MOTOROLA SEMICONDUCTORS
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000196 USS 1706/1269 11/29

MC3242A

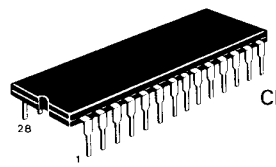
MEMORY ADDRESS MULTIPLEXER FOR 16K RAMs

The Motorola MC3242A is an address multiplexer and refresh counter for 16-pin 16K dynamic RAMs that require a 128-cycle refresh. It multiplexes fourteen system address bits to the seven address pins of the memory device. The MC3242A also contains a 7-bit refresh counter that is clocked externally to generate the 128 sequential addresses required for refresh. The high performance of the MC3242A will enhance the high speed of the N-channel RAMs such as the MCM4116.

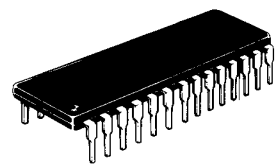
- Simplifies 16-Pin 16K Dynamic Memory Design
- Reduces Package Count
- 7-Bit Binary Counter for 128 Refresh Address
- Multiplexing: Row Address/Column Address/Refresh Address
- High Input Impedance for Minimum Loading of Bus:
  I_F = 0.25 mA Max
- Schottky TTL for High Performance Address Input to Output Delay —
  t_{AO} = 25 ns @ C_L = 250 pF
- Second Source to Intel 3242
  (Detect Zero Function Not Included and Additional Chip Enable Feature Added at Pin 15)

