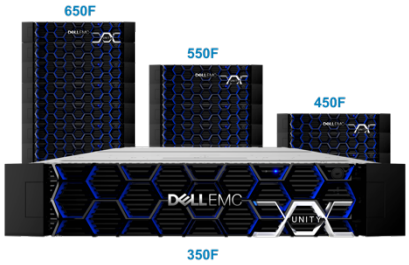
DELL EMC

SPECIFICATION SHEET




# DELL EMC UNITY ALL-FLASH STORAGE

## The ultimate in simplicity & all-flash value

The Dell EMC Unity™ All-Flash product line sets new standards for storage with compelling simplicity, modern design, flexible deployments and affordable prices– to meet the needs of resource-constrained IT professionals in large or small companies.

If you are looking for raw power and absolute simplicity in a small footprint, if you are cost-conscious and need the best from the best, Dell EMC Unity All-Flash is for you. Designed for flash with all-inclusive software, it delivers consistent performance with low response times.

## Architecture

Based on the powerful new family of Intel E5-2600 processors, Dell EMC's Unity All Flash storage systems implement an integrated architecture for block, file, and VMware VVols with concurrent support for native NAS, iSCSI, and Fibre Channel protocols. Each system leverages dual storage processors, full 12 Gb SAS back end connectivity and Dell EMC's patented multicore architected operating environment to deliver unparalleled performance & efficiency. Additional storage capacity is added via Disk Array Enclosures (DAEs) and for additional performance, online controller upgrades are available.

## Physical Specifications

| | 350F | 450F | 550F | 650F |
|---|---|---|---|---|
| Min/Max Drives | 6/150 | 6/250 | 6/500 | 6/1000 |
| Array Enclosure | A 2U Disk Processor Enclosure (DPE) with twenty five 2.5" drives | | | |
| Drive Enclosure (DAE - Disk Array Enclosure) | All models support 2U twenty five drive and 3U eighty drive trays for 2.5" drives | | | |
| Standby Power System | Dell EMC Unity systems are powered by 2 power supplies (PS) per DPE/DAE. Each power supply can provide power to the entire module if the peer PS has been removed or is faulted. DPE power during a power failure is provided by a Battery Back Up (BBU) module. BBU is located within the SP enclosure and provides power to a single module (power zone) | | | |
| RAID Options | 1/0, 5, 6 | | | |
| CPU per Array | 2 x Intel 6-core, 1.7GHz | 2 x Intel 10-core, 2.2GHz | 2 x Intel 14-core, 2.0GHz | 2 x Intel 14-core, 2.4GHz |
| Memory per Array | 96 GB | 128 GB | 256 GB | 512 GB |
| Max IO Modules per Array* | 4 | 4 | 4 | 4 |
| Embedded SAS IO Ports per Array | 4 x 4 lane 12Gb/s SAS ports for BE (back end) Connection | 4 x 4 lane 12Gb/s SAS ports for BE Connection | 4 x 4 lane 12Gb/s SAS ports for BE Connection | 4 x 4 lane 12Gb/s SAS ports for BE Connection |

