

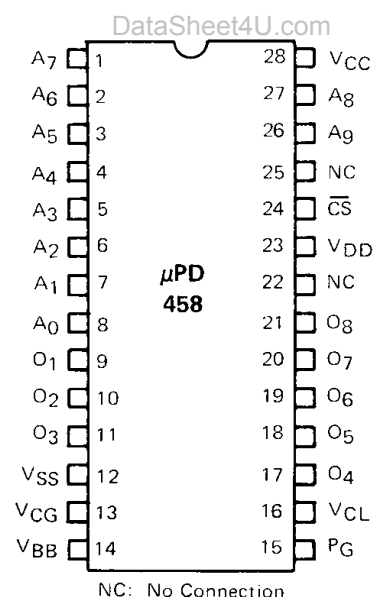
FULLY DECODED 8192 BIT ELECTRICALLY ERASABLE AND PROGRAMMABLE READ ONLY MEMORY

DESCRIPTION The μPD458 is an Electrically Erasable and Reprogrammable Read Only Memory (EEPROM), organized as 1024 words by 8 bits.

The μPD458 is fabricated with N-channel MOS technology and is packaged in a 28 pin ceramic DIP.

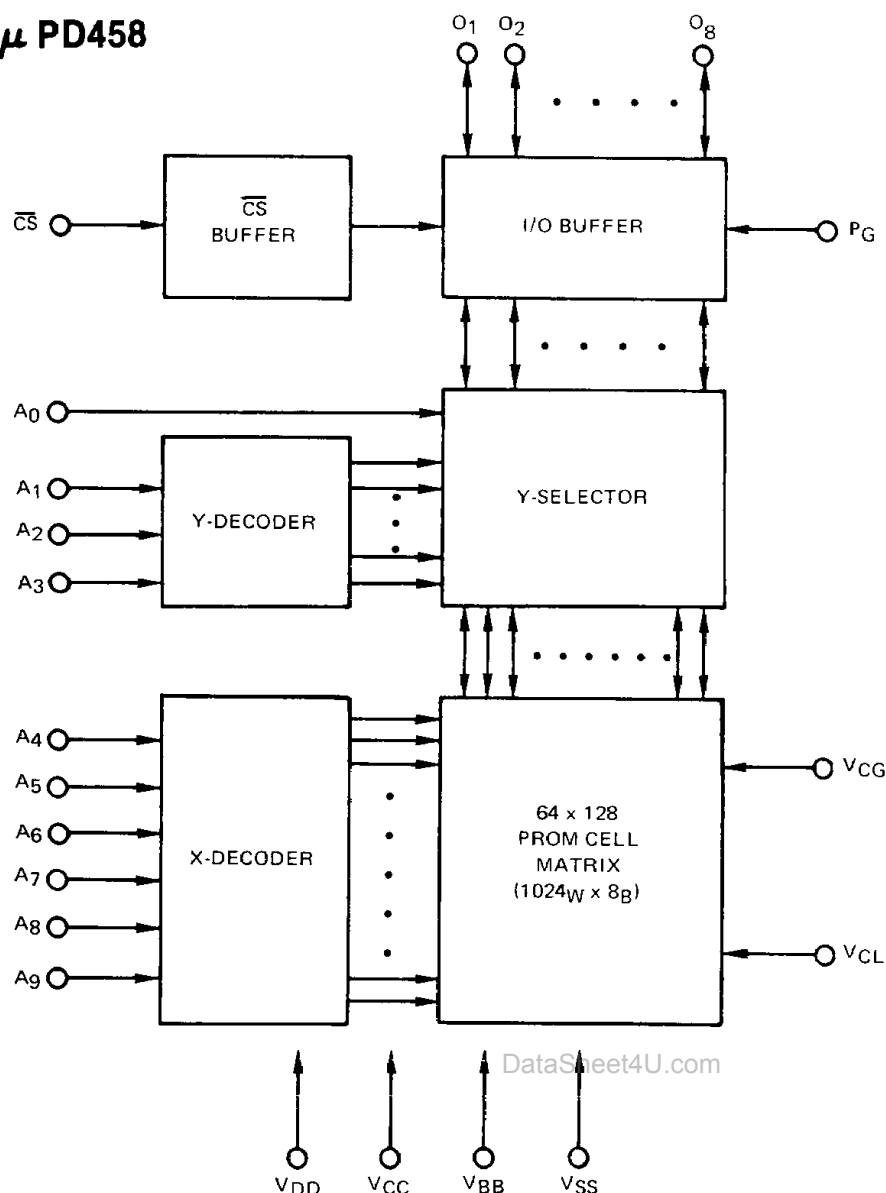
- FEATURES**
- Electrically Erasable and Reprogrammable
 - Fully Decoded, 1024 Words x 8 Bits Organization
 - Access Time — 450 ns max.
 - Fast Programming and Erasure Speed
 - Simple Worst-case Verification of Programmed Data and Erasure
 - Static, No Clock Required
 - Input/Output TTL Compatible for Read and Programming Operation
 - Three-State Output, OR-Tie Capability
 - N-Channel MOS
 - Two Power Supplies, +12V and +5V for Read
 - 28 Pin Ceramic DIP

