User Manual: K5xx 2/4-Port DisplayPort Secure KVM Switch

Models covered in this user manual:

K502 – Secure 2-port DP KVM Switch w/audio

K504 - Secure 4-port DP KVM Switch w/audio

K504E - Secure 4-port DP KVM Switch w/audio and DPP

K524E - Secure 4-port Dual Head DP KVM w/audio and DPP

Rev: 1.1

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Table of Content

Record of Revisions

Rev	Date	Description of changes
1.0	March 29, 2013	Initial release
1.1	July 31, 2015	Updated content and pictures

Introduction

Thank you for purchasing this HSL Secure DisplayPort KVM Switch. This KVM Switch is designed for use in secure defense and intelligence environments across wide security gaps. This 3rd Generation Secure KVM Switch offers optical data diode per channel. Optical data diodes are used to prevent data transfer between connected computers running at different security levels even if these computers attempts to attack the KVM. This product provides the highest security safeguards and features that meet today's and will meet future cyber prevention requirements.

This User Manual provides all the details you'll need to install and operate your new Switch, in addition to troubleshooting guidance— in the unlikely event of a problem.

Package Contents

Inside product packaging you will find the following:

- HSL Secure DP KVM Switch unit

- 12V 1.5A DC Power Supply

- User Documentation

Important: This product is equipped with always-on active anti-tampering system. Any attempt to open the product enclosure will activate the anti-tamper triggers and render the unit inoperable.

If the unit's enclosure appears disrupted or if all the channel-select LEDs flash continuously, please remove product from service immediately and contact HSL Technical Support.

Security Features

HSL Secure KVM Switch is the most advanced and secure commercially available KVM Switch available today. Below is a summary of some of the security features incorporated into the product.

Unidirectional Data Paths

Optical diodes used to enforce unidirectional data flow from the peripheral devices to computers preventing potential leakage paths between computers even in the severe threat of two infected computers attacking the KVM.

No Shared Resources

This KVM Switch designed to securely operate even when peripheral devices are vulnerable to signaling attacks. This KVM Switch does not allow computer access to any shared resource and does not share controllable power sources.

Dedicated Processors for Emulation

The Switch features a dedicated processor per computer port to emulate peripheral devices. This keeps each computer running on different security levels physically separated and secure at all times, and prevents any unintended data leakage between computers.

Non-Reprogrammable Firmware

The Switch features custom firmware that is not reprogrammable, preventing the ability to remotely attack the KVM control logic.

EDID Emulation and Firewall

HSL Secure KVM Switch blocks the computer access to the shared display by using isolated EDID emulators. This arrangement together with the internal EDID firewall protects from KVM attacks targeting the external memory effect of the shared display.

USB Ports Protection

Console USB ports are protected from the use of storage and other unsafe USB devices through strong filtering (independent of computer protection means). Unqualified devices are rejected when connected to the Switch. Only mouse and keyboard data are passed through.

Heavy-duty Steel Enclosure

HSL Secure KVM Switches uses thick steel components to protect the product from physical tampering and to minimize radiated electromagnetic emissions that can be snooped or intercepted.

Active Always-On Anti-Tamper

Active chassis anti-tamper system prevents the KVM electronic circuitry from being accessed and tampered with by permanently disabling the product once tampering is detected.

Holographic Tamper-Evident Labels

Four serially numbered holographic security tamper-evident labels are placed on the enclosure surface to provide a visual indication if the Switch has been opened or compromised.

High Inter-Channel Analog Isolation

HSL Secure KVM Switches offers exceptionally high isolation between computer channels to prevent analog leakages across the KVM.

Dedicated Peripheral Port

HSL patented Dedicated Peripheral Ports enables secure use of CAC or smart-card readers leveraging security.

Common Criteria Listing

The Switch is listed by the Common Criteria organization.

Operational Features

The HSL Secure DP KVM Switch was designed with the user in mind for today's IT environment. Below is a summary of some of the features incorporated into the Product.

DisplayPort video support

The K5xx supports DisplayPort1.1/1.2 video formats supporting resolutions up to UHD 3840×2160 pixels.

