EMERALD UNIFIED KVM FAMILY

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

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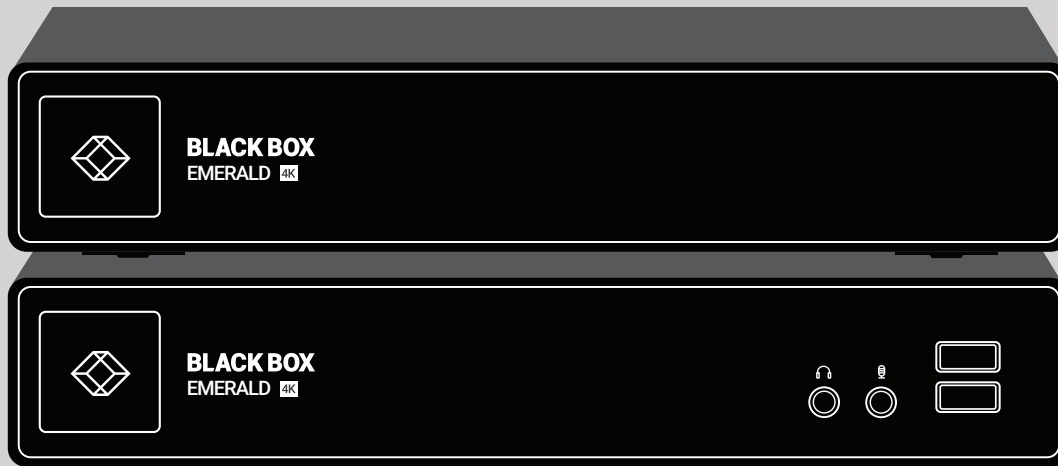
OVERVIEW

EMERALD UNIFIED KVM FAMILY DATA SHEET

INTRODUCTION

Emerald High-Performance KVM provides KVM over an existing or dedicated IP network. Extension and switching of 4K video and access to physical and virtual machines from one console ensures a future-proof system. Seven transmitters, six receivers and five Ethernet switches are available.

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

– EMERALD PE SINGLE-HEAD TRANSMITTER (EMD2000PE-T) AND RECEIVER (EMD2000PE-R OR EMD2000PE-R-P)

– EMERALD PE DUAL-HEAD TRANSMITTER (EMD2002PE-T) AND RECEIVER (EMD2002PE-R or EMD2002PE-R-P)

– EMERALD SE SINGLE-HEAD TRANSMITTER (EMD2000SE-T) AND RECEIVER (EMD2000SE-R)

– EMERALD SE DUAL-HEAD TRANSMITTER (EMD2002SE-T) AND RECEIVER (EMD2002SE-R)

- EMERALD ZEROU DVI TRANSMITTER (EMD200DV-T)

- EMERALD ZEROU DISPLAYPORT TRANSMITTER (EMD200DP-T)

- EMERALD REMOTE APP SOFTWARE (RECEIVER) (EMDRM)

– 1G 48-PORT NETWORK SWITCH (EMS1G48)

– 1G 24-PORT NETWORK SWITCH (EMS1G24F)

– 10G 12-PORT NETWORK SWITCH (EMS10G12)

– 10G 28-PORT NETWORK SWITCH (EMS10G28)

– 100G 32-PORT NETWORK SWITCH (EMS100G32)

FEATURES

- **4K VIDEO, 10 BIT COLOR @ 60 FPS**
- **PIXEL PERFECT VIDEO—MATHEMATICALLY LOSSLESS**
- **ACCESS TO VIRTUAL MACHINES USING RDP/REMOTEFX AND PCOIP SUPPORTING MICROSOFT®, VMWARE® AND CITRIX®**
- **4K VERSION HAS DUAL NETWORK OPTION FOR REDUNDANCY**
- **PE VERSION SUPPORTS POWER-OVER-ETHERNET (POE) OR POWER VIA AN EXTERNAL PSU**
- **PE VERSION HAS DUAL NETWORK INTERFACES — (1) 1GBASE-T AND SFP**
- **ACCESS RESOURCES ANYWHERE VIA WAN**
- **CENTRALIZED MANAGEMENT, ACCESS CONTROL, MONITORING AND UPGRADES**
- **OPTION TO USE EXISTING NETWORK INFRASTRUCTURE**
- **CHOOSE COPPER OR FIBER CONNECTIONS**
- **TRANSPARENT USB 2.0 – CONNECT ANY USB DEVICE**
- **SUPPORT AUDIO OVER DISPLAYPORT, USB AND ANALOG**
- **ZEROU TRANSMITTER HAS A SMALL FORM FACTOR SO IT USES ZERO RACKSPACE—YOU SAVE MONEY WHEN RACK SPACE IS EXPENSIVE**
- **ZEROU DVI OR DISPLAYPORT TRANSMITTER IS POWERED OVER USB OR VIA A SEPARATE POWER SUPPLY**
- **ZEROU DISPLAYPORT TRANSMITTER SUPPORTS EMBEDDED AUDIO**
- **SUPPORTS INTEROPERABILITY AMONG ALL EMERALD DEVICES, INCLUDING EMERALD SE/PE V6.0 , EMERALD 4K V1.4, AND BOXILLA 4.0**

COMPARISON CHART: TRANSMITTERS AND RECEIVERS

SPECIFICATION COMPARISON CHART: TRANSMITTERS AND RECEIVERS								
	NUMBER OF VIDEO HEADS	USB PORTS	NETWORK	POE	SERIAL	AUDIO	SFP+	RESOLUTION
RECEIVERS								
4K RECEIVER (EMD4000R)	(1) DISPLAYPORT	(4) USB TYPE A	(1) RJ-45*	NO	(1) DB9	(2) 3.5-MM	(2)	4096 x 2160
PE RECEIVER, SINGLE-HEAD (EMD2000PE-R)	(1) DVI	(4) USB TYPE A	(1) RJ-45, (1) SFP	NO	NONE	(2) 3.5-MM	NONE	1920 x 1200
PE POE RECEIVER, SINGLE-HEAD (EMD2000PE-R-P)	(1) DVI	(4) USB TYPE A	(1) RJ-45, (1) SFP	YES	NONE	(2) 3.5-MM	NONE	1920 x 1200
PE RECEIVER, DUAL-HEAD (EMD2002PE-R)	(2) DVI	(4) USB TYPE A	(1) RJ-45, (1) SFP	NO	NONE	(2) 3.5-MM	NONE	1920 x 1200
PE POE RECEIVER, DUAL-HEAD (EMD2002PE-R-P)	(2) DVI	(4) USB TYPE A	(1) RJ-45, (1) SFP	YES	NONE	(2) 3.5-MM	NONE	1920 x 1200
SE RECEIVER, SINGLE-HEAD (EMD2000SE-R)	(1) DVI	(4) USB TYPE A	(1) RJ-45	NO	(1) DB9	(2) 3.5-MM	NONE	1920 x 1200
SE RECEIVER, DUAL-HEAD (EMD2002SE-R)	(2) DVI	(4) USB TYPE A	(1) RJ-45	NO	NONE	(2) 3.5-MM	NONE	1920 x 1200
TRANSMITTERS								
4K TRANSMITTER (EMD4000T)	(1) DISPLAYPORT	(1) USB TYPE B	(1) RJ-45*	NO	(1) DB9	(2) 3.5-MM	(2)	4096 x 2160
PE POE TRANSMITTER, SINGLE-HEAD (EMD2000PE-T)	(1) DVI	(1) USB TYPE B	(1) RJ-45, (1) SFP	YES	NONE	(2) 3.5-MM	NONE	1920 x 1200
PE POE TRANSMITTER, DUAL-HEAD (EMD2002PE-T)	(2) DVI	(1) USB TYPE B	(1) RJ-45, (1) SFP	YES	NONE	(2) 3.5-MM	NONE	1920 x 1200
SE TRANSMITTER, SINGLE-HEAD (EMD2000SE-T)	(1) DVI	(1) USB TYPE B	(1) RJ-45	NO	(1) RJ-45	(2) 3.5-MM	NONE	1920 x 1200
SE TRANSMITTER, DUAL-HEAD (EMD2002SE-T)	(2) DVI	(1) USB TYPE B	(1) RJ-45	NO	NONE	(2) 3.5-MM	NONE	1920 x 1200
ZEROU DVI TRANSMITTER (EMD200DV-T)	(1) DVI	(2) USB TYPE A	(1) RJ-45	NO	NONE	(1) 3.5-MM	NONE	1920 x 1200
ZEROU DISPLAYPORT TRANSMITTER (EMD200DP-T)	(1) DISPLAYPORT	(2) USB TYPE A	(1) RJ-45	NO	NONE	EMBEDDED ON DP	NONE	1920 x 1200

