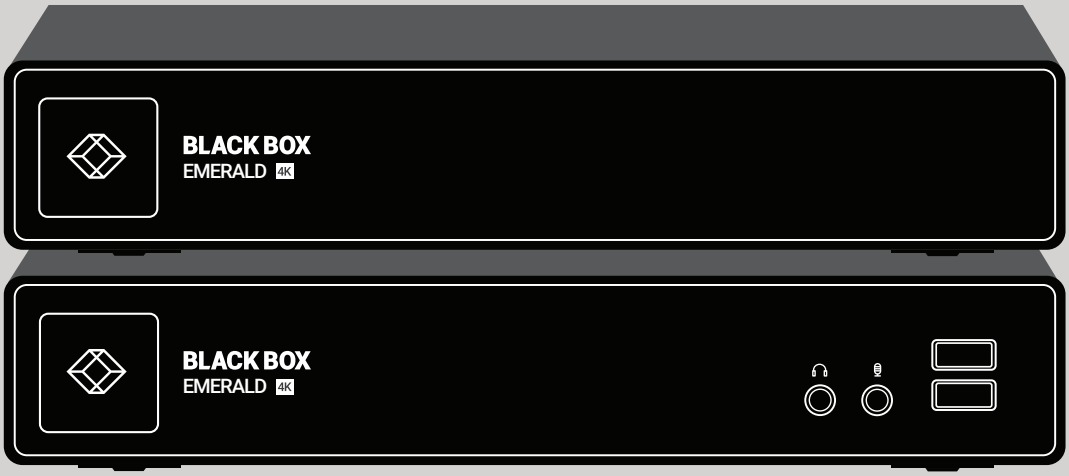
DATA SHEET

EMD SERIES

EMERALD 2K/4K UNIFIED KVM EXTENDERS

24/7 TECHNICAL SUPPORT AT 877.877.2269 OR VISIT BLACKBOX.COM



BLACK BOX

OVERVIEW

EMERALD-2K/-4K HIGH-PERFORMANCE KVM DATA SHEET

INTRODUCTION

Emerald-2K/-4K High-Performance KVM provides a choice of KVM over IP and Proprietary direct connect Matrix switch systems. 4K video, unlimited scalability and access to Virtual Machines from one console ensures a future-proof system. Three transmitters, three receivers, three direct connect switches and three Ethernet switches are available.

– SINGLE-HEAD 4K TRANSMITTER (EMD4000T) AND RECEIVER (EMD4000R)
– SINGLE-HEAD 2K TRANSMITTER (EMD2000T) AND RECEIVER (EMD2000R)
– DUAL-HEAD 2K TRANSMITTER (EMD2002T) AND RECEIVER (EMD2002R)
– 48 PORT STANDARD SPEED MATRIX DIRECT CONNECT SWITCH (EMX1-48)
– 28 PORT HIGH SPEED MATRIX DIRECT CONNECT SWITCH (EMX10-28)
– 32-PORT ULTRA SPEED MATRIX DIRECT CONNECT SWITCH (EMX100-32)
– 1G 48-PORT NETWORK SWITCH (EMS1G-48)
– 10G 28-PORT NETWORK SWITCH (EMS10G-28)
– 100G 32-PORT NETWORK SWITCH (EMS100G-32)

FEATURES

- **4K VIDEO, 10 BIT COLOR @ 60 FPS**
- **PIXEL PERFECT VIDEO—MATHEMATICALLY LOSSLESS**
- **ACCESS TO VIRTUAL MACHINES USING RDP/REMOTEFX AND PCOIP TO VMWARE AND MICROSOFT SERVERS**
- **DUAL NETWORK OPTION FOR REDUNDANCY**
- **ACCESS RESOURCES ANYWHERE VIA WAN**
- **CENTRALIZED MANAGEMENT, ACCESS CONTROL, MONITORING AND UPGRADES**
- **UNIQUE UNIFIED KVM—CHOOSE IP OR BLACK BOX PROPRIETARY DIRECT CONNECT OR MIX AND MATCH**
- **OPTION TO USE EXISTING NETWORK INFRASTRUCTURE**
- **CHOOSE COPPER OR FIBER CONNECTIONS**
- **TRANSPARENT USB – CONNECT ANY USB DEVICE**
- **SUPPORT AUDIO OVER DISPLAYPORT, USB AND ANALOG**

COMPARISON CHART

SPECIFICATION COMPARISON CHART: TRANSMITTERS AND RECEIVERS

	NUMBER OF VIDEO HEADS	USB PORTS	NETWORK	SERIAL	AUDIO	SFP	RESOLUTION
RECEIVERS							
4K RECEIVER (EMD4000R)	(1) DISPLAYPORT	(4) USB TYPE A	(1) RJ-45	(1) DB9	(2) 3.5-MM	(2)	4096 x 2160
2K RECEIVER (EMD2002R)	(2) DVI	(4) USB TYPE A	(1) RJ-45	(1) DB9	(2) 3.5-MM	(1)	1920 x 1200
2K RECEIVER (EMD2000R)	(1) DVI	(4) USB TYPE A	(1) RJ-45	(1) DB9	(2) 3.5-MM	(1)	1920 x 1200
TRANSMITTERS							
4K TRANSMITTER (EMD4000T)	(1) DISPLAYPORT	(1) USB TYPE B	(1) RJ-45	(1) DB9	(2) 3.5-MM	(2)	4096 x 2160
2K TRANSMITTER (EMD2002T)	(2) DVI	(1) USB TYPE B	(1) RJ-45	(1) DB9	(2) 3.5-MM	(1)	1920 x 1200
2K TRANSMITTER (EMD2000T)	(1) DVI	(1) USB TYPE B	(1) RJ-45	(1) DB9	(2) 3.5-MM	(1)	1920 x 1200

