



# CDP1857 CDP1857C

T-52-33-55

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## 4-Bit Bus Buffer/Separator

### Features

- Provides Easy Connection of I/O to CDP1800-Series Microprocessor Data Bus.
- Non-Inverting Fully Buffered Data Transfer

### Ordering Information

PACKAGE	TEMPERATURE RANGE	5V	10V
Plastic DIP	-40°C to +85°C	CDP1857CE	-
Ceramic DIP	-40°C to +85°C	CDP1857CD	-

TABLE 1. CDP1857 FUNCTION FOR I/O BUS SEPARATOR OPERATION

CS	$\overline{\text{MRD}}$	DATA BUS OUT DB0-DB3	DATA OUT DO0-DO3
0	X	High Impedance	High Impedance
1	0	High Impedance	Data Bus
1	1	Data In	High Impedance

### Description

The CDP1857 and CDP1857C are 4 bit CMOS non-inverting bus separators designed for use in CDP1800-series microprocessor systems. They can be controlled directly by a 1800-series microprocessor without the use of additional components.

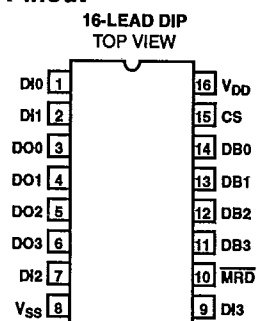
The CDP1857 is designed for use as a bus buffer or separator between the 1800-series microprocessor data bus and I/O devices. It provides a chip-select (CS) input signal which, when high (1), enables the bus-separator three-state output drivers. The direction of data flow, when enabled, is controlled by the  $\overline{\text{MRD}}$  input signal.

In the CDP1857, when  $\overline{\text{MRD}} = 1$ , it enables the three-state bus drivers (DB0-DB3) and transfers data from the DATA-IN lines onto the data bus. When  $\overline{\text{MRD}} = 0$ , it disables the three-state bus drivers (DB0-DB3) and enables the three-state data output drivers (DO0-DO3), thus transferring data from the data bus to the DATA-OUT terminals.

The CDP1857 can be used as a bi-directional bus buffer by connecting the corresponding DI and DO terminals (Figure 1). The  $\overline{\text{MRD}}$  output signal from the 1800-series microprocessor has the correct polarity to control the CDP1857 when it is used as I/O bus buffer/separator. Therefore, the 1800-series microprocessor  $\overline{\text{MRD}}$  signal can be connected directly to the  $\overline{\text{MRD}}$  input of CDP1857. See Function Table 1 for use of the CDP1857 as an I/O bus buffer/separator.

The CDP1857 is functionally identical to the CDP1857C. The CDP1857 has a recommended operating-voltage range of 4 to 10.5 volts, and the CDP1857C has recommended operating-voltage range of 4 to 6.5 volts. The CDP1857 and CDP1857C are supplied in 16-lead hermetic, dual-in-line ceramic packages (D suffix), and in 16-lead plastic packages (E suffix).

### Pinout



### Functional Diagram for CDP1857

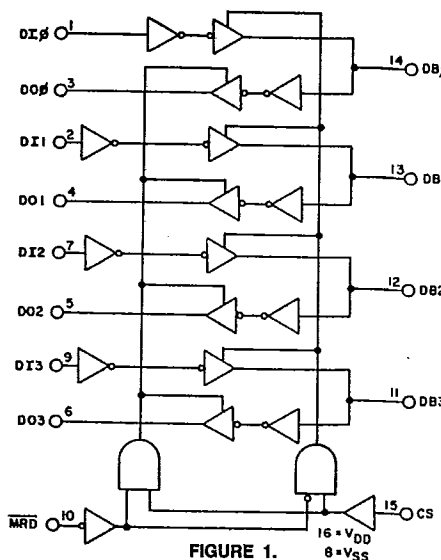


FIGURE 1.

CAUTION: These devices are sensitive to electrostatic discharge. Users should follow proper I.C. Handling Procedures.  
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**Static Electrical Characteristics** At  $T_A = -40^\circ\text{C}$  to  $+85^\circ\text{C}$ , Except as Noted:

