DELLEMC

VMAX ALL FLASH FAMILY

VMAX 450F, 850F

The Dell EMC VMAX® family of all-flash arrays began with the introduction of the VMAX 450F and 850F, delivering unparalleled performance and scale as mission-critical multi-controller platforms.   Designed around the latest high capacity Enterprise Flash drives and Intel® Xeon® processors, your data always resides in the fastest possible tier (Diamond) to deliver the highest IOPS throughput and lowest possible latency.

VMAX All Flash arrays extend the long tradition of VMAX® Reliability, Availability and Serviceability that customers have come to expect.   Ranging from 1 to 8 V-Bricks packaged in dual V-Brick racks along with their associated DAEs, the all-flash family offers unprecedented scale and footprint efficiency. The built-in hypervisor enables VMAX All Flash to offer Unified block and file support through Embedded NAS (eNAS), as well as Embedded Management.

VMAX All Flash arrays are available in two software packages, the standard "F" package and the application rich "FX" package, which makes ordering easy. The FX package includes licensed support for SRDF S/A/STAR/Metro, Data at Rest Encryption, eNAS, while both include VASA Provider Certified support for VVols, and secure snaps, a new SnapVX feature eliminating the ability for admins to delete snapshots. And now, for the first time, VMAX All Flash arrays offer optional support for RecoverPoint for heterogeneous replication.   As always, VMAX All Flash arrays come fully pre-configured out of the factory to significantly shorten the time to first I/O.

VMAX ALL FLASH

Specifications

APPLIANCE-BASED PACKAGING: THE V-BRICK

The Dynamic Virtual Matrix Architecture that allows aggregate scaling of system resources has been extended to VMAX All Flash, where basic storage building blocks are defined by appliance-based entities called V-Bricks. Each V-Brick includes an engine with two VMAX directors, packaged software, 1 or 2TB of cache, two 120 slot Drive Array Enclosure (DAEs) and a base capacity of 53TBu of Enterprise Flash. Multi V-Brick systems also include redundant InfiniBand interfaces to connect all V-Bricks in the array, forming the Dynamic Virtual Matrix. Additional flash capacity can be added to each V-Brick in varying increments up to a total usable capacity of 4.4 Petabytes Effective (PBe, which represents PBu plus inline compression invoked) on VMAX 850F.

Inline compression is supported across the entire VMAX All Flash family as of the Q3 2016 HYPERMAX 5977 release. Each director consolidates front-end, global memory, and back-end functions, enabling direct memory access to data for optimized I/O operations. Depending on the array chosen, up to eight (8) VMAX All Flash V-Bricks can be supported for highly scalable performance and high availability.

Detailed specifications and a comparison of the VMAX 450F and 850F arrays follow:

