

Consumer Memory Products: Critical Factors All OEMs Need to Know Prior to Implementing

When an OEM product requires the use of a portable memory device, design engineers and product marketing personnel often consider consumer memory devices like USB flash drives and SD (Secure Digital) memory cards. This is not surprising, as these devices have become an integral part of daily life. However, before implementing a consumer memory device into an embedded system, engineering and marketing teams must be aware of the potential pitfalls that these consumer-focused products can have.

Shortcomings of Consumer Memory Products in OEM Applications

Because USB flash drives and SD cards are so pervasive in today's culture, it is not always intuitive to recognize the risks and costs associated with using these products in embedded OEM devices. Below are just some of the factors that OEMs must consider.

"Some Work, Some Don't."

When we speak with OEMs who have implemented consumer memory devices, virtually all of them report that some models simply didn't work with their embedded system. There are three common ways to address this shortcoming:

1. **Qualify a list of models that have been confirmed to work with the embedded device.**

Although this seems practical, there are a couple of inherent problems with this plan:

- OEMs cannot prevent their customers from using "unqualified" memory devices. These unqualified devices physically fit and may also work just fine in a PC, but when they don't work in the OEM device, this results in increased support calls and leads to questions about the OEM's product quality. Since the consumer memory manufacturer will not have an interest in solving this incompatibility, the OEM is left to fully fund the support costs for each consumer memory device that does not work with the OEM device.
- Consumer memory devices have very short product life cycles (often 6-months to a year). The OEM products using these devices often have much longer product life cycles (often 5 to 10 years or more). This means that over the life of the product, the OEM will need to commit engineering resources to re-qualify new memory devices as they become available (and potentially develop new firmware to support the new devices). Additional resources will also be required to transfer this information (and firmware) to users – all adding to the OEM's support costs.



2. **Require users to purchase the USB flash drive or SD card from the OEM.**

This eliminates perhaps the most compelling reason to use consumer memory – widespread availability. And the two problems listed above still apply. OEMs cannot prevent their users from using unqualified memory devices, and they will need to re-qualify new devices throughout the life of the product.



3. **Use portable memory solutions from Datakey Electronics – designed for OEMs.**

Datakey Electronics' memory Keys and Tokens come with long term availability. Many of our products have been available, unchanged for over 15-years, some for over 20-years, and they are still available today! OEMs don't need to waste valuable engineering time re-qualifying new memory devices or re-designing their system due to obsolescence. Also, because of our products' unique physical interface, unqualified consumer memory devices cannot be used (they don't physically fit). All of these factors **increase revenue, increase security, decrease support costs, and increase customer satisfaction!**



"SD Cards and USB Flash Drives are not Very Rugged."

When an OEM device requires a portable data carrier system, the design team must consider how the data carrier will be used and account for the environment the product will operate in. These considerations are explained further below.

Mated Cycle-Life

Because of the connector systems used in consumer USB and SD memory products, devices that implement them by their nature are not rugged. These connectors were designed for consumer products, not military or industrial applications. For example: USB Type A connectors, which all USB flash drives use, have a mating cycle life of only 1500-cycles. At just 10-cycles per day, this means the USB connector will have reached the end of its rated life after only 5-months! Datakey Electronics, on the other hand, offers Receptacle options with cycle ratings of 25,000; 50,000; and 200,000 cycles.

Environmental Considerations

Because SD cards and USB flash drives are consumer-focused products, they are not designed to operate in harsh environments. When choosing a data carrier system, design teams must consider what environmental factors the data carrier and the receptacle could be exposed to. These could include: extreme temperatures, shock & vibration, high-humidity/wash-down, immersion, salt-fog, dust & sand, freezing rain, chemicals, ESD, high number of mating-cycles, etc. Design teams must consider these factors, not only for the memory device itself, but also for the system (the memory device and its mating receptacle). Most often, the cost to design, tool and manufacture a solution that will protect mass-market memory devices from the environment will far exceed the cost savings realized by using these products.

USB and SD "Standards" can and do Change!

Implementing USB or SD memory devices may seem like a wise decision, since these are "standards", but history shows that these "standards" are driven by the consumer market—they can and have changed—frequently. These changes can adversely affect embedded OEMs who adopt these products.

Example: SD and SDHC

The SD Card Association has released SDHC as an extension to the SD standard. The SDHC cards use the same physical and electrical form factor as the earlier SD cards, but use a different addressing method. This means that embedded devices designed to use SD cards won't be able to read from or write to the newer SDHC cards (without a firmware update) even though they fit in the receptacle. In other words, SDHC cards are NOT backwards compatible with SD systems. As SDHC cards become the dominant consumer format, this will surely lead to issues for OEMs that used SD cards.



Data Carrier System Checklist

	SD Cards	USB Flash Drives	Datakey Products
Controlled Supply of Quality, Tested OEM-focused Memory —Know your users are always using quality tested memory	No	No	✓
Memory is Guaranteed to Work in the OEM Device —Avoid consumer memory's "Some Work, Some Don't."	No	No	✓
Controlled Connector—Only Approved Products Fit —Users can't plug in untested, unqualified consumer memory	No	No	✓
Long Product Life Cycle —No continual qualification of new memory products due to approved product's obsolescence	No	No	✓
Rugged, Reliable, Harsh-Environment Receptacles —Why risk using a light-duty connector in harsh environments?	No	No	✓
Receptacles Have High Mated Cycle-Life —At 10 cycles/day, USB = 5-months. Datakey's SR Receptacles = 13+ Years!	No	No	✓
Memory Devices are Rugged: Immersion, Temp, Shock, ESD —Consumer memory products are not truly rugged	No	No	✓
Memory Manufacturers are Focused on Industrial OEMs —Consumer memory manufacturers focus on consumer OEMs	No	No	✓
Unique Form Factor Discourages Misuse & Theft —USB thumb drives and SD cards are targets for misuse and theft	No	No	✓
Unique Form Factor Contributes to Data Security —By design, Datakey products do not plug into standard PC ports	No	No	✓
A Full Range of Memory Sizes Are Available —Why pay extra for GBytes when your application requires far less?	No	No	✓

