

FEATURES

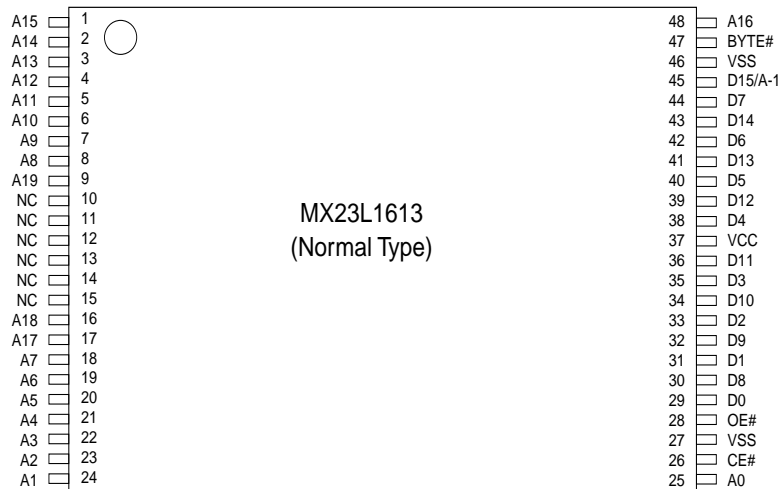
- Bit organization
 - 2M x 8 (byte mode)
 - 1M x 16 (word mode)
- Fast access time
 - Random access:70ns(max.)
- Current
 - Operating:25mA
 - Standby:5uA
- Supply voltage
 - 2.7V ~ 3.6V
- Package
 - 48 pin TSOP(12mm x 20mm)
- Temperature
 - -40 ~ 85° C

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 TSOP (Top View)



ORDER INFORMATION

Part No.	Speed	Package	Grade
MX23L1613TC-70	70ns	48 pin TSOP	Commercial
MX23L1613TC-90	90ns	48 pin TSOP	Commercial
MX23L1613TC-70G	70ns	48 pin TSOP (Pb-free, RoHS Compliant)	Commercial
MX23L1613TC-90G	90ns	48 pin TSOP (Pb-free, RoHS Compliant)	Commercial
MX23L1613TI-70	70ns	48 pin TSOP	Industrial
MX23L1613TI-90	90ns	48 pin TSOP	Industrial
MX23L1613TI-70G	70ns	48 pin TSOP (Pb-free, RoHS Compliant)	Industrial
MX23L1613TI-90G	90ns	48 pin TSOP (Pb-free, RoHS Compliant)	Industrial

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)

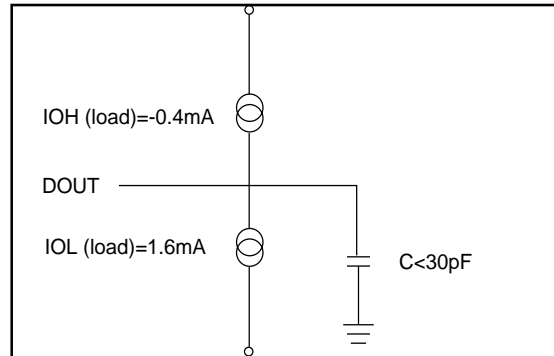
Item	Symbol	23L1613-70		23L1613-90	
		MIN.	MAX.	MIN.	MAX.
Read Cycle Time	tRC	70ns	-	90ns	-
Address Access Time	tAA	-	70ns	-	90ns
Chip Enable Access Time	tACE	-	70ns	-	90ns
Output Enable Time	tOE	-	30ns	-	40ns
Output Hold After Address	tOH	0ns	-	0ns	-
Output High Z Delay	tHZ	-	20ns	-	20ns