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COMPARISON CHART: SWITCHES

SPECIFICATION COMPARISON CHART: SWITCHES							
NETWORK SWITCHES	SPEED	PORTS	CASCADE PORTS	CAPACITY	MAC ADDRESSES	CPU MEMORY	BUFFER
EMS1G24F	1G	(24) 1G SFP	(2) 10G SFP+	212 GBPS	56 K	2 GB	4 MB
EMS1G48	1G	(48) 10/100/1000BT RJ-45	(4) 10G SFP+	260 GBPS	UP TO 80 K	2 GB	4 MB
EMS10G12	10G	(12) 10GbE SFP+	(3) 100G QSFP28	840 GBPS	272 K	4 GB	12 MB
EMS10G28	10G	(28) 10GbE SFP+	(2) 100G QSFP28	960 GBPS	272 K	4 GB	12 MB
EMS100G32	100G	(32) 100G QSFP28	—	6.4 TBPS	136 K	8 GB	16 MB

COMPATIBLE SFPS

COMPATIBLE SFPS		
PART NUMBER	DESCRIPTION	DISTANCE
1-GBPS CONNECTIONS		
LFP441	SFP, Gigabit Ethernet, 850-nm Multimode Fiber, LC	550 m
LFP442	SFP, Gigabit Ethernet, 1310-nm Single-mode Fiber, LC	20 km
LFP443	SFP, 10/100/1000BASE-T RJ-45 SGMII	100 m
10-GBPS CONNECTIONS		
LSP441	SFP+ - 10-Gb, Extended Diagnostics, 850-nm Multimode Fiber, LC	300 m
LSP442	SFP+ - 10-Gb, Extended Diagnostics, 1310-nm Single-mode Fiber, LC	10 km
LSP443	SFP+, 10GBASE-T, RJ-45	30 m
40-GBPS CONNECTIONS		
QSFP541	QSFP+ Transceiver — 40GBASE-SR4, Multimode Fiber, 850-nm	100 m
100-GBPS CONNECTIONS		
QSFP441	QSFP28 100GBASE-SR4, 850-nm Multimode, MPO	100 m
QSFP442	QSFP28 100GBASE-LR4, DWM Single-mode, LC	10 km

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

COMPATIBLE ACTIVE OPTICAL CABLES (AOCS) FOR NETWORKING

COMPATIBLE 10G ACTIVE OPTICAL CABLES FOR NETWORKING	
LENGTH	**PRODUCT CODE**
1-m	**SFP-10G-AOC1M-BB**
2-m	**SFP-10G-AOC2M-BB**
3-m	**SFP-10G-AOC3M-BB**
5-m	**SFP-10G-AOC5M-BB**
7-m	**SFP-10G-AOC7M-BB**
10-m	**SFP-10G-AOC10M-BB**

COMPATIBLE 100G ACTIVE OPTICAL CABLES FOR NETWORKING	
LENGTH	**PRODUCT CODE**
3-m	**QSFP-100G-AOC3M-BB**
5-m	**QSFP-100G-AOC5M-BB**
7-m	**QSFP-100G-AOC7M-BB**
10-m	**QSFP-100G-AOC10M-BB**
15-m	**QSFP-100G-AOC15M-BB**
30-m	**QSFP-100G-AOC30M-BB**

COMPATIBLE 10G DIRECT ATTACH CABLES (DACS) FOR NETWORKING

COMPATIBLE 10G DIRECT ATTACH CABLES FOR NETWORKING	
LENGTH	**PRODUCT CODE**
50-cm	**SFP-H10GB-CU50CM-BB**
1-m	**SFP-H10GB-CU1M-BB**
1.5-m	**SFP-H10GB-CU1M5-BB**
2-m	**SFP-H10GB-CU2M-BB**
3-m	**SFP-H10GB-CU3M-BB**
5-m	**SFP-H10GB-CU5M-BB**

SPECIFICATIONS

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

FRONT VIEW

EMD4000T

FRONT VIEW

EMD4000R

BACK VIEW

EMD4000T

BACK VIEW

EMD4000R

WHAT'S INCLUDED WITH THE TRANSMITTER

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

WHAT'S INCLUDED WITH THE RECEIVER

- **(1) RECEIVER**
- **(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 (10GBASE-X), (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 (-20° C to 60° 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

EMERALD PE SINGLE-HEAD TRANSMITTER AND RECEIVER (EMD2000PE-T, EMD2000PE-R, EMD2000PE-R-P)

TRANSMITTER FRONT VIEW

RECEIVER FRONT VIEW

TRANSMITTER BACK VIEW

RECEIVER BACK VIEW

WHAT'S INCLUDED WITH THE TRANSMITTER (EMD2000PE-T)

- (1) EMERALD PE TRANSMITTER, SINGLE-HEAD
- (1) 12-VDC POWER ADAPTER AND POWER CORD
- (1) DVI CABLE
- (1) USB 2.0 TYPE B CABLE

WHAT'S INCLUDED WITH THE RECEIVER (EMD2000PE-R OR EMD2000PE-R-P)

- (1) EMERALD PE RECEIVER, SINGLE-HEAD
- (1) 12-VDC POWER ADAPTER AND POWER CORD

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SPECIFICATIONS

EMERALD PE SINGLE-HEAD TRANSMITTER AND RECEIVER (EMD2000PE-T, EMD2000PE-R, EMD2000PE-R-P)

SPECIFICATIONS FOR EMERALD PE TRANSMITTER AND RECEIVER, SINGLE-HEAD (EMD2000PE-T, EMD2000PE-R, EMD2000PE-R-P)	
APPROVALS	
UNIT	FCC, CE, RoHS, WEEE
POWER SUPPLY	TUV, UL
PHYSICAL	

