

**DALLAS**  
SEMICONDUCTOR

**DS1608**  
EconoRAM Time Chip

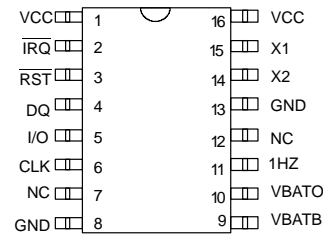
## FEATURES

- 4096 bits of nonvolatile dual-port memory including real time clock/calendar in binary format, programmable interval timer, and programmable power-on cycle counter
- 1-Wire™ interface for MicroLAN communication at 16.3k bits per second
- 3-Wire host interface for high-speed data communications at 2M bits per second
- Memory partitioned into 16 pages of 256-bits for packetizing data
- 256-bit scratchpad with strict read/write protocols ensures integrity of data transfer
- Programmable alarms can be set to generate interrupts for interval timer, real time clock, and/or cycle counter
- Space-saving 16-pin SOIC package
- Operating temperature range from -20°C to +70°C
- Operating voltage range from 2.5 to 5.5 Volts

## DESCRIPTION

The DS1608 EconoRAM Time Chip offers a simple solution for storing and retrieving vital data and time information with minimal hardware. The DS1608 contains a lasered ROM, real-time clock/calendar, interval timer, cycle counter, programmable interrupts and 4096 bits of SRAM. Two separate ports are provided for communication, 1-Wire and 3-Wire. Using the 1-Wire port, only one pin is required for communication. The 3-wire port provides high speed communication using the traditional Dallas Semiconductor 3-Wire interface. With

## PIN ASSIGNMENT



16-PIN SOIC (300 MIL)  
See Mechanical Drawings Section

## PIN DESCRIPTION

V <sub>CC</sub>	- 2.5 to 5.5 Volts
$\overline{\text{IRQ}}$	- Interrupt Output
$\overline{\text{RST}}$	- 3-Wire Reset Input
DQ	- 3-Wire Input/Output
I/O	- 1-Wire Input/Output
CLK	- 3-Wire Clock Input
NC	- No Connection
GND	- Ground
V <sub>BATB</sub>	- Battery Backup Input
V <sub>BATO</sub>	- Battery Operate Input
1 Hz	- 1 Hz Output
X <sub>1</sub> , X <sub>2</sub>	- Crystal Connections

## ORDERING INFORMATION

DS1608S-C03                      16-pin SOIC

either interface, a strict protocol for accessing the DS1608 insures data integrity. Utilizing backup energy sources, the data is nonvolatile and allows for stand-alone operation.

The DS1608 features can be used to create a stop-watch, alarm clock, time and date stamp, logbook, hour meter, calendar, system power cycle timer, and event scheduler.

The DS1608 EconoRAM Time Chip is a derivative of the DS2404 EconoRAM Time Chip. Most of the characteristics of the DS1608 are identical to those of the DS2404. However, there are several distinct differences.

1. The contents of the 64-bit lasered ROM of the DS1608 is NOT unique. For this reason, the DS1608 is not 100% MicroLAN-compatible. Only a single DS1608 may reside on the active segments of a MicroLAN network. The family code is C0h (= 40h with custom-bit set to 1). The serial number is C999EEF4A853. This results in a CRC of 41h.
2. The DS1608 cannot be programmed for expiration timer. The Write Protect/Programmable Expiration function of the DS2404 does not apply to the DS1608. For this reason, bits 0 to 2 of the control register read always zero and cannot be altered. With the write protect function not available, bit 3 of the control register has no function. It will always read zero and cannot be altered.
3. The 32.768 kHz oscillator of the DS1608 is always on. It cannot be stopped under software control. Bit 4 of the control register therefore always reads 1.

4. The DS1608's port selection logic and 1-Wire ROM Function Control are not parasitically powered. Without  $V_{CC}$  or  $V_{BATO}$  applied, the ROM code is not readable.
5. The 1-Wire signaling of the DS1608 is identical to the signaling of the DS2404. Regarding interrupt signaling on the 1-Wire port the DS1608 behaves as described for the B4 revision of the DS2404.
6. The DS1608 is specified for a operating voltage range of 2.5V to 5.5V for  $V_{CC}$  and  $V_{BATO}/V_{BATB}$  and a temperature range of  $-20^{\circ}\text{C}$  to  $+70^{\circ}\text{C}$ .

Over the temperature range of  $-20^{\circ}\text{C}$  to  $+70^{\circ}\text{C}$ , the following data of the DS2404 apply directly to the DS1608: DC Electrical Characteristics (1-Wire Port,  $V_{CC} = 5\text{V} \pm 10\%$ ), DC Electrical Characteristics ( $V_{CC}$  Operate Mode,  $V_{CC} = 5\text{V} \pm 10\%$ ), Resistances, AC Electrical Characteristics (3-Wire Port,  $V_{CC} = 5\text{V} \pm 10\%$ ), AC Electrical Characteristics (1-Wire Port,  $V_{CC} = 2.5\text{V}$  to  $5.5\text{V}$ ).

## CHARACTERISTICS OF THE DS1608 THAT DIFFER FROM THOSE OF THE DS2404

### RECOMMENDED OPERATING CONDITIONS

( $-20^{\circ}\text{C}$  to  $+70^{\circ}\text{C}$ )

PARAMETER	SYMBOL	MIN	TYP	MAX	UNITS	NOTES
RST Logic 1		2.5		5.5	V	
Supply	$V_{CC}$	2.5		5.5	V	
Battery	$V_{BATB}$ $V_{BATO}$	2.5	3.0	5.5	V	

(Otherwise same as with DS2404)

### DC ELECTRICAL CHARACTERISTICS (BATT. OP. MODE)

( $-20^{\circ}\text{C}$  to  $+70^{\circ}\text{C}$ ,  $V_{BATO} = 3.0\text{V}$ )

PARAMETER	SYMBOL	MIN	TYP	MAX	UNITS	NOTES
I/O Operate Charge	$Q_{BATO}$			500	nC	

(Otherwise same as with DS2404)

### CAPACITANCE

( $t_A = 25^{\circ}\text{C}$ )

PARAMETER	SYMBOL	MIN	TYP	MAX	UNITS	NOTES
I/O (1-Wire)	$C_{IN/OUT}$			80	pF	

(Otherwise same as with DS2404)

### NOTE:

Notes 8 and 21 of the DS2404 data sheet do not apply to the DS1608.