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The DS603 is a RS232 serial interfaced memory system for data holding and transfer applications in harsh environments where conventional disk drives or PC-CARD technologies are unsuitable. It is available in capacities from 512 kByte to 4 Mbyte.

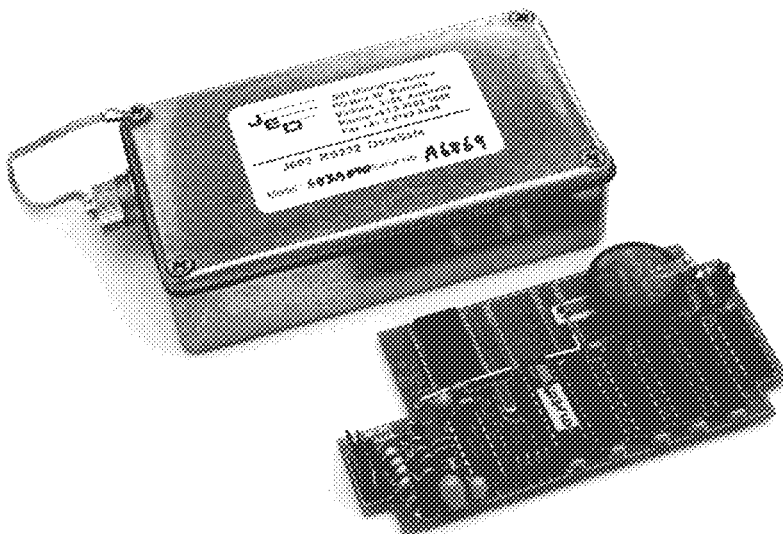
The DS603 communicates using serial asynchronous data at baud rates between 2400 and 38400, and an EEPROM inside the device can be altered by the user to set up the communications speed. Communications are 8-bits of data with a START bit and one STOP bit. No parity bit is used.

All RAM data communications are verified with check sums, and the device is normally LOCKED on initialisation, and must be specifically unlocked with the UNLOCK command before any WRITE to RAM or EEPROM. Read and write operations occur in blocks, with the block size being sent as part of the protocol. Transfer block size can be as small as one byte anywhere in memory (not on any sector boundary), and have a maximum size of 256 bytes.

The DS603 supports a number of simple commands, equivalent to the BIOS level of communications with a floppy disk, where all addresses to the device are absolute numbers, and bytes are simply transferred regardless of contents. Example code from JED written in C provides sample interfaces with these BIOS level routines in the DS603, allowing a user program to pass address, length and buffer to a function, and have the function do the sending of the request, the read/write of data and the checksum verification. On return, the user gets a result code, and has their data sent or received on a block or byte basis. The maximum size of any data transfer block is 256 bytes plus 8 header bytes, so transfer overhead is low.

JED DS603, RS232C serial DataSafe CMOS memory system.

- Memory system for data loggers, data acquisition systems, control computers.
- Communications to standard RS232C port on logger or PC, at speeds from 2400 to 38400 baud.
- Sealed diecast metal box rated to IP66; waterproof connector to multicore cable.
- Simple communications protocol allows users to read and write data with short messages from any language.
- Lithium battery gives many years of life.
- Fully CMOS system for very low power consumption and high reliability in harsh environments.
- CMOS SRAM is used, so an infinite number of read/write cycles are possible.



Users writing code for a data logger, for example, can simply regard the DS603 as a large block of memory, and place successive logged data blocks in sequence in the DS603. A location in the DS603 would then be altered to indicate the next available location for the next log to start writing to. The total code in the logger would be just the JED read/write functions and some simple control functions (lock, unlock, etc.)

Commands in the DataSafe.

All commands have the same format: an initial colon ':', (3a hex), a single upper case ASCII letter command, and several bytes of binary address and data, followed by a checksum of the address/data fields.

The DataSafe responds with a repeat of the command letter, and a string of binary information, which might be data, data and a checksum, or just a checksum. Error codes signify errors. The command letters and the corresponding functions are:

:**L**(ock) or write protect of RAM and EEPROM;
:**U**(nlock) to allow writing RAM and EEPROM;
:**Q**(uery) DataSafe internal software version number;
:**W**(rite) of RAM data;
:**R**(ead) of RAM data;
:**C**(opy) of data from one sector to another;
:**P**(rogram) EEPROM data, and
:**E**(EPROM) read of data.

