

# Always at the Forefront of Solid State Storage Technology

## OVERVIEW

Dedicated to providing leading-edge technology to the Defense Industry, Memkor offers rugged, field-proven, feature-rich, and with certified security functions commercial off the shelf (COTS) solid state storage solutions.

We utilize high-reliability components, standard or specialized firmware, locked Bill of Materials, obsolescence management, and a commitment to customer service throughout the program life cycle.

Whether SATA, PCIe, PATA, SAS, or SCSI interfaces, Memkor has the experience and engineering talent to make your program successful.

For more than a decade, Memkor has been a trusted supplier on major Defense projects for high and low volume, standard and non-standard form factor solid state drives (SSD). Fulfilling your program's storage requirements is Memkor's mission.

## CURRENT DEPLOYMENTS

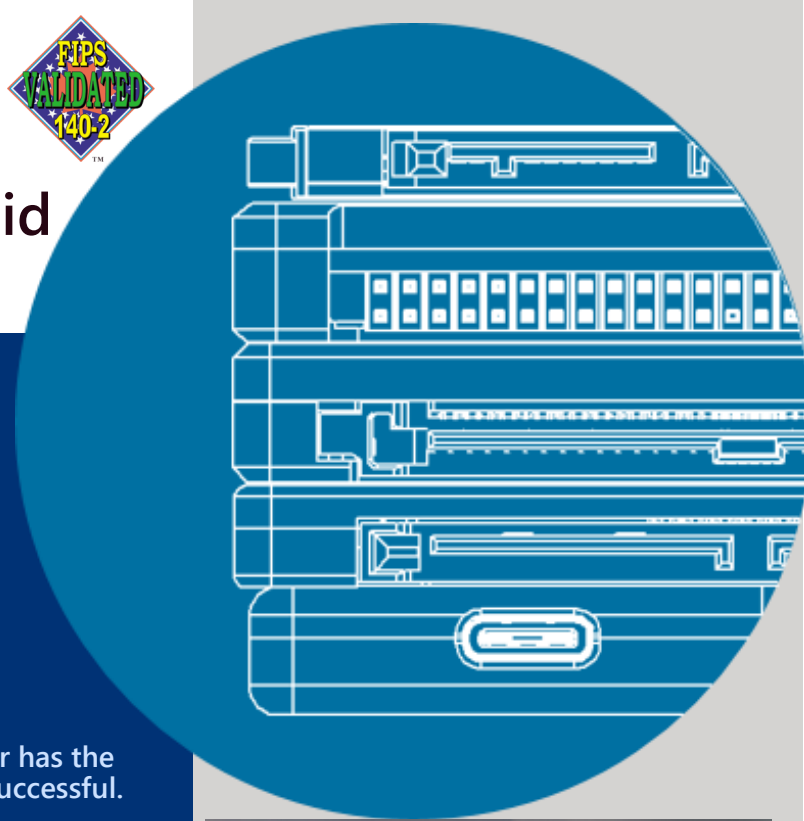
Memkor delivers military grade Solid State Storage to many programs that span through the U.S. Navy and Marines, Army, Air Force and internationally across other NATO countries Defense programs. Memkor devices are successfully deployed around the world and in all environmental and situational conditions.

Some of the projects include the deployment of highly rugged Black Series SSDs in applications such as:

- ◆ The advanced, ruggedized airborne targeting system
- ◆ State of the art rugged situational awareness multi-domain data router for the airborne platforms.

Other field deployments include high performance and versatility Orange and Blue Series SSDs used in applications such as:

- ◆ The Acoustic-Rapid COTS Insertion program for the U.S submarines and surface ships
- ◆ Several applications within the Abrams Main Battle Tank and Stryker Combat Vehicle programs.



## OPTIMIZED FOR DIFFERENT APPLICATIONS

Memkor's Solid State Storage families, while sharing a wide range of the most commonly used features, functions, and options, are optimized to target diverse Defense applications:

### ORANGE Series

If your application requires standard form factor, feature set and ruggedness levels suitable for harsh environments, the ORANGE Series may be the answer. It is built with high quality industrial grade MLC or pSLC NAND or the most reliable SLC NAND available today. With carefully selected BOM and mature firmware, it is backed by 5 year/TBW warranty. The security features go up to FIPS 140-2 compliant and validated solutions. The family supports SATA, PCIe/NVMe, USB, SAS or PATA interface.

