

# ONE TIME PROGRAMMABLE ROM

## 1. OUTLINE

The OTPROM IC MEMORY CARD series is made up of One Time Programmable ROM chips. Memory capacity is from 32K Bytes to 1M Bytes.

IE series is 8 bit wide data bus.

This card is programmed by manufacturer.

## 2. VARIATION

Part Number	Memory Size	Description
EPC032IEC0	32K Byte	32K × 8 bit CMOS OTP ROM CARD
EPC064IEC0	64K Byte	64K × 8 bit CMOS OTP ROM CARD
EPC128IEC0	128K Byte	128K × 8 bit CMOS OTP ROM CARD
EPC256IEC0	256K Byte	256K × 8 bit CMOS OTP ROM CARD
EPC512IEC0	512K Byte	512K × 8 bit CMOS OTP ROM CARD
EPC100IEC0	1M Byte	1M × 8 bit CMOS OTP ROM CARD

## 3. SIZE

- (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) Card Type : 40 pin Card Edge

## 4. FEATURES

### (1) Shutter Mechanism

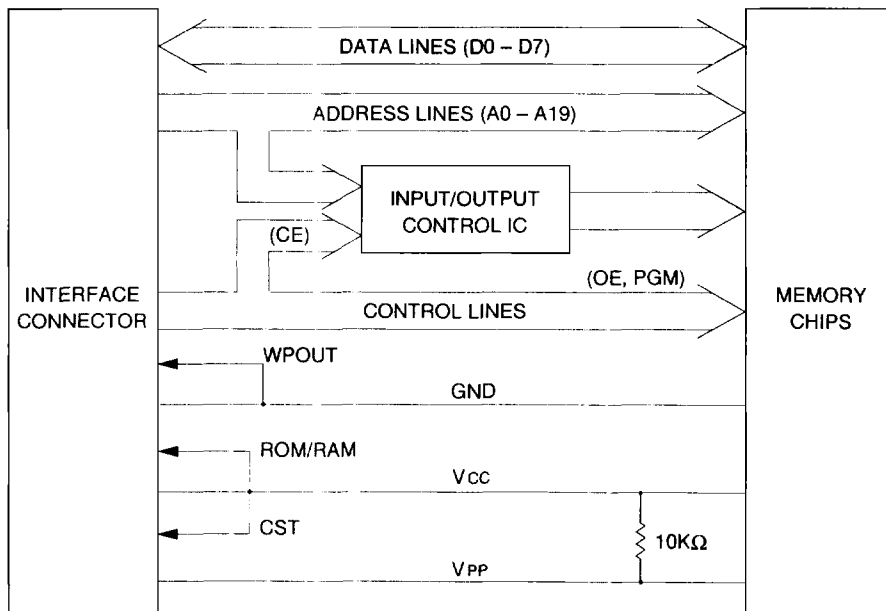
This mechanism protects the terminals from dirt, static electricity, hand contact, etc. The shutter is opened by tabs on the connector during insertion, and is closed by built-in springs when the card is removed from the connector.

(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 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 A19

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 output data when  $\overline{OE}$  is “LOW”.

(5)  $\overline{PGM}$

Program Enable input (Active LOW)

This card is programmed, so this line should be VIH state.

(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/ $\overline{RAM}$ \*

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) VPP

Power supply voltage required to program data to the card.

Connected to VCC through a 10K ohm resistor.

This card is programmed, so this line should be VCC or floating state.

## (10) VCC

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

## (11) GND

Ground

Notes: See the recommended interface circuit.

\* Do never use as VCC or GND line.

## 6. ELECTRICAL CHARACTERISTICS

### 6-1. ABSOLUTE MAXIMUM RATINGS

Symbol	Description	Maximum Rating	Unit
VCC	VCC Power supply	-0.5 to 7.0	V
VPP	VPP power supply	-0.5 to 14.0	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
TSTG	Storage Temperature	-20 to 60	°C
HSTG	Storage humidity (2)	0 to 95	%
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	EPC032IEC0	A0 to A14, CE, OE	VIN = 0 V	—	14	20	pF
	EPC064IEC0	A0 to A15, CE		—	14	20	pF
	EPC128IEC0	A0 to A16, CE, OE, PGM		—	14	20	pF
	EPC256IEC0	A0 to A16, OE, PGM, A17, CE		—	14	20	pF
	EPC512IEC0	A0 to A16, OE, PGM, A17, A18, CE		—	24	32	pF
				—	14	20	pF
EPC100IEC0	A0 to A18, OE, A19, CE	—	14	20	pF		

