SHC-8932-F User Guide

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Thank You for Choosing Ross

You've made a great choice. We expect you will be very happy with your purchase of Ross Technology.

Our mission is to:

1. Provide a Superior Customer Experience
   - offer the best product quality and support
2. Make Cool Practical Technology
   - develop great products that customers love

Ross has become well known for the Ross Video Code of Ethics. It guides our interactions and empowers our employees. I hope you enjoy reading it below.

If anything at all with your Ross experience does not live up to your expectations be sure to reach out to us at *solutions@rossvideo.com*.

David Ross
CEO, Ross Video
dross@rossvideo.com

Ross Video Code of Ethics

Any company is the sum total of the people that make things happen. At Ross, our employees are a special group. Our employees truly care about doing a great job and delivering a high quality customer experience every day. This code of ethics hangs on the wall of all Ross Video locations to guide our behavior:

1. We will always act in our customers' best interest.
2. We will do our best to understand our customers' requirements.
3. We will not ship crap.
4. We will be great to work with.
5. We will do something extra for our customers, as an apology, when something big goes wrong and it's our fault.
6. We will keep our promises.
7. We will treat the competition with respect.
8. We will cooperate with and help other friendly companies.
9. We will go above and beyond in times of crisis. *If there's no one to authorize the required action in times of company or customer crisis - do what you know in your heart is right. (You may rent helicopters if necessary.)*

SHC-8932-F · User Guide

- Ross Part Number: 8932DR-004-01
- Revision: 2
- Release Date: April 7, 2025.
- Software Version: v1.1

The information contained in this Guide is subject to change without notice or obligation.

Copyright

Patents

Patent numbers US 7,034,886; US 7,508,455; US 7,602,446; US 7,802,802 B2; US 7,834,886; US 7,914,332; US 8,307,284; US 8,407,374 B2; US 8,499,019 B2; US 8,519,949 B2; US 8,743,292 B2; GB 2,419,119 B; GB 2,447,380 B; and other patents pending.

Notices

The material in this manual is furnished for informational use only. It is subject to change without notice and should not be construed as commitment by Ross Video Limited. Ross Video Limited assumes no responsibility or liability for errors or inaccuracies that may appear in this manual.

Note: As required by the GNU General Public License, and the Lesser GNU Public License (LGPL), source code can be obtained from Ross Video for at least 3 years. Contact Ross Video Technical Support for more information. If you have any questions or comments regarding this License Agreement, please contact:

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P.O. Box 220
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Canada K0E 1K0
techsupport@rossvideo.com

Safety Notices

Refer to the "**Important Regulatory and Safety Notices**" document that accompanied your product.

Statement of Compliance

This product has been determined to be compliant with the applicable standards, regulations, and directives for the countries where the product is marketed.

Compliance documentation, such as certification or Declaration of Compliance for the product is available upon request by contacting techsupport@rossvideo.com. Please include the product; model number identifiers and serial number and country that compliance information is needed in request.

EMC Notices

US FCC Part 15

This equipment has been tested and found to comply with the limits for a class A Digital device, pursuant to part 15 of the FCC Rules.

These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a Commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Notice — *Changes or modifications to this equipment not expressly approved by Ross Video Ltd. could void the user's authority to operate this equipment.*

Canada

This Class "A" digital apparatus complies with Canadian ICES-003 and part 15 of the FCC Rules.

Cet appareil numerique de la classe "A" est conforme a la norme NMB-003 du Canada.

European Union

This equipment is in compliance with the essential requirements and other relevant provisions established under regulation (EC) No 765/2008 and Decision No 768/2008/EC referred to as the "New Legislative Framework".

Warning — *This equipment is compliant with Class A of CISPR 32. In a residential environment this equipment may cause radio interference.*

Australia/New Zealand

This equipment is in compliance with the provisions established under the Radiocommunications Act 1992 and Radiocommunications Labeling (Electromagnetic Compatibility) Notice 2008.

Korea

This equipment is in compliance with the provisions established under the Radio Waves Act.

Class A equipment (Broadcasting and communications service for business use)

This device is a business-use (Class A) EMC-compliant device. The seller and user are advised to be aware of this fact. This device is intended for use in areas outside home.

Type of Equipment	User's Guide
A급 기기 (업무용 방송통신기자재)	이 기기는 업무용(A급) 전자파적합기기로서 판매자 또는 사용자는 이 점을 주의하시기 바라며, 가정외의 지역에서 사용하는 것을 목적으로 합니다.
Class A Equipment (Industrial Broadcasting & Communication Equipment)	This equipment is **Industrial (Class A) electromagnetic wave suitability equipment** and seller or user should take notice of it, and this equipment is to be used in the places except for home.

International

This equipment has been tested under the requirements of CISPR 22:2008 or CISPR 32:2015 and found to comply with the limits for a Class A Digital device.

Notice — *This is a Class A product. In domestic environments, this product may cause radio interference, in which case the user may have to take adequate measures.*

Maintenance/User Serviceable Parts

Routine maintenance to this openGear product is not required. This product contains no user serviceable parts. If the module does not appear to be working properly, please contact Technical Support using the numbers listed under the "**Contact Us**" section of this manual. All openGear products are covered by a generous 5-year warranty and will be repaired without charge for materials or labor within this period. See the "**Warranty and Repair Policy**" section in this manual for details.

Environmental Information

The equipment may contain hazardous substances that could impact health and the environment.

To avoid the potential release of those substances into the environment and to diminish the need for the extraction of natural resources, Ross Video encourages you to use the appropriate take-back systems. These systems will reuse or recycle most of the materials from your end-of-life equipment in an environmentally friendly and health conscious manner.

The crossed-out wheeled bin symbol invites you to use these systems.

If you need more information on the collection, reuse, and recycling systems, please contact your local or regional waste administration. You can also contact Ross Video for more information on the environmental performances of our products.

Security and Privacy

If you would like more information on how Ross Video security and privacy practices have been applied to the SHC-8932-F, what you should know about maintaining security of this product, and how we can partner with you to ensure security throughout this product's life-cycle, contact techsupport@rossvideo.com.

Ross Video has implemented reasonable administrative, technical, and physical safeguards to help protect against security incidents and privacy breaches involving a Ross Video product provided those products are used in accordance with Ross Video instructions for use. However, as systems and threats evolve, no system can be protected against all vulnerabilities and we consider our customers the most important partner in maintaining security and privacy safeguards. If you have any concerns, we ask that you bring them to our attention, and we will investigate. Where appropriate, we will address the issue with product changes, technical bulletins and/or responsible disclosures to customers and regulators. Ross Video continuously strives to improve security and privacy throughout the product life-cycle using practices such as:

- Privacy and Security by Design
- Product and Supplier Risk Assessment
- Vulnerability and Patch Management
- Secure Coding Practices and Analysis
- Vulnerability Scanning
- Access Controls appropriate to Customer Data
- Incident Response
- Clear paths for two-way communication between customers and Ross Video

If you would like to report a potential product related privacy or security issue (incident, breach, or vulnerability), contact techsupport@rossvideo.com.

Company Address

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Contents

Introduction

This guide covers the installation, configuration, and use of the SHC-8932-F SDI to HDMI® Converter. The following chapters are included:

- **"Introduction"** summarizes the guide and provides important terms, and conventions.
- "**Before You Begin**" provides general information to keep in mind before installing and configuring your card.
- "**Hardware Overview**" provides a basic introduction to the hardware features including the cabling and monitoring features of the rear module.
- "**Physical Installation**" provides instructions for the physical installation of the card and its rear module.
- "**Cabling**" provides information on connecting the SHC-8932-F to your external devices.
- "**Getting Started**" provides a general overview of navigating the SHC-8932-F interfaces in DashBoard.
- "**Video Configuration**" outlines the video configuration options for the SHC-8932-F outputs.
- "**Configuring the 2SI Mode**" outlines how to assign a specified 2SI sub-image for the HDMI output.
- "**Audio Setup**" outlines how to map the audio channels to the SHC-8932-F outputs.
- "**HDR Metadata**" provides information on the HDR settings for the HDMI outputs of the SHC-8932-F.
- "**Upgrading the Software**" provides instructions for upgrading the software for your SHC-8932-F using DashBoard.
- "**DashBoard Menus**" summarizes the SHC-8932-F menus, items, and parameters in DashBoard.
- "**Technical Specifications**" provides the technical specifications for the SHC-8932-F.
- "**Supported SFP Modules**" outlines on the warranty and repair policies for your SHC-8932-F.
- "**Service Information**" outlines on the warranty and repair policies for your SHC-8932-F.
- "**Software Licenses**" provides the third-party software license information for your SHC-8932-F.
- "**Glossary**" provides a list of terms used throughout this guide.

Related Publications

It is recommended to consult the following Ross documentation before installing and configuring your card:

- ***DashBoard User Guide***, Ross Part Number: 8351DR-004
- ***MFC-OG3-N and MFC-8322-S User Guide***, Ross Part Number: 8322DR-004
- ***OGX-FR Series User Guide***, Ross Part Number: 8322DR-204

Documentation Conventions

Special text formats are used in this guide to identify parts of the user interface, text that a user must enter, or a sequence of menus and sub-menus that must be followed to reach a particular command.

Interface Elements

Bold text is used to identify a user interface element such as a dialog box, menu item, or button. For example:

In the **Network** tab, click **Apply**.

User Entered Text

Courier text is used to identify text that a user must enter. For example:

In the **Language** box, enter `English`.

Referenced Guides

Text set in bold and italic represent the titles of referenced guides, manuals, or documents. For example:

For more information, refer to the ***DashBoard User Manual***.

Menu Sequences

Menu arrows are used in procedures to identify a sequence of menu items that you must follow. For example, if a step reads "**File** > **Save As**," you would click the **File** menu and then click **Save As**.

Important Instructions

Star icons are used to identify important instructions or features. For example:

✶ Contact your IT department before connecting to your facility network to ensure that there are no conflicts. They will provide you with an appropriate value for the IP Address, Subnet Mask, and Gateway for your device.

Contacting Technical Support

At Ross Video, we take pride in the quality of our products, but if problems occur, help is as close as the nearest telephone.

Our 24-hour Hot Line service ensures you have access to technical expertise around the clock. After-sales service and technical support is provided directly by Ross Video personnel. During business hours (Eastern Time), technical support personnel are available by telephone. After hours and on weekends, a direct emergency technical support phone line is available. If the technical support person who is on call does not answer this line immediately, a voice message can be left and the call will be returned shortly. This team of highly trained staff is available to react to any problem and to do whatever is necessary to ensure customer satisfaction.

