openGear
OG4600 Series
Fiber Transport Cards

USER MANUAL

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Document Revisions

Revision	Description	Date	Author
A	Initial	14-August-2024	Khalid Waleed
B	Rev 2	31-October-2024	Khalid Waleed

Safety Info

- Do not use this apparatus near water.
- Clean only with lint free dry cloth.
- Do not block any ventilation openings.
- Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
- Do not defeat the safety purposes of the grounding- type plug. A ground type plug has two blades and a third grounding prong. The third prong is provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
- Install in accordance with the MultiDyne® installation instructions.
- Install all peripheral equipment (cameras, routers, etc.) in accordance with the manufacturer's instructions and safety requirements.
- Protect the power cord from being walked on or pinching particularly at plugs, convenience receptacles, and point where they exit from the apparatus.

⚠	**Warning** –indicate danger that requires proper procedures or practices to prevent injury or death to personnel.
⚠	**Cautions** indicate proper procedures or practices to prevent damage to equipment or property.
⚠	**Warning** –The safe operation of this product requires that a protective earth connection be provided. A grounding conductor in the equipment's mains supply cord provides this protective earth. To reduce the risk of electrical shock to the operator and service personnel, this ground conductor must be connected to an earthed ground. The mains plug shall remain readily operable.
🚫	**Warning** –The apparatus shall not be exposed to dripping or splashing and that no objects filled with liquids, such as vases, shall be placed on the apparatus.
⛰ <2000m	**Warning** - This symbol on the equipment indicates for use at altitudes not exceeding 2000 m.
🗑	**Warning** - Contact your local authority for further details on the correct disposal of this waste, in accordance with your national legislation.

- Only use attachments/accessories specified by MultiDyne®.
- Use only with the cart, rack, stand, tripod, bracket, or table specified by MultiDyne®, or sold with the apparatus. When a cart is used, use caution when moving the cart/apparatus combination to avoid injury from tip-over.
- Follow all local Electrical Codes for Grounding, Lightning Arrestment and Surge Protection. Unplug this apparatus during lightning storms or when unused for extended periods of time.
- All Electrical Work to the facility must be performed by a qualified Licensed Electrician. All local Electrical Codes must be followed and, if necessary, must be inspected by a Local or State Inspector.
- All servicing of MultiDyne equipment must be performed at the factory by a MultiDyne trained service technician or engineer.
- Throughout this manual, several Warnings and Cautions and Notes may be presented to alert the user to important safety or operating information.
- Always adhere to local building, safety and fire prevention codes during the installation and operation of this product.
- Use only power cords that were shipped with specified for this product and certified for the country

of use.
- Connect the unit only to a power source with the specified voltage rating.
- Unless otherwise stated in the Installation Instructions, and in adherence to local Electrical Codes, MultiDyne® Equipment should only be plugged into a standard 15-amp dedicated circuit.

Laser Safety Information

This unit is classified as a CLASS 1 LASER PRODUCT according to EN60825-1 (EU) and FDA 21CFR 1040.10 (USA). Class 1 laser products are considered safe and do not result in biological hazard if used according to these instructions.
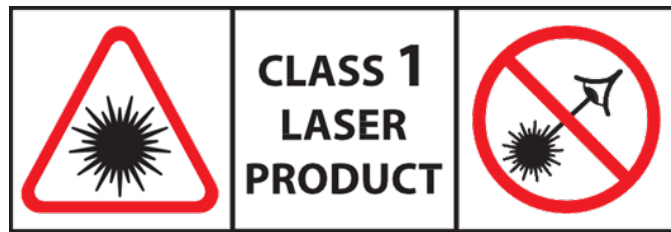
⚠	**Warning** – Use of controls, adjustments, or performance of procedures other than those specified herein may result in hazardous radiation exposure.
⚠	**Warning** – Never look directly into the end of the optical fiber while either end of the system is operating.
⚠	**Warning** – Never clean an optical fiber connector on equipment or cable that is carrying light.
⚠	**Warning** – Always use dust caps on fiber optic connectors when cables are not connected. This will protect the connector from damage and accidental exposure of a human eye to an operating laser.

1.   Overview

The OG4600 series modules for the openGear platform provide flexibility for fiber transport needs. Signals are transported uncompressed and unprocessed for maximum signal integrity. Compatible with the openGear platform, offering SNMP management via Dashboard software.

Model Number	Description
OG4601	Four-channel SDI, Audio, Data, Timecode, Reference, GPIO, Analog Video and Ethernet fiber transport
OG4602	Four-channel SDI, Audio, Data, Timecode, Reference, GPIO and Ethernet fiber transport
OG4603	Four-channel SDI, Audio, Data, Timecode, Reference and GPIO fiber transport
OG4607	Four-channel SDI-only fiber transport
OG4608	Four-channel SDI and Ethernet fiber transport
OG4610	Four-channel SDI, Audio, Data, Timecode, Reference, GPIO, and Ethernet fiber transport

This table lists the various models within the OG4600 series, each tailored to specific transport needs, including SDI, audio, data, and more.

2.   Transport Specifications

2.1   SDI Transport

The OG4600 series supports up to 4 channels of 12G SDI video. The number of channels and their direction vary based on the card model. SMPTE standards supported include:

- **ST292** (HD)
- **ST424** (3G)
- **ST2081** (6G)
- **ST2082** (12G)

All SDI outputs are non-inverted, and the electrical to optical conversion process is transparent to all embedded audio and data. Optical signals are compliant with SMPTE ST297.

By default, SDI re-clocking is performed at supported data rates (e.g., ST292, ST424, ST2081, and ST2082). However, users can manually bypass the re-clocking process through DIP switch **S3-7**. This setting allows for operational flexibility without requiring software control.

- **S3-7**: SDI Re-clocker Bypass
    - **Down**: Bypass
    - **Up**: Normal operation

2.2   Audio Transport

Each OG4600 card is capable of transporting up to 8 channels of mono audio bi-directionally. The number of audio channels and their formats (Analog/AES) can be configured manually using DIP switches **S2-1** through **S2-8**. This allows the user to select either analog or AES audio formats without relying on the software interface.

- **S2-1 to S2-4**: Audio Input Type Selection
    - **OFF (Up)** = Analog
    - **ON (Down)** = AES
- **S2-5 to S2-8**: Audio Output Type Selection
    - **OFF (Up)** = Analog
    - **ON (Down)** = AES

2.3   Serial Data Transport

Each OG4600 card can transport up to 3 channels of serial control data bi-directionally. The number of channels varies based on the card model. RS232, RS422, and RS485 serial data formats are supported with data rates up to 1 Mbps. The format of each data channel can be configured independently using the software interface or manually through the following DIP switches:

- **S3-1 to S3-6**: Data Format Selection

    o **S3-1**: Data 1 Format Select Bit 0

        ▪ **OFF (Up)** = RS232

        ▪ **ON (Down)** = RS422

    o **S3-3**: Data 2 Format Select Bit 0

        ▪ **OFF (Up)** = RS232

        ▪ **ON (Down)** = RS422

    o **S3-5**: Data 3 Format Select Bit 0

        ▪ **OFF (Up)** = RS232

        ▪ **ON (Down)** = RS422

2.4   Tally/GPIO Transport

Each OG4600 card can transport up to 4 GPIO signals, 4 GPI's, and 4 GPO's. The number of GPIO's varies based on the card model. One of the GPIO paths is labeled Tally for convention, but all GPIO paths are electrically identical.

GPI inputs are ground-closure sensing inputs (close to ground to activate) with internal pull-ups. GPO outputs are normally-open (NO) relay contacts to ground. Open-collector type GPO outputs are optionally supported.

