

KUSA A& E SPECIFICATIONS

KY-CSV3170EM#

LAYER 2, Layer 2+, and Layer 2++HARDENED, IP40, Card Rack or Input File,MANAGED 10 PORT INDUSTRIALPOWER OVER ETHERNET SWITCH (IEEE802.3at) with Cyber Secure Video (CSV) with silicon enhancements& Clean Code Technology.

PART 1 – GENERAL

The intent of this document is to specify the minimum criteria for the engineering, design, supply, installation, and commissioning of theKUSA10 port Layer 2, Layer2+ and Layer 2++, IP40, Card Rack or Input File, Managed Industrial Power Over Ethernet Switch, IEEE 802.3at (30Watt), IEEE 802.3az (Green Scheduling) with CYBER-SECURE Video (CSV) and Clean Code Technology. IP40 Hardened Casing. DC Powered with Redundant Power Inputs. Base KY-CSV3170EM comes with no Power Over Ethernet Ports. **OPTIONAL:4 or 8 Port (IEEE802.3at – 30Watt Daughter Cards / Field Upgradeable)**

1.01 SUMMARY

- A. The Layer 2, 2+, 2++ Managed Industrial Power OverEthernet switches are a series of managed industrial edge, and or coreswitches that are used as access devices to provide entry points into core networks, or can be used to form a core network. A common term for Power Over Ethernet switches is Power Sourcing Equipment (PSE). The switch enables connectivity for up to eight (8) 10/100/1000BaseT(X) twisted pair copper (PSE) ports (IEEE 802.3at / 30 Watt) and two (2) 100/1000Base(X) Small Form-Factor Pluggable (SFP) Gigabit sockets. The 2SFP socket ports can be configured as 10/100/1000BASE-T(X) RJ45 copper ports or 1000BASE-SX/LX/LH/ZX, LC fiber ports,in any permutation, to provide maximum network flexibility.
- B. The Ethernet switches are able to operate across a wide range of operating temperatures, in non-environmentally conditioned, industrial applications. The Ethernet switches support a communications protocol specifically designed for industrial applications to provide automatic recovery of cable and port failure in less than 6ms.The switches are designed to be managed through a number of different interfaces, (GUI, Command Line, Telnet, SSH) and provide a large range of hardware and software features to ensure ease of installation and enhancement of network performance. The switch also provides IEEE 802.3az (Green Scheduling& Energy Saving) capability for savings on power costs.
- C. Every switch is programmed using precision programming techniques and algorithms (Clean Code Technology) and incorporates CYBER-SECURE Video (CSV) for enhanced switch protection against hackers, viruses and BOTS. The switch is also IEEE802.3af backwards compatible.

1.02 SECTION INCLUDES

- A. **KY-CSV3170EM#** Layer 2, 2+, 2++, IndustrialHardened, Power Over Ethernet Managed switch –8 X10/100/1000BaseT(X) RJ45 PSE ports, 2X 100/1000Base(X) SFP Gigabit Sockets, IEEE 802.3at, IEEE802.3az – Card Rack – Input File Mount, Wide Range Power Supply 9 - 36vdc. Optional 50 – 57 VDC external power source required for Power over Ethernet operation, when optional POE daughter card is installed.

1.03 REFERENCES

- A. Conformity for Europe (CE)
- B. American National Standards Institute (ANSI)
- C. Federal Communications Commission (FCC)
- D. Australian Communications Authority (C-Tick)
- E. International Electrotechnical Commission (IEC)
- F. Electronic Industry Association (EIA)
- G. Institute of Electrical and Electronics Engineers (IEEE)
- H. European Standards (EN)
- I. Restriction of Hazardous Substances (RoHS)
- J. Consultative Committee for International Radio (CCIR)
- K. Underwriters Laboratories Inc. (UL)
- L. Underwriters Laboratories of Canada (ULC)
- M. Waste Electrical & Electronic Equipment (WEEE)
- N. Open Network Video Forum (ONVIF)
- O. Physical Security Interoperability Alliance (PSIA)
- P. Software Engineering Institute (SEI)
- Q. National Security Agency (NSA)

