

### FEATURES

- Switchable configuration
  - 4M x 8(byte mode)
  - 2M x 16(word mode)
- Single +5V power supply
- Fast access time: 120/150/200ns (max)
- Totally static operation
- Completely TTL compatible
- Operating current: 60mA
- Standby current: 100µA
- Package
  - 42 pin DIP (600 mil)/(word mode only)
  - 44 pin SOP (500 mil)
  - 48 pin TSOP

### GENERAL DESCRIPTION

The MX23C3210 is a 5V only, 32M-bit, Read Only Memory. It is organized as 4M x 8 bits (byte mode) or as 2M x 16 bit (word mode) depending on BYTE (pin 33/44SOP) voltage level. MX23C3210 has a static standby mode, and has an access time of 120/150/200ns. It is designed to be compatible with all microprocessors and similar applications in which high performance, large bit storage and simple interfacing are important design considerations.

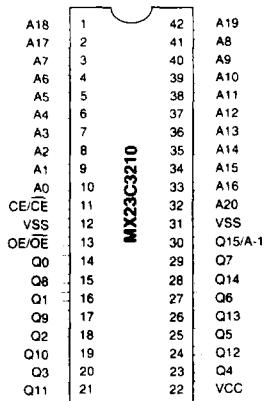
MX23C3210 offers automatic power-down, with power-down controlled by the chip enable(CE/CE) Input. When CE/CE is not selected, the device automatically powers down and remains in a low-power standby mode as long as CE/CE stays in the unselected mode.

The OE/OE inputs as well as CE/CE input may be programmed either active High or Low.