- **Technical Support**: (+1) 613-652-4886
- **After Hours Emergency**: (+1) 613-349-0006
- **E-mail**: techsupport@rossvideo.com
- **Website**: http://www.rossvideo.com

Before You Begin

If you have questions pertaining to the operation of your card, contact us at the numbers listed in "**Contacting Technical Support**". Our technical staff is always available for consultation, training, or service.

Overview

The SHC-8932-F SDI-to-HDMI Converter is a high-quality signal conversion solution within the openGear family. The SHC-8932-F is the ideal solution for converting an SDI input signal to output an HDMI 2.0 signal to another device.

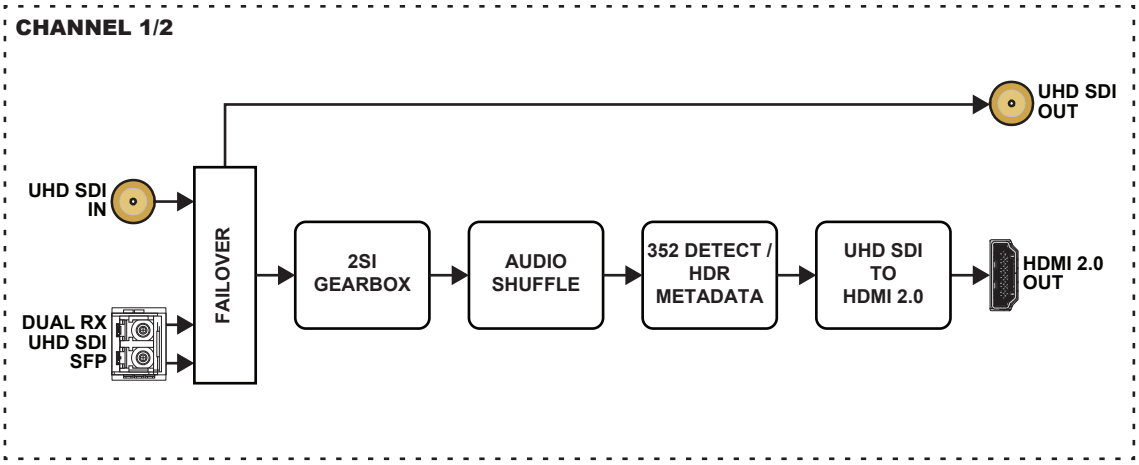


Figure 1 SHC-8932-F — Simplified Block Diagram

Features

The following features are standard for the SHC-8932-F:

- 2 x HDMI® 2.0 connections with up to 2160p 60Hz in 4:2:2
- Single link UHD SDI support
- Generate HDR10 metadata from the embedded SMPTE ST352 data in SDI with the option to override/force the settings
- Integrated SDI gearbox allows multiple UHD/HD/3G streams to be transported over a single link
- Map up to 16 channels of embedded audio from SDI to HDMI
- Reports status and configuration remotely via the DashBoard Control System
- Can be installed in an OG3-FR or OGX-FR series frame
- 5-year transferable warranty

Notes on Configuring the HDMI Outputs

Keep the following in mind when configuring the HDMI outputs of the SHC-8932-F:

- The SHC-8932-F produces the same video format at its HDMI output as you apply to the SDI input. It performs no scaling or other modification of the image. If there is no image displayed on your HDMI monitor, or the image is unstable, the most likely cause is that the monitor is incapable of displaying the video format that is present in your SDI signal.

- The input video (3G, 6G,12G) must include a valid 352 Packet Header to support HDR Metadata and 2SI.
- An incompatible 6G/12G 2SI signal will not produce any output (black or distorted output), even if the Active Input status field reports "OK" (a green indicator).

Closed Captioning

If you wish to review open captions in the HDMI output of the SHC-8932-F, you need to install an SDI VANC caption decoder in the SDI path leading to the SHC-8932-F. The SHC-8932-F will display the captions that are already keyed into the video by the decoder.

Hardware Overview

This chapter presents information on the SHC-8932-F hardware components and features.

Overview

The SHC-8932-F is an openGear modular system composed of two sub-systems.

- a main PCB which connects to a rear module and the openGear frame midplane
- a rear module and daughter card assembly (P/N 8322AR-336) that provides physical connectors

Notice — *Installing the SHC-8932-F in a frame other than the OG3-FR or OGX-FR could damage the card, the rear module, or both.*

Main PCB

The main PCB is a typical openGear card. An ejector on one end secures the module to the slot inside the openGear frame, and the other end inserts into a connector on the back of the rear module.

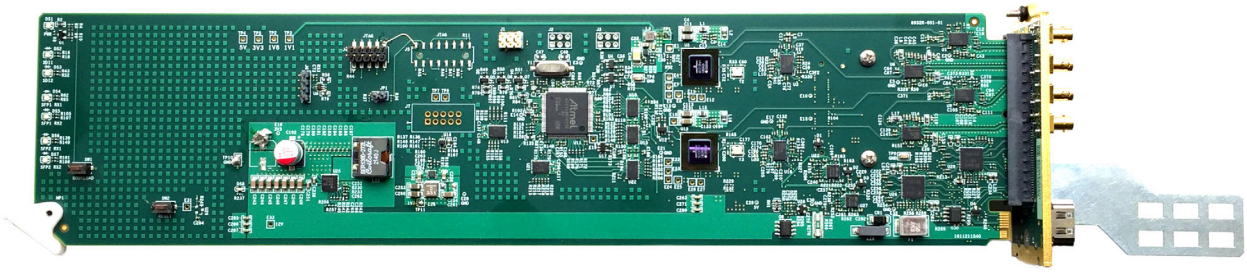


Figure 2 SHC-8932-F Card with Rear Module

BOOTLOAD Button

This button is used for factory service in the unlikely event of a complete card failure. Do not use this button unless advised by Ross Video Technical Support.

Monitoring via the Card-edge

The front-edge has LED indicators to indicate alarms, and communication activity. (**Figure 3**)

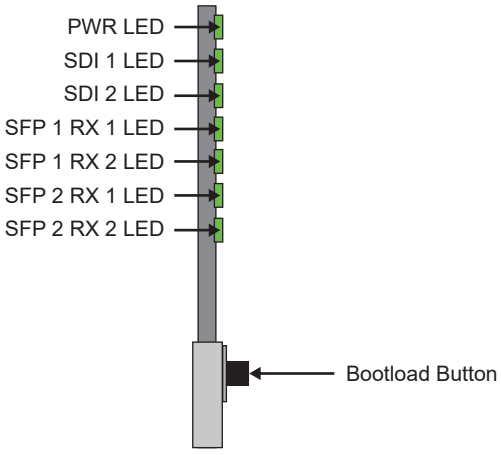


Figure 3 Card-edge Features

Table 1 provides information on the LED displays.

Table 1 SHC-8932-F LED Descriptions

LED	Color	Description
PWR	Green	The card is powered on and is operating correctly
	Flashing	The card software is updating
	Red	When lit red, this LED indicates: • the card is booting, or • a major alarm condition is occurring on the card
	Off	The card is not powered on
SDI #	Green	A valid signal is detected on the SDI BNC
	Red	The signal connected to the SDI BNC is not valid
	Off	The SDI port is not in use
SFP # RX #	Green	A valid signal is detected on the specified SFP port
	Red	The signal connected to the specified SFP port is not valid
	Off	The SFP port is not in use

Supported Rear Module

The SHC-8932-F requires the 8322AR-336 rear module. The following connections are implemented:

- 2 SDI inputs (BNC 1 and BNC 3)
- 2 SDI outputs (BNC 2 and BNC 4)
- 2 SFP dual-receiver (RX) ports
- 2 HDMI® 2.0 output ports

Each rear module occupies two slots in the openGear frame and accommodates one SHC-8932-F card. **Figure 4** represents the implemented cabling designations.

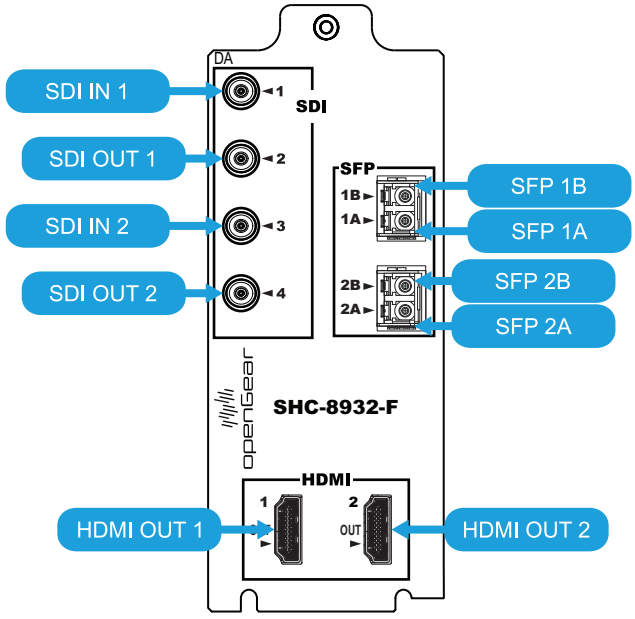


Figure 4 Cabling Designations

Physical Installation

Installing an SHC-8932-F card into an OG3-FR or OGX-FR series frame requires you to remove the blank plates in the designation frame slots, install the 8323AR-329 rear module into the frame rear panel, and then install the SHC-8932-F card into the required frame slot.

If you have questions pertaining to the installation of your card, contact us at the numbers listed in "**Contacting Technical Support**". Our technical staff is always available for consultation, training, or service.

Before You Begin

These installation guidelines assume the openGear frame is properly installed. Refer to the ***User Guide*** for your frame.

Static Discharge

Throughout this chapter, please heed the following cautionary note:

ESD Susceptibility — *Static discharge can cause serious damage to sensitive semiconductor devices. Avoid handling circuit boards in high static environments such as carpeted areas and when synthetic fiber clothing is worn. Always exercise proper grounding precautions when working on circuit boards and related equipment.*

Working with Fiber Optic Connectors

The SHC-8932-F supports up to two optical Small Form-factor Pluggable (SFP) modules. Refer to "**SFP Cabling**" for more information on using fiber optic connectors.

Removing the Blank Plates from the Rear Panel

When a frame slot is not populated with an openGear card, a blank plate must be installed to ensure proper frame cooling and ventilation. Before installing the rear module, you must remove the blank plate covering the required slots.

Notice — *Installing the rear module in a frame other than an OG3-FR or OGX-FR could damage the card, the rear module, or both.*

✶ A Phillips screwdriver is required for this procedure.