2.5   Timecode Transport

Each OG4600 card can transport unbalanced timecode in each direction. Timecode transport is available on all card models that support audio.

2.6   Reference Transport

Each OG4600 card can transport an analog video reference signal in each direction. Supported formats include SD Black Burst (NTSC, PAL) and HD Tri-Level. Only the sync portion of the signal is transported across the fiber link, with all video and color information stripped from the signal.

2.7   Ethernet Transport

Each OG4600 card may include a copper to fiber Ethernet media converter. Data rates of 10/100/1000 Mbps are supported. This Ethernet connection is independent of, and not internally connected to, any Ethernet ports built into the openGear frame or other cards in the frame.

2.8   CVBS Transport

Each OG4600 card may include one channel of composite video (CVBS) transport in each direction. NTSC and PAL video are supported.

3.   Installation Instructions

3.1   Installing a Rear Module

Before proceeding with the instructions in this chapter, ensure that your openGear frame is properly installed according to the instructions in the OG3-FR Series User Manual.

Static Discharge Warning

Please heed to the following cautionary note throughout the chapter:

> **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.

Unpacking

- Unpack the OG4600 Series Card from the shipping container and ensure that all items are included. If any items are missing or damaged, contact your sales representative directly.

Steps to Install a Rear Module in Your openGear Frame

1. Locate the card frame slots on the rear of the frame.

2. Remove the Blank Plate from the slot you have chosen for the OG4600 installation.

3. Install the bottom of the Rear Module in the Module Seating Slot at the base of the frame's back plane as shown below;
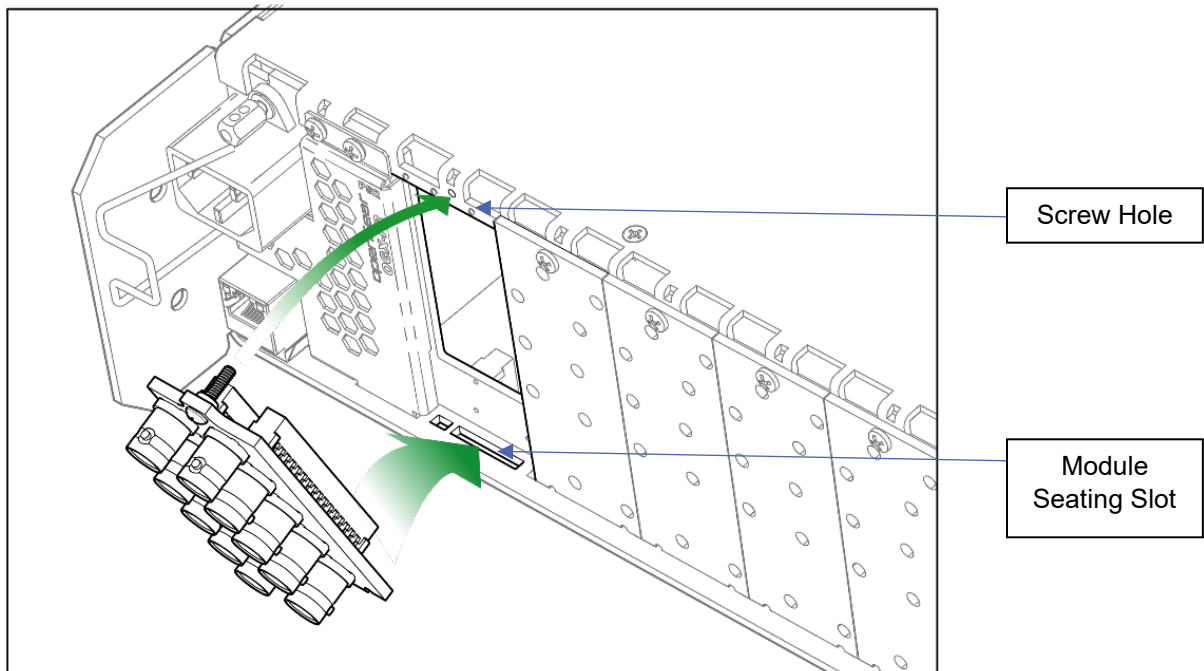
4. Align the top hole of the Rear Module with the screw on the top-edge of the frame back plane.

5. Using a Phillips screwdriver and the supplied screw, fasten the Rear Module to the back plane of the frame. Do not overtighten.

6. Ensure proper frame cooling and ventilation by having all rear frame slots covered with Rear Modules or Blank Plates.

3.2   Installing the OG4600 Series in an openGear Frame

OG4600 Series Rear Modules are designed to install the front card in even slot numbers, as shown below.
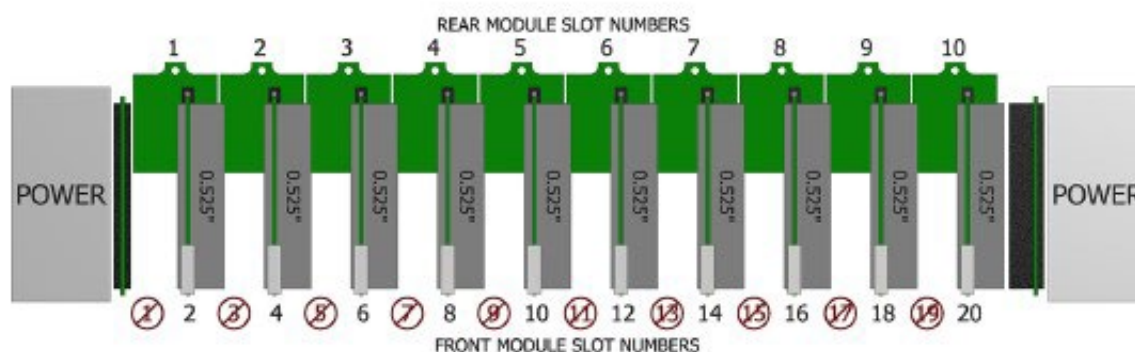
Steps to Install the OG4600 Series in an openGear Frame

1. Locate the Rear Module you installed in the previous procedure.

2. Hold the OG4600 card with the edges and carefully align the card-edges with the slots in the frame.

3. Fully insert the card into the frame until the rear connection plug is properly seated in the Rear Module.

CAUTION	Do not populate Slot 10 in the DFR-8310 series frame with an OG4600 Card. Attempting to populate Slot 10 may damage the OG4600 Card series.

4.   Configuration

4.1   DashBoard Control

The DashBoard control provides a graphical user interface for managing the configuration of the OG4600 series cards. Using DashBoard, users can configure settings, monitor signal status, and update firmware. The DashBoard GUI offers tabs for each type of configuration, such as Audio, Data, and SDI. Configuration changes made via DashBoard are saved in the card's non-volatile memory and persist through power cycles.

4. CONFIGURATION

4.2   Card Setup

If DashBoard control is disabled (DIP switch S3-8 is in the UP position), configuration of the card settings is made using the DIP switches on the card. This section provides the configuration settings for the OG4600 series.

Before installing the OG4600 card, it is crucial to determine whether to allow changes to the card's configuration via the DashBoard GUI or use the DIP switches on the card for manual setup.

Enabling DashBoard Control

- To enable DashBoard control, set DIP switch S3-8 to the Down position. When enabled, all configuration settings made through the DashBoard software interface will be stored in the card's non-volatile memory and will be restored upon power-up.

DIP Switch Configuration

If DashBoard control is disabled (DIP switch S3-8 is in the UP position), the card's settings must be manually configured using the DIP switches located at the front edge of the card.

Configuring the Card

- When DashBoard control is enabled, you can manage settings through the software GUI. All changes will be saved in non-volatile memory.

