

### FEATURES

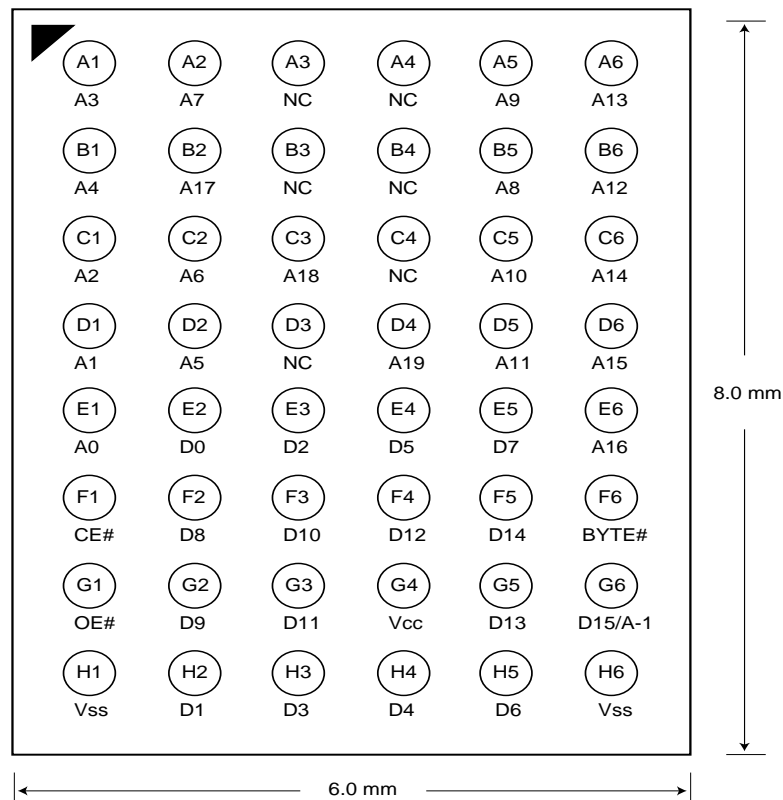
- Bit organization
  - 2M x 8 (byte mode)
  - 1M x 16 (word mode)
- Fast access time
  - Random access:70ns(max.)
- Current
  - Operating:25mA
  - Standby:5uA
- Supply voltage
  - 2.7V ~ 3.6V
- Package
  - 48 ball mini BGA (6mm x 8mm, ball pitch 0.8mm, ball size 0.4mm)
- Temperature
  - -40 ~ 85° C

### PIN DESCRIPTION

Symbol	Pin Function
A0~A19	Address Inputs
D0~D14	Data Outputs
D15/A-1	D15 (Word Mode)/ LSB Address (Byte Mode)
CE#	Chip Enable Input
OE#	Output Enable Input
Byte#	Word/ Byte Mode Selection
VCC	Power Supply Pin
VSS	Ground Pin
NC	No Connection

### PIN CONFIGURATION

#### 48 mini BGA (Top View, Ball Down)



**ORDER INFORMATION**

Part No.	Speed	Package	Grade	Note
MX23L1612XI-70	70ns	48 ball mini BGA	Industrial	
MX23L1612XI-90	90ns	48 ball mini BGA	Industrial	
MX23L1612XI-70G	70ns	48 ball mini BGA	Industrial	Lead free package
MX23L1612XI-90G	90ns	48 ball mini BGA	Industrial	Lead free package

Note: Industrial grade temperature: -40 ~ 85° C  
Commercial grade temperature: 0 ~ 70° C

**MODE SELECTION**

CE#	OE#	Byte#	D15/A-1	D0~D7	D8~D15	Mode	Power
H	X	X	X	High Z	High Z	-	Stand-by
L	H	X	X	High Z	High Z	-	Active
L	L	H	Output	D0~D7	D8~D15	Word	Active
L	L	L	Input	D0~D7	High Z	Byte	Active

**ABSOLUTE MAXIMUM RATINGS**

Item	Symbol	Ratings
Voltage on any Pin Relative to VSS	VIN	-0.3V to 3.9V
Ambient Operating Temperature	Topr	-40° C to 85° C
Storage Temperature	Tstg	-65° C to 125° C