LED INTERFACE	(1) Power LED (lights when power is on);
	NOTE: Unit automatically powers on when plugged in; must be powered off at the power source.
	(1) RJ-45 Speed LED (green, located on top left of RJ-45 connector):
	   Blinks three times when the network connection is 1000 Mbps,
	   Blinks two times when network connection is 100 Mbps,
	   Blinks once when the network connection is 10 Mbps,
	   Not blinking: No Link to network;
	(1) Activity LED (green, located on top right of RJ-45 connector):
	   Solid green: Link up,
	   Blinking: Activity on the link,
	   OFF: No link

MAXIMUM DISTANCE FROM CPU TO TRANSMITTER	EMD2000PE-T: 16 ft. (5 m), DVI-D and USB limitations
MAXIMUM DISTANCE BETWEEN TRANSMITTER AND RECEIVER	328 ft. (100 m), use a network switch to get farther distances
OPERATING SYSTEM SUPPORT	Microsoft Windows® Vista, XP, Windows 7, Windows 8, Windows 10, Server 2003, Server 2008, Server 2012, LInux®, Mac OS

CONNECTORS	EMD2000PE-T: (1) DVI input, (1) USB Type B female, (1) RJ-45 PoE network, (1) SFP network, (2) 3.5 mm audio,
	   (1) 2.5 mm barrel for power, (1) Micro USB connector;
	EMD2000PE-R: (1) DVI output, (4) USB Type A female, (1) RJ-45 network, (1) SFP network, (2) 3.5 mm audio for SPK and MIC,
	   (1) 2.5 mm barrel for power, (1) Micro USB connector;
	EMD2000PE-R-P: (1) DVI output, (4) USB Type A female, (1) RJ-45 PoE network, (1) SFP network, (2) 3.5 mm audio for SPK and MIC,
	   (1) 2.5 mm barrel for power, (1) Micro USB connector

DIMENSIONS	EMD2000PE-T, EMD2000PE-R, EMD2000PE-R-P: 1.32" H x 7.62" W x 5.79" D (3.36 x 19.36 x 14.73 cm)
WEIGHT	EMD2000PE-T, EMD2000PE-R, EMD2000PE-R-P: 1.18 lbs (0.54 kg)
OPERATION	
DEFAULT IP ADDRESS	EMD2000PE-T: 192.168.1.22; EMD2000PE-R, EMD2000PE-R-P: 192.168.1.21
ENCRYPTION	Secure Sockets Layer (SSL) over TCP/IP, 128-bit between TX and RX, user set between RX and Hyper-V
DEFAULT USERNAME	admin
DEFAULT PASSWORD	The password is blank by default
DDC SUPPORT	Built-in/clone of remote
POWER	
POWER SOURCE	External in-line power supply
INPUT VOLTAGE	100−240 VAC, 50/60 Hz
INPUT CURRENT	0.9 amps maximum
POWER CONSUMPTION	Unit: 7.5 watts with keyboard and mouse attached; Power supply is 20 W to support USB based powered devices
HEAT DISSIPATION	(12 VDC PSU x 4 amps) x 3.41 = 68.2 BTU/hour maximum (Voltage x Nominal Current) x 3.41 = BTU/hr
OUTPUT CONNECTOR	DIN locking connector
INPUT CONNECTOR	IEC-320, C8
POWER SUPPLY CORD LENGTH	6 ft. (1.8 m)
ENVIRONMENTAL	
OPERATING TEMPERATURE	32 to 104° F (0 to 40° C)
STORAGE TEMPERATURE	-4 to +140° F (-20 to 60° C)
OPERATING HUMIDITY	5 to 95%, noncondensing

SPECIFICATIONS

EMERALD PE DUAL-HEAD TRANSMITTER AND RECEIVER (EMD2002PE-T, EMD2002PE-R, EMD2002PE-R-P)

TRANSMITTER FRONT VIEW

RECEIVER FRONT VIEW

TRANSMITTER BACK VIEW

RECEIVER BACK VIEW

WHAT'S INCLUDED WITH THE TRANSMITTER (EMD2002PE-T)

- (1) EMERALD PE TRANSMITTER, DUAL-HEAD
- (1) 12-VDC POWER ADAPTER AND POWER CORD
- (2) DVI CABLES
- (1) USB 2.0 TYPE B CABLE

WHAT'S INCLUDED WITH THE RECEIVER (EMD2002PE-R OR EMD2002PE-R-P)

- (1) EMERALD PE RECEIVER, DUAL-HEAD
- (1) 12-VDC POWER ADAPTER AND POWER CORD

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SPECIFICATIONS

EMERALD PE DUAL-HEAD TRANSMITTER AND RECEIVER (EMD2002PE-T, EMD2002PE-R, EM2002PE-R-P)

SPECIFICATIONS FOR EMERALD PE TRANSMITTER AND RECEIVER, DUAL-HEAD (EMD2002PE-T, EMD2002PE-R, EMD2002PE-R-P)	
APPROVALS	
UNIT	FCC, CE, RoHS, WEEE
POWER SUPPLY	TUV, UL
PHYSICAL	
LED INTERFACE	(1) Power LED (lights when power is on); NOTE: Unit automatically powers on when plugged in; must be powered off at the power source. (1) RJ-45 Speed LED (green, located on top left of RJ-45 connector): 　Blinks three times when the network connection is 1000 Mbps, 　Blinks two times when network connection is 100 Mbps, 　Blinks once when the network connection is 10 Mbps, 　Not blinking: No Link to network; (1) Activity LED (green, located on top right of RJ-45 connector): 　Solid green: Link up, 　Blinking: Activity on the link, 　OFF: No link
MAXIMUM DISTANCE FROM CPU TO TRANSMITTER	EMD2002PE-T: 16 ft. (5 m), DVI-D and USB limitations
MAXIMUM DISTANCE BETWEEN TRANSMITTER AND RECEIVER	328 ft. (100 m), use a network switch to get farther distances
OPERATING SYSTEM SUPPORT	Microsoft Windows® Vista, XP, Windows 7, Windows 8, Windows 10, Server 2003, Server 2008, Server 2012, LInux®, Mac OS
CONNECTORS	EMD2002PE-T: (2) DVI inputs, (1) USB Type B female, (1) RJ-45 PoE network, (1) SFP network, (2) 3.5 mm audio, 　(1) 2.5 mm barrel for power, (1) Micro USB connector; EMD2002PE-R: (2) DVI outputs, (4) USB Type A female, (1) RJ-45 network, (1) SFP network, (2) 3.5 mm audio for SPK and MIC, 　(1) 2.5 mm barrel for power, (1) Micro USB connector; EMD2002PE-R-P: (2) DVI outputs, (4) USB Type A female, (1) RJ-45 PoE network, (1) SFP network, (2) 3.5 mm audio for SPK and MIC, 　(1) 2.5 mm barrel for power, (1) Micro USB connector
DIMENSIONS	EMD2002PE-T, EMD2002PE-R, EMD2002PE-R-P: 1.32" H x 7.62" W x 5.79" D (3.36 x 19.36 x 14.73 cm)
WEIGHT	EMD2002PE-T: 1.47 lb. (0.67 kg); EMD2002PE-R, EMD2002PE-R-P: 1.36 lb. (0.62 kg)
OPERATION	
DEFAULT IP ADDRESS	EMD2002PE-T: 192.168.1.22; EMD2002PE-R, EMD2002PE-R-P: 192.168.1.21
ENCRYPTION	Secure Sockets Layer (SSL) over TCP/IP, 128-bit between TX and RX, user set between RX and Hyper-V
DEFAULT USERNAME	admin
DEFAULT PASSWORD	The password is blank by default
DDC SUPPORT	Built-in/clone of remote
POWER	
POWER SOURCE	External in-line power supply
INPUT VOLTAGE	100–240 VAC, 50/60 Hz
INPUT CURRENT	0.9 amps maximum
POWER CONSUMPTION	Unit: 7.5 watts with keyboard and mouse attached; Power supply is 20 W to support USB based powered devices
HEAT DISSIPATION	(12-VDC PSU x 4 amps) x 3.41 = 68.2 BTU/hour maximum (Voltage x Nominal Current) x 3.41 = BTU/hr
OUTPUT CONNECTOR	DIN locking connector
INPUT CONNECTOR	IEC-320, C8
POWER SUPPLY CORD LENGTH	6 ft. (1.8 m)
ENVIRONMENTAL	
OPERATING TEMPERATURE	32 to 104° F (0 to 40° C)
STORAGE TEMPERATURE	-4 to +140° F (-20 to 60° C)
OPERATING HUMIDITY	5 to 95%, noncondensing