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- R. Central Security Service (CSS)
- S. National Electrical Manufacturers Association (NEMA)

1.04 DEFINITIONS

- A. No Substitutes: The exact make and model number identified in this specification shall be provided without exception.
- B. Or Equal: Any item may be substituted for the specified item provided that in every technical sense, the substituted item provides the same or better capability and functionality
- C. Or Approved Equal: A substitute for the specified item may be offered for approval by the Owner. The proposed substitution must, in every technical sense, provide the same or better capability and functionality as the specified item. Such requests for approval shall be submitted in accordance with the provisions of PART 1.06 – SUBMITTALS, and must be obtained within the time frames outlined.

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1.05 SYSTEM DESCRIPTION

- A. Performance Requirements:
1. Provides managed edge connectivity into core networks.
 2. Uses 12 or 24 vdc from card rack or input file backplane (NEMA or 170 ITS cabinets) to power the switch.
 3. Provides managed core network capability, if required.
 4. Provides IEEE802.3at / 30Watts per Port capability (IEEE802.3af backwards compliant)
 5. Provides IEEE802.3az "Green Scheduling" power management & energy conservation.
 6. Provides dual redundant uplink capability.
 7. Provide 8X 10/100/1000BaseT(X) RJ45 PSE ports, 2 X 100/1000Base(X) Gigabit SFP sockets and a USB console port for management.
 8. Possess a power consumption of less than 15Watts (Excluding POE)
 9. Operate in temperature ranges of -40°C to +80°C / -40°F to 176°F
 10. Provide a casing with IP40 protection class.
 11. Recover from port and cable failures in less than 6ms.
 12. Possess the ability to be configured using HyperTerminal, Telnet, SSH and a Web Browser.
 13. Possess DC 50 - 57 Volt / power input for optional Power Over Ethernet (POE) operation.
 14. Possess port status indicators.
 15. Possess POE Indicators
 16. Possess CYBER-SECURE Video with Silicon Enhancements
 17. Possess Clean Code Technology (Precision Coding Algorithms)
 18. IP Camera Ready
 19. Possess Automatic Denial Of Service (DOS) / Distributed Denial Of Service (DDOS) attack prevention and quenching mechanisms on every port.
 20. Possess IP Policing & Port Binding Mechanism for MAC Address & IP Addressing Security.
 21. Quick Configuration Wizard for Cameras / HD Video
 22. Switch Latency of 6us or less
 23. Made in the USA

1.06 SUBMITTALS

- A. General: Submittals shall be made in accordance with the Conditions of the Contract and Submittal Procedures Section.
- B. Shop Drawings and Schematics: Shall depict the Layer 2 Industrial Ethernet switch in final proposed "as built" configuration. The following must be provided:
1. Connection diagrams for interfacing equipment.
 2. List of connected equipment.
 3. Locations for all major equipment components to be installed under this specification.
- C. Product Data: The following shall be provided:
1. Technical data sheets.
 2. A complete set of product instruction manuals.
- D. Quality Assurance Submittals: The following shall be submitted:
1. Test Report: The final test report shall indicate that every device was tested successfully in a system test.

1.07 DELIVERY, STORAGE AND HANDLING

- A. General: Delivery, storage, and handling of the Layer 2, 2+, 2++ Industrial Power Over Ethernet switch shall be in accordance with the manufacturer's recommendations.
- B. Ordering: The manufacturer's ordering instructions and lead-time requirements must be followed in order to avoid installation delays.
- C. Delivery: The Layer 2, 2+, 2++ Industrial Power Over Ethernet switch shall be delivered in the manufacturer's original, unopened, undamaged container with identification labels intact.
- D. Storage and Protection: The Layer 2, 2+, 2++ Power Over Ethernet Industrial switch shall be stored and protected from exposure to harmful weather conditions and at the environmental conditions recommended by the manufacturer.