- If using DIP switches, refer to the respective sections in this manual (e.g., 4.3 Audio Configuration, 4.4 Data Configuration) for guidance on how to adjust these settings manually.

DashBoard Control Enable Switch S-8

Down to enable, up to disable
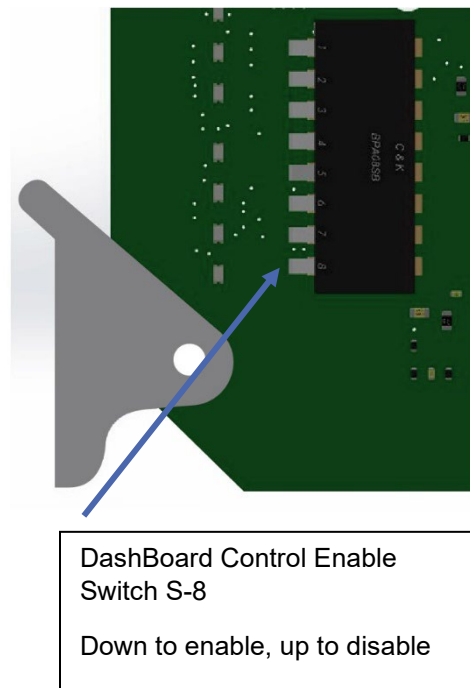
4.3   Audio Configuration

The OG4600 series supports up to 8 channels of mono audio bi-directionally. Configuration of audio inputs and outputs can be managed via the DashBoard GUI or through DIP switches when DashBoard control is disabled.

| Switch	Function	Description
S2-1	Audio Input 1 & 2 Type Select	OFF (Up) = Analog, ON (Down) = AES
S2-2	Audio Input 3 & 4 Type Select	OFF (Up) = Analog, ON (Down) = AES
S2-3	Audio Input 5 & 6 Type Select	OFF (Up) = Analog, ON (Down) = AES
S2-4	Audio Input 7 & 8 Type Select	OFF (Up) = Analog, ON (Down) = AES
S2-5	Audio Output 1 & 2 Type Select	OFF (Up) = Analog, ON (Down) = AES
S2-6	Audio Output 3 & 4 Type Select	OFF (Up) = Analog, ON (Down) = AES
S2-7	Audio Output 5 & 6 Type Select	OFF (Up) = Analog, ON (Down) = AES
S2-8	Audio Output 7 & 8 Type Select	OFF (Up) = Analog, ON (Down) = AES
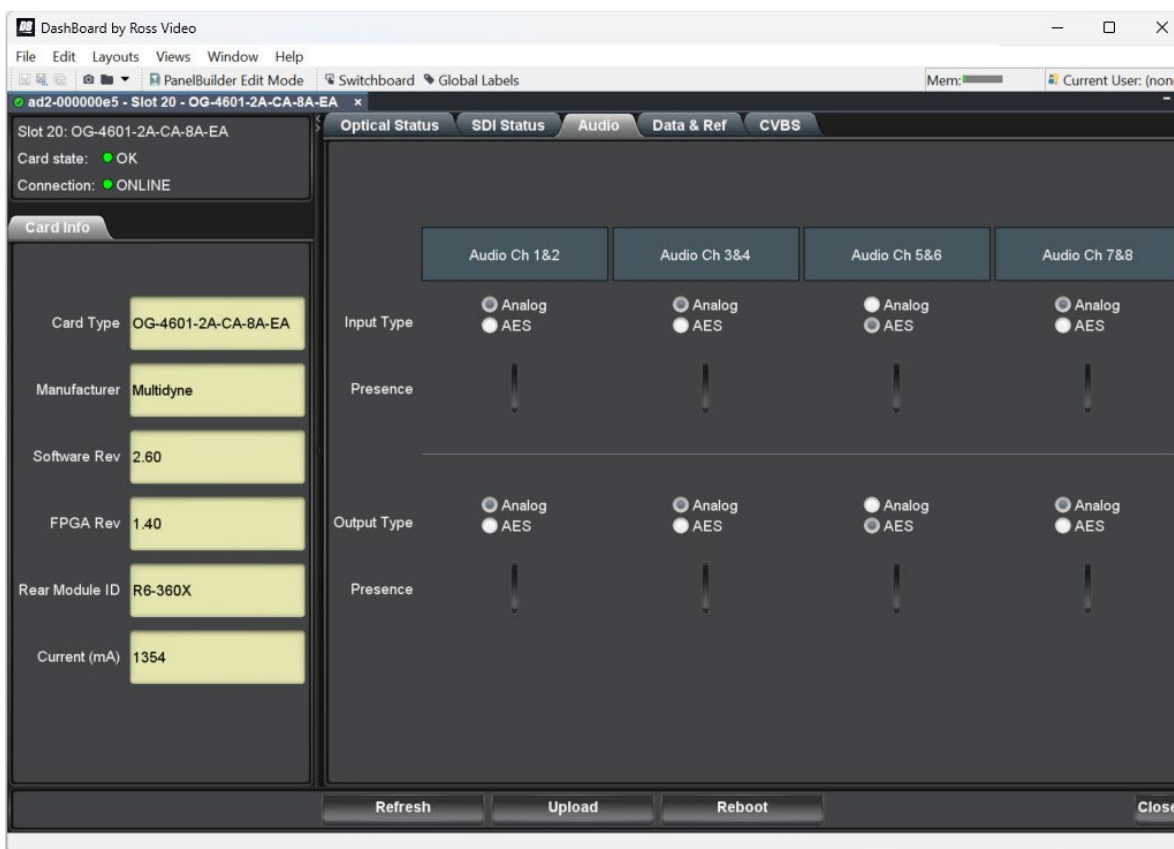
When DashBoard control is enabled, audio input and output formats can be configured via the Audio Tab in the card's DashBoard menu page. All settings made through the GUI are stored in non-volatile memory and restored upon power-up.

4.4   Data Configuration

The OG4600 series cards support up to 3 channels of serial control data bi-directionally. Data formats can be configured via the DashBoard GUI or through DIP switches.

Switch	Function	Description
S3-1	Data 1 Format Select bit0	RS232 = OFF (Up), RS422 = ON (Down)
S3-2	Data 1 Format Select bit1	n/a
S3-3	Data 2 Format Select bit0	RS232 = OFF (Up), RS422 = ON (Down)
S3-4	Data 2 Format Select bit1	n/a
S3-5	Data 3 Format Select bit0	RS232 = OFF (Up), RS422 = ON (Down)
S3-6	Data 3 Format Select bit1	n/a
S3-7	Force SDI Re-clocker Bypass	Down = Bypass, Up = Normal
S3-8	Dashboard Control Enable	Down = Enable Dashboard Control
		Up = Disable Dashboard Control

