

OKI semiconductor

MSM27C2000

262,144-Word x 8-Bit UV EPROM

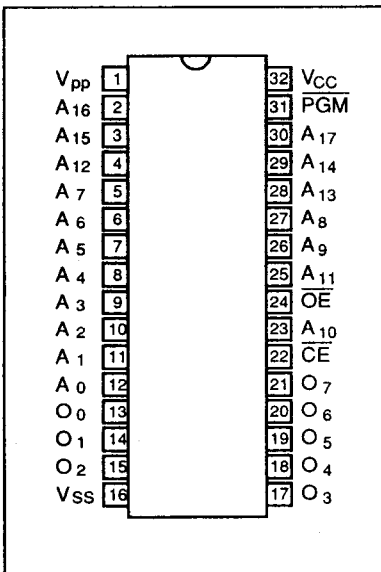
GENERAL DESCRIPTION

The MSM27C2000 is a 262,144-word x 8-bit ultraviolet erasable and electrically programmable read-only memory. The MSM27C2000 is manufactured by CMOS double silicon gate technology and is contained in the 32-pin package.

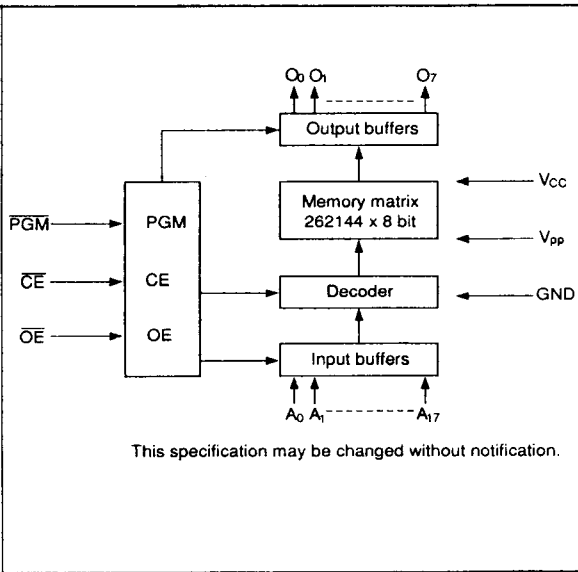
FEATURES

- +5V single power supply
- 262,144-word x 8-bit configuration
- Access time:
 - MAX 120 ns (MSM27C2000-12)
 - MAX 150 ns (MSM27C2000-15)
- Power consumption
 - MAX275 mW (during operation)
 - MAX28 mW (during standby)
- Completely static operation
- INPUT/OUTPUT TTL compatible (three state output)

PIN CONFIGURATION (TOP VIEW)



FUNCTIONAL BLOCK DIAGRAM



TRUTH TABLE

Mode \ Pins	CE (22)	OE (24)	PGM (31)	V _{pp} (1)	V _{CC} (32)	Outputs
Read	V _{IL}	V _{IL}	–	+5V	+5V	D _{OUT}
Output Disable	V _{IL}	V _{IH}	–	+5V	+5V	High impedance
Standby	V _{IH}	–	–	+5V	+5V	High impedance
Program	V _{IL}	V _{IH}	V _{IL}	+12.75V	+6.25V	D _{IN}
Program Verify	V _{IL}	V _{IL}	V _{IH}	+12.75V	+6.25V	D _{OUT}
Program Inhibit	V _{IH}	–	–	+12.75V	+6.25V	High impedance

–: Can be either V_{IL} or V_{IH}

**ELECTRICAL CHARACTERISTICS
ABSOLUTE MAXIMUM RATINGS**

Rating	Symbol	Conditions	Value	Unit
Temperature Under Bias	T _a	—————	0 ~ 70	°C
Storage Temperature	T _{stg}	—————	-55 ~ 125	°C
Input Voltage	V _{IN}	—————	-0.6 ~ 13.5	V
Output Voltage	V _{OUT}	—————	-0.6 ~ V _{CC} +0.5	V
Supply Voltage	V _{CC}	—————	-0.6 ~ 7	V
Program Voltage	V _{pp}	—————	-0.6 ~ 14	V

The voltage referenced to GND.