ORANGE Series  
U.2 PCIe/NVMe



ORANGE



**BLUE Series** — tailored and non-standard rugged form factors to enable the M+ Capacity extra storage and maximum density and supporting SATA, PCIe/NVMe, SAS or USB interface. It includes increased height 2.5"/U.2, tailored mSATA and M.2 boards compatible with standard mounting and physical interfaces and proprietary form factors. Card based storage solutions are also part of *BLUE Series* family. The *BLUE Series* SSD's are built using the most reliable industrial grade pSLC or MLC NAND and covered with 5 yearTBW warranty

BLUE Series  
2.5" 0.591" H SATA



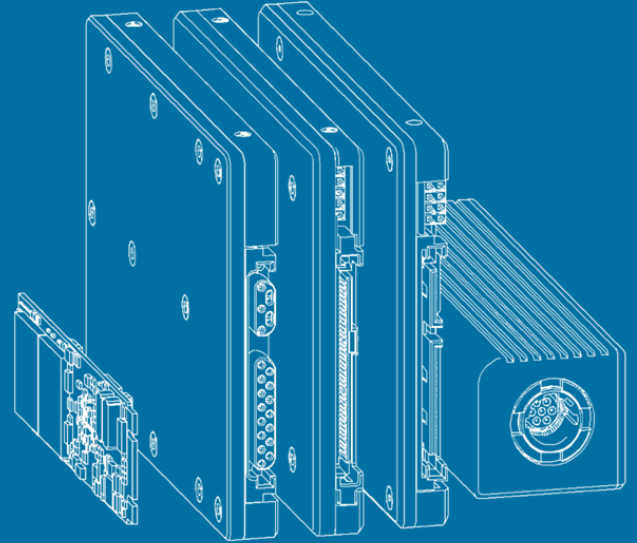
**BLACK Series** — standard and non-standard form factor M+ Ruggedized solutions for the most extreme environment for up to 30 GRMS vibration load, virtually unlimited number of insertions solutions, external storage with 38999 connectors and for up to -50°C to 95°C operations. The *BLACK Series* SSD's are built using the most reliable SLC NAND currently available (M73A) or the latest industrial grade pSLC or MLC NAND. The *BLACK*

BLACK Series  
2.5" SATA with standard  
and HiVibe connectors



**WHITE Series** — virtually all standard form factors supporting most common interfaces (SATA and PCIe/NVMe) and leveraging the latest NAND technology such as industrial grade TLC NAND and QLC NAND for maximum capacity and designated for temperature controlled deployment environments. The *WHITE Series* SSDs are covered with 3 year/TBW warranty.

## M+ SECURE FIPS 140-2 / FIPS 197 Validated SSDs



### VALUES

- ◇ FIPS 140-2 or FIPS 197 validated
- ◇ TCG OPAL option
- ◇ Crypto Erase – takes milliseconds
- ◇ HW or SW triggered Secure Erase
- ◇ HW or SW enabled Write Protect
- ◇ Use of high reliability components
- ◇ Long life component selection
- ◇ Obsolescence management
- ◇ Optional Locked Bill of Material
- ◇ Each drive thoroughly tested
- ◇ End-to-end Data protection
- ◇ End-to-end operation monitoring
- ◇ High field MTBF
- ◇ Broad range of interfaces
- ◇ Broad range of form factors
- ◇ Your design support