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



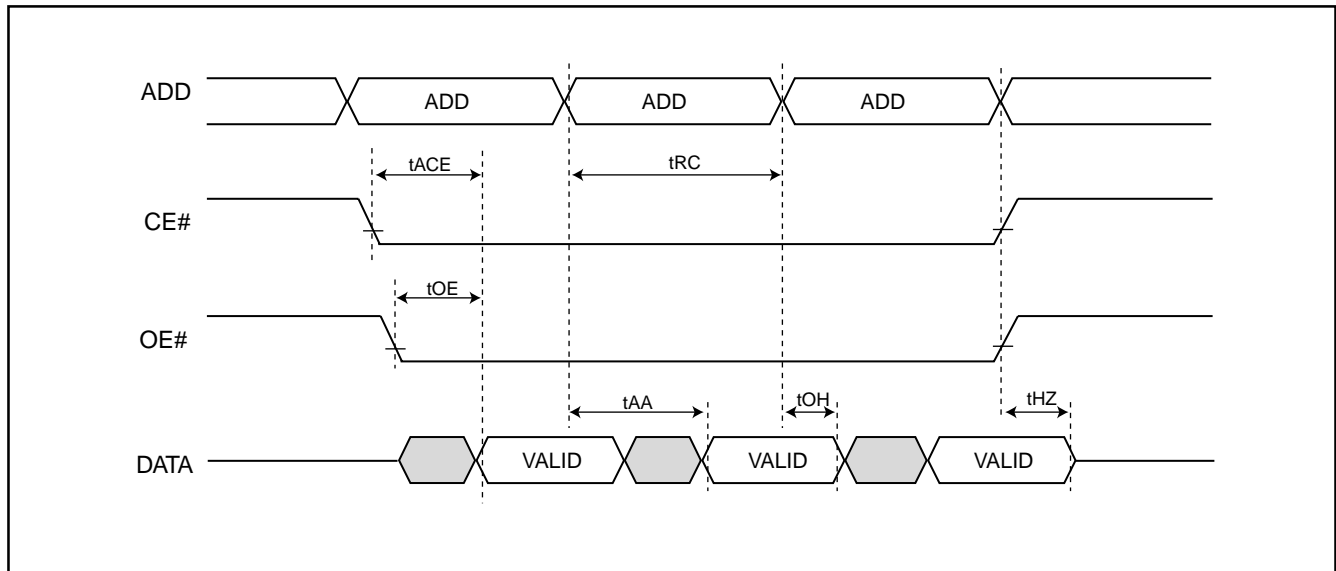
Note: No output loading is present in tester load board.

Active loading is used and under software programming control.