To remove a blank plate from the openGear frame

1. Locate the slots in the openGear frame you wish to install the SHC-8932-F into. It is recommended to use the following slot combinations:

   - Slots 1, 2
   - Slots 3, 4
   - Slots 5, 6
   - Slots 7, 8
   - Slots 9, 10
   - Slots 11, 12
   - Slots 13, 14
   - Slots 15, 16
   - Slots 17, 18
   - Slots 19, 20

2. Use a Phillips screwdriver to unfasten each blank plate from the openGear frame backplane.
3. Remove each blank plate from the chassis and set aside.

Installing the Rear Module into the openGear Frame

A Phillips screwdriver is required for this procedure.

To install the rear module into the openGear frame

1. For each retaining screw on the rear module, push the o-ring to the end of the screw (but not off the screw). This will help to align the rear module to the frame backplane in step 3.
2. Seat the bottom of the rear module in the seating slots at the base of the openGear frame's backplane.
3. Align the top holes of the rear module with the screw holes on the top-edge of the frame backplane.
4. Using a Phillips screwdriver and the provided screw, fasten the rear module to the backplane.

✶ Do not fully tighten the screws until after installing the card and you have verified that the SHC-8932-F card aligns with the rear module.

Installing the SHC-8932-F Card into an openGear Frame

The slot that the SHC-8932-F installs into depends on the slot combination you installed the rear module in. This allows adequate spacing to avoid damaging the card, the cards installed in the neighboring slots, or both.

✶ A Phillips screwdriver is required for this procedure.

To install the SHC-8932-F into the openGear frame

1. Locate the slot the SHC-8932-F card will slide into.

   Refer to **Table 2** for valid slot combinations.

Table 2 Card Slot Combinations

Rear Module is Installed in	Card Installs into Slot
Slots 1, 2	2
Slots 3, 4	4
Slots 5, 6	6
Slots 7, 8	8
Slots 9, 10	10
Slots 11, 12	12
Slots 13, 14	14
Slots 15, 16	16
Slots 17, 18	18
Slots 19, 20	20

2. Verify that the SHC-8932-F card aligns with the rear module.
3. Using a Phillips screwdriver fasten the rear module to the backplane using the provided screws.

✶ Do not over tighten the screws.

4. Hold the card by the edges and carefully align the card edges with the slot rails in the frame.
5. Fully insert the card into the frame until the card is properly seated in the rear module.

Cabling

If you have questions pertaining to the installation of SHC-8932-F, contact us at the numbers listed in "**Contacting Technical Support**". Our technical staff is always available for consultation, training, or service.

For More Information on...

- the specifications, refer to "**Technical Specifications**".

Cabling the Ethernet Port on the openGear Frame

The SHC-8932-F is connected to your network via the Network Controller Card in the openGear frame. This enables the SHC-8932-F to interface with other cards in the frame, and the computer running the DashBoard client. After a physical connection is established, DashBoard is used to configure the network settings for the SHC-8932-F. Keep the following in mind:

- Contact your IT department before connecting to your facility network to ensure that there are no conflicts.
- You must provide an Ethernet connection to the openGear frame as outlined in the manual that accompanied your frame.

For More Information on...

- downloading and installing DashBoard, refer to the ***DashBoard User Guide***.
- configuring the Ethernet port on the openGear frame, refer to the frame's ***User Guide***.

✶ Contact your network administrator if you experience problems when connecting to a network hub.

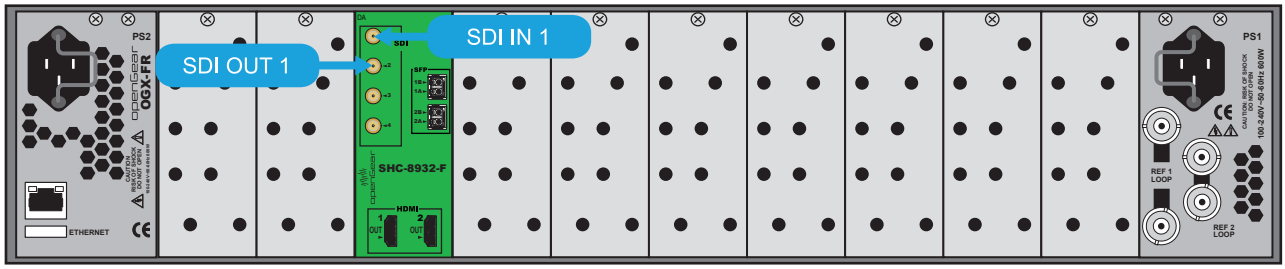
SDI Video Cabling

The SHC-8932-F provides two pairs of HD-BNCs that can be connected to SDI sources or downstream devices as required.

To cable the SDI 1 input and output

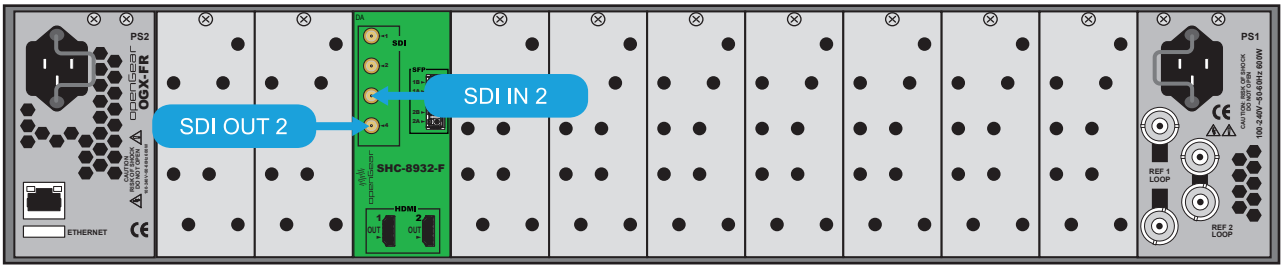
1. Connect the first SDI source device to the **SDI 1** HD-BNC on the rear module.
2. Connect the first downstream SDI device to the **SDI 2** HD-BNC on the rear module.

OGX-FR Series Frame



To cable the SDI 2 input and output

1. Connect the second SDI source device to the **SDI 3** HD-BNC on the rear module.
2. Connect the second downstream SDI device to the **SDI 4** HD-BNC on the rear module.



SFP Cabling

Caution — *Never attempt to look down the barrel of a connected fiber or device transmitting an optical signal. The transmitted light is not in the visible spectrum and may cause permanent eye damage. Turn off all laser sources before disconnecting devices.*

Working with Fiber Optic Connectors

The SHC-8932-F supports up to two optical Small Form-factor Pluggable (SFP) modules. Keep the following in mind when working with fiber optic connectors:

- Every time you are required to insert a connector into a device or mating sleeve, you must clean the connector. All exposed surfaces of the ceramic ferrule must be clean. Follow your facility practices of cleaning fiber optic connectors.
- Connectors must always be inserted into a device or have a dust cap on.
- A poor optical connection is often similar to a poor electrical connection. Try removing the connector, cleaning, and re-inserting the connector. A bad connection can result in experiencing instability of signal, high loss, or a noisy signal.

Cabling the SFP Ports

Caution — *Every time you are required to insert a connector into a device or mating sleeve, you must clean the connector. All exposed surfaces of the ceramic ferrule must be clean. Follow your facility practices of cleaning fiber optic connectors. Connectors must always be inserted into a device or have a dust cap on.*

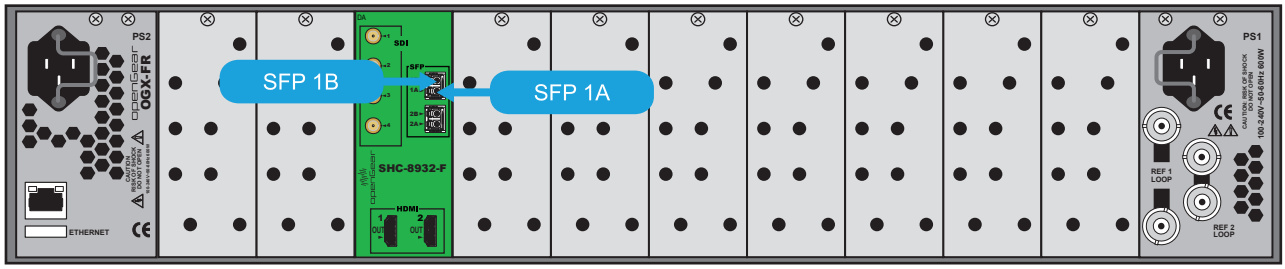
To cable a SFP port on the rear module

1. Remove the dust caps from each SFP port connector on the SHC-8932-F rear module.

✶ Refer to the document ***Important Regulatory and Safety Notices*** that shipped with your card, for safety information when handling fiber optic components.

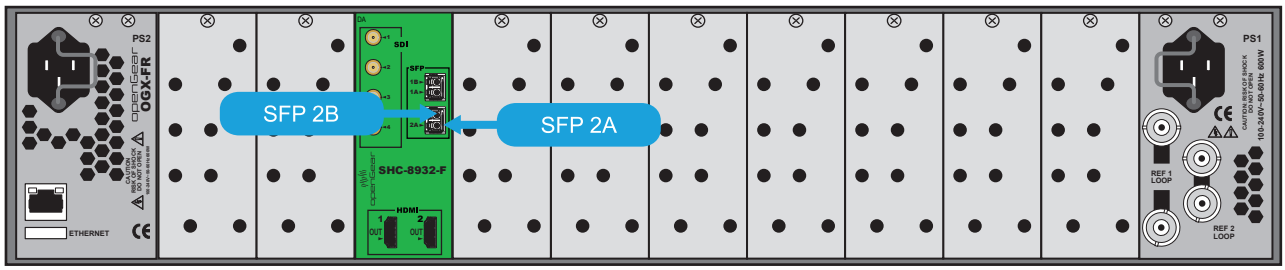
2. Ensure that the exposed surface of the ceramic ferrule of each connector is clean. Refer to "**Working with Fiber Optic Connectors**" for cleaning tips.
3. Cable the first SFP port as required.

OGX-FR Series Frame



4. Cable the second SFP port as required.

OGX-FR Series Frame



HDMI® Output Cabling

This section outlines how to connect each HDMI OUT port to an external device, and secure the cables to the rear module using the provided bracket.

Before You Begin

You will need:

- One nylon tie-wrap
- One HDMI 2.0 cable for each port
- Two supplied bumper pads

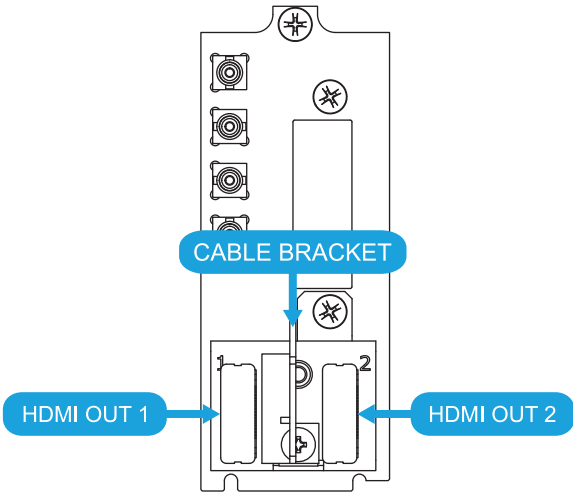
★ Ross Video does not supply the tie-wrap or cables.