| | 350F | 450F | 550F | 650F |
|---|---|---|---|---|
| Optional SAS IO ports per Array | NA | NA | 8 x 4 lane or 4 x 8 lane 12Gb/s SAS ports (for BE Connection) | 8 x 4 lane or 4 x 8 lane 12Gb/s SAS ports (for BE Connection) |
| Base 12 Gb/s SAS BE Buses per Array | 2 x 4 Lane | 2 x 4 Lane | 2 x 4 Lane | 2 x 4 Lane |
| Max 12 Gb/s SAS BE Buses per Array | 2 x 4 Lane | 2 x 4 Lane | 6 x 4 Lane; or 2 x 4 lane and 2 x 8 lane | 6 x 4 Lane; or 2 x 4 lane and 2 x 8 lane |
| Max FE (front end) Total Ports per Array (all types) | 24 | 24 | 24 | 24 |
| Max Initiators per Array | 1,024 | 2,048 | 2,048 | 4,096 |
| Max FC Ports per Array | 20 | 20 | 20 | 20 |
| Embedded 10GbaseT Ports per Array | 4 | 4 | 4 | 4 |
| Embedded CNA ports per Array | 4 ports: 8/16 Gb FC**, 10Gb IP/iSCSI, or 1Gb RJ45 | 4 ports: 8/16 Gb FC**, 10Gb IP/iSCSI, or 1Gb RJ45 | 4 ports: 8/16 Gb FC**, 10Gb IP/iSCSI, or 1Gb RJ45 | 4 ports: 8/16 Gb FC**, 10Gb IP/iSCSI, or 1Gb RJ45 |
| 1 GbaseT/iSCSI Max Total Ports per Array | 24 | 24 | 24 | 24 |
| 10 GbE/iSCSI Max Total Ports per Array | 24 | 24 | 24 | 24 |
| Max Raw Capacity*** | 2.4 PBs | 4.0 PBs | 8.0 PBs | 16.0 PBs |
| Max SAN Hosts | 512 | 1,024 | 1,024 | 2,048 |
| Max Number of Pools | 20 | 30 | 40 | 100 |
| Max Number of LUNs per Array | 1,000 | 1,500 | 2,000 | 6,000 |
| Max LUN Size | 256 TB | 256 TB | 256 TB | 256 TB |
| Max file systems per Array | 1000 | 1500 | 2000 | 4000 |
| Max File System Size | 256 TB | 256 TB | 256 TB | 256 TB |
| Max attached snapshots per Array (Block) | 1000 | 1500 | 2000 | 6000 |
| IOPS**** | up to 130K | up to 305K | up to 395K | up to 440K |
| OS Support | See EMC Simple Support Matrix on emc.com | | | |

* Two IO Modules per Storage Processor (SP), mirrored.
** 16Gb available in both single mode and multimode.
*** Maximum raw capacity will vary based on drive sizes available at time of purchase.
**** 100% Reads, 8K block size

## Connectivity

Connectivity options via IO modules for both the file for NFS/SMB connectivity and the block storage for FC and iSCSI host connectivity (see above table for number of modules supported per SP).

| IO Module Options | |
|---|---|
| **IO Module** | **Description** |
| Four-Port 16 Gb/s Fibre Channel Module (Block only) | Four port FC module with four ports auto-negotiating to 4/8/16 Gbps; uses single mode or multimode optical SFP and OM2/OM3/OM4 cabling to connect directly to host HBA or FC switch |
| Four-Port 1 GBASE-T Module (File & Block) | Four port 1GbaseT for IP/iSCSI module with four 1 GBaseT RJ-45 copper connections to Cat 5/6 cabling to Ethernet switch |
| Four-Port 10 GBASE-T Module (File & Block) | Four port 10GbaseT Ethernet IP/iSCSI module with four 10 GBaseT Ethernet ports with copper connection to Ethernet switch |
| Two-Port 10 Gb/s Optical Module (File & Block) | Two port 10GbE IP/iSCSI module with choice of SFP+ optical connection or active/passive twinax copper connection to Ethernet switch; includes iSCSI offload engine |
| Four-Port 10 Gb/s Optical Module (File & Block) | Four port 10GbE IP/iSCSI module with choice of SFP+ optical connection or active/passive twinax copper connection to Ethernet switch |
| Four-Port 12 Gb/s SAS V3.0 Module* | Four port SAS module, used for back-end storage (DAE) connectivity to Block Storage Processors. Each SAS port has 4 lanes/port @ 12Gbps, delivering 48Gbps nominal throughput. Also available specifically for the 80 drive DAE is 8 lane connectivity utilizing a pair of SAS ports to deliver high bandwidth for added performance. |
| *Only for 550 and 650 models | |

## Maximum Cable Lengths

Shortwave optical OM3: 100 meters (16 Gb) 150 meters (8 Gb), 380 meters (4 Gb), and 500 meters (2 Gb)
Shortwave optical OM4: 125 meters (16 Gb) 190 meters (8 Gb), 400 meters (4 Gb), and 500 meters (2 Gb)

## Back-end (Drive) Connectivity

Each storage processor connects to one side of each of two redundant pairs of four-lane x 12 Gb/s Serial Attached SCSI (SAS) buses, providing continuous drive access to hosts in the event of a storage processor or bus fault. All models require four “system” drives and support a platform specific maximum number of disks (see Physical Specifications table above). 107 GB per system drive is consumed by the operating environment software and data structures.

