2708
8K (1K × 8) UV ERASABLE PROM

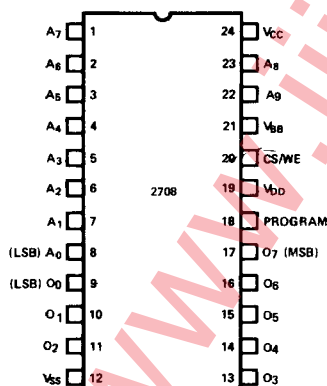|	Max. Power	Max. Access
2708	800 mW	450 ns
2708L	425 mW	450 ns
2708-1	800 mW	350 ns
2708-6	800 mW	550 ns

- **Low Power Dissipation — 425 mW Max. (2708L)**

- **Fast Access Time — 350 ns Max. (2708-1)**

- **Static — No Clocks Required**

- **Data Inputs and Outputs TTL Compatible during both Read and Program Modes**

- **Three-State Outputs — OR-Tie Capability**

The Intel® 2708 is an 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.
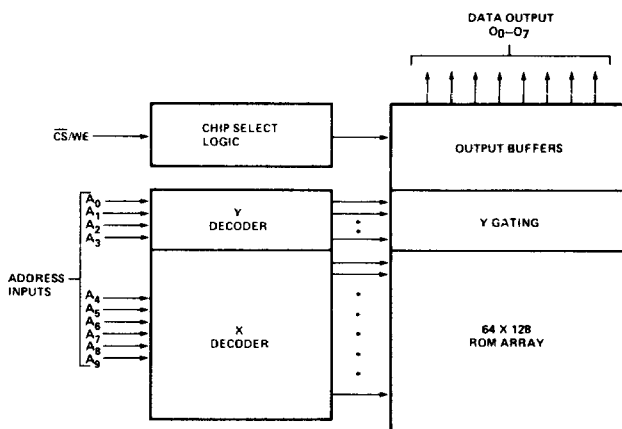
The 2708L at 425 mW is available for systems requiring lower power dissipation than from the 2708. A power dissipation savings of over 50% without any sacrifice in speed is obtained with the 2708L. The 2708L has high input noise immunity and is specified at 10% power supply tolerance. A high-speed 2708-1 is also available at 350 ns for microprocessors requiring fast access times.

The 2708 family is fabricated with the N-channel silicon gate FAMOS technology and is available in a 24-pin dual in-line package.

PIN CONFIGURATION

BLOCK DIAGRAM

PIN NAMES

A_0-A_9	ADDRESS INPUTS
O_1-O_8	DATA OUTPUTS/INPUTS
$\overline{CS}$/WE	CHIP SELECT/WRITE ENABLE INPUT

PIN CONNECTION DURING READ OR PROGRAM

	PIN NUMBER							
	DATA I/O 9-11, 13-17	ADDRESS INPUTS 1-8, 22, 23	V_{SS} 12	PROGRAM 18	V_{DD} 19	$\overline{CS}$/WE 20	V_{BB} 21	V_{CC} 24
MODE								
READ	D_{OUT}	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

PROGRAMMING

The programming specifications are described in the Data Catalog PROM/ROM Programming Instructions Section.

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
$\overline{CS}$/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	

*COMMENT

Stresses above those listed under "Absolute Maximum Ratings" 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.

D.C. AND A.C. OPERATING CONDITIONS DURING READ

	2708	2708-1	2708-6	2708L
Temperature Range	0°C–70°C	0°C–70°C	0°C–70°C	0°C–70°C
V_{CC} Power Supply	5V ± 5%	5V ± 5%	5V ± 5%	5V ± 10%
V_{DD} Power Supply	12V ± 5%	12V ± 5%	12V ± 5%	12V ± 10%
V_{BB} Power Supply	−5V ± 5%	−5V ± 5%	−5V ± 5%	−5V ± 10%

READ OPERATION
D.C. AND OPERATING CHARACTERISTICS

Symbol	Parameter	2708, 2708-1, 2708-6 Limits			2708L Limits			Units	Test Conditions
		Min.	Typ.[2]	Max.	Min.	Typ.[2]	Max.		
I_{LI}	Address and Chip Select Input Sink Current		1	10		1	10	µA	V_{IN} = 5.25V or V_{IN} = V_{IL}
I_{LO}	Output Leakage Current		1	10		1	10	µA	V_{OUT} = 5.5V, CS/WE = 5V
I_{DD}[3]	V_{DD} Supply Current		50	65		21	28	mA	Worst Case Supply Currents[4]
I_{CC}[3]	V_{CC} Supply Current		6	10		2	4	mA	All Inputs High;
I_{BB}[3]	V_{BB} Supply Current		30	45		10	14	mA	CSWE = 5V; T_A = 0°C
V_{IL}	Input Low Voltage	V_{SS}		0.65	V_{SS}		0.65	V	
V_{IH}	Input High Voltage	3.0		V_{CC}+1	2.2		V_{CC}+1	V	
V_{OL}	Output Low Voltage			0.45			0.4	V	I_{OL} = 1.6mA (2708, 2708-1, 2708-6) / I_{OL} = 2mA (2708L)
V_{OH1}	Output High Voltage	3.7			3.7			V	I_{OH} = −100µA
V_{OH2}	Output High Voltage	2.4			2.4			V	I_{OH} = −1mA
PD	Power Dissipation			800			325	mW	T_A = 70°C
							425	mW	T_A = 0°C

