



MX23C1610

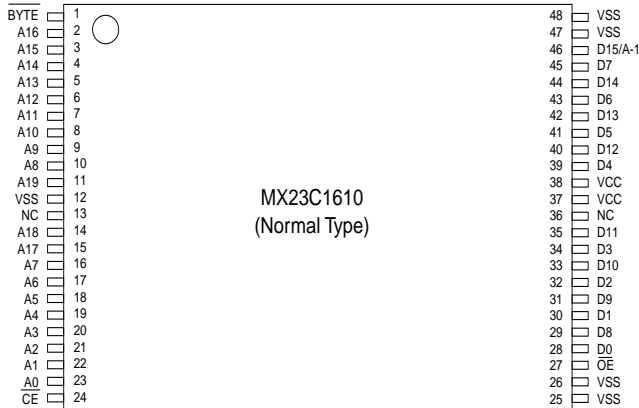
5 Volt 16-Mbit (2M x 8/1M x 16) Mask ROM

FEATURES

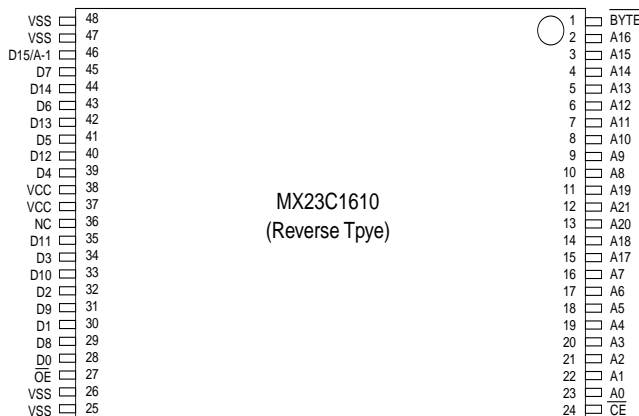
- Bit organization
 - 2M x 8 (byte mode)
 - 1M x 16 (word mode)
- Fast access time
 - Random access: 100ns (max.)
- Current
 - Operating: 60mA
 - Standby: 50uA
- Supply voltage
 - 5V±10%
- Package
 - 44 pin SOP (500mil)
 - 48 pin TSOP (12mm x 20mm)
 - 42 pin DIP (600mil)
 - 44 pin TSOP (Type II)

PIN CONFIGURATION

48 TSOP (Normal Type)



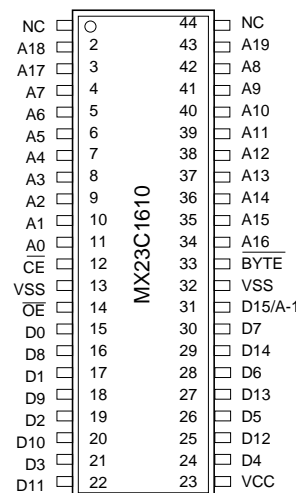
48 TSOP (Reverse Type)



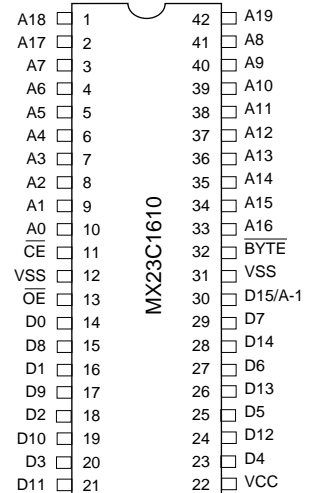
ORDER INFORMATION

Part No.	Access	Package
MX23C1610MC-10	100ns	44 pin SOP
MX23C1610MC-12	120ns	44 pin SOP
MX23C1610MC-15	150ns	44 pin SOP
MX23C1610TC-10	100ns	48 pin TSOP
MX23C1610TC-12	120ns	48 pin TSOP
MX23C1610TC-15	150ns	48 pin TSOP
MX23C1610RC-10	100ns	48 pin TSOP (Reverse type)
MX23C1610RC-12	120ns	48 pin TSOP (Reverse type)
MX23C1610RC-15	150ns	48 pin TSOP (Reverse type)
MX23C1610PC-10	100ns	42 pin DIP
MX23C1610PC-12	120ns	42 pin DIP
MX23C1610PC-15	150ns	42 pin DIP
MX23C1610YC-10	100ns	44 pin TSOP
MX23C1610YC-12	120ns	44 pin TSOP
MX23C1610YC-15	150ns	44 pin TSOP