COMPARISON CHART

SPECIFICATION COMPARISON CHART: SWITCHES							
DIRECT CONNECT SWITCHES	SPEED	PORTS	CASCADE PORTS	DISTANCE	LATENCY	NETWORK PORTS	
EMX1-48	STANDARD SPEED	(48) RJ-45 1.25 GBPS STANDARD-SPEED	(4) SFP+ 12.5 GBPS HIGH-SPEED	CATX: <140 M; MULTIMODE: < 1 KM; SINGLE-MODE: < 10 KM	< 5 µS	(2) 1 GBPS ETHERNET	—
EMX10-28	STANDARD/HIGH SPEED	(28) SFP+ AUTO-DETECT 1.25 OR 12.5 GBPS HIGH-SPEED	(2) SFP+ 125 GBPS ULTRA-SPEED	CATX: <140 M; MULTIMODE: < 1 KM; SINGLE-MODE: < 10 KM	< 1 µS	(2) 1G/10G ETHERNET	—
EMX100-32	ULTRA SPEED	(32) 12.5 GBPS OR 125 GBPS SFP+ AUTO-DETECT ULTRA-SPEED	—	CATX: <140 M; MULTIMODE: < 1 KM; SINGLE-MODE: < 10 KM	< 1 µS	(2) 1G/10G ETHERNET	—
NETWORK SWITCHES	SPEED	PORTS	CASCADE PORTS	CAPACITY	MAC ADDRESSES	CPU MEMO-RY	BUFFER
EMS1G-48	1G	(48) 10/100/1000BT RJ-45	(4) 10G SFP+	260 GBPS FD	UP TO 80 K	2 GB	4 MB
EMS10G-28	10G	(28) 10GbE SFP+	(2) 100G SFP+	960 GBPS	160 K	4 GB	12 MB
EMS100G-32	100G	(32) OR (128) 100 GbE SFP+	—	6.4 TBPS	136 K	8 GB	16 MB

COMPATIBLE SFPS

COMPATIBLE SFPS	
PART NUMBER	**DESCRIPTION**
LSP421	SFP+ - 10-Gb, Extended Diagnostics, 850-nm Multimode Fiber, 300-m, LC
LSP422	SFP+, 10GBASE-R, 1310-nm single-mode, 10 km
CALL TECHNICAL SUPPORT	SFP+, Copper

NOTE: Black Box switches will also support generic SFP+ modules.

SPECIFICATIONS

4K SINGLE-HEAD TRANSMITTER AND RECEIVER (EMD4000R AND EMD4000T)

FRONT VIEW

EMD4000R

BACK VIEW

EMD4000R

FRONT VIEW

EMD4000T

BACK VIEW

EMD4000T

WHAT'S INCLUDED WITH THE RECEIVER

- **(1) RECEIVER**
- **(1) 12-VDC POWER SUPPLY WITH POWER CORD**

WHAT'S INCLUDED WITH THE TRANSMITTER

- **(1) TRANSMITTER**
- **(1) 12-VDC POWER SUPPLY WITH POWER CORD**

4K SINGLE-HEAD EXTENDER (EMD4000R AND EMD4000T)	
APPROVALS	Unit: FCC, CE, RoHS Power Supply: 12 VDC, 3 A
CONNECTORS	Transmitter: (1) DisplayPort, (1) Power, (1) DB9 serial, (1) USB Type B, (1) RJ-45, (2) SFP cages, (2) 3.5-mm audio; Receiver: (1) DisplayPort, (1) Power, (1) DB9 serial, (4) USB Type A, (1) RJ-45, (2) SFP cages, (2) 3.5-mm audio;
DISTANCE	Distance between Transmitter and Receiver: in IP mode: Unlimited using IP rules; in DX mode: CATx: 328 ft. (100 m); Fiber: 984.2 ft. to 6.2 mi. (300 m to 10 km), based on SFP used
INDICATORS	(1) single bi-color LED (red/green)
MAXIMUM RESOLUTION	4096 x 2160 @ 60 Hz
MATERIAL	Aluminum outer case with plastic bezel
OPERATING SYSTEMS SUPPORTED	Microsoft Windows Vista, XP, Windows 7, Windows 8, Server 2003, Server 2008, Server 2012, Linux, Solaris, Mac OS
OPERATION	Default IP Address for Transmitter:192.168.1.22; Default IP Address for Receiver: 192.168.1.21; Default Username: admin; Default Password: Blank password by default, just press the Enter key; EDID Support: Internal EDID table in Transmitter (can be updated from a Receiver or manager); Encryption: Secure Sockets Layer (SSL) over a TCP/IP up to 128-bit for transmitter to receiver with virtualized targets, depending on configuration
ENVIRONMENTAL	Operating Temperature: 32 to 104° F (0 to 40° C); Storage Temperature: -4ºF to 140ºF (-20º C to 60º C); Operating Humidity: 5–95%
POWER	External desktop-style adapter, 100–240 VAC input, 12 VDC, 3 A connection to unit
DIMENSIONS	Each unit: 1.5" H x 8.5" W x 7.4" D (3.9 x 21.6 x 18.7 cm)
WEIGHT	TX: 2.50 lb. (1.14 kg); RX: 2.55 lb. (1.16 kg)

