# CDP1857C

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$^{o}$C to +85$^{o}$C | PDIP | E16.3 |
| CDP1857CD | -40$^{o}$C to +85$^{o}$C | SBDIP | D16.3 |

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

| CS | $\overline{MRD}$ | 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 $\overline{MRD}$ input signal.

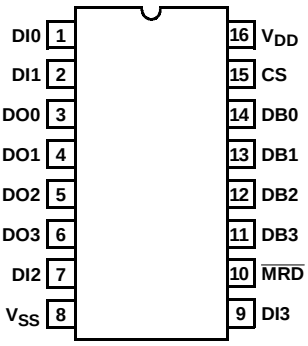
In the CDP1857, when $\overline{MRD}$ = 1, it enables the three-state bus drivers (DB0-DB3) and transfers data from the DATA-IN lines onto the data bus. When $\overline{MRD}$ = 0, it disables the three-state bus drivers (DB0-DB3) and enables the three-state data output drivers (DO0-DO3), thus, transferring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

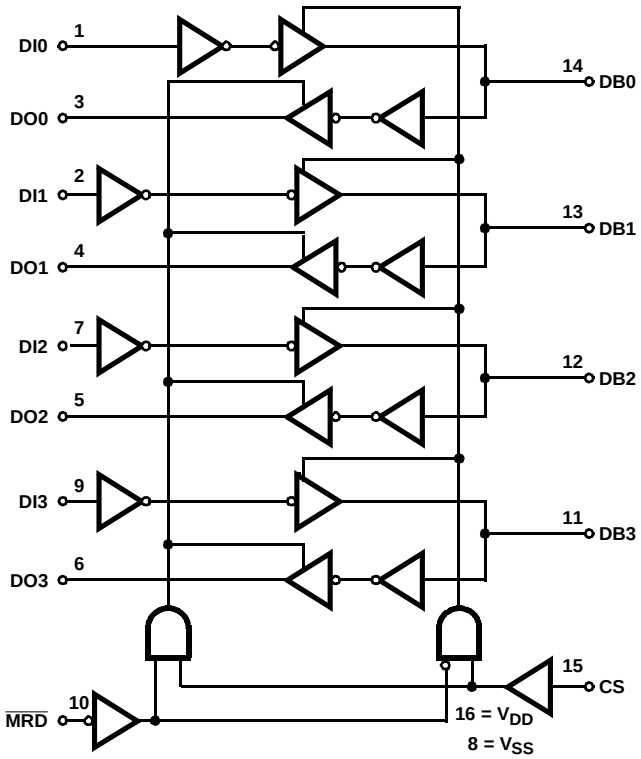
### Pinout

**16 LEAD DIP**
**TOP VIEW**




CAUTION: These devices are sensitive to electrostatic discharge; follow proper IC Handling Procedures.
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## *Functional Diagram For CDP1857*



## 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 . . . . . ±10mA

## Thermal Information

| Thermal Resistance (Typical) | $\theta_{JA}$ ($^{o}$C/W) | $\theta_{JC}$ ($^{o}$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$^{o}$C to +125$^{o}$C
Package Type E . . . . . -40$^{o}$C to +85$^{o}$C
Storage Temperature Range ($T_{STG}$) . . . . . -65$^{o}$C to +150$^{o}$C
Lead Temperature (During Soldering) . . . . . +265$^{o}$C
At distance 1/16 □± 1/32 In. (1.59 ± 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$^{o}$C to +85$^{o}$C, Except as Noted:

| PARAMETER | SYMBOL | CONDITIONS $V_O$ (V) | CONDITIONS $V_{IN}$ (V) | CONDITIONS $V_{DD}$ (V) | MIN | (NOTE 1) TYP | MAX | UNITS |
|---|---|---|---|---|---|---|---|---|
| Quiescent Device Current | $I_{DD}$ | - | 0, 5 | 5 | - | 5 | 50 | µA |
| 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 | µA |
| Operating Current (Note 2) | $I_{DD1}$ | 0, 5 | 0, 5 | 5 | - | 50 | 100 | µA |
| Input Capacitance | $C_{IN}$ | - | - | - | - | 5 | 7.5 | pF |

