

March 1997

## 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

| PART NUMBER | TEMP. RANGE    | PACKAGE | PKG. NO. |
|-------------|----------------|---------|----------|
| CDP1857CE   | -40°C to +85°C | PDIP    | E16.3    |
| CDP1857CD   | -40°C to +85°C | SBDIP   | D16.3    |

**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 CDP1857C is a 4-bit CMOS non-inverting bus separator designed for use in CDP1800-series microprocessor systems. It can be controlled directly by a 1800-series microprocessor without the use of additional components.

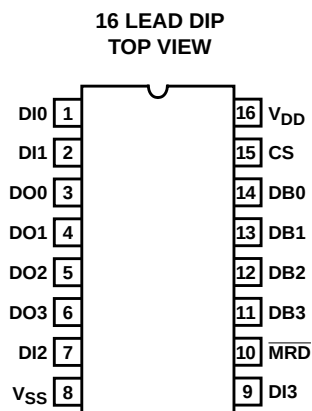
The CDP1857 is designed for use as a bus buffer or separator between the 1800-series microprocessor data bus and I/O devices. It provides a chip-select (CS) input signal which, when high (1), enables the bus-separator three-state output drivers. The direction of data flow, when enabled, is controlled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

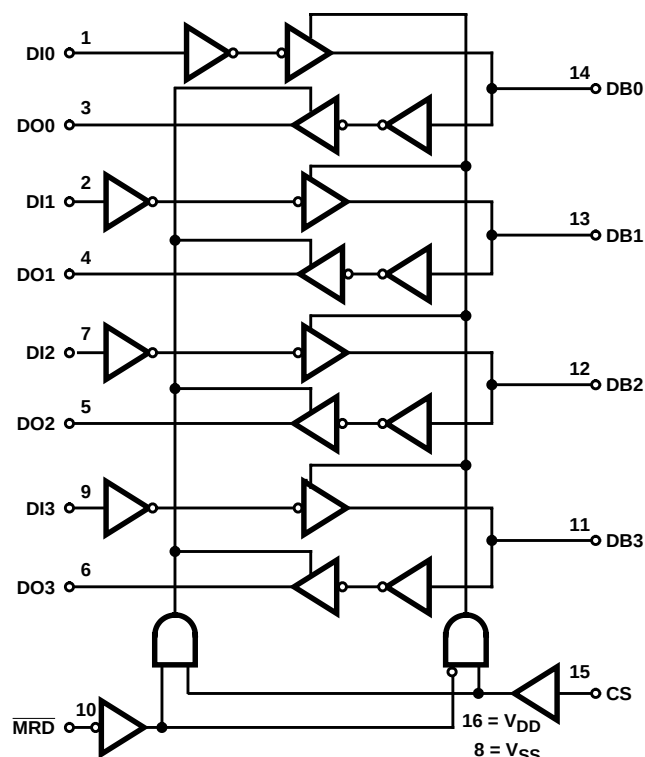
The CDP1857 can be used as a bidirectional bus buffer by connecting the corresponding DI and DO terminals (Figure 1). The  $\overline{\text{MRD}}$  output signal from the 1800-series microprocessor has the correct polarity to control the CDP1857 when it is used as I/O bus buffer/separator. Therefore, 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 CDP1857C is 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



# CDP1857C

## Absolute Maximum Ratings

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

## Thermal Information

Thermal Resistance (Typical)  $\theta_{JA}$  ( $^{\circ}\text{C/W}$ )  $\theta_{JC}$  ( $^{\circ}\text{C/W}$ )  
PDIP Package . . . . . 85 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. . . . .  $-55^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$   
Package Type E. . . . .  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$   
Storage Temperature Range ( $T_{STG}$ ) . . . . .  $-65^{\circ}\text{C}$  to  $+150^{\circ}\text{C}$   
Lead Temperature (During Soldering) . . . . .  $+265^{\circ}\text{C}$   
At distance 1/16  $\pm$  1/32 In. (1.59  $\pm$  0.79mm)  
from case for 10s max

**CAUTION:** Stresses above those listed in "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 operational sections of this specification is not implied.

