

FEATURES

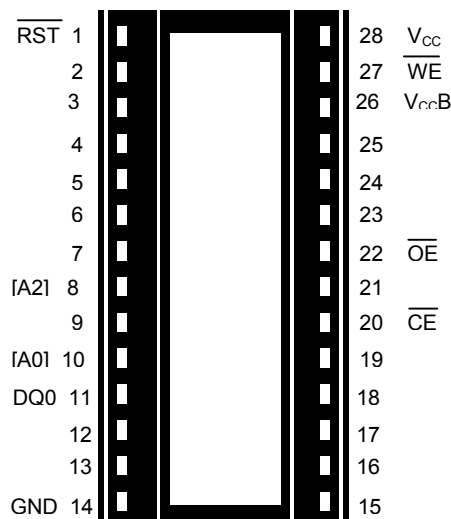
- Keeps track of hundredths of seconds, seconds, minutes, hours, days, date of the month, months, and years
- Converts standard 2k x 8 up to 512k x 8 CMOS static RAMs into nonvolatile memory
- Embedded lithium energy cell maintains watch information and retains RAM data
- Watch function is transparent to RAM operation
- Month and year determine the number of days in each month; leap-year compensation valid up to 2100
- Lithium energy source is electrically disconnected to retain freshness until power is applied for the first time
- Proven gas-tight socket contacts
- Full $\pm 10\%$ operating range
- Operating temperature range: 0°C to +70°C
- Accuracy is better than ± 1 minute/month @ +25°C

ORDERING INFORMATION

DS1216B, DS1216C, DS1216D, DS1216E, DS1216F, DS1216H (See Figure 2 for letter suffix marking identification.)

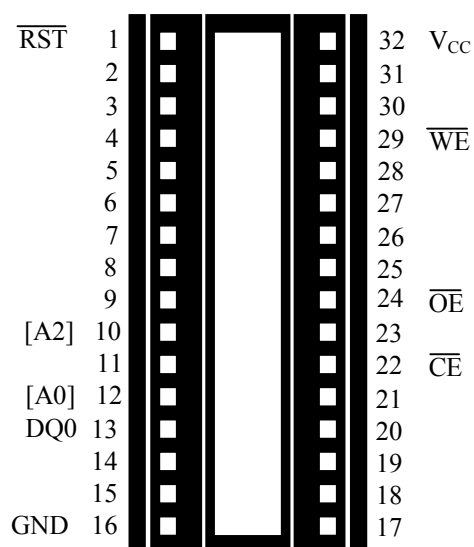
PIN DESCRIPTION

- $\overline{\text{RST}}$ - RESET
- DQ0 - Data Input/Output 0 [RAM]
- A2 - Address Bit 2 (Read/Write [ROM])
- A0 - Address Bit 0 (Data Input [ROM])
- GND - Ground
- $\overline{\text{CE}}$ - Conditioned Chip Enable
- $\overline{\text{OE}}$ - Output Enable
- $\overline{\text{WE}}$ - Write Enable
- V_{CC} - Switched V_{CC} for 28-/32-Pin RAM
- V_{CCB} - Switched V_{CC} for 24-Pin RAM
- V_{CCD} - Switched V_{CC} for 28-Ppin RAM



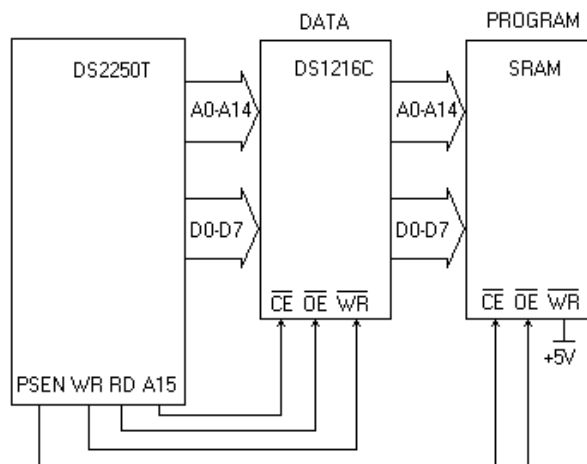
DS1216B/C/D/E
28-Pin Intelligent Socket

PART	RAM/ROM	RAM DENSITY	PCB MODIFICATION REQUIRED FOR DENSITY UPGRADE?
DS1216B	RAM	16k/64k	No/Yes
DS1216C	RAM	64k/256k	No
DS1216D	RAM	256k/1M	No/Yes
DS1216E	ROM	64k/256k	No
DS1216F	ROM	64k/256k/1M	No
DS1216H	RAM	1M/4M	No



DS1216D/E/F/H
32-Pin Intelligent Socket

TYPICAL OPERATING CIRCUIT



DESCRIPTION

The DS1216 SmartWatch RAM and SmartWatch ROM Sockets are 600mil-wide DIP sockets with a built-in CMOS watch function, an NV RAM controller circuit, and an embedded lithium energy source. The sockets provide an NV RAM solution for memory sized from 2k x 8 to 512k x 8 with package sizes from 26 pins to 32 pins. When a socket is mated with a CMOS SRAM, it provides a complete solution to problems associated with memory volatility and uses a common energy source to maintain time and date. The SmartWatch ROM sockets use the embedded lithium source to maintain the time and date only. A key feature of the SmartWatch is that the watch function remains transparent to the RAM. The SmartWatch monitors V_{CC} for an out-of-tolerance condition. When such a condition occurs, an internal lithium energy source is automatically switched on and write protection is unconditionally enabled to prevent loss of watch and RAM data.

Using the SmartWatch saves PC board space since the combination of SmartWatch and the mated RAM take up no more area than the memory alone. The SmartWatch uses the V_{CC} , data I/O 0, \overline{CE} , \overline{OE} , and \overline{WE} for RAM and watch control. All other pins are passed straight through to the socket receptacle.

The SmartWatch provides timekeeping information including hundredths of seconds, seconds, minutes, hours, days, date, months, and years. The date at the end of the month is automatically adjusted for months with fewer than 31 days, including correction for leap years. The SmartWatch operates in either 24-hour or 12-hour format with an AM/PM indicator.

OPERATION

Communication with the SmartWatch RAM is established by pattern recognition on a serial bit stream of 64 bits that must be matched by executing 64 consecutive write cycles containing the proper data on DQ0. On the SmartWatch ROM, communication with the clock is established using A2 and A0, and either OE or CE. All accesses that occur prior to recognition of the 64-bit pattern are directed to memory.