4. CONFIGURATION
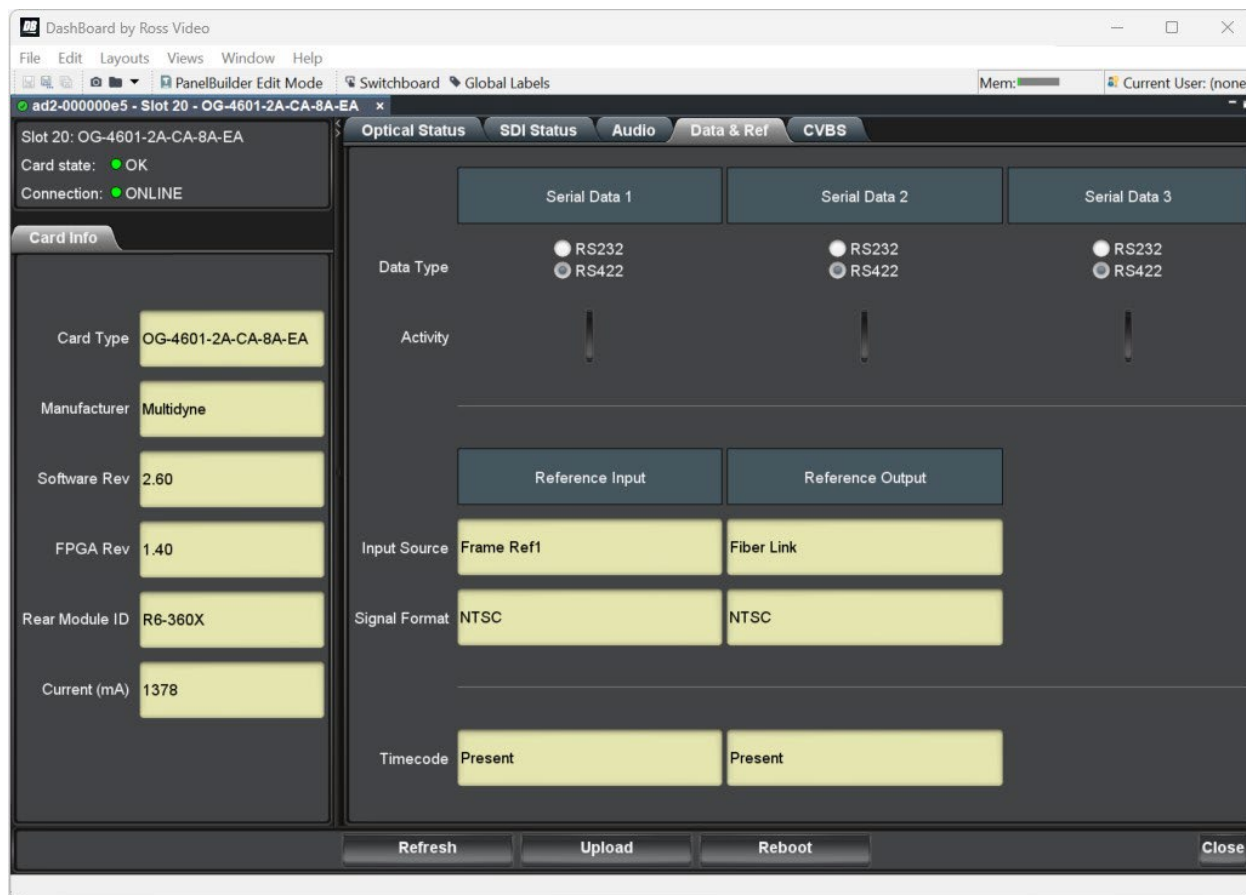
When DashBoard control is enabled, data format selection is made via the Data Tab in the DashBoard menu. All settings are stored in non-volatile memory and restored upon power-up.

The OG4600 series cards can be wired externally to support point-to-point 2-wire RS485 serial communications when set to the RS422 format. Please refer to the diagram below for wiring instructions.

| OG Rear Panel RJ-45 | External Wiring to RS485 Device |

RXD IN+ → → RS485+
RXD IN- → → RS485-
680R** 680R**
TXD OUT+ → →
TXD OUT- → →

**If the RS485 Bus is terminated, a smaller resistor value may be required.
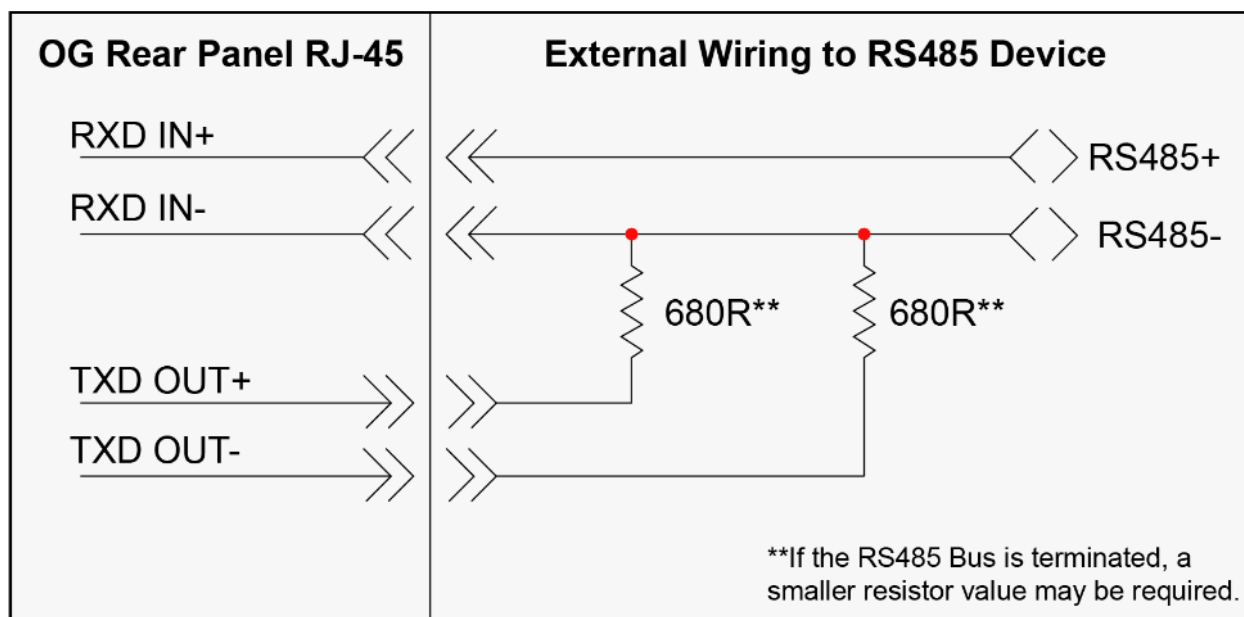
4.5   SDI Re-clocker Bypass Configuration

If DashBoard control is disabled (DIP switch S3-8 is in the UP position), bypass configuration of the SDI re-clockers is made using switch #7 on DIP switch S3. This DIP switch is located at the front edge of the card. Enabling the bypass mode with this DIP switch will place all the re-clockers in bypass mode. The table below outlines the SDI re-clocker configuration settings.

Bypass configuration of each individual re-clocker can only be set using the DashBoard. When DashBoard control is enabled, configuration of re-clocker bypass is made using the SDI Tab in the card's DashBoard menu page. All settings made through the DashBoard GUI interface are stored in non-volatile memory on the card and are restored upon power-up.

The OG4600 series cards support re-clocking of SDI signals at multiple data rates, including:

- **ST292** (HD)
- **ST424** (3G)
- **ST2081** (6G)
- **ST2082** (12G)