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1.08 PROJECT/SITE CONDITIONS

- A. Temperature Requirements: Layer 2, 2+, 2++ Industrial Power Over Ethernet switch products shall operate in an environmental temperature range of -40°C to $+80^{\circ}\text{C}$ // -40°F to $+176^{\circ}\text{F}$
- B. Humidity Requirements: Products shall operate in an environment with relative humidity of 0% to 95% (non-condensing).

1.09 WARRANTY

- A. Manufacturer shall warrant the Layer 2, 2+, 2++ Industrial Power Over Ethernet switch products to be free from defects in material or workmanship for a period of at least five years. Maintenance releases for embedded software shall be supported for the full warranty period.

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PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURER

- A. KUSA, 1107 SE Willow Place, Blue Springs, MO 64014-5248, United States of America.
Telephone: +1-(219)-595-2631, Fax: +1-(480)-287-8605
Email:sales@kusa1.co, Internet: www.kusa1.co
- B. Substitutions: Not Permitted
- C. All Ethernet switches and SFP modules shall be supplied from a single manufacturer.
- D. SFP Modules MUST be temperature hardened

2.02 SYSTEM PERFORMANCE

- A. The Layer 2 Industrial Ethernet switch products shall include, as a minimum, the following features/functions/specifications:
 - 1. The system shall provide managed edge network connectivity into core networks.
 - 2. The system shall provide managed core network connectivity, if required.
 - 3. The system shall provide 8X 10/100/1000BaseT(X), RJ45 (PSE / up to 30 Watts)ports, 2X 100/1000Base(X) SFP Gigabit socket ports, and a shielded USB Console interface.
 - 4. The system shall provide a casing with an IP40 protection class rating.
 - 5. The system shall support eRing protocols (recovery time 10ms) and RSTP/STP (IEEE 802.1w/d) and ring redundant protocols.
 - 6. Configuration of the system shall be achieved by HyperTerminal, Telnet,or a Web Browser.
 - 7. The system shall provide port status indicators, dual power input terminals.
 - 8. The system shall provide the ability when configured in a Ring network to have an additional uplink port.
 - 9. The system shall provide Broadcast Storm Control, Port Mirroring, Static FDB, Multicast, Quality of Service (QoS), Virtual Local Area Networks (VLANs), Port Trunking, RMON Configuration, Secure Shell (SSH), Authentication, DHCP Server, DHCP Client, LACP,VLAN's, Automatic DOS & DDOS Quenching, MSTP, Cyber Secure Video (CSV),TOS, COS,Diffserv, Protocol 41, Jumbo Frames(up to 9K),IGMP Snooping, IGMPv3,IP based Bandwidth Management, SNMPv3, GVRP, MAC based Port Security, IP Based Port Security, MAC & IP based Port Security, NEMA TS-2, Configuration Wizards, Multicast, Authorization, Authentication and Accounting (AAA).
 - 10. The system shall use Store & Forward as its switching method.
 - 11. The system's transfer rate shall be 148,810pps Fast Ethernet Port, 1,488,100pps Gigabit Ethernet Port, its backplane switch capacity shall be 24 Gbps, it shall provide up to 4094 VLANs, 128 IGMP Multicast Groups for Each VLAN, an 8K MAC address table and 16 priority queues.
 - 12. The system shall support the following protocols: Simple Network Management Protocol (SNMP) v3.0, Internet Group Management Protocol (IGMPv1,v2, v3) Snooping, Address Resolution Protocol (ARP), Spanning Tree Protocol (STP), Rapid Spanning Tree Protocol (RSTP), eRing (proprietary redundant ring protocol), Simple Network Time Protocol (SNTP)
 - 13. The system shall have an operating temperature of -40°C to +80°C;have an operating humidity of 0 to 95% non-condensing and a MTBF of >41,000 hours.
 - 14. The module shall have a power consumption figure of <15W (does not include POE)
 - 15. The system shall provide built in over-current protection.
 - 16. The system radiated emission shall be compliant with FCC Part 15/EN55022, Class A.
 - 17. The system shall be available in POE and Non-POE configurations.

