

March 1997

High-Reliability Byte-Wide Input/Output Port

Features

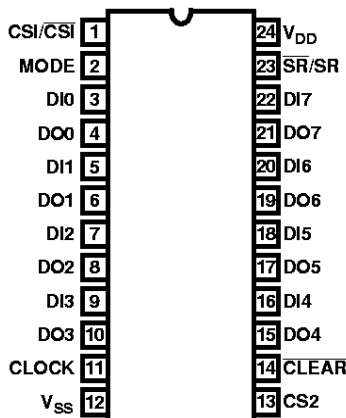
- Static Silicon-Gate CMOS Circuitry
- Parallel 8-Bit Data Register and Buffer
- Handshaking Via Service Request Flip-Flop
- Low Quiescent and Operating Power
- Interfaces Directly with CDP1800-Series Microprocessors
- Single Voltage Supply
- Full Military Temperature Range (-55°C to +125°C)

Ordering Information

PACKAGE	TEMP. RANGE	5V	10V	PKG. NO
SBDIP	-55°C to +125°C	CDP1852CD3	CDP1852D3	D24.6

Pinout

CDP1852/3, CDP1852C/3 (SBDIP)
TOP VIEW



Description

The CDP1852/3 and CDP1852C/3 are parallel, 8-bit, mode-programmable input/output ports. They are compatible and will interface directly with CDP1800-Series microprocessors. They are also useful as 8-bit address latches when used with the CDP1800 multiplexed address bus and as I/O ports in general-purpose applications.

The mode control is used to program the device as an input port (mode = 0) or as an output port (mode = 1). The \overline{SR}/SR output can be used as a signal to indicate when data is ready to be transferred. In the input mode, a peripheral device can strobe data into the CDP1852/3, and microprocessor can read that data by device selection. In the output mode, a microprocessor strobes data into the CDP1852/3, and handshaking is established with a peripheral device when the CDP1852/3 is deselected.

In the input mode, data at the data-in terminals (DI0-DI7) is strobed into the port's 8-bit register by a high (1) level on the clock line. The negative high-to-low transition of the clock latches the data in the register and sets the service request output low ($\overline{SR}/SR = 0$). When $CS1/\overline{CS1}$ and $CS2$ are high ($CS1/\overline{CS1}$ and $CS2 = 1$), the three-state output drivers are enabled and data in the 8-bit register appear at the data-out terminals (DO0-DO7). When either $CS1/\overline{CS1}$ or $CS2$ goes low ($CS1/\overline{CS1}$ or $CS2 = 0$), the data-out terminals are tristated and the service request output returns high ($\overline{SR}/SR = 1$).

In the output mode, the output drivers are enabled at all times. Data at the data-in terminals (DI0-DI7) is strobed into the 8-bit register when $CS1/\overline{CS1}$ is low ($CS1/\overline{CS1} = 0$) and $CS2$ and the clock are high (1), and are present at the data-out terminals (DO0-DO7). The negative high-to-low transition of the clock latches the data in the register. The \overline{SR}/SR output goes high ($\overline{SR}/SR = 1$) when the device is deselected ($CS1/\overline{CS1} = 1$ or $CS2 = 0$) and returns low ($\overline{SR}/SR = 0$) on the following trailing edge of the clock.

A \overline{CLEAR} control is provided for resetting the port's register (DO0-DO7 = 0) and service request flip-flop (input mode: $\overline{SR}/SR = 1$ and output mode: $\overline{SR}/SR = 0$).

The CDP1852/3 is functionally identical to the CDP1852C/3. The CDP1852/3 has a recommended operating voltage range of 4V to 10.5V, and the CDP1852C/3 has a recommended operating voltage range of 4V to 6.5V.

The CDP1852/3 and CDP1852C/3 are supplied in 24-lead, dual-in-line side-brazed ceramic packages (D suffix).