Wide peripherals and computers support

The K5xx supports the widest variety of peripherals and computers. It also supports the latest keyboards, mice and card readers and all Operating Systems.

Dual-Head Support

HSL K524E Secure Switch enables easy switching of two user displays to four dual-head computers.

USB Support

HSL Secure KVM Switch product designed and tested to support the widest variety of USB keyboards and mice.

Dedicate Peripheral Port

HSL Secure KVM Switch products supports parallel switching of wide set of user authentication devices including CAC, smart-card and biometric readers.

Keyboard Shortcuts Support

HSL Secure KVM Switch is the only Secure KVM that supports keyboard shortcuts switching mode while providing highest level of isolation.

Audio Support

Switch support audio out switching. Microphone switching not supported to prevent analog leakages through audio ports.

Display Diagnostic LED

Special display diagnostic LEDs near each one of the console display connectors provides essential guidance during installation.

KVM Extenders Support

HSL Secure KVM Switch supports most copper and fiber KVM extenders connected to the console port.

Equipment Requirements

Cables

It is highly recommended to use HSL Cable Kits for product to ensure optimal security and performance.

One Cable Kit is required per connected computer.

Operating Systems

Product is compatible with devices running on the following operating systems:

• Microsoft® Windows®

• Red Hat®, Ubuntu® and other Linux® platforms

• Mac OS® X v10.3 and higher.

USB Keyboard console port

The product console USB keyboard port is compatible with Standard USB keyboards.

Notes:

a. For security reasons products do not support wireless keyboards. In any case do not connect wireless keyboard to product.
b. Non-standard keyboards, such as keyboards with integrated USB hubs and other USB-integrated devices, may not be fully supported due to security policy. If they are supported, only classical keyboard (HID) operation will be functional. It is recommended to use standard USB keyboards.

USB Mouse console port

The product console USB mouse port is compatible with standard USB mice.

Notes:

a. Console USB keyboard and mouse ports are switchable, i.e. you can connect keyboard to mouse port and vice versa. However, for optimal operation it is recommended to connect USB keyboard to console USB keyboard port and USB mouse to console USB mouse port.
b. Console USB mouse port supports Standard KVM Extender composite device having a keyboard/mouse functions.
c. For security reasons products do not support wireless mice. In any case do not connect wireless mouse to product.

PS/2 Mouse and Keyboard console ports

The product console PS/2 keyboard and mouse ports are compatible with standard PS/2 keyboards and mice.

DisplayPort video support

The K5xx supports DisplayPort1.1/1.2 video formats supporting resolutions up to UHD 3840×2160 pixels.

User Audio Devices

Product is compatible with the following types of user audio devices:

• Stereo headphones;
• Amplified stereo speakers.

Note: In any case do not connect a microphone to product audio output port including headsets.

DPP Port

The product operates with authorized USB devices plugged into the console DPP Port, such as USB smart-card reader or Common Access Card (CAC) reader.

Safety Precautions

Please read the following safety precautions carefully before using the product:

- Before cleaning, disconnect the product from DC power.

- Be sure not to expose the product to excessive humidity.

- Be sure to install the product on a clean secure surface.

- Do not place the DC power cord in a path of foot traffic.

- If the product is not used for a long period of time, remove the product's wall-mount power supply from the mains jack.

- If one of the following situations occurs, get the product checked by a qualified service technician:

  - The product's power supply is overheated, damaged, broken, causes smoke or shortens the mains power socket.

  - Liquid penetrates the product's case.

  - The product is exposed to excessive moisture or water.

  - The product is not working well even after carefully following the instructions in this user's manual.

  - The product has been dropped or is physically damaged.

  - The product has obvious signs of breakage or loose internal parts.

- The product should be stored and used only in temperature and humidity controlled environments as defined in the product's environmental specifications.

- The wall-mount power supply used with this product should be the model supplied by the manufacturer or an approved equivalent provided by HSL or an authorized service provider. The use of improper power source will void product warranty.

