

# MASK ROM

## 1. OUTLINE

The MASK ROM IC MEMORY CARD series is made up of Mask ROM chips. The memory sizes available are from 128K Bytes to 4M Bytes. IE series is 8 bit wide data bus.

## 2. VARIATION

Part Number	Memory Size	Description
MRC128IEC0	128K Byte	128K x 8 bit CMOS MASK ROM CARD
MRC256IEC0	256K Byte	256K x 8 bit CMOS MASK ROM CARD
MRC512IEC0	512K Byte	512K x 8 bit CMOS MASK ROM CARD
MRC100IEC0	1M Byte	1M x 8 bit CMOS MASK ROM CARD
MRC200IEC0	2M Byte	2M x 8 bit CMOS MASK ROM CARD
MRC400IEC0	4M Byte	4M x 8 bit CMOS MASK ROM CARD

## 3. SIZE

- (1) Size :  $54.0 \pm 0.1$  mm wide by  $86.0 \pm 0.2$  mm long by  $2.4 \pm 0.15$  mm thick
- (2) Thickness at the contacts :  $1.80 \pm 0.15$  mm
- (3) Card type : 40 pin Card Edge

## 4. FEATURES

- (1) Shutter Mechanism

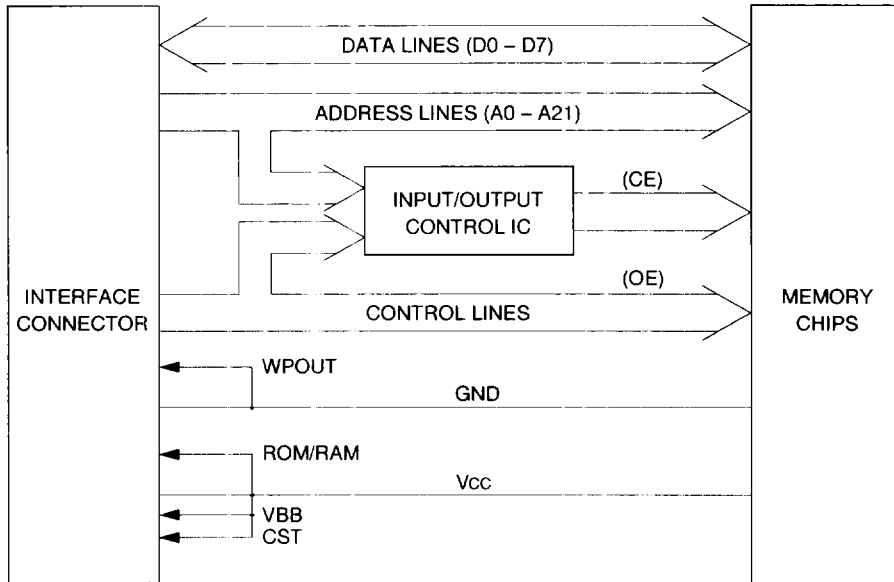
This mechanism protects the terminals from dirt, static electricity, hand contact, etc. The shutter is opened by the tabs on the connector during insertion, and is closed by built-in springs when the card is removed.

(Our connector is required to operate this feature.)

(2) Polarization of the connector to the card

The IC card and our connector have a mechanism to safeguard against incorrect insertion. This mechanism protects the circuits of the system unit, the connector, and the card from potential damage.

**5. BLOCK DIAGRAM**



(1) D0 to D7

Data input/output, 8 bit wide

(2) A0 to A21

Address inputs  
Unused address lines should be “no connect”.

(3) CE

Card Enable input (Active HIGH)  
Memory card operates when CE signal is “HIGH”

(4)  $\overline{OE}$

Output Enable input (Active LOW)  
Memory card data can be READ when  $\overline{OE}$  is "LOW"

(5) WPOUT\*

This card can not be programmed, so WPOUT is connected to GND line.

(6) CST\*

Output line to indicate that the card is accessible or not. This line is connected to VCC line.

(7) ROM/ $\overline{RAM}$ \*

This line is connected VCC or GND line.

Output line to indicate the card type.

VCC level indicates ROM : OTP (EPC, BPC), MASKROM (MRC),  
FLASH MEMORY (FPC)

GND level indicates RAM : SRAM (RBC), EEPROM (EEC),  
FLASH MEMORY (FEC)

Do never use as card VCC or GND line.

