

M5L8216P / M5L8226P

T-52-09

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4-BIT PARALLEL BIDIRECTIONAL BUS DRIVERS

DESCRIPTION

The M5L8216P and M5L8226P are 4-bit bidirectional bus drivers and suitable for the 8-bit parallel CPU M5L8085AP.

FEATURES

- Parallel 8-bit data bus buffer driver
- Low input current \overline{DIEN} , CS: $I_{iL} = -500\mu A(\text{max.})$
 DI , DB : $I_{iL} = -250\mu A(\text{max.})$
- High output current M5L8216P
 DB : $I_{oL} = 55\text{mA}(\text{max.})$
 $I_{oH} = -10\text{mA}(\text{max.})$
 DO : $I_{oH} = -1\text{mA}(\text{max.})$
M5L8226P
 DB : $I_{oL} = 50\text{mA}(\text{max.})$
 $I_{oH} = -10\text{mA}(\text{max.})$
 DO : $I_{oH} = -1\text{mA}(\text{max.})$
- Outputs can be connected with the CPU M5L8085AP: $V_{oH} = 3.65\text{V}(\text{min.})$
- Three-state output

APPLICATION

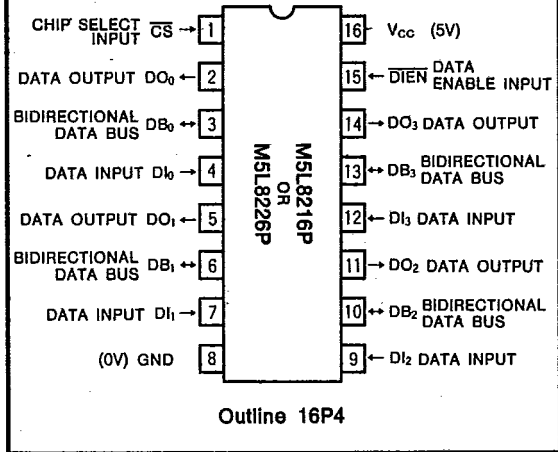
Bidirectional bus driver/receiver for various types of micro-computer systems.

FUNCTION

The M5L8216P is a non-inverting and the M5L8226P is an inverting 4-bit bidirectional bus driver.

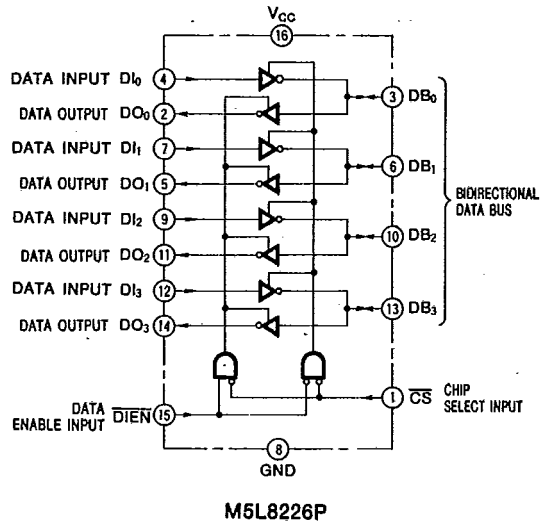
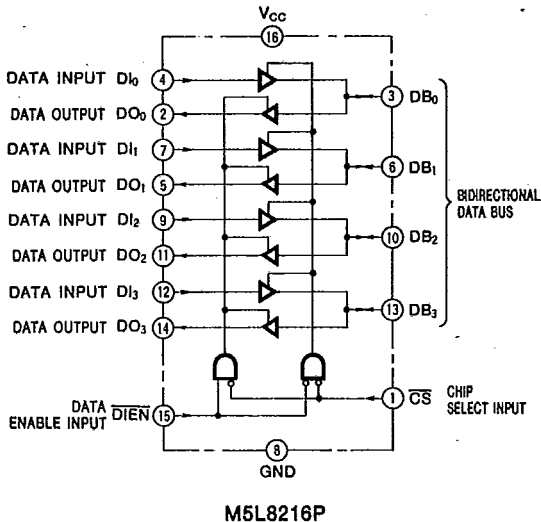
When the terminal CS is high-level, all outputs are in high-impedance state, and when low-level, the direction of the bidirectional bus can be controlled by the terminal \overline{DIEN} .

PIN CONFIGURATION (TOP VIEW)



The terminal \overline{DIEN} controls the data flow. The data flow control is performed by placing one of a pair of buffers in high-impedance state and allowing the other to transfer the data.

