256-BIT BIPOLAR FIELD-PROGRAMMABLE ROM (32x8 PROM)

DIGITAL 8000 SERIES TTL/MEMORY

DESCRIPTION

The 8223 is a TTL 256-Bit Read Only Memory organized as 32 words with 8 bits per word. The words are selected by five binary address lines; full word decoding is incorporated on the chip. A chip enable input is provided for additional decoding flexibility, which causes all eight outputs to go to the high state when the chip enable input is high.

This device is fully TTL or DTL compatible. The outputs are uncommitted collectors, which permits wired AND operation with the outputs of other TTL or DTL devices. These outputs are capable of sinking twelve standard DCL loads. Propagation delay time is 50ns maximum. Power dissipation is 310 milliwatts with 400 milliwatts maximum. The 8223 may be programmed to any desired pattern by the user. (See fusing procedure.) This feature is ideal for prototype hardware and systems requiring proprietary codes.

A Truth Table/Order Blank is included on page 4-43 for ordering custom patterns.

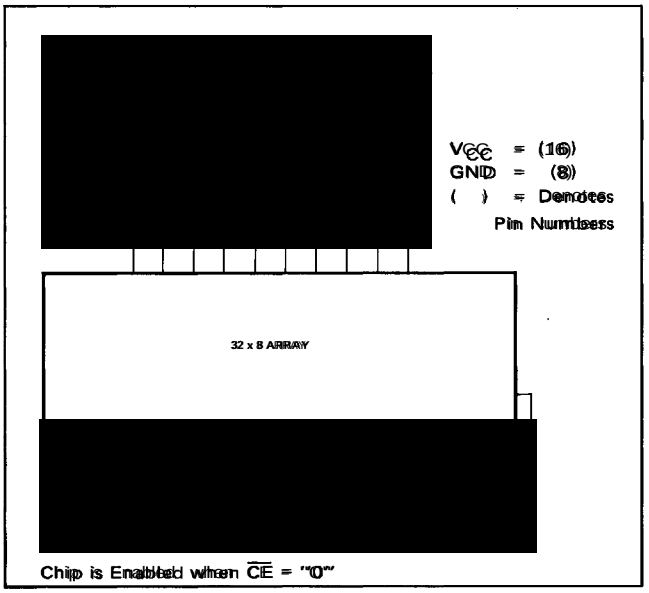
FEATURES

- BUFFERED ADDRESS LINES
- ON THE CHIP DECODING
- CHIP ENABLE CONTROL LINE
- OPEN COLLECTOR OUTPUTS
- DIODE PROTECTED INPUTS
- NO SEPARATE FUSING PINS
- BOARD LEVEL PROGRAMMABLE

APPLICATIONS

PROTOTYPING
VOLUME PRODUCTION
MICROPROGRAMMING
HARDWIRED ALGORITHMS
CONTROL STORE

LOGIC DIAGRAM



ELECTRICAL CHARACTERISTICS S8223 -55°C ≤ T_A ≤ +125°C N8223 0°C ≤ T_A ≤ 75°C; 4.75V ≤ V_{CC} ≤ 5.25V

CHARACTERISTICS		LIMITS				"0" A_n	"1" A_n	$\overline{\text{CHIP}}$ $\overline{\text{ENABLE}}$	OUTPUTS	NOTES
		MIN.	TYP.	MAX.	UNITS					
"1" Output Leakage Current	(N8223)			100	µA			2.0V	5.5V	13
	(S8223)			250	µA				2.7V	
"0" Output Voltage (N8223)	(S8223)			0.4	V	0.8V	2.0V	0.8V	9.6mA	6,10
	(N8223)			0.5	V	0.8V	2.0V	0.8V	16mA	6,10
"1" Input Current										
A_n, Address				40	µA		4.5V			
$\overline{\text{Chip Enable}}$ Input				80	µA			4.5V		
"0" Input Current										
A_n, $\overline{\text{Chip Enable}}$		-0.11		-1.6	mA	0.4V		0.4V		
Power Consumption			62/310	77/400	mW/mA		4.5V	4.5V		14

