

## FEATURES

- Bit organization
  - 4Mb x 8 (byte mode)
  - 2Mb x 16 (word mode)
- Fast access time
  - Random access:80/25ns(max.)
- Page Size
  - 8 words per page
- Current
  - Operating:40mA
  - Standby:15uA(max.)
- Supply voltage
  - VCC : 2.7 ~ 3.6V
  - VCCQ : 2.7 ~ 3.6V
- Package
  - 64 ball mini BGA (10.0mm X 13.0mm, ball pitch 1.0mm)
  - 56 pin TSOP (14mm x 20mm)
- Temperature
  - 25~85°C

## PIN DESCRIPTION

Symbol	Pin Function
A0~A21	Address Inputs, A0 not used in word mode
D0~D15	Data Outputs
CE0#, CE1# CE2#	Chip Enable Input
OE#	Output Enable Input
BYTE#	Word/Byte mode Selection
VCC	Power Supply Pin
VCCQ	Output VCC Pin
GND	Ground Pin
NC	No Connection

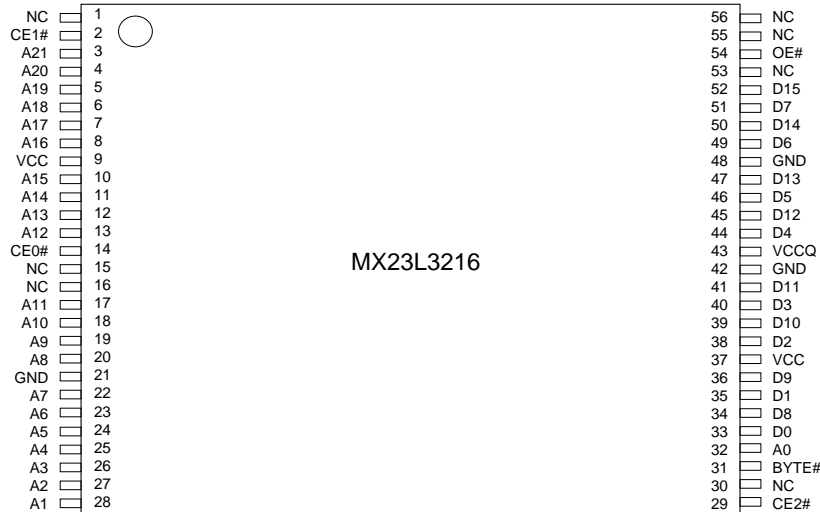
## CHIP ENABLE TRUTH TABLE

CE2#	CE1#	CE0#	Device
L	L	L	Enabled
L	L	H	Disabled
L	H	L	Disabled
L	H	H	Disabled
H	L	L	Enabled
H	L	H	Enabled
H	H	L	Enabled
H	H	H	Disabled

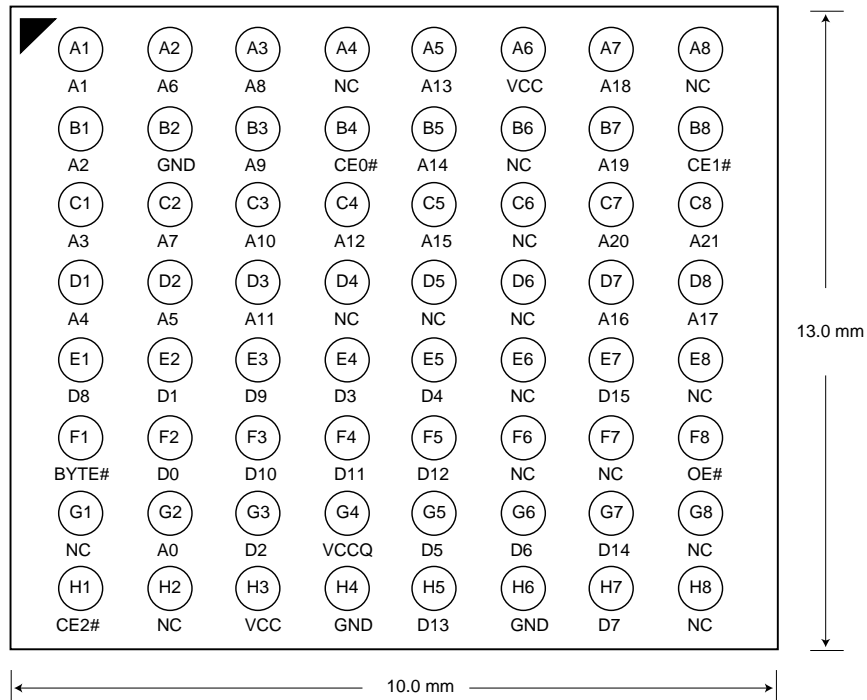
Note: for single-chip applications, CE2#, CE1# can be strapped to GND.