SPECIFICATIONS

2K DUAL-HEAD TRANSMITTER AND RECEIVER (EMD2002R AND EMD2002T)

FRONT VIEW

EMD2002R

BACK VIEW

EMD2002R

FRONT VIEW

EMD2002T

BACK VIEW

EMD2002T

WHAT'S INCLUDED WITH THE RECEIVER

- **(1) RECEIVER**
- **(1) 12-VDC POWER SUPPLY WITH POWER CORD**

WHAT'S INCLUDED WITH THE TRANSMITTER

- **(1) TRANSMITTER**
- **(1) 12-VDC POWER SUPPLY WITH POWER CORD**

2K DUAL-HEAD EXTENDER (EMD2002R AND EMD2002T)	
APPROVALS	Unit: FCC, CE and RoHS
CONNECTORS	Transmitter: (2) DVI, (1) Power, (1) DB9 serial, (1) USB Type B, (1) RJ-45, (1) SFP cage, (2) 3.5-mm audio; Receiver: (2) DVI, (1) Power, (1) DB9 serial, (4) USB Type A, (1) RJ-45, (1) SFP cage, (2) 3.5-mm audio;
DISTANCE	Distance between Transmitter and Receiver: in IP mode: Unlimited using IP rules; in DX mode: CATx: 328 ft. (100 m); Fiber: 984.2 ft. to 6.2 mi. (300 m to 10 km), based on SFP used
INDICATORS	(1) single bi-color LED (green/red):
MAXIMUM RESOLUTION	1920 x 1200 @ 60 Hz
MATERIAL	Aluminum outer case with plastic bezel
OPERATING SYSTEMS SUPPORTED	Microsoft Windows Vista, XP, Windows 7, Windows 8, Server 2003, Server 2008, Server 2012, Linux, Solaris, Mac OS
OPERATION	Default IP Address for Transmitter:192.168.1.22; Default IP Address for Receiver: 192.168.1.21; Default Username: admin; Default Password: Blank password by default, just press the Enter key; EDID Support: Internal EDID table in Transmitter (can be updated from a Receiver or manager); Encryption: Secure Sockets Layer (SSL) over a TCP/IP up to 128-bit for transmitter to receiver with virtualized targets, depending on configuration

SPECIFICATIONS

2K SINGLE-HEAD TRANSMITTER AND RECEIVER (EMD2000R AND EMD2000T)

FRONT VIEW

EMD2000R

BACK VIEW

EMD2000R

FRONT VIEW

EMD2000T

BACK VIEW

EMD2000T

WHAT'S INCLUDED WITH THE RECEIVER

- **(1) RECEIVER**
- **(1) 12-VDC POWER SUPPLY WITH POWER CORD**

WHAT'S INCLUDED WITH THE TRANSMITTER

- **(1) TRANSMITTER**
- **(1) 12-VDC POWER SUPPLY WITH POWER CORD**

2K SINGLE-HEAD EXTENDER (EMD2000R AND EMD2000T)	
APPROVALS	Unit: FCC, CE and RoHS
CONNECTORS	Transmitter: (1) DVI, (1) Power, (1) DB9 serial, (1) USB Type B, (1) RJ-45, (1) SFP cage, (2) 3.5-mm audio; Receiver: (1) DVI, (1) Power, (1) DB9 serial, (4) USB Type A, (1) RJ-45, (1) SFP cage, (2) 3.5-mm audio;
DISTANCE	Distance between Transmitter and Receiver: in IP mode: Unlimited using IP rules; in DX mode: CATx: 328 ft. (100 m); Fiber: 984.2 ft. to 6.2 mi. (300 m to 10 km), based on SFP used
INDICATORS	(1) single bi-color LED (red/green)
MAXIMUM RESOLUTION	1920 x 1200 @ 60 Hz
MATERIAL	Aluminum outer case with plastic bezel
OPERATING SYSTEMS SUPPORTED	Microsoft Windows Vista, XP, Windows 7, Windows 8, Server 2003, Server 2008, Server 2012, Linux, Solaris, Mac OS
OPERATION	Default IP Address for Transmitter:192.168.1.22; Default IP Address for Receiver: 192.168.1.21; Default Username: admin; Default Password: Blank password by default, just press the Enter key; EDID Support: Internal EDID table in Transmitter (can be updated from a Receiver or manager); Encryption: Secure Sockets Layer (SSL) over a TCP/IP up to 128-bit for transmitter to receiver with virtualized targets, depending on configuration

SPECIFICATIONS

48-PORT STANDARD SPEED MATRIX DIRECT CONNECT SWITCH (EMX1-48)

FEATURES

- NON-BLOCKING SWITCHING ARCHITECTURE
- HAS (48) PORTS FOR CONNECTION TO STANDARD SPEED DEVICES
- ALSO HAS (4) SFP+ FOR HIGH-SPEED CASCADE PORTS TO ENABLE LINKING TO ANOTHER DIRECT CONNECT SWITCH FOR MAXIMUM FLEXIBILITY AND INVESTMENT PROTECTION
- I/O PANEL TO PSU AIRFLOW OR PSU TO I/O PANEL AIRFLOW
- REDUNDANT HOT-SWAPPABLE POWER SUPPLIES AND FANS
- (2) STANDARD ETHERNET PORTS ALLOW CONNECTION TO STANDARD IP NETWORKS FOR MANAGEMENT
- PROPRIETARY DIRECT CONNECT TECHNOLOGY

