1024 BIT (256 x 4) STATIC MOS RAM WITH COMMON I/O AND OUTPUT DISABLE

- **Organization 256 Words by 4 Bits**
- **Access Time — 850 nsec Max.**
- **Common Data Input and Output**
- **Single +5V Supply Voltage**
- **Directly TTL Compatible — All Inputs and Output**
- **Static MOS — No Clocks or Refreshing Required**
- **Simple Memory Expansion — Chip Enable Input**
- **Fully Decoded — On Chip Address Decode**
- **Inputs Protected — All Inputs Have Protection Against Static Charge**
- **Low Cost Packaging — 18 Pin Plastic Dual-In-Line Configuration**
- **Low Power — Typically 150 mW**
- **Three-State Output — OR-Tie Capability**

The Intel®8111-2 is a 256 word by 4 bit static random access memory element using normally off N-channel MOS devices integrated on a monolithic array. It uses fully DC stable (static) circuitry and therefore requires no clocks or refreshing to operate. The data is read out nondestructively and has the same polarity as the input data. Common input/output pins are provided.

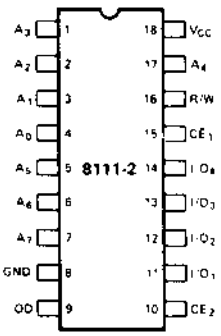
The 8111-2 is designed for memory applications in small systems where high performance, low cost, large bit storage, and simple interfacing are important design objectives.

It is directly TTL compatible in all respects: inputs, outputs, and a single +5V supply. Separate chip enable ($\overline{CE}$) leads allow easy selection of an individual package when outputs are OR-tied.

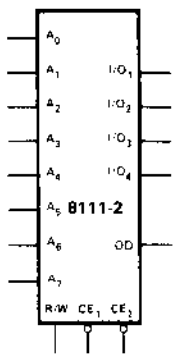
The Intel®8111-2 is fabricated with N-channel silicon gate technology. This technology allows the design and production of high performance, easy-to-use MOS circuits and provides a higher functional density on a monolithic chip than either conventional MOS technology or P-channel silicon gate technology.

Intel's silicon gate technology also provides excellent protection against contamination. This permits the use of low cost silicone packaging.

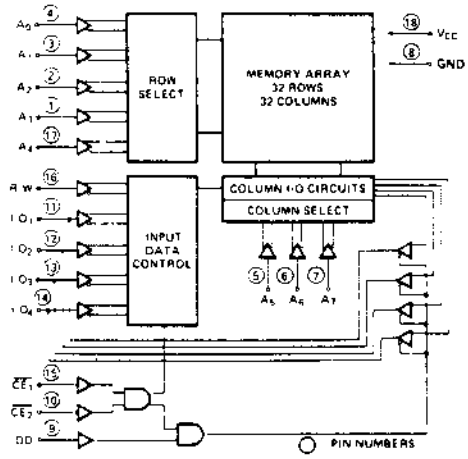
PIN CONFIGURATION



LOGIC SYMBOL



BLOCK DIAGRAM



PIN NAMES

A_0-A_7	ADDRESS INPUTS
OD	OUTPUT DISABLE
R/W	READ/WRITE INPUT
$\overline{CE}_1$	CHIP ENABLE 1
$\overline{CE}_2$	CHIP ENABLE 2
I/O_1-I/O_4	DATA INPUT/OUTPUT

Absolute Maximum Ratings*

Ambient Temperature Under Bias . . . . . 0°C to 70°C

Storage Temperature . . . . . -65°C to +150°C

Voltage On Any Pin
With Respect to Ground . . . . . -0.5V to +7V

Power Dissipation . . . . . 1 Watt

*COMMENT:

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 at any other condition 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.

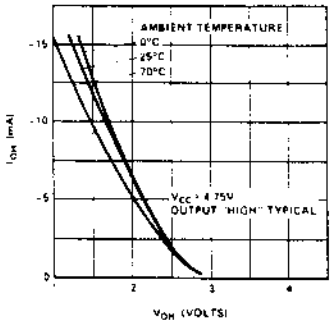
D.C. and Operating Characteristics

T_A = 0°C to 70°C, V_{CC} = 5V ±5% , unless otherwise specified.