PIN CONFIGURATION



Rev/1

91

μ PD458

BLOCK DIAGRAM

Operating Temperature	-10°C to +70°C
Storage Temperature	-40°C to +125°C
All Output Voltages	-0.3 to +11 Volts ^①
All Input Voltages	-0.3 to +11 Volts ^①
Supply Voltage V _{DD}	-0.3 to +15 Volts ^①
Supply Voltage V _{CC}	-0.3 to +7 Volts ^①
Supply Voltage V _{BB}	V _{SS} to -7 Volts ^②
Supply Voltage P _G	-0.3 to +30 Volts ^{① ②}
Supply Voltage V _{CL}	-0.3 to +43 Volts ^{① ②}
Supply Voltage V _{CG}	-44 to +30 Volts ^{① ②}

Notes: ^① Relative to V_{BB}.^② Data in the memory cell is not guaranteed to be preserved.

Specifies ratings which will not cause permanent damage to the device.

COMMENT: Stress 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.

*T_a = 25°C**ABSOLUTE MAXIMUM RATINGS***

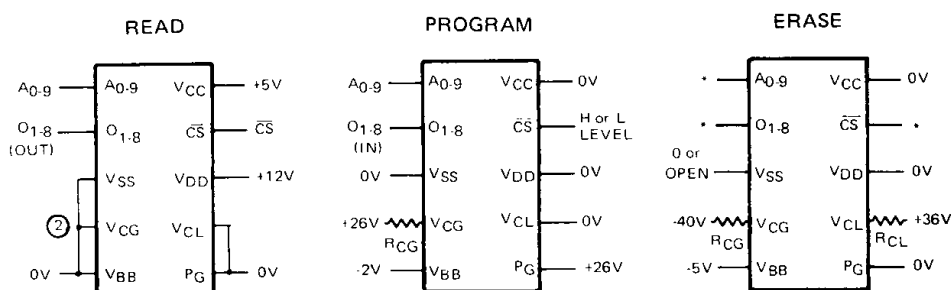
CAPACITANCE

PARAMETER	SYMBOL	LIMITS			UNIT	TEST CONDITIONS
		MIN	TYP	MAX		
Input Capacitance	C _{IN}			10	pF	f = 1 MHz
Output Capacitance	C _{OUT}			15	pF	f = 1 MHz

SUPPLY VOLTAGES

Typical values. Unit – Voltage.

PIN MODE	V _{DD} (23)	V _{CC} (28)	V _{BB} (14)	P _G (15)	V _{CL} (16)	V _{CG} (13)	V _{SS} (12)
Read	+12	+5	0	0	0	0	0
Program	0	0	-2	+26	0	+26	0
Erase	0	0	-5	0	+36	-40	0 or Open
Verify "0"	+12	+5		0	0	+3	0
Verify "1"	+12	+5		0	0		0



Notes: * = Either High or Low Level, or Open.

- ① R_{CG} and R_{CL} are Protection Resistors
 R_{CG} = 10 kΩ ± 10%, 1/4W
 R_{CL} = 200Ω ± 10%, 10W
- ② R_{CG} may be left connected in Read Mode.

