

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.

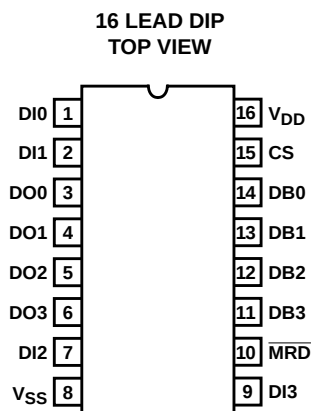
The CDP1857 is designed for use as a bus buffer or separator between the 1800-series microprocessor data bus and I/O devices. It provides a chip-select (CS) input signal which, when high (1), enables the bus-separator three-state output drivers. The direction of data flow, when enabled, is controlled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

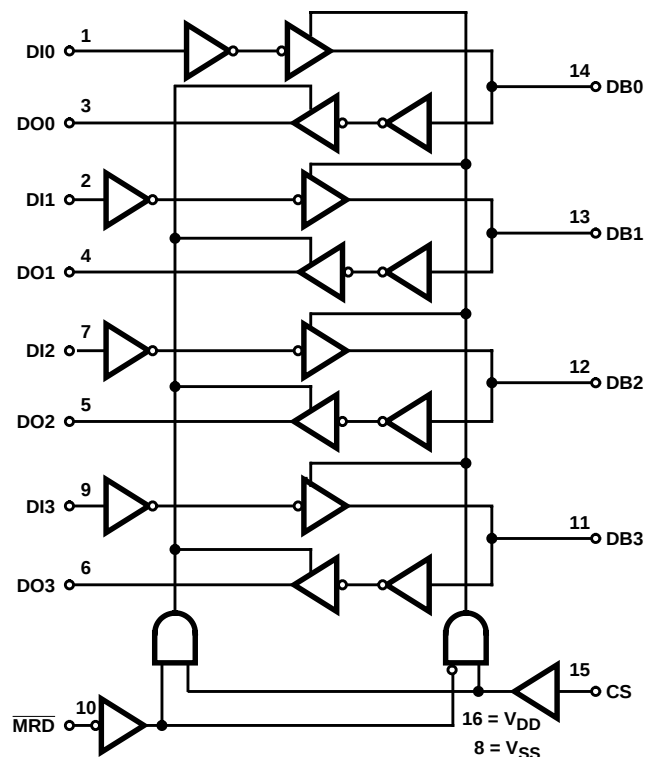
The CDP1857 can be used as a bidirectional bus buffer by connecting the corresponding DI and DO terminals (Figure 1). The  $\overline{\text{MRD}}$  output signal from the 1800-series microprocessor has the correct polarity to control the CDP1857 when it is used as I/O bus buffer/separator. Therefore, 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. . . . .  $\pm 10\text{mA}$

## 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. ( $1.59 \pm 0.79\text{mm}$ )  
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     |

