MASK ROM

OUTLINE

The MASK ROM IC MEMORY CARD series is made up of Masked ROM chips. The memory sizes available are from 256K Bytes to 4M Bytes.
HE series is 16 bit wide data bus.

VARIATION

Part Number	Memory Size	Description
MRC257HEC0	256K Bytes	128K x 16 bits CMOS MASK ROM CARD
MRC513HEC0	512K Bytes	256K x 16 bits CMOS MASK ROM CARD
MRC101HEC0	1 M Bytes	512K x 16 bits CMOS MASK ROM CARD
MRC201HEC0	2 M Bytes	1M x 16 bits CMOS MASK ROM CARD
MRC401HEC0	4 M Bytes	2M x 16 bits CMOS MASK ROM CARD

SIZE AND WEIGHT

(1) Size : 54.0 ±0.1 mm wide by 86.0 ±0.2 mm long by 2.4 ±0.15 mm thick
(2) Thickness at the contacts : 1.80 ±0.15 mm
(3) Weight : approx. 23 grams
(4) Card Type : 50 pin Card Edge Type

FEATURES

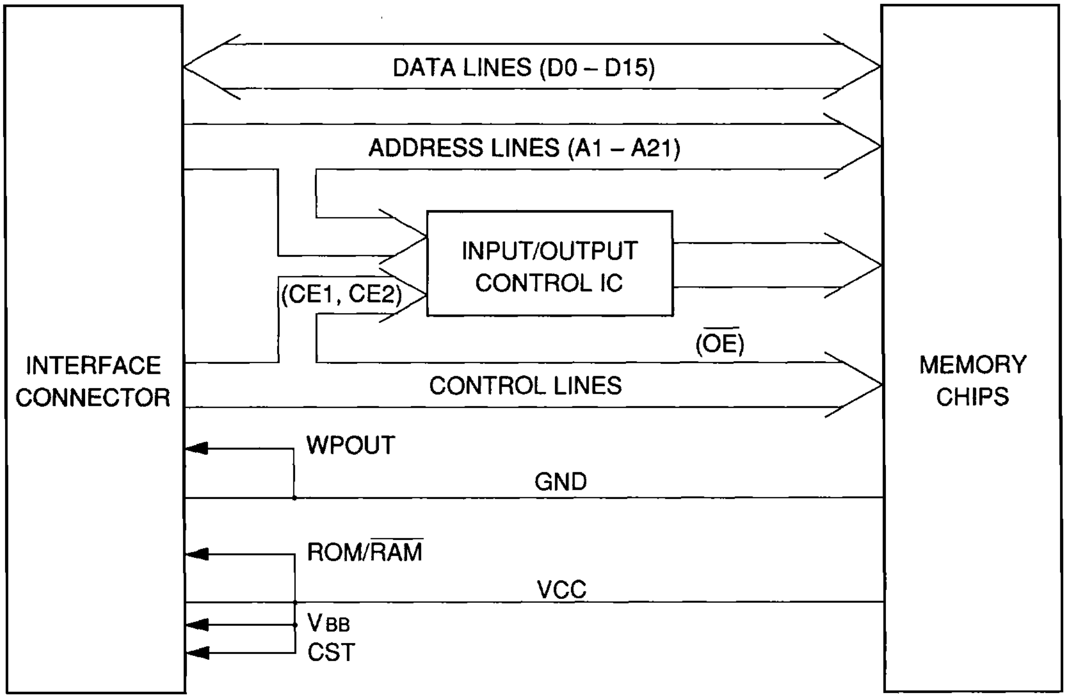
(1) Shutter Mechanism

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.

INTERFACE SIGNAL DIRECTION



(1) D0 to D15

Data input/output, 16 bit wide
D0 to D7 : lower data
D8 to D15 : upper data

(2) A1 to A21

Address input
Unused address lines should be "no connect".

(3) CE1

Card Enable input (Active HIGH)
Controls D0 to D7

(4) CE2

Card Enable input (Active HIGH)
Controls D8 to D15

(5) $\overline{\text{OE}}$

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

(6) WPOUT*

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

(7) CST*

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

This line is connected to VCC line.

(8) ROM/$\overline{\text{RAM}}$*

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.