BLOCK DIAGRAM



ABSOLUTE MAXIMUM RATINGS (T_a=0~75°C, unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
V _{CC}	Supply voltage	With respect to GND	7	V
V _I	Input voltage, CS, DIEN, DI inputs		5.5	V
V _I	Input voltage, DB input		V _{CC}	V
V _O	High-level output voltage		V _{CC}	V
P _d	Power dissipation		T _a =25°C	700
T _{opr}	Operating free-air temperature range		0~75	°C
T _{stg}	Storage temperature range		-65~+150	°C

RECOMMENDED OPERATING CONDITONS (T_a=0~75°C, unless otherwise noted)

Symbol	Parameter	Limits			Unit
		Min	Nom	Max	
V _{CC}	Supply voltage	4.75	5	5.25	V
I _{OH}	High-level output current, DO output			-1	mA
I _{OH}	High-level output current, DB output			-10	mA
I _{OL}	Low-level output current, DO output			15	mA
I _{OL}	Low-level output current, DB output			25	mA

ELECTRICAL CHARACTERISTICS (T_a=0~75°C, unless otherwise noted)

Symbol	Parameter	Conditions	Limits			Unit	
			Min	Typ	Max		
V _{IH}	High-level input voltage		2			V	
V _{IL}	Low-level input voltage				0.95	V	
V _{IC}	Input clamp voltage	V _{CC} =4.75V, I _{IC} =-5mA			-1	V	
V _{OH}	High-level output voltage, DO output	V _{CC} =4.75V V _{IH} =2V V _{IL} =0.95V		I _{OH} =-1mA	3.65	V	
V _{OH}	High-level output voltage, DB output			I _{OH} =-10mA	2.4	V	
V _{OL1}	Low-level output voltage, DO output			I _{OL} =15mA		0.45	V
V _{OL1}	Low-level output voltage, DB output			I _{OL} =25mA		0.45	V
V _{OL2}	Low-level output voltage, DB output		M5L8216P M5L8226P		I _{OL} =55mA I _{OL} =50mA	0.6 0.6	V
I _{OZH}	Off-state output current, DO output	V _{CC} =5.25V		V _O =5.25V		20	μA
I _{OZH}	Off-state output current, DB output					100	μA
I _{OZL}	Off-state output current, DO output			V _O =0.45V		-20	μA
I _{OZL}	Off-state output current, DB output					-100	μA
I _{IH}	High-level input current, DIEN, CS inputs	V _{CC} =5.25V, V _{IH} =4.5V				20	μA
I _{IH}	High-level input current, DI, DB inputs					10	μA
I _{IL}	Low-level input current, DIEN CS inputs	V _{CC} =5.25V, V _{IH} =4.5V				-500	μA
I _{IL}	Low-level input current, DI, DB input					-250	μA
I _{OS}	Short-circuit output DO output (Note 2)	V _{CC} =5.25V, V _O =0V	-15			-65	mA
I _{OS}	Short-circuit output, DB output (Note 2)		-30			-120	mA
I _{CC}	Supply current	M5L8216P				100	mA
		M5L8226P				100	
I _{CCZ}	Supply current z	M5L8216P				120	mA
		M5L8226P				100	

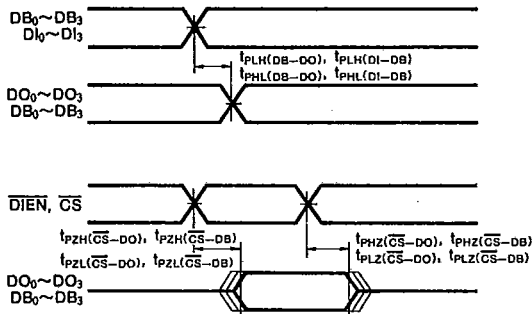
Note 1 : Current flowing into an IC is positive, out is negative.

2 : All measurements should be done quickly, and not more than one output should be shorted at a time.

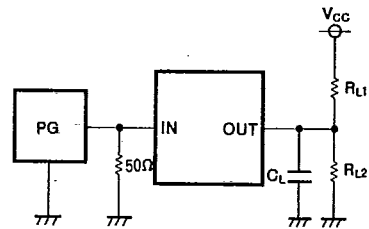
SWITCHING CHARACTERISTICS ($V_{CC}=5V \pm 5\%$, $T_a=25^\circ C$, unless otherwise noted)

Symbol	Parameter	Test conditions (Note 3)	Limits			Unit
			Min	Typ	Max	
$t_{PHL}(DB-DO)$ $t_{PLH}(DB-DO)$	High-to-low and low-to-high output propagation time, from input DB to output DO	$C_L=30pF, R_{L1}=300\Omega, R_{L2}=600\Omega$			25	ns
$t_{PHL}(DI-DB)$ $t_{PLH}(DI-DB)$	High-to-low and low-to-high output propagation time, from input DI to output DB	$C_L=300pF, R_{L1}=90\Omega, R_{L2}=180\Omega$			30	ns
		$C_L=300pF, R_{L1}=90\Omega, R_{L2}=180\Omega$			25	
$t_{PHZ}(\overline{CS}-DO)$ $t_{PLZ}(\overline{CS}-DO)$	High-to-Z and low-to-Z output propagation time, from inputs $\overline{DIEN}, \overline{CS}$ to output DO	$C_L=5pF, R_{L1}=10k\Omega, R_{L2}=1k\Omega$ $C_L=5pF, R_{L1}=300\Omega, R_{L2}=600\Omega$			35	ns
$t_{PZH}(\overline{CS}-DO)$ $t_{PLZ}(\overline{CS}-DO)$	Output enable time, from inputs $\overline{DIEN}, \overline{CS}$ to output DO	$C_L=30pF, R_{L1}=10k\Omega, R_{L2}=1k\Omega$			65	ns
		$C_L=30pF, R_{L1}=10k\Omega, R_{L2}=1k\Omega$			54	
$t_{PHZ}(\overline{CS}-DB)$ $t_{PLZ}(\overline{CS}-DB)$	Output disable time, from inputs $\overline{DIEN}, \overline{CS}$ to output DB	$C_L=30pF, R_{L1}=300\Omega, R_{L2}=600\Omega$			65	ns
		$C_L=30pF, R_{L1}=300\Omega, R_{L2}=600\Omega$			54	
$t_{PZH}(\overline{CS}-DB)$ $t_{PLZ}(\overline{CS}-DB)$	Output enable time, from inputs $\overline{DIEN}, \overline{CS}$ to output DB	$C_L=300pF, R_{L1}=10k\Omega, R_{L2}=1k\Omega$ $C_L=300pF, R_{L1}=90\Omega, R_{L2}=180\Omega$			65	ns
		$C_L=300pF, R_{L1}=10k\Omega, R_{L2}=1k\Omega$			54	
		$C_L=300pF, R_{L1}=90\Omega, R_{L2}=180\Omega$			65	ns
		$C_L=300pF, R_{L1}=90\Omega, R_{L2}=180\Omega$			54	

