

OKI semiconductor

MSM2708AS

8192-BIT UV ERASABLE ELECTRICALLY-PROGRAMMABLE
READ-ONLY MEMORY

GENERAL DESCRIPTION

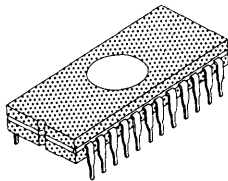
The Oki MSM2708 AS (Compatible to the Intel 2708) is a 8192-bit ultraviolet light erasable and electrically reprogrammable EPROM, ideally suited where fast turnaround and pattern experimentation are important requirements. All data inputs and outputs are TTL compatible during both the read and program modes. The outputs are three-state, allowing direct interface with common system bus structures.

The MSM2708 AS is fabricated with the N-channel silicon gate FAMOS technology and is available in a 24-pin dual in-line package.

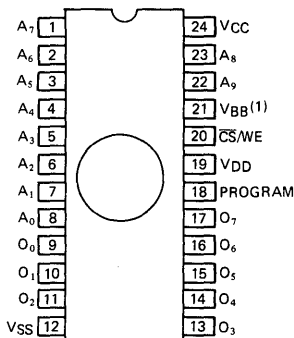
FEATURES

- Data Inputs and Outputs TTL Compatible during both Read and Program Modes
- Three-State Outputs — OR-Tie Capability
- Static — No Clocks Required

	Max. Power	Max. Access	Organization
MSM 2708 AS	800 mW	450 ns	1K x 8

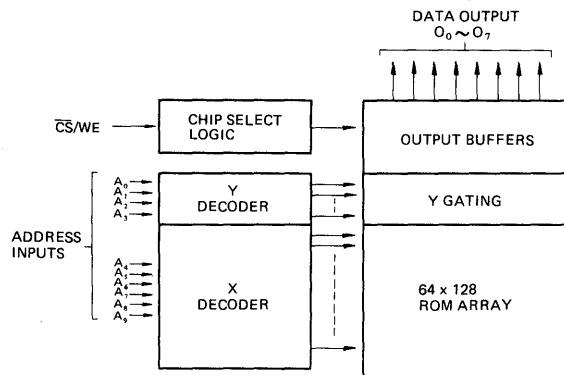


PIN CONFIGURATION



$A_0 \sim A_9$	Address Inputs
$O_0 \sim O_8$	Data Outputs/Inputs
$\overline{CS/WE}$	Chip Select/Write Enable Input

FUNCTIONAL BLOCK DIAGRAM



PIN CONNECTION DURING READ OR PROGRAM

Mode	PIN Number							
	Data I/O 9 ~ 11, 13 ~ 17	Address Inputs 1 ~ 8, 22, 23	V _{SS} 12	Program 18	V _{DD} 19	$\overline{\text{CS}}/\text{WE}$ 20	V _{BB} 21	V _{CC} 24
Read	DOUT	A _{IN}	GND	GND	+12	V _{IL}	-5	+5
Deselect	High Impedance	Don't Care	GND	GND	+12	V _{IH}	-5	+5
Program	D _{IN}	A _{IN}	GND	Pulsed 26V	+12	V _{IHW}	-5	+5

ABSOLUTE MAXIMUM RATINGS*

- Temperature Under Bias -25°C to +85°C
- Storage Temperature -65°C to +125°C
- V_{DD} with Respect to V_{BB} +20V to -0.3V
- V_{CC} and V_{SS} with Respect to V_{BB} +15V to -0.3V
- All Input or Output Voltages with Respect to V_{BB} during Read +15V to -0.3V
- $\overline{\text{CS}}/\text{WE}$ Input with Respect to V_{BB} during Programming +20V to -0.3V
- Program Input with Respect to V_{BB} +35V to -0.3V
- Power Dissipation 1.5W

*

Stresses above those listed under "Absolute Maximum Rating" may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