CDP1852/3, CDP1852C/3

Block Diagram of CDP1852/3

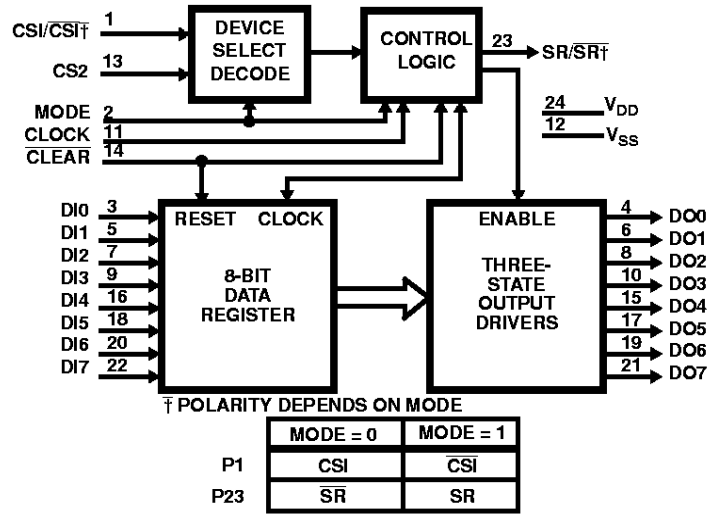


FIGURE 1.

