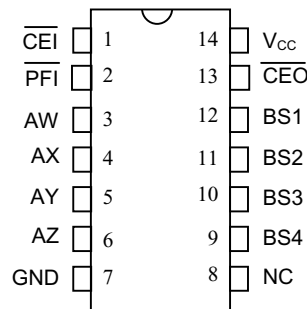


### FEATURES

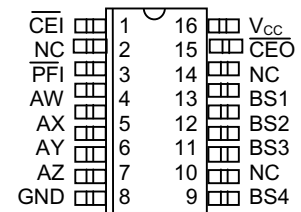
- Provides bank switching for 16 banks of memory
- Bank switching is software-controlled by a pattern recognition sequence on four address inputs
- Automatically sets all 16 banks off on power-up
- Bank switching logic allows only one bank on at a time
- Custom recognition patterns are available to prevent unauthorized access
- Full  $\pm 10\%$  operating range
- Low-power CMOS circuitry
- Can be used to expand the address range of microprocessors and decoders
- Optional 16-pin SOIC surface mount package

### PIN ASSIGNMENT



DS1222 14-Pin DIP  
(300-mil)

See Mech. Drawings  
Section



DS1222S 16-Pin SOIC  
(300-mil)

See Mech. Drawings  
Section

### PIN DESCRIPTION

$A_W-A_Z$	- Address Inputs
$\overline{CEI}$	- Chip Enable Input
$\overline{CEO}$	- Chip Enable Output
NC	- No Connection
BS1,BS2, BS3,BS4	- Bank Select Outputs
$\overline{PFI}$	- Power Fail Input
$V_{CC}$	- +5 Volts
GND	- Ground

### DESCRIPTION

The DS1222 BankSwitch Chip is a CMOS circuit designed to select one of 16 memory banks under software control. Memory bank switching allows for an increase in memory capacity without additional address lines. Continuous blocks of memory are enabled by selecting proper memory bank through a pattern recognition sequence on four address inputs. Custom patterns from Dallas Semiconductor can provide security through uniqueness and prevent unauthorized access. By combining the DS1222 with the DS1212 Nonvolatile Controller x16 Chip, up to 16 banks of static RAMs can be selected.

## OPERATION - BANK SWITCHING

Initially, on power-up all four bank select outputs are low and the chip enable output ( $\overline{\text{CEO}}$ ) is held high. (Note: the power fail input [ $\overline{\text{PFI}}$ ] must be low prior to power-up to assure proper initialization.) Bank switching is achieved by matching a predefined pattern stored within the DS1222 with a 16-bit sequence received on four address inputs. Prior to entering the 16-bit pattern, which sets the bank switch, a read cycle of 1111 on address inputs AW through AZ should be executed to guarantee that pattern entry starts with bit 0. Each set of address inputs is clocked into the DS1222 when  $\overline{\text{CEI}}$  is driven low. All 16 inputs must be consecutive read cycles. The first eleven cycles must match the exact bit pattern as shown in Table 1. The last five cycles must match the exact bit pattern as shown for addresses AX, AY, and AZ. However, address line AW defines the bank number to be enabled as per Table 2.

Switching to a selected bank of memory occurs on the rising edge of  $\overline{\text{CEI}}$  when the last set of bits is input and a match has been established. After bank selection  $\overline{\text{CEO}}$  always follows  $\overline{\text{CEI}}$  with a maximum propagation delay of 15 ns. The bank selected is determined by the levels set on Bank Select 1 through Bank Select 4 as per Table 2. These levels are held constant for all memory cycles until a new memory bank is selected.

**ADDRESS BIT SEQUENCE Table 1**

BIT SEQUENCE																
ADDRESS INPUTS	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
A <sub>W</sub>	1	0	1	0	0	0	1	1	0	1	0	x	x	x	x	x
A <sub>X</sub>	0	1	0	1	1	1	0	0	1	0	1	0	0	0	1	1
A <sub>Y</sub>	1	0	1	0	0	0	1	1	0	1	0	1	1	1	0	0
A <sub>Z</sub>	0	1	0	1	1	1	0	0	1	0	1	0	0	0	1	1