44 SOP/44 TSOP



42 PDIP



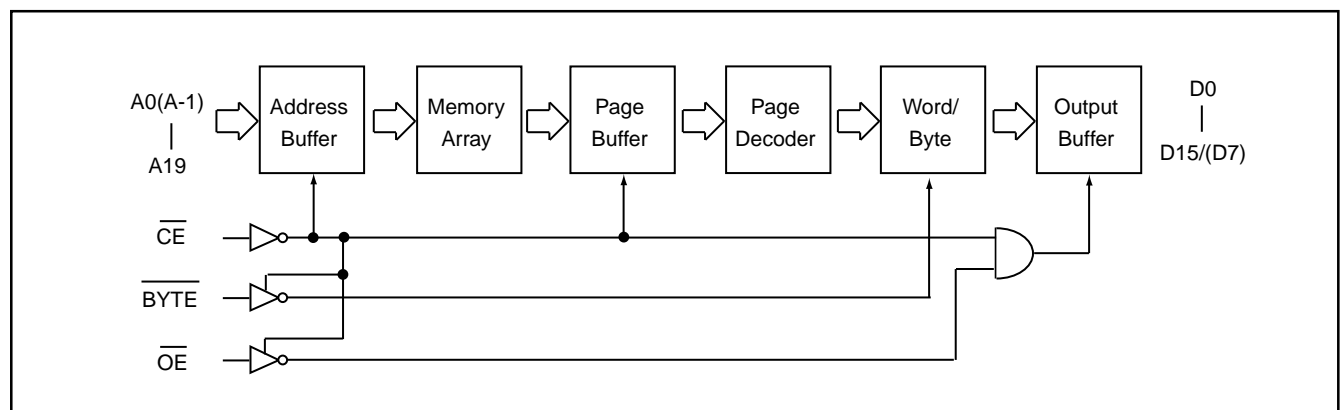
PIN DESCRIPTION

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

MODE SELECTION

$\overline{\text{CE}}$	$\overline{\text{OE}}$	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

BLOCK DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Item	Symbol	Ratings
Voltage on any Pin Relative to VSS	VIN	-0.5V to 7.0V
Ambient Operating Temperature	Topr	0°C to 70°C
Storage Temperature	Tstg	-65°C to 125°C

Note: Minimum DC voltage on input or I/O pins is -0.5V. During voltage transitions, inputs may undershoot VSS to -1.3V for periods of up to 20ns. Maximum DC voltage on input or I/O pins is VCC+0.5V. During voltage transitions, input may overshoot VCC to VCC+2.0V for periods of up to 20ns.

DC CHARACTERISTICS (Ta = 0°C ~ 70°C, VCC = 5V±10%)

Item	Symbol	MIN.	MAX.	Conditions
Output High Voltage	VOH	2.4V	-	IOH = -1.0mA
Output Low Voltage	VOL	-	0.4V	IOL = 2.1mA
Input High Voltage	VIH	2.2V	VCC+0.3V	
Input Low Voltage	VIL	-0.3V	0.8V	
Input Leakage Current	ILI	-	10uA	0V, VCC
Output Leakage Current	ILO	-	10uA	0V, VCC
Operating Current	ICC1	-	60mA	f=5MHz, all output open, CE=VIL, OE=VIH
Standby Current (TTL)	ISTB1	-	1mA	CE = VIH
Standby Current (CMOS)	ISTB2	-	50uA	CE>VCC-0.2V
Input Capacitance	CIN	-	10pF	Ta = 25°C, f = 1MHZ
Output Capacitance	COUT	-	10pF	Ta = 25°C, f = 1MHZ

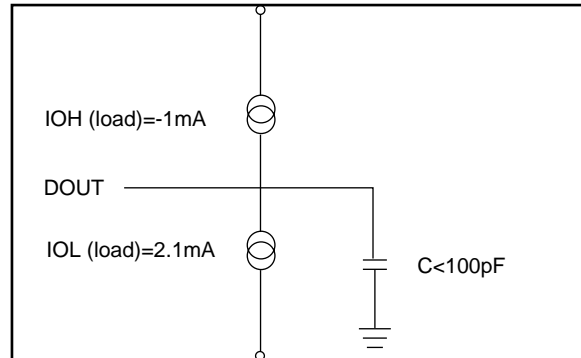
AC CHARACTERISTICS (Ta = 0°C ~ 70°C, VCC = 5V±10%)

