Am9216
2048 x 8 Read Only Memory

DISTINCTIVE CHARACTERISTICS

- 2048 x 8 organization
- High speed — 300ns access time
- Fully capacitive inputs — simplified driving
- 2 fully programmable chip selects — increased flexibility
- Logic voltage levels compatible with TTL
- Three-state output buffers — simplified expansion
- Standard supply voltages — +12V, +5.0V
- No V_{BB} supply required
- N-channel silicon gate MOS technology
- 100% MIL-STD-883 reliability assurance testing

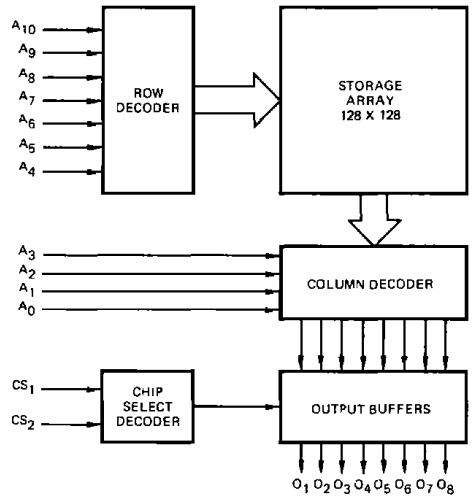
FUNCTIONAL DESCRIPTION

The Am9216 devices are high performance, 16384-bit, static, mask programmed, read only memories. Each memory is implemented as 2048 words by 8 bits per word. This organization simplifies the design of small memory systems and permits incremental memory sizes as small as 2048 words. The fast access times provided allow the ROM to service high performance microcomputer applications without stalling the processor.

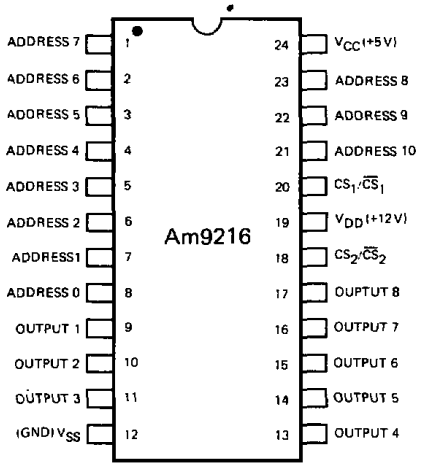
Two Chip Select input signals are logically ANDed together to provide control of the output buffers. Each Chip Select polarity may be specified by the customer thus allowing the addressing of 4 memory chips without external gating. The outputs of unselected chips are turned off and assume a high impedance state. This permits wire-ORing with additional Am9216 devices and other three-state components.

These memories are fully static and require no clock signals of any kind. A selected chip will output data from a location specified by whatever address is present on the address input lines. The Am9216 is pin compatible with the Am9208 which is an 8k-bit mask programmed ROM. Input and output voltage levels are compatible with TTL specifications.

BLOCK DIAGRAM



CONNECTION DIAGRAM
Top View



Note: Pin 1 is marked for orientation.

ORDERING INFORMATION

Package Type	Ambient Temperature Specifications	Access Time	
		400ns	300ns
Hermetic DIP	0°C ≤ T_A ≤ 70°C	AM9216BDC	AM9216CDC
	−55°C ≤ T_A ≤ +125°C	AM9216BDM	

MAXIMUM RATINGS (Above which the useful life may be impaired)

Storage Temperature	−65°C to +150°C
Ambient Temperature Under Bias	−55°C to +125°C
V_{DD} with Respect to V_{SS}	15V
V_{CC} with Respect to V_{SS}	+7.0V
DC Voltage Applied to Outputs	−0.5V to +7.0V
DC Input Voltage	−0.5V to +7.0V
Power Dissipation	1.0W

The products described by this specification include internal circuitry designed to protect input devices from damaging accumulations of static charge. It is suggested nevertheless, that conventional precautions be observed during storage, handling and use in order to avoid exposure to excessive voltages.

