

Industrial 3D TLC NAND M.2 2242 NVMe SSD

MEA3F0 E SERIES

PCIe Gen3x4

DRAM-less

3K PE Cycles

3D TLC NAND



PRODUCT FEATURES

- High-Quality 112-layer 3D TLC NAND Flash Technology
- Industrial Standard PCIe Gen3.0x4 with NVMe 1.3 Compliant
- Support TRIM command to remove data not in use to keep optimized performance.
- Dynamic SLC caching algorithm to deliver the better sustained performance.
- “Predict & Fetch” mechanism to improve read performance.
- When SSD is going to worn-out to activate Read Only Mode to prevent further data corruption.
- Lifetime Enhancements
 - Support Both Dynamic wear leveling and Static wear leveling.
 - Early bad block detect and Later bad block management.
 - Over-provisioning to reserve extra space to enhance reliability and endurance. (by request)
 - Block/Page RAID function to ensure data recovery.
- Reliable Industrial grade integrated Active PMU and complete protection design with OVP, OCP, surge rejection and Short protection
- Power shielding firmware architecture to ensure power failure resilience
- SP SMART Toolbox
- SP SMART Embedded and SMART IoT service (by request)
- Driven by a growing number of IOPS in heavy data applications, the biggest benefit of PCIe-based SSD is increased performance. Reach up to R:2450 MB/s and W:2150 MB/s based on 16CE NAND flash.

PRODUCT SUMMARY

- Capacities : 256GB · 512GB, 1TB, 2TB
- Form Factor : M.2 2242 PCIe Solid State Drive (42 mm x 22 mm x 3.5 mm)
- Compliance : PCIe Gen3.0x4 compliant with Gen1.0/2.0/3.0
- Command Sets : NVMe1.3 standard command protocol.
- Performance : *(estimated)*

	240/256GB	480/512GB	960GB/1TB	1.9/2TB
Sequential Read (MB/s Max.)	2,250	2,400	2,400	2,450
Sequential Write (MB/s Max.)	1,050	1,700	1,900	2,150
Random 4K Read (IOPS Max.)	110,000	170,000	200,000	250,000
Random 4K Write (IOPS Max.)	230,000	360,000	400,000	400,000

* Actual performance may vary based on the specific model and capacity

- Operating Temperature Range :
Normal : 0°C to 70°C
- Storage Temperature Range : -55°C to 95°C
- Operating Voltage : 3.3 V ± 10%
- Power Consumption : *(estimated)*

(Unit: mW)	240/256GB	480/512GB	960GB/1TB	1.9/2TB
Read (Max.)	2730	3020	3240	3470
Write (Max.)	1950	2890	3080	3350
Stand-by (Avg.)	30	30	30	30

* Actual value may vary based on the specific model and capacity

- Data Retention @40 °C : 10 Years @ Life Begin; 1 Year @ Life End
- Endurance in Tera Bytes Written (TBW) : *(Unit: TB) (estimated)*

Workload	240/256GB	480/512GB	960GB/1TB	1.9/2TB
Sequential	>200	>400	>800	>1600
Enterprise	TBD	TBD	TBD	TBD

TBW is estimated by formula $TBW = (\text{Capacity} \times \text{PE Cycles}) \times (1 + \text{OP}) \times (\text{WLE}) / (\text{WAF})$

$\text{OP (Over Provision)} = (\text{Physical Capacity} / \text{Logical Capacity}) - 1$

$\text{WAF} = \text{Write Amplification Factor}$

$\text{WLE} = \text{Wear Leveling Efficiency}$ could be different depended on the workload or usage containing data size and access rate.

Sequential workload: Sequential write workload which is generated by VDBENCH script and tested by VDBENCH

Enterprise workload: Follow JESD219A enterprise workload which is generated by VDBENCH script and tested by VDBENCH.

- Mechanical (IEC-60068) :
Vibration : 15G, 10 ~ 2001Hz
Drop : 76cm
Shock : 1,500G@0.6ms
- LDPC ECC engine and Block/Page RAID to ensure reliable 3K PE cycles
- Mean Time Between Failure : > 2,000,000 hours
- Data Reliability: Non-recover Read (UBER) $\leq 10^{-16}$
- Serious quality control and assurance
100% NAND Flash screening
High endurance product design with 3D NAND product offerings
Implement high/low temperature dynamic burn-in in each lot production to monitor production quality to meet design specification
Reliability criteria compliant with international standards IEC-60068/61000