MEMORY ADDRESS MULTIPLEXER AND REFRESH ADDRESS COUNTER

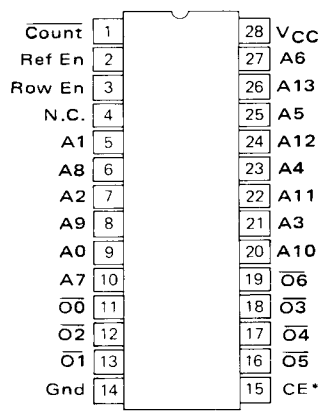
SCHOTTKY
SILICON MONOLITHIC
INTEGRATED CIRCUITS



L SUFFIX
CERAMIC PACKAGE
CASE 733-03



P SUFFIX
PLASTIC PACKAGE
CASE 710-02



Note: A0 Through A6 Are Row Addresses
A7 Through A13 Are Column Addresses

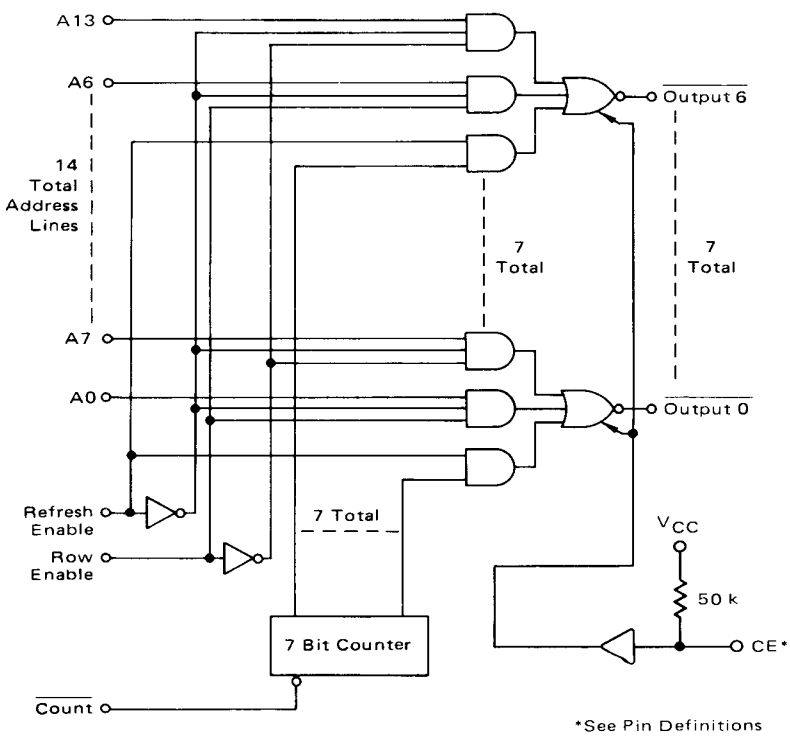
*See Pin Definitions

TRUTH TABLE AND DEFINITIONS

Refresh Enable	Row Enable	Output
H	X	Refresh Address (From Internal Counter)
L	H	Row Address (A0 through A6)
L	L	Column Address (A7 through A13)

Count — Advances Internal Refresh Counter

LOGIC DIAGRAM



*See Pin Definitions

ORDERING INFORMATION		
Device	Temperature Range	Package
MC3242AL	0 to 75°C	Ceramic DIP
MC3242AP	0 to 75°C	Plastic DIP

▲ Indicates area of change from the previous issue

DS9538R1

ABSOLUTE MAXIMUM RATINGS (T_A = 25°C unless otherwise noted.)

Rating	Symbol	Value	Unit
Power Supply Voltage	V_{CC}	−0.5 to +7.0	V
Input Voltage	V_I	−0.5 to +7.0	V
Output Voltage	V_O	−0.5 to +7.0	V
Output Current	I_O	100	mA
Operating Ambient Temperature	T_A	0 to +75	°C
Storage Temperature	T_{stg}	−65 to +150	°C
Junction Temperature Ceramic Package Plastic Package	T_J	 +175 +150	°C

"Absolute Maximum Ratings" are those values beyond which the safety of the device cannot be guaranteed. 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 ratings for extended periods may affect reliability.

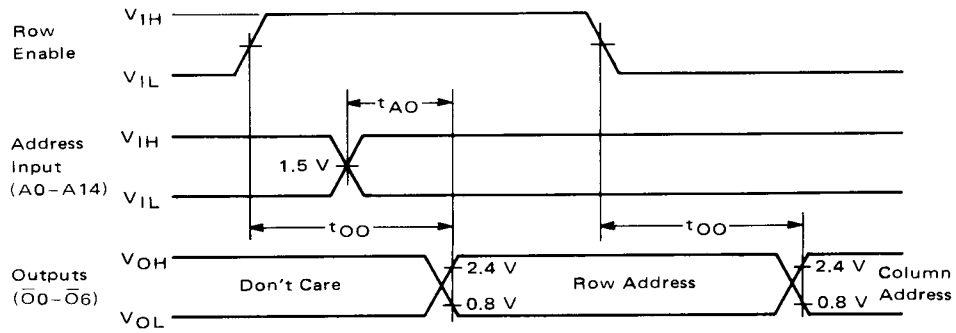
ELECTRICAL CHARACTERISTICS (Unless otherwise noted, Min/Max values apply with 4.5 V ≤ V_{CC} ≤ 5.5 V, 0°C ≤ T_A ≤ 75°C; typical values apply with V_{CC} = 5.0 V, T_A = 25°C.)

Characteristic	Symbol	Min	Typ	Max	Unit
Input Current, Low Logic State (V_{IL} = 0.45 V)	I_{IL}	—	−0.25	−0.40	mA
Input Current, High Logic State (V_{IH} = 5.5 V)	I_{IH}	—	—	10	μA
Input Voltage, Low Logic State	V_{IL}	—	—	0.8	V
Input Voltage, High Logic State	V_{IH}	2.0	—	—	V
Output Voltage, Low Logic State (I_{OL} = 5.0 mA)	V_{OL}	—	0.25	0.4	V
Output Voltage, High Logic State (I_{OH} = −1.0 mA)	V_{OH}	3.0	4.0	—	V
Input Clamp Voltage (I_{IK} = −12 mA)	V_{IK}	—	−0.8	−1.5	V
Power Supply Current (V_{CC} = 5.5 V)	I_{CC}	—	80	125	mA

SWITCHING CHARACTERISTICS (Unless otherwise noted, Min/Max values apply with 4.5 V ≤ V_{CC} ≤ 5.5 V, 0°C ≤ T_A ≤ 75°C; typical values apply with V_{CC} = 5.0 V, T_A = 25°C.)