WHAT'S INCLUDED WITH THE SWITCH

- (1) SWITCH
- (2) POWER SUPPLIES
- (4) FANS
- (1) RACKMOUNT KIT

48-PORT STANDARD SPEED MATRIX DIRECT CONNECT SWITCH (EMX1-48)	
APPROVALS	Environmental Compliances: Japan: VCCI V3/2009 Class A; USA: FCC CFR 47 Part 15, Subpart B:2009, Class A; RoHS EMI Certifications: Australia/New Zealand: AS/NZS CISPR 32: Class A; Canada: ICES-003, Issue-4, Class A; Europe: EN 55032: 2015+A1:2007 (CISPR 32); Class A; Japan: VCCI V3/2009 Class A; USA: FCC CFR 47 Part 15, Subpart B:2009, Class A Safety Certifications: UL/CSA, EN 60959-1, EN 60825-1, FDA Regulation 21 CFR 1040.10 and 1040.11
ENVIRONMENTAL	Operating Humidity: 5 to 85%, relative humidity, non-condensing Operating Temperature: 32 to 113° F (0 to 45° C) Storage Humidity: 5 to 95%, relative humidity, non-condensing Storage Temperature: -40 to +158° F (-40 to +70° C)
MANAGEMENT	Console port management: (1) RJ-45 console management port with RS-232 signaling
PERFORMANCE	Switching Capacity: non-blocking; Latency : <5 µs (ingress to egress)
PHYSICAL	Connectors/Interfaces: (48) RJ-45 ports, (4) 10 SFP+ cascade ports, (1) RJ-45 RS-232 serial console port Dimensions: 1.71" H (1 RU) x 17.09" W x 12.6" D (4.4 x 43.4 x 32 cm) Indicators: (1) Power LED, (48) Link/Activity LEDs, (4) SFP Link LEDs Mounting: Rackmounted Weight: 12.8 lb. (5.84 kg)
POWER	Input: 90–264 VAC, 50/60 Hz Maximum Power Consumption: 88 W Typical Power Consumption: 66 W Max. Thermal Output: 290 BTU/hr.; Max. Current Draw per System: <1 A at 100/120 VAC, <0.5 A at 200/240 VAC Power Supply Type: (2) hot-swappable redundant AC power Fans: (4) hot-swappable redundant fans
OTHER	Proprietary Direct Connect Technology

SPECIFICATIONS

28-PORT HIGH-SPEED MATRIX DIRECT CONNECT SWITCH (EMX10-28)

FEATURES

- **(1) RU HIGH-DENSITY (28) DEVICE PORTS, WHICH CAN AUTO-DETECT USER DEVICE ATTACHED STANDARD-SPEED OR HIGH-SPEED AND (2) ULTRA-SPEED CASCADE PORTS**
- **REDUNDANT, HOT-SWAPPABLE POWER SUPPLIES AND FANS**
- **SUPPORTS 10GBASE FIBER OPTICS**
- **I/O PANEL TO PSU AIRFLOW OR PSU TO I/O PANEL AIRFLOW**
- **PROPRIETARY DIRECT CONNECT TECHNOLOGY**

WHAT'S INCLUDED WITH THE SWITCH

- **(1) SWITCH**
- **(2) POWER SUPPLIES**
- **(4) FANS**
- **(1) RACKMOUNT KIT**

28-PORT HIGH-SPEED MATRIX DIRECT CONNECT SWITCH (EMX10-28)	
APPROVALS	Environmental Compliances: Japan: VCCI V3/2009 Class A; USA: FCC CFR 47 Part 15, Subpart B:2009, Class A; RoHS EMI Certifications: Australia/New Zealand: AS/NZS CISPR 32: Class A; Canada: ICES-003, Issue-4, Class A; Europe: EN 55032: 2015+A1:2007 (CISPR 32); Class A; Japan: VCCI V3/2009 Class A; USA: FCC CFR 47 Part 15, Subpart B:2009, Class A Safety Certifications: UL/CSA, EN 60959-1, EN 60825-1, FDA Regulation 21 CFR 1040.10 and 1040.11
ENVIRONMENTAL	Operating Humidity: 10 to 85%, relative humidity, non-condensing Operating Temperature: 32 to 104° F (0 to 40° C) Storage Humidity: 5 to 95%, relative humidity, non-condensing Storage Temperature: -40 to +158° F (-40 to +70° C)
MANAGEMENT	Console port management: (1) RJ-45 serial
PERFORMANCE	Switching Capacity: non-blocking; Latency : <1 µs (ingress to egress)
PHYSICAL	Connectors/Interfaces: (28) HS SFP+, (2) US QSFP28, (2) AC PSUs, (4) Fan modules, PSU to I/O Panel Airflow Dimensions: 1.75" H (1 RU) x 17" W x 18" D (4.4 x 43.1 x 45.7 cm) Mounting: Rackmounted Weight: 19.66 lb. (8.92 kg)
POWER	Input: 100–240 VAC, 50/60 Hz Maximum Power: 292 W Typical Operating Power: 262 W Max. Thermal Output: 887 BTU/hr. Power Supply Type: (2) hot-swappable redundant AC power Fans: (4) hot-swappable redundant fans
OTHER	Proprietary Direct Connect Technology

SPECIFICATIONS

32-PORT ULTRA SPEED MATRIX DIRECT CONNECT SWITCH (EMX100-32)