(9) VBB*

This line is connected to VCC line.

(10) VCC

Power source : +5V ±10%.

(11) GND

Ground

Note: See the recommended interface circuit.
* Do never use as VCC or GND line.

ABSOLUTE MAXIMUM RATING

Symbol	Description	Maximum Rating	Unit
VCC	Power supply voltage:	–0.5 to 7.0	V
VIN	Input voltage:	–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:	0 to 65	%
PD	Power dissipation:	2	W

Note: VIN should be under 7.0 V.

CAPACITANCE (Ta = 25°C, f = 1 MHz)

Card	Item	Condition	Min	Typ	Max	Unit
MRC257HEC0	A1 – A17, $\overline{OE}$	VIN = 0 V	—	12	16	pF
	CE1, CE2	VIN = 0 V	—	6	8	pF
	D0 – D15	VIN/VOUT = 0 V	—	10	14	pF
MRC513HEC0	A1 – A18, $\overline{OE}$	VIN = 0V	—	12	16	pF
	CE1, CE2	VIN = 0 V	—	6	8	pF
	D0 – D15	VIN/VOUT = 0V	—	10	14	pF
MRC101HEC0	A1 – A19, $\overline{OE}$	VIN = 0V	—	12	16	pF
	CE1, CE2	VIN = 0 V	—	6	8	pF
	D0 – D15	VIN/VOUT = 0 V	—	10	14	pF
MRC201HEC0	A1 – A20, $\overline{OE}$	VIN = 0 V	—	12	16	pF
	CE1, CE2	VIN = 0 V	—	6	8	pF
	D0 – D15	VIN/VOUT = 0 V	—	10	14	pF
MRC401HEC0	A1 – A20, $\overline{OE}$	VIN = 0 V	—	24	32	pF
	A21, CE1, CE2	VIN = 0 V	—	6	8	pF
	D0 – D15	VIN/VOUT = 0 V	—	20	28	pF

Note: The above figures are reference only

DC RECOMMENDED OPERATING CONDITIONS

Symbol	Item	Min	Typ	Max	Unit
V_{CC}	Supply voltage	4.5	5.0	5.5	V
V_{IH}	High input voltage	2.2	—	V_{CC} +0.3	V
V_{IL}	Low input voltage	–0.3	—	0.6	V

DC ELECTRICAL CHARACTERISTICS (Ta = 0 to 60°C, V_{CC} = 5 V ±10%)

Symbol	Description	Note	Parameter	Min	Typ	Max	Unit
V_{OH}	High output	1	I_{OH} = –200 uA	2.4	—	—	V
V_{OL}	Low output	1	I_{OL} = 1.6 mA	—	—	0.4	V
I_{LI}	Leakage cur.	2	V_{IN} = 0 V to 5 V	–10	—	10	µA
	Leakage cur.	1	CE = V_{IL} or $\overline{OE}$ = V_{IH}, V_{OUT} = 0 V to V_{CC}	–10	—	10	µA
I_{ACT}	Active Current	3	CE1, CE2 = V_{IH}				
			MRC257HEC0	—	—	100	mA
			MRC513HEC0	—	—	100	mA
			MRC101HEC0	—	—	100	mA
			MRC201HEC0	—	—	100	mA
			MRC401HEC0	—	—	100	mA
I_{STB}	Stand-by Current	3	CE1, CE2 = V_{IL}				
			MRC257HEC0	—	—	1	mA
			MRC513HEC0	—	—	1	mA
			MRC101HEC0	—	—	1	mA
			MRC201HEC0	—	—	1	mA
			MRC401HEC0	—	—	1	mA

Notes:
1. D0 – D15
2. A0 – A21, $\overline{OE}$, CE1, CE2
3. D0 to D15, CST = No Load//other inputs = V_{IH} or V_{IL}

OPERATING MODES

Mode	CE1,CE2	$\overline{OE}$	V_{CC}	A1 – A21	D0 – D15	CST
READ	V_{IH}	V_{IL}	V1	INPUT	OUTPUT	HO
STAND-BY	V_{IL}	*	V1	*	HZ	HO