## SELECTED STANDARD SSD's

| Form Factor | Series              | Capacity Range <sup>(1)</sup> [GB] | I/F       | Read <sup>(2)</sup> [MB/s] | Write <sup>(2)</sup> [MB/s] | GRMS | Security (Validated) |
|-------------|---------------------|------------------------------------|-----------|----------------------------|-----------------------------|------|----------------------|
|             | ORANGE              | 32 - 4,096                         | SATA      | 450-550                    | 60-520                      | 16.3 | FIPS 197, FIPS 140-2 |
| 2.5"        | BLUE <sup>(3)</sup> | 8,192-16,384                       | SATA      | 520-550                    | 500-520                     | 16.3 | FIPS 197             |
| 2.5"        | BLACK               | 32-2,048                           | SATA      | 450-550                    | 80-500                      | 30.0 | FIPS 197             |
| mSATA       | ORANGE              | 32-512                             | SATA      | 400-500                    | 150-350                     | 3.0  | FIPS 197             |
| 1.8"        | ORANGE              | 32-2,048                           | SATA      | 250-550                    | 80-500                      | 16.3 | FIPS 197             |
| M.2 2260    | ORANGE              | 128-512                            | SATA      | 450-500                    | 300-500                     | 3.0  | FIPS 197             |
| M.2 2280    | ORANGE              | 32-1,024                           | SATA      | 450-500                    | 80-350                      | 2.0  | FIPS 197, FIPS 140-2 |
| M.2 2280    | BLUE <sup>(3)</sup> | 2,048-4,092                        | SATA      | 450-550                    | 450-520                     | 2.0  | FIPS 197             |
| M.2 22110   | ORANGE              | 1,024-2,048                        | SATA      | 450-550                    | 450-520                     | 2.0  | FIPS 197             |
| 3U VPX      | BLUE                | 1,024-8,192                        | SATA      | 450-550                    | 450-520                     | 2.5  | FIPS 197, FIPS 140-2 |
| U.2/2.5"    | ORANGE              | 512-4,096                          | PCIe/NVMe | 600-1200                   | 1100-1200                   | 16.3 | FIPS 197, FIPS 140-2 |
| U.2/2.5"    | BLUE <sup>(3)</sup> | 8,192-16,384                       | PCIe/NVMe | 1000-1200                  | 1100-1200                   | 16.3 | FIPS 197             |
| M.2 2280    | ORANGE              | 128-512                            | PCIe/NVMe | 800-1000                   | 300-600                     | 2.0  | FIPS 197             |
| M.2 2280    | BLUE <sup>(3)</sup> | 1,024-4,092                        | PCIe/NVMe | 900-1200                   | 800-1000                    | 2.0  | FIPS 197             |
| M.2 22110   | ORANGE              | 1,024-2,048                        | PCIe/NVMe | 900-1200                   | 800-1000                    | 2.0  | FIPS 197             |
| 3U VPX      | BLUE                | 1,024-8,192                        | PCIe/NVMe | 900-1200                   | 800-1000                    | 2.5  | FIPS 197, FIPS 140-2 |

(1) Capacity range covers SLC, MLC and TLC NAND based SSD's.

(2) Performance depends on drive capacity and also on the computer system. Typically, the smaller drive capacity, the lower the performance.

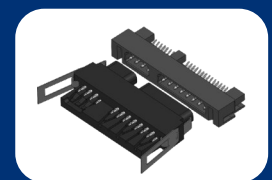
(3) SSD has an increased height as compared to the standard to provide more capacity.

Please contact us for information on other products.

## SELECTED SPECIALTY PRODUCTS

### HiVibe<sup>®</sup> SATA Connector

Standard SATA connectors are rated for 6g RMS vibration and 100-600 insertions. The traditional approach to address these limitations requires extra hardware and cost. Within the M<sup>+</sup> Ruggedized strategy, Memkor offers a solution—HiVibe, a drop in replacement for standard SATA connectors. HiVibe is rated for more than 30g RMS and 20,000 insertion cycles.



Straddle and Cable HiVibe SATA

### MAAD<sup>®</sup> 192TB 1U SSD

Memkor Anything Attached Drive (MAAD) is a 1U, short depth, 19" rack mounted solid state storage that can be configured as a standard SATA, PCIe/NVMe or NVMeoF/ROCE2 storage device. It offers up to 192TB of capacity, reliable operations in extended temperatures and security features that may include FIPS 140-2 applications.



BLUE Series: 1U 19" SSD

### FRED<sup>®</sup> Add-on ATR Storage

Flash Ruggedized External Drive (FRED) provides an easy to deploy, highly ruggedized and high performance up to 4TB flash storage module that can be attached via cable or directly to an ATR or an ATR-like enclosures via 38999 grade connectors. Ideal as a replacement to storage cards, freeing valuable slots for other functions that can help to extend the life of the existing systems. FRED supports Memkor standard data at rest security features for up to FIPS 140-2.