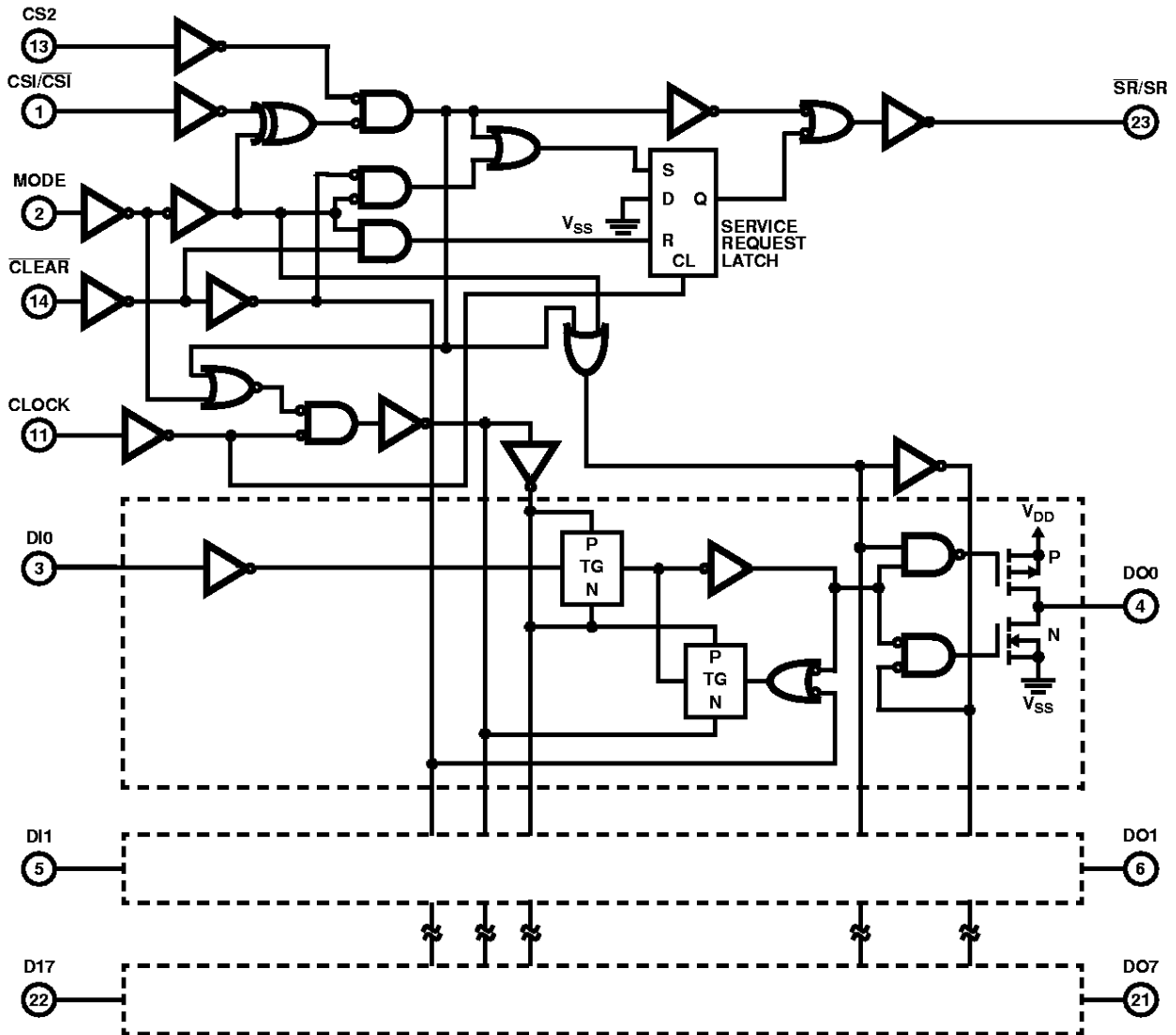


FIGURE 2. CDP1852/3 LOGIC DIAGRAM

CDP1852/3, CDP1852C/3

Absolute Maximum Ratings

DC Supply Voltage Range, (V_{DD}): (All Voltages Referenced to V_{SS} Terminal)	
CDP1852/3	-0.5V to +11V
CDP1852C/3	-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)	θ_{JA} ($^{\circ}C/W$)	θ_{JC} ($^{\circ}C/W$)
SBDIP Package	65	20
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 $^{\circ}C$	
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 "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.

Recommended Operating Conditions T_A = Full-Package Temperature Range. For maximum reliability, operating conditions should be selected so that operation is always within the following ranges.

PARAMETER	LIMITS				UNITS
	CPP1852/3		CDP1852C/3		
	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 $V_{IN} = 0$ or V_{DD} , Except as Noted

PARAMETER	SYMBOL	TEST CONDITIONS	LIMITS				UNITS
			-55 $^{\circ}C$, +25 $^{\circ}C$		+125 $^{\circ}C$		
			MIN	MAX	MIN	MAX	
Quiescent Device Current (Note 1)	I_{DD}	$V_{DD} = 5V$	-	10	-	100	μA
		$V_{DD} = 10V$	-	20	-	300	μA
Output Low Drive (Sink) Current	I_{OL}	$V_{DD} = 5V, V_O = 0.4V$	2.6	-	1.9	-	mA
		$V_{DD} = 10V, V_O = 0.5V$	6.1	-	4.1	-	mA
Output High Drive (Source) Current	I_{OH}	$V_{DD} = 5V, V_O = 4.6V$	-1.8	-	-1.3	-	mA
		$V_{DD} = 10V, V_O = 9.5V$	-4.4	-	-2.9	-	mA
Output Voltage Low Level	V_{OL}	$V_{DD} = 5V, I_{OL} = 0\mu A$	-	0.1	-	0.2	V
		$V_{DD} = 10V, I_{OL} = 0\mu A$	-	0.1	-	0.2	V
Output Voltage High Level	V_{OH}	$V_{DD} = 5V, I_{OL} = 0\mu A$	4.9	-	4.8	-	V
		$V_{DD} = 10V, I_{OL} = 0\mu A$	9.9	-	9.8	-	V
Input Low Voltage	V_{IL}	$V_{DD} = 5V, V_O = 0.2, 4.8V$	-	1.5	-	1.5	V
		$V_{DD} = 10V, V_O = 0.2, 9.8V$	-	3	-	3	V
Input High Voltage	V_{IH}	$V_{DD} = 5V, V_O = 0.2, 4.8V$	3.5	-	3.5	-	V
		$V_{DD} = 10V, V_O = 0.2, 9.8V$	7	-	7	-	V
Input Leakage Low	I_{IL}	$V_{DD} = 5V, V_{IN} = 0V$	-	-1	-	-5	μA
		$V_{DD} = 10V, V_{IN} = 0V$	-	-1	-	-5	μA
Input Leakage High	I_{IH}	$V_{DD} = 5V, V_{IN} = 5V$	-	1	-	5	μA
		$V_{DD} = 10V, V_{IN} = 10V$	-	1	-	5	μA