Item	Symbol	23C1610-10		23C1610-12		23C1610-15	
		MIN.	MAX.	MIN.	MAX.	MIN.	MAX.
Read Cycle Time	tRC	100ns	-	120ns	-	150ns	-
Address Access Time	tAA	-	100ns	-	120ns	-	150ns
Chip Enable Access Time	tACE	-	100ns	-	120ns	-	150ns
Output Enable Time	tOE	-	50ns	-	60ns	-	70ns
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	10ns
Input Timing Level	1.5V
Output Timing Level	0.8V and 2.0V
Output Load	See Figure



Note:

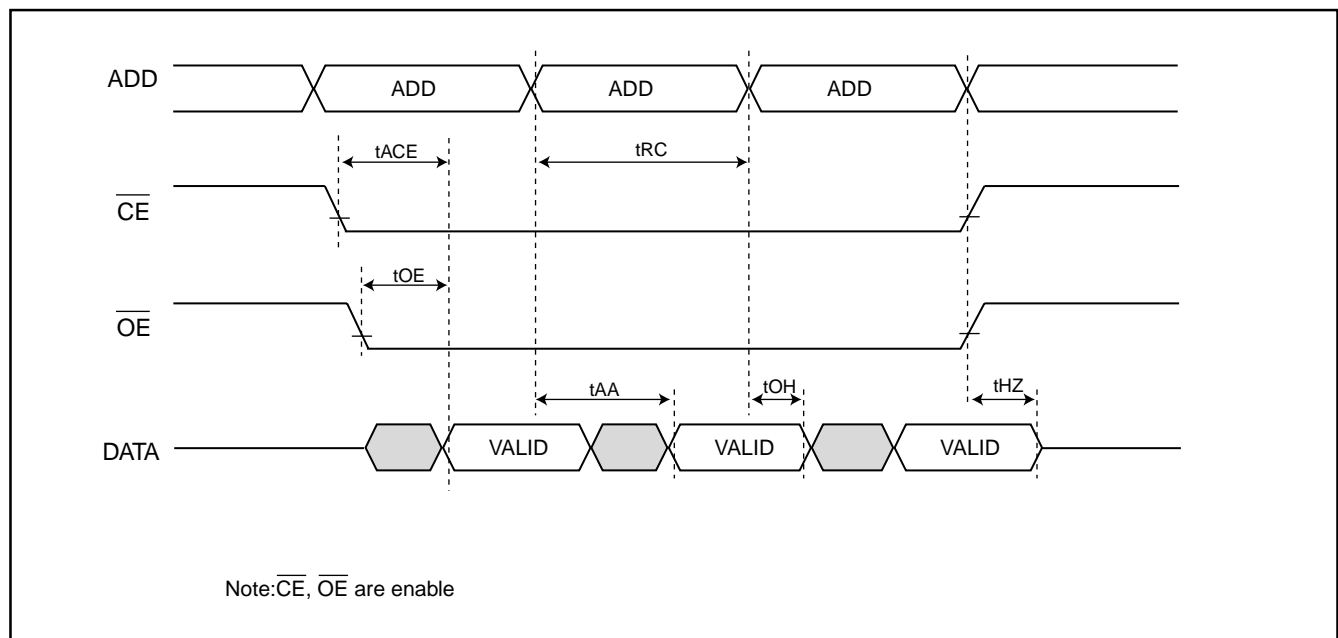
No output loading is present in tester load board.

Active loading is used and under software programming control.