**CAPACITANCE (6-2. Con't)**  
 (Ta = 25°C, f = 1 MHz)

Symbol	Variation	Item	Condition	Min	Typ	Max	Unit
C2	EPC032IEC0, EPC064IEC0, EPC128IEC0	D0 to D7	VIN/VOUT = 0 V	—	10	14	pF
	EPC256IEC0			—	20	28	pF
	EPC512IEC0			—	40	56	pF
	EPC100IEC0			—	20	28	pF

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

Symbol	Description	Min	Typ	Max	Unit
VCC	Supply voltage	4.5	5.0	5.5	V
VIH	High input voltage	VCC × 0.8	—	VCC + 0.3	V
VIL	Low input voltage	-0.3	—	VCC × 0.1	V

**6-4. DC ELECTRICAL CHARACTERISTICS**  
 (Ta = 0 to 60°C, VCC = 5 V ±10%)

Symbol	Description	Note	Condition	Min	Typ	Max	Unit
VOH	High level output voltage	1	IOH = -400 μA	2.4	—	—	V
VOL	Low level output voltage	1	IOL = 2.1 mA	—	—	0.4	V
ILI	Input leakage current	2	VIN = 0 V or VCC	-10	—	10	μA
ILO	Output leakage current	1	CE = VIL or OE=VIH, VOUT = 0 V or VCC	-10	—	10	μA

**DC and OPERATING CHARACTERISTICS(6-4. Con't)**  
**(Ta = 0 to 60°C, VCC = 5 V +/-5%)**

Symbol	Description	Note	Condition	Min	Typ	Max	Unit
I <sub>ACT</sub>	Active current	3	CE = V <sub>CC</sub> -0.4V				
			OTHER INPUTS =				
			0.4 V/V <sub>CC</sub> -0.4 V				
			I <sub>OUT</sub> = 0 mA				
			EPC032IEC0	—	—	50	mA
			EPC064IEC0	—	—	50	mA
			EPC128IEC0	—	—	50	mA
I <sub>STB</sub>	Standby current	3	CE = 0.4 V				
			OTHER INPUTS =				
			0.4 V/V <sub>CC</sub> -0.4V				
			EPC032IEC0	—	—	1	mA
			EPC064IEC0	—	—	1	mA
			EPC128IEC0	—	—	1	mA
			EPC256IEC0	—	—	1	mA
EPC512IEC0	—	—	1	mA			
EPC100IEC0	—	—	1	mA			

- Notes: 1. D0 to D7  
 2. A0 to A19,  $\overline{OE}$ , CE,  $\overline{PGM}$   
 3. D0 to D7, CST = No Load

**6-5. V<sub>PP</sub> RESISTANCE**  
**(Ta = 0 to 60°C)**

Symbol	Description	Min	Typ	Max	Unit
RV <sub>PP</sub>	V <sub>PP</sub> RESISTANCE	9	10	11	K $\Omega$

### 6-6. OPERATING MODES

Mode	CE	OE	PGM	VPP	VCC	A0 to A19	D0 to D7	CST
READ	V <sub>IH</sub>	V <sub>IL</sub>	V <sub>IH</sub>	V1	V1	INPUT	OUTPUT	HO
DISABLE	V <sub>IH</sub>	V <sub>IL</sub>	V <sub>IH</sub>	V1	V1	INPUT	HZ	HO
STANDBY	V <sub>IL</sub>	*	*	V1	V1	*	HZ	HO

Notes: \* : Input is V<sub>IH</sub> or V<sub>IL</sub>  
 V1 : 4.5 V to 5.5 V  
 HZ : High Impedance  
 HO : Output VCC level

### 6-7. JEDEC ELECTRIC SIGNATURE MODE

Variation	Manufacturer Code (A0 = V <sub>IL</sub> )	Device Code (A0 = V <sub>IH</sub> )
	HEX	HEX
EPC032IEC0	98	C4
	10	64
EPC064IEC0	10	25
EPC128IEC0	98	07
	10	86
	10	16
EPC256IEC0	98	07
	10	86
EPC512IEC0	98	07
EPC100IEC0	98	C8