X See Table 2

**BANK SELECT CONTROL Table 2**

Bank Selected	A <sub>W</sub> Bit Sequence					Outputs			
	11	12	13	14	15	BS1	BS2	BS3	BS4
*Banks Off	0	X	X	X	X	Low	Low	Low	Low
Bank 0	1	0	0	0	0	Low	Low	Low	Low
Bank 1	1	0	0	0	1	High	Low	Low	Low
Bank 2	1	0	0	1	0	Low	High	Low	Low
Bank 3	1	0	0	1	1	High	High	Low	Low
Bank 4	1	0	1	0	0	Low	Low	High	Low
Bank 5	1	0	1	0	1	High	Low	High	Low
Bank 6	1	0	1	1	0	Low	High	High	Low
Bank 7	1	0	1	1	1	High	High	High	Low
Bank 8	1	1	0	0	0	Low	Low	Low	High
Bank 9	1	1	0	0	1	High	Low	Low	High
Bank 10	1	1	0	1	0	Low	High	Low	High
Bank 11	1	1	0	1	1	High	High	Low	High
Bank 12	1	1	1	0	0	Low	Low	Low	High
Bank 13	1	1	1	0	1	High	Low	High	High
Bank 14	1	1	1	1	0	Low	High	High	High
Bank 15	1	1	1	1	1	High	High	High	High

\*  $\overline{\text{CEO}} = V_{\text{IH}}$  independent of  $\overline{\text{CEI}}$

**ABSOLUTE MAXIMUM RATINGS\***

Voltage on any Pin Relative to Ground	-0.3V to +7.0V
Operating Temperature	0°C to 70°C
Storage Temperature	-55°C to +125°C

- \* This is a stress rating only and functional operation of the device at these or any other conditions above those indicated in the operation sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods of time may affect reliability.

**RECOMMENDED DC OPERATING CONDITIONS**

(0°C to 70°C)

PARAMETER	SYMBOL	MIN	TYP	MAX	UNITS	NOTES
Power Supply Voltage	$V_{CC}$	4.5	5.0	5.5	V	1
Logic 1	$V_{IH}$	2.2		$V_{CC} + 0.3$	V	1
Logic 0	$V_{IL}$	-0.3		+0.8	V	1

**DC ELECTRICAL CHARACTERISTICS**(0°C to 70°C;  $V_{CC} = 5V \pm 10\%$ )

PARAMETER	SYMBOL	MIN	TYP	MAX	UNITS	NOTES
Input Leakage Current	$I_{IL}$	-1.0		+1.0	$\mu A$	
I/O Leakage Current	$I_{LO}$	-1.0		+1.0	$\mu A$	
Output Current @ 2.4V	$I_{OH}$	-1.0			mA	2
Output Current @ 0.4V	$I_{OL}$			+4.0	mA	2
Operating Current	$I_{CC}$			15	mA	

**CAPACITANCE**(T<sub>A</sub> = 25°C)

PARAMETER	SYMBOL	MIN	TYP	MAX	UNITS	NOTES
Input Capacitance	$C_{IN}$		5	10	pF	
Input/Output Capacitance	$C_{I/O}$		5	10	pF	

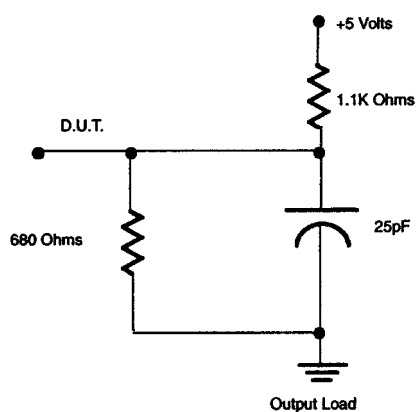
**AC ELECTRICAL CHARACTERISTICS**(0°C to 70°C;  $V_{CC} = 5V \pm 10\%$ )

PARAMETER	SYMBOL	MIN	TYP	MAX	UNITS	NOTES
Address Setup	$t_{AS}$	5			ns	
Address Hold	$t_{AH}$	50			ns	
Read Recovery	$t_{RR}$	40			ns	
Propagation Delay	$t_{PD}$			15	ns	2
Power Fail Input to First $\overline{CEI}$	$t_{PF}$	50			ns	
Chip Enable Low	$t_{CW}$	110			ns	

**NOTES:**

1. All voltages are referenced to ground.
2. Measured with a load as shown in Figure 1.

# OUTPUT LOAD Figure 1



## TIMING DIAGRAM-ACCESS TO BANK SWITCH