Cabling an HDMI® Port

Ensure the HDMI cable does not come out at an undue angle or is otherwise pinched.

To cable an HDMI port on the rear module

1. Connect one end of the cable to the HDMI OUT 1 port on the rear module.
2. Connect the other end of the cable to your external device.



3. Repeat steps 1-2 for the HDMI OUT 2 port (if required).

Securing the Cable to the Rear Module

The cable bracket works with any HDMI cable and device. Use the bracket to retain a good cable connection and avoid placing excess stress on the HDMI output port, the cable, or both.

✶ A bad cable connection may result in experiencing instability of signal, high loss, or a noisy signal.

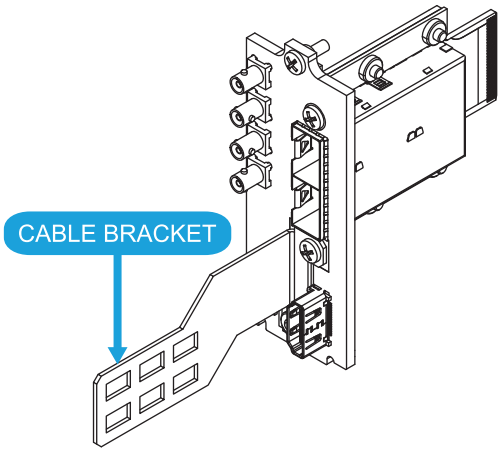


Figure 5 Cable Bracket on Rear Module

To secure the cable to the rear module via the cable bracket

1. Thread the nylon tie-wrap around the HDMI cable and through one of the openings of the cable bracket.

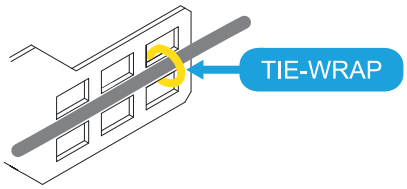


Figure 6 HDMI OUT 1 Cabling

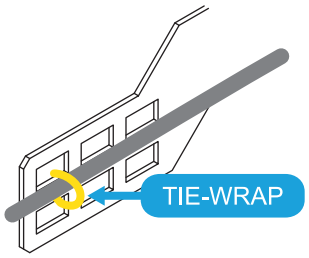


Figure 7 HDMI OUT 2 Cabling

2. Ensure the tie-wrap is secured just beyond the housing to avoid slipping.

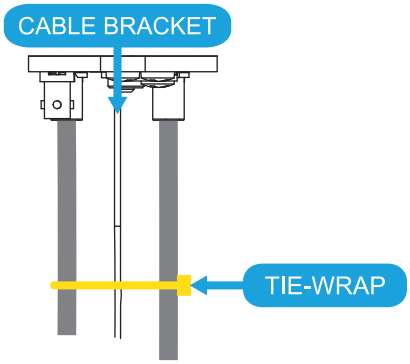


Figure 8 Top View of HDMI Cabling

3. Secure the tie-wrap to the cable bracket so that it is not unduly tight around the cable.
4. If required, apply the supplied bumper pads to the cable bracket to insure that the cables does not come out at an undue angle.

Getting Started

The DashBoard Control System enables you to monitor and control openGear frames and cards from a computer. DashBoard communicates with other cards in the frame through the Network Controller Card. The DashBoard Control System software and manual are available for download from our website. This chapter provides instructions for launching DashBoard, and accessing the SHC-8932-F interfaces.

For More Information on...

- on the SHC-8932-F interfaces in DashBoard, refer to "**DashBoard Menus**".
- using DashBoard, refer to the ***DashBoard User Guide***.

Launching DashBoard

DashBoard must run on a computer that has a physical wired Ethernet connection. Wireless connections do not allow device discovery.

To launch DashBoard

1. Ensure that you are running DashBoard software version 9.13 or higher.
2. Launch DashBoard by double-clicking its icon on your computer desktop.

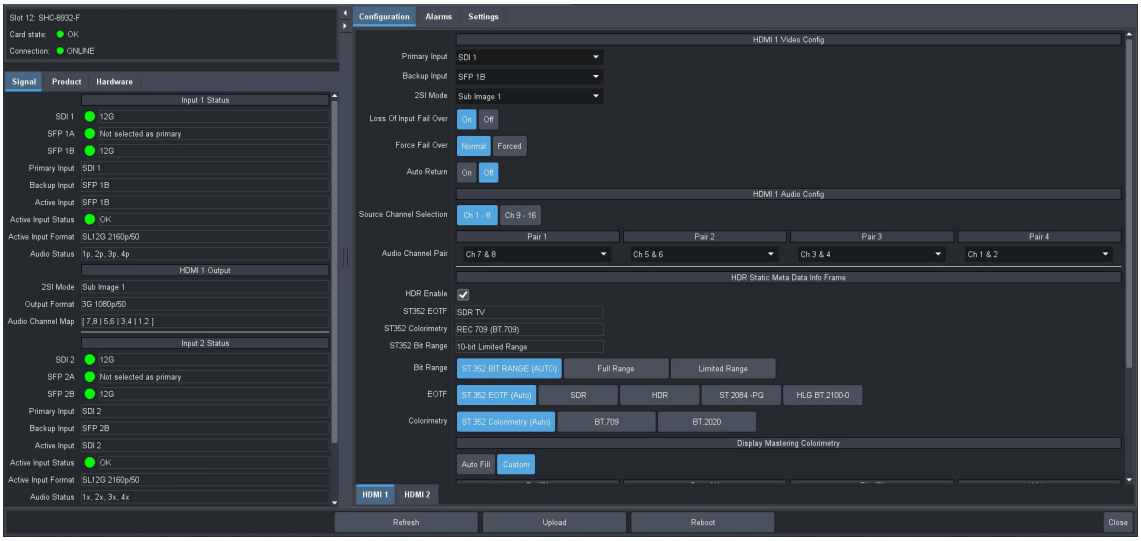
Accessing the SHC-8932-F Interfaces in DashBoard

The interfaces are accessed by double-clicking the SHC-8932-F node in the DashBoard Tree View.

To access the SHC-8932-F interfaces in DashBoard

1. In the Basic Tree View of DashBoard, locate the openGear frame the SHC-8932-F is installed in.
2. Expand the openGear frame node to display a list of sub-nodes.

   Each sub-node represents a slot in the frame that is populated with an openGear card.
3. Double-click the **SHC-8932-F** sub-node to display its interface in the DashBoard window.



Video Configuration

This chapter outlines the video configuration options for the HDMI outputs of the SHC-8932-F. Each HDMI output is configured independently.

If you have questions pertaining to the operation of SHC-8932-F, contact us at the numbers listed in "**Contacting Technical Support**". Our technical staff is always available for consultation, training, or service.

For More Information on...

- generating static HDR metadata, refer to "**HDR Metadata**".
- the 2SI mode options, refer to "**Configuring the 2SI Mode**"
- configuring the audio options, refer to "**Audio Setup**".

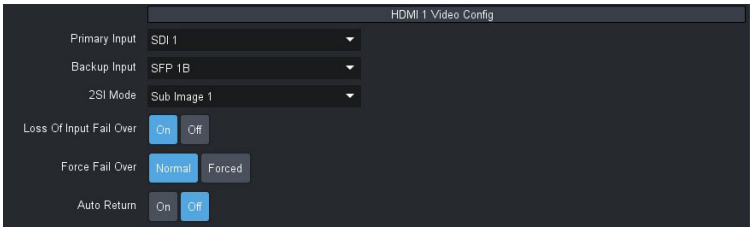
Configuring the Loss of Input Failover Mode

By default, the SHC-8932-F card provides a Loss of Input Failover feature where a user can manually switch from the primary SDI input signal to a secondary (backup) SDI input signal. The card stays on the backup SDI input signal until the user manually switches the card back to the primary signal. You can choose to enable an option that allows the card to automatically switch to the primary input when a valid signal is detected again.

The user defines which SDI video signal is the primary and backup using the options in the Configuration tab. This tab also displays the buttons used to manually switch the signals from primary to backup (and vice versa).

To define the primary SDI signal for the Loss of Input Failover mode

1. Display the **SHC-8932-F** interface as outlined in "**To access the SHC-8932-F interfaces in DashBoard**".
2. Select the **Configuration** tab.
3. Select the sub-tab for the HDMI output you wish to configure.
4. Locate the **Video Config** area of the tab.



5. Use the **Primary Input** menu to assign an input signal as the primary signal for the Loss of Input Failover mode. Choose from the following:
   - SDI # — Assigns the specified SDI IN BNC as the primary input signal.
   - SFP # — Assigns the specified SFP channel as the primary input signal.

✶ You cannot assign the same signal as the **Primary Input** and the **Backup Input**.

6. Use the **Backup Input** menu to assign an input signal as the backup signal for the Loss of Input Failover mode. Choose from the following:
   - SDI # — Assigns the specified SDI IN BNC as the backup input signal.
   - SFP # — Assigns the specified SFP channel as the backup input signal.

✶ It is recommended to assign **SFP 1B** as the **Backup Input** when **SDI 1** is assigned as the **Primary Input**.

7. Use the **Force Fail Over** options to determine when the failover occurs. Choose from the following:
   - Normal — When a loss of input occurs, the card automatically switches from the primary to the backup video source.
   - Forced — The user manually switches to the other video source by clicking the Loss of Input Failover buttons.
8. In the **Loss of Input Fail Over** area, click **ON**.

   The **ON** button automatically is lit (active) and the card switches from the primary signal to the backup as defined in steps 5 to 7.

To verify the current active SDI input signal

1. Display the **SHC-8932-F** > **Signal** tab in DashBoard.
2. Locate the **Input # Status** area of the tab for the input signal you wish to monitor.
3. Use the **Primary Input** field to determine which input signal is the Primary Input Video Source.
4. Use the **Backup Input** field to determine which input signal is the Backup Video Source.
5. Use the **Active Input Status** and **Active Input Format** fields to verify if the input signal is currently active and in use.
6. Use the **SDI** and **SFP** fields to verify the signal status of the required port(s).

Configuring the Auto Return Feature

The Auto Return feature enables the SHC-8932-F to automatically switch from the backup to the primary input signal when a valid primary signal is detected again. The user is notified of the automatic switch via a message in the Signal > Active Input field.