NOTES:

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

## Dynamic Electrical Specifications

At $T_A$ = -40$^{o}$C to +85$^{o}$C, $V_{DD}$ = 5V ±5%, $V_{IH}$ = 0.7 $V_{DD}$, $V_{IL}$ = 0.3 $V_{DD}$, $t_R$, $t_F$ = 20ns, $C_L$ = 100pF

| PARAMETER | SYMBOL | $V_{DD}$ (V) | (NOTE 1) TYP | MAX | UNITS |
|---|---|---|---|---|---|
| Propagation Delay Time: | | | | | |
| $\overline{MRD}$ or CS to DO | $t_{ED}$ | 5 | 150 | 225 | ns |
| $\overline{MRD}$ 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$^{o}$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*

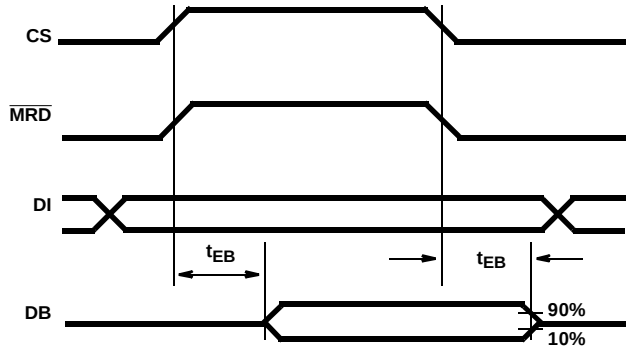



FIGURE 1A. ENABLE TO DB TIME

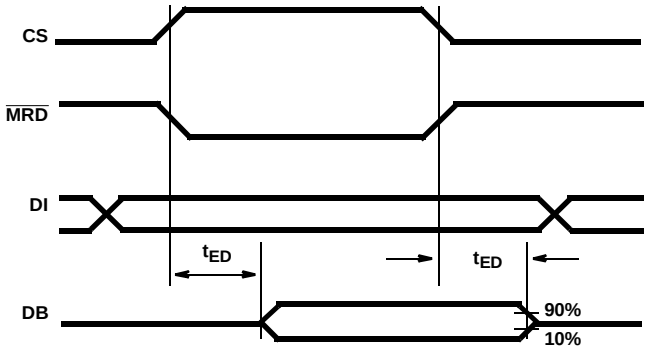