Note: Permanent device damage may occur if ABSOLUTE MAXIMUM RATINGS are exceeded. Functional operation should be restricted to the conditions as detailed in the operational sections of this data sheet. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

**READ OPERATION
RECOMMENDED OPERATING CONDITIONS**

(T_a = 0 ~ 70°C)

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Supply Voltage	V _{CC}	V _{CC} = 5V ± 10% V _{pp} = V _{CC}	4.5	5.0	5.5	V
V _{pp} Voltage	V _{pp}		4.5	5.0	5.5	V
"H" Level Input Voltage	V _{IH}		2.0	–	V _{CC} +0.5	V
"L" Level Input Voltage	V _{IL}		-0.1	–	0.8	V

The voltage referenced to GND.

DC CHARACTERISTICS

(V_{CC} = 5V ± 10%, T_a = 0 ~ 70°C)

Parameter	Symbol	Conditions	MSM27C2000			Unit	Notes
			Min.	Typ.	Max.		
Input Leakage Current	I _{LI}	V _{IN} = 5.5V	-	-	10	μA	
Output Leakage Current	I _{LO}	V _{OUT} = 5.5V	-	-	10	μA	
V _{CC} Power Current (Standby)	I _{CC1}	$\overline{CE} = V_{IH}$	-	-	5	mA	
V _{CC} Power Current (Operation)	I _{CC2}	$\overline{CE} = V_{IL}, f = 8.3 \text{ MHz}, I_{OUT} = 0 \text{ mA}$	-	-	50	mA	
Program Power Current	I _{pp1}	V _{pp} = V _{CC}	-	-	100	μA	
Input Voltage "H" Level	V _{IH}	-	2.0	-	V _{CC} +0.5	V	
Input Voltage "L" Level	V _{IL}	-	-0.1	-	0.8	V	
Output Voltage "H" Level	V _{OH}	I _{OH} = -400 μA	2.4	-	-	V	
Output Voltage "L" Level	V _{OL}	I _{OL} = 2.1 mA	-	-	0.45	V	

AC CHARACTERISTICS

(V_{CC} = 5V ± 10%, T_a = 0 ~ 70°C)

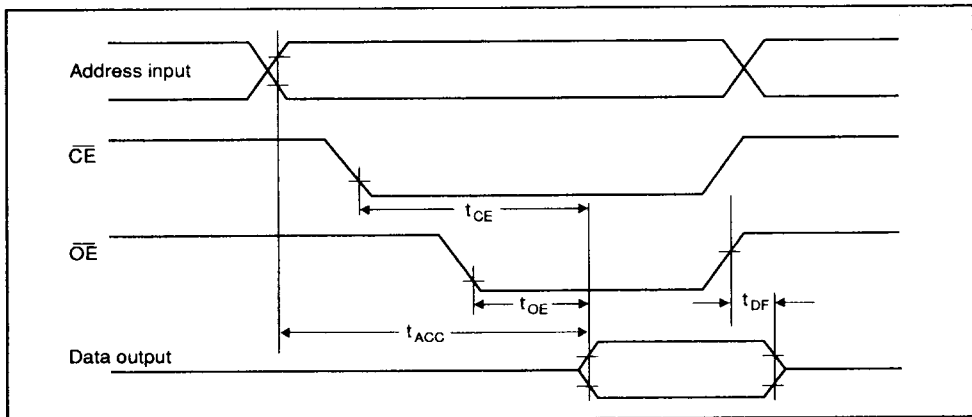
Parameter	Symbol	Conditions	27C2000-12		27C2000-15		Unit	Notes
			Min.	Max.	Min.	Max.		
Address Access Time	t _{ACC}	$\overline{CE} = \overline{OE} = V_{IL}$	-	120	-	150	ns	
\overline{CE} Access Time	t _{CE}	$\overline{OE} = V_{IL}$	-	120	-	150	ns	
\overline{OE} Access Time	t _{OE}	$\overline{CE} = V_{IL}$	-	50	-	60	ns	
Output Disable Time	t _{DF}	$\overline{CE} = V_{IL}$	0	40	0	50	ns	

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Measurement Conditions

- Input pulse level 0.45V and 2.4V
- Input timing reference level 0.8V and 2.0V
- Output load 1 TTL GATE + 100 pF
- Output timing reference level 0.8V and 2.0V