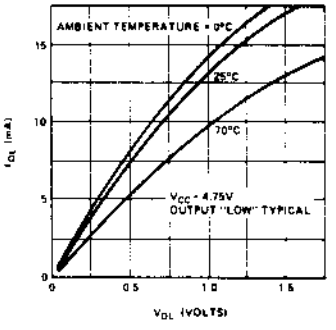
Symbol	Parameter	Min.	Typ.[1]	Max.	Unit	Test Conditions
I_{LI}	Input Load Current			10	µA	V_{IN} = 0 to 5.25V
I_{LOH}	I/O Leakage Current			15	µA	$\overline{CE}$ = 2.2V, $V_{I/O}$ = 4.0V
I_{LOL}	I/O Leakage Current			-50	µA	$\overline{CE}$ = 2.2V, $V_{I/O}$ = 0.45V
I_{CC1}	Power Supply Current		30	60	mA	V_{IN} = 5.25V $I_{I/O}$ = 0mA, T_A = 25°C
I_{CC2}	Power Supply Current			70	mA	V_{IN} = 5.25V $I_{I/O}$ = 0mA, T_A = 0°C
V_{IL}	Input Low Voltage	-0.5		+0.65	V	
V_{IH}	Input High Voltage	2.2		V_{CC}	V	
V_{OL}	Output Low Voltage			0.45	V	I_{OL} = 2.0mA
V_{OH}	Output High Voltage	2.2			V	I_{OH} = -150 µA

NOTES. 1. Typical values are for T_A = 25°C and nominal supply voltage.

OUTPUT SOURCE CURRENT VS. OUTPUT VOLTAGE



OUTPUT SINK CURRENT VS. OUTPUT VOLTAGE



A.C. Characteristics

READ CYCLE $T_A = 0°C$ to $70°C$, $V_{CC} = 5V \pm 5\%$, unless otherwise specified.

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
t_{RCY}	Read Cycle	850			ns	(See below)
t_A	Access Time			850	ns	
t_{CO}	Chip Enable To Output			650	ns	
t_{OD}	Output Disable To Output			550	ns	
t_{DF} [1]	Data Output to High Z State	0		200	ns	
t_{OH}	Previous Data Read Valid after change of Address	0			ns	

WRITE CYCLE

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
t_{WCY}	Write Cycle	850			ns	(See below)
t_{AW}	Write Delay	150			ns	
t_{CW}	Chip Enable To Write	750			ns	
t_{DW}	Data Setup	500			ns	
t_{DH}	Data Hold	100			ns	
t_{WP}	Write Pulse	630			ns	
t_{WR}	Write Recovery	50			ns	

A. C. CONDITIONS OF TEST

Input Pulse Levels: +0.65 Volt to 2.2 Volt

Input Pulse Rise and Fall Times: 20nsec

Timing Measurement Reference Level: 1.5 Volt

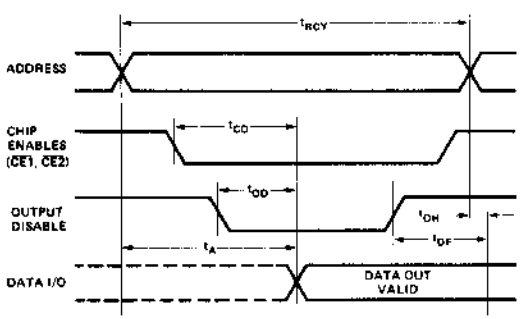
Output Load: 1 TTL Gate and $C_L = 100pF$

Capacitance $T_A = 25°C$, f = 1 MHz

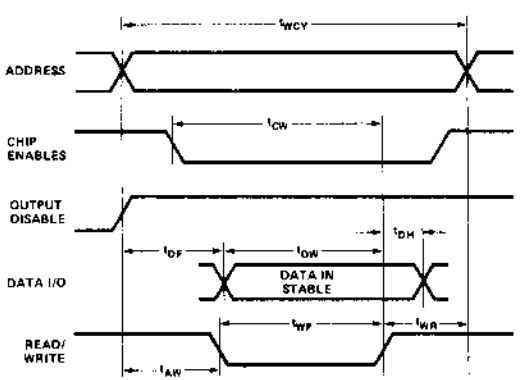
Symbol	Test	Limits (pF)	
		Typ.	Max.
C_{IN}	Input Capacitance (All Input Pins) $V_{IN} = 0V$	4	8
C_{OUT}	Output Capacitance $V_{OUT} = 0V$	10	15

Waveforms

READ CYCLE



WRITE CYCLE



NOTE: 1. t_{DF} is with respect to the trailing edge of $\overline{CE1}$, $\overline{CE2}$, or OD, whichever occurs first.