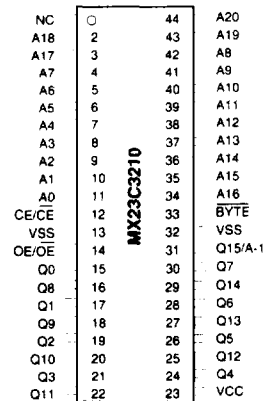
MASK ROM DATA SHEETS

### PIN CONFIGURATIONS (Word Mode Only)

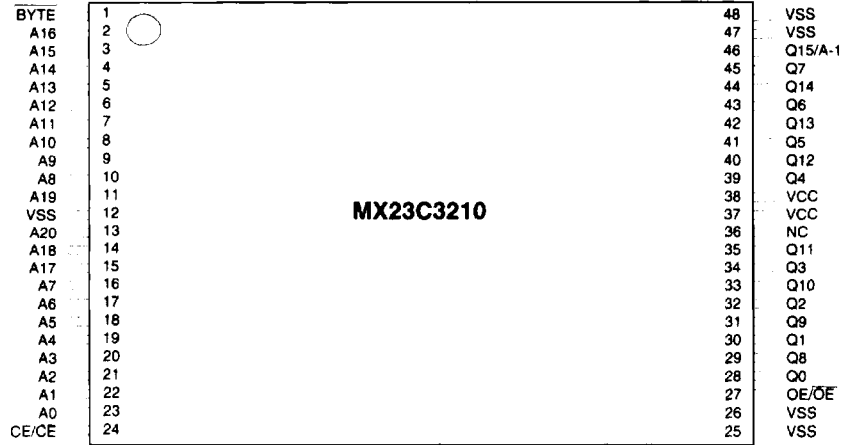
#### 42 PDIP



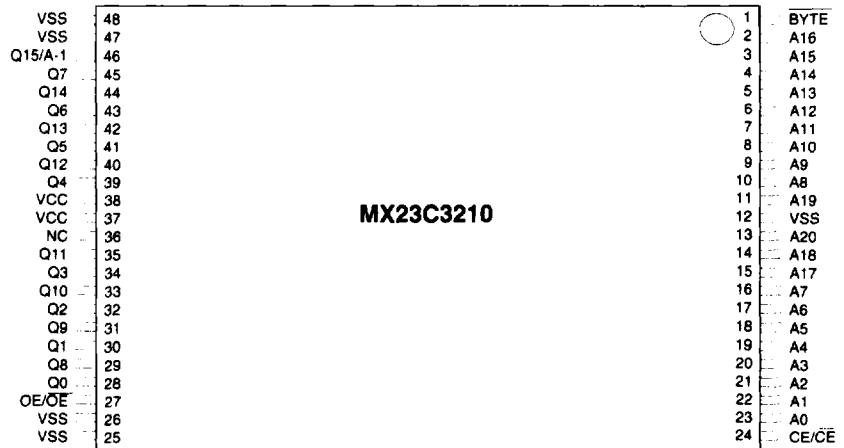
#### 44 SOP



**48 TSOP**

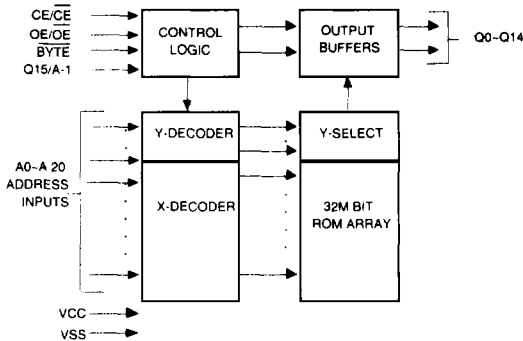


**(NORMAL TYPE)**



**(REVERSE TYPE)**

## BLOCK DIAGRAM



## PIN DESCRIPTION:

SYMBOL	PIN NAME
A0~A20	Address Input
Q0-Q14	Data Output
CE/CE	Chip Enable Input
OE/OE	Output Enable Input
BYTE	Word/Byte Selection
Q15/A-1	Q15(Word mode)/LSB addr. (Byte mode)
VCC	Power Supply Pin (+5V)
VSS	Ground Pin

1/ASK (011)  
DATA SHEETS

## TRUTH TABLE OF BYTE FUNCTION

### BYTE MODE (BYTE = VSS)

CE	OE/OE	Q15/A-1	MODE	Q0-Q7	SUPPLY CURRENT	NOTE
H	X	X	Non selected	High Z	Standby(ICC2)	1
L	L/H	X	Non selected	High Z	Operating(ICC1)	1
L	H/L	A-1 input	Selected	DOUT	Operating(ICC1)	1

### WORD MODE (BYTE = VCC)

CE	OE/OE	Q15/A-1	MODE	Q0-Q14	SUPPLY CURRENT	NOTE
H	X	High Z	Non selected	High Z	Standby(ICC2)	1
L	L/H	High Z	Non selected	High Z	Operating(ICC1)	1
L	H/L	DOUT	Selected	DOUT	Operating(ICC1)	1

NOTE1: X = H or L

## ABSOLUTE MAXIMUM RATINGS\*

RATING	VALUE
Ambient Operating Temperature	0°C to 70°C
Storage Temperature	-65°C to 125°C
Applied Input Voltage	-0.5V to 7.0V
Applied Output Voltage	-0.5V to 7.0V
VCC to Ground Potential	-0.5V to 7.0V
Power Dissipation	1.0W

### \*NOTICE:

Stresses greater than those listed under ABSOLUTE MAXIMUM RATINGS may cause permanent damage to the device. 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 rating conditions for extended period may affect reliability.

## DC CHARACTERISTICS TA = 0°C TO 70°C, VCC = 5V ± 10%

SYMBOL	PARAMETER	MIN.	MAX.	UNIT	CONDITIONS
VOH	Output High Voltage	2.4		V	IOH = -1.0mA
VOL	Output Low Voltage		0.4	V	IOL = 2.1mA
VIH	Input High Voltage	2.2	VCC + 0.3	V	
VIL	Input Low Voltage	-0.3	0.8	V	
ILI	Input Leakage Current		10	μA	VIN = 0 to 5.5V
ILO	Output Leakage Current		10	μA	VOUT = 0 to 5.5V
ICC3	Power-Down Supply Current		100	μA	$\overline{CE} > VCC - 0.2V$
ICC2	Standby Supply Current		1	mA	$\overline{CE} = VIH$
ICC1	Operating Supply Current		60	mA	Note 1

## CAPACITANCE TA = 25°C, f = 1.0 MHz (Note 2)

SYMBOL	PARAMETER	MIN.	MAX.	UNIT	CONDITIONS
CIN	Input Capacitance		10	pF	VIN = 0V
COUT	Output Capacitance		10	pF	VOUT = 0V

**AC CHARACTERISTICS:** TA = 0°C to 70°C, VCC = 5V ± 10%

SYMBOL	PARAMETER	23C3210-12		23C3210-15		23C3210-20		UNIT	CONDITIONS
		MIN.	MAX.	MIN.	MAX.	MIN.	MAX.		
tCYC	Cycle Time	120		150		200		ns	
tAA	Address Access Time		120		150		200	ns	
tOH	Output Hold Time After Address Change	10		10		10		ns	
tACE	Chip Enable Access Time		120		150		200	ns	
tAOE	Output Enable/Chip Select Access Time		70		80		90	ns	
tLZ	Output Low Z Delay	0		0		0		ns	Note 3
tHZ	Output High Z Delay		70		70		70	ns	Note 4
tBHA	BYTE Access Time		120		150		200	ns	
tOHB	BYTE Output Hold Time	0		0				ns	
tBHZ	BYTE Output Delay Time		70		70		70	ns	
tBLZ	BYTE Output Set Time	10		10		10		ns	

**NOTE:**

1. Measured with device selected at f = 5 MHz and output unloaded.
2. This parameter is periodically sampled and is not 100% tested.
3. Output low-impedance delay (tLZ) is measured from CE going low.
4. Output high-impedance delay (tHZ) is measured from CE going high.

