5V±0.25V, Ta=25°C±5°C)

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

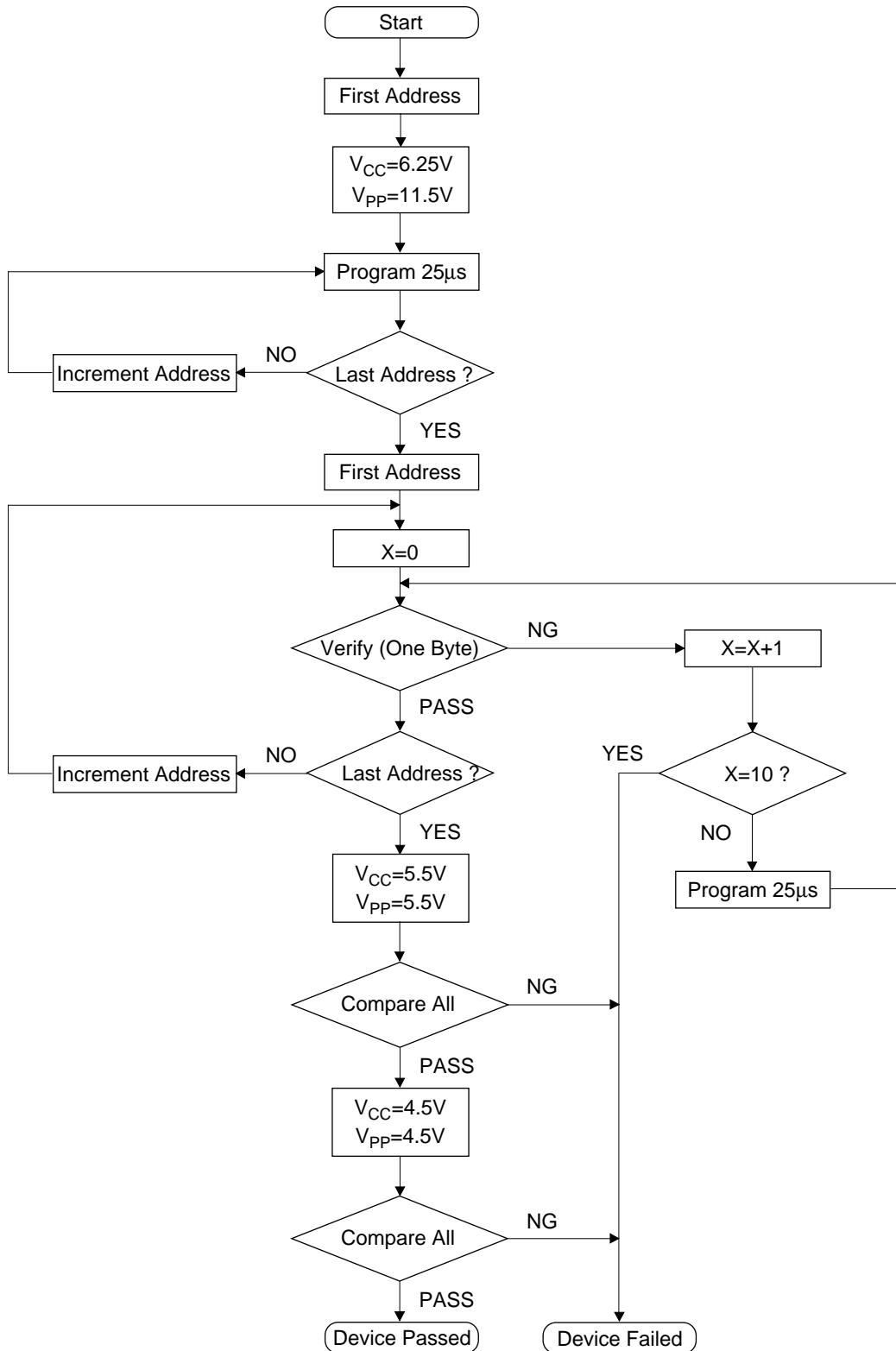
Programming Waveform**PIN Capacitance**(V_{CC}=5V, Ta=25°C, f=1MHz)

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Input	C _{IN1}	V _I =0V	-	-	12	pF
BYTE/V _{PP}	C _{IN2}		-	-	60	
Output	C _{OUT}		-	-	15	

High Speed Programming Algorithm (I)



High Speed Programming Algorithm (II)



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