

# CDP1881C, CDP1882, CDP1882C

## CMOS 6-Bit Latch and Decoder Memory Interfaces

March 1997

### Features

- Performs Memory Address Latch and Decoder Functions Multiplexed or Non-Multiplexed
- Decodes Up to 16K Bytes of Memory
- Interfaces Directly with CDP1800-Series Microprocessors at Maximum Clock Frequency
- Can Replace CDP1866 and CDP1867 (Upward Speed and Function Capability)

### Ordering Information

PACKAGE	5V	10V	TEMP. RANGE (°C)	PKG. NO.
PDIP	CDP1881CE	-	-40 to +85	E20.3
PDIP	CDP1882CE	-	-40 to +85	E18.3
PDIP Burn-In	CDP1882CEX	-	-40 to +85	E18.3
SBDIP	-	CDP1882D	-40 to +85	D18.3

### Description

The CDP1881C, CDP1882 and CDP1882C are CMOS 6-bit memory latch and decoder circuits intended for use in CDP1800 series microprocessor systems. They can interface directly with the multiplexed address bus of this system at maximum clock frequency, and up to four 4K x 8-bit memories to provide a 16K byte memory system. With four 2K x 8-bit memories an 8K byte system can be decoded.

The devices are also compatible with non-multiplexed address bus microprocessors. By connecting the clock input to  $V_{DD}$ , the latches are in the data-following mode and the decoded outputs can be used in general purpose memory-system applications.

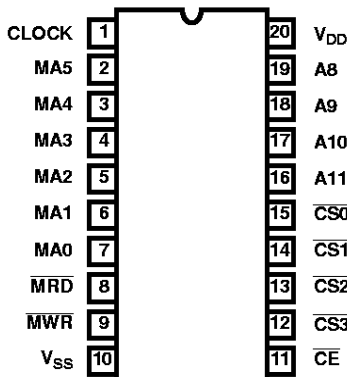
The CDP1881C, CDP1882 and CDP1882C are intended for use with 2K or 4K byte RAMs and are identical except that in the CDP1882 MWR and MRD are excluded.

The CDP1882 is functionally identical to the CDP1882C. It differs in that the CDP1882 has recommended operating voltage range of 4V to 10.5V and the C version has a recommended operating voltage range of 4V to 6.5V.

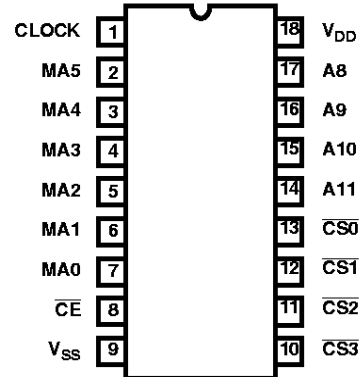
The CDP1881C, CDP1882 and CDP1882C are supplied in 20 lead and 18 lead packages, respectively. The CDP1881C is supplied only in a dual-in-line plastic package (E suffix). The CDP1882 is supplied in dual-in-line, hermetic side-brazed ceramic (D suffix) and in plastic (E suffix) packages.

### Pinouts

CDP1881C  
(PDIP)  
TOP VIEW



CDP1882, CDP1882C  
(PDIP, CERDIP)  
TOP VIEW



## CDP1881C, CDP1882, CDP1882C

### Absolute Maximum Ratings

DC Supply Voltage Range, ( $V_{DD}$ ) (All Voltages Referenced to $V_{SS}$ Terminal)	
CDP1882	-0.5V to +11V
CDP1881C and CDP1882C	-0.5V to +7V
Input Voltage Range, All Inputs	-0.5V to $V_{DD} + 0.5V$
DC Input Current, Any One Input	$\pm 10mA$

### Thermal Information

Thermal Resistance (Typical)	$\theta_{JA}$ ( $^{\circ}C/W$ )	$\theta_{JC}$ ( $^{\circ}C/W$ )
18 Lead PDIP	85	N/A
20 Lead PDIP	80	N/A
SBDIP Package	85	22
Device Dissipation Per Output Transistor $T_A$ = Full Package Temperature Range (All Package Types)	100mW	
Operating Temperature Range ( $T_A$ )		
Package Type D	-55 $^{\circ}C$ to +125 $^{\circ}C$	
Package Type E	-40 $^{\circ}C$ to +85 $^{\circ}C$	
Storage Temperature Range ( $T_{STG}$ )	-65 $^{\circ}C$ to +150 $^{\circ}C$	
Lead Temperature (During Soldering) At distance 1/16 $\pm$ 1/32 In. (1.59 $\pm$ 0.79mm) from case for 10s max	+265 $^{\circ}C$	

**CAUTION:** Stresses above those listed in the "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress only rating and operation of the device at these or any other conditions above those indicated in the operation section of this specification is not implied.