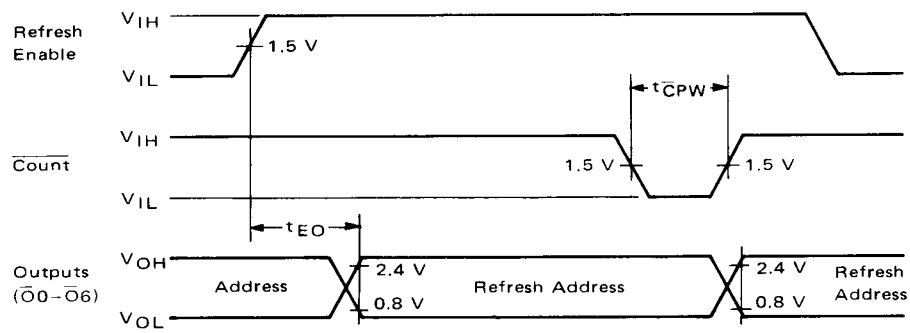
Characteristic	Symbol	Min	Typ	Max	Unit
Propagation Delay Times Address Input to Output (Load = 1 TTL, C_L = 250 pF) (Load = 1 TTL, C_L = 15 pF, V_{CC} = 5.0 V, T_A = 25°C)	t_{AO}	 — —	 12 6.0	 25 9.0	ns
Row Enable to Output (Load = 1 TTL, C_L = 250 pF) (Load = 1 TTL, C_L = 15 pF, V_{CC} = 5.0 V, T_A = 25°C)	t_{OO}	 12 7	 27 12	 41 27	ns
Refresh Enable to Output (Load = 1 TTL, C_L = 250 pF) (Load = 1 TTL, C_L = 15 pF, V_{CC} = 5.0 V, T_A = 25°C)	t_{EO}	 12 7	 30 14	 45 27	ns
$\overline{\text{Count}}$ Pulse Width	$t_{W\overline{C}}$	30	—	—	ns
Counting Frequency	$f_{\overline{C}}$	5.0	10	—	MHz