ARRAY FAMILY	VMAX 450F/VMAX 450FX	VMAX 850F/VMAX 850FX
V-BRICKS		
NUMBER OF V-BRICKS	1 to 4	1 to 8
ENGINE ENCLOSURE	4u	4u
CPU	Intel Xeon E5-2650-v2 [4]3.0 GHz 8 core	Intel Xeon E5-2697-v2 [4]3.0 GHz 12 core
# CORES PER CPU/PER ENGINE/PER SYSTEM	8/32/128	12/48/384
DYNAMIC VIRTUAL MATRIX INTERCONNECT	InfiniBand Dual Redundant Fabric: 56Gbps per port	InfiniBand Dual Redundant Fabric: 56Gbps per port
CACHE		
CACHE-SYSTEM MIN (RAW)	1024GB	1024GB
CACHE-SYSTEM MAX (RAW)	8TB (with 2048GB engine)	16TB (with 2048GB engine)
CACHE-PER ENGINE OPTIONS	1TB, 2TB	1TB, 2TB
VAULT		
VAULT STRATEGY	Vault to Flash	Vault to Flash
VAULT IMPLEMENTATION	4 to 8 NVMe Flash SLICs / Engine	4 to 8 NVMe Flash SLICs / Engine
FRONT END I/O MODULES		
MAXIMUM FRONT-END I/O MODULES/V-BRICK	6	6
MAXIMUM FRONT-END I/O MODULES/z-BRICK	8	8
FRONT-END I/O MODULES AND PROTOCOLS SUPPORTED	FC: 4 x 8Gbs (FC, SRDF) FC: 4 x 16Gbs (FC, SRDF) 10GbE: 4 x10GbE (iSCSI, SRDF) 10GbE: 2 x 10GbE (SRDF) GbE: 4 x 1GbE (2 Cu/2 Opt SRDF) FICON: 4 x 16Gbs (FICON)	FC: 4 x 8Gbs (FC, SRDF) FC: 4 x 16Gbs (FC, SRDF) 10GbE: 4 x10GbE (iSCSI, SRDF) 10GbE: 2 x 10GbE (SRDF) GbE 4 x 1GbE (2 Cu/2 Opt SRDF) FICON: 4 x 16Gbs (FICON)
E**NAS I/O MODULES**		
MAX ENAS I/O MODULES/ SOFTWARE DATA MOVER	[1]up to 2	[1]up to 2
ENAS I/O MODULES SUPPORTED	10GbE: 2 x 10GbE Optical [1]10GbE: 2 x 10GbE Cu GbE: 4 x 1GbE Cu [2]8Gbs: 4 x 8Gbs FC (Tape BU)	10GbE: 2 x 10GbE Optical [1]10GbE: 2 x 10GbE Cu GbE: 4 x 1GbE Cu [2]8Gbs: 4 x 8Gbs FC (Tape BU)
E**NAS SOFTWARE DATA MOVERS**		
MAX SOFTWARE DATA MOVERS	4 (3 Active + 1 Standby) (4 Data Movers requires minimum 2 VBricks)	[3]8 (7 Active and 1 Standby) (8 Data Movers requires minimum 4 V-Bricks)
MAX NAS CAPACITY/ARRAY (TERABYTES USABLE)	1536	3584

[1] Quantity one (1) 2 x 10GbE Optical module is the default choice/Data Mover.
[2] Used to support NDMP Tape Backup
[3] Support for 8 Data Movers on the VMAX 850F/FX is available by request.
[4] CPUs run in Turbo Mode except at elevated ambient temperatures.

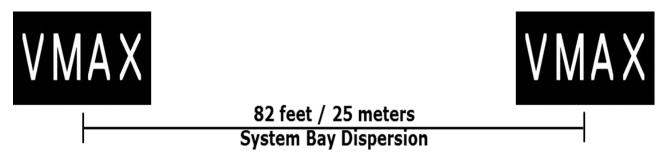| ARRAY FAMILY	VMAX 450F/VMAX 450FX	VMAX 850F/VMAX 850FX
CAPACITY, DRIVES		
Max Capacity per Array[1]	2.3PBe	4.4PBe
Base Capacity per V-Brick	52.6TBu	52.6TBu
Incremental Capacity Blocks	13.2TBu	13.2TBu
Max Drives per V-Brick	240	240
Max Drives per Array	960	1920
Max Drives per System Bay	480	480
Min Drive Count per V-Brick	16 + 1 spare	16 + 1 spare
FLASH DRIVES		
Flash Drives Supported (2.5")	960GB, 1.92TB, 3.84TB	960GB, 1.92TB, 3.84TB
BE Interface	6Gbps SAS	6Gbps SAS
RAID Options Supported	RAID 5(7 +1) RAID 6(14+2)	RAID 5(7 +1) RAID 6(14+2)
Mixed RAID Group Support	No	No
Support for Mixed Drive Capacities	Yes	Yes
FLASH ARRAY ENCLOSURES		
120 x 2.5" Drive DAE	Yes	Yes
CABINET CONFIGURATIONS		
Standard 19" bays	Yes	Yes
Single V-Brick System Bay Configuration	No (Packaging based on Dual V-Bricks, but initial V-Brick in each System Bay supported)	No (Packaging based on Dual V- Bricks, but initial V-Brick in each System Bay supported)
Dual V-Brick System Bay Configuration	Yes (Default packaging)	Yes (Default packaging)
Third Party Rack Mount Option	Yes	Yes
DISPERSION		
System Bay Dispersion	Yes (on request)	Yes (on request)
PRE-CONFIGURATION FROM FACTORY		
100% Thin Provisioned	Yes	Yes
Open Systems	Yes	Yes
Mainframe	Yes	Yes
POWER OPTIONS		
Input Power Options	Single or Three Phase Delta or Wye	Single or Three Phase Delta or Wye

---

[1] Max capacity per array based on over provisioning ratio of 1.0.