OPERATING RANGE

Part Number	Ambient Temperature	V_{DD}	V_{CC}	V_{SS}
Am9216DC	$0°C \leq T_A \leq +70°C$	+12V ± 5%	+5.0V ± 5%	0V
Am9216DM	$-55°C \leq T_A \leq +125°C$	+12V ± 10%	+5.0V ± 10%	0V

ELECTRICAL CHARACTERISTICS OVER OPERATING RANGE

Parameters	Description	Test Conditions		Am9216DC Min.	Am9216DC Max.	Am9216DM Min.	Am9216DM Max.	Units
V_{OH}	Output HIGH Voltage	$I_{OH} = -1.0mA$		3.7		3.7		Volts
		$I_{OH} = -4.0mA$		2.4		2.4		
V_{OL}	Output LOW Voltage	$I_{OL} = 3.2mA$			0.4		0.4	Volts
V_{IH}	Input HIGH Voltage			2.4	$V_{CC}+1.0$	2.6	$V_{CC}+1.0$	Volts
V_{IL}	Input LOW Voltage			−0.5	0.8	−0.5	0.8	Volts
I_{LO}	Output Leakage Current	Chip disabled			10		10	µA
I_{LI}	Input Leakage Current				10		10	µA
I_{DD}	V_{DD} Supply Current	Selected	Am9216B		42		47	mA
			Am9216C		49			
		Deselected	Am9216B		52		57	
			Am9216C		60			
I_{CC}	V_{CC} Supply Current		Am9216B		13		15	mA
			Am9216C		15			

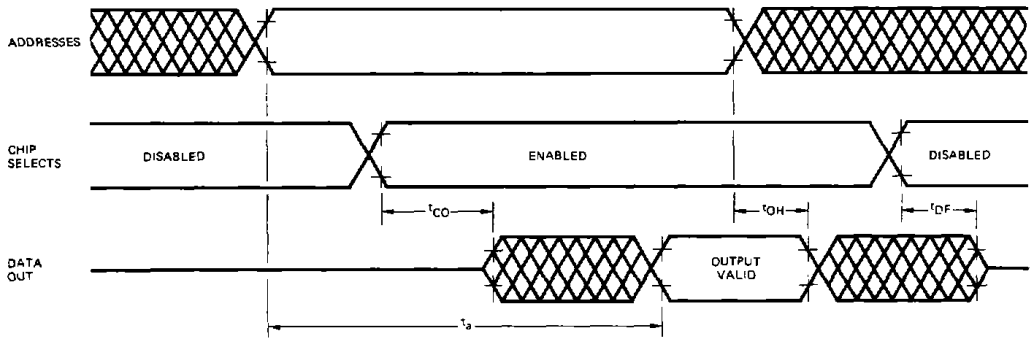
SWITCHING CHARACTERISTICS OVER OPERATING RANGE

Am9216BDC, Am9216BDM, Am9216CDC

Parameters	Description	Test Conditions	Am9216DC/DM Min.	Am9216DC/DM Max.	Am9216CDC Min.	Am9216CDC Max.	Units
t_a	Address to Output Access Time	$t_r = t_f = 20ns$ Output load: one standard TTL gate plus 100pF (Note 1)		400		300	ns
t_{CO}	Chip Select to Output ON Delay			160		140	ns
t_{OH}	Previous Read Data Valid with Respect to Address Change		20		20		ns
t_{DF}	Chip Select to Output OFF Delay			120		100	ns
C_I	Input Capacitance	$T_A = 25°C$, f = 1.0MHz All pins at 0V		6.0		6.0	pF
C_O	Output Capacitance			6.0		6.0	pF

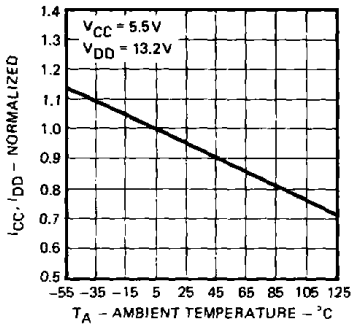
Notes: 1. Timing reference levels — Inputs: High = 2.0V, Low = 1.0V.
Outputs: High = 2.4V, Low = 0.8V.