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

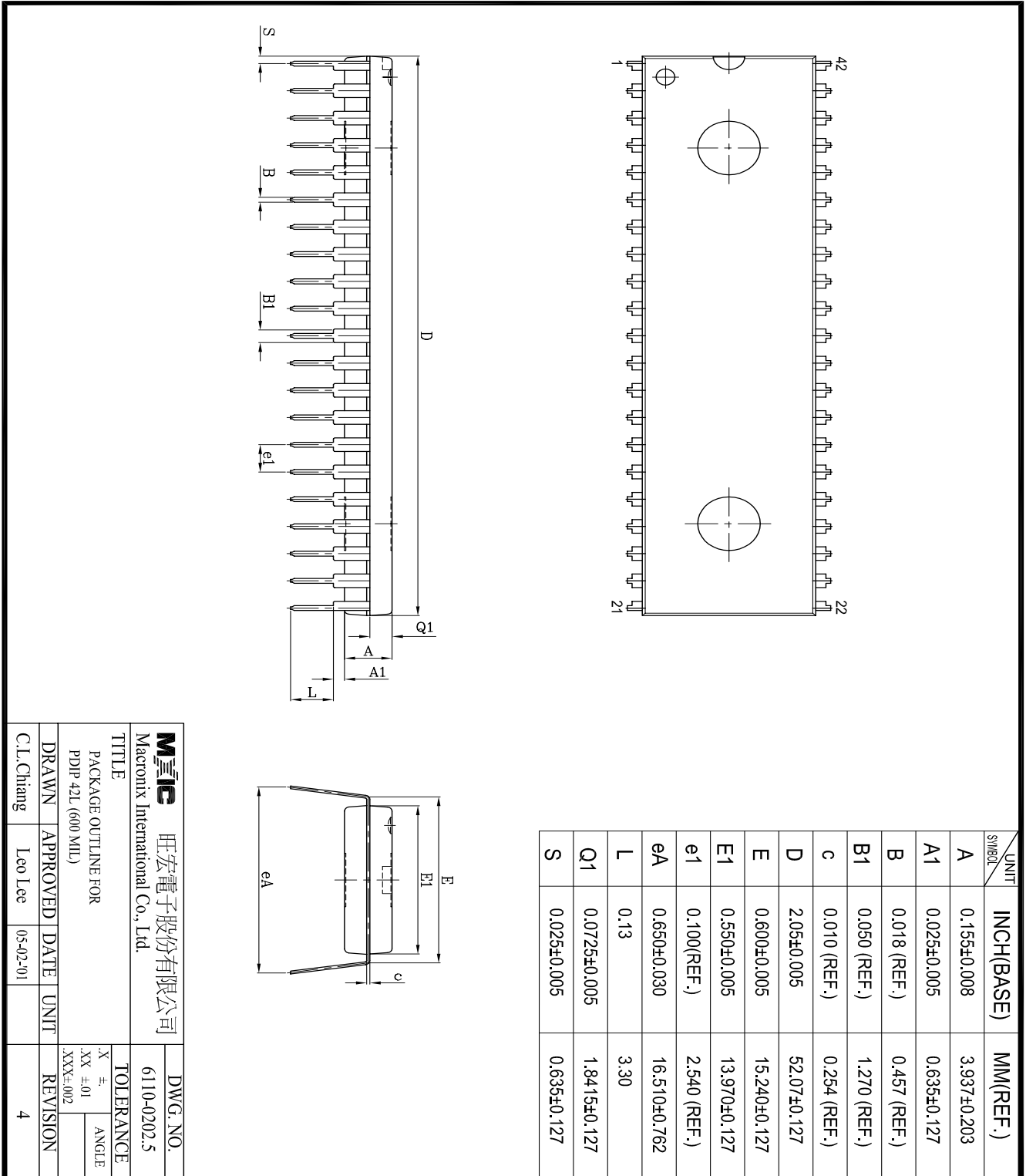
TIMING DIAGRAM

