

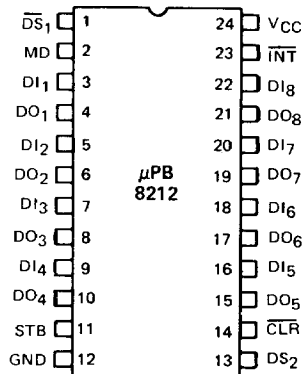
## EIGHT-BIT INPUT/OUTPUT PORT

**DESCRIPTION** The  $\mu$ PB8212 input/output port consists of an 8-bit latch with three-state output buffers along with control and device selection logic. Also included is a service request flip-flop for the control and generation of interrupts to the microprocessor.

The device is multimode in nature and can be used to implement latches, gated buffers or multiplexers. Thus, all of the principal peripheral and input/output functions of a microcomputer system can be implemented with this device.

- FEATURES**
- Fully Parallel 8-Bit Data Register and Buffer
  - Service Request Flip-Flop for Interrupt Generation
  - Low Input Load Current – 0.25 mA Max
  - Three State Outputs
  - Outputs Sink 15 mA
  - 3.65V Output High Voltage for Direct Interface to 8080A Processor
  - Asynchronous Register Clear
  - Replaces Buffers, Latches and Multiplexers in Microcomputer Systems
  - Reduces System Package Count
  - Available in 24-pin Plastic and Cerdip Packages

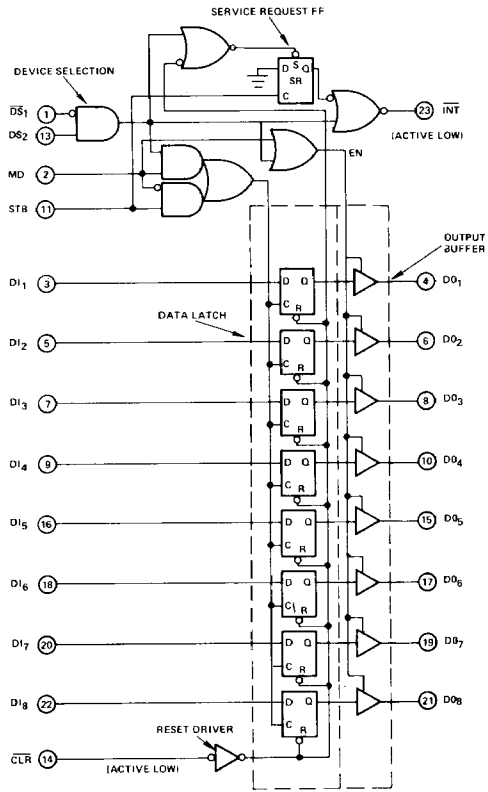
### PIN CONFIGURATION



### PIN NAMES

DI <sub>1</sub> – DI <sub>8</sub>	Data In
DO <sub>1</sub> – DO <sub>8</sub>	Data Out
$\overline{DS}_1$ , DS <sub>2</sub>	Device Select
MD	Mode
STB	Strobe
$\overline{INT}$	Interrupt (Active Low)
$\overline{CLR}$	Clear (Active Low)

**BLOCK DIAGRAM**



STB	MD	(DS <sub>1</sub> · DS <sub>2</sub> )	DATA OUT EQUALS
0	0	0	Three-State
1	0	0	Three-State
0	1	0	Data Latch
1	1	0	Data Latch
0	0	1	Data Latch
1	0	1	Data In
0	1	1	Data In
1	1	1	Data In

CLR	(DS <sub>1</sub> · DS <sub>2</sub> )	STB	SR ②	INT
0	0	0	1	1
0	1	0	1	0
1	0	0	③	③
1	0	0	1	1
1	0	0	0	0
1	1	0	1	0
1	1	0	0	0

- Notes: ① CLR resets data latch sets SR flip-flop. (No effect on output buffer)  
 ② Internal SR flip-flop  
 ③ Previous data remains

Operating Temperature . . . . . 0°C to +70°C  
 Storage Temperature . . . . . -65°C to +150°C  
 All Output or Supply Voltages . . . . . -0.5 to +7 Volts  
 All Input Voltages . . . . . -1.0 to +5.5 Volts  
 Output Currents . . . . . 125 mA  
 T<sub>a</sub> = 25°C

**ABSOLUTE MAXIMUM RATINGS\***

\*COMMENT: Stress above those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

**DC CHARACTERISTICS** $T_a = 0^{\circ}\text{C to } 70^{\circ}\text{C}; V_{CC} = +5\text{V} \pm 5\%$ 

PARAMETER	SYMBOL	LIMITS		UNIT	TEST CONDITIONS
		MIN	MAX		
Input Load Current STB, DS <sub>2</sub> , CLR, DI <sub>1</sub> – DI <sub>8</sub> Inputs	IIL1		-0.25	mA	V <sub>F</sub> = 0.45V
Input Load Current MD Input	IIL2		-0.75	mA	V <sub>F</sub> = 0.45V
Input Load Current $\overline{\text{DS}}_1$ Input	IIL3		-1.0	mA	V <sub>F</sub> = 0.45V
Input Leakage Current STB, DS, CLR, DI <sub>1</sub> – DI <sub>8</sub> Inputs	IIH1		10	μA	V <sub>R</sub> = 5.25V
Input Leakage Current MD Input	IIH2		30	μA	V <sub>R</sub> = 5.25V
Input Leakage Current $\overline{\text{DS}}_1$ Input	IIH3		40	μA	V <sub>R</sub> = 5.25V
Input Forward Voltage Clamp	V <sub>C</sub>		-1.0	V	I <sub>C</sub> = -5 mA
Input "Low" Voltage	V <sub>IL</sub>		0.85	V	
Input "High" Voltage	V <sub>IH</sub>	2.0		V	
Output "Low" Voltage	V <sub>OL</sub>		0.48	V	I <sub>OL</sub> = 15 mA
Output "High" Voltage	V <sub>OH</sub>	3.65		V	I <sub>OH</sub> = -1 mA
Short Circuit Output Current	I <sub>OS</sub>	-15	-75	mA	V <sub>O</sub> = 0V V <sub>CC</sub> = 5V
Output Leakage Current High Impedance State DO <sub>0</sub> – DO <sub>8</sub>	I <sub>O</sub>		20	μA	V <sub>O</sub> = 0.45V/5.25V
Power Supply Current	I <sub>CC</sub>		130	mA	