CHARACTERISTIC	SYMBOL	CONDITIONS			LIMITS						UNITS
		$V_O$ (V)	$V_{IN}$ (V)	$V_{DD}$ (V)	CDP1857			CDP1857C			
					MIN	TYP (Note 1)	MAX	MIN	TYP (Note 1)	MAX	
Quiescent Device Current	$I_{DD}$	-	0, 5	5	-	1	10	-	5	50	$\mu\text{A}$
		-	0, 10	10	-	10	100	-	-	-	$\mu\text{A}$
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	2.6	5.2	-	-	-	-	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	-2.6	-5.2	-	-	-	-	mA
Output Voltage Low-Level (Note 3)	$V_{OL}$	-	0, 5	5	-	0	0.1	-	0	0.1	V
		-	0, 10	10	-	0	0.1	-	-	-	V
Output Voltage High-Level (Note 3)	$V_{OH}$	-	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
		0.5, 9.5	-	10	-	-	3	-	-	-	V
Input High Voltage	$V_{IH}$	0.5, 9.5	-	5	3.5	-	-	3.5	-	-	V
		0.5, 9.5	-	10	7	-	-	-	-	-	V
Input Leakage Current	$I_{IN}$	Any Input	0, 5	5	-	-	1	-	-	1	$\mu\text{A}$
			0, 10	10	-	-	1	-	-	-	$\mu\text{A}$
Operating Current (Note 2)	$I_{DD1}$	0, 5	0, 5	5	-	50	100	-	50	100	$\mu\text{A}$
		0, 10	0, 10	10	-	150	300	-	-	-	$\mu\text{A}$
Input Capacitance	$C_{IN}$	-	-	-	-	5	7.5	-	5	7.5	pF
Output Capacitance	$C_{OUT}$	-	-	-	-	10	15	-	10	15	pF

NOTES:

- Typical values are for  $T_A = +25^\circ\text{C}$  and nominal voltage.
- Operating current measured in a CDP1802 system at 3.2MHz with outputs floating.
- $I_{OL} = I_{OH} = 1\mu\text{A}$ .

**Dynamic Electrical Characteristics** At  $T_A = -40^\circ\text{C}$  to  $+85^\circ\text{C}$ ,  $V_{DD} = 5\%$ ,  $V_{IH} = 0.7 V_{DD}$ ,  $V_{IL} = 0.3 V_{DD}$ ,  $t_r, t_f = 20\text{ns}$ ,  $C_L = 100\text{pF}$

CHARACTERISTIC	SYMBOL	$V_{DD}$ (V)	LIMITS				UNITS
			CDP1857		CDP1857C		
			TYP (Note 1)	MAX	TYP (Note 1)	MAX	
Propagation Delay Time: MRD or CS to DO	$t_{ED}$	5	150	225	150	225	ns
		10	75	125	-	-	ns
MRD or CS to DB	$t_{EB}$	5	150	225	150	225	ns
		10	75	125	-	-	ns
DI to DB	$t_{IB}$	5	100	150	100	150	ns
		10	50	75	-	-	ns
DB to DO	$t_{BO}$	5	100	150	100	150	ns
		10	50	75	-	-	ns

NOTE: 1. Typical values are for  $T_A = 25^\circ\text{C}$  and nominal voltages.

**Recommended Operating Conditions** At  $T_A = \text{Full Package Temperature Range}$ . For maximum reliability, operating conditions should be selected so that operation is always within the following ranges:

CHARACTERISTIC	LIMITS				UNITS
	CDP1857		CDP1857C		
	MIN	MAX	MIN	MAX	
Supply-Voltage Range	4	10.5	4	6.5	V
Recommended Input voltage Range	$V_{SS}$	$V_{DD}$	$V_{SS}$	$V_{DD}$	V

**Absolute Maximum Ratings**

DC Supply Voltage Range, ( $V_{DD}$ ):  
 (All Voltages Referenced to  $V_{SS}$  Terminal)  
 CDP1857 ..... -0.5V to +11V  
 CDP1857C ..... -0.5V to +7V  
 Input Voltage Range, All Inputs ..... -0.5V to  $V_{DD} + 0.5V$   
 DC Input Current, Any One Input .....  $\pm 10mA$   
 Power Dissipation Per Package ( $P_D$ )  
 $T_A = -40^\circ C$  to  $+60^\circ C$  (Package Type E) ..... 500mW  
 $T_A = +60^\circ C$  to  $+85^\circ C$  (Package Type E) ..... Derate Linearly at  
 12mW/ $^\circ C$  to 200mW  
 $T_A = -55^\circ C$  to  $+100^\circ C$  (Package Type D) ..... 500mW  
 $T_A = +100^\circ C$  to  $+125^\circ C$  (Package Type D) ..... Derate Linearly at  
 12mW/ $^\circ C$  to 200mW