## PIN CONFIGURATION

### 56 TSOP (Normal Type)



## 64 Mini BGA (Top View, Balls Facing Down)



## MODE SELECTION

CE#	OE#	Byte#	D0~D7	D8~D15	Power
Disabled	X	X	High Z	High Z	Stand-by
Enabled	H	X	High Z	High Z	Active
Enabled	L	L	D0~D7	High Z	Active
Enabled	L	H	D0~D7	D8~D15	Active

## ORDER INFORMATION

Part No.	Speed	Package	Grade
MX23L3216TI-80	80ns	56 pin TSOP	Industrial
MX23L3216TI-10	100ns	56 pin TSOP	Industrial
MX23L3216TI-12	120ns	56 pin TSOP	Industrial
MX23L3216XI-80	80ns	64 ball mini BGA	Industrial
MX23L3216XI-10	100ns	64 ball mini BGA	Industrial
MX23L3216XI-12	120ns	64 ball mini BGA	Industrial

Note: Industrial grade temperature: -25 ~ 85° C  
 Commercial grade temperature: 0 ~ 70° C

**ABSOLUTE MAXIMUM RATINGS**

Item	Symbol	Ratings
Voltage on any Pin Relative to VSS	VIN	-0.3V to 3.9V
Ambient Operating Temperature	Topr	-25° C to 85° C
Storage Temperature	Tstg	-65° C to 125° C

**DC CHARACTERISTICS** (Ta = -25° C ~ 85° C, VCC = 2.7V~3.6V)

Item	Symbol	MIN.	MAX.	Conditions
Output High Voltage	VOH	2.4V	-	IOH = -400uA
Output Low Voltage	VOL	-	0.4V	IOL = 1.6mA
Input High Voltage	VIH	2.2V	VCCQ+0.5V	
Input Low Voltage	VIL	-0.5V	0.8V	
Input Leakage Current	ILI	-	10uA	0V, VCC
Output Leakage Current	ILO	-10	10uA	0V, VCC
Operating Current	ICC	-	40mA	f=5MHz, CE#=VIL, OE#=VIH all output open
Standby Current (CMOS)	ISTB	-	15uA	CE#>VCC-0.2V
Input Capacitance	CIN	-	10pF	Ta = 25° C, f = 1MHZ
Output Capacitance	COUT	-	10pF	Ta = 25° C, f = 1MHZ

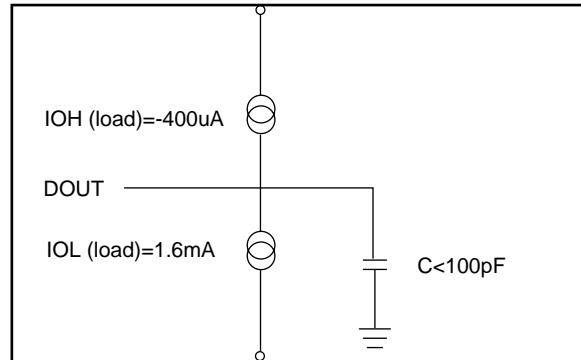
**AC CHARACTERISTICS** (Ta = -25° C ~ 85° C, VCC = 2.7V~3.6V)

Item	Symbol	<u>23L3216-80</u>		<u>23L3216-10</u>		<u>23L3216-12</u>	
		MIN.	MAX.	MIN.	MAX.	MIN.	MAX.
Read Cycle Time	tRC	80ns	-	100ns	-	120ns	-
Address Access Time	tAA	-	80ns	-	100ns	-	120ns
Chip Enable Access Time	tACE	-	80ns	-	100ns	-	120ns
Page Mode Access Time	tPA	-	25ns	-	25ns	-	25ns
Output Enable Time	tOE	-	25ns	-	25ns	-	25ns
Output Hold After Address	tOH	0ns	-	0ns	-	0ns	-
Output High Z Delay	tHZ	-	20ns	-	20ns	-	20ns

Note: Output high-impedance delay (tHZ) is measured from OE# or CE# going high, and this parameter guaranteed by design over the full voltage and temperature operating range - not tested.