VMAX ALL FLASH ARRAY CONNECTIVITY

ARRAY FAMILY	VMAX 450F/VMAX 450FX	VMAX 850F/VMAX 850FX
I/O PROTOCOLS SUPPORTED		
8 Gb/s FC Host/SRDF Ports		
Maximum/V-Brick	24	24
Maximum/array	96	192
16 Gb/s FC Host Ports		
Maximum/V-Brick	24	24
Maximum/array	96	192
16 Gb/s FICON Host Ports		
Maximum/V-Brick	32	32
Maximum/array	128	256
10 GbE iSCSI Ports		
Maximum/V-Brick	24	24
Maximum/array	96	192
10 GbE SRDF Ports (Optical)		
Maximum/V-Brick	24	24
Maximum/array	96	192
GbE SRDF Ports (Optical/Cu)		
Maximum/V-Brick	12/12	12/12
Maximum/array	48	96
EMBEDDED NAS PORTS		
10GbE Optical Ports		
Max ports/Software Data Mover	2	2
Maximum ports/array	8	16
[1]10GbE Copper Ports		
Max ports/Software Data Mover	2	2
Maximum ports/array	8	16
[1]1GbE Copper Ports		
Max ports/Software Data Mover	4	4
Maximum ports/array	16	32
[1]8 Gb/s FC Tape Back Up Ports		
Max ports/Software Data Mover	2	2
Maximum ports/array	8	16

[1] Indicated eNAS I/O Modules are available by request.

SYSTEM BAY DISPERSION

82 feet / 25 meters
System Bay Dispersion

System Bay Dispersion allows customers to separate any individual or contiguous group of system bays by up to a distance of 82 feet (25 meters) from System Bay 1. This provides unsurpassed datacenter flexibility in solving floor loading constraints or working around obstacles that mighty preclude fully contiguous configurations.

FLASH DRIVE SUPPORT

The 450F/FX and 850F/FX (6Gb/s) support the latest dual ported native SAS Flash drives. All Flash drives support two independent I/O channels with automatic failover and fault isolation. Check with your Dell EMC sales representative for the latest list of supported drives and types.   All capacities are based on 1 GB = 1,000,000,000 bytes. Actual usable capacity may vary depending upon configuration.

2.5" FLASH DRIVES USED IN V-BRICKS AND CAPACITY UPGRADES

PLATFORM SUPPORT	VMAX 450F, 850F	VMAX 450F, 850F	VMAX 450F, 850F
NOMINAL CAPACITY (GB)	[1]960	[1]1920	[1]3840
SPEED (RPM)	Flash	Flash	Flash
AVERAGE SEEK TIME (READ/WRITE MS)	N/A	N/A	N/A
RAW CAPACITY (GB)	960	1920	3840
[2]OPEN SYSTEMS FORMATTED CAPACITY (GB)	935.41	1876.11	3757.51
MAINFRAME 3390 FORMATTED CAPACITY	934.09	1875.12	3757.18

[1]V-Bricks and Capacity upgrades in any given configuration could contain different underlying drive sizes in order to achieve the desired Usable Capacity. This is automatically optimized by the VMAX Sizer Tool.
[2]Open Systems Formatted Capacity is also referred to as TBu in this document.