At a higher level, JED (is writing) directory and file related code for the DS603. This creates a directory in high memory in the DS603...a directory entry is 32 bytes long, and is structured similarly to a directory entry in MS-DOS. It allows for a file name and extension (8 + 3 bytes), time and date (4 bytes), attributes (1 byte), start sector (2 bytes) and file length (byte count, 4 bytes, allowing for files up to the full DS603 in length.) (The length and start sector fields are duplicated for security, allowing for recovery if power to a system dies while a transfer is in the process of saving a new length field.)

Functions provided in the file-handling system are **File-Create, File-Open, Byte-Write and File-Close**. A Directory command displays the DS603 contents. Another command allows a user-specified area and length of DS603 memory to be written to an MS-DOS file.

It is anticipated that users will use the file, copy and directory manipulation functions on their PC when loading and unloading data, and setting up a directory framework. Using simple read and write functions, users can directly read the sector start field from a directory block, write or read data byte by byte and manipulate the length field as data is written. When the DS603 is brought back to the base PC, the file transfer routine on the PC can read the directory data name and length fields from the field-altered directory and copy the file to the DOS environment.

This may sound a bit complicated, but if the JED DSMON program is used, it means the user can put files into the DataSafe in their DOS machine and read them in the field WITHOUT NEEDING DOS IN THE REMOTE.

It can also write bytes of data-logged data to the DataSafe in the field, and back at base, copy one or more files into a DOS environment. The transfer software uses internal functions rather than being a DOS device driver, saving the need for any changes to the AUTOEXEC.BAT or CONFIG.SYS programs in the PC.

The DSMON.C source is distributed to users allowing them to add their own front ends to the functions.

Physical Construction.

The DS603 is installed in a diecast metal box (114mm by 64mm by 31mm) which protects against the environment: it is sealed with an IP66 rated gasket of conductive neoprene, which also serves as an EMI seal. All I/O lines have RF bypasses, so the DS603 should easily meet EMC requirements. The circular screw connector is waterproof when connected, and a screw-on metal cap protects the DataSafe and connector during transport.

RS232 and power interface.

The DS603 plugs into a standard R5232 serial port on a PC, PLC or data logger, and is powered from the interface signals on that port (DTR, TX data, RTS, etc.) Data is returned to the DS603 serially with the same voltage levels as are sent to it, (less a diode drop), so it is compatible both with older 12 or 15 volt +/- rails fed from DS1488 transmitters, as well as newer systems which use voltage doublers from the 5 volt rail (MAX232 style chips) which typically generate 7 or 8 volts on the positive rail and 5-6 volts on the negative rail. The DS603 regulates an internal plus 5 volt rail for the microprocessor and logic from the positive line inputs, with a low dropout regulator. It can work if the input positive lines were as low as 5.5 volts under load. System current consumption is under 10 milliamps.

An otherwise unused pin (called Vin) is also available for external voltage supply input if enough power is not available from the R5232 interface lines.

The pin labelled RTS is usually HIGH when the DataSafe is in operation, but the standard release of the internal software does not use this pin. Custom versions could use this as a send-file hardware command, e.g. in a system where a piece of "dumb" equipment needs its memory loaded from a serial data stream from a source like the DataSafe.

Battery backed Memory.

The memory inside the DS603 is backed up with a 0.5 AH 3.6 volt lithium battery, which should have a life of several years. Current consumption from the battery has been measured at under 1 microamp on tested units (with one RAM, 512 kBytes).

Order codes:

DS603A512: Standard DataSafe with 512 kByte RAM.
DS603A010: Standard DataSafe with 1 MByte RAM.
DS603A020: Standard DataSafe with 2 MByte RAM.
DS603A040: Standard DataSafe with 4 MByte RAM.
DS603 CUT: Cable, 1m, R04 one end, other blank.
DS603CPC: Cable, 1m, R04 one end, PC D9 other end.