2.03 Switch Specifications:

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- A. Physical User Ports:
1. 10/100/1000 BaseT(X) Ports – RJ45 (Auto MDI /MDIX with PSE)
**8X RJ45 PORTS (Optional -30 Watts PSE Per Port – 4 or 8 Ports)
IEEE802.3at, IEEE802.3az, Bidirectional /
Auto-Negotiable**
 2. 100/1000Base(X) SFP Sockets
2 X SFP Sockets, Bi-directional, Auto-Negotiable
- B. Ethernet Standards:
1. IEEE802.3 for 10BaseT
 2. IEEE802.3u for 100BaseTX
 3. IEEE802.3z for 1000Base-X
 4. IEEE802.3ab for 1000 Base-T
 5. IEEE802.3x for Flow Control
 6. IEEE802.3ad for LACP (Link Aggregation Control Protocol)
 7. IEEE802.1D for STP (Spanning Tree Protocol)
 8. IEEE802.1p for Cos (Class of Service)
 9. IEEE802.1Q for VLAN Tagging
 10. IEEE802.1w for RSTP (Rapid Spanning Tree Protocol)
 11. IEEE802.1x for Authentication
 12. IEEE802.1at POE Specification (up to 30 Watts per port for PSE)
 13. IEEE802.1az – POE Specification (Green Scheduling)
- C. Ethernet Interface Specifications
1. Ethernet Compliance: IEEE 802.3 10BASE-T, IEEE 802.3u 100BASE-TX & 100BASE-FX, IEEE 802.3x Full Duplex, IEEE 802.3z Gigabit Fiber, IEEE 802.1AB, IEEE 802.1d Spanning Tree, IEEE 802.1w Rapid Spanning Tree, IEEE 802.1p Class of Service and IEEE 802.1q VLAN Tagging. LLDP, Jumbo-Frames
 2. Interface: RJ45 Auto-MDI/MDI-X&1000 Base SFP.
 3. Data Rate: 10/100/1000 Mbps (Manual or auto-negotiate)and SFP ports that can be configured as1000Base-TX or 1000Base-SX/LX/LH/ZX.
 4. Operating Mode: Half or full-duplex
 5. Network Protocols: Unicast/Multicast/Broadcast, SNMP v3.0, IGMP, ARP, STP, RSTP, eRing & SNTP.
 6. Shielded USB Console Port
- D. Switch Specifications
1. Switching Method: Store & Forward.
 2. Transfer Rate: 148,810pps Fast Ethernet Port, 1,488,100pps Gigabit Ethernet Port
 3. Backplane Switch Capacity: 28 Gbps
 4. Mac Address Table: 8192 Addresses
 5. Number of VLANs: 4094
 6. Number of Priority Queues: 8
 7. Switching Latency: 6µs
 8. Switching Bandwidth: 28Gbps
 9. Maximum Available VLANS: 256
 10. IGMP Multicast Groups: 128 for Each VLAN
 11. Port Rate Limiting: User Defined
 12. Jumbo Frame Support: 9K Bytes

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E. Status Indicators

1. **Power Indicator: (PWR)** Green Power Indicator
2. **System Ready Indicator: (STA)** Green : Indicates System Ready / Blinking: System is upgrading firmware
3. **Ring Master Indicator: (RM)** Green Indicates the system is operating in Ring Master Mode
4. **Ring Indicator: (Ring)** Green Indicates the system is operating in Ring Mode. // Blinking indicates the ring is broken,
5. **System Running Indicator: (RUN)** System operated continuously
6. **Reset to Default Running Indicator: (DEF)** Green Indicates system reset to default configuration
7. **PoE Indicator:** Blue – POE LED x 24
8. **10/100/1000Base(X) RJ45 Indicator:** Green for port Link/Activity Amber for Duplex /Collision
9. **100/1000Base(X) SFP Port Indicator:** Green for port LINK/ACTIVITY
10. System Status
11. High Visibility Blue LED's

