

DT800 PC Card / Compact Flash Card Compatibility

The dataTaker DT800 data logger was designed to work with most ATA memory cards (PC Card and Compact Flash). However not all cards are created equal so there can be compatibility issues. This tech notes lists compatible cards that can be used with DT800 data loggers as well as cards that have shown problems. It also discusses card characteristics, helping to explain why cards can behave differently.

Datataker recommends the use of cards from our standard products pricelist, as these have been tested with our products. The cards that we currently supply are Industrial Grade, more suited to use in industrial applications such as data logging and include a wider operating temperature range.

Compatible Cards

The following cards have been tested without problems being encountered.

Brand / Name	Type	Size
SimpleTech	Compact Flash	64Mbyte
lomega	Compact Flash	32Mbyte
IBM	microdrive	340MByte
Apacer Steno/Steno Pro	Compact Flash	64Mbyte
SanDisk Industrial Grade	Compact Flash	64Mbyte/128Mbyte
Kingmax	Compact Flash	64Mbyte
Verbatim	Compact Flash	64Mbyte
Viking	Compact Flash	32Mbyte

Problem Cards

The following cards have exhibited some problems when used with the DT800 and should be avoided. These problems may have been encountered either during our testing or from customer experience.

Brand/Name	Type	Size
Apacer / SST (consumer grade)	Compact Flash	48Mbyte / 64Mbyte
Pretec	Compact Flash	
MemoryGold	Compact Flash	256Mbyte
PQI	Compact Flash	1GB
PQI (Hi-Speed)	Compact Flash	1GB

Card Characteristics

Memory card specifications for are not always easy to get, especially for consumer targeted cards. This is partially due to the fact that consumer often don't understand, nor want to understand, what all the specifications mean.

PCMCIA or Compact Flash	The DT800 has a single PCMCIA (also known as PC CARD) slot. It readily supports PCMCIA and Compact flash card (via an adaptor). Most cards currently used are compact flash cards. The card must be an ATA flash card, this is important for PCMCIA cards. All compact flash cards are ATA flash cards as this is part of the standard.
Supply Voltage 5V / 3V	Most cards support 3V and 5V operation. The current DT800 firmware always uses 5V operation. 3V only cards are not supported.
Power Consumption	This can vary from card to card and must not exceed the maximum available current in the PCMCIA slot of the DT800 which is ~300mA. It may also be of concern if using low power mode in which case a card with lower average consumption may be of interest. Typically the mini hard drives such as the IBM microdrive cards consume close to 300mA, whereas compact flash cards consume around 50mA during write operations.
Access Speed	Similar to speed rating on memory chips, this is the minimum time that signals must be present when accessing the controller on the memory card. Normally quoted in the range 100nS-350nS. The DT800 firmware (V3.16 & V4.00) always uses worst case of 600nS and does not check the access speed of the memory card. Some beta versions V3.99 used a fixed 250nS, which is a problem for some cards such as Kingmax (access speed of 350nS). The time does not have a noticeable effect on overall performance. Future versions of the DT800 firmware may interrogate the Card Information Structure (CIS) on the card to determine the access speed and set it accordingly.
Performance	The read and write performance of a card can vary from card to card. This is mostly to do with the performance of the on-board controller within the card. The present DT800 firmware does not take advantage of higher performing cards. In fact higher performing cards may perform slightly slower depending on the controller inside the card. In future versions of the DT800 firmware we will be aiming to take advantage of these faster cards.
Memory / I/O Interface	Cards can be accessed in either memory mapped or I/O modes. The DT800 always uses memory-mapped mode.
Maximum Size	The maximum supported card size is 2Gbyte. Larger cards will simply be formatted as 2GB if used with the DT800.
Environmental Specifications	Operating Temperature Range, shock rating and humidity tolerance are specifications that can be important depending on the operating environment of the DT800. Industrial grade cards are usually better suited for use in the range of environments that the DT800 can operate in.

Erase Cycles The number of times a sector on a card can be erased impacts on the useful life of the card. This is typically 10,000 to 1,000,000 times. See Wear Leveling for detailed discussion of card life.

Wear Leveling/ Card Life Most cards include a wear leveling system that is transparent to the user of the card to vastly improve the useable life of the card. By combining the erase cycles and the size of the card with a wear leveling system the life of the card should be many years if used continuously over that period. For typical DT800 applications the life should be longer than your lifetime.

A 64Mbyte card has approx 131,072 x 512 byte sectors. There will also be a number of spare sectors which can be used in case of failed sectors to ensure maximum capacity is always available. This could be as much as 10-50% spare sectors. This will be ignored for this calculation.

Assume we write at a rate of 30x 512 byte sectors per second (about the maximum rate the DT800 can sustain).

Assume worst case of 10,000 write per sector.

It takes $131,072/30 = 4,369.066666667$ seconds = 72.817 minutes to write each sector once.

With perfect wear leveling you should be able to write each sector it's maximum amount of times. Therefore it takes $72.817 * 10,000 = 728,177.7$ minutes = 505 days = 1.3 years before the card will be no longer reliable.

By using a card with 100,000 erase cycles per sector this increases to ~13.8 years.

In practice the DT800 would rarely operate at a sustained rate of 30 sectors per second for any real world application so the life of the card should never really be an issue (unless the card does not provide for wear leveling).