CDP1852/3, CDP1852C/3

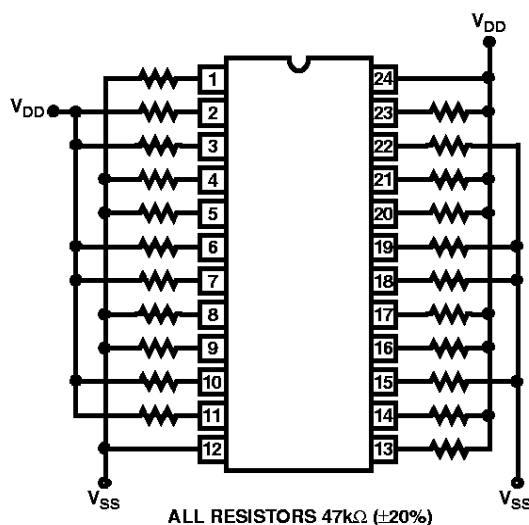
Static Electrical Specifications $V_{IN} = 0$ or V_{DD} , Except as Noted (Continued)

PARAMETER	SYMBOL	TEST CONDITIONS	LIMITS				UNITS
			-55°C, +25°C		+125°C		
			MIN	MAX	MIN	MAX	
Three-State Output Leakage Low	I_{OZL}	$V_{DD} = 5V, V_O = 0V$	-	-1	-	-5	μA
		$V_{DD} = 10V, V_O = 0V$	-	-1	-	-5	μA
Three-State Output Leakage High	I_{OZH}	$V_{DD} = 5V, V_O = 5V$	-	1	-	5	μA
		$V_{DD} = 10V, V_O = 10V$	-	1	-	5	μA
Input Capacitance	C_{IN}	Note 2	-	10	-	10	pF
Output Capacitance	C_{OUT}	Note 2	-	15	-	15	pF

NOTES:

- The CDP1852C/3 meets all 5V static electrical specifications of the CDP1852/3 except +125°C quiescent device current for which the limit is $I_{DD} = 300\mu A$.
- Input and output capacitance are guaranteed but not tested.

Static Burn-In Circuit



TYPE NO.	V_{DD}	TEMPERATURE	TIME
CDP1852/3	11V	+125°C	160 Hrs. Min.
CDP1852C/3	7V	+125°C	160 Hrs. Min.

Dynamic Electrical Specifications Mode = 0 Input Port, See Figure 3, Input $t_p, t_f \leq 15ns$; $C_L = 50pF$

PARAMETER	SYMBOL	V_{DD} VOLTS	LIMITS (NOTE 1)				UNITS
			-55°C, +25°C		+125°C		
			(NOTE 1) MIN	MAX	(NOTE 1) MIN	MAX	
Select Duration	t_{SW}	5	250	-	360	-	ns
		10	150	-	180	-	ns
Clock Pulse Width	t_{WW}	5	150	-	200	-	ns
		10	90	-	110	-	ns
Clear Pulse Width	t_{CLR}	5	110	-	160	-	ns
		10	50	-	80	-	ns
Data-In to Clock Fall Setup Time	t_{DS}	5	-10	-	-10	-	ns
		10	-5	-	-5	-	ns

