T-49-19-08

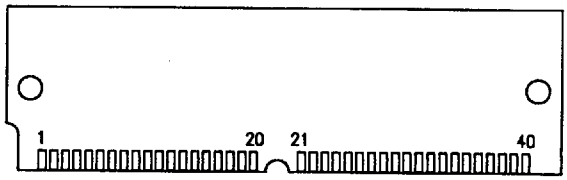
DALLAS SEMICONDUCTOR
Micro SipStik™
Time Micro SipStik

DS2250
DS2250T

FEATURES

- Nonvolatile SRAM for program and/or data
- Capable of modifying its own program and/or data memory
- Program downloading via an on-chip full duplex serial port
- Adjustable partition between program and data memory
- Completely crash-proof: program/data RAM and all data registers are maintained in absence of power
- All 32 port pins available for I/O
- Automatic restart on detection of errant software execution
- Orderly shutdown and automatic restart on power up/down
- Program and data memory secure, with a tamper proof on-chip encryptor
- Compatible with industry standard 8051 instruction set
- DS2250T: Permanently powered clock/calendar
- 40-position SIMM connection scheme

PACKAGE OUTLINE



ORDERING INFORMATION

DS2250 XX–XX MICRO SIPSTIK
DS2250T XX–XX TIME MICRO SIPSTIK

Speed Grade

8	8 MHz
12	12 MHz
16	16 MHz

Program/Data RAM

8	8 Kbytes
16	16 Kbytes
32	32 Kbytes
64	64 Kbytes

DESCRIPTION

The DS2250 Microcontroller SipStik stays up-to-date because it was designed for change. Unlike rigid ROM or EPROM based microcontrollers, all of the Microcomtroller Sipstik's memory is high performance, read/write, and nonvolatile for more than ten years. The DS2250 is equipped with nonvolatile SRAM which can be dynamically partitioned to fit program and data storage requirements of a particular task. As a result of sophisticated crashproofing circuitry, processing of a task can resume after a power

outage. A built-in encryptor prevents unauthorized access to resident application software. The DS2250T Time Micro SipStik incorporates all of the features of the DS2250 along with the addition of a built-in real-time clock/calender function.

The DS2250 and DS2250T are the functional equivalents of the DS5000 and DS5000T, respectively, with the exception that both devices are available with addtional memory size variations, including 16K bytes and 64 Kbytes of nonvolatile memory. The pinout and instruction set of both products match the industry standard 8051 microcontroller. The DS2250 and DS2250T each plug into the SIMM connector scheme which supports redundant contacts, simple insertion/extraction, and low overall height profiles.

PIN ASSIGNMENTS

The following table summarizes the pin assignments for the DS2250:

1	P1.0	2	V_{CC}
3	P1.1	4	P0.0 (AD0)
5	P1.2	6	P0.1 (AD1)
7	P1.3	8	P0.2 (AD2)
9	P1.4	10	P0.3 (AD3)
11	P1.5	12	P0.4 (AD4)
13	P1.6	14	P0.5 (AD5)
15	P1.7	16	P0.6 (AD6)
17	RST	18	P0.7 (AD7)
19	P3.0 (RXD)	20	EA* (V_{PP})
21	P3.1 (TXD)	22	ALE (PROG*)
23	P3.2 (INT0*)	24	PSEN*
25	P3.3 (INT1*)	26	P2.7 (A15)
27	P3.4 (T0)	28	P2.6 (A14)
29	P3.5 (T1)	30	P2.5 (A13)
31	P3.6 (WR*)	32	P2.4 (A12)
33	P3.7 (RD*)	34	P2.3 (A11)
35	XTAL2	36	P2.2 (A10)
37	XTAL1	38	P2.1 (A9)
39	GND	40	P2.0 (A8)

16K AND 64K VERSION MEMORY ORGANIZATION

The DS2250(T) 16-XX device incorporates a total of 16K bytes of embedded nonvolatile RAM for program/data storage. Similarly, the DS2250(T) 64-XX incorporates a total of 64K bytes for program/data storage. The following is a description of how this memory may be utilized by the designer. This discussion assumes that the reader is familiar with the programming model of the DS5000, which is described in detail in Section 4 of the DS5000 User's Guide.

The memory on the DS2250(T) 16-XX and DS2250(T) 64-XX is organized as two separately accessed 8K byte memory devices and two separately accessed 32K byte memory devices, respectively. Each of the devices are enabled by one of the two separate chip enable signals from the microcontroller die: CE1* and CE2*. These chip enable signals operate under the control of the application software via the ECE2 bit in the MCON Special Function register. For the DS2250(T) 16-XX, a maximum of 8K bytes of Program and/or Data Memory under the

control of CE1* is available, with 8K bytes Data Memory under the control of the CE2* map. For the DS2250(T) 64-XX, 32K bytes of Program/Data memory is under the control of CE1* and 32K bytes of Data Memory is under the control of CE2*.