FIGURE 1 – AC WAVEFORMS WITH MCM4116 NORMAL CYCLE



Refresh Enable – Low Logic State

FIGURE 2 – REFRESH CYCLE



TYPICAL CHARACTERISTICS

FIGURE 3 – OUTPUT CURRENT versus OUTPUT LOW VOLTAGE

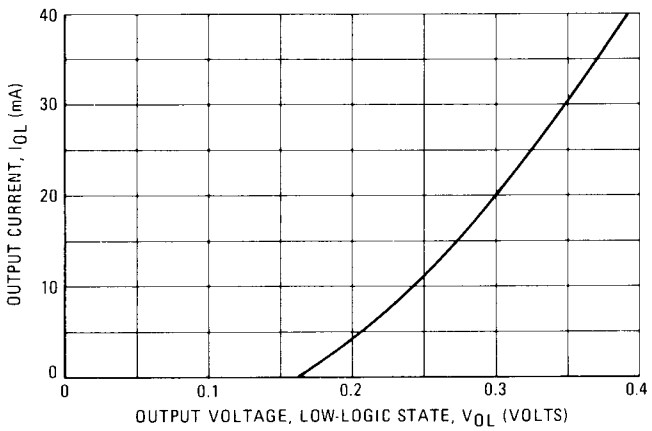
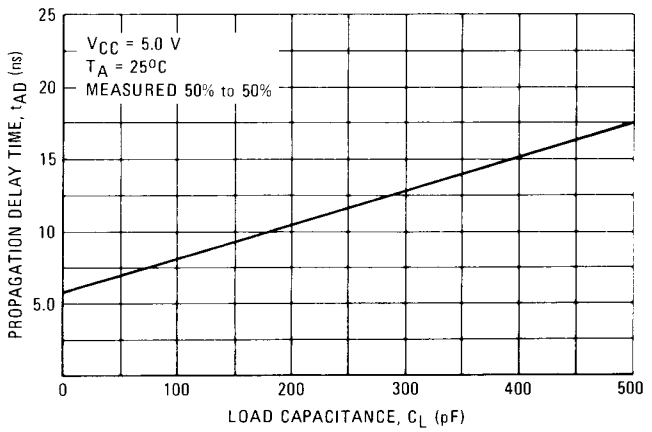
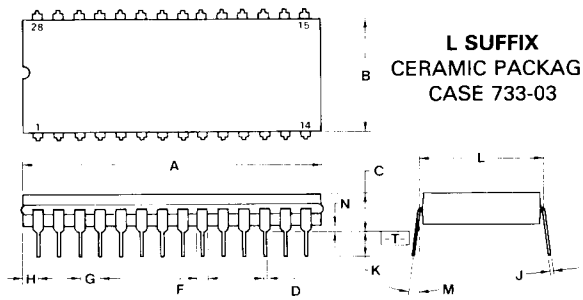


FIGURE 4 – PROPAGATION DELAY versus LOAD CAPACITANCE
Row or Column Address to Output



OUTLINE DIMENSIONS

L SUFFIX
CERAMIC PACKAGE
CASE 733-03

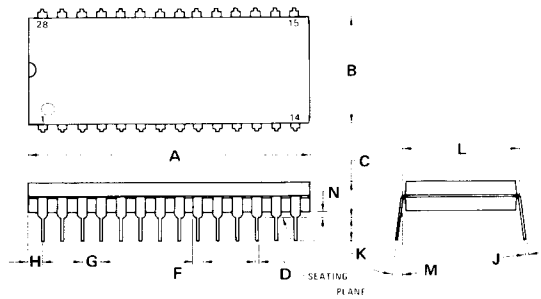


DIM	MILLIMETERS MIN	MAX	INCHES MIN	MAX
A	36.45	37.85	1.435	1.490
B	12.70	15.37	0.500	0.605
C	4.06	5.84	0.160	0.230
D	0.38	0.56	0.015	0.022
F	1.27	1.65	0.050	0.065
G	2.54 BSC		0.100 BSC	
J	0.20	0.30	0.008	0.012
K	3.18	4.06	0.125	0.160
L	15.24 BSC		0.600 BSC	
M	5°	15°	5°	15°
N	0.51	1.27	0.020	0.050

NOTES:
1. DIM A IS DATUM.
2. POSITIONAL TOL FOR LEADS:
   Ø 0.25 (0.010) M T A M
3. T IS SEATING PLANE.
4. DIM A AND B INCLUDES MENISCUS.
5. DIM L TO CENTER OF LEADS WHEN FORMED PARALLEL.
6. DIMENSIONING AND TOLERANCING PER ANSI Y14.5, 1973.

P SUFFIX
PLASTIC PACKAGE
CASE 710-02

DIM	MILLIMETERS MIN	MAX	INCHES MIN	MAX
A	36.45	37.21	1.435	1.465
B	13.72	14.22	0.540	0.560
C	3.94	5.08	0.155	0.200
D	0.36	0.56	0.014	0.022
F	1.02	1.52	0.040	0.060
G	2.54 BSC		0.100 BSC	
H	1.65	2.16	0.065	0.085
J	0.20	0.38	0.008	0.015
K	2.92	3.43	0.115	0.135
L	15.24 BSC		0.600 BSC	
M	0°	15°	0°	15°
N	0.51	1.02	0.020	0.040



THERMAL INFORMATION

The maximum power consumption an integrated circuit can tolerate at a given operating ambient temperature, can be found from the equation:

$$P_{D(T_A)} = \frac{T_{J(max)} - T_A}{R_{\theta JA(Typ)}}$$

Where: $P_{D(T_A)}$ = Power Dissipation allowable at a given operating ambient temperature. This must be greater than the sum of the products of the supply voltages and supply currents at the worst case operating condition.