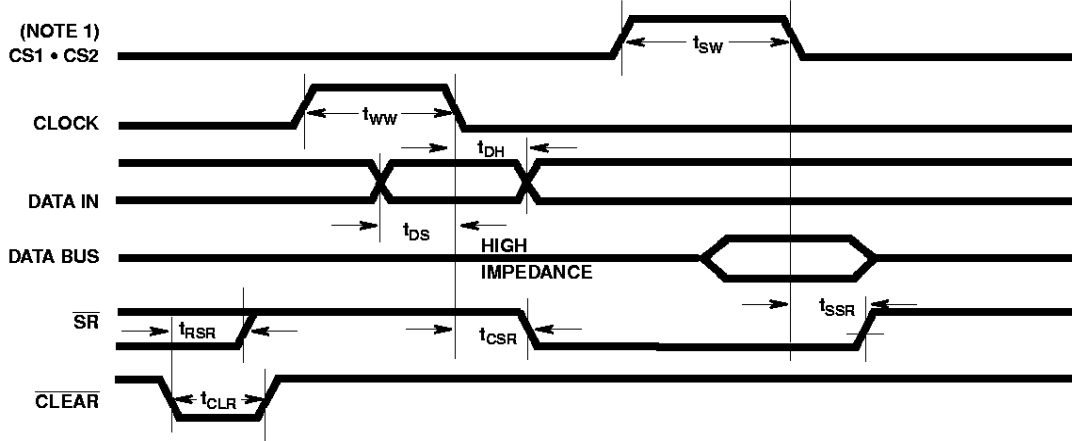
CDP1852/3, CDP1852C/3

Dynamic Electrical Specifications Mode = 0 Input Port, See Figure 3, Input $t_p, t_f \leq 15\text{ns}$; $C_L = 50\text{pF}$ (Continued)

PARAMETER	SYMBOL	V _{DD} VOLTS	LIMITS (NOTE 1)				UNITS
			-55°C, +25°C		+125°C		
			(NOTE 1) MIN	MAX	(NOTE 1) MIN	MAX	
Data-In After Clock Fall Hold Time	t_{DH}	5	150	-	170	-	ns
		10	70	-	100	-	ns
Propagation Delay Times: Clear to \overline{SR}	t_{RSR}	5	-	200	-	340	ns
		10	-	110	-	170	ns
Clock to \overline{SR}	t_{CSR}	5	-	175	-	220	ns
		10	-	110	-	130	ns
Deselect to \overline{SR}	t_{SSR}	5	-	175	-	240	ns
		10	-	110	-	120	ns

NOTE:

- Time required by a device to allow for the indicated function.



NOTE:

- $CS1 \cdot CS2$ is the overlap of $CS1 = 1$ and $CS2 = 1$.

MODE = 0 TRUTH TABLE			
CLOCK	CS1 • CS2 (Note 1)	CLEAR	DATA OUT EQUALS
X	0	X	High Impedance
0	1	0	0
0	1	1	Data Latch
1	1	X	Data In

SERVICE REQUEST TRUTH TABLE	
Clock = \nearrow	CS1 or CS2 = \nearrow or CLEAR = 0
$\overline{SR} = 0$	$\overline{SR} = 1$

NOTE:

- $CS1 \cdot CS2 = CS1 = 1, CS2 = 1$.