(8) VBB\*

This line is connected to VCC line.

(9) VCC

Power source : +5 V  $\pm$ 10%.

(10) GND

Ground

Note: See the recommended interface circuit.

\* Do never use as VCC or GND line.

## 6. ELECTRICAL CHARACTERISTICS

### 6-1. ABSOLUTE MAXIMUM RATING

Symbol	Description	Maximum Rating	Unit
VCC	Power supply voltage	-0.5 to 7.0	V
VIN	Input voltage (1)	-0.5 to VCC +0.5	V
VOUT	Output voltage	-0.5 to VCC	V
TOP	Operating temperature	0 to 60	°C
TSRT	Storage temperature	-20 to 60	°C
HSRT	Storage humidity (2)	0 to 65	%
PD	Power dissipation	1	W

Note: (1) VIN should be under 7.0 V

(2) No dew condition.

### 6-2. CAPACITANCE (Ta = 25°C, f = 1 MHz)

Symbol	Variation	Item	Condition	Min	Typ	Max	Unit
C1	MRC128IEC0 MRC256IEC0 MRC512IEC0 MRC100IEC0	A0 to A19, CE, OE	VIN = 0 V	—	14	20	pF
	MRC200IEC0	A0 to A19, OE	VIN = 0 V	—	14	20	pF
	MRC400IEC0			—	24	32	pF
	MRC200IEC0, MRC400IEC0	A20,A21,CE	—	14	20	pF	
C2	MRC128IEC0 MRC256IEC0 MRC512IEC0 MRC100IEC0	D0 to D7	VIN/ VOUT = 0 V	—	10	14	pF
	MRC200IEC0			—	20	28	pF
	MRC400IEC0			—	40	56	pF

**6-3. DC RECOMMENDED OPERATING CONDITIONS**

Symbol	Description	Min	Typ	Max	Unit
VCC	Supply voltage	4.5	5.0	5.5	V
V <sub>IH</sub>	High level input voltage	V <sub>CC</sub> × 0.8	—	V <sub>CC</sub> + 0.3	V
V <sub>IL</sub>	Low level input voltage	-0.3	—	V <sub>CC</sub> × 0.1	V

**6-4. DC ELECTRICAL CHARACTERISTICS**

(T<sub>a</sub> = 0 to 60°C, V<sub>CC</sub> = 5 V ±10%)

Symbol	Description	Note	Condition	Min	Typ	Max	Unit
V <sub>OH</sub>	High level output voltage	1	I <sub>OH</sub> = -200 μA	2.4	—	—	V
V <sub>OL</sub>	Low level output voltage	1	I <sub>OL</sub> = 1.6 mA	—	—	0.4	V
I <sub>LI</sub>	Input leakage current	2	V <sub>IN</sub> = 0 V or V <sub>CC</sub>	-10	—	10	μA
I <sub>LO</sub>	Output leakage current	1	CE = V <sub>IL</sub> or OE = V <sub>IH</sub> , V <sub>OUT</sub> = 0 V or V <sub>CC</sub>	-10	—	10	μA
I <sub>ACT</sub>	Active current	3	CE = V <sub>CC</sub> - 0.4 V OTHER INPUTS = 0.4 V/V <sub>CC</sub> - 0.4 V I <sub>OUT</sub> = 0 mA MRC128IEC0 MRC256IEC0 MRC512IEC0 MRC100IEC0 MRC200IEC0 MRC400IEC0	—	—	50	mA
I <sub>STB</sub>	Standby current	3	CE = 0.4 V OTHER INPUTS = 0.4 V/V <sub>CC</sub> - 0.4 V MRC128IEC0 MRC256IEC0 MRC512IEC0 MRC100IEC0 MRC200IEC0 MRC400IEC0	—	—	1	mA

- Notes:
1. D0 to D7
  2. A0 to A21,  $\overline{\text{OE}}$ , CE
  3. D0 to D7, CST = No Load