Front Panel Features – K524E
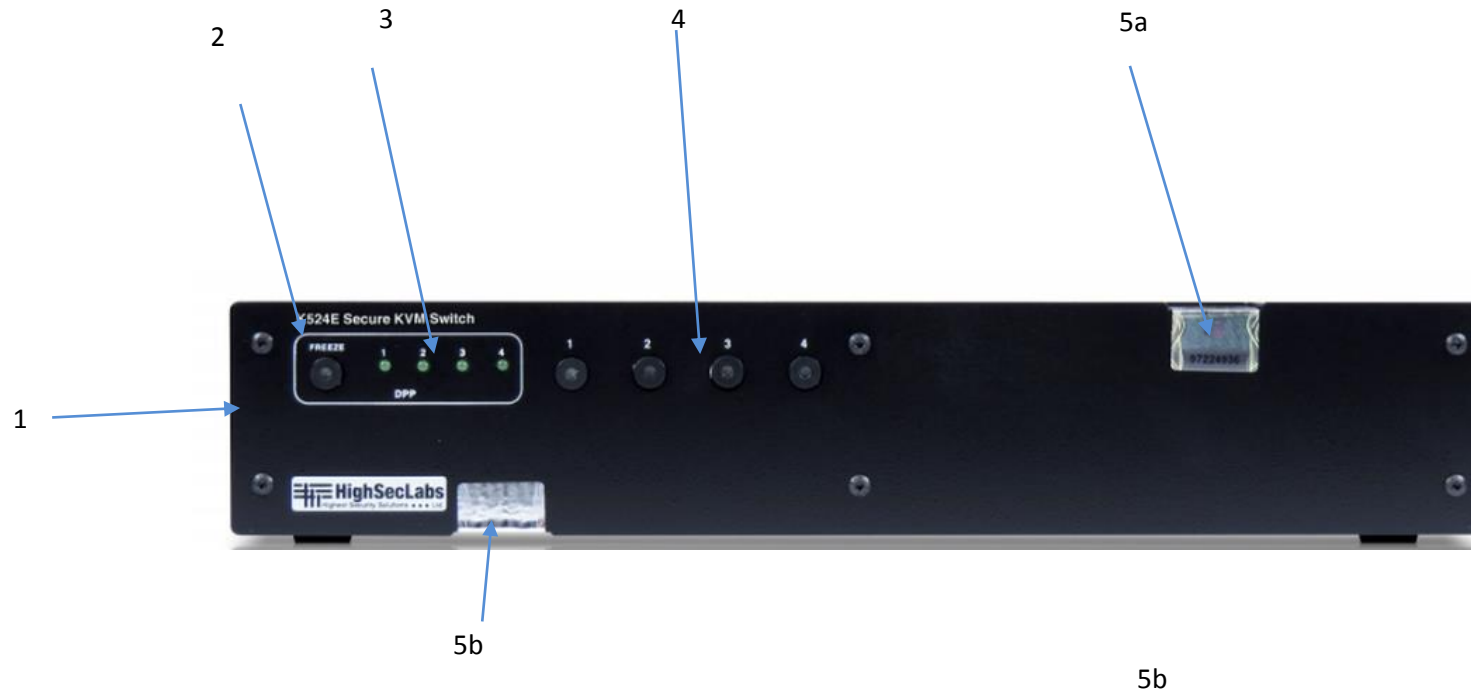
1 – Steel enclosure

2 – DPP (Dedicated Peripheral Port) Status LED ("Freeze")