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

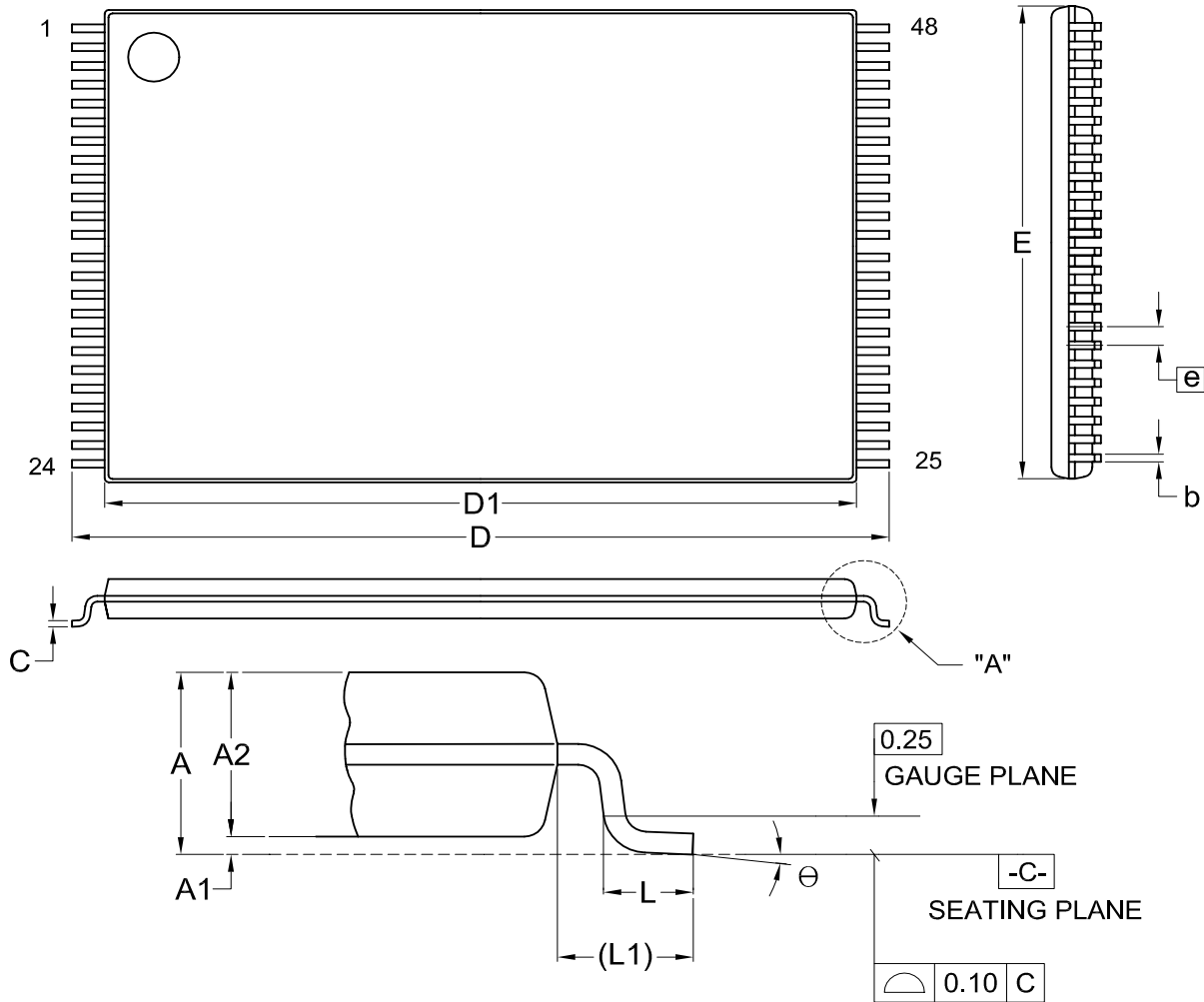
TIMING DIAGRAM

RANDOM READ



PACKAGE INFORMATION

Title: Package Outline for TSOP(I) 48L (12X20mm)NORMAL FORM



DETAIL "A"

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

SYMBOL		A	A1	A2	b	C	D	D1	E	e	L	L1	θ
UNIT													
mm	Min.	---	0.05	0.95	0.17	0.10	19.80	18.30	11.90		0.50	0.70	0
	Nom.	---	0.10	1.00	0.20	0.13	20.00	18.40	12.00	0.50	0.60	0.80	5
	Max.	1.20	0.15	1.05	0.27	0.21	20.20	18.50	12.10		0.70	0.90	8
Inch	Min.	---	0.002	0.037	0.007	0.004	0.780	0.720	0.469		0.020	0.028	0
	Nom.	---	0.004	0.039	0.008	0.005	0.787	0.724	0.472	0.020	0.024	0.031	5
	Max.	0.047	0.006	0.041	0.011	0.008	0.795	0.728	0.476		0.028	0.035	8

DWG.NO.	REVISION	REFERENCE			ISSUE DATE
		JEDEC	EIAJ		
6110-1607	7	MO-142			12-01-'03

Revision History

Revision No.	Description	Page	Date
1.2	Modify Package 48-ball mini BGA 8mm x 13mm-->8mm x 9mm	P1	APR/27/2000
1.3	Modify Fast access time:100ns-->70ns Add AC Characteristics--23L1613-70&90	P1 P3	JAN/18/2001
1.4	1.Modify Pin Configuration--48 mini BGA 2.Added 48-Ball mini BGA--Package Information	P1,2 P6	JUN/28/2001
1.5	Added Order Information Add Temperature:-40~85° C	P2 P1	JUL/16/2001
1.6	Add CE#=VIL, OE#=VIH in DC Characteristics's ICC Add MX23L1613TC-70 in Order Information	P3 P2	OCT/02/2001
1.7	Modify Package Information	P5~6	NOV/22/2002
1.8	1. Removed 48-ball BGA package 2. Removed 100ns & 120ns speed	All P1,2	NOV/28/2005



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