SPECIFICATIONS

EMERALD SE SINGLE-HEAD TRANSMITTER AND RECEIVER (EMD2000SE-T AND EMD2000SE-R)
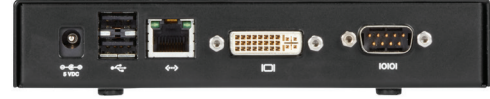
TRANSMITTER FRONT VIEW

RECEIVER FRONT VIEW

TRANSMITTER BACK VIEW

RECEIVER BACK VIEW

WHAT'S INCLUDED WITH THE TRANSMITTER (EMD2000SE-T)

- (1) EMERALD SE TRANSMITTER, SINGLE-HEAD
- (1) 5 VDC POWER SUPPLY
- (1) US POWER CORD

WHAT'S INCLUDED WITH THE RECEIVER (EMD2000SE-R)

- (1) EMERALD SE RECEIVER, SINGLE-HEAD
- (1) 5 VDC POWER SUPPLY
- (1) US POWER CORD

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SPECIFICATIONS

EMERALD SE SINGLE-HEAD TRANSMITTER AND RECEIVER (EMD2000SE-T AND EMD2000SE-R)

SPECIFICATIONS FOR EMERALD SE TRANSMITTER AND RECEIVER, SINGLE-HEAD (EMD2000SE-T AND EMD2000SE-R)	
APPROVALS	
UNIT	FCC, CE, RoHS, WEEE
POWER SUPPLY	TUV, UL
PHYSICAL	

LED INTERFACE	(1) Power LED button (deactivated, not used);
	NOTE: Unit automatically powers on when plugged in; must be powered off at the power source.
	(1) RJ-45 Speed LED (green, located on top left of RJ-45 connector):
	  Blinks three times when the network connection is 1000 Mbps,
	  Blinks two times when network connection is 100 Mbps,
	  Blinks once when the network connection is 10 Mbps,
	  Not blinking: No Link to network;
	(1) Activity LED (green, located on top right of RJ-45 connector):
	  Solid green: Link up,
	  Blinking: Activity on the link,
	  OFF: No link

MAXIMUM DISTANCE FROM CPU TO TRANSMITTER	EMD2000SE-T: 16 ft. (5 m), DVI-D and USB limitations
MAXIMUM DISTANCE BETWEEN TRANSMITTER AND RECEIVER	328 ft. (100 m), use a network switch to get farther distances
OPERATING SYSTEM SUPPORT	Microsoft Windows® Vista, XP, Windows 7, Windows 8, Windows 10, Server 2003, Server 2008, Server 2012, LInux®, Mac OS

CONNECTORS	EMD2000SE-T: (1) DVI input, (1) USB Type B female, (1) RJ-45 network (10/100/1000BASE-T), (1) RJ-45 serial, (2) 3.5 mm audio,
	  (1) 2.5 mm barrel for power;
	EMD2000SE-R: (1) DVI output, (4) USB Type A female, (1) RJ-45 network (10/100/1000BASE-T), (1) DB9 serial,
	  (2) 3.5 mm audio for SPK and MIC, (1) 2.5 mm barrel for power

DIMENSIONS	EMD2000SE-T, EMD2000SE-R: 1.15" H x 6.2" W x 4.2" D (2.92 x 15.75 x 10.67 cm)
WEIGHT	EMD2000SE-T, EMD2000SE-R: 1.18 lbs (0.54 kg)
OPERATION	
DEFAULT IP ADDRESS	EMD2000SE-T: 192.168.1.22; EMD2000SE-R: 192.168.1.21
ENCRYPTION	Secure Sockets Layer (SSL) over TCP/IP, 128-bit between TX and RX, user set between RX and Hyper-V
DEFAULT USERNAME	admin
DEFAULT PASSWORD	The password is blank by default
DDC SUPPORT	Built-in/clone of remote
POWER	
POWER SOURCE	External in-line power supply
INPUT VOLTAGE	100–240 VAC, 50/60 Hz
INPUT CURRENT	0.9 amps maximum
POWER CONSUMPTION	Unit: 6.5 watts with keyboard and mouse attached; Power supply is 20 W to support USB based powered devices
HEAT DISSIPATION	(5 VDC x 4 amps) x 3.41 = 68.2 BTU/hour maximum (Voltage x Nominal Current) x 3.41 = BTU/hr
OUTPUT CONNECTOR	2.5-mm barrel
INPUT CONNECTOR	IEC-320, C8
POWER SUPPLY CORD LENGTH	6 ft. (1.8 m)
ENVIRONMENTAL	
OPERATING TEMPERATURE	32 to 104° F (0 to 40° C)
STORAGE TEMPERATURE	-4 to +140° F (-20 to 60° C)
OPERATING HUMIDITY	5 to 95%, noncondensing

SPECIFICATIONS

EMERALD SE DUAL-HEAD TRANSMITTER AND RECEIVER (EMD2002SE-T AND EMD2002SE-R)

TRANSMITTER FRONT VIEW

RECEIVER FRONT VIEW

TRANSMITTER BACK VIEW

RECEIVER BACK VIEW

WHAT'S INCLUDED WITH THE TRANSMITTER (EMD2002SE-T)

- (1) EMERALD SE TRANSMITTER, DUAL-HEAD
- (1) 5 VDC POWER SUPPLY
- (1) US POWER CORD

WHAT'S INCLUDED WITH THE RECEIVER (EMD2002SE-R)

- (1) EMERALD SE RECEIVER, DUAL-HEAD
- (1) 5 VDC POWER SUPPLY
- (1) US POWER CORD

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SPECIFICATIONS

EMERALD SE DUAL-HEAD TRANSMITTER AND RECEIVER (EMD2002SE-T AND EMD2002SE-R)