RANDOM READ



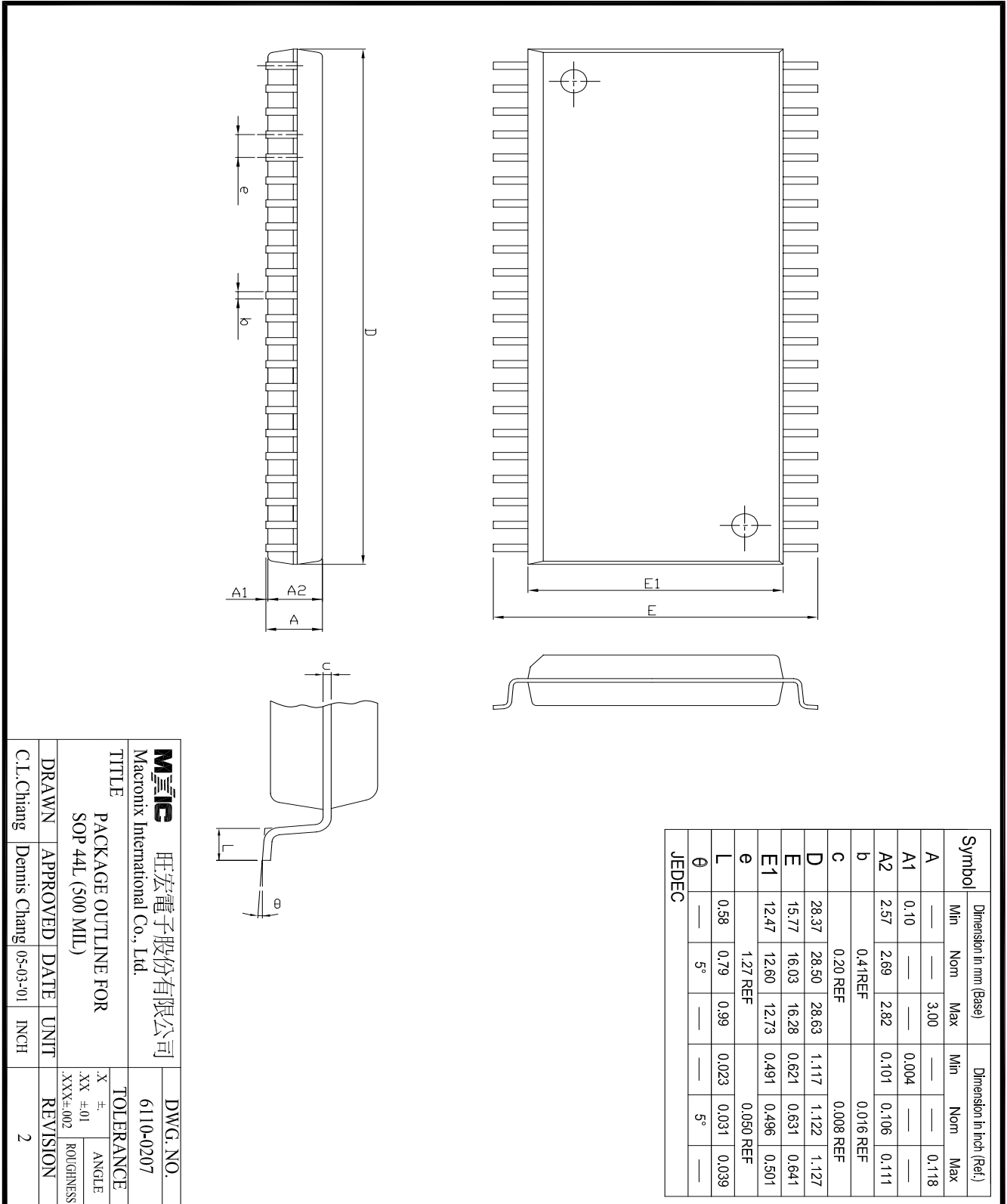
PACKAGE INFORMATION

42-PIN PLASTIC DIP(600 mil)