| Disk Array Enclosure (DAE) | | |
|---|---|---|
| | 25 X 2.5” Drive DAE | 80 X 2.5” Drive DAE |
| Drive Types Supported | FLASH | FLASH |
| Controller Interface | 12 Gb SAS | 12 Gb SAS |

| Solid State Disk Drives | | | | | | | |
|---|---|---|---|---|---|---|---|
| Nominal Capacity | 400 GB SSD | 800 GB SSD | 1.6 TB SSD | 1.92 TB SSD | 3.84 TB SSD | 7.68TB SSD | 15.36 TB SSD |
| Formatted Capacity (GB)* | 366.7 | 733.5 | 1467.45 | 1751.9 | 3503.9 | 7006.9 | 14014.9 |
| Supported in 25 drive DAE/DPE and 80 drive DAE | √ | √ | √ | √ | √ | √ | √ |
| Interface | 12 Gb SAS | | | | | | |
| NOMINAL POWER CONSUMPTION (WATTS) | | | | | | | |
| Operating Mode | 4.25 | 4.25 | 4.25 | 4.25 | 4.25 | 4.25 | 4.25 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Idle Mode | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |

*GB = Base2 GiB (GB = 1024x1024x1024)

## Dell EMC Unity OE Protocols and Software Facilities

Support is provided for a wide variety of protocols and advanced features available via various software suites, plug-ins, drivers and packs.

| Protocols and Facilities Supported | | |
|---|---|---|
| Access-based Enumeration (ABE) for SMB protocol | Address Resolution Protocol (ARP) | Block Protocols: iSCSI, Fibre Channel (FCP SCSI-3) |
| Controller based Data at Rest Encryption (D@RE), with self-managed keys | DFS Distributed File System (Microsoft) as Leaf node or Standalone Root Server | Direct Host Attach for Fibre Channel and iSCSI |
| Dynamic Access Control (DAC) with claims support | Fail-Safe Networking (FSN) | Internet Control Message Protocol (ICMP) |
| Kerberos Authentication | Key Management Interoperability Protocol (KMIP) compliant external key manager for D@RE | LDAP (Lightweight Directory Access Protocol) |
| LDAP SSL | Link Aggregation for File (IEEE 802.3ad) | Lock Manager (NLM) v1, v2, v3, and v4 |
| Management & Data Ports IPv4 and/or IPv6 | NAS Servers Multi-protocol for UNIX and SMB clients (Microsoft, Apple, Samba) | Network Data Management Protocol (NDMP) v1-v4 |
| Network Information Service (NIS) Client | Network Status Monitor (NSM) v1 Network Status Monitor (NSM) v1 | Network Time Protocol (NTP) client |
| NFS v3/v4 Secure Support | NT LAN Manager (NTLM) | Portmapper v2 |
| REST API: Open API that uses HTTP requests to provide management | Restriction of Hazardous Substances (RoHS) compliance | RSVD v1 for Microsoft Hyper-V |
| Simple Home Directory access for SMB protocol | SMI-S v1.6.0 compatible Dell EMC Unity File client | Simple Mail Transfer Protocol (SMTP) |
| Simple Network Management Protocol v2c & v3 (SNMP) | Virtual LAN (IEEE 802.1q) | |

| Security & Compliance (applies to all Dell EMC Unity systems, except Dell EMC UnityVSA) |
|---|
| Department of Defense Information Network Approved Products List (DODIN APL) in test |
| Common Criteria |
| Controller based Data at Rest Encryption (D@RE) with self-managed keys |
| KMIP compliant external key manager for D@RE |
| FIPS 140-2 validation |
| IPv6 and dual stack (IPv4) modes of operation |
| Native SHA2 certificate |
| Security Technical Implementation Guide /Security Requirements Guide (STIG/SRG) |
| TLS 1.2 support and TLS 1.0 disablement |