## AC Test Conditions

Input Pulse Levels	0.4V~2.4V
Input Rise and Fall Times	5ns
Input Timing Level	1.5V
Output Timing Level	1.5V
Output Load	See Figure 100pF output load capacitance



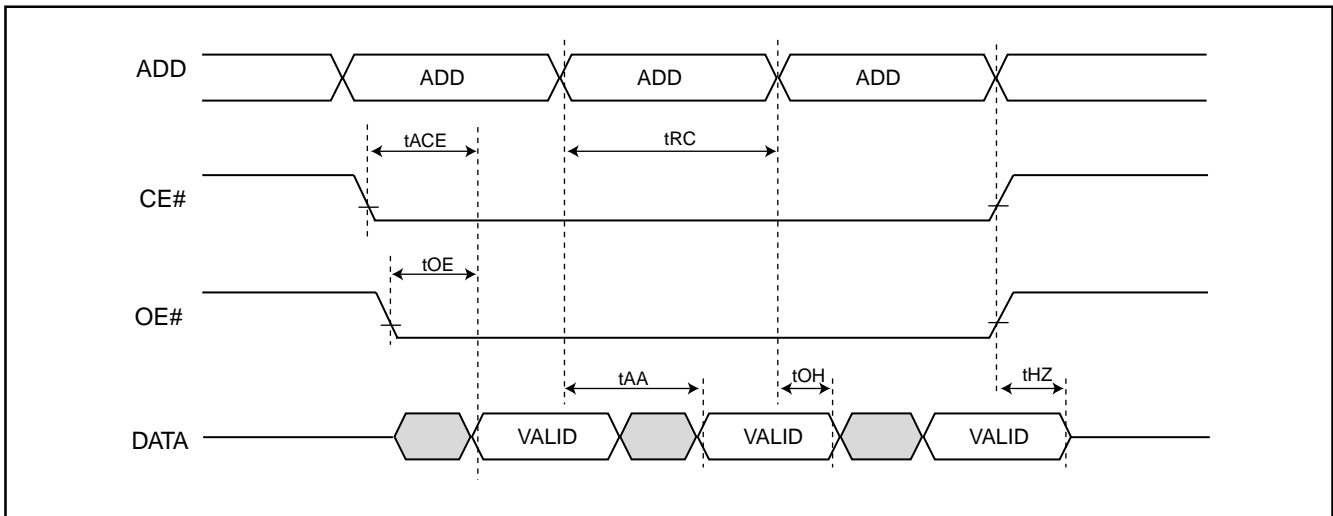
Note: No output loading is present in tester load board.

Active loading is used and under software programming control.

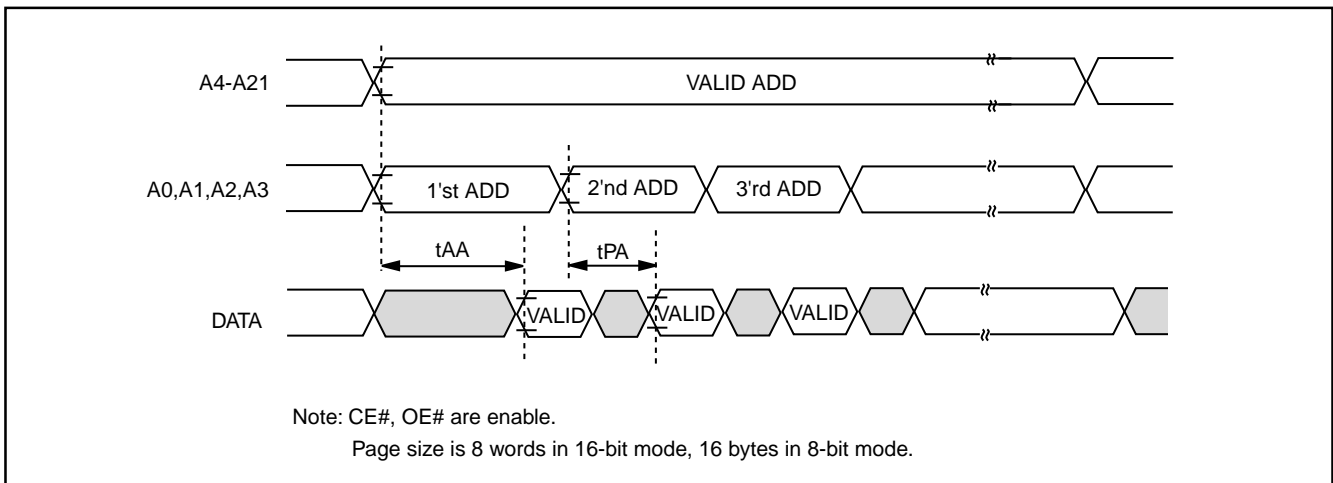
Output loading capacitance includes load board's and all stray capacitance.

## TIMING DIAGRAM

### RANDOM READ



### PAGE READ





**MX23L3216**

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