PIN IDENTIFICATION

PIN		INPUT/ OUTPUT	FUNCTION
NO.	SYMBOL		
1 – 8, 26, 27	A ₀ – A ₉	Input	Address Input
24	$\overline{CS}$	Input	Chip Select Input (Active Low)
9 – 11, 17 – 21	O ₁ – O ₈	Output	Data Out for Read Operation
		Input	Data Input for Programming Operation
15	P _G	Power Supply	Power Supply for Programming Operation
16	V _{CL}	Power Supply	Power Supply for Erasure Operation
13	V _{CG}	Power Supply	Power Supply for Control Gate for Programming and Erasure Operation
14	V _{BB}	Power Supply	Power Supply for Substrate Bias
23	V _{DD}	Power Supply	+12V Power Supply for Read Operation
28	V _{CC}	Power Supply	+5V Power Supply for Read Operation
12	V _{SS}	GND	Ground Reference

μPD458

$T_a = -10$ to $+70^\circ\text{C}$, $V_{DD} = +12\text{V} \pm 5\%$, $V_{CC} = +5\text{V} \pm 5\%$,
 $V_{BB} = P_G = V_{CL} = V_{CG} = V_{SS} = 0\text{V}$

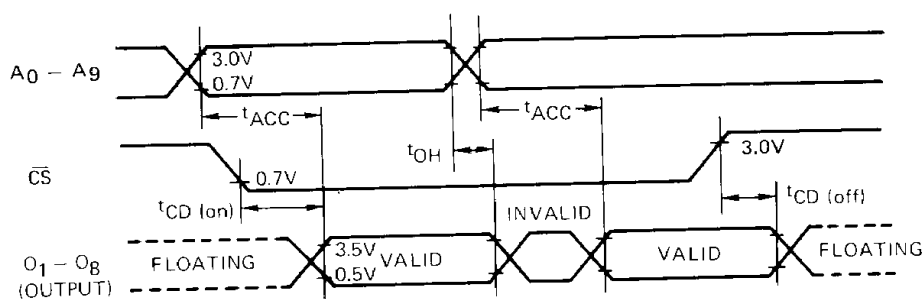
READ OPERATION**DC CHARACTERISTICS**

PARAMETER	SYMBOL	LIMITS			UNIT	TEST CONDITIONS
		MIN	TYP	MAX		
Input High Voltage	V_{IH}	3.0		V_{CC}	V	
Input Low Voltage	V_{IL}	0		0.7	V	
Output High Voltage	V_{OH}	3.5			V	$I_{OH} = -2.0\text{ mA}$
Output Low Voltage	V_{OL}			0.5	V	$I_{OL} = 1.7\text{ mA}$
Input Leakage Current High	I_{LIH}			+10	μA	$V_I = +3.0\text{V}$
Input Leakage Current Low	I_{LIL}			-10	μA	$V_I = +0.7\text{V}$
Output Leakage Current High	I_{LOH}			+20	μA	$\overline{CS} = "1"$ $V_O = 3.5\text{V}$
Output Leakage Current Low	I_{LOL}			-10	μA	$\overline{CS} = "1"$ $V_O = 0.4\text{V}$
V_{DD} Supply Current	I_{DD}		55	80	mA	
V_{CC} Supply Current	I_{CC}		20	30	mA	with no load

$T_a = -10$ to $+70^\circ\text{C}$, $V_{DD} = +12\text{V} \pm 5\%$, $V_{CC} = +5\text{V} \pm 5\%$,
 $V_{BB} = P_G = V_{CL} = V_{CG} = V_{SS} = 0\text{V}$

AC CHARACTERISTICS

PARAMETER	SYMBOL	LIMITS			UNIT	TEST CONDITIONS
		MIN	TYP	MAX		
Access Time	t_{ACC}			450	ns	1 TTL + 100 pF
$\overline{CS}$ to Output On Delay	$t_{CD(on)}$			200	ns	
$\overline{CS}$ to Output Off Delay	$t_{CD(off)}$	0		200	ns	
Output Hold Time	t_{OH}	0			ns	