3 – DPP channel select LEDs

4 – Channel Select push-buttons and LEDs

5a-5b – Holographic Tamper Evident Labels

Rear Panel Features –K502

Console Area

1 - Audio console output 3.5 mm stereo jack

2 - USB Keyboard & Mouse jacks
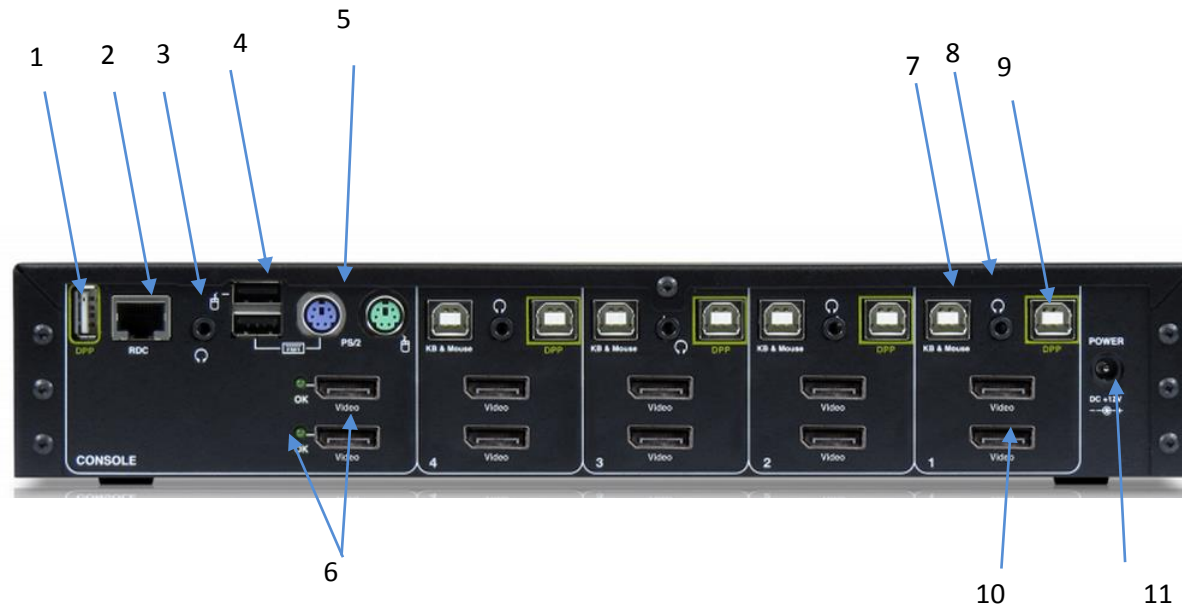
3 – Console DisplayPort video input jack & diagnostic LED

Computer Area

4 - Computer USB Keyboard & Mouse jack

5 - Computer audio input jack 3.5mm stereo

6 - Computer DP video input jack

General

7 - DC Power input jack – barrel type

Rear Panel Features –K524E

Console Area

1 - DPP (Dedicated Peripheral Port) console USB jack

2 - RDC remote control port RJ-45 (for future use)

3 – Audio console output 3.5 mm stereo jack

4 - USB Keyboard & Mouse jacks

5 – PS/2 Keyboard & Mouse jacks (Mini-DIN)

6 – Console 2 X DP input jacks & diagnostic LEDs

Computer Area

7 - Computer USB Keyboard & Mouse jack

8 - Computer audio input jack 3.5mm stereo

9 - Computer DPP USB jack

10 - Computer 2 X DP video input jacks

General

11 - DC Power input jack – barrel type

Tamper Evident Labels

HSL Secure KVM Switch uses four holographic tamper evident labels to provide visual indications in case of enclosure intrusion attempt. These labels indicate white dots or the text "VOID" once removed. When opening product packaging inspect the four tampering evident labels.

If for any reason one or more tamper-evident label is missing, appears disrupted, or looks different than the example shown here, please call HSL Technical Support and avoid using that product.

Active Anti-Tampering System

HSL Secure KVM Switch is equipped with always-on active anti-tampering system. If mechanical intrusion is detected by this system, the Switch will be permanently disabled and LED will blink continuously.

If product indication tampered state (all LEDs blinking) - please call HSL Technical Support and avoid using that product.