SPECIFICATIONS FOR EMERALD SE TRANSMITTER AND RECEIVER, DUAL-HEAD (EMD2002SE-T AND EMD2002SE-R)	
APPROVALS	
UNIT	FCC, CE, RoHS, WEEE
POWER SUPPLY	TUV, UL
PHYSICAL	

LED INTERFACE	(1) Power LED button (deactivated, not used);
	 NOTE: Unit automatically powers on when plugged in; must be powered off at the power source.
	 (1) RJ-45 Speed LED (green, located on top left of RJ-45 connector):
	   Blinks three times when the network connection is 1000 Mbps,
	   Blinks two times when network connection is 100 Mbps,
	   Blinks once when the network connection is 10 Mbps,
	   Not blinking: No Link to network;
	 (1) Activity LED (green, located on top right of RJ-45 connector):
	   Solid green: Link up,
	   Blinking: Activity on the link,
	   OFF: No link

MAXIMUM DISTANCE FROM CPU TO TRANSMITTER	EMD2002SE-T: 16 ft. (5 m), DVI-D and USB limitations
MAXIMUM DISTANCE BETWEEN TRANSMITTER AND RECEIVER	328 ft. (100 m), use a network switch to get farther distances
OPERATING SYSTEM SUPPORT	Microsoft Windows® Vista, XP, Windows 7, Windows 8, Windows 10, Server 2003, Server 2008, Server 2012, LInux®, Mac OS

CONNECTORS	EMD2002SE-T: (2) DVI inputs, (1) USB Type B female, (1) RJ-45 network (10/100/1000BASE-T), (2) 3.5 mm audio, (1) 2.5 mm barrel
	   for power;
	 EMD2002SE-R: (2) DVI outputs, (4) USB Type A female, (1) RJ-45 network (10/100/1000BASE-T), (2) 3.5 mm audio for SPK and MIC,
	   (1) 2.5 mm barrel for power

DIMENSIONS	EMD2002SE-T: 1.43" H x 6.2" W x 4.2" D (3.65 x 15.75 x 10.67 cm); EMD2002SE-R: 1.15" H x 6.2" W x 4.2" D (2.92 x 15.75 x 10.67 cm)
WEIGHT	EMD2002SE-T: 1.47 lb. (0.67 kg); EMD2002SE-R: 1.36 lb. (0.62 kg)
OPERATION	
DEFAULT IP ADDRESS	EMD2002SE-T: 192.168.1.22; EMD2002SE-R: 192.168.1.21
ENCRYPTION	Secure Sockets Layer (SSL) over TCP/IP, 128-bit between TX and RX, user set between RX and Hyper-V
DEFAULT USERNAME	admin
DEFAULT PASSWORD	The password is blank by default
DDC SUPPORT	Built-in/clone of remote
POWER	
POWER SOURCE	External in-line power supply
INPUT VOLTAGE	100–240 VAC, 50/60 Hz
INPUT CURRENT	0.9 amps maximum
POWER CONSUMPTION	Unit: 6.5 watts with keyboard and mouse attached; Power supply is 20 W to support USB based powered devices
HEAT DISSIPATION	(5 VDC x 4 amps) x 3.41 = 68.2 BTU/hour maximum (Voltage x Nominal Current) x 3.41 = BTU/hr
OUTPUT CONNECTOR	2.5-mm barrel
INPUT CONNECTOR	IEC-320, C8
POWER SUPPLY CORD LENGTH	6 ft. (1.8 m)
ENVIRONMENTAL	
OPERATING TEMPERATURE	32 to 104° F (0 to 40° C)
STORAGE TEMPERATURE	-4 to +140° F (-20 to 60° C)
OPERATING HUMIDITY	5 to 95%, noncondensing

SPECIFICATIONS

EMERALD ZEROU DVI TRANSMITTER (EMD200DV-T)

TRANSMITTER

NOTE: The Emerald ZeroU DVI Transmitter (EMD200DV-T) supports speakers-only audio on the 3.5-mm connector.

WHAT'S INCLUDED WITH THE TRANSMITTER (EMD200DV-T)

- **(1) EMERALD ZEROU DVI TRANSMITTER**

NOTE: The Emerald ZeroU DVI Transmitter (EMD200DV-T) must be used with the Emerald SE Receiver (EMD2000SE-R).

The Emerald ZeroU DVI Transmitter (EMD200DV-T) and the Emerald SE Receiver (EMD2000SE-R) must be purchased separately.

SPECIFICATIONS FOR EMERALD ZEROU DVI TRANSMITTER (EMD200DV-T)	
APPROVALS	
UNIT	FCC, CE, RoHS, WEEE
PHYSICAL	

LED INTERFACE	(1) Power LED (green);
	(1) RJ-45 Speed LED (green, located on top left of RJ-45 connector):
	  Blinks three times when the network connection is 1000 Mbps,
	  Blinks two times when network connection is 100 Mbps,
	  Blinks once when the network connection is 10 Mbps,
	  Not blinking: No Link to network;
	(1) Activity LED (green, located on top right of RJ-45 connector):
	  Solid green: Link up,
	  Blinking: Activity on the link,
	  OFF: No link

MAXIMUM DISTANCE FROM CPU TO TRANSMITTER	EMD200DV-T: 12" (30.48 cm) via connected cable harness
MAXIMUM DISTANCE BETWEEN TRANSMITTER AND RECEIVER	328 ft. (100 m), use a network switch to get farther distances
OPERATING SYSTEM SUPPORT	Microsoft Windows® Vista, XP, Windows 7, Windows 8, Windows 10, Server 2003, Server 2008, Server 2012, LInux®, Mac OS
CONNECTORS	EMD200DV-T: (1) DVI input, (2) USB Type A female, (1) RJ-45 network (10/100/1000BASE-T), (1) 3.5 mm audio for speakers (only on 12" version), (1) 2.5 mm barrel for power; NOTE: The ZeroU Transmitter can be powered via (2) USB Type A connectors or via an optional DC power adapter;
DIMENSIONS	0.98" H x 2.78" W x 6.12" D (2.5 x 7.07 x 15.55 cm)
WEIGHT	0.474 lb. (0.215 kg)
OPERATION	
DEFAULT IP ADDRESS	EMD200DV-T: 192.168.1.22
ENCRYPTION	Secure Sockets Layer (SSL) over TCP/IP, 128-bit between TX and RX, user set between RX and Hyper-V
DEFAULT USERNAME	admin
DEFAULT PASSWORD	The password is blank by default
DDC SUPPORT	Built-in/clone of remote
POWER	
POWER SOURCE	Via USB or an optional 5-VDC power adapter
INPUT VOLTAGE	5 VDC
ENVIRONMENTAL	
OPERATING TEMPERATURE	32 to 104° F (0 to 40° C)
STORAGE TEMPERATURE	-4 to +140° F (-20 to 60° C)
OPERATING HUMIDITY	5 to 95%, noncondensing

SPECIFICATIONS

EMERALD ZEROU DISPLAYPORT TRANSMITTER (EMD200DP-T)

TRANSMITTER

The Emerald system will take audio from your DisplayPort connector and transmit it across the network just like it does with the video signal. The Receiver will decode this and send it out the Receiver's 3.5-mm audio connector with no configuration required in Emerald.

NOTE: The graphics card and OS must support Embedded audio over DisplayPort and it may need to be enabled on your system.