TIME CHART



**PROGRAMMING OPERATION
DC CHARACTERISTICS**

($V_{CC} = 6.25V \pm 0.25V$, $V_{pp} = 12.75V \pm 0.25V$, $T_a = 25^\circ C \pm 5^\circ C$)

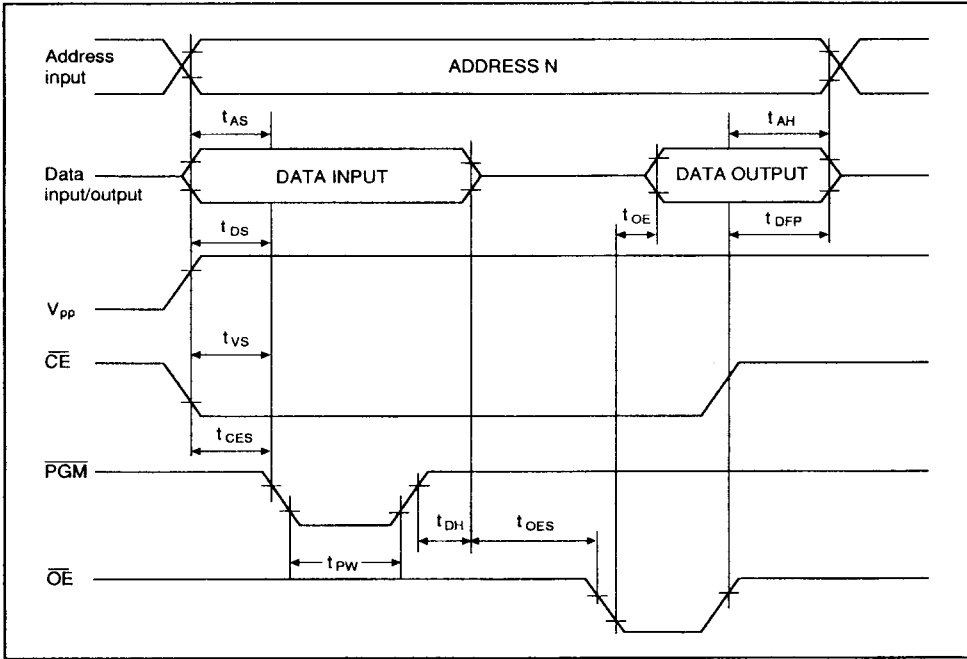
Parameter	Symbol	Conditions	MSM27C2000			Unit	Notes
			Min.	Typ.	Max.		
Input Leakage Current	I_{LI}	$V_{IN} = 5.5V$	-	-	10	μA	
V_{pp} Power Current	I_{pp2}	$\overline{CE} = \overline{PGM} = V_{IL}$	-	-	50	mA	
V_{CC} Power Current	I_{CC}	-	-	-	70	mA	
Input Voltage "H" Level	V_{IH}	-	2.0	-	$V_{CC}+0.5$	V	
Input Voltage "L" Level	V_{IL}	-	-0.1	-	0.8	V	
Output Voltage "H" Level	V_{OH}	$I_{OH} = -400 \mu A$	2.4	-	-	V	
Output Voltage "L" Level	V_{OL}	$I_{OL} = 2.1 mA$	-	-	0.45	V	

AC CHARACTERISTICS

($V_{CC} = 6.25V \pm 0.25V$, $V_{pp} = 12.75V \pm 0.25V$, $T_a = 25^\circ C \pm 5^\circ C$)

Parameter	Symbol	Conditions	MSM27C2000			Unit	Notes
			Min.	Typ.	Max.		
Address Set-up Time	t_{AS}	-	2	-	-	μS	
\overline{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 Enable to Output Float Delay	t_{DFP}	-	0	-	130	ns	
V_{pp} Power Set-up Time	t_{VS}	-	2	-	-	μS	
\overline{PGM} Program Pulse Width	t_{PW}	-	95	100	105	μS	
\overline{CE} Set-up Time	t_{CES}	-	2	-	-	μS	
Data Valid from \overline{OE}	t_{OE}	-	-	-	150	ns	