SWITCHING WAVEFORMS

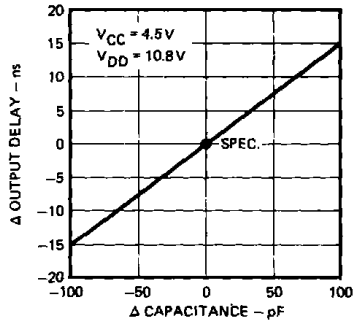


TYPICAL CHARACTERISTICS

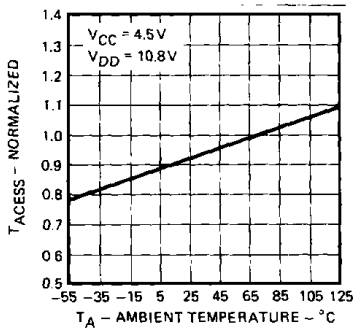
I_{DD}, I_{CC} Versus Temperature (Normalized)



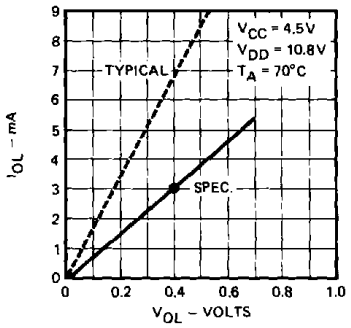
Δ Output Capacitance Versus Δ Output Delay



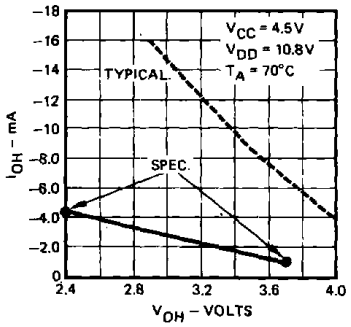
T_{Access} Versus Temperature (Normalized)



I_{OL} Versus V_{OL}



I_{OH} Versus V_{OH}



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PROGRAMMING INSTRUCTIONS

CUSTOM PATTERN ORDERING INFORMATION

The Am9216 is programmed from punched cards, card coding forms or from paper tape in card image form in the format as shown below.

Logic "1" = a more positive voltage (normally +5.0 V)
Logic "0" = a more negative voltage (normally 0V)

FIRST CARD

Column Number	Description
10 thru 29	Customer Name
32 thru 37	Total number of "1's" contained in the data. This is optional and should be left blank if not used.
50 thru 62	9216B or 9216C
65 thru 72	Data

SECOND CARD

Column Number	Description
31	CS_2 input required to select chip (0 or 1)
33	CS_1 input required to select chip (0 or 1)

Two options are provided for entering the data pattern with the remaining cards.

OPTION 1 is the Binary Option where the address and data are presented in binary form on the basis of one word per card. With this option 2048 data cards are required.

Column Number	
10, 12, 14, 16, 18 20, 22, 24, 26, 28, 30	Address input pattern with the most significant bit (A_{10}) in column 10 and the least significant bit (A_0) in column 30.
40, 42, 44, 46, 48, 50, 52, 54	Output pattern with the most significant bit (O_8) in column 40 and the least significant bit (O_1) in column 54.
73 thru 80	Coding these columns is not essential and may be used for card identification purposes.

OPTION 2 is the Hexadecimal Option and is a much more compact way of presenting the data. This format requires only 128 data cards. Each data card contains the 8-bit output information for 16 storage locations in the memory. The address indicated in columns 21, 22 and 23 is the address of the data presented in columns 30 and 31. Addresses for successive data are assumed to be in incremental ascending order from the initial address. Since the address in columns 21, 22 and 23 always points only to the first data on the card, column 23 is always zero. Columns 21 and 22 take all hex values from 00 through 7F: 128 cards in all. Data is entered in hex values and may be any combination of 8 bits, that is, hex values from 00 through FF.