- **(1) RU HIGH-DENSITY (32) ULTRA-SPEED PORTS (CAN ALSO CONNECT TO HIGH-SPEED)**
- **REDUNDANT, HOT-SWAPPABLE POWER SUPPLIES AND FANS**
- **I/O PANEL TO POWER SUPPLY AIRFLOW OR POWER SUPPLY TO I/O PANEL AIRFLOW**
- **TOOL-LESS MOUNTING KITS REDUCE TIME AND RESOURCES FOR SWITCH RACK INSTALLATION**
- **POWER-EFFICIENT OPERATION UP TO 45°C HELPING REDUCE COOLING COSTS IN TEMPERATURE-CONSTRAINED DEPLOYMENTS**
- **PROPRIETARY DIRECT CONNECT TECHNOLOGY**

WHAT'S INCLUDED WITH THE SWITCH

- **(1) SWITCH**
- **(2) POWER SUPPLIES**
- **(4) FANS**
- **(1) RACKMOUNT KIT**

32-PORT ULTRA SPEED MATRIX DIRECT CONNECT SWITCH (EMX100-32)	
APPROVALS	Environmental Compliances: Japan: VCCI V3/2009 Class A; USA: FCC CFR 47 Part 15, Subpart B:2009, Class A; RoHS EMI Certifications: Australia/New Zealand: AS/NZS CISPR 32: Class A; Canada: ICES-003, Issue-4, Class A; Europe: EN 55032: 2015+A1:2007 (CISPR 32); Class A; Japan: VCCI V3/2009 Class A; USA: FCC CFR 47 Part 15, Subpart B:2009, Class A Safety Certifications: UL/CSA, EN 60959-1, EN 60825-1, FDA Regulation 21 CFR 1040.10 and 1040.11
ENVIRONMENTAL	Operating Humidity: 10 to 90% (RH), noncondensing Operating Temperature: 32 to 113° F (0 to 45° C) Storage Humidity: 5 to 95% (RH), noncondensing Storage Temperature: -40 to +158° F (-40 to +70° C)
MANAGEMENT	Console port management: (1) RJ-45 serial
PERFORMANCE	Switching Capacity: non-blocking; Latency: < 1 µs (ingress to egress)
PHYSICAL	Connectors/Interfaces: (32) Ultra Speed Ethernet SFP ports, (1) RJ-45 serial console management port, (1) 10/100/1000BT Ethernet port for management, (1) USB 2.0 Type A storage port, (1) micro USB Type B for console/management port access Dimensions: 1.75" H (1 RU) x 17.08" W x 18.11" D (4.4 x 43.4 x 46 cm) Mounting:Rackmounted Weight: 20.1 lb. (9.12 kg), including power modules
POWER	Input: 100–240 VAC, 50/60 Hz Max. Power Consumption: 608 W; Min. Power Consumption: 197 W; Power Supply Type: (2) hot-swappable redundant AC power Fans: (4) hot-swappable redundant fans
OTHER	Proprietary Direct Connect Technology

SPECIFICATIONS

48-PORT 1G NETWORK SWITCH (EMS1G-48)

FEATURES

- **NON-BLOCKING SWITCHING ARCHITECTURE WITH OS 9.X SOFTWARE DELIVERS LINE-RATE L2/L3 FEATURES**
- **HAS (48) 10/100/1000 MBPS TWISTED-PAIR PORTS**
- **ALSO HAS (4) SFP+ 10 GBE UPLINK PORTS FOR MAXIMUM FLEXIBILITY AND INVESTMENT PROTECTION**
- **I/O PANEL TO PSU AIRFLOW OR PSU TO I/O PANEL AIRFLOW**
- **REDUNDANT HOT-SWAPPABLE POWER SUPPLIES AND FANS**
- **SUPPORTS JUMBO FRAMES FOR HIGH-END PERFORMANCE IN VIRTUALIZED ENVIRONMENTS AND IP STORAGE/SERVER COMMUNICATION**

WHAT'S INCLUDED WITH THE SWITCH

- **(1) SWITCH**
- **(2) POWER SUPPLIES**
- **(4) FANS**
- **(1) RACKMOUNT KIT**

48-PORT 1G NETWORK SWITCH (EMS1G-48) SPECIFICATIONS	
APPROVALS	Environmental Compliances: Japan: VCCI V3/2009 Class A; USA: FCC CFR 47 Part 15, Subpart B:2009, Class A; RoHS EMI Certifications: Australia/New Zealand: AS/NZS CISPR 32: Class A; Canada: ICES-003, Issue-4, Class A; Europe: EN 55032: 2015+A1:2007 (CISPR 32); Class A; Japan: VCCI V3/2009 Class A; USA: FCC CFR 47 Part 15, Subpart B:2009, Class A Safety Certifications: UL/CSA, EN 60959-1, EN 60825-1, FDA Regulation 21 CFR 1040.10 and 1040.11
ENVIRONMENTAL	Operating Humidity: 5 to 85%, relative humidity, non-condensing Operating Temperature: 32 to 113° F (0 to 45° C) Storage Humidity: 5 to 95%, relative humidity, non-condensing Storage Temperature: -40 to +158° F (-40 to +70° C)
MANAGEMENT	Console port management: (1) RJ-45 console management port with RS-232 signaling; Protocols: UDP, TCP, Ethernet, Telnet, FTP, IPv4, IPv6; IPv4: ICMP, ARP, DNS (client), NTPv3, CIDR, BOOTP (relay) IPv6: Telnet, FTP, TACACS, RADIUS, SSH, NTP
PERFORMANCE	Switching Capacity: 260 Gbps (full-duplex); Forwarding capacity: 131 Mpps; Packet Buffer Memory: 4 MB; CPU Memory: 2 GB MAC Addresses: Up to 80 K IPv4 Routes: 16 K; IPv6 Routes: 8K (Shared CAM space with IPv4); Link aggregation: 16 links per group, 128 groups per stack; Queues per port: 8 queues; Layer 2 VLANs: 4K; MSTP: 64 instances; VRF-lite: 64 instances; Line-rate Layer 2 switching: all protocols, including IPv4 and IPv6; Line-rate Layer 3 routing: IPv4 and IPv6; IPv4 host table size up to 40k max; IPv6 host table size 8K; IPv4 Multicast table size 8K; LAG load balancing: based on Layer 2, IPv4 or IPv6 headers; Latency: 3.7 µsec for 1000BASE-T, 1.8 µsec for SFP+;