2.04 POWER SPECIFICATIONS

- A. Power Input: 50-57 Volts DC
- B. Frequency: 50-60 Hz
- C. Power Consumption: <15.0W (Excludes POE)
- D. Overload Current Protection: Yes

2.05 MECHANICAL SPECIFICATIONS

- A. Dimensions: 96.4 (W) x 108.5 (D) x 154 (H) mm (3.8 x 4.2.7 x 6.06 inch)
- B. Weight: 1,400g
- C. Casing: IP40 Protection

2.06 Regulatory Approvals

- A. **EMI:** FCC Part 15, CISPR (EN55022) Class A, IEC-60255-5
- B. **EMS:** EN61000-4-2 (ESD), EN61000-4-3 (RS), EN61000-4-4 (EFT), EN61000-4-5 (Surge) EN61000-4-11, EN61000-4-8, EN61000-4-6 (CS) EN61000-4-12, 61000-4-16, EN61000-4-17
- C. **SHOCK:** IEC60068-2-27
- D. **FREE FALL:** IEC60068-2-32
- E. **VIBRATION:** IEC60068-2-6
- F. **NEMA:** Exceeds NEMA TS-2 for Traffic Control Equipment
- G. **IEEE1613:** IEEE C37.90.1, IEEE C37.90.2, IEEE C37.90.3
- H.

2.07 ENVIRONMENTAL SPECIFICATIONS

- A. Operating Temperature: -40°C to +80°C
- B. Storage Temperature: -40°C to +85°C
- C. Humidity: 0% to 95% (non-condensing)
- D. Emissions: FCC CFR47 Part 15/EN55022, Class A
- E. IEC 600068-2-1, IEC 600068-2-2, IEC 600068-2-30. IEC 60255-21-1, IEC 60255-21-2
- F. Mean Time between Failure: >51,000 hours

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2.08 SFP MODULES

The SFP modules used shall be supplied by KUSA. The SFP modules shall have a hot-pluggable SFP footprint, low power dissipation, a metal enclosure for lower EMI, a single 3.3V power supply and an operating temperature range of -40°C to +85°C. The switch shall support but not be limited to supporting the following SFP modules:

- A. Electrical, 10/100/1000 Mbps, 100m, RJ45 connector.
- B. Fiber, 1000 Mbps, 2 fiber, multi-mode, 550m, 850nm, LC connector.
- C. Fiber, 1000Mbps, 2 fiber, single-mode, 10Km, 1310nm, LC connector.
- D. Fiber, 1000 Mbps, 2 fiber, single-mode, 20Km, 1310nm, LC connector.
- E. Fiber, 1000 Mbps, 2 fiber, single-mode, 40Km, 1550nm, LC connector.
- F. Fiber, 1000Mbps, 2 fiber, single-mode, 80Km, 1550nm, LC connector.
- G. Fiber, 1000Mbps, 2 fiber, single-mode, 120Km, 1550nm, LC connector.
- H. Fiber, 1000 Mbps, 1 fiber, single-mode 10Km, 1550nm/1310nm, LC connector.
- I. Fiber, 1000 Mbps, 1 fiber, single-mode 20Km, 1550nm/1310nm, LC connector.
- J. Fiber, 1000 Mbps, 1 fiber, single-mode 40Km, 1550nm/1490nm, LC connector.
- K. Fiber, 1000 Mbps, 1 fiber, single-mode 80Km, 1550nm/1490nm, LC connector.

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PART 3 - EXECUTION

3.01 EXAMINATION

- A. Inspect modules before installation to verify physical condition as well as inclusion of all peripheral materials
- B. Modules shall be free of any cosmetic defects or damage.
- C. Shipping box shall include the module, power supply(surface mount units) and operations manual.

3.02 PREPARATION

- A. Wall Mount
 - 1. Shall be mounted on a properly prepared surface adequate for the size and weight of module. The placement of the unit shall allow provision for cable installation and maintenance as indicated on the approved detail drawings and in accordance with the installation manual.
- B. Rack Mount
 - 1. Shall be mounted on a properly installed equipment cabinet or rack adequate for the size and weight of the unit. The placement of the unit shall allow provision for cable installation and maintenance as indicated on the approved detail drawings and in compliance with the installation manual.