FIGURE 3. MODE = 0 INPUT PORT TIMING WAVEFORMS AND TRUTH TABLES

CDP1852/3, CDP1852C/3

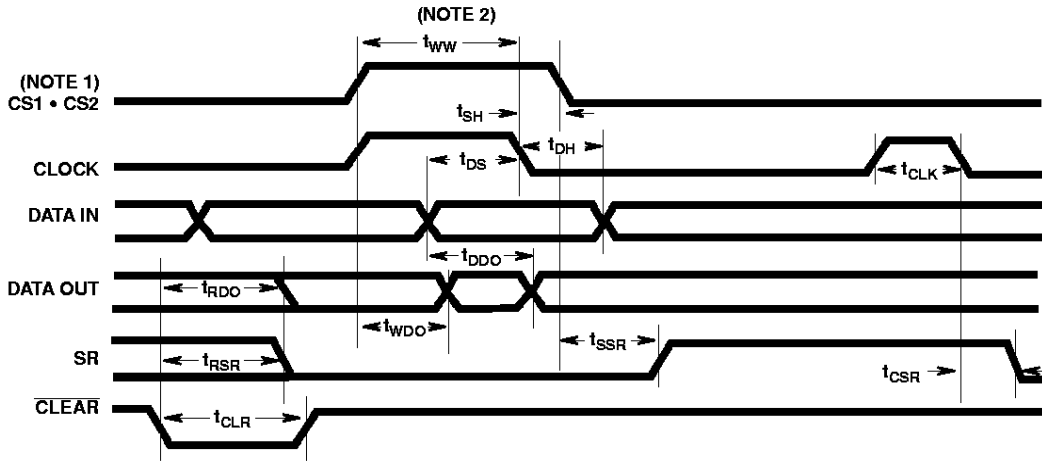
Dynamic Electrical Specification Mode = 1 Output Port, See Figure 4, Input $t_r, t_f \leq 15\text{ns}$; $C_L = 50\text{pF}$

PARAMETER	SYMBOL	V _{DD} VOLTS	LIMITS (NOTE 1)				UNITS
			-55°C, +25°C		+125°C		
			(NOTE 1) MIN	MAX	(NOTE 1) MIN	MAX	
Clock Pulse Width	t_{CLK}	5	170	-	260	-	ns
		10	90	-	130	-	ns
Write Width Duration	t_{WW}	5	200	-	260	-	ns
		10	110	-	130	-	ns
Clear Pulse Width	t_{CLR}	5	110	-	135	-	ns
		10	60	-	75	-	ns
Data-In to Clock Fall Setup Time	t_{DS}	5	-10	-	-10	-	ns
		10	-5	-	-5	-	ns
Data Hold from Write Termination	t_{DH}	5	130	-	170	-	ns
		10	70	-	90	-	ns
Select-After Clock-Fall Hold Time	t_{SH}	5	0	-	0	-	ns
		10	0	-	0	-	ns
Propagation Delay Times: Clear to Data	t_{RDO}	5	-	215	-	290	ns
		10	-	140	-	190	ns
Write to Data Out	t_{WDO}	5	-	250	-	350	ns
		10	-	130	-	190	ns
Data In to Data Out	t_{DDO}	5	-	150	-	200	ns
		10	-	80	-	100	ns
Clear to SR	t_{RSR}	5	-	175	-	240	ns
		10	-	120	-	160	ns
Clock to SR	t_{CSR}	5	-	170	-	240	ns
		10	-	90	-	120	ns
Deselect to SR	t_{SSR}	5	-	170	-	240	ns
		10	-	90	-	120	ns

NOTE:

1. Time required by a device to allow for the indicated function.

CDP1852/3, CDP1852C/3



NOTES:

1. $\overline{CS1} \cdot CS2$ is the overlap of the $\overline{CS1} = 0$ and $CS2 = 1$.
2. Write is the overlap of $\overline{CS1} \cdot CS2$ and clock.

MODE = 1 TRUTH TABLE			
CLOCK	$\overline{CS1} \cdot CS2$ (NOTE 1)	\overline{CLEAR}	DATA OUT EQUALS
0	X	0	0
0	X	1	Data Latch
X	0	1	Data Latch
1	1	X	Data In

SERVICE REQUEST TRUTH TABLE	
$\overline{CS1}$ or $CS2$	Clock • ($\overline{CS1} \cdot CS2$) or $\overline{CLEAR} = 0$
SR = 1	SR = 0

NOTE:

1. $\overline{CS1} \cdot CS2 = \overline{CS1} = 0, CS2 = 1$

FIGURE 4. MODE = 1 OUTPUT PORT TIMING WAVEFORMS AND TRUTH TABLES