NOTE: The Emerald ZeroU DisplayPort Transmitter (EMD200DP-T) supports embedded audio on the DisplayPort connector.

WHAT'S INCLUDED WITH THE TRANSMITTER (EMD200DP-T)

▪ **(1) EMERALD ZEROU DISPLAYPORT TRANSMITTER**

NOTE: The Emerald ZeroU DisplayPort Transmitter (EMD200DP-T) must be used with the Emerald SE Receiver (EMD2000SE-R).

The Emerald ZeroU DisplayPort Transmitter (EMD200DP-T) and the Emerald SE Receiver (EMD2000SE-R) must be purchased separately.

SPECIFICATIONS FOR EMERALD ZEROU DVI TRANSMITTER (EMD200DV-T)	
APPROVALS	
UNIT	FCC, CE, RoHS, WEEE
PHYSICAL	
LED INTERFACE	(1) Power LED (green); (1) RJ-45 Speed LED (green, located on top left of RJ-45 connector): 　Blinks three times when the network connection is 1000 Mbps, 　Blinks two times when network connection is 100 Mbps, 　Blinks once when the network connection is 10 Mbps, 　Not blinking: No Link to network; (1) Activity LED (green, located on top right of RJ-45 connector): 　Solid green: Link up, 　Blinking: Activity on the link, 　OFF: No link
MAXIMUM DISTANCE FROM CPU TO TRANSMITTER	EMD200DP-T: 12" (30.48 cm) via connected cable harness
MAXIMUM DISTANCE BETWEEN TRANSMITTER AND RECEIVER	328 ft. (100 m), use a network switch to get farther distances
OPERATING SYSTEM SUPPORT	Microsoft Windows® Vista, XP, Windows 7, Windows 8, Windows 10, Server 2003, Server 2008, Server 2012, LInux®, Mac OS
CONNECTORS	EMD200DP-T: (1) DisplayPort input, (2) USB Type A female, (1) RJ-45 network (10/100/1000BASE-T), (1) 2.5 mm barrel for power; NOTE: The ZeroU Transmitter can be powered via (2) USB Type A connectors or via an optional DC power adapter;
DIMENSIONS	0.98" H x 2.78" W x 6.12" D (2.5 x 7.07 x 15.55 cm)
WEIGHT	0.400 lb. (0.181 kg)
OPERATION	
DEFAULT IP ADDRESS	EMD200DP-T: 192.168.1.22
ENCRYPTION	Secure Sockets Layer (SSL) over TCP/IP, 128-bit between TX and RX, user set between RX and Hyper-V
DEFAULT USERNAME	admin
DEFAULT PASSWORD	The password is blank by default
DDC SUPPORT	Built-in/clone of remote
POWER	
POWER SOURCE	Via USB or an optional 5-VDC power adapter
INPUT VOLTAGE	5 VDC
ENVIRONMENTAL	
OPERATING TEMPERATURE	32 to 104° F (0 to 40° C)
STORAGE TEMPERATURE	-4 to +140° F (-20 to 60° C)
OPERATING HUMIDITY	5 to 95%, noncondensing

SPECIFICATIONS

EMERALD REMOTE APP RECEIVER (EMDRM)

OVERVIEW

The Emerald™ Remote App is new software from Black Box that allows users to access their Emerald connections, both physical and virtual, from any Windows 10 device. This increases mobility and device access and monitoring in full HD video on the Emerald System. And multiple connections can be launched simultaneously to facilitate multiple device management.

Available licenses are listed below:

– EMDRMDEMO-LIC: Emerald Remote Access, 30-day Trial (4 Connections)

– EMDRM1-LIC: Emerald Remote Access, 1 Connection

– EMDRM5-LIC: Emerald Remote Access, 5 Connections

– EMDRM10-LIC: Emerald Remote Access, 10 Connections

– EMDRM20-LIC: Emerald Remote Access, 20 Connections

FEATURES

- **HIGH-QUALITY USER EXPERIENCE: SUPPORTS HD VIDEO UP TO 1920 X 1200 WITH ACCESS TO BOTH PHYSICAL MACHINES AND VIRTUAL MACHINES**

- **NO HARDWARE REQUIRED: WORKS ON ANY LAPTOP, TABLET AND DESKTOP DEVICES RUNNING WINDOWS 10**

- **MULTIPLE CONNECTIONS: OPEN CONNECTIONS TO MULTIPLE DEVICES SIMULTANEOUSLY. THIS ALLOWS YOU TO INTERACT OR MONITOR MANY SYSTEMS FROM YOUR OWN DEVICE. PURCHASE THE APPROPRIATE NUMBER OF SIMULTANEOUS CONNECTION LICENSES**

- **SECURITY: ALL ACCESS IS AUTHENTICATED BY BOXILLA IN REAL TIME, ENSURING THAT THE EMERALD ADMINISTRATOR HAS FULL CONTROL AND CAN DEFINE ONLY THE USERS REQUIRED TO HAVE REMOTE ACCESS**

- **WAN SUPPORT: USERS CAN CONNECT FROM ANYWHERE WITH ACCESS TO ALL CONNECTED RESOURCES, ONCE THEY CAN AUTHENTICATE VIA BOXILLA**

SPECIFICATIONS FOR EMERALD REMOTE APP (EMDRM)	
HARDWARE/SOFTWARE REQUIREMENTS	
HARDWARE	PC, laptop or tablet
SOFTWARE	Windows® 10

REMOTE APP SCREEN
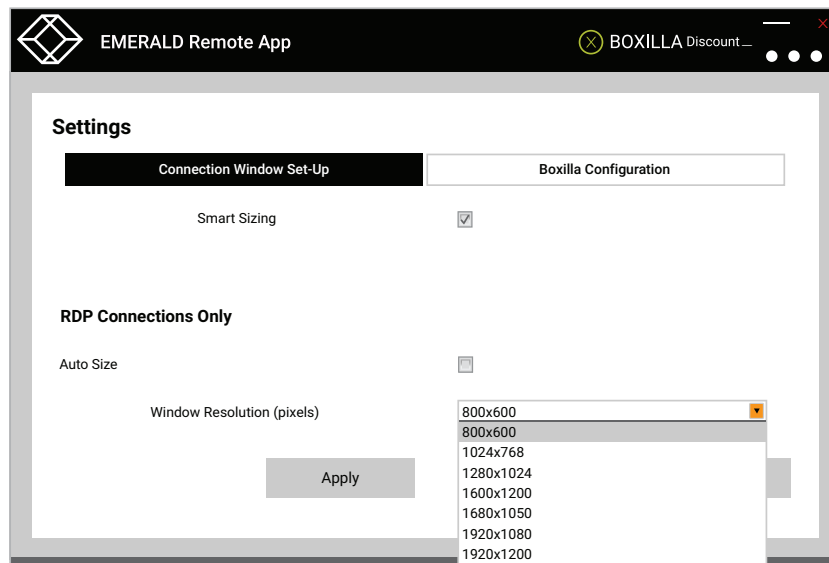
SPECIFICATIONS

48-PORT 1G NETWORK SWITCH (EMS1G48)