DC AND AC OPERATING CONDITIONS DURING READ

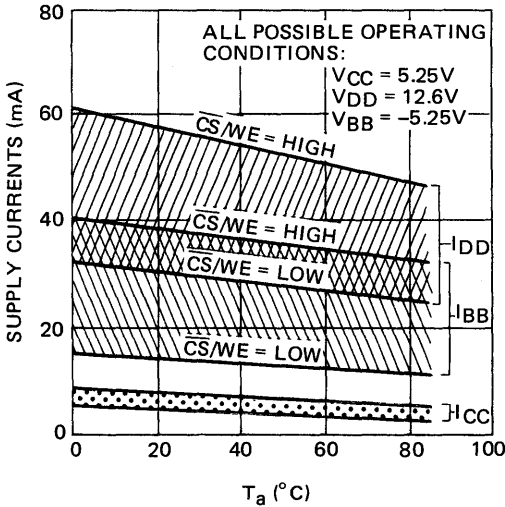
Temperature Range	0°C to 70°C
V _{CC} Power Supply	5V ± 5%
V _{DD} Power Supply	12V ± 5%
V _{BB} Power Supply	-5V ± 5%

READ OPERATION
DC AND OPERATING CHARACTERISTICS

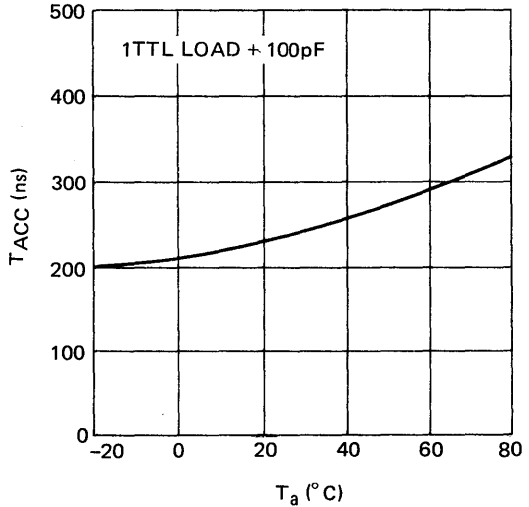
Parameter	Symbol	Min.	Typ.(2)	Max.	Units	Test Conditions
Address and Chip Select Input Leakage Current	I _{LI}		1	10	μA	V _{IN} =5.25V or V _{IN} =V _{IL}
Output Leakage Current	I _{LO}		1	10	μA	V _{OUT} =5.5V, $\overline{CS}/\overline{WE}$ =5V
V _{DD} Supply Current	I _{DD} ⁽³⁾		50	65	mA	Worst Case Supply Currents All Inputs High: CS/WE=5V; T _a =0°C
V _{CC} Supply Current	I _{CC} ⁽³⁾		6	10	mA	
V _{BB} Supply Current	I _{BB} ⁽³⁾		30	45	mA	
Input Low Voltage	V _{IL}	V _{SS}		0.65	V	
Input High Voltage	V _{IH}	3.0		V _{CC} +1	V	
Output Low Voltage	V _{OL}			0.45	V	I _{OL} =1.6mA
Output High Voltage	V _{OH1}	3.7			V	I _{OH} =-100 A
Output High Voltage	V _{OH2}	2.4			V	I _{OH} =-1mA
Power Dissipation	P _D			800	mW	T _a =70°C

- Note:** 1. V_{BB} must be applied prior to V_{CC} and V_{DD}. V_{BB} must also be the last power supply switched off.
 2. Typical values are for T_a = 25°C and nominal supply voltages.
 3. The total power dissipation is not calculated by summing the various currents (I_{DD}, I_{CC}, and I_{BB}) multiplied by their respective voltages since current paths exist between the various power supplies and V_{SS}. The I_{DD}, I_{CC} and I_{BB} currents should be used to determine power supply capacity only.