TIME CHART



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CAPACITANCE

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

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Input Capacitance	C_{IN}	$V_{IN} = 0\text{V}$	-	-	12	pF
Output Capacitance	C_{OUT}	$V_{OUT} = 0\text{V}$	-	-	15	pF

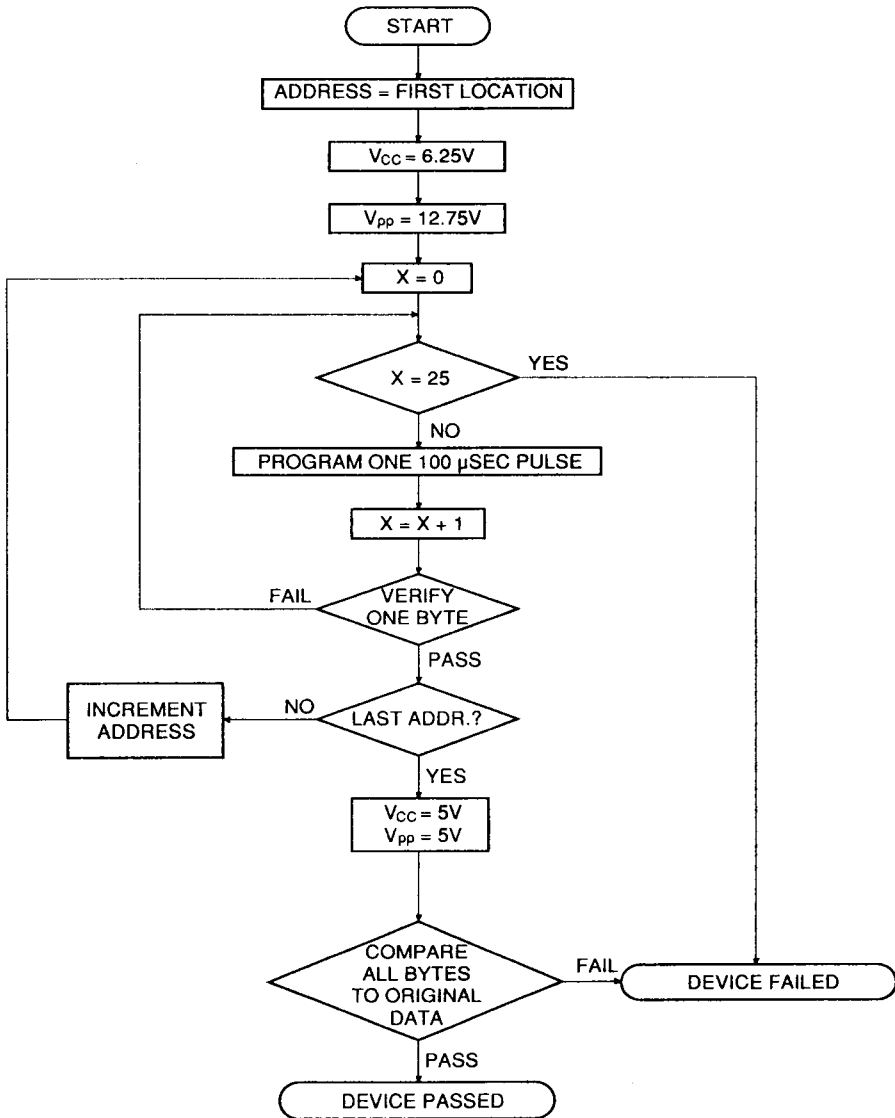
MSM27C2000

IDENTIFIER BYTES

Code	Plns	A ₀ (12)	D ₇ (21)	D ₆ (20)	D ₅ (19)	D ₄ (18)	D ₃ (17)	D ₂ (15)	D ₁ (14)	D ₀ (13)	Hex Data
Manufacturer Code	V _{IL}	1	0	1	0	1	1	1	1	0	AE
Device Code	V _{IH}	1	0	0	0	1	0	0	0	1	89

Note: $A_9 = 12.0 \pm 0.5\text{V}$

$A_1 \sim A_8, A_{10} \sim A_{17}, \overline{CE}, \overline{OE} = V_{IL}, \overline{PGM} = V_{IH} \text{ or } V_{IL}, V_{pp} = V_{CC}$



Programming Flowchart Example