

# ORANGE Series

## Rugged M.2 SATA or PCIe/NVMe SSD's

### OVERVIEW

The M.2 solid state drive form factor evolves from the mSATA add-in card standard improving storage deployment flexibility. It supports both SATA and PCIe interfaces. Since it is designed around the standard dimensions of NAND chips, it provides higher GB/volume storage density. The standard lengths between 42mm and 110mm enable capacity scalability. Through minimized allowance for the components height on the top and bottom, and minimized PCB thickness, the M.2 profile is reduced as compared to designed for similar applications mSATA, and makes it suitable for applications with really limited space. Memkor offers up to 2048/1024 GB of MLC/SLC NAND in a minimized weight, small form factor M.2 package.

### M+ SECURITY - CUTTING-EDGE DATA PROTECTION

Memkor's ORANGE Series M.2 SSDs ensure Data at Rest (DAR) protection through the embedded FIPS 197 validated encryption engine. In addition, some models are validated under FIPS 140-2, Level 2 program that includes strength testing of algorithms and methods used to authenticate users, safe-keeping of security parameters and anti-tempering measures. The encryption management is either FIPS validated procedures or TCG OPAL method. Both use the concept of Shadow MBR thus allowing for pre-boot authentication and the use of the SSD as a boot drive.

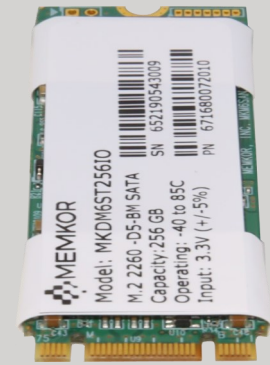
Data protection includes a Write Protect function option which ensures data integrity and prevents malicious or accidental Data alteration. The Write Protect function can be enabled and disabled by the user through software or hardware triggering.

### RELIABILITY

Through the use of the highest reliability MLC and SLC NAND, combined with the state of the art flash management techniques, strong EDC/ECC/CRC, end-to-end data protection strategy and sudden power loss safeguards integrated in software and hardware, Memkor's ORANGE Series SSDs provide the highest level of reliability, durability and endurance.

### CLIENT or ENTERPRISE CLASS OPERATIONS

Designed for extreme temperatures, Memkor's ORANGE Series M.2 SSDs can be optimized for Client operations such as boot drives or Enterprise class operations to maximize performance and reduce latencies.



### SUMMARY

- M.2 2260/2280/22110
- PCIe 2.0 x 4/NVMe 1.1 or
- SATA 6G, 3G, 1.5G
- Client and Enterprise versions

### M.2 FORM FACTOR (FF) APPLICATIONS

- FF optimized for embedded applications
- Where low SWaP is the driving factor
- Either SATA or PCIe interface
- Lower height and width than mSATA
- Multiple standard lengths to scale capacity
- Where highest performance is not required
- For relatively low shock/vibration applications
- PCIe version performance may be reduced at extreme temperatures

### MEMKOR ORANGE SERIES ADDED VALUE

- Selected models FIPS 140-2 Level 2 validated
- All models FIPS 197 validated
- Optional TCG OPAL
- HW or SW triggered Crypto and Secure Erase
- HW or SW enabled Write Protect
- Use of high reliability components
- End-to-end Data protection
- End-to-end operation monitoring
- Sudden power loss safeguards
- Good for extreme temperature operations
- Each SSD thoroughly tested
- Locked BOM options
- Obsolescence management
- 5 year/TBW warranty

## ABOUT ORANGE SERIES

Memkor's 3rd generation Orange Series SATA and PCIe SSDs aim to provide the highest throughput performance combined with the highest capacities available in the standard form factors. They are built with high quality industrial grade MLC, pSLC NAND or the most reliable SLC NAND available today. With carefully selected BOM and mature firmware, it is backed by 5 year limited warranty. The family supports SATA, PCIe/NVMe, USB, SAS or PATA interface. All Memkor products are available with locked BOM configurations and Supply Chain component management for long-term deployment applications.

## MEMKOR—PART OF YOUR PROJECT

- We will support your design process
- Each SSD undergoes ESS test
- We offer Locked BOM Management
- We offer obsolescence management

## MEMKOR ORANGE SERIES M.2 SPECIFICATION<sup>(5)</sup>

Form Factor	M.2 2260	M.2 2280	M.2 22110
Dimensions	60 x 22 x 4.9 [mm]	80 x 22 x 4.9 [mm]	110 x 22 x 4.9 [mm]
Interface	SATA or PCIe Gen 2		
Capacity	32—512 GB	32– 1,024 GB	1,024-2,048 GB
Performance	SATA: Write: up to 350 MB/s Read: up to 500 MB/s PCIe Write: up to 500 MB/s Read: up to 800 MB/s	SATA: Write: up to 500 MB/s Read: up to 500 MB/s PCIe Write: up to 600 MB/s Read: up to 1000 MB/s	SATA: Write: up to 500 MB/s Read: up to 550 MB/s PCIe Write: up to 1000 MB/s Read: up to 1200 MB/s
Operating Temperature	Military: -40 to 85 °C		
Power Consumption	SATA: MLC NAND: up to 4.5W pSLC NAND: up to 3.0W PCIe MLC NAND: up to 6.5 W pSLC NAND: up to 7.5W	SATA: MLC NAND: up to 4.8W pSLC NAND: up to 3.5W PCIe MLC NAND: up to 11.0W pSLC NAND: up to 8.0W	SATA: MLC NAND: up to 5.3W pSLC NAND: up to 3.9W PCIe MLC NAND: up to 13.0W pSLC NAND: up to 9.0W
Security	FIPS 197 AES-256	FIPS 197 AES-256 FIPS 140-2 <sup>(1)</sup>	FIPS 197 AES-256
Endurance <sup>(2)</sup>	400 TBW (512 GB MLC NAND) 4,100 TBW (512 GB pSLC NAND)		
Data Reliability	Flash managed by static and dynamic wear leveling and powerful ECC/CRC End-to-end Data Protection Uncorrectable bit error rate (UBER): less than 10 <sup>-16</sup>		
Data Retention	1 year at 30°C when power off and TBW reached <sup>(4)</sup>		
Reliability	MTBF: >1,000,000 <sup>(3)</sup>		
Health monitoring	S.M.A.R.T. to report system health; Thermal performance monitoring and management		

- (1) Selected models  
 (2) Per JEDEC219. Contact Memkor for TBW for other capacities and specific workloads.  
 (3) Contact Memkor for MTBF prediction for specific environmental conditions and field MTBF data.  
 (4) Per JESD47/JEP122. Contact Memkor for Data Retention prediction for your application.  
 (5) Refer also to Industrial TLC/QLC NAND based WHITE Series M.2 SSD specifications

DISCLAIMER: Memkor, Inc. reserves the right to change products, specifications and information without notice.

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.



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