**TIMING WAVEFORMS**

μ PD458

$T_a = 25^\circ\text{C} \pm 2^\circ\text{C}$, $V_{DD} = V_{CC} = P_G = 0\text{V}$, $V_{SS} = 0\text{V}$ or Open
 $\overline{\text{CS}}$, $A_0 - A_9$ and $0_1 - 0_8$ = Either HIGH or LOW level, or non-connected

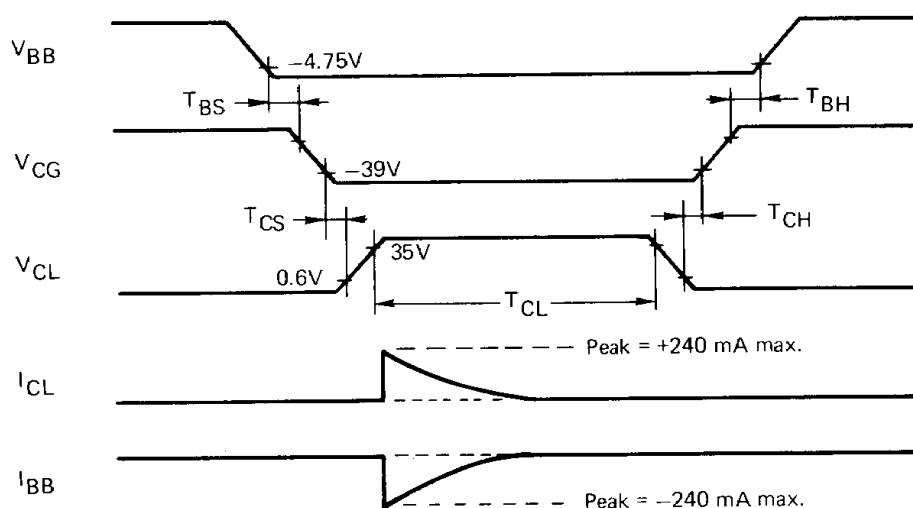
ERASURE OPERATION***DC CHARACTERISTICS**

PARAMETER	SYMBOL	LIMITS			UNIT	TEST CONDITIONS
		MIN	TYP	MAX		
Supply Voltage	V_{BB}	-4.75	-5.0	-5.25	V	
Supply Voltage	V_{CL}	+35	+36	+37	V	through R_{CL}
Supply Voltage	V_{CG}	-39	-40	-41	V	through R_{CG}
Supply Current (V_{BB})	I_{BB}			-240	mA	Initial peak current. See timing chart.
Supply Current (V_{CL})	I_{CL}			+240	mA	
Supply Current (V_{CG})	I_{CG}			-20	μA	

$T_a = 25^\circ\text{C} \pm 2^\circ\text{C}$, $V_{DD} = V_{CC} = P_G = 0\text{V}$, $V_{SS} = 0\text{V}$ or Open
 $\overline{\text{CS}}$, $A_0 - A_9$ and $0_1 - 0_8$ = Either HIGH or LOW level, or non-connected

AC CHARACTERISTICS

PARAMETER	SYMBOL	LIMITS			UNIT	TEST CONDITIONS
		MIN.	TYP	MAX		
Clear Time	T_{CL}		60		sec	
V_{BB} Setup Time	T_{BS}	0			μs	
V_{BB} Hold Time	T_{BH}	0			μs	
V_{CG} Setup Time	T_{CS}	1.0			μs	
V_{CG} Hold Time	T_{CH}	1.0			μs	

**TIMING WAVEFORMS**

Note: The supply currents I_{BB} and I_{CL} diminish to almost zero within T_{CL} .

*Erasure operation clears all 8192 bits to Logic "0" simultaneously.

APPENDIX PROM PROGRAMMER DESIGN

To insure integrity and retention of data programmed in the μPD458, the following requirements are specified for the μPD458 supply voltage and current levels. The PROM PROGRAMMER should be designed such that voltages provided to the PROM socket be within the range specified on any occasion including power on/off to the programmer, power on/off to the μPD458, and in READ, WRITE or ERASE operation. Surge or noise voltages beyond the specified range are to be avoided.