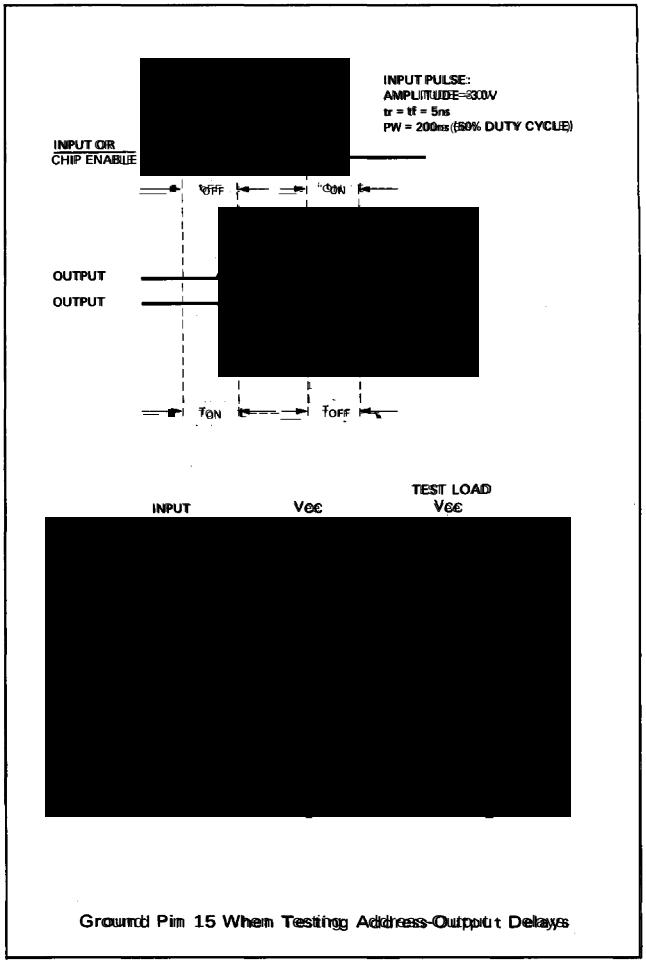
SWITCHING CHARACTERISTICS S8223 $-55°C \leq T_A \leq 125°C$, N8223 $0 \leq T_A \leq 75°C$, $4.75 \leq V_{CC} \leq 5.25V$

CHARACTERISTICS	LIMITS				TEST CONDITIONS
	MIN.	TYP.	MAX.	UNITS	
Access Time (t_{ON}, t_{OFF})					
Address		35	50	ns	$T_A = 25°C$ Only
S8223			65	ns	Full Temp
N8223			60	ns	Full Temp
Chip Select		35	50	ns	$T_A = 25°C$ Only
S8223			60	ns	Full Temp
N8223			55	ns	Full Temp

NOTES

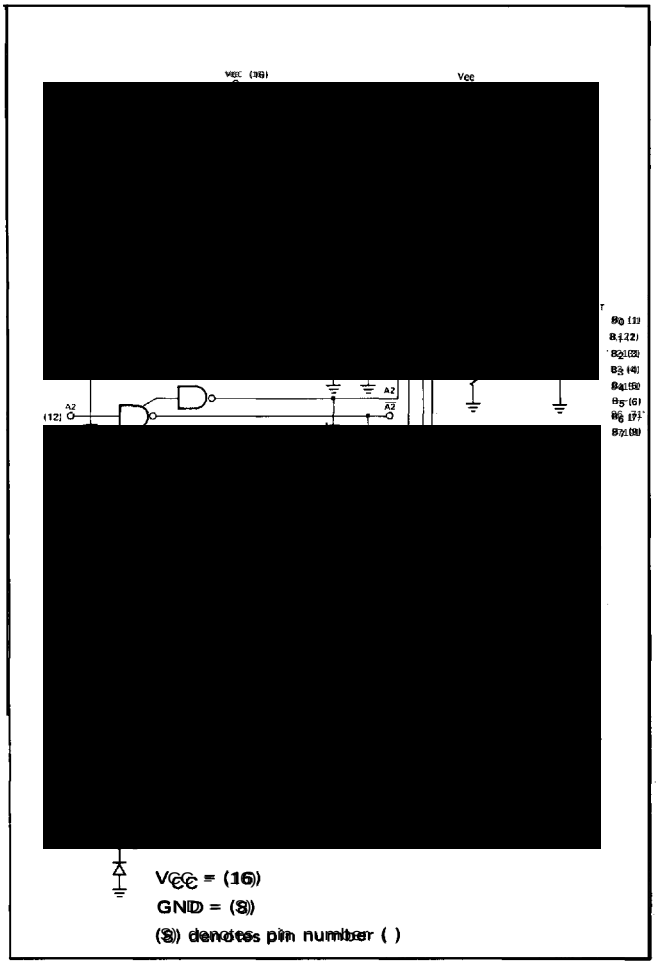
1. All voltage measurements are referenced to the ground terminal. Terminals not specifically referenced are left electrically open.
2. All measurements are taken with ground pin tied to zero volts.
3. Positive current is defined as into the terminal referenced.
4. Positive logic definition: "UP" Level = "1", "DOWN" Level = "0".
5. Precautionary measures should be taken to ensure current limiting in accordance with Absolute Maximum Ratings should the isolation diodes become forward biased.
6. Output sink current is supplied through a resistor to V_{CC}.
7. One DC fan-out is defined as 0.8mA.
8. One AC fan-out is defined as 50pF.
9. Manufacturer reserves the right to make design and process changes and improvements
10. By DC tests per the truth table, all inputs have guaranteed thresholds of 0.8V for logical "0" and 2.0V for logical "1".
11. This test guarantees operation free of input latch-up over the specified operating power supply voltage range.
12. For detailed test conditions, see AC testing.
13. Connect an external 1k resistor from V_{CC} to the output terminal for this test.
14. $V_{CC} = 5.25V$.