RANGE OF SUPPLY CURRENTS VS. TEMPERATURE



ACCESS TIME VS. TEMPERATURE



A.C. CHARACTERISTICS

Parameter	Symbol	Min.	Typ.	Max.	Units
Address to Output Delay	t_{ACC}		350	450	ns
Chip Select to Output Delay	t_{CO}		60	120	ns
Chip Deselect to Output Float	t_{DF}	0		120	ns
Address to Output Hold	t_{OH}	0			

CAPACITANCE⁽¹⁾

($T_a = 25^\circ C, f = 1 MHz$)

Parameter	Symbol	Typ.	Max.	Unit.	Conditions
Input Capacitance	C_{IN}	4	6	pF	$V_{IN} = 0V$
Output Capacitance	C_{OUT}	8	12	pF	$V_{OUT} = 0V$

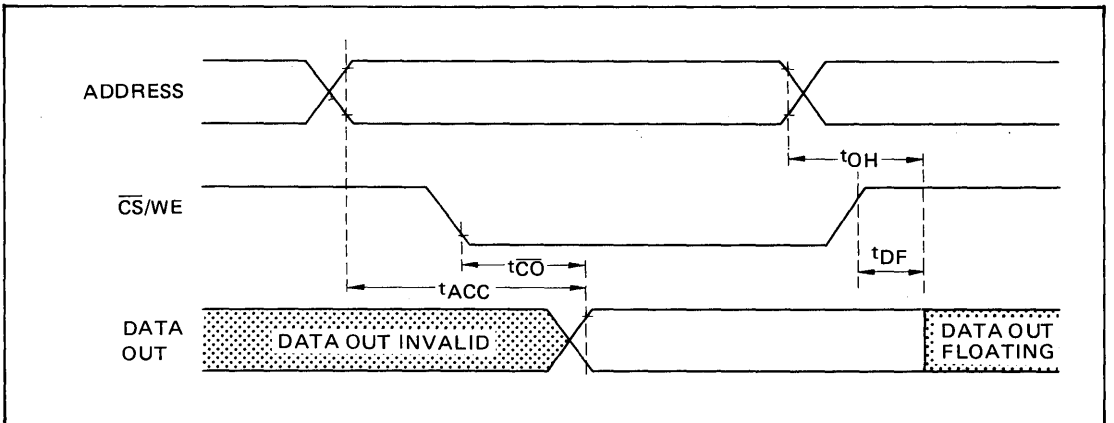
Note: 1. This parameter is periodically sampled and is not 100% tested.

AC TEST CONDITIONS:

Output Load: 1 TTL gate and $C_L = 100 pF$
 Input Rise and Fall Times: <20 ns

Timing Measurement
 Reference Levels: 0.8V and 2.8V for inputs;
 0.8V and 2.4V for outputs.
 Input Pulse Levels: 0.65V to 2.0V

WAVEFORMS



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ERASURE CHARACTERISTICS

The erasure characteristics of the MSM 2708 AS are such that erasure begins to occur when exposed to light with wavelengths shorter than approximately 4,000 Angstrom (\AA). It should be noted that sunlight and certain types of fluorescent lamps have wavelengths in the 3,000–4,000 \AA range. Data show that constant exposure to room level fluorescent lighting could erase the typical device in approximately 3 years, while it would take approximately 1 week to cause erasure when exposed to direct sunlight. If the MSM 2708 AS is to be exposed to these types of lighting conditions for extended periods of time, opaque labels are available from Oki which should be placed over the MS 3578 AS window to prevent unintentional erasure.

The recommended erasure procedure for the MSM 2708 AS is exposure to shortwave ultraviolet light which has a wavelength of 2537 Angstroms (\AA). The integrated dose (i.e., UV intensity x Exposure time) for erasure should be a minimum of 15 W-sec/cm². The erasure time with this dosage is approximately 15 to 20 minutes using an ultraviolet lamp with a 12,000 $\mu\text{W}/\text{cm}^2$ power rating. The device should be placed within 1 inch of the lamp tubes during erasure. Some lamps have a filter on their tubes which should be removed before erasure.