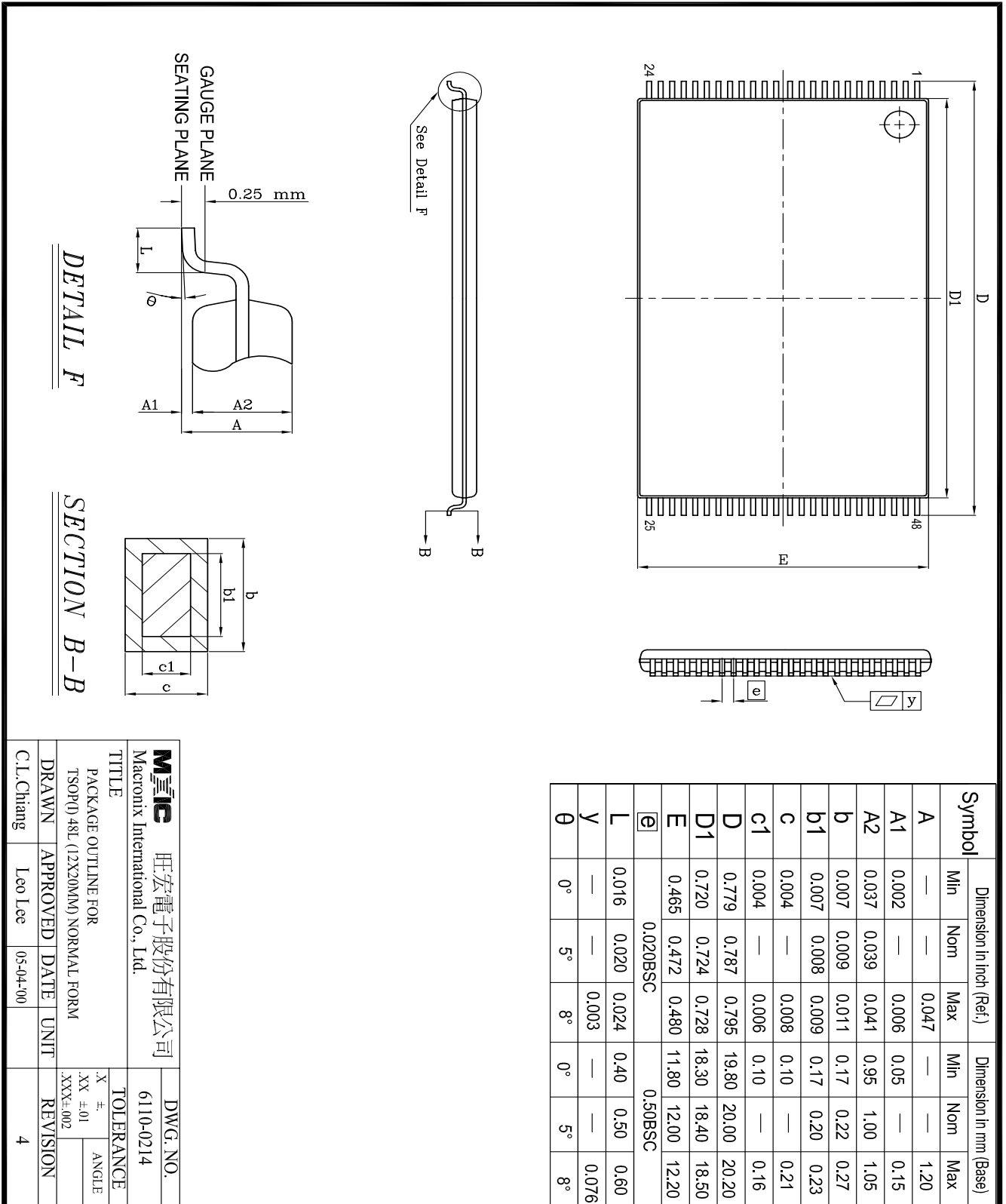


Mxic 旺宏電子股份有限公司 Macromix International Co., Ltd.		DWG. NO. 61110-0202.5	
TITLE PACKAGE OUTLINE FOR PDIP 42L (600 MIL)			
DRAWN C.L.Chang		APPROVED Leo Lee	
DATE 05-02-01		UNIT REVISION 4	
TOLERANCE X ±. XX ±.01 .XXX±.002		ANGLE	