POWER CONSUMPTION AND HEAT DISSIPATION AT < 26 & > 35 DEGREES C

COMPONENTS	VMAX 450F/FX				VMAX 850F/FX			
Maximum Power and Heat dissipation at temperatures <26° C and > 35° C [2,3]	Maximum Total power consumption (kVA)		Maximum Heat dissipation (Btu/Hr)		Maximum Total power consumption (kVA)		Maximum Heat dissipation (Btu/Hr)	
	<26° C	>35° C	<26° C	>35° C	<26° C	>35° C	<26° C	>35° C
SYSTEM BAY 1, DUAL ENGINE	6.69	9.05	22,813	30,861	6.94	9.30	23,665	31,713
SYSTEM BAY 2, DUAL ENGINE[1]	6.28	8.38	21,415	28,576	6.49	8.59	22,131	29,292

[1]Power Values for System Bay 2 and all subsequent System Bays where applicable

[2]Power Values and Heat Dissipations shown at >35 degrees C reflect the higher power levels associated with both the battery recharge cycle, and the initiation of high Ambient temperature Adaptive Cooling algorithms.

[3] Values at <26° C are reflective of more Steady State maximum values during normal operation.

PHYSICAL SPECIFICATIONS

COMPONENTS	HEIGHT (IN/CM)	WIDTH (IN/CM)	DEPTH (IN/CM)	WEIGHT (MAXIMUM LBS/KG)
SYSTEM BAY, DUAL ENGINE 450F/850F	75/190	24/61	47/119	1860/844

INPUT POWER REQUIREMENTS

SINGLE-PHASE NORTH AMERICAN, INTERNATIONAL, AUSTRALIAN

SPECIFICATION	NORTH AMERICAN 3 WIRE CONNECTION (2 L & 1 G)[1]	INTERNATIONAL AND AUSTRALIAN 3 WIRE CONNECTION (1 L & 1 N & 1 G)[1]
INPUT NOMINAL VOLTAGE	200 – 240 VAC +/- 10% L- L nom	220 – 240 VAC +/- 10% L - N nom
FREQUENCY	50 – 60 Hz	50 – 60 Hz
CIRCUIT BREAKERS	30 A	32 A
POWER ZONES	Two	Two
Power requirements at customer site (min)	• Three 30A, single phase drops per zone (450F/850F) • Two power zones require 6 drops (450/850F) with each drop rated for 30A	

[1] L = line or phase, N = neutral, G = ground

THREE-PHASE NORTH AMERICAN, INTERNATIONAL, AUSTRALIAN

SPECIFICATION	NORTH AMERICAN (DELTA) 4 WIRE CONNECTION (3 L & 1 G)[1]	INTERNATIONAL (WYE) 5 WIRE CONNECTION (3 L & 1 N & 1 G)[1]
INPUT VOLTAGE[2]	200 – 240 VAC +/- 10% L- L nom	220 – 240 VAC +/- 10% L - N nom
FREQUENCY	50 – 60 Hz	50 – 60 Hz
CIRCUIT BREAKERS	50 A	32 A
POWER ZONES	Two	Two
POWER REQUIREMENTS AT CUSTOMER SITE (MIN)	Two 50 A, three-phase drops per bay	Two 32 A, three-phase drops per bay

[1] L = line or phase, N = neutral, G = ground

[2] An imbalance of AC input currents may exist on the three-phase power source feeding the array, depending on the configuration. The customer's electrician must be alerted to this possible condition to balance the phase-by-phase loading conditions within the customer's data center

RADIO FREQUENCY INTERFERENCE

Electro-magnetic fields which include radio frequencies can interfere with the operation of electronic equipment. Dell EMC products have been certified to withstand radio frequency interference in accordance with standard EN61000-4-3. In Data Centers that employ intentional radiators, such as cell phone repeaters, the maximum ambient RF field strength should not exceed 3 Volts /meter.

REPEATER POWER LEVEL (WATTS)	RECOMMENDED MINIMUM DISTANCE (FEET/METERS)
1	9.84 FT (3M)
2	13.12 FT (4 M)
5	19.69 FT (6M)
7	22.97 FT (7M)
10	26.25 FT (8M)
12	29.53 FT (9M)
15	32.81 FT (10M)