Setting $V_{DD} = +12V \pm 5\%$, $V_{CC} = +5V \pm 5\%$ and $V_{CG} = +3V \pm 0.1V$ after erasure and comparing data read from the μPD458 with zero effectively tests for proper erasure.

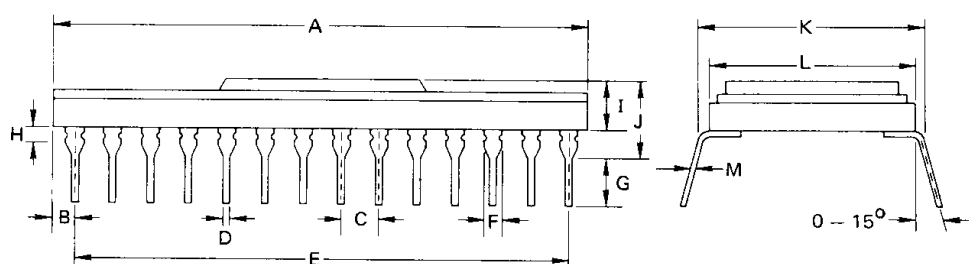
Setting $V_{DD} = +12V \pm 5\%$, $V_{CC} = +5V \pm 5\%$ and $V_{CG} = -3V \pm 0.1V$ after programming and comparing data read from the μPD458 with the desired data coupled with erase verification, provides a simple test of worst-case temperature and long-term data retention.

Under normal Read Mode conditions, V_{CG} should either be grounded directly or held at $0V \pm 0.1V$ through R_{CG} . R_{CG} is required when any non-zero voltage is applied to V_{CG} .

SYMBOL	LIMITS ②									UNIT	TEST CONDITIONS
	READ			PROGRAM			ERASE				
	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX		
V _{DD}	+11.4	+12	+12.6	-0.3	0	+0.3	-0.3	0	+0.3	V	
V _{CC}	+4.75	+5	+5.25	-0.3	0	+0.3	-0.3	0	+0.3	V	
V _{CG}	-0.1	0	+0.1	+25	+26	+27	-39	-40	41	V	
V _{BB}	-0.1	0	+0.1	-1.9	-2	2.1	-4.75	-5	-5.25	V	
P _G	-0.3	0	+0.3	+25	+26	+27	-0.3	0	+0.3	V	
V _{CL}	-0.1	0	+0.1	-0.1	0	+0.1	+35	+36	+37	V	
I _{CC}		+20	+30			-0.2			0.2	mA	①
I _{DD}		+55	+80			-0.2			-0.2	mA	①
I _{CG}			+10			+20			-20	μA	①
I _{BB}			-0.2		-8	15			-240	mA	①
I _{PG}			-0.2		+30	+50			-0.2	mA	①
I _{CL}			-0.5			-10			+240	mA	①

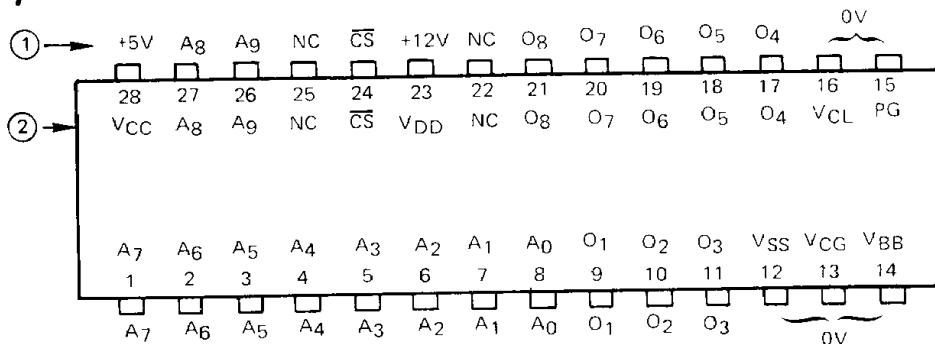
- Notes: ① At typical supply voltage
② All voltages relative to $V_{SS} = 0V$.

