Schottky Bipolar **8210**

TTL-TO-MOS LEVEL SHIFTER AND HIGH VOLTAGE CLOCK DRIVER

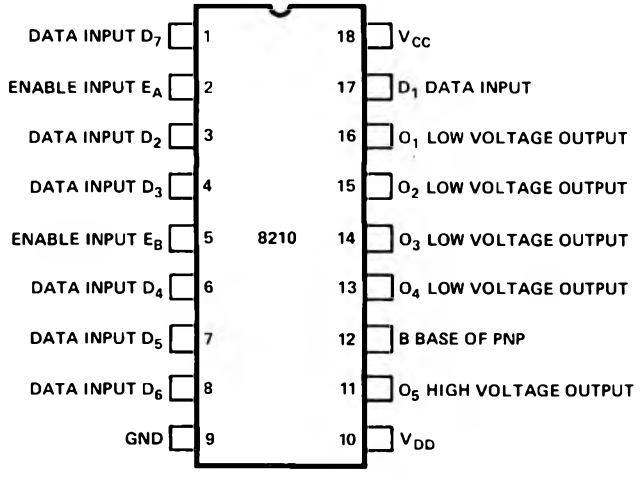
- **Four Low Voltage Drivers**
- **One High Voltage Driver**
- **TTL and DTL Compatible Inputs**
- **Outputs Compatible with 8107A MOS Memories**
- **Operates from Standard Bipolar and MOS Power Supplies**
- **Maximum MOS Device Protection — Output Clamp Diodes**

The Intel® 8210 is a Bipolar-to-MOS level shifter and high voltage driver which accepts TTL and DTL inputs. It contains four (4) low voltage drivers and one high voltage driver, each with current driving capabilities suitable for driving N-channel MOS memory devices. The 8210 is particularly suitable for driving the 8107A N-channel MOS memory chips. The 8210 operates from the 5 volt and 12 volt power supplies used to bias the memory devices.

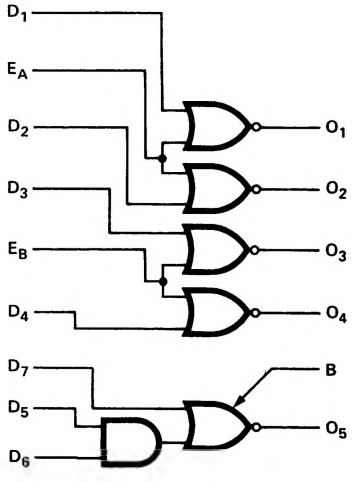
The four low voltage drivers feature two common enable inputs per pair of drivers which permits address or data decoding. The high voltage driver swings the 12 volts required to drive the chip enable (clock) input for the 8107A.

The 8210 high voltage driver requires an externally connected PNP transistor. The PNP base is connected to pin 12, the collector to pin 11, and the emitter to pin 10 or V_{DD} . The use of a fast switching, high voltage, high current gain PNP, like the 2N5057 is recommended.

PIN CONFIGURATION



LOGIC SYMBOL



A.C. Characteristics $T_A = 0°C$ to $70°C$, $V_{CC} = 5.0V \pm 5\%$, $V_{DD} = 12V \pm 5\%$

Symbol	Parameter	Min.	Typ.	Max.	Unit
t_{Ld+}	Delay Plus Rise Time for Low Voltage Drivers	5	13	20	ns
t_{Ld-}	Delay Plus Fall Time for Low Voltage Drivers	5	13	20	ns
t_{Hd+}	Delay Plus Rise Time for High Voltage Driver	10	30	40	ns
t_{Hd-}	Delay Plus Fall Time for High Voltage Driver	10	30	40	ns

Capacitance* $T_A = 25°C$

Symbol	Test	Typ.	Max.
C_{IN}	Input Capacitance	6pF	12pF

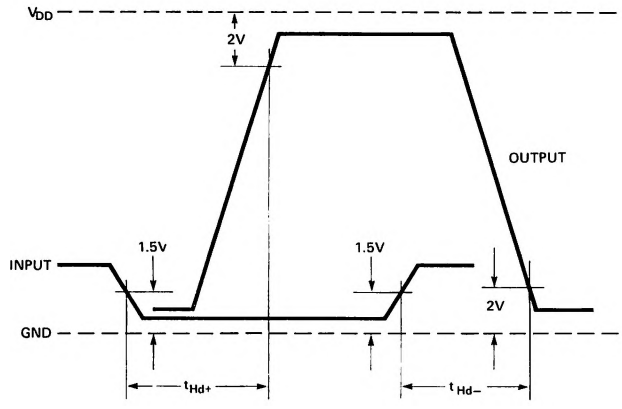
*This parameter is periodically sampled and is not 100% tested. Condition of measurement is f = 1 MHz, $V_{bias} = 2V$, $V_{CC} = 0V$, and $T_A = 25°C$.