3.03 INSTALLATION

- A. General: The Layer 2, 2+, 2++ POE Ethernet switch products must be installed, configured, and tested in accordance with the manufacturer's instructions.

3.04 TESTING AND CERTIFICATION

- A. The Contractor shall demonstrate the functionality of the Layer 2, 2+, 2++ POE Ethernet switch on completion of installation, documenting the result of all tests and providing these results to the Owner. The Layer 2, Ethernet switch shall be tested in accordance with the following:
 - 1. The Contractor shall conduct a complete inspection and test of all installed Layer 2, 2+, 2++ POE Ethernet switch equipment. This includes testing and verifying operation with connected equipment and network infrastructure.
 - 2. The Contractor shall provide staff to test all devices and all operational features of the system for witness by the Owner's representative and the Authority having jurisdiction. All testing must be witnessed by the Owner's representative, prior to acceptance.

END OF SECTION

Brief Specification

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The Layer 2, 2+, 2++,IP40, Rack or Input File Mounted, Managed Industrial Ethernet Edge switch products shall be KUSA model KY-CSV3170EM. Refer to contract drawings for mounting type. The system shall provide edge connectivity into both edge and core networks. The system shall provide 8X 10/100/1000BaseT(X) RJ45 PSE ports (IEEE802.3at – up to 30 Watts), 2X 100/1000Base(X) SFP Fast Ethernet/Gigabit sockets, and a shielded USB Console interface. The SFP ports shall be configured as either 10/100/1000BASE-T(X) RJ45 copper ports or 1000BASE-SX/LX/LH/ZX, LC fiber ports, in any permutation, to provide maximum network flexibility. The system shall provide a casing with an IP40 protection class rating. The system shall have high speed redundant ring technology and be able to recover from port and cable failures in less than 10ms. Configuration of the system shall be achieved by either HyperTerminal, Telnet or a Web Browser. The system shall provide port status indicators (high visibility blue led's). The system shall provide the ability to be configured in a Ring network and shall have an additional uplink port. The system shall provide Broadcast Storm Control, Port Mirroring, Static FDB, Multicast, Quality of Service (QoS), Virtual Local Area Networks (VLANs), Port Trunking, RMON Configuration, Secure Shell (SSH), Authentication, DHCP Server, DHCP Client, LACP, VLAN's, Automatic DOS & DDOS Quenching, MSTP, Cyber Secure Video (CSV), TOS, COS, Diffserv, Protocol 41, Jumbo Frames (up to 9K), IGMP Snooping, IGMPv3, IP based Bandwidth Management, SNMPv3, GVRP, MAC based Port Security, IP Based Port Security, MAC & IP based Port Security, NEMA TS-2, Configuration Wizards, Authorization, Authentication and Accounting (AAA). The system shall use Store & Forward as its switching method. The switch latency will be 6us or less. The system's transfer rate shall be 148,810pps Fast Ethernet Port, 1,488,100pps Gigabit Ethernet Port, its backplane switch capacity shall be 28Gbps, it shall provide up to 4094 VLANs, an 8K MAC address table and 8 priority queues. The system shall support the following protocols: Simple Network Management Protocol (SNMP) v3.0, Internet Group Management Protocol (IGMP) Snooping, LLDP, Address Resolution Protocol (ARP), Spanning Tree Protocol (STP), Multicast, Rapid Spanning Tree Protocol (RSTP), eRing (proprietary redundant ring protocol), Simple Network Time Protocol (SNTP). The system shall have an operating temperature of -40°C to +80°C, have an operating humidity of 0 to 95% non-condensing, and have a power consumption of less than 8.0W (minus POE) and a MTBF of > 41,000 hours. The system shall provide built in over-current protection. The system radiated emission shall be compliant with FCC Part 15/EN55022, Class A. The switch will have a 5 year warranty and be "Made in the USA".