

## ECL-TO-MOS LEVEL SHIFTER AND HIGH VOLTAGE CLOCK DRIVER

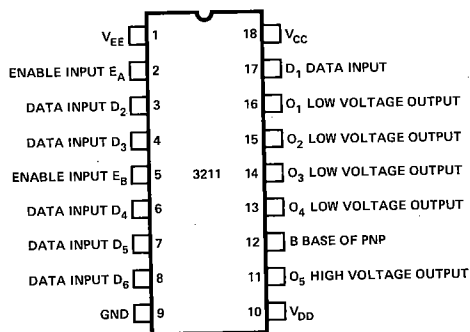
- Four Low Voltage Drivers
- One High Voltage Driver
- 10K Series ECL Compatible Inputs
- Outputs Compatible with 2105 and 2107 MOS Memories
- Operates from Standard TTL, ECL, and MOS Power Supplies
- Maximum MOS Device Protection-- Output Clamp Diodes

The Intel 3211 is an ECL to MOS level shifter and N-channel MOS memory driver. Each package contains four (4) low voltage drivers and one high voltage driver. The 3211 is designed to have high performance when driving many RAM devices. It is compatible with the 2105 and 2107 N-channel MOS memory devices. The operating voltages are +5, +12, and -5.2V which are standard TTL, MOS and ECL power supply voltages.

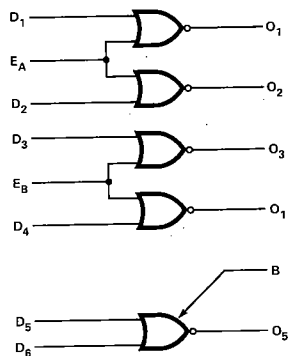
The four low voltage drivers feature two common enable inputs per pair of drivers which permits address or data decoding. The high voltage driver swings the 12 volts required to drive the chip enable (clock) input for the 2105 and 2107. The chip enable driver has two inputs to simplify logic design.

The 3211 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 or 2N3546 is recommended.

### PIN CONFIGURATION



### LOGIC SYMBOL



MEMORY PERIPHERALS

## Absolute Maximum Ratings\*

Temperature Under Bias	0°C to 75°C	All Input Voltages	0V to V <sub>EE</sub>
Storage Temperature	-65°C to +150°C	Outputs for Low Voltage Drivers	-1.0 to +7V
Supply Voltage, V <sub>CC</sub>	-0.5 to +7V	Outputs for Clock Driver	-1.0 to +13V
Supply Voltage, V <sub>DD</sub>	-0.5 to +13V	Power Dissipation at 25°C	2W
Supply Voltage, V <sub>EE</sub>	+0.5 to -7V		

\*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<sub>A</sub> = 0°C to 75°C, V<sub>CC</sub> = 5.0V ±5%, V<sub>DD</sub> = 12V ±5%, V<sub>EE</sub> = -5.2V ±5%

Symbol	Parameter	Min.	Max.	Unit	Test Conditions
I <sub>FD</sub>	Data Input Load Current		0.5	mA	V <sub>F</sub> = -0.8V
I <sub>FE</sub>	Enable Input Load Current		1.0	mA	V <sub>F</sub> = -0.8V
V <sub>OL</sub>	Output Low Voltage for all Drivers		0.45	V	I <sub>OL</sub> = 3mA, V <sub>IH</sub> = -1.025V
		-1.0		V	I <sub>OL</sub> = -5mA
V <sub>OH1</sub>	Output High Voltage for Low Voltage Drivers	V <sub>CC</sub> -0.65		V	I <sub>OH</sub> = -1mA, V <sub>IL</sub> = -1.500V
			V <sub>CC</sub> +1.0	V	I <sub>OH</sub> = 5mA
V <sub>OH2</sub>	Output High Voltage for High Voltage Driver	V <sub>DD</sub> -0.75		V	I <sub>OH</sub> = -1mA, V <sub>IL</sub> = -1.500V
			V <sub>DD</sub> +1.0	V	I <sub>OH</sub> = 5mA
V <sub>IL</sub>	Input Low Voltage, All Inputs	-1.500V		V	
V <sub>IH</sub>	Input High Voltage, All Inputs		-1.025V	V	
I <sub>B</sub>	Base Drive to External PNP (Pin 12)	7	16	mA	V <sub>IL</sub> = -1.5V V <sub>B</sub> = V <sub>DD</sub> -0.8V