FIGURE 1B. ENABLE TO DO TIME

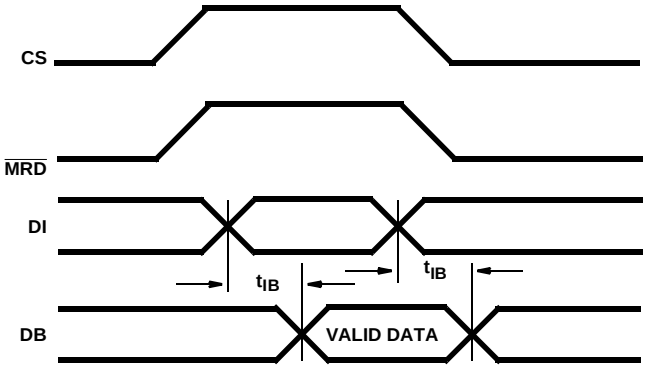



FIGURE 1C. DI TO DB TIME

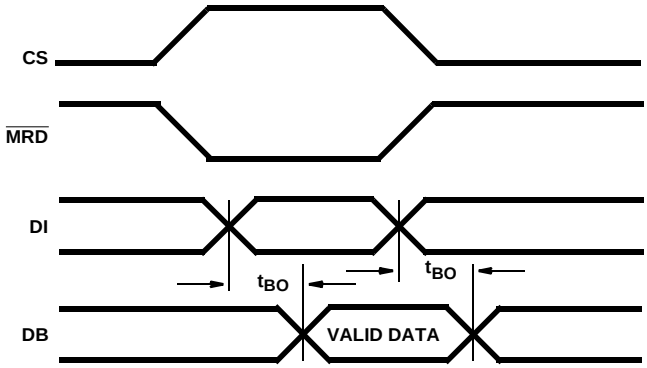



FIGURE 1D. DB TO DO TIME

FIGURE 1. TIMING DIAGRAMS FOR CDP1857C

## Typical Applications

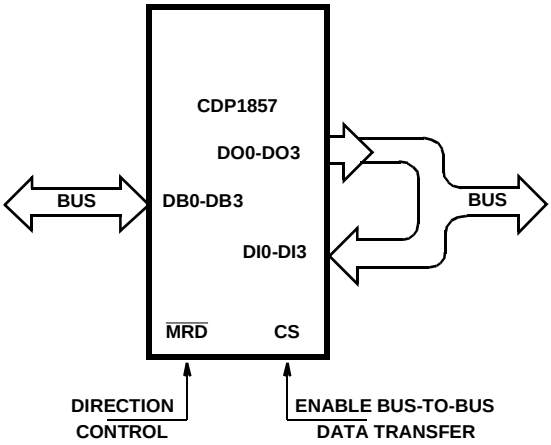



**FIGURE 2. CDP1857 BIDIRECTIONAL BUS BUFFER OPERATION**

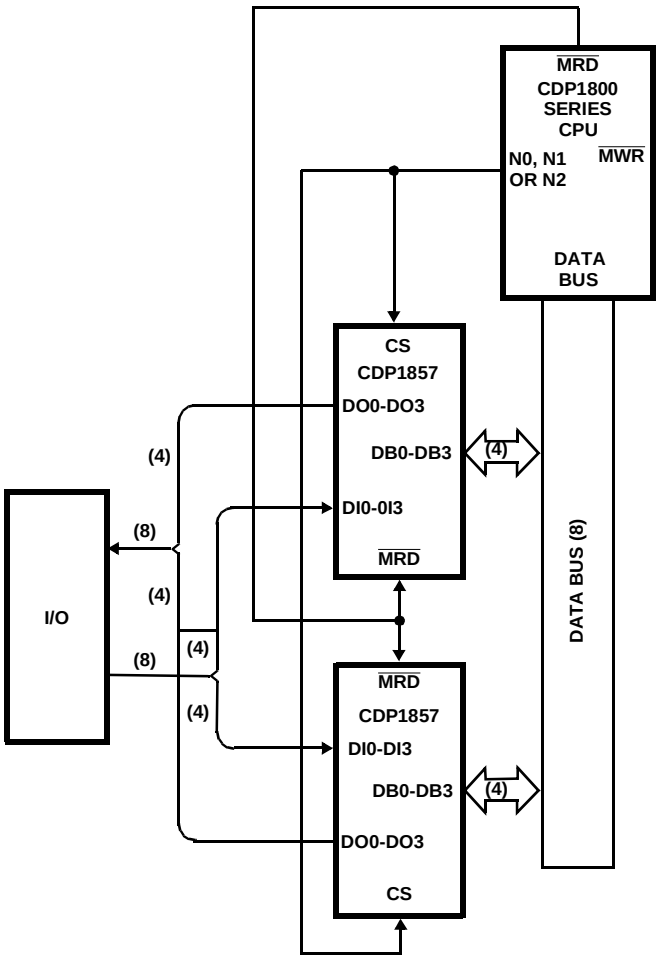



**FIGURE 3. CDP1857 BUS SEPARATOR OPERATION**

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ООО «НИОКР СИТЕМС»
Москва, 125362, Россия, ул. Вишневая, д. 9, к. 1, Блок 104 а и 104 в

Телефон: 8 (495) 268-14-82
Email: n@nsistems.ru

ИНН: 7735154786
ОГРН: 1167746717709