A.C. CONDITIONS OF TEST

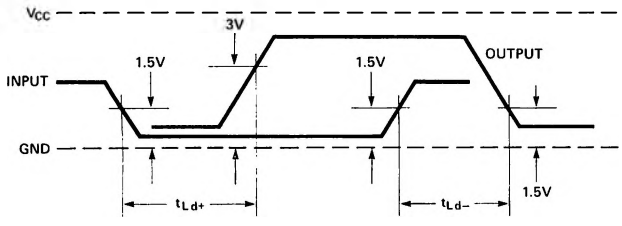
Test Load: $C_L = 200pF$ for Low Voltage Drivers,
$C_L = 350pF$ for High Voltage Drivers
Input Pulse Amplitudes: 3.0V
Input Pulse Rise and Fall Times: 5 ns between 1 volt and 2 volts
Measurement Points: See Waveforms

Waveforms

HIGH VOLTAGE DRIVER

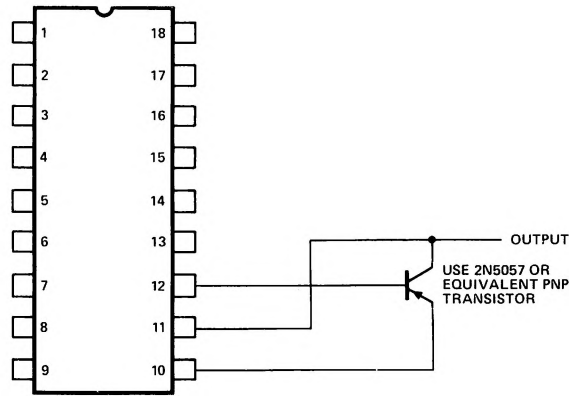


LOW VOLTAGE DRIVER



Application

HIGH VOLTAGE OUTPUT CONNECTIONS



Absolute Maximum Ratings*

Temperature Under Bias	0°C to 70°C
Storage Temperature	−65°C to +150°C
Supply Voltage, V_{CC}	−0.5 to +7V
Supply Voltage, V_{DD}	−0.5 to +13V
All Input Voltages	−1.0 to +5.5V
Outputs for Low Voltage Drivers	−0.5 to +7V
Outputs for Clock Driver	−1.0 to +13V
Power Dissipation at 25°C	2W

*COMMENT: Stresses 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.

D.C. Characteristics T_A = 0°C to 70°C, V_{CC} = 5.0V ± 5%, V_{DD} = 12V ± 5%

Symbol	Parameter	Min.	Max.	Unit	Test Conditions
I_{FD}	Data Input Load Current		−0.25	mA	V_F = 0.45V
I_{FE}	Enable Input Load Current		−0.50	mA	V_F = 0.45V
I_{RD}	Data Input Leakage Current		10	μA	V_R = 12.6V
I_{RE}	Enable Input Leakage Current		20	μA	V_R = 12.6V
V_{OL}	Output Low Voltage for all Drivers		0.45	V	I_{OL} = 3mA, V_{IH} = 2V
		−1.0		V	I_{OL} = −5mA
V_{OH1}	Output High Voltage for Low Voltage Drivers	V_{CC} −1.0		V	I_{OH} = −1mA, V_{IL} = 0.8V
			V_{CC} +1.0	V	I_{OH} = 5mA
V_{OH2}	Output High Voltage for High Voltage Driver	V_{DD} −0.75		V	I_{OH} = −1mA, V_{IL} = 0.8V
			V_{DD} + 0.5	V	I_{OH} = 5mA
I_{O1}	Pulsed Output Sink Current for Low Voltage Drivers	75		mA	V_O = 2V, V_{IH} = 2V
I_{O2}	Pulsed Output Sink Current for High Voltage Driver	100		mA	V_O = 3V, V_{IH} = 2V
I_{O3}	Pulsed Output Source Current for Low Voltage Drivers	−75		mA	V_O = V_{CC} −1.5V, V_{IL} = 0.8V
I_{O4}	Pulsed Output Source Current for High Voltage Driver	−100		mA	V_O = V_{DD} −3V, V_{IL} = 0.8V
V_{IL}	Input Low Voltage, All Inputs		0.8	V	
V_{IH}	Input High Voltage, All Inputs	2		V	

POWER SUPPLY CURRENT DRAIN AND POWER DISSIPATION

All driver outputs are in the state indicated

Symbol	Parameter	Typ.[1]	Max.	Unit	Test Conditions -- Input states to ensure the following output states:		Additional Test Conditions
					All Low Voltage Outputs	High Voltage Output	
I_{CC1}	Current from V_{CC}	26	35	mA	Low	Low	
I_{DD1}	Current from V_{DD}	12	16	mA	Low	Low	
P_{D1}	Power Dissipation	290	390	mW	Low	Low	
I_{CC2}	Current from V_{CC}	21	28	mA	Low	High	
I_{DD2}	Current from V_{DD}	26	35	mA	Low	High	
P_{D2}	Power Dissipation	450	600	mW	Low	High	V_{CC} = 5.25V, V_{DD} = 12.6V
I_{CC3}	Current from V_{CC}	19	25	mA	High	Low	
I_{DD3}	Current from V_{DD}	12	16	mA	High	Low	
P_{D3}	Power Dissipation	260	340	mW	High	Low	
I_{CC4}	Current from V_{CC}	14	18	mA	High	High	
I_{DD4}	Current from V_{DD}	26	35	mA	High	High	
P_{D4}	Power Dissipation	410	550	mW	High	High	

[1] This parameter is periodically sampled and is not 100% tested. Condition of measurement is T_A = 25°C, V_{CC} = 5V, V_{DD} = 12V.

Typical System

Below is an example of a 16K x 8 bit memory circuit. Device decoding is done with the CE input. All devices are unselected during refresh with CS input. The 8210, 8205 and 8212 are standard Intel products.