### Recommended Operating Conditions

At  $T_A$  = Full Package Temperature Range. For maximum reliability, operating conditions should be selected so that operation is always within the following ranges:

PARAMETER	CDP1882		CDP1881C, CDP1882C		UNITS
	MIN	MAX	MIN	MAX	
DC Operating Voltage Range	4	10.5	4	6.5	V
Input Voltage Range	$V_{SS}$	$V_{DD}$	$V_{SS}$	$V_{DD}$	V

### Static Electrical Specifications

At  $T_A$  = -40 $^{\circ}C$  to +85 $^{\circ}C$ ,  $V_{DD} \pm 5\%$ , Except as Noted:

PARAMETER	SYMBOL	CONDITIONS			CDP1882			CDP1881C, CDP1882C			UNITS
		$V_O$ (V)	$V_{IN}$ (V)	$V_{DD}$ (V)	MIN	(NOTE 1) TYP	MAX	MIN	(NOTE 1) TYP	MAX	
Quiescent Device Current	$I_{DD}$	-	0, 5	5	-	1	10	-	5	50	$\mu A$
		-	0, 10	10	-	10	100	-	-	-	$\mu A$
Output Low Drive (Sink) Current	$I_{OL}$	0.4	0, 5	5	1.6	3.2	-	1.6	3.2	-	mA
		0.5	0, 10	10	3.2	6.4	-	-	-	-	mA
Output High Drive (Source) Current	$I_{OH}$	4.6	0, 5	5	-1.15	-2.3	-	-1.15	-2.3	-	mA
		9.5	0, 10	10	-2.3	-4.6	-	-	-	-	mA
Output Voltage Low-Level (Note 2)	$V_{OL}$	-	0, 5	5	-	0	0.1	-	0	0.1	V
		-	0, 10	10	-	0	0.1	-	-	-	V
Output Voltage High-Level (Note 2)	$V_{OH}$	-	0, 5	5	4.9	5	-	4.9	5	-	V
		-	0, 10	10	9.9	10	-	-	-	-	V
Input Low Voltage	$V_{IL}$	0.5, 4.5	-	5	-	-	1.5	-	-	1.5	V
		1, 9	-	10	-	-	3	-	-	-	V
Input High Voltage	$V_{IH}$	0.5, 9.5	-	5	3.5	-	-	3.5	-	-	V
		1, 9	-	10	7	-	-	-	-	-	V

## CDP1881C, CDP1882, CDP1882C

**Static Electrical Specifications** At  $T_A = -40^\circ\text{C}$  to  $+85^\circ\text{C}$ ,  $V_{DD} \pm 5\%$ , Except as Noted: (Continued)

PARAMETER	SYMBOL	CONDITIONS			CDP1882			CDP1881C, CDP1882C			UNITS
		$V_O$ (V)	$V_{IN}$ (V)	$V_{DD}$ (V)	MIN	(NOTE 1) TYP	MAX	MIN	(NOTE 1) TYP	MAX	
Input Leakage Current	$I_{IN}$	Any Input	0, 5	5	-	-	$\pm 1$	-	-	$\pm 1$	$\mu\text{A}$
			0, 10	10	-	-	$\pm 2$	-	-	-	$\mu\text{A}$
Operating Current (Note 2)	$I_{DD1}$	0, 5	0, 5	5	-	-	2	-	-	2	mA
		0, 10	0, 10	10	-	-	4	-	-	-	mA
Input Capacitance	$C_{IN}$	-	-	-	-	5	7.5	-	5	7.5	pF
Output Capacitance	$C_{OUT}$	-	-	-	-	10	15	-	10	15	pF
Minimum Data Retention Voltage	$V_{DR}$	$V_{DD} = V_{DR}$			-	2	2.4	-	2	2.4	V
Data Retention Current	$I_{DR}$	$V_{DD} = 2.4\text{V}$			-	0.01	1	-	0.5	5	$\mu\text{A}$

**NOTES:**

1. Typical values are for  $T_A = +25^\circ\text{C}$ .
2.  $I_{OL} = I_{OH} = 1\mu\text{A}$ .
3. Operating current measured at 200kHz for  $V_{DD} = 5\text{V}$  and 400kHz for  $V_{DD} = 10\text{V}$ , with outputs open circuits (equivalent to typical CDP1800 system at 3.2MHz, 5V; and 6.4MHz, 10V).