SPECIFICATIONS

48-PORT 1G NETWORK SWITCH (EMS1G-48)

48-PORT 1G NETWORK SWITCH (EMS1G-48) SPECIFICATIONS (CONTINUED)	
PHYSICAL	Connectors/Interfaces: (48) 10/1000/1000BASE-T RJ-45 ports, (4) 10 GbE SFP+ uplink ports, (1) RJ-45 RS-232 serial console port Dimensions: 1.71" H (1 RU) x 17.09" W x 12.6" D (4.4 x 43.4 x 32 cm) Indicators: (1) Power LED, (48) TP Link/Activity LEDs, (48) Speed LEDs, (4) SFP Link LEDs; Mounting: Rackmounted Weight: 12.8 lb. (5.84 kg)
POWER	Input: 90–264 VAC, 50/60 Hz Maximum Power Consumption: 87 W Typical Power Consumption: 65 W Max. Thermal Output: 290 BTU/hr.; Max. Current Draw per System: <1 A at 100/120 VAC, <0.5 A at 200/240 VAC Power Supply Type: (2) hot-swappable redundant AC power Fans: (4) hot-swappable redundant fans
STANDARDS	IEEE: IEEE 802.1ab LLDP; 802.1D Bridging, STP; 802.1p L2 Prioritization; 802.1Q VLAN Tagging, Double VLAN Tagging, GVRP; 802.1s MSTP; 802.1w RSTP; 802.1X Network Access Control; 802.3ab Gigabit Ethernet (1000BASE-T); 802.3ac Frame Extensions for VLAN Tagging; 802.3ad Link Aggregation with LACP; 802.3ae 10 Gigabit Ethernet (10GBASE-X) on optical ports; 802.3az Energy Efficient Ethernet (EEE); 802.3u Fast Ethernet (100BASE-TX) on mgmt ports; 802.3x Flow Control; 802.3z Gigabit Ethernet (1000BASE-X); ANSI/TIA-1057 LLDP-MED, Force10 PVST+, MTU 12,000 bytes; RFC and I-D compliance

SPECIFICATIONS

28-PORT 10G NETWORK SWITCH (EMS10G-28)

FEATURES

- **(1) RU HIGH-DENSITY 28-PORT 10 GBE SWITCH**
- **960 GBPS (FULL-DUPLEX) NON-BLOCKING, CUT-THROUGH SWITCHING FABRIC DELIVERS LINE-RATE PERFORMANCE UNDER FULL LOAD**
- **REDUNDANT, HOT-SWAPPABLE POWER SUPPLIES AND FANS**
- **SUPPORTS 10GBASE FIBER OPTICS**
- **COMPLIES WITH IEEE 1588V2**
- **VXLAN GATEWAY SUPPORT FOR BRIDGING AND ROUTING NON-VIRTUALIZED AND VIRTUALIZED OVERLAY NETWORKS WITH LINE-RATE PERFORMANCE**
- **I/O PANEL TO PSU AIRFLOW OR PSU TO I/O PANEL AIRFLOW**
- **CONVERGED NETWORK SUPPORT WITH DCB**

WHAT'S INCLUDED WITH THE SWITCH

- **(1) SWITCH**
- **(2) POWER SUPPLIES**
- **(4) FANS**
- **(1) RACKMOUNT KIT**

FRONT VIEW

EMS10G-28

28-PORT 10G NETWORK SWITCH (EMS10G-28) SPECIFICATIONS	
APPROVALS	Environmental Compliances: Japan: VCCI V3/2009 Class A; USA: FCC CFR 47 Part 15, Subpart B:2009, Class A; RoHS EMI Certifications: Australia/New Zealand: AS/NZS CISPR 32: Class A; Canada: ICES-003, Issue-4, Class A; Europe: EN 55032: 2015+A1:2007 (CISPR 32); Class A; Japan: VCCI V3/2009 Class A; USA: FCC CFR 47 Part 15, Subpart B:2009, Class A Safety Certifications: UL/CSA, EN 60959-1, EN 60825-1, FDA Regulation 21 CFR 1040.10 and 1040.11
ENVIRONMENTAL	Operating Humidity: 10 to 85%, relative humidity, non-condensing Operating Temperature: 32 to 104° F (0 to 40° C) Storage Humidity: 5 to 95%, relative humidity, non-condensing Storage Temperature: -40 to +158° F (-40 to +70° C)
MANAGEMENT	Console port management: (1) RJ-45 serial Security/Authentication: RADIUS, RADIUS and IPv6, SSHv2, Security Architecture for IPSec, IPSec Authentication Header, ESP Protocol Network Management: SNMPv1/2, SSHv2, FTP, TFTP, SCP, Syslog, Port Mirroring, RADIUS, 802.1X, Support Assist (Phone Home, Netconf APIs, XML Schema, CLI Commit (Scratchpad), sFlow Automation: Control Plane Services APIs, Linux Utilities and Scripting Tools Quality of Service (QoS): Access Control Lists, Prefix List, Route-Map, Rate Shaping (Egress), Rate Policing (Ingress); Scheduling Algorithms: Round Robin, Weighted Round Robin, Deficit Round Robin, Strict Priority, Weighted Random Early Detect
PERFORMANCE	Switching Capacity: 960 Gbps; Forwarding Capacity: 720 Mpps; Frame Size: 9416 bytes; Packet Buffer Memory: 12 MB; CPU Memory: 4 GB; MAC Addresses: 160 K; ARP Table: 128 K; IPv4 routes: 128K; IPv6 hosts: 64K; IPv6 routes: 64K; Multicast hosts: 8K Link aggregation: 16 links per group, 128 groups; Layer 2 VLANs: 4K; MSTP: 64 instances; LAG load balancing: Based on layer 2, IPv4 or IPv6 headers