To configure the auto return feature

1. Display the **SHC-8932-F** interface as outlined in "**To access the SHC-8932-F interfaces in DashBoard**".
2. Select the **Configuration** tab.
3. Select the sub-tab for the HDMI output you wish to configure.
4. Use the **Auto Return** options to configure the auto return feature. Choose from the following:
   - On — when a valid signal is detected on the primary input, the SHC-8932-F automatically switches from the backup signal. The primary input signal is now the active input signal.
   - Off — disables this feature. The backup stays as the active input even if a valid primary signal is detected.

Configuring the 2SI Mode

The SHC-8932-F is compatible with multiple transport methods commonly used to carry UHD video content. The SHC-8932-F accepts 11.88Gbps SDI as per SMPTE 2082-10. The SHC-8932-F ingests an 12G UHD single-link and then enables you to specify which of the four 3Gbsp 2SI quad-link UHD signals for the HDMI output. This chapter outlines how to assign a specified 2SI sub-image to the HDMI output.

✶ This feature requires a valid 2160p input signal.

Before You Begin

The SHC-8932-F supports the 2 Sample Interleave (2SI) method where four sub-images (1-4) are used to alternate sampling every 2 pixels and every line. (**Figure 9**) This method is defined in all UHDTV specifications.

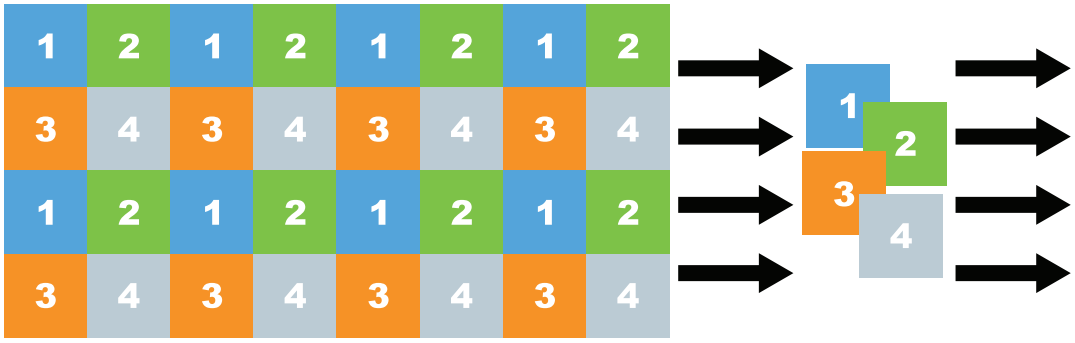


Figure 9 Representation of 2SI Sampling

2SI Mode Overview on the SHC-8932-F

The 2SI Mode provides the option to select and display one of four 1080p 2SI sub-images present in the 2160p input signal. Using this feature, two SHC-8932-F cards could be used to extract and display those sub-images to different monitors. The reclocking output can be used to pass the 2160p stream containing all the sub-images to each SHC-8932-F as shown in **Figure 10**.

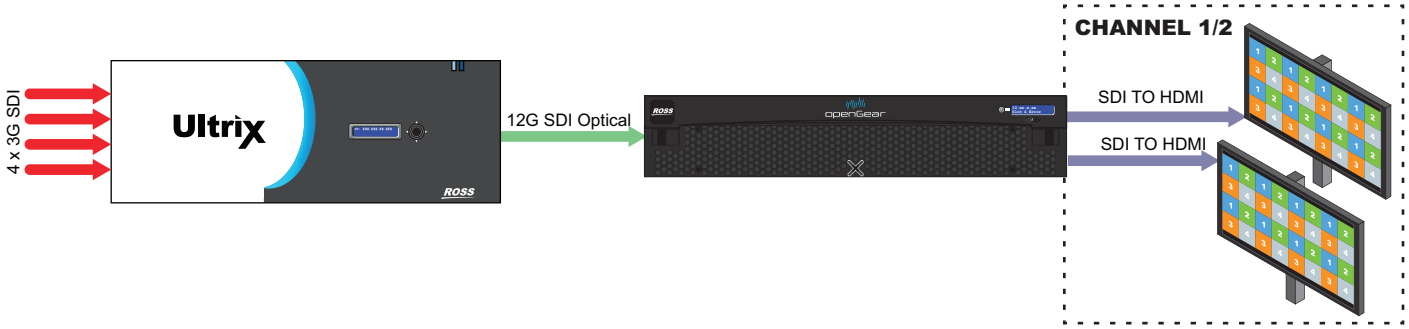


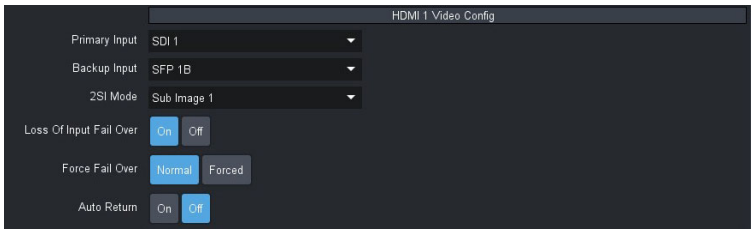
Figure 10 Workflow Example of Two SHC-8932-F Cards with 2SI Mode

Configuring 2SI Mode for the SHC-8932-F

By default, the 2SI Mode is disabled for each HDMI output of a card. Selecting a sub-image enables the mode and automatically assigns it to that HDMI output. This section outlines how to assign a sub-image from a 12G input signal to one HDMI output for a single card.

To assign a sub-image to an HDMI output

1. Display the **SHC-8932-F** interface as outlined in "**To access the SHC-8932-F interfaces in DashBoard**".
2. Select the **Configuration** tab.
3. Select the sub-tab for the HDMI output you wish to configure.



4. Use the **2SI Mode** menu to assign a sub-image to the HDMI output:
   - Off — disables this feature.
   - Sub Image # — assigns the specified sub-image to the HDMI output.
5. Repeat steps 3 and 4 for the other HDMI output.

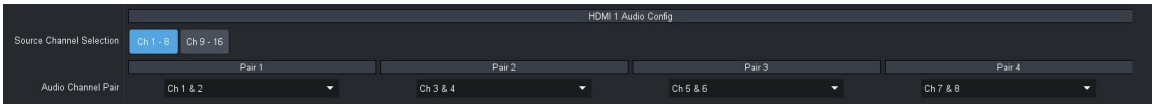
Audio Setup

The embedded output channels are configured per processed input to allow different audio mapping that will track the currently processed input. The SHC-8932-F organizes the audio channels into two groups of 8 channels each (1-8, and 9-16) and you can map the channels of embedded audio within a group for an HDMI output.

✶ The SHC-8932-F does not support the mapping of audio channels from one group to another.

To map a channel

1. Display the **SHC-8932-F** interface as outlined in "**To access the SHC-8932-F interfaces in DashBoard**".
2. Select the **Configuration** tab.
3. Select the sub-tab for the HDMI output you wish to configure.
4. Locate the **HDMI Audio Config** area of the tab.



5. Use the **Source Channel Selection** options to assign an audio group to the HDMI output.

   In the example above, the user selected **Ch 1-8**.

✶ If the selected source is not present on the input video, silence is embedded.

✶ Channel status bits are only passed when a left/right pair are not separated. Otherwise, a standard channel status will be inserted. When channel status is passed, it may not reflect a change between 20bit and 24bit.

6. Use the **Audio Channel Pair** options to map the channels from the selected audio source to the output channels.

HDR Metadata

The SHC-8932-F provides the option to generate HDR10 metadata from the embedded ST.352 data in an SDI signal. You can also override/force the settings to customize the colorimetry as required. This chapter provides information on the HDR10 metadata options for the SHC-8932-F.

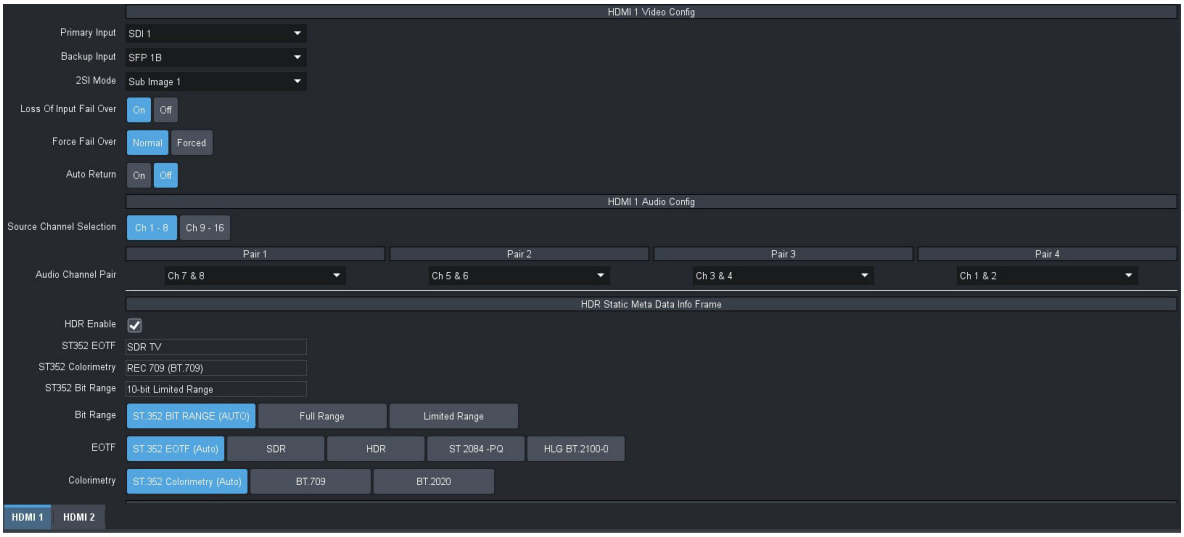
Specifying the Payload ID Colorimetry for an Output

The HDR metadata options in DashBoard are used to specify the content of the HDR metadata info frame. You can choose to have the metadata manually specified or auto detected using the ST.352 payload ID information if present. Ensure to set this value to match the input value.

To specify the Payload ID for an HDMI output signal

1. Display the **SHC-8932-F** interface as outlined in "**To access the SHC-8932-F interfaces in DashBoard**".
2. Select the **Configuration** tab.
3. Select the sub-tab for the HDMI output you wish to configure.
4. Locate the **HDR Static Meta Data Info Frame** area of the tab.
5. Select the **HDR Enable** box.

   The HDR options are now editable.