TIMING DIAGRAM (Reference level=1.5V)



Note 3 : Test circuit



APPLICATION EXAMPLES

Fig. 1 shows a pair of M5L8216Ps or M5L8226Ps which are directly connected with the 8080A CPU data bus, and their control signal. Fig. 2 shows an example circuit in which the M5L8216P or M5L8226P is used as an interface for memory and I/O to a bidirectional bus.

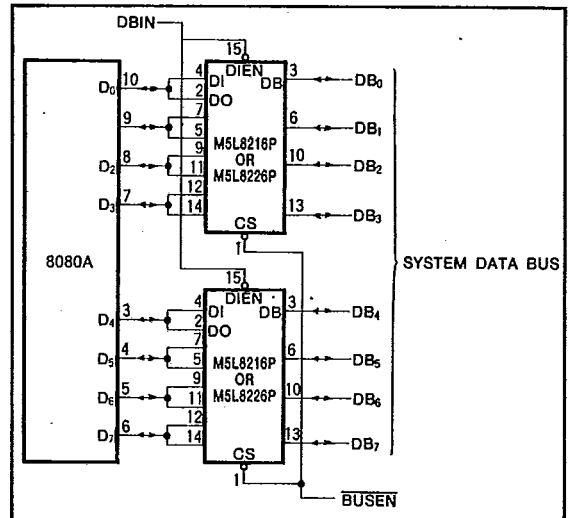


Fig. 1 Data bus buffer

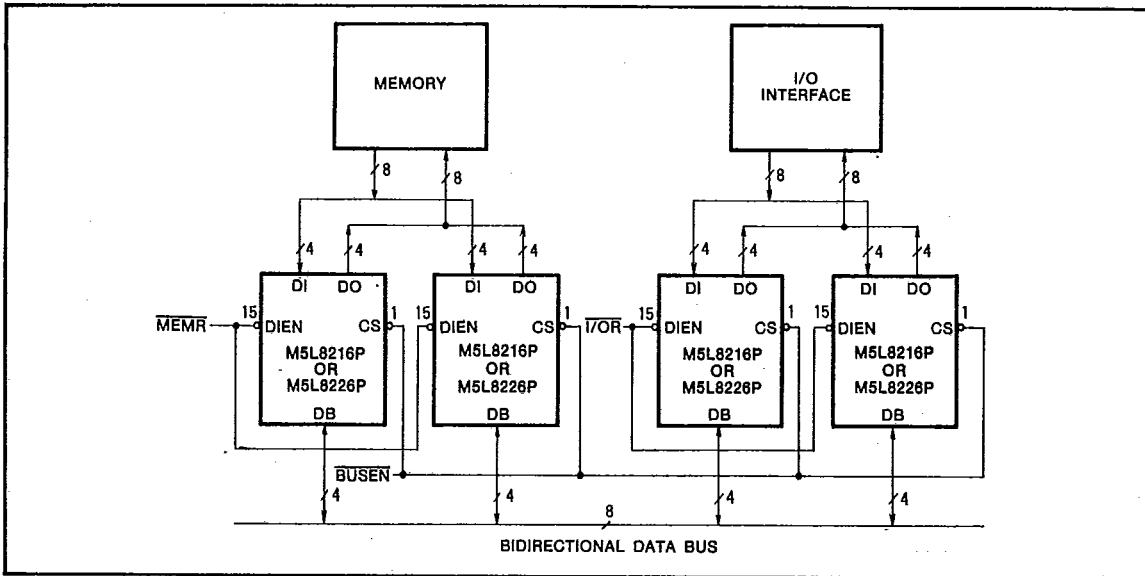


Fig. 2 Memory and I/O Interface to bidirectional data bus

PRECAUTIONS FOR USE

When the M5L8216P data input or two-way data bus is set to high to disable-output from the two-way bus or data output, care is required as a low glitch of approximate width 10ns will be generated.