Notes: * : Input is V_{IH} or V_{IL} HZ : High Impedance

V1 : 4.5 V to 5.5 V HO : Output V_{CC} level

AC ELECTRICAL CHARACTERISTICS (Ta = 0 to 60°C, V_{CC} = 5 V ±10%)

Symbol	Parameter	Min	Max	Unit
t_{RC}	Read cycle time	220	—	ns
t_{ACC}	Address access time	—	200*	ns
t_{CE}	CE access time	—	220	ns
t_{OE}	OE access time	—	90	ns
t_{COE}	CE to enable time	10	—	ns
t_{OEE}	OE to enable time	10	—	ns
t_{OD}	CE to disable time	—	80	ns
t_{ODO}	OE to disable time	—	80	ns
t_{OH}	DATA hold time	0**	—	ns

* 220 ns at MRC401HEC0

** 20 ns at MRC401HEC0

<< AC test conditions >>

Output load : 1 TTL gate + 100 pF (include jig)

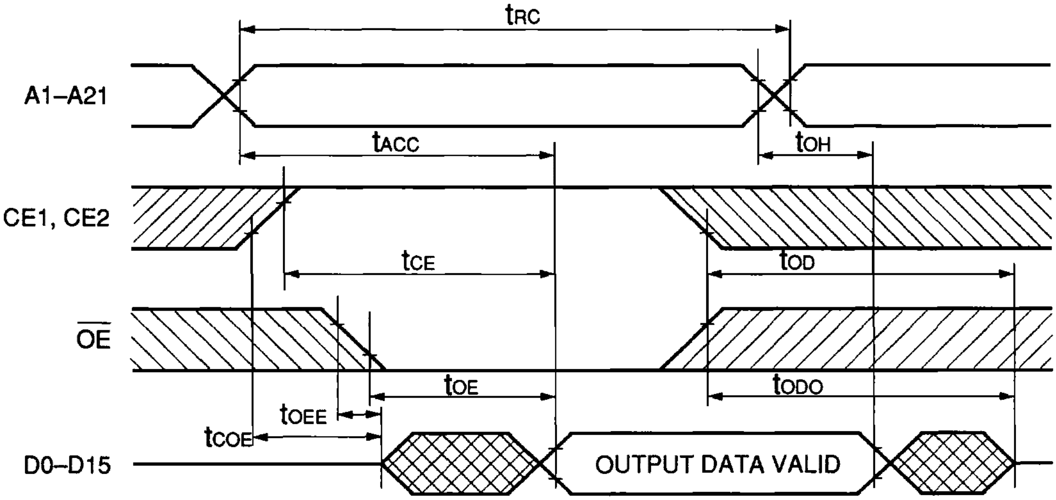
Input pulse rise & fall time : 20 ns

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


tRC
A1–A21
tACC
tOH
CE1, CE2
tCE
tOD
OE
tOE
tODO
tOEE
tCOE
D0–D15
OUTPUT DATA VALID

PIN ASSIGNMENT

Pin #	Name	Len
1	GND	L
2	A1	M
3	A2	M
4	A3	M
5	A4	M
6	A5	M
7	A6	M
8	A7	M
9	A8	M
10	A9	M
11	A10	M
12	A11	M
13	A12	M
14	A13	M
15	A14	M
16	A15	M
17	A16	M
18	A17*	M
19	A18*	M
20	A19*	M
21	A20*	M
22	A21*	M
23	N/C	M
24	ROM/$\overline{\text{RAM}}$	M
25	CE1	M
26	CE2	M
27	WPOUT	M
28	OE	M
29	CST	S
30	VBB	M
31	VCC	L
32	VCC	L
33	N/C	M
34	D0	M
35	D1	M
36	D2	M
37	D3	M
38	D4	M
39	D5	M
40	D6	M
41	D7	M
42	D8	M
43	D9	M
44	D10	M
45	D11	M
46	D12	M
47	D13	M
48	D14	M
49	D15	M
50	GND	L

<Note>

Len = Terminal length

L : Long length M: Middle length S: Short length

* A17 : MRC257, MRC513, MRC101, MRC201, MRC401
* A18 : MRC513, MRC101, MRC201, MRC401
* A19 : MRC101, MRC201, MRC401
* A20 : MRC201, MRC401
* A21 : MRC401

Unused address lines should be N/C.