HSL Holographic Tampering Evident Label

Product Specifications

Model	K502, K504, K504E, K524E
Enclosure	Steel metal enclosure
Power Requirements	12V DC, 1.5A (maximum) power adapter with center-pin-positive polarity
AC Input	100 to 240VAC
No. of Secure Channels	2 (K502) or 4 (4-port models)
No. of Users Supported	1
No. of Computers Supported	2 (K502) or 4 (4-port models)
Displays Supported	DisplayPort 1.1/1.2
Resolution Support	Up to UHD 3840×2160 pixels
Console Keyboard Input	- USB Type-A female connector
	- PS/2 Mini-DIN 6 pin female connector (only 4 port KVMs)
Console Mouse Input	- USB Type-A female connector
	- PS/2 Mini-DIN 6 pin female connector (only 4 port KVMs)
Console DPP Input	- USB Type A (only 4 port KVMs)
Console Display Port	DP female connector (model 524E supports dual display)
Console Audio Out	1/8" (3.5mm) stereo jack
CPU Keyboard/Mouse Ports	USB Type-B jack
CPU DPP Ports	USB Type-B jack

CPU Audio Input	1/8" (3.5mm) stereo jack
CPU Video Input Port	DP female connector (model 524E supports dual display)
Port Selectors	2/4 push button channel LEDS (model pending)
LED Indicators	4 DPP selected channel LEDS (model pending) 1 DPP status LED
Operating Temp	32° to 104° F (0° to 40° C)
Storage Temp	-4° to 140° F (-20° to 60° C)
Humidity	0-80% RH, non-condensing

Dimensions

Model K502: 136 (W) x 61 (D) x 36 (H) mm / 5.4 (W) x 24.6 (D) x 1.46 (H) inch

Model K504 & K504E: 320 (W) x 130 (D) x 52 (H) mm / 12.8 (W) x 5.2 (D) x 2 (H) inch

Model K524E: 320 (W) x 130 (D) x 65 (H) mm / 12.8 (W) x 5.2 (D) x 2.6 (H) inch

Weight

Model K502: 0.36 Kg. (0.79 lbs.)

Model K504 & K504E: 1.47 Kg (3.2 lbs.)

Model K524E: 1.8 Kg. (4 lbs.)

Warranty   2 years

Before Installation

Unpacking the Product

Before opening the product packaging, inspect the packaging condition to assure that product was not damaged during delivery.

When opening the package, inspect that the product Tamper Evident Labels are intact.

Where to locate the Product?

The enclosure of the product is designed for desktop or under the table configurations. An optional Mount Kit is available.

Product must be located in a secure and well protected environment to prevent potential attacker access.

Consider the following when deciding where to place product:

- Product front panel must be visible to the user at all times.
- The location of the computers in relation to the product and the length of available cables (typically 1.8 m)

Warning: Avoid placing cables near fluorescent lights, air-conditioning equipment, RF equipment or machines that create electrical noise (e.g., vacuum cleaners).).

Important:

1. If the unit's enclosure appears disrupted or if all channel-select LEDs flash continuously, please remove product from service immediately and contact HSL Technical Support at http://highseclabs.com/support/case/.
2. Do not connect product to computing devices:
    a. That are TEMPEST computers;
    b. That include telecommunication equipment;
    c. That include frame grabber video cards
    d. That include special audio processing cards.

Installation

Connecting devices to product console

Product requires connection of all devices and computers prior to powering it up.

Note: some devices such as user display would not be recognized if connected after product is already powered up.

See figures above for connector locations.

- Connect user display/s. Mark which display is coupled with which computer. It is also recommended to mark which computer is coupled with which channel.
- Connect user keyboard and mouse to console keyboard and mouse ports.
- Connect headphones/speakers to console audio out port (optional).
- If the computer uses a smart card reader/USB device, connect the smart card reader/USB device to the console DPP port (optional, model pending).

Notes:

1. Console USB mouse and keyboard ports are switchable, i.e. you can connect keyboard to mouse port. However, for optimal operation it is recommended to connect USB keyboard to console USB keyboard port and USB mouse to console USB mouse port.
2. For security reasons products do not support wireless keyboards. In any case do not connect wireless keyboard to product.
3. Non-standard keyboards, such as keyboards with integrated USB hubs and other USB-integrated devices, may not be fully supported due to security policy. If they are supported, only classical keyboard (HID) operation will be functional. It is recommended to use standard USB keyboards.
4. Console USB mouse port supports Standard KVM Extender composite device having a keyboard/mouse functions.