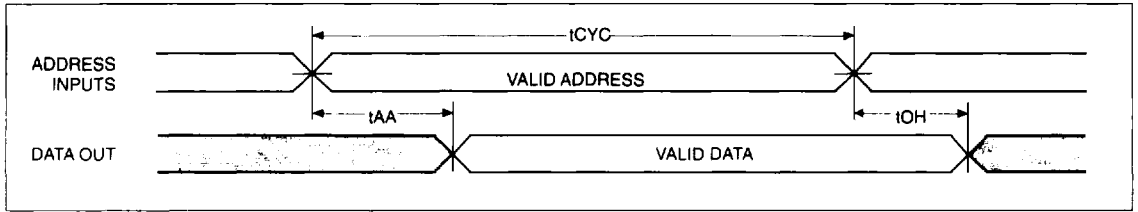
**AC TEST CONDITIONS**

Input Pulse Levels	0.4V to 2.4V
Input Rise and Fall Times	10ns
Input Timing Level	1.5V
Output Timing Level	0.8V and 2.0V
Output Load	1TTL + 100pF

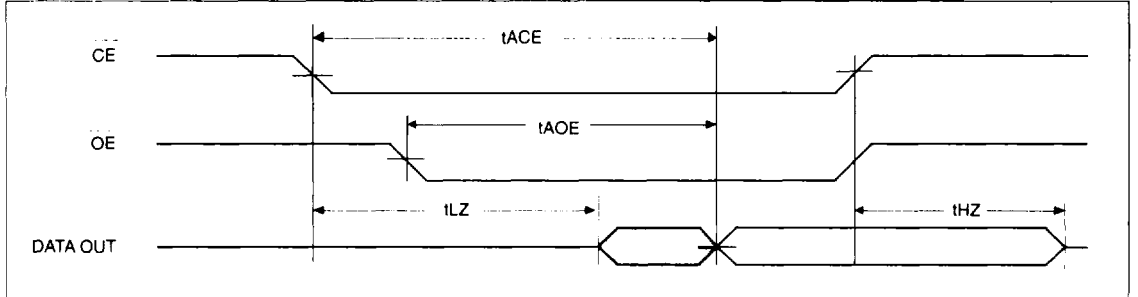
MASK ROOM  
 DATA SHEETS

**WAVEFORMS**

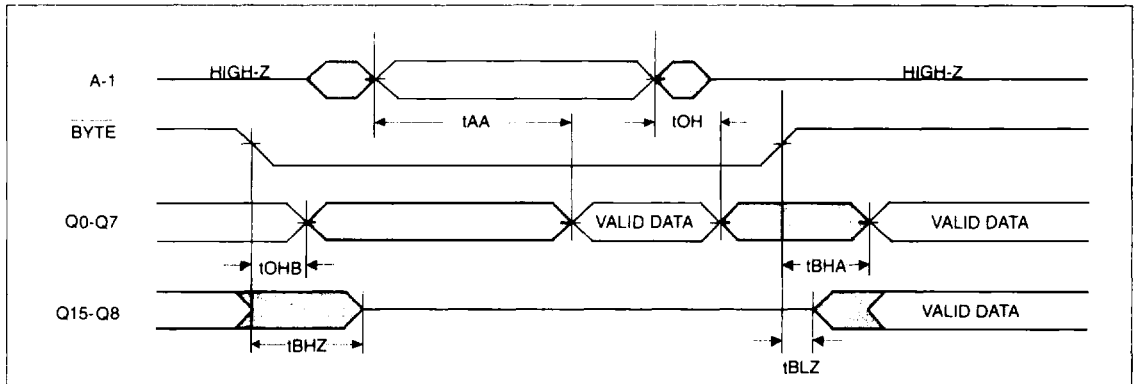
**PROPAGATION DELAY FROM ADDRESS ( $\overline{CE}/\overline{OE} = \text{ACTIVE}$ )**



**PN DELAY FROM CHIP ENABLE CHIP (ADDRESS VALID)**



**PROPAGATION DELAY FROM CHIP ENABLE (ADDRESS VALID)**



## ORDERING INFORMATION

PART NO.	ACCESS TIME(ns)	OPERATING CURRENT MAX.(mA)	STANDBY CURRENT MAX.(μA)	PACKAGE
MX23C3210PC-12	120	60	100	42 Pin DIP
MX23C3210MC-12	120	60	100	44 Pin SOP
MX23C3210TC-12	120	60	100	48 Pin TSOP (Normal Type)
MX23C3210RC-12	120	60	100	48 Pin TSOP (Reverse Type)
MX23C3210PC-15	150	60	100	42 Pin DIP
MX23C3210MC-15	150	60	100	44 Pin SOP
MX23C3210TC-15	150	60	100	48 Pin TSOP (Normal Type)
MX23C3210RC-15	150	60	100	48 Pin TSOP (Reverse Type)
MX23C3210PC-20	200	60	100	42 Pin DIP
MX23C3210MC-20	200	60	100	44 Pin SOP
MX23C3210TC-20	200	60	100	48 Pin TSOP (Normal Type)
MX23C3210RC-20	200	60	100	48 Pin TSOP (Reverse Type)

MASK ROOM DATA SHEETS