**CAPACITANCE ①** $T_a = 25^{\circ}\text{C}; V_{CC} = +5\text{V}; V_{BIAS} = 2.5\text{V}; f = 1\text{ MHz}$ 

PARAMETER	SYMBOL	LIMITS		UNIT	TEST CONDITIONS
		MIN	MAX		
Input Capacitance	C <sub>IN</sub>		12	pF	$\overline{\text{DS}}_1$ , MD
Input Capacitance	C <sub>IN</sub>		9	pF	DS <sub>2</sub> , CLR, STB, DI <sub>1</sub> – DI <sub>8</sub>
Output Capacitance	C <sub>OUT</sub>		12	pF	DO <sub>1</sub> – DO <sub>8</sub>

Note: ① This parameter is periodically sampled and not 100% tested

**AC CHARACTERISTICS** $T_a = 0^{\circ}\text{C to } +70^{\circ}\text{C}; V_{CC} = +5\text{V} \pm 5\%$ 

PARAMETER	SYMBOL	LIMITS		UNIT	TEST CONDITIONS	
		MIN	MAX			
Pulse Width	t <sub>pw</sub>	30		ns	Input Pulse Amplitude = 2.5V	
Data To Output Delay	t <sub>pd</sub>		30	ns		
Write Enable To Output Delay	t <sub>we</sub>		40	ns	Input Rise and Fall Times = 5 ns	
Data Setup Time	t <sub>set</sub>	15		ns		
Data Hold Time	t <sub>h</sub>	20		ns	Between 1V and 2V Measurement made at 1.5V with 15 mA and 30 pF Test Load	
Reset to Output Delay	t <sub>r</sub>		40	ns		
Set To Output Delay	t <sub>s</sub>		30	ns		
Output Enable/Disable Time	t <sub>e</sub> /t <sub>d</sub>		45	ns		①
Clear To Output Delay	t <sub>c</sub>		55	ns		

Notes: ① R<sub>1</sub> = 300Ω/10KΩ; R<sub>2</sub> = 600Ω/1KΩ

#### Data Latch

The 8 flip-flops that compose the data latch are of a "D" type design. The output (Q) of the flip-flop follows the data input (D) while the clock input (C) is high. Latching occurs when the clock (C) returns low.

The data latch is cleared by an asynchronous reset input ( $\overline{\text{CLR}}$ ).  
(Note: Clock (C) Overrides Reset ( $\overline{\text{CLR}}$ ).)

#### Output Buffer

The outputs of the data latch (Q) are connected to three-state, non-inverting output buffers. These buffers have a common control line (EN); enabling the buffer to transmit the data from the outputs of the data latch (Q) or disabling the buffer, forcing the output into a high impedance state (three-state).

This high-impedance state allows the designer to connect the μPB8212 directly to the microprocessor bi-directional data bus.

#### Control Logic

The μPB8212 has four control inputs:  $\overline{\text{DS}}_1$ ,  $\text{DS}_2$ , MD and STB. These inputs are employed to control device selection, data latching, output buffer state and the service request flip-flop.

#### $\overline{\text{DS}}_1$ , $\text{DS}_2$ (Device Select)

These two inputs are employed for device selection. When  $\overline{\text{DS}}_1$  is low and  $\text{DS}_2$  is high ( $\overline{\text{DS}}_1 \cdot \text{DS}_2$ ) the device is selected. In the selected state the output buffer is enabled and the service request flip-flop (SR) is asynchronously set.

#### Service Request Flip-Flop (SR)

The (SR) flip-flop is employed to generate and control interrupts in microcomputer systems. It is asynchronously set by the  $\overline{\text{CLR}}$  input (active low). When the (SR) flip-flop is set it is in the non-interrupting state.

The output (Q) of the (SR) flip-flop is connected to an inverting input of a "NOR" gate. The other input of the "NOR" gate is non-inverting and is connected to the device selection logic ( $\overline{\text{DS}}_1 \cdot \text{DS}_2$ ). The output of the "NOR" gate ( $\overline{\text{INT}}$ ) is active low (interrupting state) for connection to active low input priority generating circuits.

#### MD (Mode)

This input is employed to control the state of the output buffer and to determine the source of the clock input (C) to the data latch.

When MD is in the output mode (high) the output buffers are enabled and the source of clock (C) to the data latch is from the device selection logic ( $\overline{\text{DS}}_1 \cdot \text{DS}_2$ ).

When MD is in the input mode (low) the output buffer state is determined by the device selection logic ( $\overline{\text{DS}}_1 \cdot \text{DS}_2$ ) and the source of clock (C) to the data latch is the STB (Strobe) input.

#### STB (Strobe)

STB is employed as the clock (C) to the data latch for the input mode (MD = 0) and to synchronously reset the service request flip-flop (SR).

Note that the SR flip-flop triggers on the negative edge of STB which overrides  $\overline{\text{CLR}}$ .



**Package Outlines**

**For information, see Package Outline Section 7.**

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Plastic, μPB8212C

Cerdip, μPB8212D