SPECIFICATIONS

28-PORT 10G NETWORK SWITCH (EMS10G-28)

28-PORT 10G NETWORK SWITCH (EMS10G-28) SPECIFICATIONS (CONTINUED)	
PHYSICAL	Connectors/Interfaces: (28) 10GbE SFP+, (2) 100GbE QSFP28, (2) AC PSUs, (4) Fan modules, PSU to I/O Panel Airflow Dimensions: 1.75" H (1 RU) x 17" W x 18" D (4.4 x 43.1 x 45.7 cm) Mounting: Rackmounted Weight: 19.66 lb. (8.92 kg)
POWER	Input: 100–240 VAC, 50/60 Hz Maximum Power: 290 W Typical Operating Power: 260 W Max. Thermal Output: 886 BTU/hr. Power Supply Type: (2) hot-swappable redundant AC power Fans: (4) hot-swappable redundant fans
STANDARDS	IEEE Compliance: 802.1ab LLDP; TIA-1057 LLDP-MED; 802.1s MSTP; 802.1w RSTP; 802.3ab Gigabit Ethernet (1000BASE-T); 802.3ad Link Aggregation with LACP; 802.3ae 10 Gigabit Ethernet (10GBASE-X); 802.3i Ethernet (10BASE-T); 802.3u Fast Ethernet (100BASE-TX); 802.3z Gigabit Ethernet (1000BASE-X); 802.1D Bridging, STP; 802.1p L1 Prioritization; 802.1Q VLAN Tagging, Double VLAN Tagging, GVRP; 802.1Qbb PFC; 801.2Qaz ETS; 802.1s MSTP; 802.1w RSTP; PVST+; 802.1X Network Access Control; 802.3ac Frame Extensions for VLAN Tagging; 802.3u Fast Ethernet (100BASE-TX) on mgmt ports; 802.3x Flow Control; 802.3z Gigabit Ethernet (1000BASE-X) with QSA; ANSI/TIA-1057, Jumbo MTU support 9416 bytes

SPECIFICATIONS

32-PORT 100G NETWORK SWITCH (EMS100G-32)

FEATURES

- (1) RU HIGH-DENSITY (32) ULTRA-SPEED PORTS (CAN ALSO CONNECT TO HIGH-SPEED)
- UP TO 6.4 TBPS OF SWITCHING I/O BANDWIDTH (FULL DUPLEX) AVAILABLE
- SCALABLE L2 AND L3 ETHERNET SWITCHING WITH QOS AND A FULL COMPLEMENT OF STANDARDS-BASED IPV4 AND IPV6 FEATURES, INCLUDING OSPF AND BGP ROUTING SUPPORT
- L2 MULTIPATH SUPPORT VIA VIRTUAL LINK TRUNKING (VLT) AND MULTIPLE VLT (MVLT) MULTI-CHASSIS LINK AGGREGATION TECHNOLOGY
- VRF-LITE ENABLES SHARING OF NETWORKING INFRASTRUCTURE AND PROVIDES L3 TRAFFIC ISOLATION ACROSS TENANTS
- OPEN AUTOMATION FRAMEWORK ADDING AUTOMATED CONFIGURATION AND PROVISIONING CAPABILITIES TO SIMPLIFY THE MANAGEMENT OF NETWORK ENVIRONMENTS
- JUMBO FRAME SUPPORT FOR LARGE DATA TRANSFERS
- 128 LINK AGGREGATION GROUPS WITH UP TO EIGHT MEMBERS PER GROUP, USING ENHANCED HASHING
- REDUNDANT, HOT-SWAPPABLE POWER SUPPLIES AND FANS
- I/O PANEL TO POWER SUPPLY AIRFLOW OR POWER SUPPLY TO I/O PANEL AIRFLOW
- TOOL-LESS MOUNTING KITS REDUCE TIME AND RESOURCES FOR SWITCH RACK INSTALLATION
- POWER-EFFICIENT OPERATION UP TO 45°C HELPING REDUCE COOLING COSTS IN TEMPERATURE-CONSTRAINED DEPLOYMENTS