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 .....  $+265^\circ C$

**Timing Diagrams**

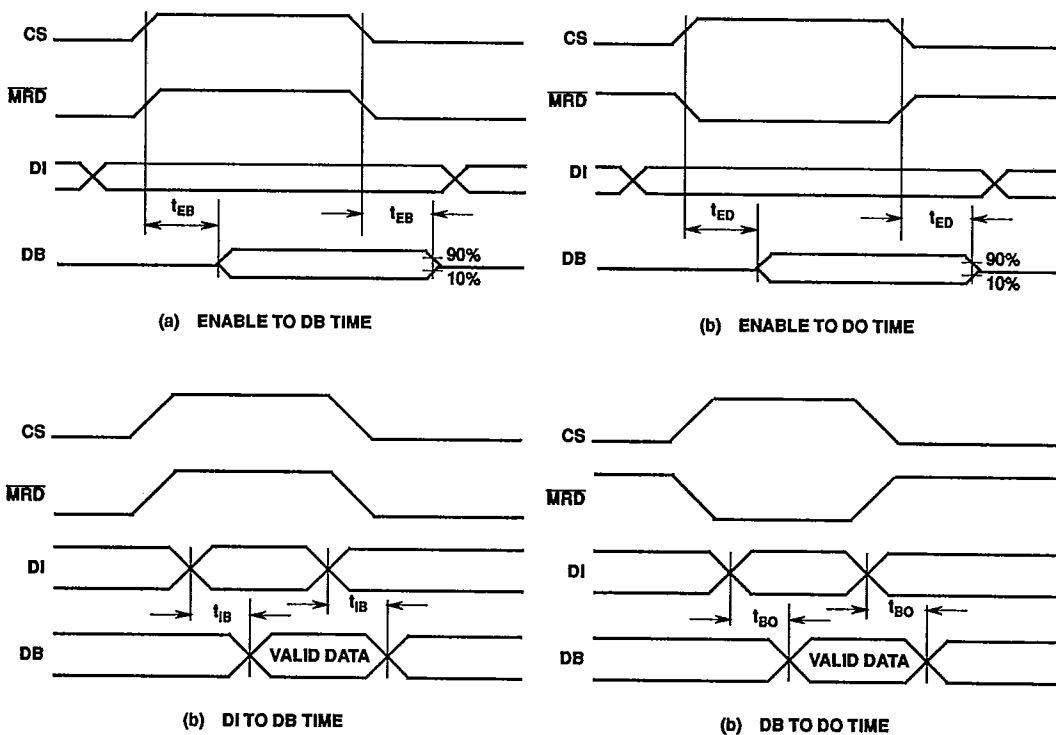


FIGURE 2. TIMING DIAGRAMS FOR CDP1857

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Typical Applications

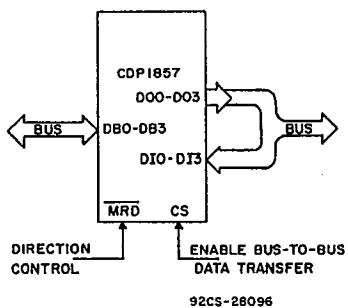


FIGURE 3. CDP1857 BIDIRECTIONAL BUS BUFFER OPERATION

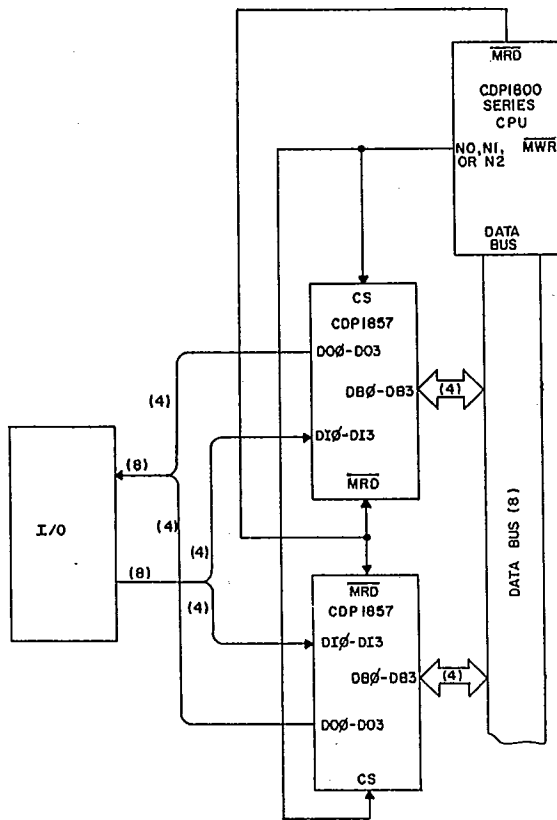


FIGURE 4. CDP1857 BUS SEPARATOR OPERATION