4.   CONFIGURATION
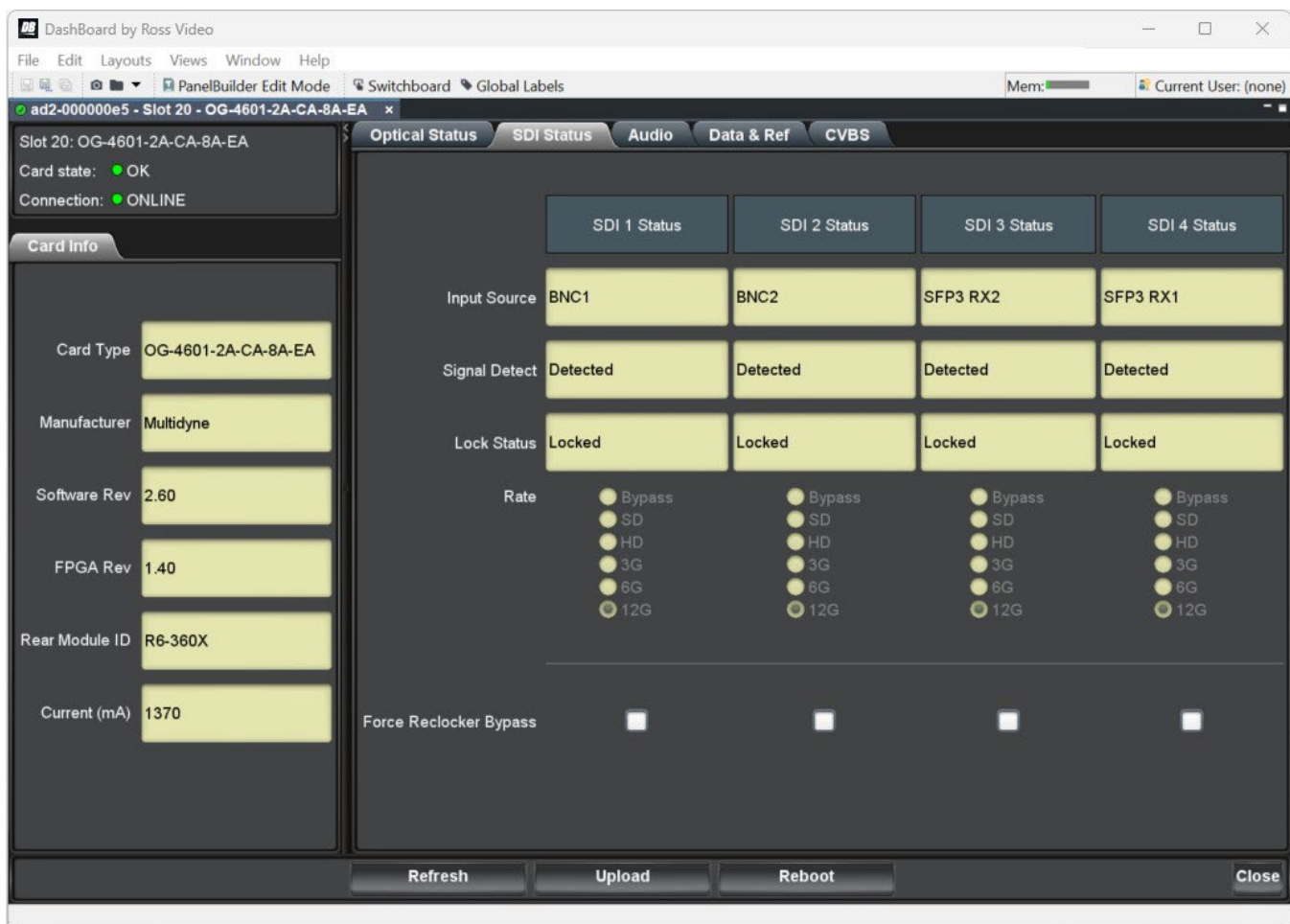
This configuration allows for flexibility in managing the re-clocking of SDI signals, providing the option to either use the default re-clocking functionality or bypass it as needed for specific operational requirements.

5.   Rear Panel Layouts

The rear panels for the OG4600 series are designed to provide various connectivity options depending on the specific model. The standard components found on most rear panels include:

- CVBS OUT

- SDI IN/OUT

- REF OUT

- CVBS IN

- TC IN/OUT

- DATA

- GPIO

- ETHERNET

- OPTICAL I/O

- AUDIO IN/OUT

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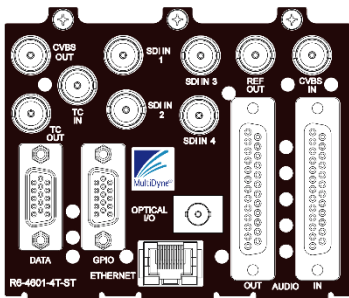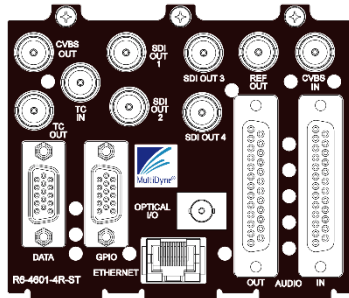
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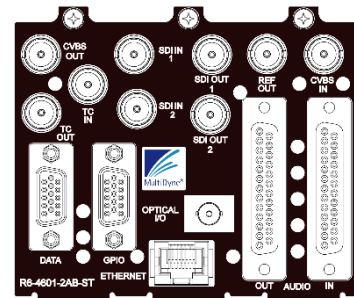
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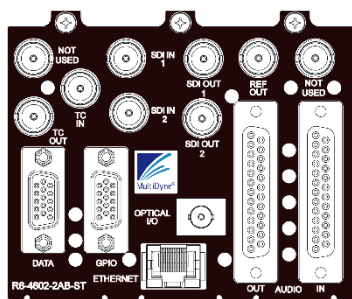
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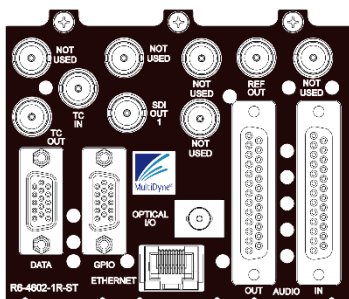
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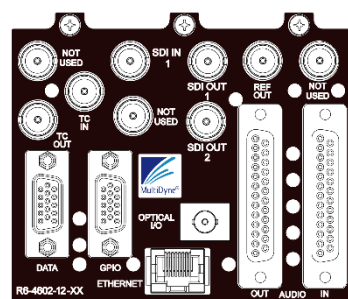
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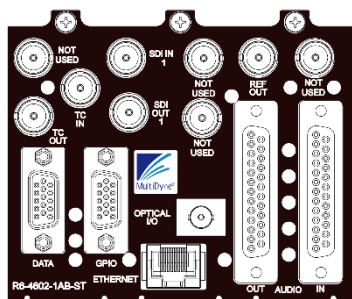
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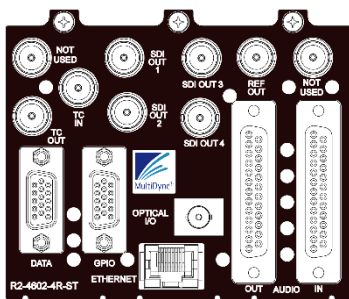
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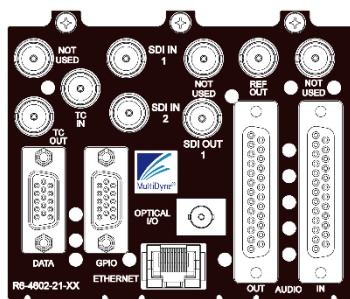
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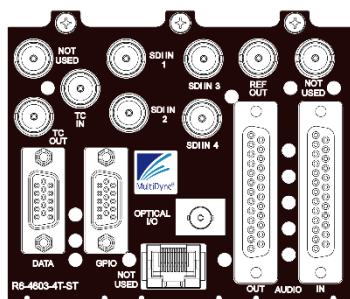
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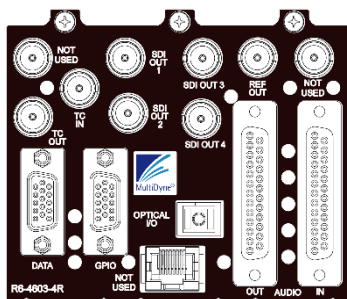
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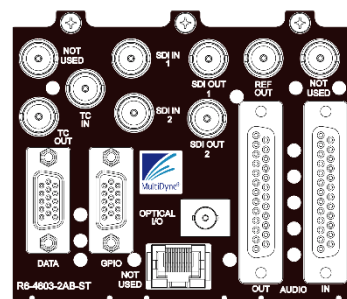
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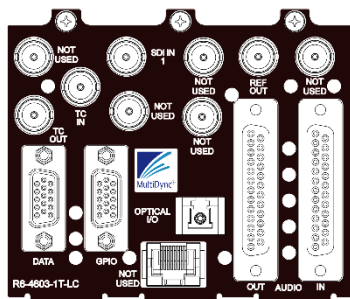
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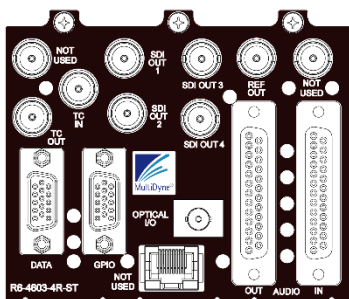
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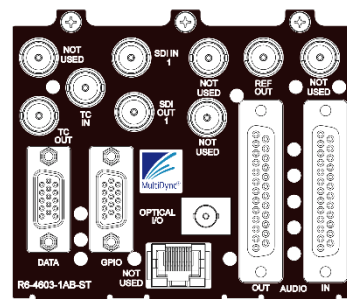
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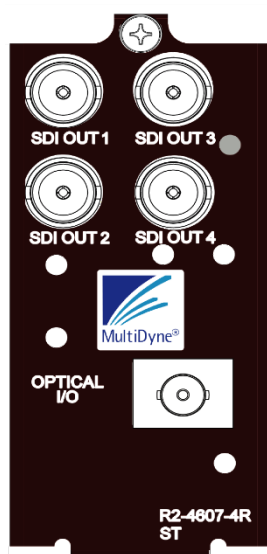# 5. REAR PANEL LAYOUTS
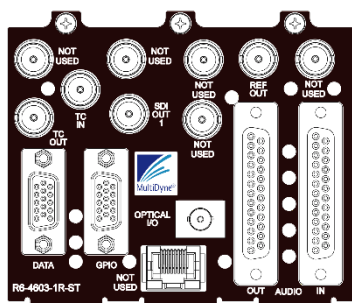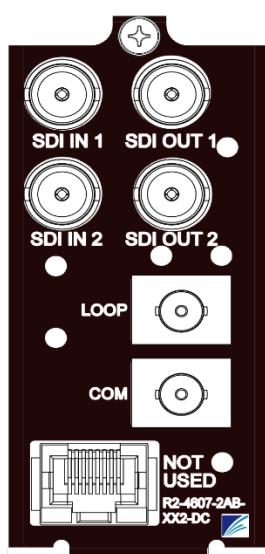