| Software | |
|---|---|
| All Inclusive Base Software | Management Software:<br>• Unisphere: Element Manager<br>• Unisphere Central: Consolidated dashboard and alerting<br>• CloudIQ: Cloud-based storage analytics<br>• Thin Provisioning<br>• Dynamic Pools<br>• Data Reduction: Compression/deduplication (Block and File)<br>• Proactive Assist: Configure remote support, online chat, open a service request, etc.<br>• Quality of Service (Block and VVols)<br>• Dell EMC Storage Analytics Adapter for VMware® vRealize™<br>• File & Block Tiering / Archiving to Public/Private Cloud (Cloud Tiering Appliance)<br>Unified Protocols:<br>• File<br>• Block<br>• VVols<br>Local Protection:<br>• Controller Based Encryption (optional), with self-managed or external key management<br>• Local Point-In-Time Copies (Snapshots and Thin Clones)<br>• AppSync Basic<br>• Dell EMC Common Event Enabler; AntiVirus Agent, Event Publishing Agent<br>Remote Protection:<br>• Native Asynchronous Block & File Replication<br>• Native Synchronous Block Replication<br>• Snapshot Shipping<br>• Dell EMC RecoverPoint Basic<br>• Dell EMC RecoverPoint for VMs |
| Interface Protocols | NFSv3, NFSv4, NFSv4.1; CIFS (SMB 1), SMB 2, SMB 3.0, SMB 3.02, and SMB 3.1.1; FTP and SFTP; FC, iSCSI included |
| Optional Software | • AppSync Advanced<br>• Data Protection Suite: Backup, Archive and Collaboration Software<br>• Dell EMC RecoverPoint Advanced<br>• PowerPath Migration Enabler<br>• PowerPath Multipathing<br>• VPLEX |
| Note: For more details on software licensing, please contact your sales representative | |

## Virtualization Solutions

Dell EMC Unity offers support for a wide variety of protocol and advanced features available via various software suites and packs including but not limited to:

- Dell EMC Storage Integrator (ESI): For provisioning within the Microsoft management context (Systems Center) for Hyper-V and SharePoint
- OpenStack Cinder Driver: For provisioning and managing block volumes within an OpenStack environment
- OpenStack Manila Driver: For managing shared file systems within an OpenStack environment
- Dell EMC Virtual Storage Integrator (VSI) for VMware vSphere™ : For provisioning, management, and cloning
- VMware Site Recovery Manager (SRM) Integration: Managing failover and failback making disaster recovery rapid and reliable
- Virtualization API Integration: VMware: VAAI and VASA. Hyper-V: Offloaded Data Transfer (ODX) and Offload Copy for File

## Electrical Specifications

All power figures shown represent a worst case product configuration with max normal values operating in an ambient temperature environment of 20°C to 25°C.

The chassis power numbers provided may increase when operating in a higher ambient temperature environment.

| Disk Processor Enclosure (DPE) | | | | |
|---|---|---|---|---|
| | 350F<br>DPE 25 2.5”SFF drives and four IO modules | 450F<br>DPE 25 2.5”SFF drives and four IO modules | 550F<br>DPE 25 2.5”SFF drives and four IO modules | 650F<br>DPE 25 2.5”SFF drives and four IO modules |
| **POWER** | | | | |
| AC Line Voltage | 100 to 240 VAC ± 10%, single phase, 47 to 63 Hz | | | |
| AC Line Current (operating maximum) | 10.07 A max at 100 VAC; 5.04 A max at 200VAC | 10.18 A max at 100 VAC; 5.09 A max at 200VAC | 10.56 A max at 100 VAC; 5.28 A max at 200VAC | 10.98 A max at 100 VAC; 5.49 A max at 200VAC |
| Power Consumption (operating maximum) | 1007 VA (970.5 W) max at 100 VAC; 1007 VA (970.5 W) max at 200 VAC | 1017.6 VA (981.0 W) max at 100 VAC; 1017.6 VA (981.0 W) max at 200 VAC | 1055.6 VA (1019.0 W) max at 100 VAC; 1055.6 VA (1019.0 W) max at 200 VAC | 1097.6 VA (1061.0 W) max at 100 VAC; 1097.6 VA (1061.0 W) max at 200 VAC |
| Power Factor | 0.95 minimum at full load, @ 100/ 200 VAC | | | |
| Heat Dissipation (operating maximum) | 3.49 x $10^6$ J/hr, (3,311 Btu/hr) max at 100 VAC; 3.49 x $10^6$ J/hr, (3,311 Btu/hr) max (100V*) | 3.53 x $10^6$ J/hr, (3,347 Btu/hr) max at 100 VAC; 3.53 x $10^6$ J/hr, (3,347 Btu/hr) max (100V*) | 3.67 x $10^6$ J/hr, (3,477 Btu/hr) max at 100 VAC; 3.67 x $10^6$ J/hr, (3,477 Btu/hr) max (100V*) | 3.82 x $10^6$ J/hr, (3,620 Btu/hr) max at 100 VAC; 3.82 x $10^6$ J/hr, (3,620 Btu/hr) max (100V*) |
| In-rush Current | 45 Apk “cold” per line cord, at any line voltage | | | |
| Startup Surge Current | 120 Apk “hot” per line cord, at any line voltage | | | |
| AC Protection | 15 A fuse on each power supply, single line | | | |
| AC Inlet Type | IEC320-C14 appliance coupler, per power zone | | | |
| Ride-through Time | 10 ms min | | | |
| Current Sharing | ± 5 percent of full load, between power supplies | | | |