## Static Electrical Specifications At $T_A = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$ , Except as Noted:

| PARAMETER                          | SYMBOL    | CONDITIONS   |                 |                 | MIN   | (NOTE 1)<br>TYP | MAX | UNITS         |
|------------------------------------|-----------|--------------|-----------------|-----------------|-------|-----------------|-----|---------------|
|                                    |           | $V_O$<br>(V) | $V_{IN}$<br>(V) | $V_{DD}$<br>(V) |       |                 |     |               |
| Quiescent Device Current           | $I_{DD}$  | -            | 0, 5            | 5               | -     | 5               | 50  | $\mu\text{A}$ |
| Output Low Drive (Sink) Current    | $I_{OL}$  | 0.4          | 0, 5            | 5               | 1.6   | 3.2             | -   | mA            |
| Output High Drive (Source) Current | $I_{OH}$  | 4.6          | 0, 5            | 5               | -1.15 | -2.3            | -   | mA            |
| Output Voltage Low-Level (Note 3)  | $V_{OL}$  | -            | 0, 5            | 5               | -     | 0               | 0.1 | V             |
| Output Voltage High-Level (Note 3) | $V_{OH}$  | -            | 0, 5            | 5               | 4.9   | 5               | -   | V             |
| Input Low Voltage                  | $V_{IL}$  | 0.5, 4.5     | -               | 5               | -     | -               | 1.5 | V             |
| Input High Voltage                 | $V_{IH}$  | 0.5, 4.5     | -               | 5               | 3.5   | -               | -   | V             |
| Input Leakage Current              | $I_{IN}$  | Any Input    | 0, 5            | 5               | -     | -               | 1   | $\mu\text{A}$ |
| Operating Current (Note 2)         | $I_{DD1}$ | 0, 5         | 0, 5            | 5               | -     | 50              | 100 | $\mu\text{A}$ |
| Input Capacitance                  | $C_{IN}$  | -            | -               | -               | -     | 5               | 7.5 | pF            |

### NOTES:

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

## Dynamic Electrical Specifications At $T_A = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$ , $V_{DD} = 5\text{V} \pm 5\%$ , $V_{IH} = 0.7 V_{DD}$ , $V_{IL} = 0.3 V_{DD}$ , $t_R, t_F = 20\text{ns}$ , $C_L = 100\text{pF}$

| PARAMETER                           | SYMBOL   | $V_{DD}$<br>(V) | (NOTE 1)<br>TYP | MAX | UNITS |
|-------------------------------------|----------|-----------------|-----------------|-----|-------|
| Propagation Delay Time:             |          |                 |                 |     |       |
| $\overline{\text{MRD}}$ or CS to DO | $t_{ED}$ | 5               | 150             | 225 | ns    |
| $\overline{\text{MRD}}$ or CS to DB | $t_{EB}$ | 5               | 150             | 225 | ns    |
| DI to DB                            | $t_{IB}$ | 5               | 100             | 150 | ns    |
| DB to DO                            | $t_{BO}$ | 5               | 100             | 150 | ns    |

### NOTE:

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

# 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                       | MIN      | MAX      | UNITS |
|---------------------------------|----------|----------|-------|
| Supply-Voltage Range            | 4        | 6.5      | V     |
| Recommended Input Voltage Range | $V_{SS}$ | $V_{DD}$ | V     |