FEATURES

- **NON-BLOCKING SWITCHING ARCHITECTURE WITH OS 10.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**
- **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**
- **(1) POWER SUPPLY**
- **(4) FANS**
- **(1) RACKMOUNT KIT**

48-PORT 1G NETWORK SWITCH (EMS1G48) 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 (EMS1G48)

48-PORT 1G NETWORK SWITCH (EMS1G48) 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: Hot-swappable redundant AC power (one power supply provided; optional redundant) 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

12-PORT 10G NETWORK SWITCH (EMS10G12)

FEATURES

- **(1) RU HIGH-DENSITY 12-PORT 10 GBE SWITCH**
- **840 GBPS (FULL-DUPLEX) NON-BLOCKING, CUT-THROUGH SWITCHING FABRIC DELIVERS LINE-RATE PERFORMANCE UNDER FULL LOAD**
- **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**
- **CONVERGED NETWORK SUPPORT WITH DCB**

WHAT'S INCLUDED WITH THE SWITCH

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

FRONT VIEW

EMS10G12

12-PORT 10G NETWORK SWITCH (EMS10G12) 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: 41 to 104° F (5 to 40° C) Storage Humidity: 5 to 90%, relative humidity, non-condensing Storage Temperature: -40 to +149° F (-40 to +65° C) NOTE: Reduce maximum temperature by 1°/228 ft. (1°/125 m) above 3117 ft. (950 m) Maximum Operating Altitude: 10,000 ft. (3048 m) Maximum Non-operating Altitude: 39,370 ft. (12,000 m) Shock: Dell EMC Spec SV0115
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: 840 Gbps; Forwarding Capacity: 720 Mpps; Frame Size: 9416 bytes; Packet Buffer Memory: 12 MB; CPU Memory: 4 GB; MAC Addresses: 272K (in Scaled L2 mode); ARP Table: 200K (in Scaled L3 routes mode); IPv4 routes: 200K (in Scaled L3 routes mode); IPv6 hosts: 64K; IPv6 routes: 130K (in scaled L3 routes mode); Multicast hosts: 8K Link aggregation: 16 links per group, 128 groups; Layer 2 VLANs: 4K; MSTP: 32 instances; LAG load balancing: Based on layer 2, IPv4 or IPv6 headers

SPECIFICATIONS

12-PORT 10G NETWORK SWITCH (EMS10G12)

12-PORT 10G NETWORK SWITCH (EMS10G-28) SPECIFICATIONS (CONTINUED)	

PHYSICAL	Connectors/Interfaces: (12) 10GbE SFP+, (3) 100GbE QSFP28, (1) Micro USB-B console port, (1) RJ-45 Ethernet management port, (1) RS-232 console port, (2) AC PSUs, (3) Fan modules, I/O Panel to PSU Airflow
	Dimensions: 1.75" H (1 RU) x 17.7" W x 8.2" D (4.4 x 45 x 20.9 cm)
	Mounting: Rackmounted
	Rack Clearance Required:
	   Front: 5" (12.7 cm)
	   Back: 5" (12.7 cm)
	Weight: 8.3 lb. (3.76 kg) with (2) PSUs and (3) fans

POWER	Input: 100–240 VAC, 50/60 Hz Maximum Current Draw per System: 2 A/1.7 A at 100/120 VAC; 1 A/0.8 A at 200/240 VAC Maximum Power Consumption: 180 W Typical Power Consumption: 90 W Max. Thermal Output: 180 W, 614 BTU/hr. Power Supply Type: (2) hot-swappable redundant AC power Fans: (3) 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

28-PORT 10G NETWORK SWITCH (EMS10G28)

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**
- **CONVERGED NETWORK SUPPORT WITH DCB**

WHAT'S INCLUDED WITH THE SWITCH

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

FRONT VIEW

EMS10G28

28-PORT 10G NETWORK SWITCH (EMS10G28) 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 (EMS10G28)

28-PORT 10G NETWORK SWITCH (EMS10G28) SPECIFICATIONS (CONTINUED)	
PHYSICAL	Connectors/Interfaces: (28) 10GbE SFP+, (2) 100GbE QSFP28, (2) AC PSUs, (4) Fan modules, I/O Panel to PSU 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

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SPECIFICATIONS

32-PORT 100G NETWORK SWITCH (EMS100G32)

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 PSU 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**
- **(5) FANS**
- **(1) RACKMOUNT KIT**

32-PORT 100G NETWORK SWITCH (EMS100G32) 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 (EMS100G32)

32-PORT 100G NETWORK SWITCH (EMS100G32) 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) SFP+ 10 GbE/1 GbE cages, (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

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SPECIFICATIONS

24-PORT 1G NETWORK SWITCH (EMS1G24F)

FEATURES

- **(1) RU SWITCH HAS (24) LINE-RATE FIBER PORTS AND (2) INTEGRATED 10G SFP+ PORTS**
- **NON-BLOCKING ACCESS**
- **I/O PANEL TO PSU AIRFLOW**
- **HOT-SWAPPABLE POWER SUPPLIES**

WHAT'S INCLUDED WITH THE SWITCH

- **(1) SWITCH**
- **(1) RJ-45 TO DB9 FEMALE CABLE**
- **(1) POWER SUPPLY**
- **(1) RACKMOUNT KIT**
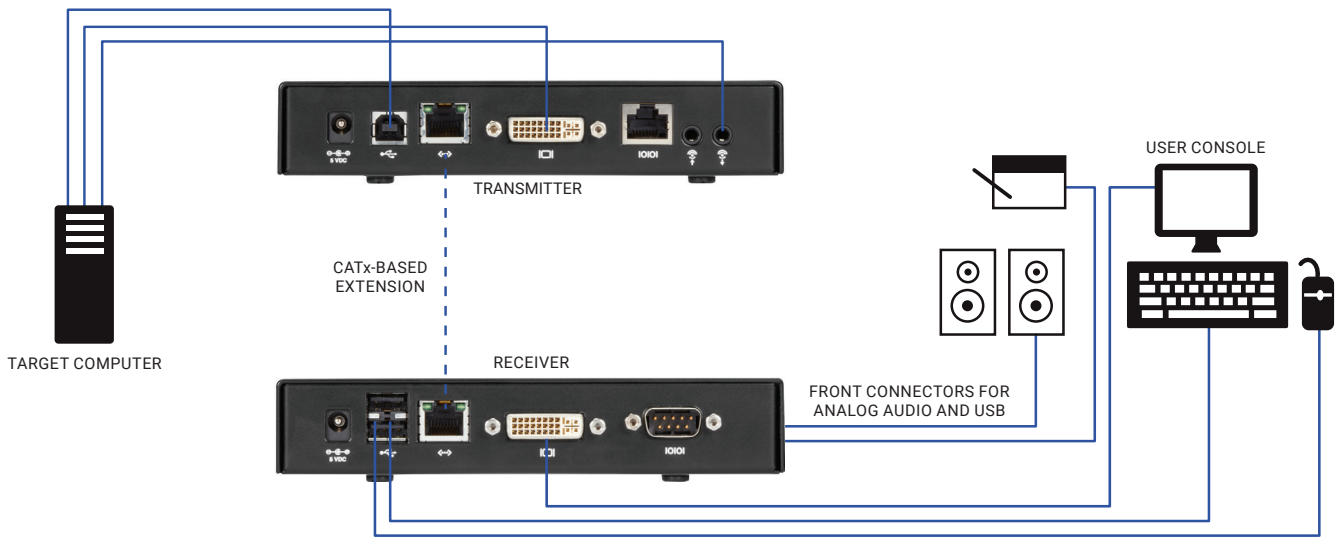- **(1) SET OF SELF-ADHESIVE RUBBER PADS FOR DESKTOP MOUNTING**