**6-5. OPERATING MODES**

Mode	CE	OE	Vcc	A0 to A21	D0 to D7	CST
READ	HI	LI	V1	INPUT	OUTPUT	HO
STANDBY	LI	*	V1	*	HZ	HO

Notes: HI : 2.2 V to VCC + 0.3 V  
 LI : -0.3 to 0.6 V  
 \* : Input is VIH or VIL  
 HZ : High Impedance  
 HO : Output VCC level  
 V1 : 4.5 V to 5.5 V

**6-6. AC ELECTRICAL CHARACTERISTICS**

(Ta = 0 to 60°C, VCC = 5 V ±10%)

Symbol	Description	Min	Max	Unit
tRC	Read cycle time	220	—	ns
tACC	Address access time	—	200*	ns
tCE	CE access time	—	220	ns
tOE	OE access time	—	90	ns
tCOE	CE to output enable time	10	—	ns
tOEE	OE to output enable time	10	—	ns
tOD	CE to output disable time	—	80	ns
tODO	OE to output disable time	—	80	ns
tOH	DATA hold time	0**	—	ns

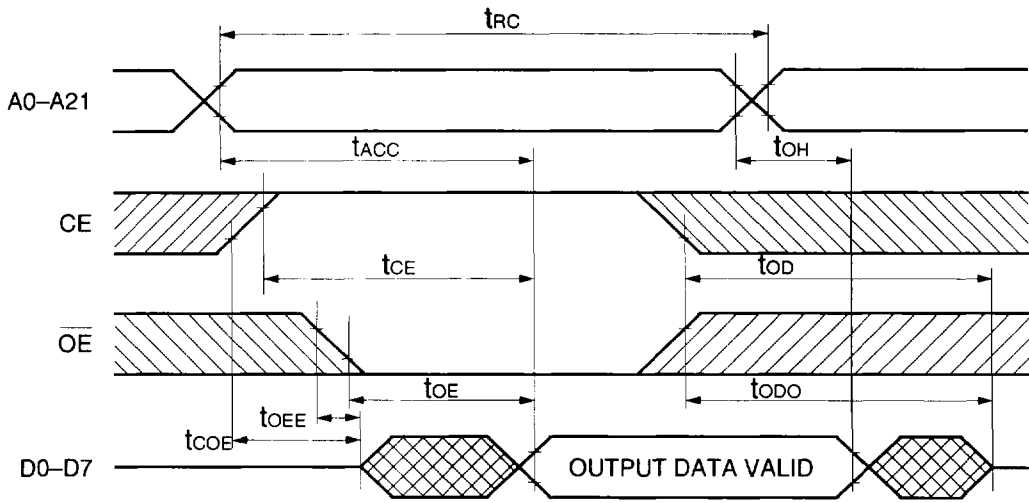
\* 220 ns at MRC200IEC0, MRC400IEC0

\*\* 20 ns at MRC200IEC0, MRC400IEC0

<< AC test conditions >>

Output load : 1 TTL gate + 100 pF (include jig)  
 Input pulse rise & fall time : 20 ns  
 Input pulse level : 0.4 V, 2.4 V  
 Timing measurement comparison level Input : 0.6 V and 2.2 V  
 Output : 0.6 V and 2.2 V

READ TIMING (6-6. Con't)



7. PIN ASSIGNMENT

Pin #	Name	Pin #	Name
1	VCC	21	CE
2	VBB**	22	OE
3	A0	23	D0
4	A1	24	D1
5	A2	25	D2
6	A3	26	D3
7	A4	27	D4
8	A5	28	D5
9	A6	29	D6
10	A7	30	D7
11	A8	31	A17*
12	A9	32	A18*
13	A10	33	A19*
14	A11	34	A20*
15	A12	35	A21*
16	A13	36	N/C
17	A14	37	WPOUT**
18	A15	38	CST**
19	A16*	39	ROM/RAM**
20	N/C	40	GND

Notes: \*A16 : 128KB,256KB,512KB,1MB,2MB,4MB

\*A17 : 256KB,512KB,1MB,2MB,4MB

\*A18 : 512KB,1MB,2MB,4MB

\*A19 : 1MB,2MB,4MB

\*A20 : 2MB,4MB

\*A21 : 4MB

Unused address lines should be N/C (No Connect).

\*\* : Output signal line. (Connect to VCC or GND inside the card.)

Do never use as VCC or GND line.