**DC CHARACTERISTICS** (Ta = -40° 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	VCC+0.3V	
Input Low Voltage	VIL	-0.3V	0.8V	
Input Leakage Current	ILI	-	5uA	0V, VCC
Output Leakage Current	ILO	-	5uA	0V, VCC
Operating Current	ICC	-	25mA	f=5MHz, CE#=VIL, OE#=VIH all output open
Standby Current (CMOS)	ISTB	-	5uA	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 = -40° C ~ 85° C, VCC = 2.7V~3.6V)

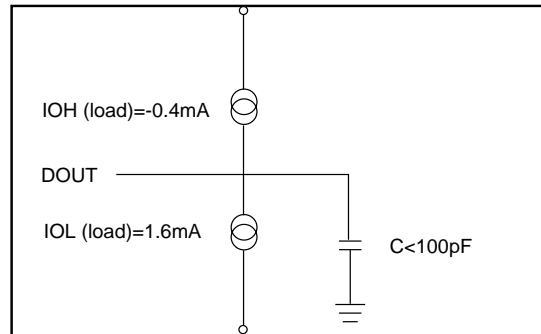
Item	Symbol	23L1612-70		23L1612-90	
		MIN.	MAX.	MIN.	MAX.
Read Cycle Time	tRC	70ns	-	90ns	-
Address Access Time	tAA	-	70ns	-	90ns
Chip Enable Access Time	tACE	-	70ns	-	90ns
Output Enable Time	tOE	-	30ns	-	40ns
Output Hold After Address	tOH	0ns	-	0ns	-
Output High Z Delay	tHZ	-	20ns	-	20ns

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	0V~ 3.0V
Input Rise and Fall Times	5ns
Input Timing Level	1.5V
Output Timing Level	1.5V
Output Load	See Figure

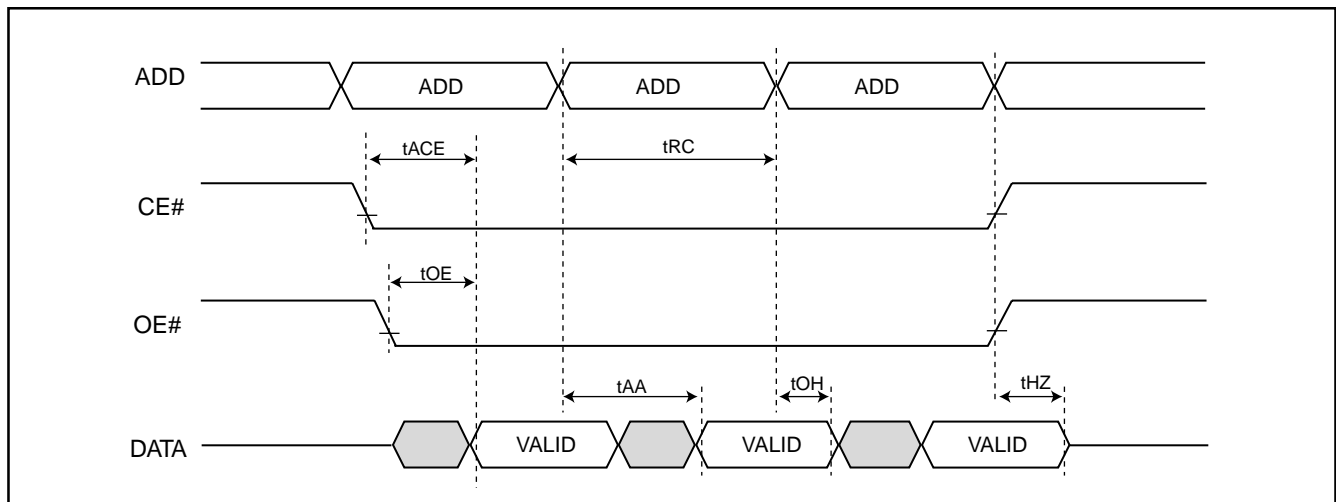
Note: 30pF output load capacitance for 70 and 90ns speed grade  
100pF output load capacitance for 120ns speed grade