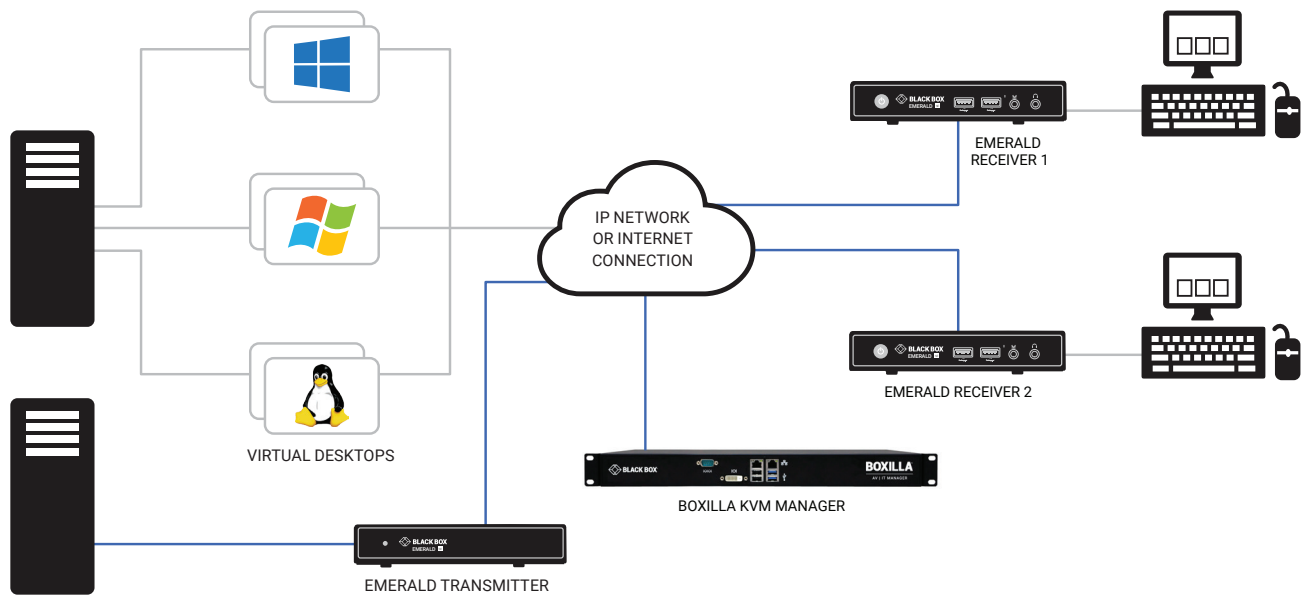| 24-PORT 1G NETWORK SWITCH (EMS1G24F) SPECIFICATIONS	
APPROVALS	Environmental Compliances: Japan: VCCI V3/2009 Class A; USA: FCC CFR 47 Part 15, Subpart B:2009, Class A; RoHS EMI Certifications: Australia/New Zealand: AS/NZS CISPR 32: Class A; Canada: ICES-003, Issue-4, Class A; Europe: EN 55032: 2015+A1:2007 (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: 8 to 85% (RH), noncondensing Operating Temperature: 32 to 113° F (0 to 45° C) Storage Humidity: 5 to 90% (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
PERFORMANCE	Switching Capacity: 212 Gbps; Forwarding capacity: Up to 158 Mpps (Full Duplex); Packet buffer memory: 4 MB; CPU memory: 2 GB; Flash memory: 256 MB; MAC addresses: 56 K
PHYSICAL	Connectors/Interfaces: (24) 1-Gbps Ethernet SFP ports, (2) SFP+ 10 GbE/1 GbE cages, (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: 1.71" H (1 RU) x 17.09" W x 16.02" D (4.4 x 43.4 x 40.7 cm) Mounting: Rackmounted Weight: 13.45 lb. (6.1 kg), including power modules
POWER	Input: 100–240 VAC, 50/60 Hz Max. Power Consumption (excluding PoE power): 63 W; Max.Current Draw per System (excluding PoE power): 0.40 W at 40.41 W/100 VAC; Power Supply Type: (2) hot-swappable redundant AC power
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

APPLICATION DIAGRAMS

BASIC EXTENDER APPLICATION

TRANSMITTER

USER CONSOLE

CATx-BASED
EXTENSION

TARGET COMPUTER

RECEIVER

FRONT CONNECTORS FOR
ANALOG AUDIO AND USB

EMERALD SE SINGLE-HEAD TRANSMITTER AND RECEIVER MANAGED APPLICATION

EMERALD
RECEIVER 1

IP NETWORK
OR INTERNET
CONNECTION

EMERALD RECEIVER 2

VIRTUAL DESKTOPS

BOXILLA KVM MANAGER

EMERALD TRANSMITTER

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ORDERING INFORMATION

ITEM	CODE
Emerald 4K High-Performance KVM	
4K Single-Head Extender	
Transmitter	**EMD4000T**
Receiver	**EMD4000R**
Emerald PE KVM Over IP Technology	
Single-Head Extender	
Transmitter, PoE	**EMD2000PE-T**
Receiver	**EMD2000PE-R**
Receiver, PoE	**EMD2000PE-R-P**
Dual-Head Extender	
Transmitter, PoE	**EMD2002PE-T**
Receiver	**EMD2002PE-R**
Receiver, PoE	**EMD2002PE-R-P**
Emerald SE KVM Over IP Technology	
Single-Head Extender	
Transmitter	**EMD2000SE-T**
Receiver	**EMD2000SE-R**
Dual-Head Extender	
Transmitter	**EMD2002SE-T**
Receiver	**EMD2002SE-R**
Emerald ZeroU DVI Transmitter	**EMD200DV-T**
Emerald ZeroU DisplayPort Transmitter	**EMD200DP-T**
Emerald Remote App	
Emerald Remote Access, 30-day Trial (4 Connections)	**EMDRMDEMO-LIC**
Emerald Remote Access, 1 Connection	**EMDRM1-LIC**
Emerald Remote Access, 5 Connections	**EMDRM5-LIC**
Emerald Remote Access, 10 Connections	**EMDRM10-LIC**
Emerald Remote Access, 20 Connections	**EMDRM20-LIC**
Ethernet Switches	
1G 24-Port SFP	**EMS1G24F**
1G 48-Port	**EMS1G48**
10G 12-Port	**EMS10G12**
10G 28-Port	**EMS10G28**
100G 32-Port	**EMS100G32**
Management Device	
Boxilla™ Enterprise Level KVM and AV/IT Manager	**BXAMGR**

DISCLAIMER

Black Box Corporation shall not be liable for damages of any kind, including, but not limited to, punitive, consequential or cost of cover damages, resulting from any errors in the product information or specifications set forth in this document and Black Box Corporation may revise this document at any time without notice.

NOTES

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