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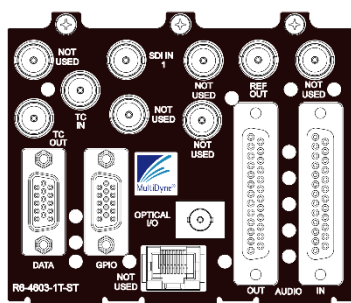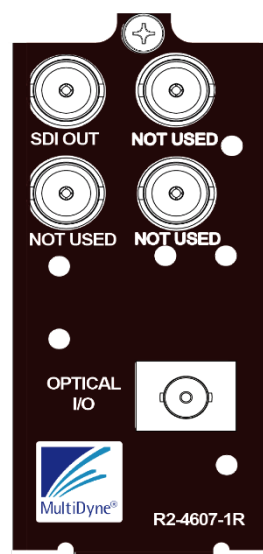
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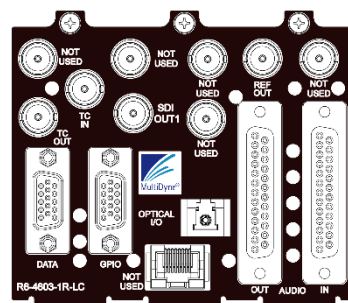
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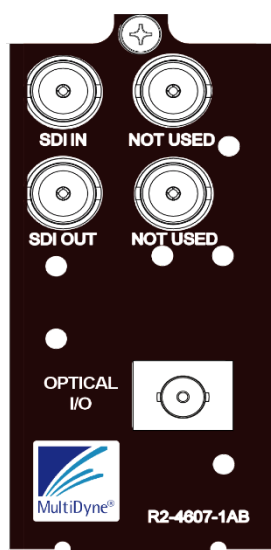
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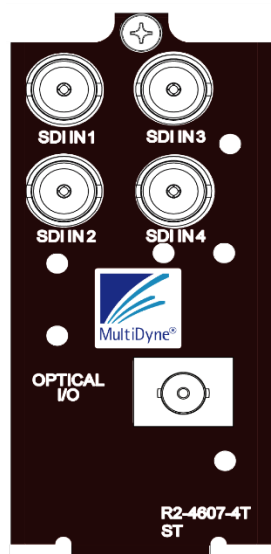
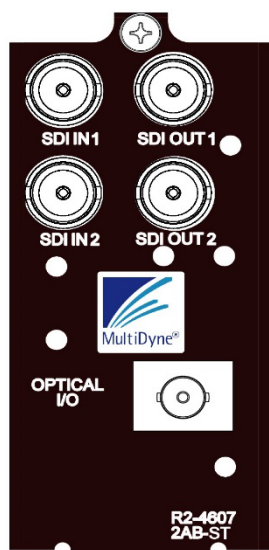**R2-4607-4T-ST**
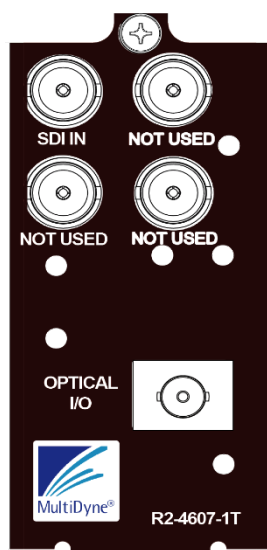
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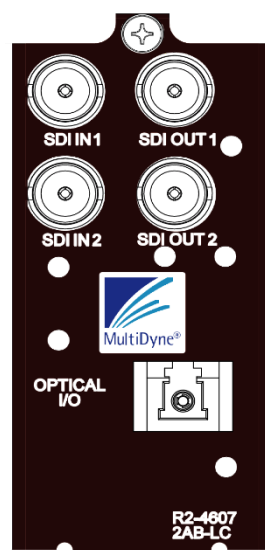
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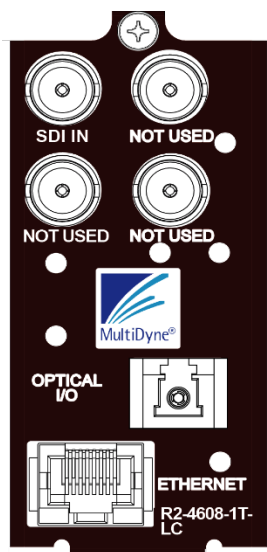**R2-4607-1R2**