44-PIN PLASTIC SOP



48-PIN PLASTIC TSOP

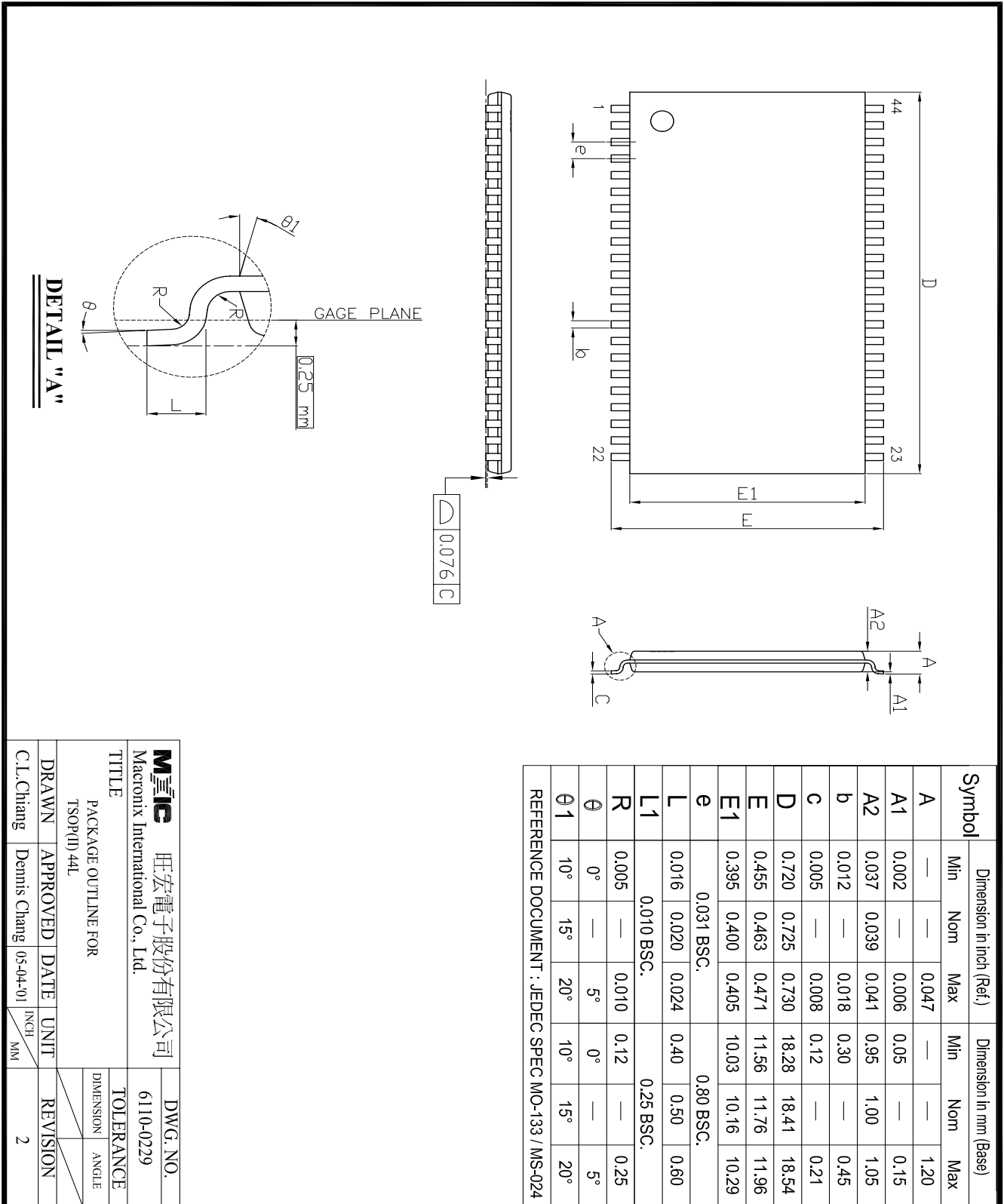


DETAIL F

SECTION B-B

旺宏電子股份有限公司 Macronix International Co., Ltd.		DWG. NO. 61110-0214	
TITLE PACKAGE OUTLINE FOR TSOP(D) 48L (12X30MM) NORMAL FORM			
TOLERANCE X # XX ±.01 .XXX±.002		ANGLE	
DRAWN	APPROVED	DATE	UNIT
C.L.Chang	Leo Lee	05-04-00	
REVISION			4

44-PINTSOP (Type II)



Mxic 旺宏電子股份有限公司 Macronix International Co., Ltd.		DWG. NO. 6110-0229	
TITLE PACKAGE OUTLINE FOR TSOP(D) 44L		TOLERANCE DIMENSION ANGLE	
DRAWN C.L.Chang	APPROVED Dennis Chang	DATE 05-04-01	UNIT INCH / MM
		REVISION 2	

REVISION HISTORY

Revision	Description	Page	Date
2.9	DC Characteristics:The standby current (CMOS) ISTB2 is changed as 50 uA instead of 100uA. AC Characteristics:Add 90ns grade item, deleted 200ns grade item. The output enable time (tOE) is changed as 60ns instead of 70ns in 120ns grade item, and 70ns instead of 80ns in 150ns grade item. The output high Z delay is changed as 20ns instead of 70ns.		SEP/17/1997
3.0	AC Characteristics: tOH 10ns --> 0ns	P3	FEB/01/1999
3.1	Typing error correction	P1	JAN/18/2000
3.2	1.Added 44-pin TSOP(Type II) Package 2.Modify Package Information	P1,8 P5~7	JUL/18/2001
3.3	1.Delete Access Time:90ns	P1,3	OCT/18/2001



MX23C1610

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

JAPAN OFFICE:

TEL: +81-44-246-9100

FAX: +81-44-246-9105

SINGAPORE OFFICE:

TEL: +65-348-8385

FAX: +65-348-8096

TAIPEI OFFICE:

TEL: +886-2-2509-3300

FAX: +886-2-2509-2200

MACRONIX AMERICA, INC.

TEL: +1-408-453-8088

FAX: +1-408-453-8488

CHICAGO OFFICE:

TEL: +1-847-963-1900

FAX: +1-847-963-1909

[http : //www.macronix.com](http://www.macronix.com)