## Timing Diagrams

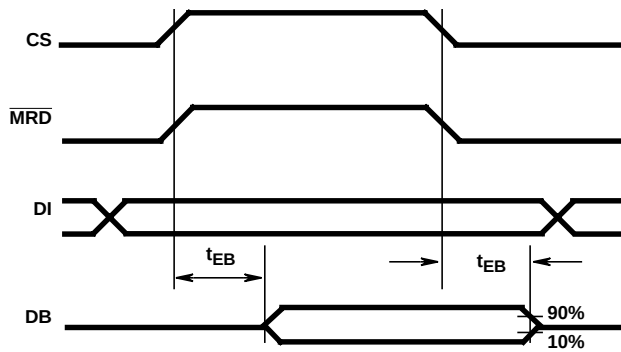


FIGURE 1A. ENABLE TO DB TIME

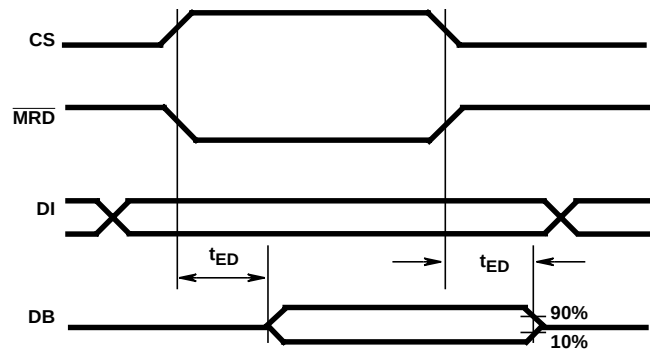


FIGURE 1B. ENABLE TO DO TIME

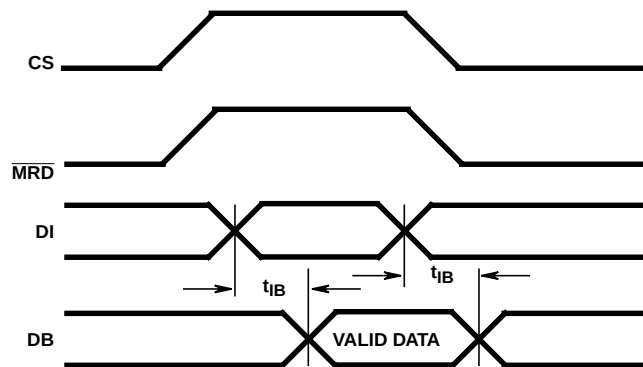


FIGURE 1C. DI TO DB TIME

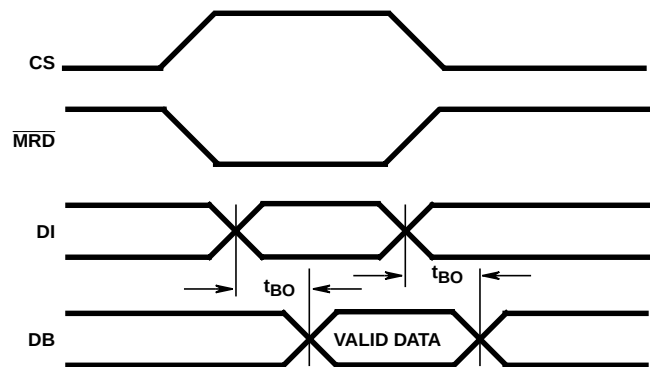


FIGURE 1D. DB TO DO TIME

FIGURE 1. TIMING DIAGRAMS FOR CDP1857C

## Typical Applications

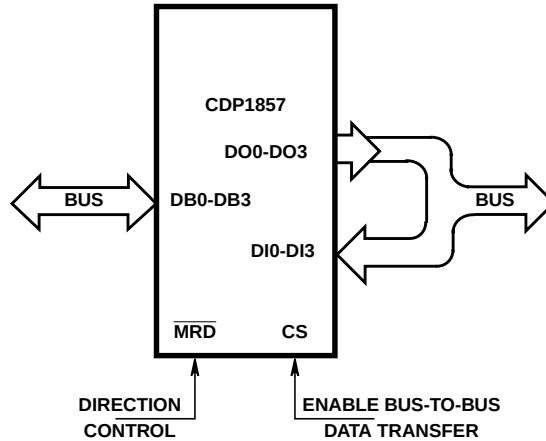


FIGURE 2. CDP1857 BIDIRECTIONAL BUS BUFFER OPERATION

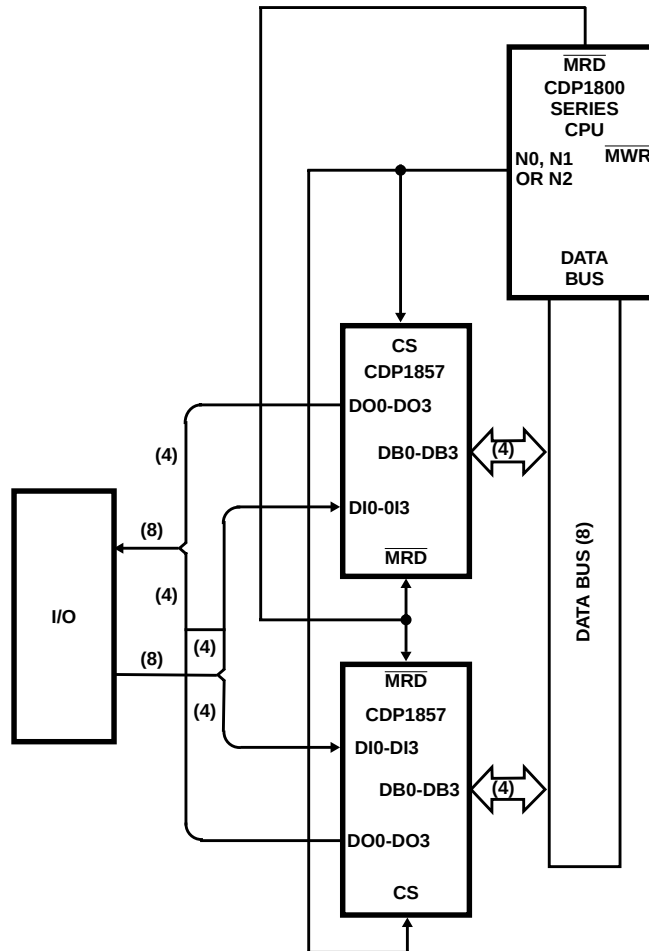


FIGURE 3. CDP1857 BUS SEPARATOR OPERATION

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