6. Use the **Colorimetry** options to select the color gamut for the output signal. In the example above, the user selected ST.352 Colorimetry (Auto). Choose from the following:
   - **ST 352 Colorimetry (Auto)** — automatically applies the ST.352M payload ID from the SDI input.
   - **BT.709** — for HD video signals within the Standard Dynamic Range (SDR) color gamut.
   - **BT.2020** — for video signals within the BT.2020 color gamut.

✶ When a Colorimetry ID is selected, the mastering range information in the HDR area are automatically set to the applicable values for that ID.

7. Use the **EOTF** menu to specify the Electrical to Optical Transfer Function (EOTF) method for specifying the display light values. Choose from the following:

- **ST.352 (EOTF Auto)** — automatically applies the display light values from the ST.352M payload ID of the active SDI input.
- **SDR** — applies the Standard Dynamic Range display light values.
- **HDR** — applies the High Dynamic Range display light values.
- **ST.2084-PQ** — applies the SMPTE ST 2084:2014 Perceptual Quantizer dynamic range for display light values.
- **HLG BT.2100-0** — applies the BT.2100 HLG display light values.

✶ The new settings are automatically applied and included in the HDR metadata of the specified HDMI output.

Specifying the Bit Range

If your downstream equipment requirements differ from the default Bit Range, you can specify a different range for each HDMI output.

To specify the bit range for an HDMI output

1. Display the **SHC-8932-F** interface as outlined in "**To access the SHC-8932-F interfaces in DashBoard**".
2. Select the **Configuration** tab.
3. Select the sub-tab for the HDMI output you wish to configure.
4. Choose from the following **Bit Range** options:
   - **352 Range** — select this option to apply limited or full range as defined by the ST.352-packet information.
   - **Full Range** — select this option if the signal is outside the range of 4-1019 bits.
   - **Limited Range** — select this option when the signal is within the legal TV level of 64-940 bits.

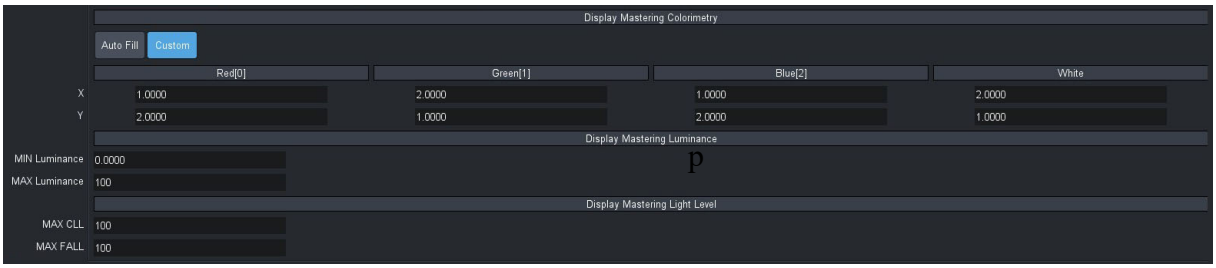
✶ The new setting is automatically applied and included in the Info Frame of the specified HDMI output.

Customizing the Master Display Values

This section is applicable if you wish to define the master display values outside of the defaults as defined by the EOTF standard selected. This is useful when your downstream equipment signal conversion.

To customize the color values for the master display

1. Display the **SHC-8932-F** interface as outlined in "**To access the SHC-8932-F interfaces in DashBoard**".
2. Select the **Configuration** tab.
3. Select the sub-tab for the HDMI output you wish to configure.
4. Locate the **Display Mastering Colorimetry** area of the tab.
5. Select **Custom**.



6. Use the **X** and **Y** fields to adjust the percentage of the full black to white signal amplitude with an adjustment range from -20% to +20%, in steps of four decimal places.
7. Use the **Display Mastering Luminance** fields to set the minimum and maximum luminance values for the master display.
   - **MIN Luminance** — sets the minimum master display luminance to a value between 0.0001 and 5.0000nits (cd/m2).
   - **MAX Luminance** — sets the maximum master display luminance to a value between 5 and 10,000nits (cd/m2).
8. Use the **Display Mastering Light Level** fields as follows:
   - **MAX CLL** — specifies the Maximum Content Light Level (in number of nits) for a single pixel within the coded HDR video signal.
   - **MAX FALL** — specifies the Maximum Frame Average Light Level (in number of nits) of the playback sequence.

✶ The new settings are automatically applied and included in the HDR metadata of the specified HDMI output.

Upgrading the Software

The SHC-8932-F can be upgraded in the field via DashBoard.

To upgrade the software on a card

1. Contact Ross Technical Support for the latest software version file.
2. Ensure the Ethernet cable is connected to the **Ethernet** port on the openGear frame.
3. From the **Tree View**, expand the node for the SHC-8932-F you want to access.
4. Double-click the **Global** sub-node to display the interface in the right-half of DashBoard.
5. Select **Upload**, located near the bottom of the interface, to display the **Select file Upload** dialog.
6. Navigate to the ***.bin** file you want to upload.
7. Click **Open**.
8. If you are upgrading a single card:
   a. Click **Finish** to start the upgrade.
   b. Proceed to step 10.
9. If you are upgrading multiple cards:
   a. Click **Next >** to display the **Select Destination** menu. This menu provides a list of the compatible cards.
   b. Specify the card(s) to upload the file to by selecting the check box(es) for the cards you want to upload the file to.
   c. Verify the card(s) you want to upload the file to. The **Error/Warning** fields indicate any errors, such as incompatible software or card type mismatch.
   d. Click **Finish**.
10. Monitor the upgrade.
    - An **Upload Status** dialog enables you to monitor the upgrade process.
    - Notice that each card is listed in the dialog with a button. This button is replaced with a **Reboot** button once the software file is loaded to that card.

✶ Avoid clicking the individual Reboot buttons until all cards have successfully completed the file upload process and the OK button, located in the bottom right corner of the dialog, is enabled.

- Click **OK** to reboot all the cards listed in the **Uploading to Selected Devices** dialog.
- The **Reboot Confirm** dialog displays, indicating the number of cards that will reboot. Click **Yes** to continue the upgrade process. Note that clicking **Cancel** or **No** returns you to the **Uploading to Selected Devices** dialog without rebooting the card(s).
- The card(s) are temporarily taken off-line during the reboot process. The process is complete once the status indicators for the **Card State** and **Connection** return to their previous status.

DashBoard Menus

This chapter briefly summarize the menus, items, and parameters available in the DashBoard Control System for the SHC-8932-F. Parameters marked with an asterisk (*) are the factory default values.

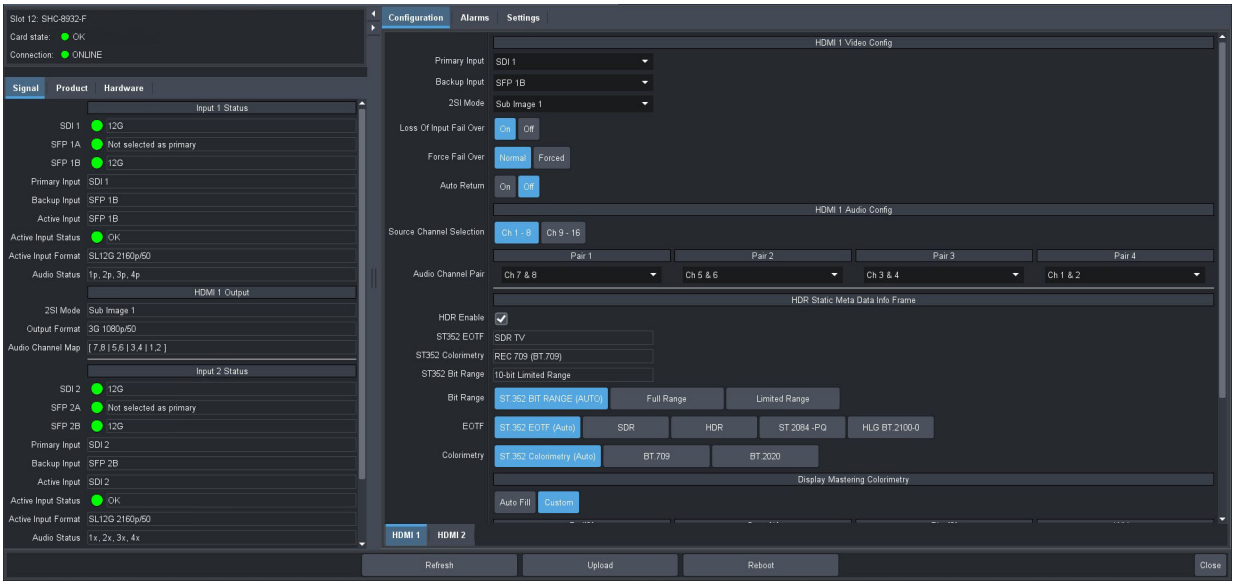


Figure 11 Example of the SHC-8932-F in DashBoard

Signal Tab

Table 3 summarizes the read-only fields displayed in the **Signal** tab.

Table 3 Signal Tab

Item	Parameters	Description
Input # Status		
SDI #	# (Green)	A valid SDI signal is detected on the specified SDI port
	Incompatible Video (Yellow)	The input signal is detected but it is in an unsupported format or an error has occurred
	No Signal (Red)	No signal detected on the specified input
SFP #	# (Green)	A valid SDI signal is detected on the specified SFP port
	Incompatible Video (Yellow)	The input signal is detected but it is in an unsupported format or an error has occurred
	No Signal (Red)	No signal detected on the specified input
Primary Input	#	Indicates the video format detected on the active input signal
Backup Input	#	Indicates the video format detected on the backup SDI input signal

Table 3 Signal Tab (Continued)

Item	Parameters	Description
Active Input	#	Indicates that the Primary Input Source is the active input signal for the card
	#	Indicates that the Backup Input Source is the active input signal for the card
Active Input # Status	OK (Green)	No errors are detected on the video signal of the currently configured and active input
	CRC Errors (Yellow)	Indicates that CRC errors are detected on the current Active Input
	Unsupported Format (Yellow)	A signal is detected on the Active Input but the video is not supported by the card
	No Signal (Red)	One of the following issues is occurring: • the SDI input signal assigned to the Active Input is not detected • the frame rate of the current Active Input does not match the output frame rate
Active Input Format	#	Indicates the video format of the Active Input signal
	N/A	An invalid signal is detected on the Active Input
Audio Status	#p #x	Indicates the input audio status where: • # represents the audio group (e.g. 1, 2) • p represents a detected audio group • x represents a missing audio group
HDMI # Output		
2SI Mode	#	Indicates the selection made in the Configuration > HDMI # > 2SI Mode menu
Output Format	#	Indicates the video format of the output signal assigned to the specified HDMI port
Audio Channel Map	|#,#|#,#|#,#|#,#|	Indicates the audio channel mapping as defined in the Configuration > HDMI # > Audio Config setting

Product Tab

Table 4 summarizes the read-only information displayed in the Product tab.