NOTES:
1. V_{BB} must be applied prior to V_{CC} and V_{DD}. V_{BB} must also be the last power supply switched off.
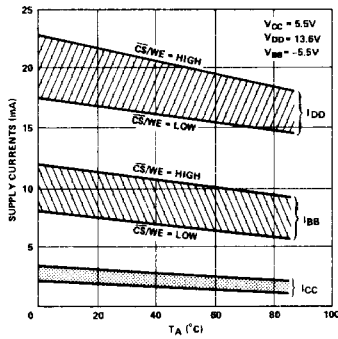2. Typical values are for T_A = 25°C and nominal supply voltages.
3. The total power dissipation is not calculated by summing the various currents (I_{DD}, I_{CC}, and I_{BB}) multiplied by their respective voltages since current paths exist between the various power supplies and V_{SS}. The I_{DD}, I_{CC}, and I_{BB} currents should be used to determine power supply capacity only.
4. I_{BB} for the 2708L is specified in the programmed state and is 18mA maximum in the unprogrammed state.
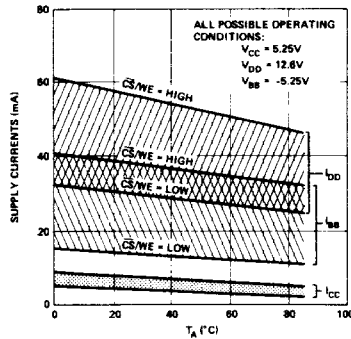
2708L
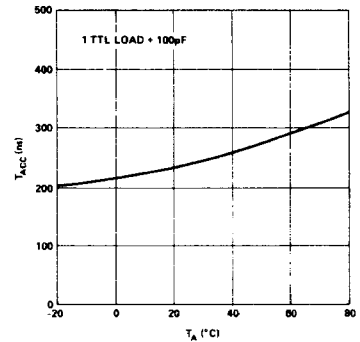### RANGE OF SUPPLY CURRENTS VS. TEMPERATURE

2708, 2708-1, AND 2708-6
RANGE OF SUPPLY CURRENTS VS. TEMPERATURE

ACCESS TIME VS. TEMPERATURE

ROM/PROM

A.C. CHARACTERISTICS

Symbol	Parameter	2708, 2708L Limits		2708-1 Limits		2708-6 Limits		Units
		Min.	Max.	Min.	Max.	Min.	Max.	
t_{ACC}	Address to Output Delay		450		350		550	ns
t_{CO}	Chip Select to Output Delay		120		120		160	ns
t_{DF}	Chip Deselect to Output Float	0	120	0	120	0	160	ns
t_{OH}	Address to Output Hold	0		0		0		ns

CAPACITANCE [1] $T_A = 25°C$, f = 1 MHz

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

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

A.C. 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 3.0V

A.C. WAVEFORMS [2]

NOTES:
2. ALL TIMES SHOWN IN PARENTHESES ARE MINIMUM AND ARE NSEC UNLESS OTHERWISE SPECIFIED.
3. $\overline{CS}$ MAY BE DELAYED UP TO t_{ACC}-t_{CO} AFTER ADDRESSES ARE VALID WITHOUT IMPACT ON t_{ACC}.
4. t_{DF} IS SPECIFIED FROM $\overline{CS}$ OR ADDRESS CHANGE, WHICHEVER OCCURS FIRST.

ERASURE CHARACTERISTICS

The erasure characteristics of the 2708 family are such that erasure begins to occur when exposed to light with wavelengths shorter than approximately 4000 Angstroms (Å). It should be noted that sunlight and certain types of fluorescent lamps have wavelengths in the 3000—4000Å 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 2708 is to be exposed to these types of lighting conditions for extended periods of time, opaque labels are available from Intel which should be placed over the 2708 window to prevent unintentional erasure.

The recommended erasure procedure (see Data Catalog PROM/ROM Programming Instructions Section) for the 2708 family is exposure to shortwave ultraviolet light which has a wavelength of 2537 Angstroms (Å). 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 12000 μW/cm² 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.