| DIMENSIONS | | | | |
|---|---|---|---|---|
| Weight kgs/lbs | empty 24.60/54.11 | empty 24.60/54.11 | empty 24.60/54.11 | empty 24.60/54.11 |
| Vertical size | 2 NEMA units | 2 NEMA units | 2 NEMA units | 2 NEMA units |
| Height cm/inches | 8.88/3.5 | 8.88/3.5 | 8.88/3.5 | 8.88/3.5 |
| Width cm/inches | 44.76/17.62 | 44.76/17.62 | 44.76/17.62 | 44.76/17.62 |
| Depth cm/inches | 60.9/24.0 | 60.9/24.0 | 60.9/24.0 | 60.9/24.0 |
| Note: Power consumption values for DPEs and DAEs are based on fully populated enclosures (power supplies, drives and I/O modules). | | | | |

| Disk Array Enclosure (DAE) | | |
|---|---|---|
| | 25 X 2.5” Drive DAE | 80 X 2.5” Drive DAE |
| **POWER** | | |
| AC Line Voltage | 100 to 240 VAC ± 10%, single phase, 47 to 63 Hz | |
| AC Line Current (operating maximum) | 4.50 A max at 100 VAC,<br>2.40 A max at 200 VAC | 13.18 A max at 100 VAC,<br>6.59 A max at 200 VAC |
| Power Consumption (operating maximum) | 453.0 VA/ 432.0 W max at 100 VAC<br>485.0 VA/ 427.0 W max at 200VAC | 1318.0 VA/ 1233.0 W max at 100 VAC<br>1318.0 VA/ 1233.0 W max at 200VAC |
| Power Factor | 0.95 minimum at full load, @ 100V/200V | |
| Heat Dissipation (operating maximum) | $1.56 \times 10^6$ J/hr, (1,474 Btu/hr) max at 100 VAC<br>$1.54 \times 10^6$ J/hr, (1,457 Btu/hr) max at 200 VAC | $4.43 \times 10^6$ J/hr, (4,207 Btu/hr) max at 100 VAC<br>$4.43 \times 10^6$ J/hr, (4,207 Btu/hr) max at 200 VAC |
| In-rush Current | 30 Apk “cold” per line cord, at any line voltage | 45 Apk “cold” per line cord, at any line voltage |
| Startup Surge Current | 40 Apk “cold” per line cord, at any line voltage | 120 Apk “hot” per line cord, at any line voltage |
| AC Protection | 15 A fuse on each power supply, single line | |
| AC Inlet Type | IEC320-C14 appliance coupler, per power zone | |
| Ride-through Time | 12 ms minimum | 10 ms minimum |
| Current Sharing | ± 5 percent of full load, between power supplies | |
| **WEIGHT AND DIMENSIONS** | | |
| Weight kg/lbs | Empty: 10.0/22.1<br>Full: 20.23/44.61 | Empty: 11.33/25<br>Full: 58.9/130 |
| Vertical size | 2 NEMA units | 3 NEMA units |
| Height cm/inches | 8.46/3.40 | 13.21/5.20 |
| Width cm/inches | 44.45/17.5 | 44.70/17.6 |
| Depth cm/inches | 33.02/13 | 76.20/30 |
| Note: Power consumption values for DPEs and DAEs are based on fully populated enclosures (power supplies, drives and I/O modules). | | |