Table 4 Product Tab

Item	Parameters	Description
Product	SHC-8932-F	
Supplier	Ross Video Ltd.	
Board Rev	#	Indicates the hardware version
Rear Module	#	Summarizes the rear module installed with the card

Table 4 Product Tab (Continued)

Item	Parameters	Description
Board S/N	#	Indicates the serial number of the card
Software Rev	#.#-#	Indicates the software version running on the card

Hardware Tab

Table 5 summarizes the read-only information displayed in the **Hardware** tab.

Table 5 Hardware Tab

Item	Parameters	Description
Voltage (mV)	#	Measured input millivolts
Current (mA)	#	Current consumption in milliamperes
CPU Headroom	#	Displays the CPU Load average
RAM Available	# / # MB	CPU Memory Used / Total CPU Memory
Configuration Bank	#	Storage count
Uptime (h)	#	Reports the number of hours since the last reboot of the card
SFP #		
SFP # Vendor	#	Reports the vendor details of the module installed in the specified SFP port
SFP # P/N	#	
SFP # Status	OK (Green)	A supported SFP module is detected in the specified SFP port and a valid signal is detected
	Not Present (Yellow)	No SFP Module is detected in the specified SFP port or
	Unsupported (Red)	The SFP Module is unsupported
Temperature	#C	Internal temperature (in Celsius) as reported by the specified SFP port
Rx Power #	#dBm	Indicates the power at the optical input. This value is accurate to ±3dBm. Note that if a signal is not present on the SFP port, this field may appear invalid.

Configuration Tab

The Configuration tab provides a sub-tab for each HDMI output of the SHC-8932-F. **Table 6** summarizes the options displayed in each Configuration > HDMI sub-tab.

Table 6 Configuration > HDMI #

Item	Parameters	Description
HDMI # Video Config		
Primary Input	SDI #	Assigns the specified SDI port as the primary input signal when the Loss of Input Failover mode is enabled
	SFP #	Assigns the specified SFP channel as the primary input signal when the Loss of Input Failover mode is enabled
Backup Input	SDI #	Assigns the specified SDI port as the backup input signal when the Loss of Input Failover mode is enabled
	SFP #	Assigns the specified SFP channel as the backup input signal when the Loss of Input Failover mode is enabled
2SI Mode	Off	Disables this feature. This is the default.
	Sub Image #	Assigns a sub-image of the 12G input (2SI) signal to the HDMI output
Loss of Input Fail Over	On	• Enables the feature where one input video signal (as defined by the Primary Input menu) is the primary source and a second SDI source is defined as the Backup Input for the specified HDMI output. • If the Primary Input is lost, the card automatically switches to the Backup Input.
	Off	Disables this feature
Force Fail Over	Normal	The card switches input video sources when a loss of input signal is detected
	Forced	The user has manually switched between the input video sources by clicking this button
Auto Return	On	The card automatically returns to the Primary Input when a valid signal is detected
	Off	Disables this feature
HDMI # Audio Config		
Source Channel Selection	Ch 1-8	Assigns the audio input that is inserted into the embedded pair (if present) for the HDMI output
	Ch 9-16	

Table 6 Configuration > HDMI # (Continued)

Item	Parameters	Description
Pair # > Audio Channel Pair	Ch 1 & 2	Enables you to map the audio channels as required by your system
	Ch 3 & 4	
	Ch 5 & 6	
	Ch 7 & 8	
HDR Static Meta Data Info Frame		
HDR Enable	Selected	The card processes the video input through the HDR module, and performing the target transform
	Cleared	The card passes the video input without modifications
ST352 EOTF (read-only)	#	Reports the Electrical to Optical Transfer Function method currently applied to this HDMI output
ST352 Colorimetry (read-only)	#	Reports the Payload ID Colorimetry currently applied to this HDMI output
ST352 Bit Range (read-only)	#	Reports the bit range assigned to this HDMI output
Bit Range[a]	352 Range	Select this option if the signal is within the legal TV level of 64-940 bits
	Full Range	Select this option if the signal is outside the range of 4-1019 bits
	Limited Range	Select this option if the signal is within the range of 4-1019 bits
EOTF	ST.352 EOTF (Auto)	Automatically applies the display light values from the 352M payload ID of the active SDI input
	SDR	Applies the Standard Dynamic Range display light values
	HDR	Applies the High Dynamic Range display light values
	ST 2084-PQ	Applies the SMPTE ST 2084:2014 High Dynamic Range EOTF for display light values
	HLG BT.2100-0	Applies the BT.2100 HLG display light values
Colorimetry	ST 352 Colorimetry (Auto)	Automatically applies the 352M payload ID from the active SDI input
	BT.709	Applies the HD color gamut to the output payload ID
	BT.2020	Applies the UHD wide color gamut to the output payload ID
Display Mastering Colorimetry (Red / Green / Blue / White)		
Auto Fill	The Display Mastering values are automatically set as defined by the Colorimetry selections	

Table 6 Configuration > HDMI # (Continued)

Item	Parameters	Description
Custom	The user can edit the display mastering values as required	
X	#	Adjusts the X value of the color space, as specified in ***ISO 11664-3:2012***, to a value between 0.0001 and 0.7400
Y	#	Adjusts the Y value of the color space, as specified in ***ISO 11664-3:2012***, to a value between 0.0001 and 0.8400
Display Mastering Luminance		
MIN Luminance	#	Sets the minimum master display luminance to a value between 0.0001 and 5.0000nits (cd/m2)
MAX Luminance	#	Sets the maximum master display luminance to a value between 5 and 10000nits (cd/m2)
Display Mastering Light Level		
MAX CLL	#	Specifies the Maximum Content Light Level (in number of nits) for a single pixel within the coded HDR video signal
MAX FALL	#	Specifies the Maximum Frame Average Light Level (in number of nits) of the playback sequence

a. This value is automatically set when the EOTF mode is specified.

Alarms Tab

Table 7 summarizes the options and read-only fields displayed in the Alarms tab.

Table 7 Alarms Tab

Item	Parameters	Description
Input # Status		
SDI # (read-only)	OK (Green)	No errors are detected on the video signal of the specific SDI BNC
	Alarm Suppressed (Green)	The card is not monitoring the input signal
	Unsupported Format (Yellow)	An input signal is detected on the specific SDI BNC but the video is not supported by the card
	Incompatible Video (Yellow)	An input signal is detected on the specific SDI BNC but its format is not compatible with the output video format
	Not time to Ref (Yellow)	An input signal is detected on the specific SDI BNC but the detected reference signal is incompatible with this input signal

Table 7 Alarms Tab (Continued)

Item	Parameters	Description
SDI # (read-only)	No Signal (Red)	Indicates one of the following issues is occurring: • the SDI input signal is not detected • the system frame rate does not match the input frame rate
SFP # (read-only)	OK (Green)	No errors are detected on the video signal of the specific SFP channel
	Alarm suppressed (Green)	The card is not monitoring the SFP channel
	Unsupported Format (Yellow)	A signal is detected on the specific SFP channel but the video is not supported by the card
	Incompatible Video (Yellow)	A signal is detected on the specific SFP channel but its format is not compatible with the output video format
	Not time to Ref (Yellow)	A signal is detected on the specific SFP channel but the detected reference signal is incompatible with this input signal
	No Signal (Red)	Indicates one of the following issues is occurring: • the SFP channel is not detected • the system frame rate does not match the input frame rate
SDI # Alarm Enable	Selected*	The card reports a loss of the specified input or if the format is incompatible for the specified input
	Cleared	Disables this alarm
SFP # Alarm Enable	Selected*	The card reports a loss of the specified input or if the format is incompatible for the specified input
	Cleared	Disables this alarm
Active Input # Status (read-only)	#	Reports which input signal (Primary or Backup) is the currently active input signal
Active Input # Alarm Enable	Selected*	The card reports
	Cleared	Disables this alarm
SFP # Status (read-only)	#	Reports if there is an error condition occurring with the specified SFP channel
SFP # Hardware Alarm Enable	Selected*	Reports when the SFP port is populated with an unsupported module or there is an error occurring with the module
	Cleared	Disables this alarm

Settings Tab

Table 8 summarizes the options displayed in the Settings tab.

Table 8 Settings Tab

Item	Parameters	Description
Edit Permission	Unlocked	All editable parameters in DashBoard can be modified by a user
	Locked	The DashBoard interface is locked. The editable parameters in DashBoard can no longer be modified by the user. To unlock the interface, select the box again
Factory Defaults	Reset	All editable parameters in DashBoard are reset to the factory default values

Technical Specifications

This chapter provides technical information for SHC-8932-F.

✶ Specifications are subject to change without notice.

Supported Video Formats

Table 9 Technical Specifications — Supported Video Formats

Video Format
HD Formats
720p 50Hz
720p 59.94Hz
1080i 50Hz
1080i 59.94Hz
1080p 23.98Hz
1080p 24Hz
1080p 25Hz
1080p 29.97Hz
1080p 30Hz
1080p 50Hz
1080p 59.94Hz
1080p 60Hz
UHD Formats
2160p 23.98Hz
2160p 24Hz
2160p 25Hz
2160p 29.97Hz
2160p 30Hz
2160p 50Hz
2160p 59.94Hz
2160p 60Hz

SDI Inputs Specifications

Table 10 Technical Specifications — SDI Inputs

Item	Specifications
Number of Inputs	2 dedicated
Connector Type	HD-BNC

Table 10 Technical Specifications — SDI Inputs (Continued)

Item	Specifications
Standards Accommodated	1.485Gbps Component, SMPTE 292M
	2.97Gbps Component, SMPTE 424M
	5.94Gbps Component, SMPTE 2081
	11.88Gbps Component, SMPTE 2082
Impedance	75ohm
Return Loss	>15dB to 1.5GHz
	>10dB to 3GHz
	>7dB to 6GHz
	>4dB to 12GHz
Equalization (Belden 1694A cable)	>180m (590ft) @ 1.485Gbps
	>150m (492ft) @ 2.97Gbps
	>70m (229ft) @ 5.94Gbps
	>50m (164ft) @ 11.88Gbps

SDI Outputs Specifications

Table 11 Technical Specifications — SDI Outputs

Item	Specifications
Number of Outputs	2 dedicated
Connector Type	HD-BNC
Impedance	75ohm
Return Loss	>15dB to 1.5GHz
	>10dB to 3GHz
	>7dB to 6GHz
	>4dB to 12GHz
Signal Level	± 800mV 10%
DC Offset	0V +/- 50mV
Rise and Fall Time (20-80%)	1.485Gbps: <270ps, <100ps difference
	2.97Gbps: <135ps, <50ps difference
	5.94Gbps: <80ps, <30ps difference
	11.88Gbps: <45ps, <18ps difference

Table 11 Technical Specifications — SDI Outputs (Continued)

Item	Specifications	
Jitter	1.485Gbps:	<1.0UI 10Hz-100kHz, <0.2UI above 100kHz
	2.97Gbps:	<1.0UI 10Hz-100kHz, <0.3UI above 100kHz
	5.94Gbps:	<2.0UI 10Hz-100kHz, <0.3UI above 100kHz
	11.88Gbps:	<2.0UI 10Hz-100kHz, <0.3UI above 100kHz, band limit @1188MHz
Overshoot	<10%	

HDMI Ports Specifications

Table 12 Technical Specifications — HDMI Ports

Item	Specifications
Number of Inputs	0
Number of Outputs	2
HDMI Version	2.0
Output Color Space	4:2:2 YCbCr
Connector Type	HDMI 2.0

Environment

Table 13 Technical Specifications — Environment

Item	Specifications
Maximum Ambient Temperature	40°C (104°F)

Power

Table 14 Technical Specifications — Power

Item	Specifications
Maximum Power Consumption	5W

Supported SFP Modules

This chapter summarizes the supported SFP modules for the SHC-8932-F.