#### HOW TO READ THE IDENTIFIER CODE:

- (1) A1 to A8 & A10 to A19 = V<sub>IL</sub> (-0.3 to 0.6 V)
- (2) A9 = 11.5 V to 12.5 V
- (3) A0 = V<sub>IL</sub> : Manufacturer code is output to D0 to D7  
 A0 = V<sub>IH</sub> : Device code is output to D0 to D7
- (4) CE & PGM = V<sub>IH</sub>, OE = V<sub>IL</sub>
- (5) VCC = VPP = 5 V ±10%



**6-8. AC ELECTRICAL CHARACTERISTICS**
**(Ta = 0 to 60°C, VCC = 5 V ±10%)**

Symbol	Description	Type1		Unit
		Min	Max	
t <sub>RC</sub>	Read cycle time	220	—	ns
t <sub>ACC</sub>	Address access time	—	200*	ns
t <sub>CE</sub>	CE access time	—	220	ns
t <sub>OE</sub>	OE access time	—	90	ns
t <sub>COE</sub>	CE to output enable time	10	—	ns
t <sub>OEE</sub>	OE to output enable time	10	—	ns
t <sub>OD</sub>	CE to output disable time	—	80	ns
t <sub>ODO</sub>	OE to output disable time	—	80	ns
t <sub>OH</sub>	DATA hold time	0**	—	ns

Notes: Type1 = EPC032IEC0, EPC064IEC0, EPC128IEC0, EPC256IEC0,  
EPC512IEC0, EPC100IEC0

\* 220 ns at EPC256IEC0, EPC512IEC0, EPC100IEC0

\*\* 20 ns at EPC256IEC0, EPC512IEC0, EPC100IEC0

<< AC test conditions >>

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

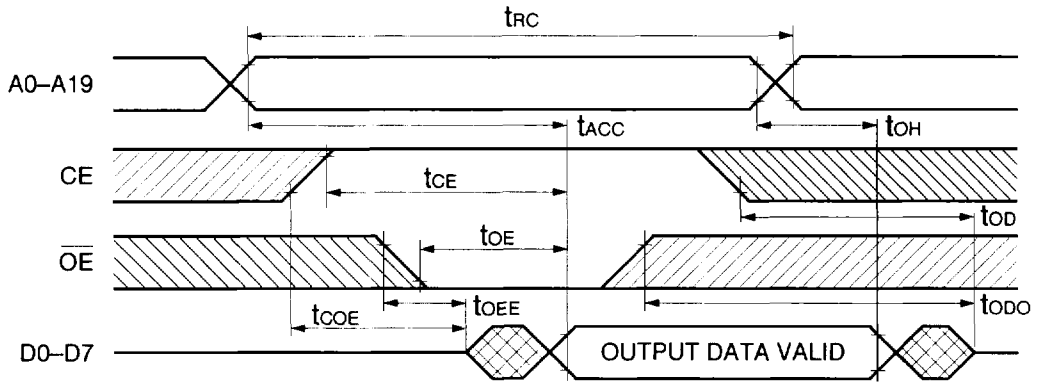
Input pulse rise & fall time : 20 ns

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 (6-8. Con't)**



## 7. PIN ASSIGNMENT

Pin #	Name	Pin #	Name
1	VCC	21	CE
2	VPP***	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	N/C
15	A12	35	N/C
16	A13	36	N/C
17	A14*	37	WPOUT**
18	A15*	38	CST**
19	A16*	39	ROM/RAM**
20	PGM***	40	GND

Notes: \*A14 : 32KB, 64KB, 128KB, 256KB, 512KB, 1MB

\*A15 : 64KB, 128KB, 256KB, 512KB, 1MB

\*A16 : 128KB, 256KB, 512KB, 1MB

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

\*A18 : 512KB, 1MB

\*A19 : 1MB

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.

\*\*\* : EPC032 & EPC100 ( $V_{PP} \rightarrow V_{PP}$ ,  $\overline{PGM} \rightarrow N/C$ ,  $\overline{OE} \rightarrow \overline{OE}$ )

EPC064 ( $V_{PP} \rightarrow N/C$ ,  $\overline{PGM} \rightarrow N/C$ ,  $\overline{OE} \rightarrow \overline{OE}/V_{PP}$ )

EPC128, EPC256 & EPC512 ( $V_{PP} \rightarrow V_{PP}$ ,  $\overline{PGM} \rightarrow \overline{PGM}$ ,  $\overline{OE} \rightarrow \overline{OE}$ )