2. Connecting the Computers

- Using USB cables, connect each computer to the USB type B port in "computer interface ports" area on product.
- If computer uses audio output, e.g. speakers/headphones, connect audio cable from its audio output port to the corresponding audio input port on product.
- If the computer uses a smart card reader/USB device, connect a USB cable between the DPP-enabled computer and the corresponding DPP port on product.

Note:

1. If the number of product channels is larger than the number of sources used, make sure the computers are connected in a row starting from computer #1. For example, if there are 3 channels used, connect computers to channels #1, #2 and then #3.
2. The USB cable must be connected directly to a free USB port on the computer, with no USB hubs or other devices in between.

3. Power up

- Connect DC power supply.
- Power up user display/s. Select through display setup menu the appropriate video input if applicable.
- Power up the connected computers.
- Power up the product.

When you power up your computers, the product emulates display, mouse and keyboard on each port and allows your computers to boot normally. You should be able to move the mouse cursor on the primary display connected to computer #1.

Check to see that the keyboard and mouse are working properly on each computer.

Repeat this check with all occupied ports to verify that all computers are connected and responding correctly.

If you encounter an error, check your cable connections for that computer and reboot. If the problem persists, please refer to the Troubleshooting section in this User Manual.

DPP Installation

In case computer and product support DPP functionality, such as user authentication smart card reader, do the following:

1. Connect USB device, such as smart card reader, to **DPP port** on **product console**
2. Connect **DPP input port** on product to any free **USB port on computer** using a USB cable.
    Note: Do not connect the USB cable if DPP functionality is not needed for that computer.

If only some of the computers use DPP functionality, such as user authentication, make sure that **computer #1** is connected to the USB device. If needed, switch channels/computer mapping to create this configuration.

When product is powered ON and connected USB device is qualified and ready for use, the DPP status LED ("Freeze") will illuminate steady green.

If the USB device is detected but not authorized, as not being a Smart Card or CAC reader, it will be rejected for security reasons. This will be indicated by DPP status LED illuminating steady red.

K504E typical system installation diagram
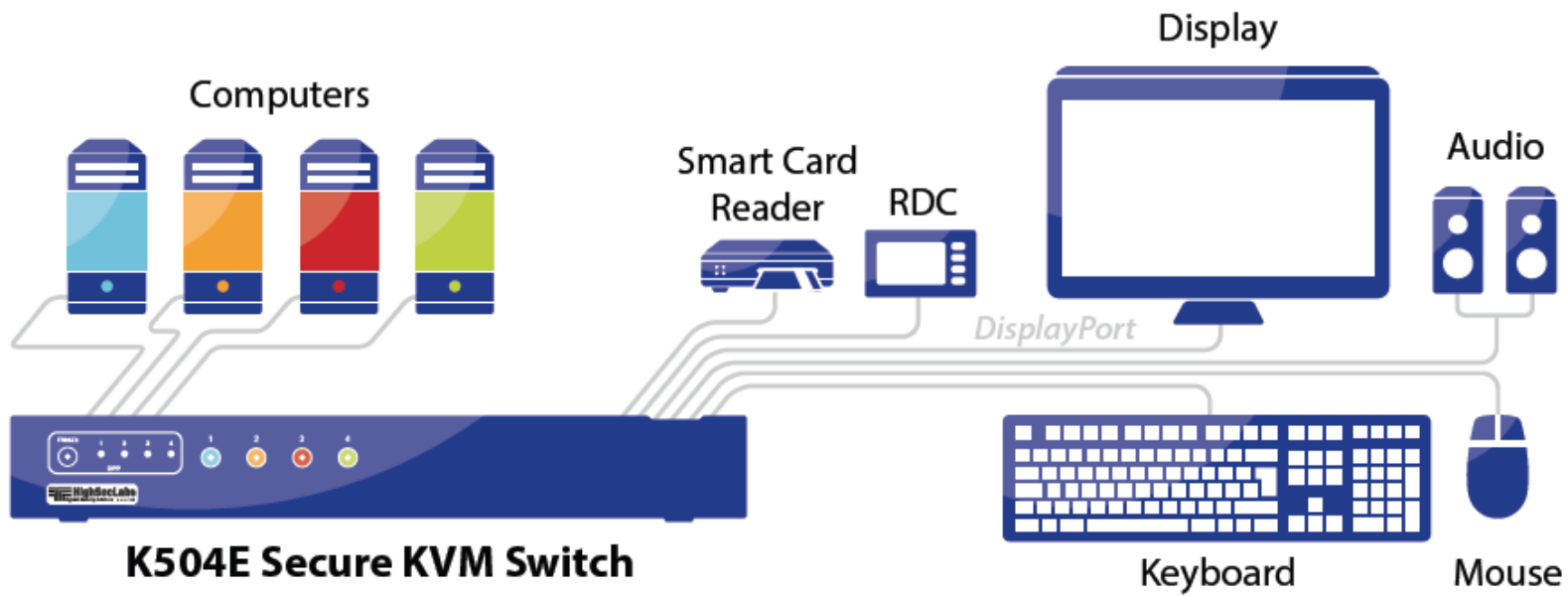
Operation