## POWER SUPPLY CURRENT DRAIN AND POWER DISSIPATION

All driver outputs are in the state indicated

Symbol	Parameter	Typ.	Max.	Unit	Test Conditions -- Input states to ensure the following output states:		Additional Test Conditions
					All Low Voltage Outputs	High Voltage Output	
I <sub>CC1</sub>	Current from V <sub>CC</sub>	24.5	31	mA	Low	Low	V <sub>CC</sub> = 5.25V, V <sub>DD</sub> = 12.6V, V <sub>EE</sub> = -5.46V
I <sub>EE1</sub>	Current from V <sub>EE</sub>	-24	-30	mA			
I <sub>DD1</sub>	Current from V <sub>DD</sub>	12.5	16.5	mA			
P <sub>D1</sub>	Power Dissipation	415	535	mW			
I <sub>CC2</sub>	Current from V <sub>CC</sub>	20	26	mA	Low	High	
I <sub>EE2</sub>	Current from V <sub>EE</sub>	-21.5	-27	mA			
I <sub>DD2</sub>	Current from V <sub>DD</sub>	27	33.5	mA			
P <sub>D2</sub>	Power Dissipation	560	705	mW			
I <sub>CC3</sub>	Current from V <sub>CC</sub>	11	16	mA	High	Low	
I <sub>EE3</sub>	Current from V <sub>EE</sub>	-19	-23.5	mA			
I <sub>DD3</sub>	Current from V <sub>DD</sub>	9	12	mA			
P <sub>D3</sub>	Power Dissipation	275	365	mW			
I <sub>CC4</sub>	Current from V <sub>CC</sub>	6	10	mA	High	High	
I <sub>EE4</sub>	Current from V <sub>EE</sub>	-16	-20	mA			
I <sub>DD4</sub>	Current from V <sub>DD</sub>	23.5	27	mA			
P <sub>D4</sub>	Power Dissipation	415	500	mW			

**A.C. Characteristics**  $T_A = 0^\circ\text{C to } 75^\circ\text{C}$ ,  $V_{CC} = 5.0\text{V} \pm 5\%$ ,  $V_{DD} = 12\text{V} \pm 5\%$ ,  $V_{EE} = -5.2\text{V} \pm 5\%$

Symbol	Parameter	Min.	Typ. <sup>[1]</sup>	Max.	Units	Test Conditions
$t_{LDR}$	Delay Plus Rise Time for Low Voltage Drivers		21	27	ns	$C_L = 200\text{pF}$
$t_{LDF}$	Delay Plus Fall Time for Low Voltage Drivers		22	32	ns	$C_L = 200\text{pF}$
$t_{H+}$	Input to Output Delay for High Voltage Driver	14	20		ns	$C_L = 175\text{pF}$
$t_{HDR}$	Delay Plus Rise Time for High Voltage Driver		36	45	ns	$C_L = 350\text{pF}$
$t_{H-}$	Input to Output Delay for High Voltage Driver	7	12		ns	$C_L = 175\text{pF}$
$t_{HDF}$	Delay Plus Fall Time for High Voltage Driver		27	40	ns	$C_L = 350\text{pF}$
$t_{DB}$	Delay to Base Drive to External PNP (Pin 12)	7	14	23	ns	

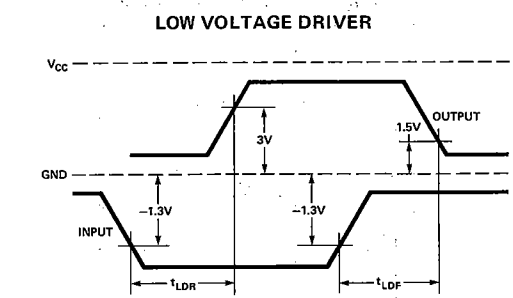
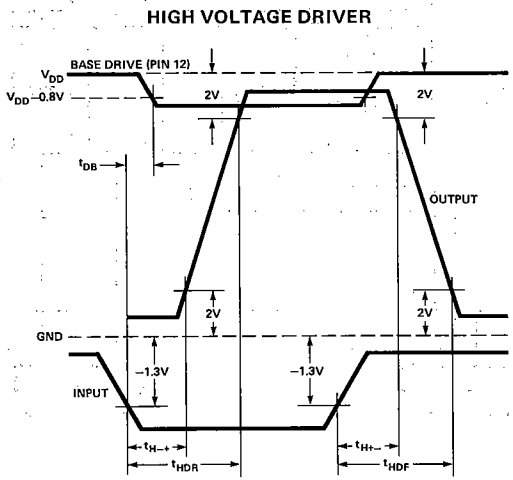
Note 1: Typical values measured at  $T_A = 25^\circ\text{C}$ .