AC TEST FIGURE AND WAVEFORMS



Ground Pin 15 When Testing Address-Output Delays

SCHEMATIC DIAGRAM



V_{CC} = (16)
GND = (8)
(8) denotes pin number ( )

8223 PROGRAMMING PROCEDURE

The 8223 Standard part is shipped with all outputs at logical "0". To write a logical "1" proceed as follows:

Simple Programming Procedure using "bench" Equipment (See below)

1. Start with pin 8 grounded and V_{CC} removed from pin 16.
2. Remove any load from the outputs.
3. Ground the Chip Enable.
4. Address the desired location by applying ground (i.e., 0.4V maximum) for a "0", and +5.0V (i.e., +2.8V minimum) for a "1" at the address input lines.
5. Apply +12.5V ±0.5V to the output to be programmed through a 390 ohm ±10% resistor (Program one output at a time)
6. After a short delay apply +12.5V to V_{CC} (pin 16) and remove as quickly as possible (rise time of 50μsec or less). The V_{CC} overshoot should be limited to 1.0V maximum. If necessary, a clamping circuit should be used.

   NOTE: Normal practice in test fixture layout should be followed. Lead lengths, particularly to the power supply, should be as short as possible. A capacitor of 10 microfarads minimum, connected from the +12.5V to ground, should be located close to the unit being programmed.
7. Verify that the bit has programmed by applying 5 volts to V_{CC} and 5 volts through a 1k resistor to the output.
8. Proceed to the next output and repeat, or change address and repeat.
9. Continue until the entire bit pattern is programmed into your custom 8223.
10. If during verification a bit had been found not to have programmed, return to that bit and repeat the programming procedure once.

Fast Programming Procedure

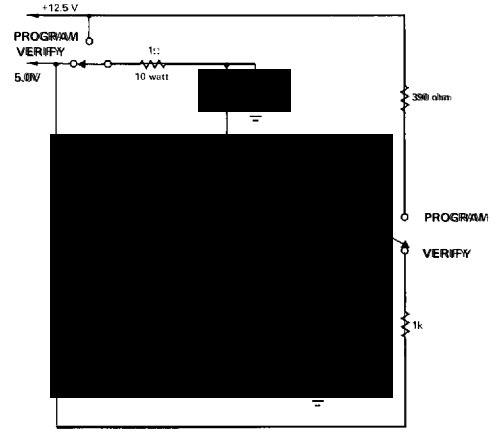
1. Remove V_{CC} (open or ground pin 16).
2. Remove any load from the output.
3. Ground $\overline{CE}$ (pin 15)
4. Address the word to be programmed by applying 5 volts for a "1" and ground for a "0" to the address lines.
5. Apply +12.5V ±0.5V to the output to be programmed through a 390 ohm ±10% resistor (Program one output at a time)
6. After a minimum delay of 100μsec, apply +12.5V to V_{CC} (pin 16) for 1.0mS. The V_{CC} rise time must be 50μsec or less. Limit the V_{CC} overshoot to 1.0 volts max.
7. Reduce V_{CC} to ground (≤0.5V) and remove the load from the output.
8. Repeat steps 5 and 6 for other outputs of the same word, or repeat 4 through 6 for a different word until the entire bit pattern is programmed.

After programming the 8223, the unit should be checked to insure the code is correct.

BOARD LEVEL PROGRAMMING PROCEDURE FOR THE 8223

The chip select controls which 8223 is being programmed when several PROMS are collector OR'd. To program in this manner, the only change required is to reduce the 390 ohm resistor to $\frac{200 \text{ ohm}}{N}$ where N is the number of outputs tied together ($2 \leq N \leq 12$).

MANUAL PROGRAMMER DIAGRAM



NOTES
1. The 10μF capacitor across pin 16 to ground is required to eliminate noise from V_{CC}.
2. During programming switch S_a must be in the verify position long enough for the 10μF capacitor to discharge to 5.0 volts.