SFP-FIBER-12G

The SFP-FIBER-12G is a dual optical receiver module that supports data rates up to 12Gbps for single fiber communications.

Features

- SMPTE 297-2006 compatible for SD-SDI, HD-SDI, 3G-SDI, and 12G-SDI
- Compliant with SFP MSA (Small Form-Factor Pluggable Multi-Source Agreement) and SFS-8472
- Compliant with SMPTE 297, SMPTE 259, SMPTE 292, SMPTE 424, SMPTE 2081, and SMPTE 2082
- 1310 DFB laser diode with CML logic interface
- Duplex LC receptacle
- Up to 10km on 9/125µm SMF
- Single 3.3V power supply
- Operating temperature range: 0°C to 70°C
- SFP package size: 56.5mm x 13.4mm x 8.6mm

Simplified Block Diagram

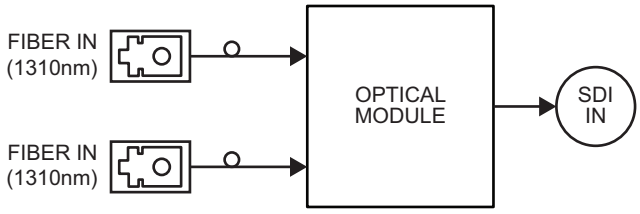


Figure 12 SFP-FIBER-12G — High Level Block Diagram

Technical Specifications

Note that specifications are subject to change without notice.

Absolute Maximum Ratings

Exceeding any of these ratings may permanently damage the module. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

Table 15 Absolute Maximum Ratings

Parameter	Min.	Max.
Supply Voltage	0V	+3.6V
Storage Temperature	-40°C	+85°C
Relative Humidity	5%	95%

Recommended Operating Environment and Electrical Ratings

Table 16 Recommended Ratings

Parameter	Min.	Typical	Max.
Supply Voltage	+3.2V	+3.3V	+3.4V
Supply Current	-	-	300mA
Operating Case Temperature	0°C		+70°C
Data Rate	-	11.88Gbps	-

Optical Specifications

Table 17 Optical Specifications — Receiver

Parameter		Min.	Typical	Max.	Notes
Receiver Sensitivity				-11dBm	With a PRBS 223-1 test pattern @ 11.88Gbps
Maximum Input Power		-3dBm			
Operation Center Wavelength		1260nm		1360nm	
Loss of Signal	Assert	-25dBm			
	De-assert			-11dBm	
LOS Hysteresis		0.5dB			

Physical Channel Position

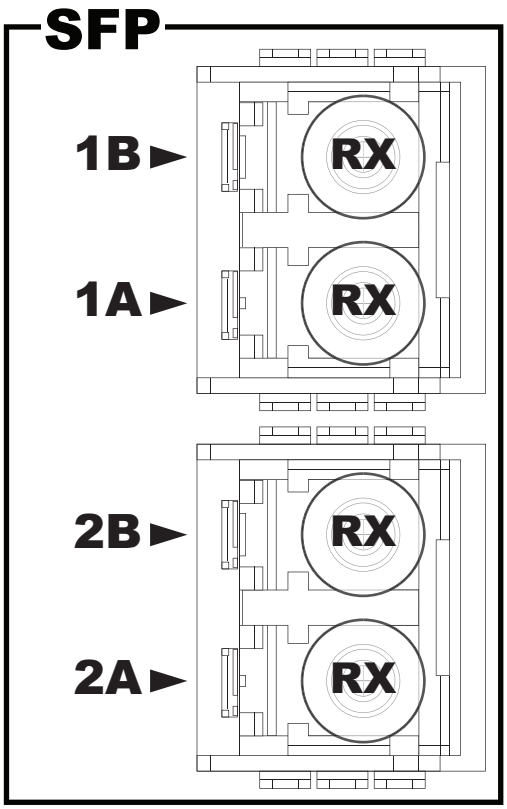


Figure 13 SFP Package Outline, Front View — Channel Position

Service Information

Troubleshooting Checklist

Routine maintenance to this openGear product is not required. In the event of problems with your SHC-8932-F, the following basic troubleshooting checklist may help identify the source of the problem. If the frame still does not appear to be working properly after checking all possible causes, please contact your openGear products distributor, or the Technical Support department at the numbers listed in "**Contacting Technical Support**".

1. **Visual Review** — Performing a quick visual check may reveal many problems, such as connectors not properly seated or loose cables. Check the card, the frame, and any associated peripheral equipment for signs of trouble.
2. **Power Check** — Check the power indicator LED on the distribution frame front panel for the presence of power. If the power LED is not illuminated, verify that the power cable is connected to a power source and that power is available at the power main. Confirm that the power supplies are fully seated in their slots. If the power LED is still not illuminated, replace the power supply with one that is verified to work.
3. **Input Signal Status** — Verify that source equipment is operating correctly and that a valid signal is being supplied.
4. **Output Signal Path** — Verify that destination equipment is operating correctly and receiving a valid signal.
5. **Unit Exchange** — Exchanging a suspect unit with a unit that is known to be working correctly is an efficient method for localizing problems to individual units.

Bootload Button

In the unlikely event of a complete card failure, you may be instructed by a Ross Technical Support specialist to perform a complete software reload on the SHC-8932-F.

To reload the software on a SHC-8932-F

1. Eject the card from the frame.
2. Press and hold the **Bootload** button, while re-inserting the card into the frame.
3. Release the button.
   - The **OK/ERROR** LED flashes green while the card is waiting for a new software load.
   - If a new software load is not sent to the card within 60 seconds, the card will attempt to re-start with its last operational software load.
   - Software loads can be sent to the SHC-8932-F via the connection on the rear of the frame.

Warranty and Repair Policy

The SHC-8932-F is warranted to be free of any defect with respect to performance, quality, reliability, and workmanship for a period of FIVE (5) years from the date of shipment from our factory. In the event that your SHC-8932-F proves to be defective in any way during this warranty period, Ross Video Limited reserves the right to repair or replace this piece of equipment with a unit of equal or superior performance characteristics.

Should you find that this SHC-8932-F has failed after your warranty period has expired, we will repair your defective product should suitable replacement components be available. You, the owner, will bear any labor and/or part costs incurred in the repair or refurbishment of said equipment beyond the FIVE (5) year warranty period.

In no event shall Ross Video Limited be liable for direct, indirect, special, incidental, or consequential damages (including loss of profits) incurred by the use of this product. Implied warranties are expressly limited to the duration of this warranty.

This SHC-8932-F User Manual provides all pertinent information for the safe installation and operation of your openGear Product. Ross Video policy dictates that all repairs to the SHC-8932-F are to be conducted only by an authorized Ross Video Limited factory representative. Therefore, any unauthorized attempt to repair this product, by anyone other than an authorized Ross Video Limited factory representative, will automatically void the warranty. Please contact Ross Video Technical Support for more information.

In Case of Problems

Should any problem arise with your SHC-8932-F, please contact the Ross Video Technical Support Department. (Contact information is supplied at the end of this publication.)

A Return Material Authorization number (RMA) will be issued to you, as well as specific shipping instructions, should you wish our factory to repair your SHC-8932-F. If required, a temporary replacement frame will be made available at a nominal charge. Any shipping costs incurred will be the responsibility of you, the customer. All products shipped to you from Ross Video Limited will be shipped collect.

The Ross Video Technical Support Department will continue to provide advice on any product manufactured by Ross Video Limited, beyond the warranty period without charge, for the life of the equipment.

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This chapter provides third-party software license information for your SHC-8932-F. This product includes multiple software components which are individually licensed under one or more of the following licenses included in this chapter.

BSD

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d. d) Convey the object code by offering access from a designated place (gratis or for a charge), and offer equivalent access to the Corresponding Source in the same way through the same place at no further charge. You need not require recipients to copy the Corresponding Source along with the object code. If the place to copy the object code is a network server, the Corresponding Source may be on a different server (operated by you or a third party) that supports equivalent copying facilities, provided you maintain clear directions next to the object code saying where to find the Corresponding Source. Regardless of what server hosts the Corresponding Source, you remain obligated to ensure that it is available for as long as needed to satisfy these requirements.

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zlib

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The data format used by the zlib library is described by RFCs (Request for Comments) 1950 to 1952 in the files ftp://ds.internic.net/rfc/rfc1950.txt (zlib format), rfc1951.txt (deflate format) and rfc1952.txt (gzip format).

Glossary

The following terms are used throughout this guide:

Card — refers to the SHC-8932-F unless otherwise noted.

DashBoard — the DashBoard Control System.

EDID — Extended Display Information Data as defined by the Consumer Technology Association (CTA). The EDID specifies the display characteristics of an input signal (e.g. resolution, frame rate, etc.) to the DVI or HDMI compliant device ingesting that signal.

EOTF — Electrical (Y'CbCr) to Optical display light (cd/m2) Transfer Function as defined by SMPTE ST 2084. This mathematical function specifies how an image is displayed by downstream devices (e.g monitors).

Frame — the openGear frame that houses the SHC-8932-F unless otherwise noted.

HDMI — High Definition Multimedia Interface.

HDR — High Dynamic Range.

Network Controller Card — the MFC-OG3-N, MFC-OGX-N, MFC-8322-S, and any available options unless otherwise noted.

openGear Frame — refers to the OG3-FR and OGX-FR series frames unless otherwise noted.

System— the mix of interconnected production and terminal equipment in your environment.

User — the person who uses the SHC-8932-F.