PACKAGE OUTLINE μPD458D

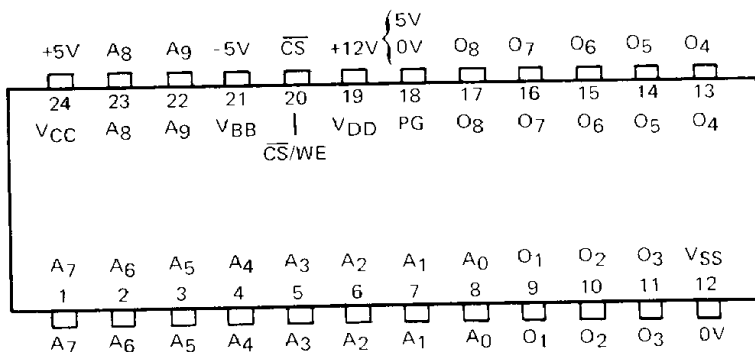


ITEM	MILLIMETERS	INCHES
A	36.0 MAX	1.41 MAX
B	1.5 MAX	0.059 MAX
C	2.54	0.1
D	0.50 ± 0.1	0.02 ± 0.004
E	33.0	1.299
F	1.27	0.05
G	3.2 MIN	0.126 MIN
H	1.0 MIN	0.04 MIN
I	3.3 MAX	0.13 MAX
J	5.2 MAX	0.20 MAX
K	15.3	0.60
L	13.9	0.55
M	0.30 ± 0.1	0.012 ± 0.004

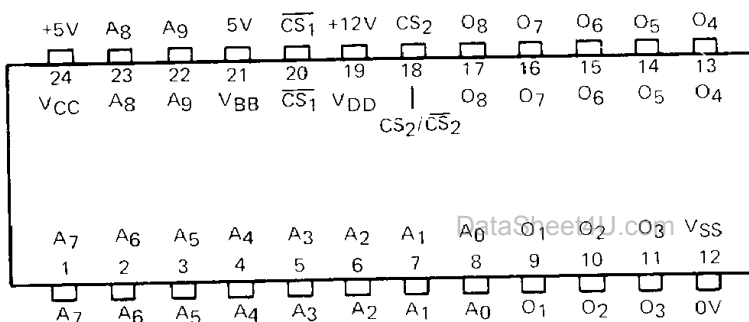
μ PD458



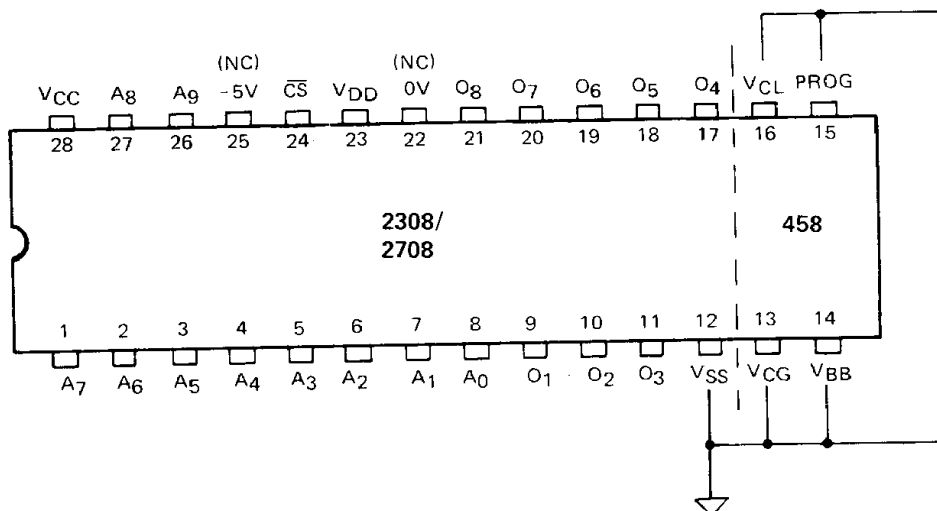
μPD458D (EEPROM)



2708 (PROM ERASABLE WITH ULTRAVIOLET)



μPD2308C/D – 2308 (MASK ROM)



COMMON PIN CONFIGURATION

- Notes: ① Names of signals.
② Names of the terminal.