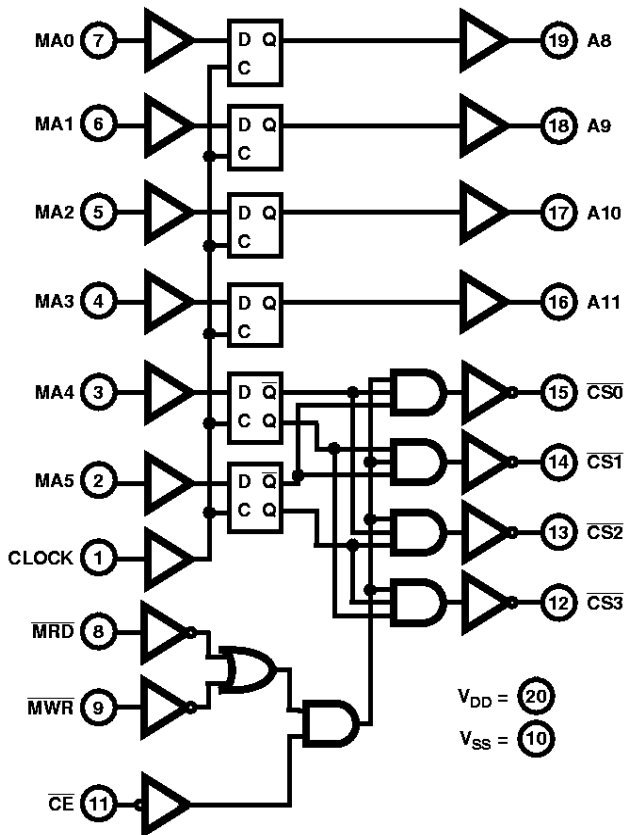


FIGURE 1. FUNCTIONAL DIAGRAM FOR THE CDP1881C

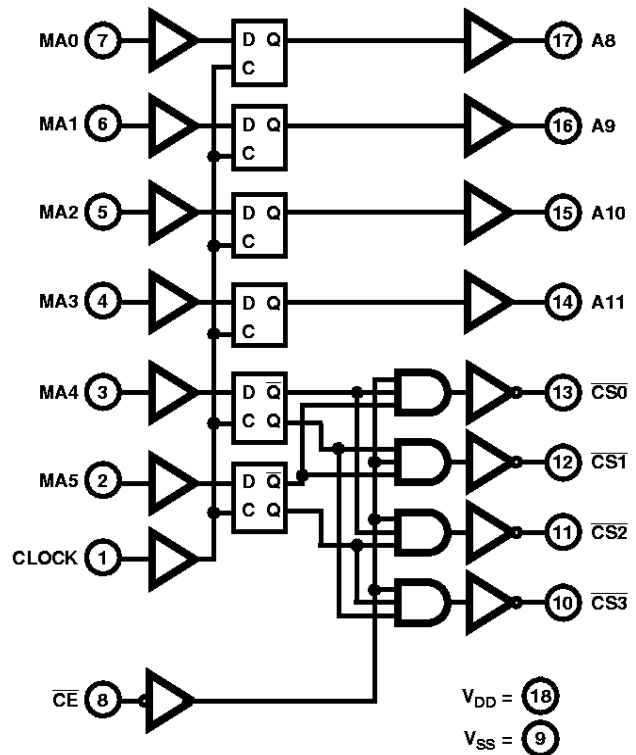


FIGURE 2. FUNCTIONAL DIAGRAM FOR THE CDP1882, CDP1882C

**CDP1881C, CDP1882, CDP1882C**

**TRUTH TABLE**

INPUTS						OUTPUTS			
(NOTE 1) MWR	(NOTE 1) MRD	$\overline{CE}$	CLK	MA4	MA5	$\overline{CS0}$	$\overline{CS1}$	$\overline{CS2}$	$\overline{CS3}$
1	1	X	X	X	X	1	1	1	1
X	X	1	X	X	X	1	1	1	1
0	X	0	1	0	0	0	1	1	1
0	X	0	1	1	0	1	0	1	1
0	X	0	1	0	1	1	1	0	1
0	X	0	1	1	1	1	1	1	0
0	X	0	0	X	X	Previous State			
X	0	0	1	0	0	0	1	1	1
X	0	0	1	1	0	1	0	1	1
X	0	0	1	0	1	1	1	0	1
X	0	0	1	1	1	1	1	1	0
X	0	0	0	X	X	Previous State			