Figure 1 illustrates the mapping within the embedded RAM which results when the ECE2 bit is cleared to 0. In this case, only the Program/Data RAM which is under the control of the CE1* signal is accessible and it is mapped in an identical fashion to a 8 or 32K byte version of a DS5000. The Partition Address and the Range Address (as defined in the MCON register) determine the mapping of Program and Data Memory space within the CE1* controlled embedded RAM area. Any program memory access from location 0000H up to (but not including) the Partition Address location will be mapped to the corresponding locations within the embedded Program/Data RAM. Program accesses at or above the Partition and/or Range addresses will be executed via the Expanded Address/Data bus in place of Ports 0 and 2, as long as the Security Lock bit is cleared to 0. If the Security Lock bit is set to a 1, then no external Program Memory accesses are possible. Any data memory access (using a MOVX instruction) from the Partition Address location up to (but not including) the Range address location will be mapped to the corresponding locations within the embedded Program/Data RAM. Any Data Memory access outside of the area between these two addresses will be executed on the Expanded Bus.

FIGURE 1: 16K or 64K VERSION PROGRAM/DATA MEMORY: ECE2=0

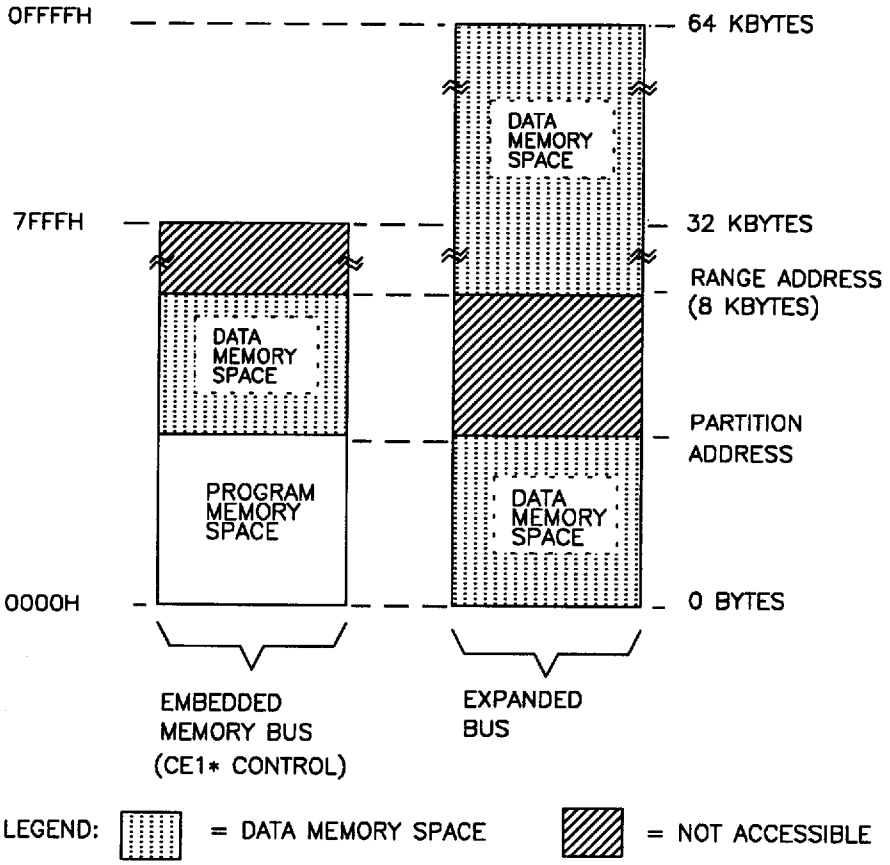
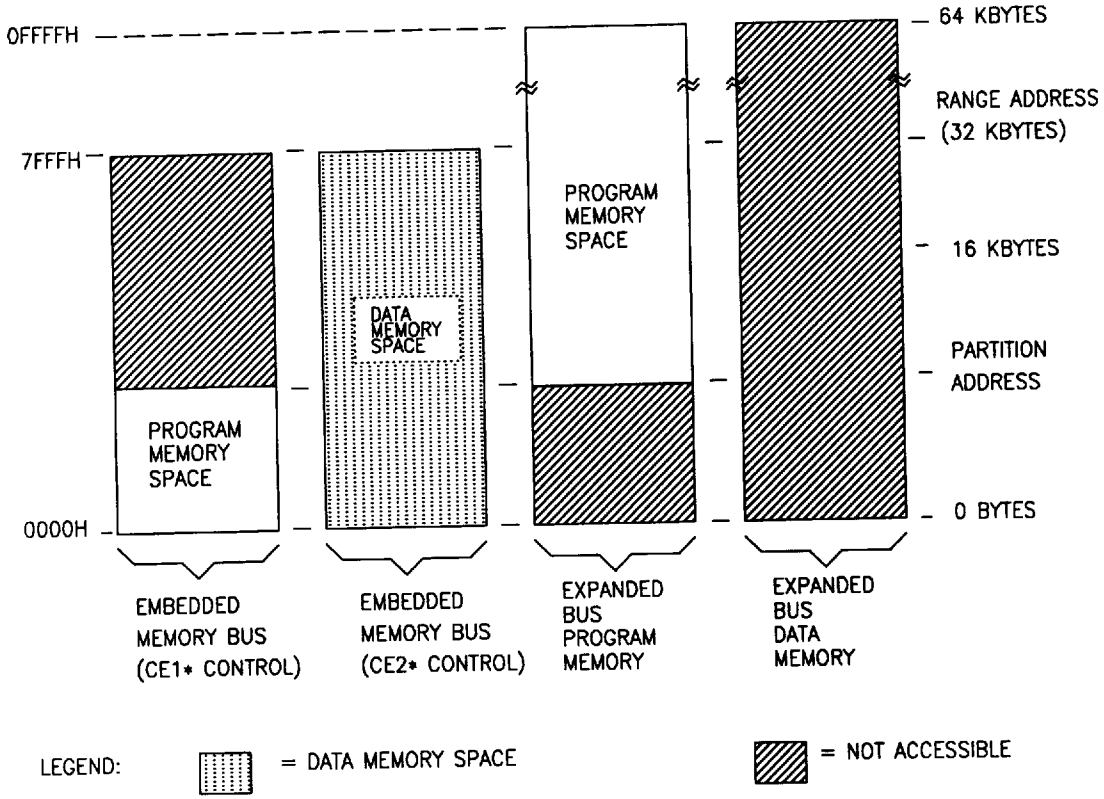