| Cabinets | |
|---|---|
| | Standard 40U Cabinet |
| AC Line Voltage | 200 to 240 VAC ± 10%, single-phase, 47 to 63 Hz |
| Power Configuration | One, two, three or four power domains, each redundant |
| Power Inlet Count | Two, four, six, or eight (two per domain) |
| Plug Types | NEMA L6-30P or IEC309-332 P6 or IP57 (Australia) |
| Input Power Capacity | 1 Domain: 4,800 VA @ 200 VAC, 5,760 VA @ 240 VAC<br>2 Domain: 9,600 VA @ 200 VAC, 11,520 VA @ 240 VAC<br>3 Domain: 14,400 VA @ 200 VAC, 17,280 VA @ 240 VAC<br>4 Domain: 19,200 VA @ 200 VAC, 20,040 VA @ 240 VAC |
| AC Protection | 30 A site circuit breakers on each power branch |
| 40U Cabinet Dimensions | Height - 75 in (190.8 cm); Width - 24.0 in (61.1 cm); Depth - 39.0 in (99.2 cm); Weight Empty – 380 lb (173 kg) |

## Operating environment (meets ASHRAE Equipment Class A4)

| | Description | Specification |
|---|---|---|
| Recommended Range Operation | The limits under which equipment will operate the most reliably while still achieving reasonably energy-efficient data center operation. | 18°C to 27°C (64.4°F to 80.6°F) at 5.5°C (41.9°F) dew point to 60% relative humidity and 15°C (59°F) dew point |
| Continuous Allowable Range Operation | Data center economization techniques (e.g. free cooling) may be employed to improve overall data center efficiency. These techniques may cause equipment inlet conditions to fall outside the recommended range but still within the continuously allowable range. Equipment may be operated without any hourly limitations in this range. | 10°C to 35°C (50°F to 95°F) at 20% to 80% relative humidity with 21°C (69.8°F) maximum dew point (maximum wet bulb temperature). De-rate maximum allowable dry bulb temperature at 1°C per 300m above 950m (1°F per 547 ft above 3117 ft). |
| Expanded Allowable Range Operation | During certain times of the day or year, equipment inlet conditions may fall outside the continuously allowable range but still within the expanded improbable range. Equipment operation is limited to ≤ 10% of annual operating hours in this range. | 5°C to 10°C and 35°C to 40°C (with no direct sunlight on the equipment) at -12°C dew point and 8% to 85% relative humidity with 24°C dew point (maximum wet bulb temperature). Outside the continuously allowable range (10°C to 35°C), the system can operate down to 5°C or up to 40°C for a maximum of 10% of its annual operating hours. For temperatures between 35°C and 40°C (95°F to 104°F), de-rate maximum allowable dry bulb temperature by 1°C per 175m above 950m (1°F per 319 ft above 3117 ft). |
| Exceptions to Expanded Allowable Range Operation | During certain times of the day or year, equipment inlet conditions may fall outside the continuously allowable range but still within the expanded exceptional range. Equipment operation is limited to ≤ 1% of annual operating hours in this range. | 5°C to 10°C and 35°C to 40°C (with no direct sunlight on the equipment) at -12°C dew point and 8% to 85% relative humidity with 24°C dew point (maximum wet bulb temperature). Outside the continuously allowable range (10°C to 35°C), the system can operate down to 5°C or up to 45°C for a maximum of 1% of its annual operating hours. For temperatures between 35°C and 45°C (95°F to 104°F), de-rate maximum allowable dry bulb temperature by 1°C per 125m above 950m (1°F per 228 ft above 3117 ft). |
| Temperature Gradient | | 20°C / hour (36°F / hour) |
| Altitude | Max Operating | 3050m (10,000ft) |

## Statement of Compliance

This Information Technology Equipment is compliant with the electromagnetic compatibility (Dell EMC) and product safety regulations/standards required by the countries in which the product is sold. Dell EMC compliance is based on FCC part 15, CISPR22/CISPR24 and EN55022/EN55024 standards, including applicable international variations. Dell EMC compliant Class A products are marketed for use in business, industrial, and commercial environments. Product Safety compliance is based on IEC 60950-1 and EN60950-1 standards, including applicable national deviations.

This Information Technology Equipment is in compliance with EU RoHS Directive 2011/65/EU.

The individual devices used in this product are approved under a unique regulatory model identifier that is affixed to each individual device rating label, which may differ from any marketing or product family name in this data sheet.

For additional information see https://support.emc.com, under the Safety & EMI Compliance Information tab.

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Learn more about Dell EMC Unity solutions

Contact a Dell EMC Expert