WHAT'S INCLUDED WITH THE SWITCH

- (1) SWITCH
- (2) POWER SUPPLIES
- (4) FANS
- (1) RACKMOUNT KIT

32-PORT 100G NETWORK SWITCH (EMS100G-32) SPECIFICATIONS	
APPROVALS	Environmental Compliances: Japan: VCCI V3/2009 Class A; USA: FCC CFR 47 Part 15, Subpart B:2009, Class A; RoHS EMI Certifications: Australia/New Zealand: AS/NZS CISPR 32: Class A; Canada: ICES-003, Issue-4, Class A; Europe: EN 55032: 2015+A1:2007 (CISPR 32); Class A; Japan: VCCI V3/2009 Class A; USA: FCC CFR 47 Part 15, Subpart B:2009, Class A Safety Certifications: UL/CSA, EN 60959-1, EN 60825-1, FDA Regulation 21 CFR 1040.10 and 1040.11
ENVIRONMENTAL	Operating Humidity: 10 to 90% (RH), noncondensing Operating Temperature: 32 to 113° F (0 to 45° C) Storage Humidity: 5 to 95% (RH), noncondensing Storage Temperature: -40 to +158° F (-40 to +70° C)
MANAGEMENT	Network Management: SMIv1, SNMPv1, Concise MIB Definitions, SNMP Traps, Bridges MIB, OSPFv2 MIB, Community-Based SNMPv2, IP MIB, IP Forwarding Table MIB, SMIv2, Textual Conventions for SMIv2; Security/Authentication: RADIUS, RADIUS and IPv6, Radius support for EAP, 802.1X with RADIUS, EAP, AES Cipher Algorithm in the SNMP User Base Security Model, SSHv2, Security Architecture for IPSec, IPSec Authentication Header, ESP Protocol, IPsec Security Policy DB MIB Type

SPECIFICATIONS

32-PORT 100G NETWORK SWITCH (EMS100G-32)

32-PORT 100G NETWORK SWITCH (EMS100G-32) SPECIFICATIONS (CONTINUED)	
PERFORMANCE	Switching Capacity: 6.4 Tbps; Forwarding capacity: Up to 4400 Mpps (Full Duplex); Packet buffer memory: 16MB; CPU memory: 8GB; MAC addresses: 136 K; ARP entries: 128K; IPv4 Unicast routes: 136 K; IPv6 Unicast routes: 68K; IPv4 Multicast routes: 68K; IPv6 Multicast routes: Not supported; Multicast Hosts: 8K; Layer 2 VLANs: 4K per port; Layer 3 VLANs: Standalone 1K/VLT 4K; MSTP: 64 instances; PVST+: 128 instances; LAG: 128 groups, 16 members per LAG group:; LAG load balancing: Based on layer 2, IPv4 or IPv6 headers:; Latency: Sub 500 ns; QOS data queues: 8; QOS control queues: 12; QOS: Default 1024 entries scalable to 2.5K; ACL Support: 3K
PHYSICAL	Connectors/Interfaces: (32) 100 Gbps Ethernet SFP ports, (2) 10 GbE/100 GbE/100 MbE SFP+ uplink ports, (1) RJ-45 serial console management port, (1) 10/100/1000BT Ethernet port for management, (1) USB 2.0 Type A storage port, (1) micro USB Type B for console/management port access Dimensions: 1.75" H (1 RU) x 17.08" W x 18.11" D (4.4 x 43.4 x 46 cm) Mounting: Rackmounted Weight: 20.1 lb. (9.12 kg), including power modules
POWER	Input: 100–240 VAC, 50/60 Hz Max. Power Consumption: 605 W; Min. Power Consumption: 195 W; Power Supply Type: (2) hot-swappable redundant AC power Fans: (4) hot-swappable redundant fans
STANDARDS	LLDP, Bridging, STP, L2 Prioritization, VLAN Tagging, Double VLAN Tagging, GVRP, PFC, ETS, MSTP, RSTP, Network Access Control, Gigabit Ethernet (1000BASE-T) or breakout, Frame extensions for VLAN Tagging, Link Aggregation with LACP, MORE; ANSI/TIA-1057 LLDP-MED, Force10 PVST+. Jumbo MTU support 9.416 bytes

ORDERING INFORMATION

ITEM	CODE
Emerald-2K/-4K High-Performance KVM	
4K Single-Head Extender	
Transmitter	**EMD4000T**
Receiver	**EMD4000R**
2K Dual-Head Extender	
Transmitter	**EMD2002T**
Receiver	**EMD2002R**
2K Single-Head Extender	
Transmitter	**EMD2000T**
Receiver	**EMD2000R**
Direct Connect Switches	
48-Port, Standard Speed Matrix	**EMX1-48**
28-Port, High Speed Matrix	**EMX10-28**
32-Port, Ultra Speed Matrix	**EMX100-32**
Ethernet Switches	
1G 48-Port	**EMS1G-48**
10G 28-Port	**EMS10G-28**
100G 32-Port	**EMS100G-32**
Management Device	
Boxilla™ Enterprise Level KVM and AV/IT Manager	**BXAMGR**

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ABOUT BLACK BOX

Black Box is a world leading technology solutions provider specializing in complete high-performance KVM, professional A/V signal distribution and extension and switching solutions for mission-critical applications. Black Box is dedicated to delivering superior project engineering, technical support, and 24/7 customer service you can rely on for your most critical operations.

Every day, our customers trust us to design, integrate, and maintain reliable control room solutions for broadcasting, post-production, stadiums & arenas, medical, air traffic control, oil & gas, government & military, and utility industries. Leave the tech to us and our comprehensive technology solutions will deliver secure connections, fast-response times, real-time collaboration and more.

NOTES

FILENAME: EMERALD_DS_REV1

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