Figure 2 illustrates the mapping of Program and Data Memory within the DS2250(T) 16-XX or DS2250(T) 64-XX when the ECE2 bit is set to 1. When ECE2 is set to 1 by the application software, Program Memory accesses to the embedded RAM will still cause only CE1* to be activated. However, any Data Memory access by a MOVX instruction to the embedded RAM will cause CE2* to be activated instead of CE1*. As a result, the memory device under the control of the CE2* signal can only be used for data memory accesses.

FIGURE 2: 64K PROGRAM/DATA MEMORY: ECE2=1

(Paste Figure 2f rom 2250(T).PIC)



DS2250T CLOCK/CALENDAR

The DS2250T incorporates a permanently powered Embedded Clock/Calendar (ECC) that is identical in function to the DS1215 Timekeeper. The real-time clock is memory-mapped on the internal Embedded RAM address/data bus. As a result, it may be accessed by software as if it were Embedded Data RAM using the "MOVX" set of instructions. Accesses to the ECC take place with no effect on I/O port pins. Detailed operation of the ECC may be found in the DS5000T data sheet.

For the DS2250T 16-XX and DS2250T 64-XX versions, both the ECC and the second memory device are accessed via the CE2* control line from the microcontroller. The CE2* signal is routed through the ECC so that the CE* signal on the second memory device is conditioned by control logic within the ECC itself. Access to the second memory device by the application software can proceed as normal until communication with the ECC is desired. The application software may then select the ECC by performing the 64-bit pattern recognition CE2* read cycle sequence. Reads and writes can then proceed as described for the DS5000T.

TABLE 1: DS2250 COMPATIBLE CONNECTORS

SOCKET TYPE	PLATING	AMP	DALLAS
.050" Centerline Vertical Single Row	Tin	821918-1 or 821918-2	DS9072-V

SELECTED ELECTRICAL CHARACTERISTICS

The following are selected electrical operating characteristics of the DS2250 and the DS2250T. A partial set of DC and AC operating characteristics which are applicable to the DS2250 and DS2250T are given in the DS5000 and DS5000T data sheets in the Dallas Semiconductor Data Book. A full set of electrical characterics which are applicable to the DS2250 and DS2250T are available in the DS5000 User's Guide.

ABSOLUTE MAXIMUM RATINGS *

Voltage on any pin relative to ground	-0.3 to 7.0V
Operating Temperature	0° to +70° C
Storage Temperature	-40° C to +70° C
Soldering Temperature on the leads	260° C for 10 sec.