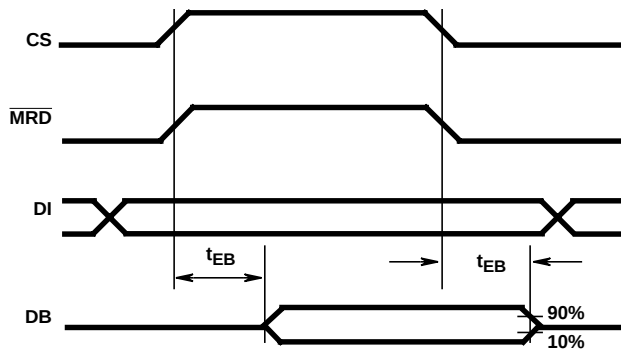
**Timing Diagrams**

FIGURE 1A. ENABLE TO DB TIME

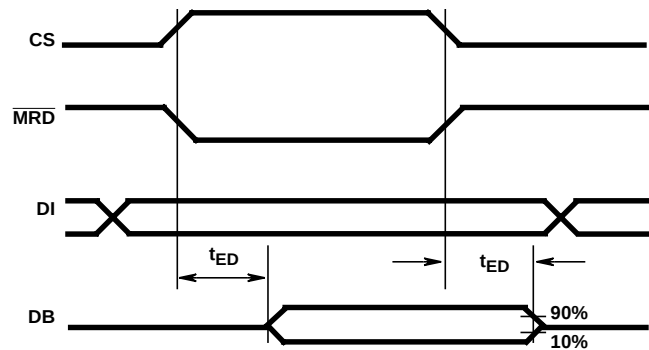


FIGURE 1B. ENABLE TO DO TIME

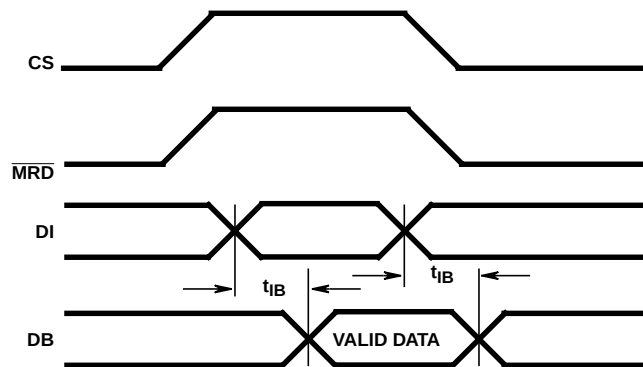


FIGURE 1C. DI TO DB TIME

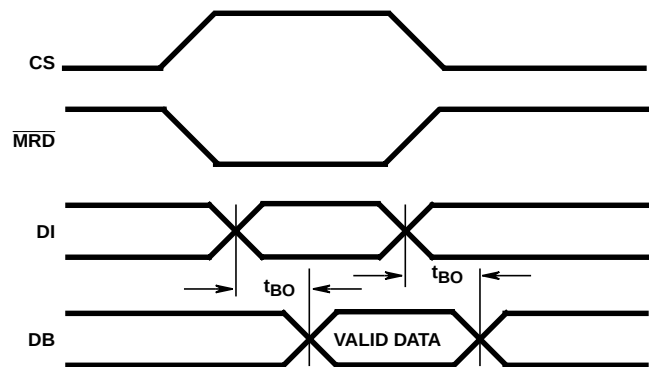


FIGURE 1D. DB TO DO TIME

FIGURE 1. TIMING DIAGRAMS FOR CDP1857C

## Typical Applications

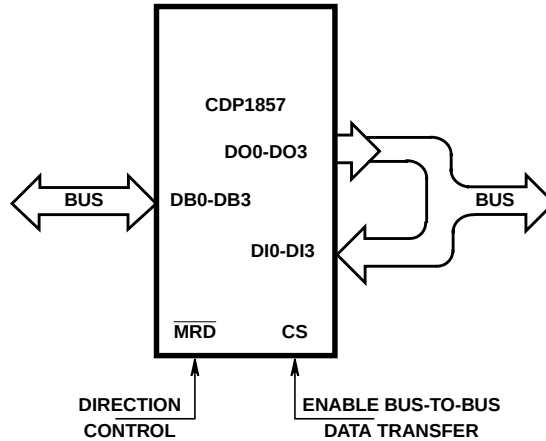


FIGURE 2. CDP1857 BIDIRECTIONAL BUS BUFFER OPERATION

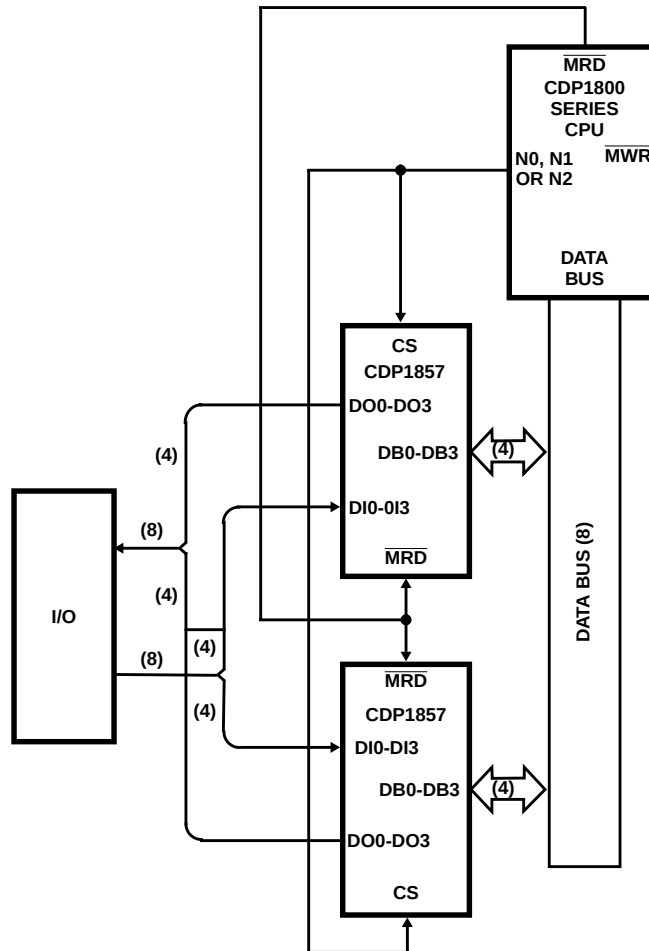


FIGURE 3. CDP1857 BUS SEPARATOR OPERATION

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