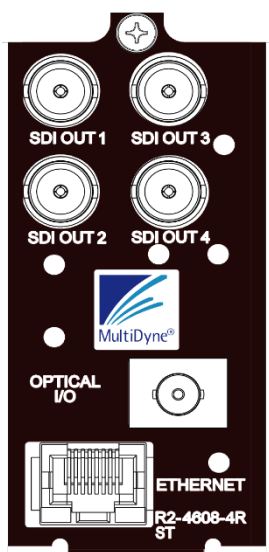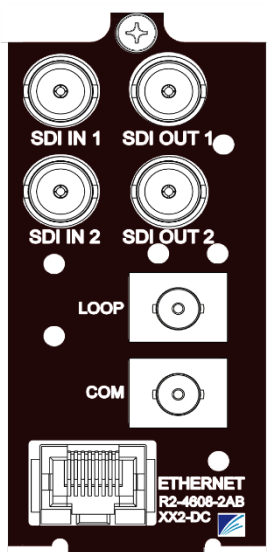**R2-4607-1AB-ST**   **R2-4607-2AB-ST**   **R2-4607-1T**   **R2-4607-2AB-LC**
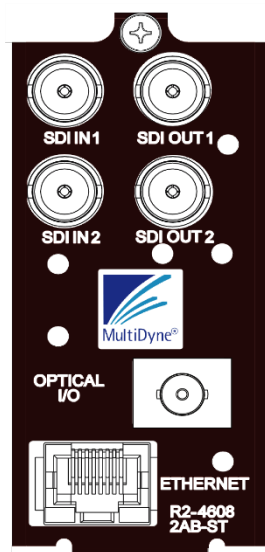
5.5   OG-4608

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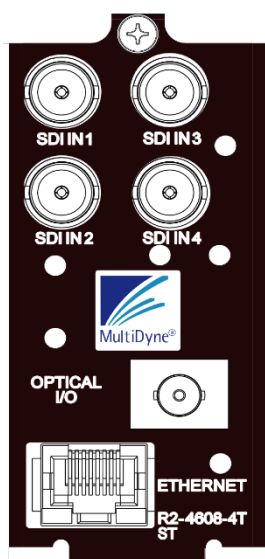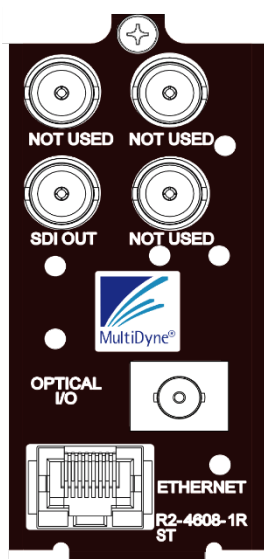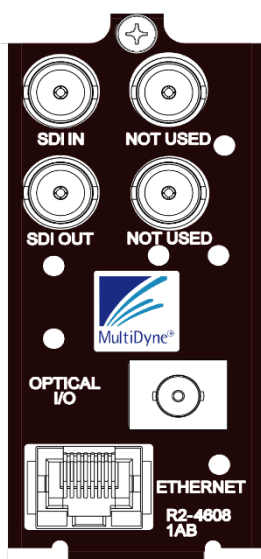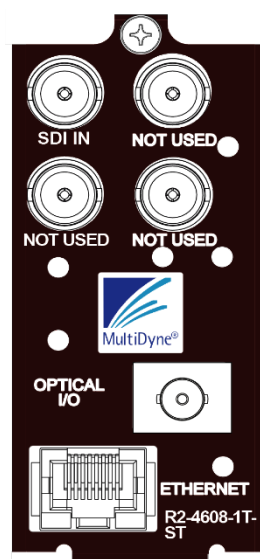
R2-4608-4T-ST   **R2-4608-1R-ST**   **R2-4608-1AB-ST**   **R2-4608-1T-ST**
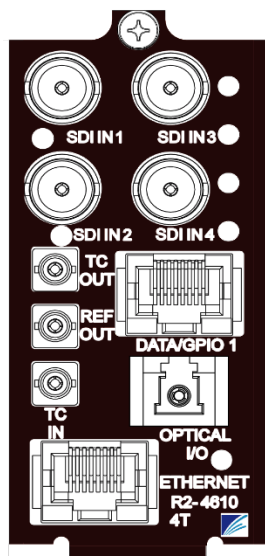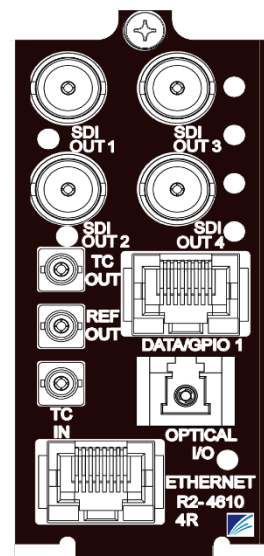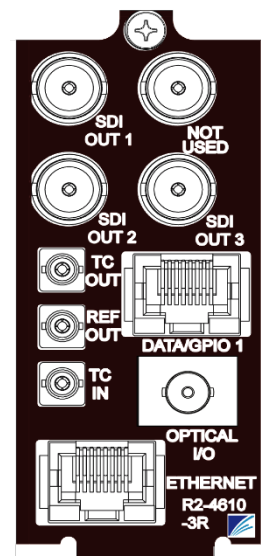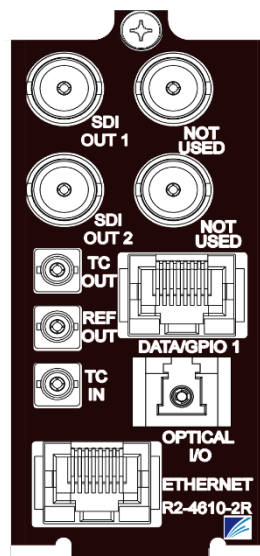
5.6   OG-4610

R2-4610-4T   **R2-4610-4R**   **R2-4610-3R**   **R6-4610-2R-LC**
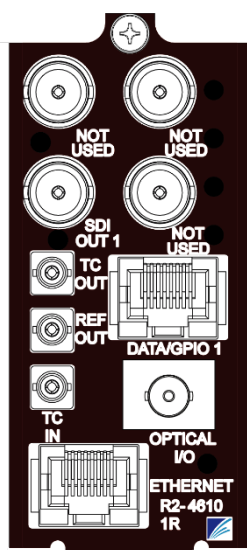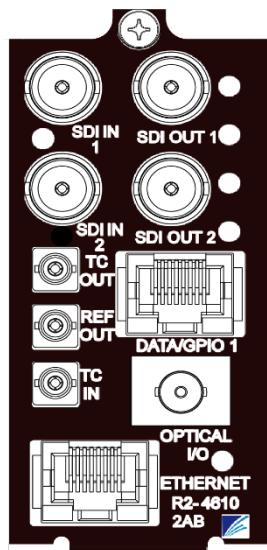
R2-4610-1R   **R2-4610-2AB**   **R6-4610-1R-LC**   **R6-4608-2AB-LC**
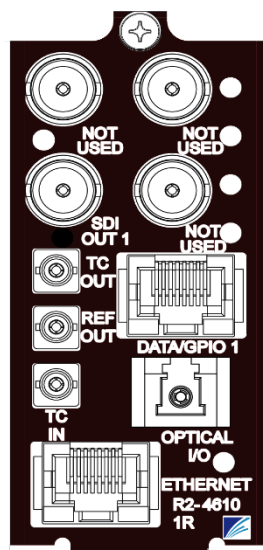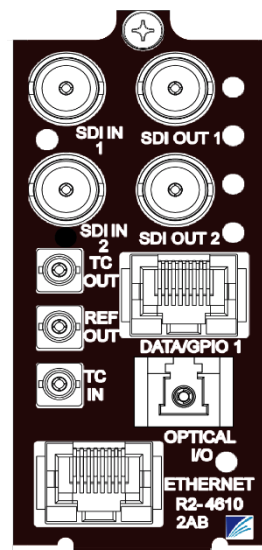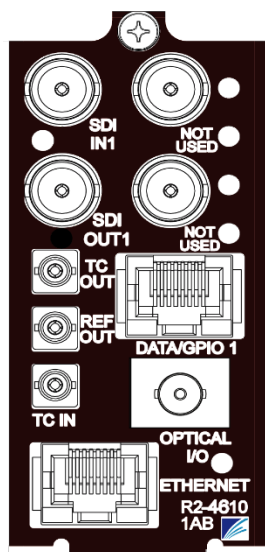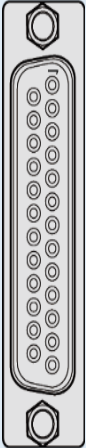
R2-4610-1AB