* This is a stress rating only and functional operation of the device at these or any other conditions outside of 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.

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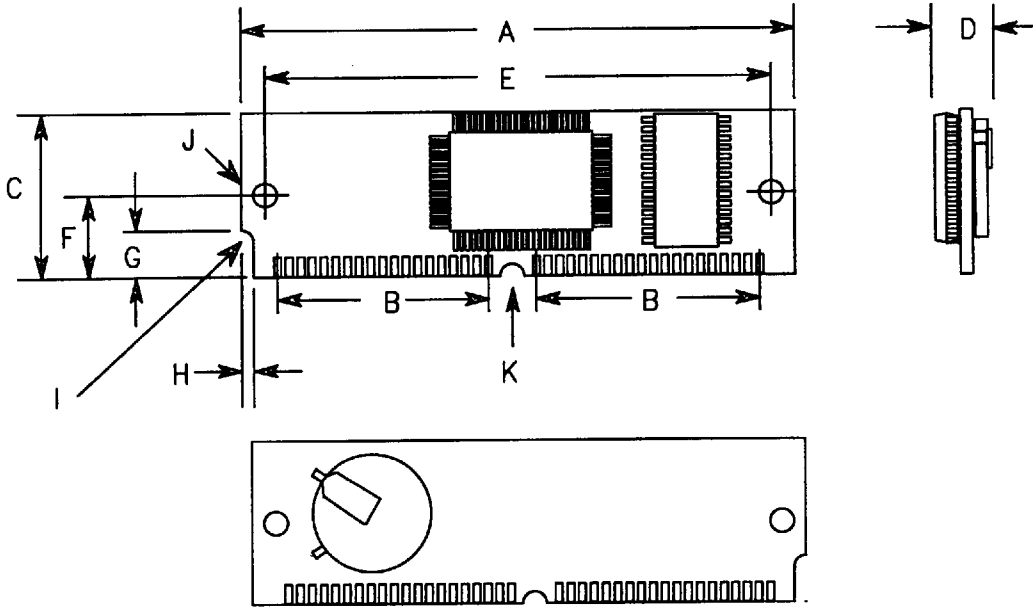
DS2250
Micro Sipstik

DIM.	INCHES
A	2.650
B	0.950
C	0.840
D	0.350
E	2.384
F	0.400
G	0.250
H	0.080
I	R .062
J	D 0.125



DS2250T
Time Micro Sipstik

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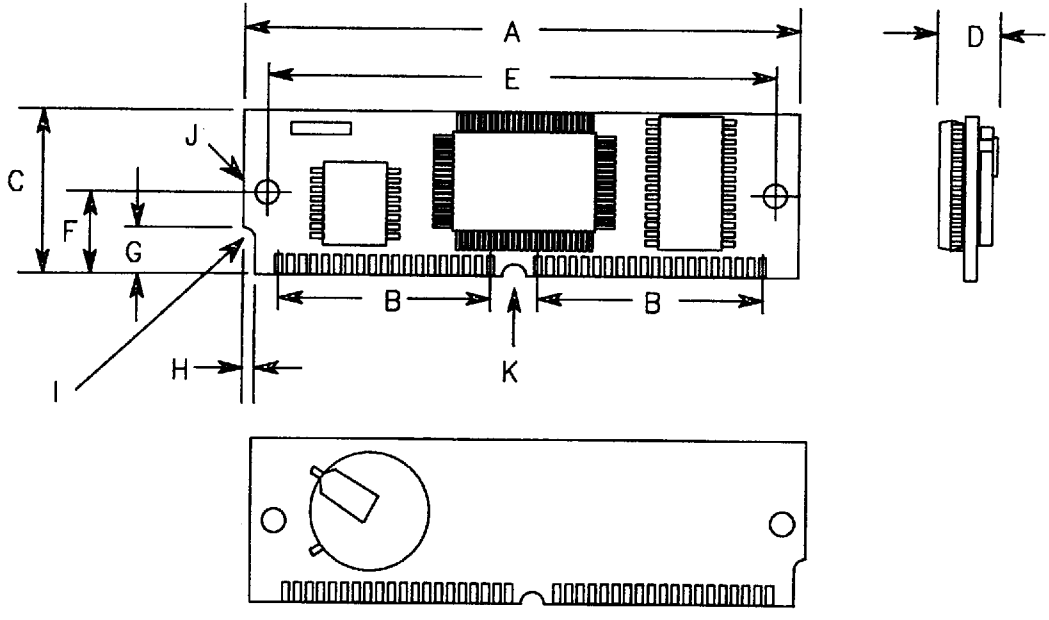
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