NOTE:

1. CDP1881C Only

INPUTS			OUTPUTS
$\overline{CE}$	CLK	MA0, MA1, MA2, MA3	A8, A9, A10, A11
X	1	1	1
X	1	0	0
X	0	X	Previous State

Logic 1 = High, Logic 0 = Low, X = Don't Care

**Dynamic Electrical Specifications** at  $T_A = -40^\circ\text{C}$  to  $+85^\circ\text{C}$ ,  $V_{DD} \pm 5\%$ ,  $t_R, t_F = 20\text{ns}$ ,  $V_{IH} = 0.7 V_{DD}$ ,  $V_{IL} = 0.3 V_{DD}$ ,  $C_L = 100\text{pF}$ , (See Figure 1)

PARAMETER	$V_{DD}$ (V)	CDP1882			CDP1881C, CDP1882C			UNITS	
		MIN	(NOTE 1) TYP	(NOTE 2) MAX	MIN	(NOTE 1) TYP	(NOTE 2) MAX		
Minimum Setup Time	$t_{MACL}$	5	-	10	35	-	10	35	ns
Memory Address to CLOCK		10	-	8	25	-	-	-	ns
Minimum Hold Time	$t_{CLMA}$	5	-	8	25	-	8	25	ns
Memory Address After CLOCK		10	-	8	25	-	-	-	ns
Minimum CLOCK Pulse Width	$t_{CLCL}$	5	-	50	75	-	50	75	ns
		10	-	25	40	-	-	-	ns

## CDP1881C, CDP1882, CDP1882C

**Dynamic Electrical Specifications** at  $T_A = -40^\circ\text{C}$  to  $+85^\circ\text{C}$ ,  $V_{DD} \pm 5\%$ ,  $t_R, t_F = 20\text{ns}$ ,  $V_{IH} = 0.7 V_{DD}$ ,  $V_{IL} = 0.3 V_{DD}$ ,  $C_L = 100\text{pF}$ ,  
(See Figure 1) (Continued)

PARAMETER	$V_{DD}$ (V)	CDP1882			CDP1881C, CDP1882C			UNITS	
		MIN	(NOTE 1) TYP	(NOTE 2) MAX	MIN	(NOTE 1) TYP	(NOTE 2) MAX		
PROPAGATION DELAY TIMES									
Chip Enable to Chip Select	$t_{CECS}$	5	-	75	150	-	75	150	ns
		10	-	45	100	-	-	-	ns
MRD or MRW to Chip Select (Note 3)	$t_{MCS}$	5	-	75	150	-	75	150	ns
		10	-	40	100	-	-	-	ns
CLOCK to Chip Select	$t_{CLCS}$	5	-	100	175	-	100	175	ns
		10	-	65	125	-	-	-	ns
CLOCK to Address	$t_{CLA}$	5	-	100	175	-	100	175	ns
		10	-	65	125	-	-	-	ns
Memory Address to Chip Select	$t_{MACS}$	5	-	100	175	-	100	175	ns
		10	-	75	125	-	-	-	ns
Memory Address to Address	$t_{MAA}$	5	-	80	125	-	80	125	ns
		10	-	40	60	-	-	-	ns

**NOTES:**

1. Typical values are for  $T_A = 25^\circ\text{C}$ .
2. Maximum limits of minimum characteristics are the values above which all devices function.
3. For CDP1881C type only.