6.   Rear Panel Pinouts
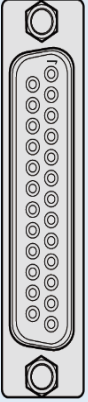
6.1   J11 – Audio Input Connector Pinout (Follows Tascam Analog Convention)

	Number	Analog Pinout	AES Pinout	Number	Analog Pinout	AES Pinout
	1	Ch 8 Input +	N/C	14	Ch 8 Input -	N/C
	2	Ground	Ground	15	Ch 7 Input +	AES 7/8 Input +
	3	Ch 7 Input -	AES 7/8 Input -	16	Ground	Ground
	4	Ch 6 Input +	N/C	17	Ch 6 Input -	N/C
	5	Ground	Ground	18	Ch 5 Input +	AES 5/6 Input +
	6	Ch 5 Input -	AES 5/6 Input -	19	Ground	Ground
	7	Ch 4 Input +	N/C	20	Ch 4 Input -	N/C
	8	Ground	Ground	21	Ch 3 Input +	AES 3/4 Input +
	9	Ch 3 Input -	AES 3/4 Input -	22	Ground	Ground
	10	Ch 2 Input +	N/C	23	Ch 2 Input -	N/C
DB25-F	11	Ground	Ground	24	Ch 1 Input +	AES 1/2 Input +
	12	Ch 1 Input -	AES 1/2 Input -	25	Ground	Ground
	13	N/C	N/C			
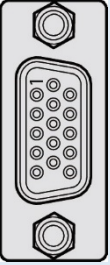
6. REAR PANEL PINOUTS

6.2 J12 – Audio Output Connector Pinout (Follows Tascam Analog Convention)
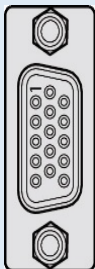
	Number	Analog	AES	Number	Analog	AES Pinout
	1	Ch 8 Output+	N/C	14	Ch 8 Output-	N/C
	2	GND	GND	15	Ch 7 Output+	AES 7/8 Output+
	3	Ch 7 Output-	AES 7/8 Output-	16	GND	GND
	4	Ch 6 Output+	N/C	17	Ch 6 Output-	N/C
	5	GND	GND	18	Ch 5 Output+	AES 5/6 Output+
	6	Ch 5 Output-	AES 5/6 Output-	19	GND	GND
	7	Ch 4 Output+	N/C	20	Ch 4 Output-	N/C
	8	GND	GND	21	Ch 3 Output+	AES 3/4 Output+
	9	Ch 3 Output-	AES 3/4 Output-	22	GND	GND
	10	Ch 2 Output+	N/C	23	Ch 2 Output-	N/C
DB25-F	11	GND	GND	24	Ch 1 Output+	AES 1/2 Output-
	12	Ch 1 Output-	AES 1/2 Output-	25	GND	GND
	13	N/C	N/C			

6.3 J14 - Serial Data Connector Pinout
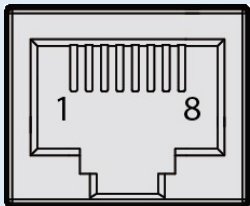
	Number	RS422 Pinout	RS232 Pinout	Number	RS422 Pinout	RS232 Pinout
	1	Data1 RXD In-	Data1 RXD	9	Data3 RXD In+	N/C
	2	Data2 RXD In+	N/C	10	Data3 TXD Out-	Data3 TXD
	3	Data2 TXD Out-	Data2 TXD	11	Data1 TXD Out+	N/C
	4	Data3 RXD In-	Data3 RXD	12	Data2 TXD Out+	N/C
	5	+12VDC Output	N/C	13	Data3 TXD Out+	N/C
	6	Data1 RXD In+	N/C	14	GND	GND
HDB15-F	7	Data1 TXD Out-	Data1 TXD	15	GND	GND
	8	Data2 RXD In-	Data2 RXD			

6.4   J15 - GPIO Connector Pinout

	Number	Description	Number	Description
	1	Tally Output	9	GPI Input 3
	2	GPO Output 1	10	N/C
HDB15-F	3	GPO Output 2	11	GND
	4	GPO Output 3	12	GND
	5	+12VDC Output	13	GND
	6	Tally Input	14	GND
	7	GPI Input 1	15	GND
	8	GPI Input 2		

6.5   RJ-45 GPIO Connector for 4610

	Pin	Function
	1	D1 TXD OUT+
	2	D1 TXD OUT-
	3	GPI1 IN
RJ-45	4	GND
	5	GND
	6	GPO1 OUT
	7	D1 RXD OUT+
	8	D1 RXD OUT-

7.   Technical Specifications

Digital Video	
Number of Inputs	Up to 4
Number of Outputs	Up to 4
SMPTE Standards	ST259, ST292, ST297, ST424, ST2081-1, ST2082-1, DVB-ASI
Data Rates	270Mbps, 1.5Gbps, 3Gbps, 6 Gbps, 12Gbps
Input/Output Level	800mVp-p
Input/Output Impedance	75 Ohms
Return Loss	>15 dB 5 MHz - 1.485 GHz
	>10 dB up to 3 GHz
Jitter	< 0.2UI

Video, CVBS	
Number of Inputs	1
Number of Outputs	1
Type	Analog NTSC, PAL
Impedance	75 Ohms

Video, Genlock	
Number of Inputs	1 (REF1 On OpenGear Frame)
Number of Outputs	1
Type	Analog Black Burst (NTSC, PAL), HD Tri-Level
Impedance	75 Ohms

Audio	
Number of Input Channels (mono)	0, 4 or 8
Number of Output Channels (mono)	0, 4 or 8
Type	Balanced. Analog Line-Level or AES3, selectable in groups of 2
Analog Audio:	
Level	+4dBu nominal, +24dBu max.
Input Impedance	> 10k Ohms
Output Impedance	22 ohms
S/N	>90db
Frequency Response	+/-0.1db 20Hz - 20kHz
Distortion	< 0.05%
Digital Audio:	
Sample Rate	Up to 48kHz
Bit Depth	Up to 24 bits

7.   TECHNICAL SPECIFICATIONS

Serial Data	
Number of Channels	3
Type	RS232, RS422
Data Rate	DC - 1Mbps

Ethernet	
Number of Channels	1
Data Rate	10/100/1000 Base-T

Timecode	
Number of Inputs	1
Number of Outputs	1
Inputs	Unbalanced, 5Vp-p max
Outputs	Unbalanced, 3Vp-p

Tally/GPIO	
Number of GPI Inputs	3
Number of Tally Inputs	1
Number of GPI Outputs	3
Number of Tally Outputs	1
Inputs	Short to GND or TTL Low to Activate
Outputs	Relay Contact Closure (30V, 2A max)

Optical	
Operating Wavelengths	1471-1611nm
Tx Laser Output Power	0dBm nominal (Class 1 Laser)
Receiver Sensitivity	-20dBm
Fiber Compatibility	Single-mode
Optical Connector Types	ST, SC, LC
Distance limit	20km w/Single-mode (<= 3Gbps)

Mechanical/Environmental	
Dimensions (HxLxW)	3.025H" x 12.75L" x 1 or 3 Standard Density Slots
openGear Form Factor	
Environmental	0 to 50°C, 0 to 95% RH, non-condensing.
Power Consumption	12.5 Watts

8. Contact Support

Contact support@multidyne.com

9. Copyrights

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