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

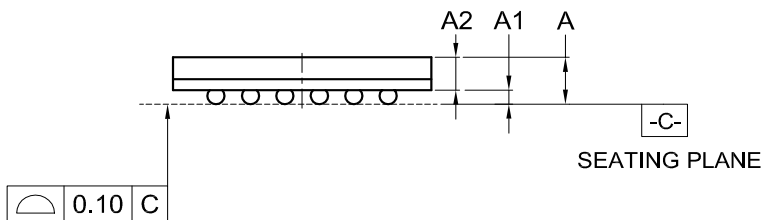
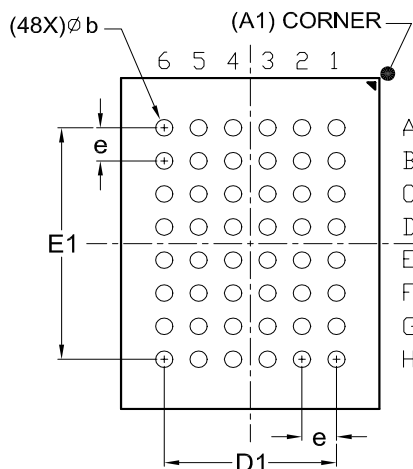
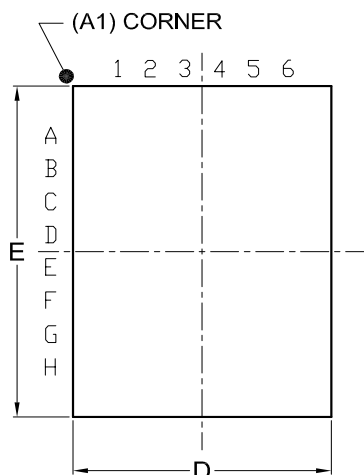


## PACKAGE INFORMATION

Title: Package Outline for CSP 48BALL(6X8X1.3MM,BALL PITCH 0.8MM,BALL DIAMETER 0.4MM)

TOP VIEW

BOTTOM VIEW



Dimensions (inch dimensions are derived from the original mm dimensions)

SYMBOL		A	A1	A2	b	D	D1	E	E1	e
mm	Min.	---	0.25	0.65	0.35	5.90		7.90		
	Nom.	---	0.30	---	0.40	6.00	4.00	8.00	5.60	0.80
	Max.	1.30	0.35	---	0.45	6.10		8.10		
Inch	Min.	---	0.010	0.026	0.014	0.232		0.311		
	Nom.	---	0.012	---	0.016	0.236	0.157	0.315	0.220	0.031
	Max.	0.051	0.014	---	0.018	0.240		0.319		

DWG.NO.	REVISION	REFERENCE			ISSUE DATE
		JEDEC	EIAJ		
6110-4202	4	MO-219			12-12-'03

**REVISION HISTORY**

<b>Revision No.</b>	<b>Description</b>	<b>Page</b>	<b>Date</b>
1.1	Added Order Information	P2	JUL/10/2001
1.2	Order Information added commercial grade Add 48 ball mini BGA (6mm x 8mm, ball pitch 0.8mm) Add Temperature:-40~85° C	P2 P1,5 P1	JUL/16/2001
1.3	Add CE#=VIL, OE#=VIH in DC Characteristics's ICC	P3	OCT/03/2001
1.4	Modify 48-Ball BGA Package Information	P4,5	MAR/12/2002
1.5	Replace 8mm x 9mm BGA with 6mm x 8mm BGA Phase out 100ns and 120ns speed grade Add Lead free package	P1 P3 P2	MAY/20/2002
1.6	Modify Package Information	P4	JUN/23/2003



**MX23L1612**

---

---

**MACRONIX INTERNATIONAL Co., LTD.**

**Headquarters:**

TEL:+886-3-578-6688

FAX:+886-3-563-2888

**Europe Office :**

TEL:+32-2-456-8020

FAX:+32-2-456-8021

**Hong Kong Office :**

TEL:+86-755-834-335-79

FAX:+86-755-834-380-78

**Japan Office :**

**Kawasaki Office :**

TEL:+81-44-246-9100

FAX:+81-44-246-9105

**Osaka Office :**

TEL:+81-6-4807-5460

FAX:+81-6-4807-5461

**Singapore Office :**

TEL:+65-6346-5505

FAX:+65-6348-8096

**Taipei Office :**

TEL:+886-2-2509-3300

FAX:+886-2-2509-2200

**MACRONIX AMERICA, INC.**

TEL:+1-408-262-8887

FAX:+1-408-262-8810

*<http://www.macronix.com>*

---