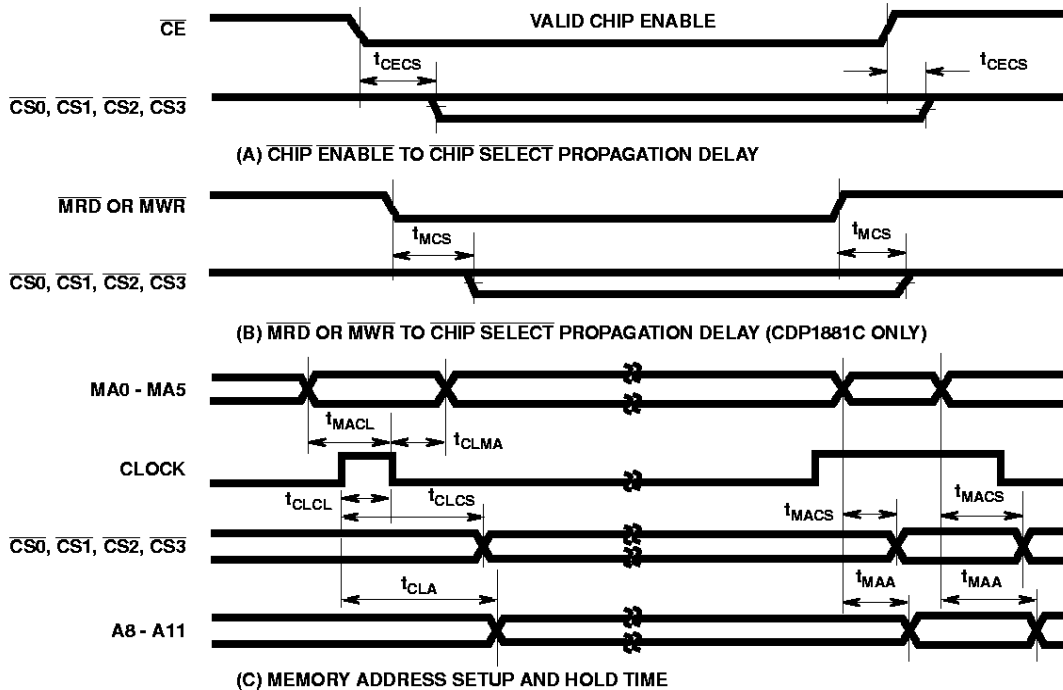


FIGURE 3. TIMING WAVEFORMS

### Signal Descriptions/Pin Functions

**CLOCK:** Latch-Input Control - a high at the clock input will allow data to pass through the latch to the output pin. Data is latched on the high to low transition of the clock input. This input is connected to TPA in CDP1800-series systems.

**MA0 - MA5:** Address inputs to the high-byte address latches.

**MA4 - MA5:** High byte address inputs decoded to produce chip selects  $\overline{CS0} - \overline{CS3}$ .

**MRD, MWR:** MEMORY READ ( $\overline{MRD}$ ) and MEMORY WRITE ( $\overline{MWR}$ ) signal inputs on the CDP1881C. A low at either input, when the  $\overline{CE}$  pin is low, will enable the decoder chip select outputs ( $\overline{CS0} - \overline{CS3}$ ).

**CE:** CHIP ENABLE input - a low at the  $\overline{CE}$  input of CDP1882, CDP1882C will enable the chip select decoder. A low at the  $\overline{CE}$  input of CDP1881C, coincident with a low at either  $\overline{MRD}$  or  $\overline{MWR}$  pin, will enable the chip select decoder. A high on this pin forces  $\overline{CS0}$ ,  $\overline{CS1}$ ,  $\overline{CS2}$ , and  $\overline{CS3}$  to a high (false) state.

**A8 - A11:** Latched high-byte address outputs.

**CS0 - CS3:** One of four latched and decoded Chip Select outputs.

**V<sub>DD</sub>, V<sub>SS</sub>:** Power and ground pins, respectively.

### Application Information

The CDP1881C, CDP1882, CDP1882C can interface directly with the multiplexed address bus of the CDP1800-series microprocessor family at maximum clock frequency. A single CDP1881C or CDP1882 is capable of decoding up to 16K-bytes of memory.

The CDP1881C is provided with  $\overline{MRD}$  and  $\overline{MWR}$  inputs for controlling bus contention, and is especially useful for interfacing with RAMs that do not have an output enable ( $\overline{OE}$ ). Figure 4 shows the CDP1881C in a minimum system configuration which includes the CDP1833 ROM (1K x 8) and two 2K x 8 RAMs. The CDP1881C in this example performs the following functions:

- 1) Latch and decode high-order address bits for use as chip selects.
- 2) Gate chip selects with  $\overline{MRD}$  and  $\overline{MWR}$  to prevent bus contention with the CPU.
- 3) Latch high-order address bits A8 to A11.