**Capacitance** \*  $T_A = 25^\circ\text{C}$

Symbol	Test	Typ.	Max.
$C_{IN}$	Input Capacitance	4pF	8pF

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

**Waveforms**

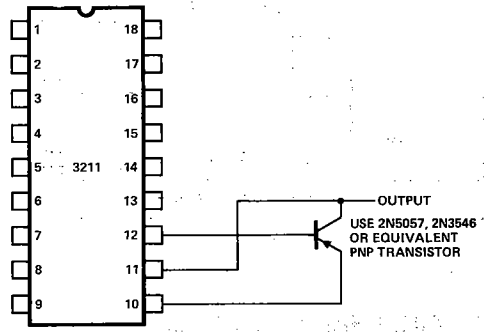


**A.C. CONDITIONS OF TEST**

Input Pulse Amplitudes:  $-0.9\text{V to } -1.7\text{V}$   
 Input Pulse Rise and Fall Times:  $5\text{ns}$  (Between 10% and 90% points)  
 Measurement Points: See Waveforms

**Application**

**HIGH VOLTAGE OUTPUT CONNECTIONS**

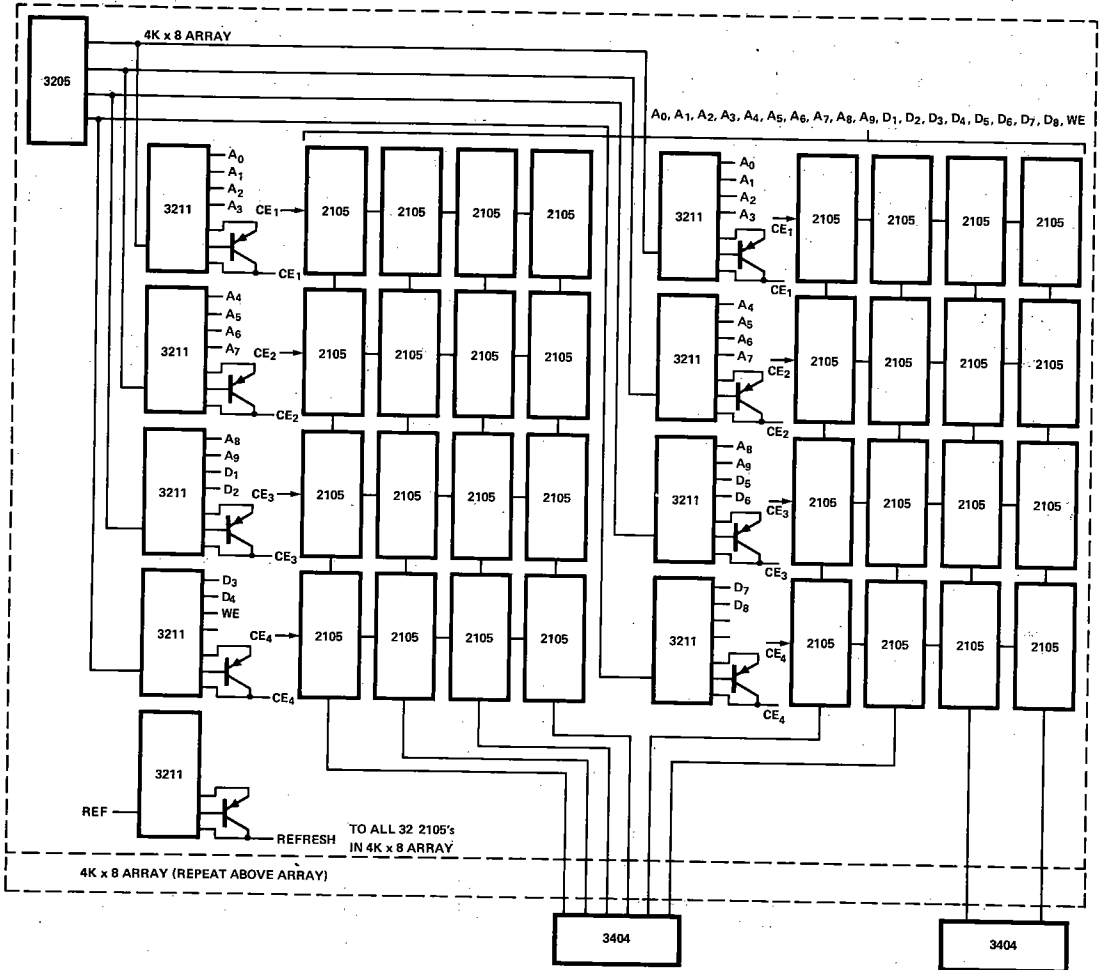


MEMORY PERIPHERALS

# SCHOTTKY BIPOLAR 3211

## TYPICAL SYSTEM

Below is an example of an 8K x 8 bit memory circuit employing the 3211 driver. Device decoding is done with the CE input. The 2105, 3205 and 3404 are standard Intel products.



MEMORY PERIPHERALS

## TYPICAL CHARACTERISTICS