Now that you have connected your console and computers to the Switch, it is ready for use. Default channel after power up is channel #1 as indicated by channel select LED #1 illumination. You can select which computer you wish to control by one of the following methods:

Default Channel
After product boots up, the default active channel will be channel #1. This will be indicated by white color illumination of push-button #1.

Product Mapping to Sources
Product mapping to sources is indicated by stickers/labels specifying which channel is mapped to which computer.

Front Panel Push-Buttons

Following power up, the default channel is #1.

The user can select any other channel by pressing the appropriate front panel push button.

The mouse cursor will be positioned at the center of the selected computer display.

The currently selected channel is indicated by white color illumination of the appropriate push-button.

Important Security Note:

If you are aware of potential security vulnerability while installing or operating this product, we encourage you to contact us immediately in one of the following ways:

- Web form: http://www.highseclabs.com/support/case/
- Email: security@highseclabs.com
- Tel: +972-4-9591191 or +972-4-9591192

Important: If the unit's enclosure appears disrupted or if all channel-select LEDs flash continuously, please remove product from service immediately and contact HSL Technical Support at http://www.highseclabs.com/support/case/

Important: This product is equipped with always-on active anti-tampering system. Any attempt to open the product enclosure will activate the anti-tamper triggers and render the unit inoperable and warranty void.

DPP Operation

The product is equipped with DPP port enabling connectivity to external USB-devices such as smartcard reader.

Summary of rules that apply to DPP switching:

It is assumed that a "connected channel" is when:

1. Product is powered ON
2. The USB device connected to product console is qualified and ready for use, as indicated by the DPP status LED illuminating steady green.
3. The channel DPP port on product is connected via USB cable to a USB port on computer.

- When the USB device connected to the DPP console port is qualified, the DPP status LED on the front panel would illuminate steady green.
  - When connecting a USB device that is rejected for security reasons to the product's DPP port, the DPP LED will illuminate steady red and USB device will be inoperable. In such case the USB device must be replaced with a qualified device, either USB smart card or CAC reader.
- Since channel #1 is the default active channel after power up and in case only some of the channels operate with a USB device, it is recommended to make sure computer #1 is connected to USB device.
- Once the user switches channels, for example to channel #3, DPP functionality will move to computer #3 and be indicated by channel #3 DPP LED turning steady green.
- In case user switches to a channel that is not connected to a USB device, the DPP function will remain with the last channel that had DPP connection.

Troubleshooting Guide

> **Important Security Note:**
>
> If you are aware of potential security vulnerability while installing or operating this product, we encourage you to contact us immediately in one of the following ways:
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> - Web form: http://www.highseclabs.com/support/case/
> - Email: security@highseclabs.com
> - Tel: +972-4-9591191 or +972-4-9591192
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> **Important:** If the unit's enclosure appears disrupted or if all channel-select LEDs flash continuously, please remove product from service immediately and contact HSL Technical Support at http://www.highseclabs.com/support/case/
>
> **Important:** This product is equipped with always-on active anti-tampering system. Any attempt to open the product enclosure will activate the anti-tamper triggers and render the unit inoperable and warranty void.

General

Problem: No power - No video output, none of the front panel LEDs are illuminating.