$T_{J(max)}$ = Maximum Operating Junction Temperature as listed in the Maximum Ratings Section

T_A = Maximum Desired Operating Ambient Temperature

$R_{\theta JA(Typ)}$ = Typical Thermal Resistance Junction to Ambient

PIN DEFINITIONS

$\overline{\text{Count}}$ Input — Pin 1
Active low input increments internal 6-bit counter by one for each count pulse in.

Refresh Enable Input — Pin 2
Active high input which determines whether the MC3242A is in refresh mode (H) or address enable (L).

A0–A6 Inputs — Pins 9, 5, 7, 21, 23, 27
Row address inputs.

A7–A13 Inputs — Pins 10, 6, 8, 20, 22, 24, 26
Column address inputs.

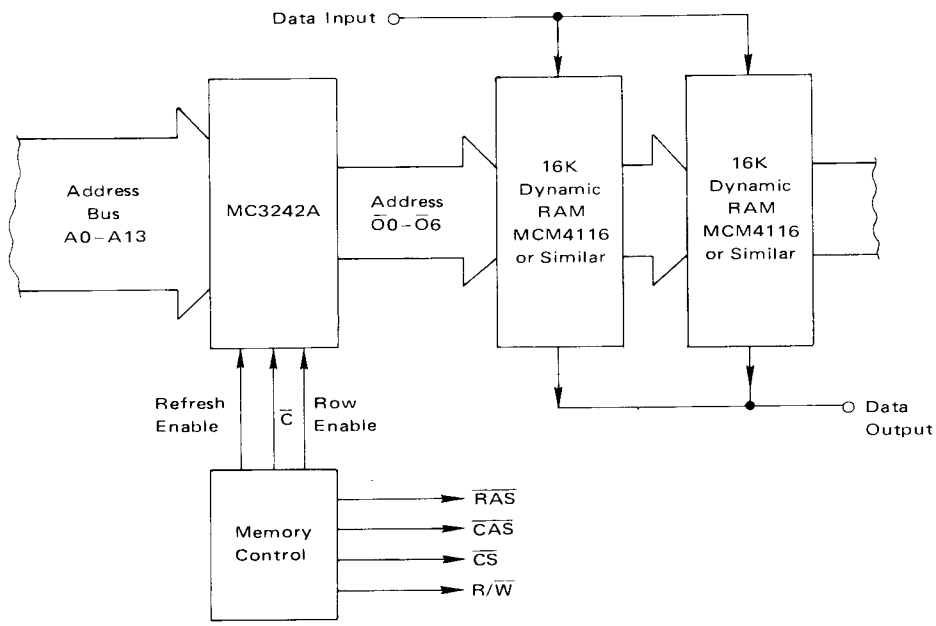
$\overline{O}0$–$\overline{O}6$ Outputs — Pins 11, 12, 13, 18, 17, 16, 19
Address outputs to memories. Inverted with respect to address inputs.

Gnd — Pin 14
Power supply ground.

CE Input — Pin 15
Optional use, chip enable control pin. Left open, an internal 50 kΩ pullup resistor keeps this pin high and the MC3242A is a functional replacement for the Intel 3242 (without detect zero function). As an active input, when pulled low, all 3242A outputs go three-state.

V_{CC} — Pin 28
+5 V power supply input. Due to high capacitance drive capability, a 0.1 μF capacitor should be used to ground along with careful V_{CC} and Gnd Bus layout.

GENERAL 16K DYNAMIC RAM SIMPLIFIED BLOCK DIAGRAM



TYPICAL APPLICATION
16K X 8-BIT MEMORY SYSTEM FOR M6800 MPU

Note: Numbers in parenthesis indicate part types or values for 16K x 1 RAMs