A system using the CDP1882 is shown in Figure 5. The CDP1882 performs the memory address latch and decoder functions. Note that the RAM has an output enable ( $\overline{OE}$ ) pin which eliminates the need for  $\overline{MRD}$  and  $\overline{MWR}$  inputs on the latch/decoder. Instead, the  $\overline{MRD}$  line is connected directly to the RAM output enable ( $\overline{OE}$ ) pin.

In Figure 6 the CDP1882 is used to decode a 16K-byte ROM system consisting of four CDM5332s.

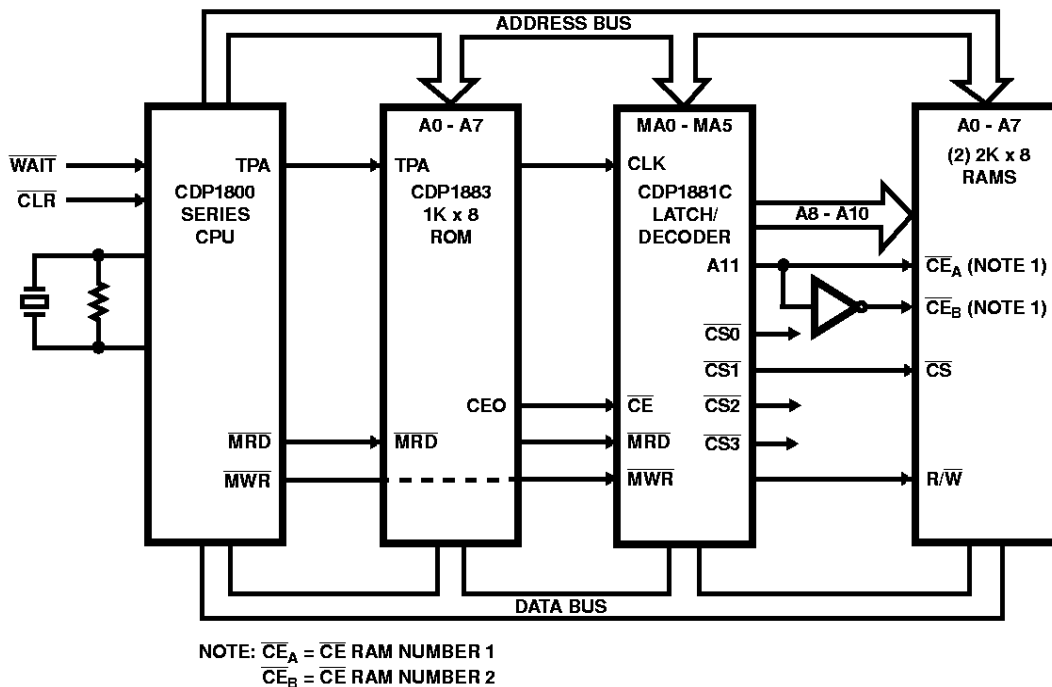


FIGURE 4. MINIMUM 1800-SERIES USING THE CDP1881C

CDP1881C, CDP1882, CDP1882C

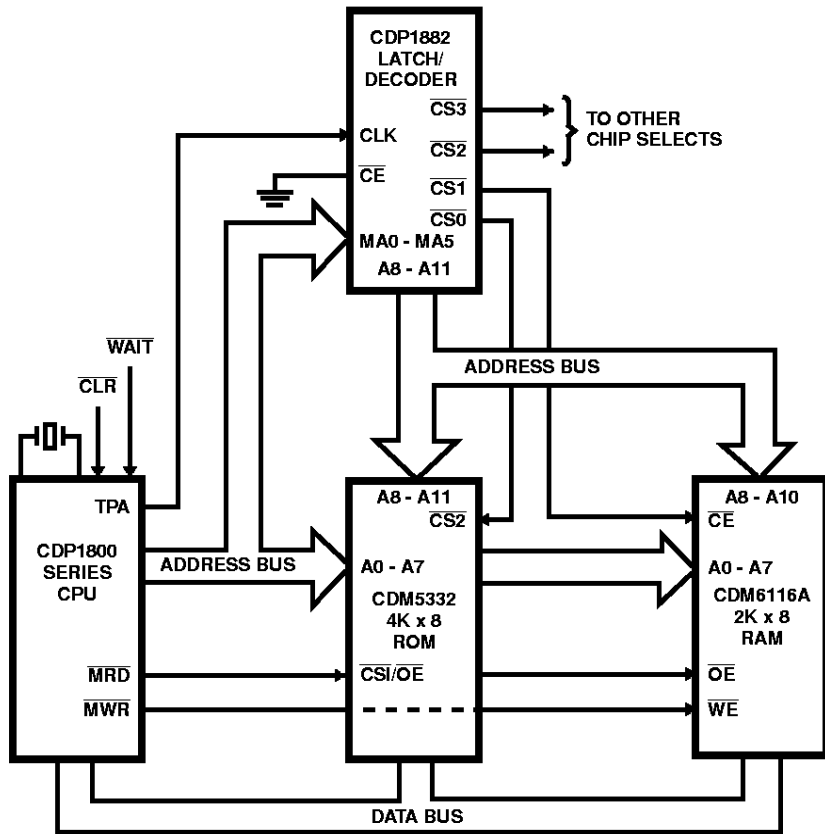


FIGURE 5. CDP1800-SERIES SYSTEM USING THE CDP1882

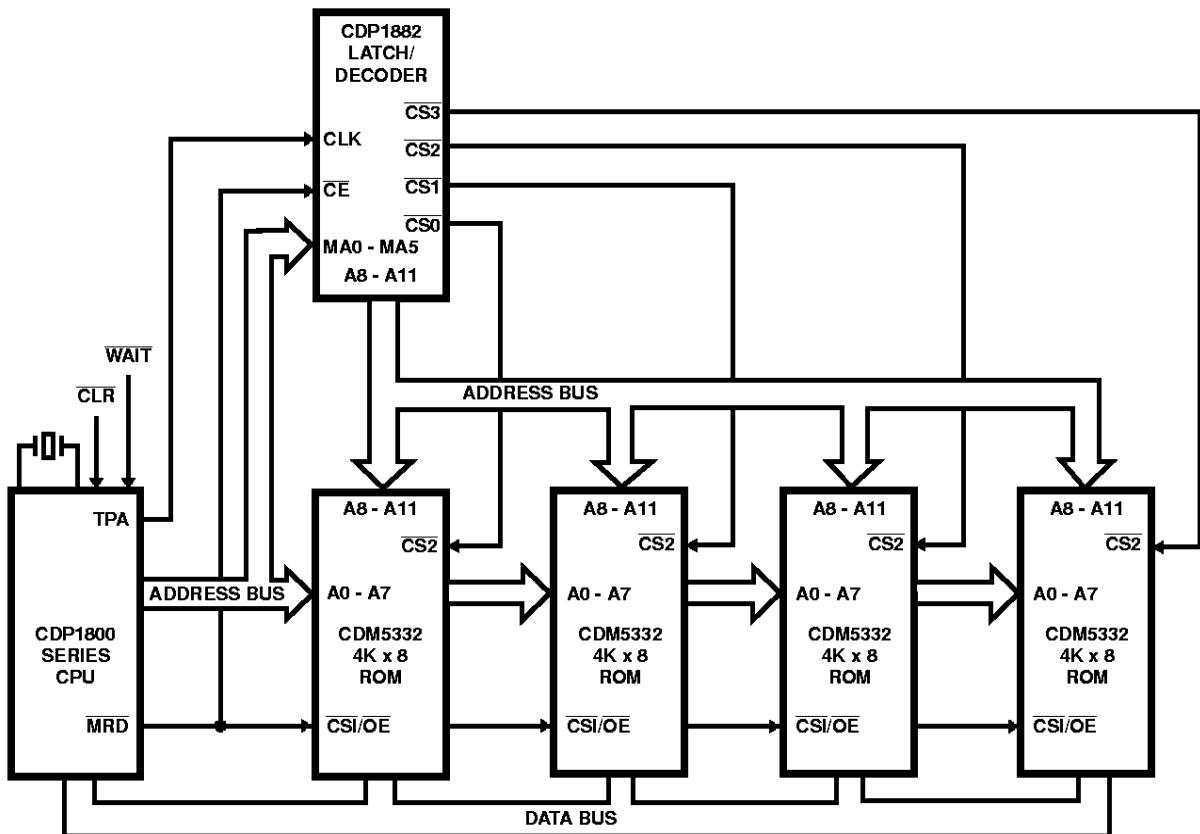


FIGURE 6. 6K-BYTE ROM SYSTEMS USING THE CDP1882