Solutions:

- Check AC cable connection to make sure product receives power properly. Replace cable if needed. If problem persists, contact your system administrator or our technical support.

Problem: Product enclosure appears disrupted or all channel-select LEDs flash continuously.
Solution: The product may have been tampered with. Please remove product from service immediately and contact Technical Support.

Keyboard

Problem: Mouse and keyboard are not working (two channels)

Solutions:

- Check that computer USB and video cables are not crossed i.e. computer #1 video is connected to channel #1 while USB keyboard and mouse cables are connected to channel #2.

Problem: Keyboard does not work (all channels)

Solutions:

- Check that the keyboard you are using is properly connected to product.
- Check that the USB cable between the product and computer is properly connected.
- Try connecting keyboard to a different USB port on computer.
- Make sure the keyboard works when directly connected to computer, i.e. the HID USB driver is installed on computer; this may require computer reboot.
- It is recommended to use standard USB keyboards and not a keyboard with an integrated USB hub or other USB-integrated devices.
- If the computer is coming out of standby mode, allow up to one minute to regain mouse function.
- Try a different keyboard.
- Do not use a wireless keyboard.

Mouse

Problem: Mouse cursor does not switch from primary to secondary display.

Solutions: Driver supporting multiple displays was not installed or not installed properly on computer. Reinstall driver.

Problem: Mouse and keyboard are not working (two channels)

Solutions:

- Check that computer USB and video cables are not crossed i.e. computer #1 video is connected to channel #1 while USB keyboard and mouse cables are connected to channel #2.

Problem: Mouse does not work (all channels)

Solutions:

- Check that the mouse you are using is properly connected to product.
- Check that USB cable between the product and computer is properly connected.
- Try connecting mouse to a different USB port on computer.
- Make sure the mouse works when directly connected to computer, i.e. the HID USB driver is installed on computer; this may require computer reboot.
- It is recommended to use standard USB mice.
- If the computer is coming out of standby mode, allow up to one minute to regain mouse function.
- Try a different mouse.
- Do not use a wireless mouse.

Problem: both keyboard and mouse are not working (one channel**)**
Solution: Use computer Device Manager Utility to see product and solve problem.

Video

Problem: No video image in user display (all channels)

Solutions:

- Check that displays are properly powered.
- Check that video cable is properly secured at both sides.
- Check at the displays' on-screen menu that sources selected match the cables connected to displays.
- Check if display video mode is the same as computer's video mode (e.g. DP and DP, etc.).
- Check that displays' diagnostic LED is steady green – if not, change displays, change displays' cables or call technical support.

Problem: No video image in user display (specific channel)

Solutions:

- Reboot product first, then disconnect and reconnect the video cable and reboot the computer.
- Check that the video cable connecting computer and product is properly secured at both sides.
- Check that computer video output is sent to the connected video connector (if computer supports multiple displays).
- Check that computer resolution matches connected display capabilities.
- Connect the display/s directly to the computer to confirm that video output is available and that a good image is shown.

Problem: Bad video image quality (some or all channels)

Solutions:

- Check that all video cables are properly connected to product, computer, and display.
- Check that cables are original cables supplied by HSL.

- With everything connected, power-cycle the product to reset the video. Make sure the Video Diagnostic LED is solid green.
- Check that the displays that you are using support the resolution and refresh-rate setting on computer.
- Lower the video resolution of your computer.
- Connect displays directly to computer showing bad video image to see if problem persists.

DPP

Problem: DPP is not working (two channels)

Solutions:

- Check that computer USB and video cables are not crossed i.e. computer #1 video is connected to channel #1 while USB device is connected to channel #2.

Problem: DPP is not working (all channels)

Solutions:

- Check that the USB device is properly connected to product console.
- Check that the DPP status LED is steady green. If DPP status LED is illuminated steady red the device is rejected or non-qualified for security reasons. To resolve please connect a USB smart card or CAC reader or contact your system administrator.

Problem: DPP is not working (one channel only)

Solutions:

- Check that device is working properly when connected directly to computer.
- Check that there is a USB cable connected between the computer and the relevant DPP input port on product.

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