BLACK Series FRED



## MEMKOR—PART OF YOUR PROJECT

### Design Support

Designing new computer and computer storage for Defense applications often pushes system operational envelope into an unknown territory, close to the edges or beyond industry standards, making detailed design a challenge. We've been there. Memkor is happy to offer its expertise and experience and help in this process.

### Production Testing

While ruggedized design and special purpose Bills of Material are the requirements for the Defense market, each Memkor production SSD undergoes stiff functional and Environmental Stress Screening (ESS) tests to eliminate risks such as infant mortality and machine and/or human errors and ensure the highest overall reliability and durability.

### Locked BOM Management

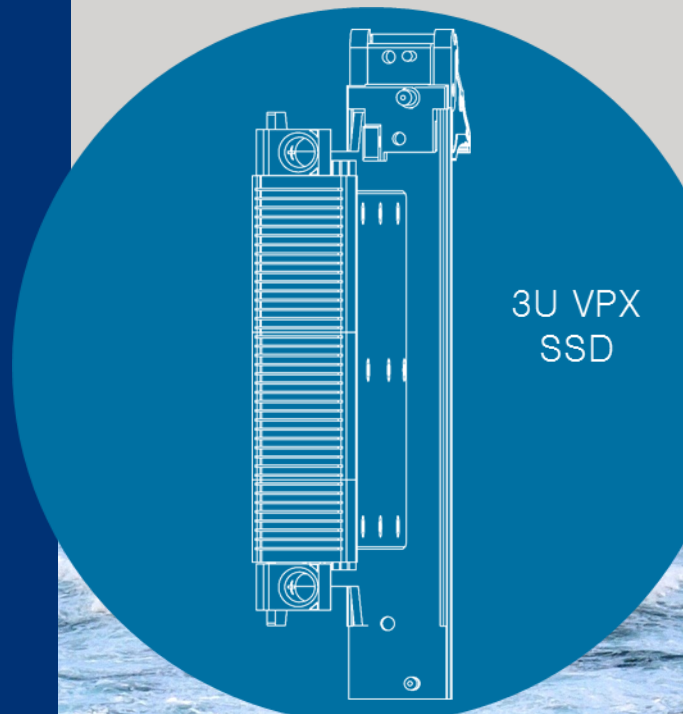
Loyal to Defense and Industrial markets, MEMKOR offers Locked Bill-of-Materials (L-BOM) utilizing high reliability components, Firmware tailoring and are committed to providing excellent engineering support throughout the products life cycle. Last Time Buy and End-of-Life notices are available to users of MEMKOR's Locked BOM products.

### Obsolescence Management

Part of Memkor Locked Bill of Material (L-BOM) management is periodic scrubbing of the BOM for any potential early warning of the risk of obsolescence. Should such risk or issue be identified, Memkor notifies the L-BOM owners, offers Last Time Buy process and most of all works with customers on an alternative solution.

### Field MTBF and DfR

One of Memkor's Key Performance Indicators (KPI) is field MTBF. We track each Series and form factor as well as major firmware branch reliability performances. We can compute the field MTBF for any part number and/or firmware version. We review the field MTBF regularly making sure that we are continuously improving our products. Furthermore, we are using the field reliability data as an input to our new designs as a part of our Design for Reliability (DfR) process. We have our own database of field proven components including ROHS non-compliant part when needed. We conduct Finite Element Analysis (FEA) of all critical SSD designs when heat generation or structural integrity are technical risks.



Memkor® is an American engineering company dedicated to providing flash solid state storage solutions for defense, industrial and enterprise applications. We create secure, reliable, robust and innovative solutions with rich feature sets, tailored, as required, to meet your technology investment objectives. We are dedicated to delivering on our promises. We simply believe that your satisfaction enables the continuous success of our company.



Memkor, Inc., 10051 E Dynamite Blvd., Suite 120, Scottsdale, Arizona 85262, USA

Tel: 602.424.6246  
Fax: 480.657.0298

<https://www.memkor.com>  
email: sales@memkor.com

ISO 9001:2015 Certified



Preferred Registrar Group Inc.