3GM
3G/1.5G HD-SDI Multiplexer User Manual

AJA® VIDEO SYSTEMS

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Support Email: support@aja.com
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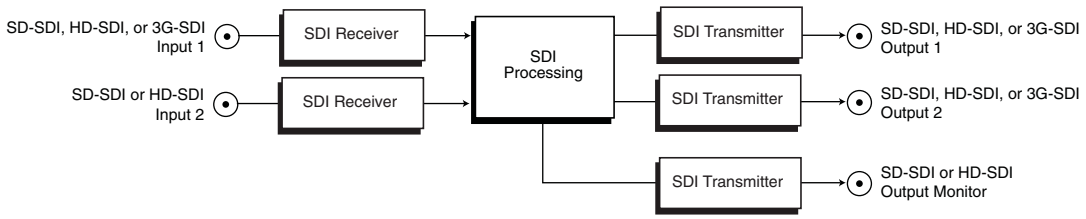
Introduction

The 3GM is versatile and economical tool for interconnecting dual-link 1.5G SMPTE372M and 3G SMPTE425M. 3GM is bi-directional - allowing dual 1.5G to 3G or 3G to dual 1.5G conversion. Additionally, 3GM's 3G HD-SDI output is configurable for SMPTE425M type A or B. The 3GM can even convert 3G from/to type A or B. 3GM also provides a monitor output which is a single link SMPTE292M 1.5G HD-SDI. The 3GM is compatible with SMPTE259M 270Mb SDI.

Features

- Compact 3G to/from 1.5G conversion
- SMPTE425M-AB inputs, 3G outputs configurable to A or B
- Converts SMPTE425M A to/from SMPTE425M B
- Provides SMPTE292 monitor output for dual 1.5G or 3G inputs
- Fully equalizing and re-clocking with jitter attenuation
- Passes all ancillary data

Block Diagram



3GM, Simplified Block Diagram

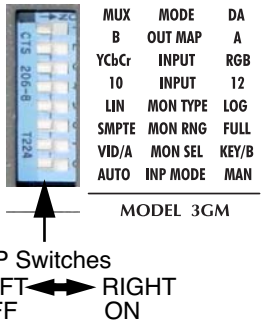
I/O Connections

3GM Converter

User Controls

The user interface for the 3GM is an 8-position DIP switch accessible through a cut-out in the bottom of the unit.

The exact function of each DIP switch and what it controls is described on the following pages.



Switch 1—Selects Multiplex or Distribution Amplifier (MODE)

LEFT (MUX)	RIGHT (DA)
MUX: Converts between Dual-link (SMPTE 372M) and 3G (SMPTE 425M) A Dual-Link input results in a 3G output (mode A or B). A 3G-SDI input (mode A or B) results in a Dual-Link output **Note: I**n both cases, the monitor output will be a downconverted HD (SMPTE 292M compliant) output.	DA: Places device in distribution amplifier mode. A Dual-Link input results in a Dual-Link output A 3G-SDI input results in a 3G output (both in mode A or B) **Note:** In both cases, the monitor output will be a downconverted HD (SMPTE 292M compliant) output.

Switch 2—Selects between 3G A or 3G B output map (when device is set to output 3G)

LEFT (B)	RIGHT (A)
B: Selects 3G B mapping. 3G output is set to the B mapping structure.	A: Selects 3G A mapping. 3G output is set to the A mapping structure.

Switch 3—Manually select input signal color space: YCbCr/RGB

LEFT (YCbCr)	RIGHT (RGB)
YCbrCr: If Dipswitch 8 is set to *Manual* or there is no payload ID, the 3GM will behave as if the input video is in the YC color space. If payload ID is present and Dipswitch 8 is set to *Auto*, the 3GM uses the video specifications in the payload ID.	RGB: If Dipswitch 8 is set to *Manual* or there is no payload ID, the 3GM will behave as if the input video is in the RGB color space. If payload ID is present and Dipswitch 8 is set to *Auto*, the 3GM uses the video specifications in the payload ID.

Switch 4 —Manually select the input signal bit depth: 10 or 12-bit

LEFT (10 Bit)	RIGHT (12 Bit)
10-Bit: If Dipswitch 8 is set to *Manual* or there is no payload ID, the 3GM will behave as if the input video is 10-bit. If payload ID is present and Dipswitch 8 is set to *Auto*, the 3GM uses the video specifications in the payload ID.	12-Bit: If Dipswitch 8 is set to *Manual* or there is no payload ID, the 3GM will behave as if the input video is 12-bit. If payload ID is present and Dipswitch 8 is set to *Auto*, the 3GM uses the video specifications in the payload ID.

Switch 5 —Select linear or log color (MON TYPE)

LEFT (LIN)	RIGHT (LOG)
LIN: Configure input video as linear color. Will colorspace convert and resample as needed. **Note:** Switches 5, 6, and 7 only affect the monitor output.This switch has no effect on primary outputs (linear or log color in results in the same output)	LOG: Configure input video as logarithmic color. Will perform a 10-bit Cineon to 8-bit linear conversion before colorspace converting and resampling the monitor output. **Note:** Switches 5, 6, and 7 only affect the monitor output.This switch has no effect on primary outputs (linear or log color in results in the same output)

Switch 6 —Select SMPTE or FULL range color values for input (MON RNG)

LEFT (SMPTE)	RIGHT (FULL)
SMPTE: Defines input video as SMPTE color range (040h-3ACh). **Note:** Switches 5, 6, and 7 only affect the monitor output.This switch has no effect on primary outputs (SMPTE in/ SMPTE out).	FULL: Defines input video as FULL color range (004h-3FBh). **Note:** Switches 5, 6, and 7 only affect the monitor output.This switch has no effect on primary outputs (FULL in/ FULL out).

Switch 7—Select between Video or Key for Monitor output

LEFT (Video, Input A)	RIGHT (Key, Input B)
VID/A: For video input with an Alpha channel, this sets the monitor output to Video in the case of 4:4:4:4 video input. For video input without an Alpha channel, this sets the monitor output to be Link A. **Note:** Switches 5, 6, and 7 only affect the monitor output.This switch has no effect on primary outputs.	KEY/B: For video input with an Alpha channel, this sets monitor output to the Alpha (key) in the case of 4:4:4:4 video input. For video input without an Alpha channel, this sets the monitor output to be Link B. **Note:** Switches 5, 6, and 7 only affect the monitor output.This switch has no effect on primary outputs.

Switch 8—Select between Automatic or Manual Setup

LEFT (Auto)	RIGHT (Man)
AUTO: If payload ID is present, the 3GM uses data from the payload ID information to set color space and bit depth (switches 3 and 4). If payload ID is not present, the 3GM reverts to switches 3 and 4 for input information.	MAN: The 3GM uses switches 3 and 4 for color space and bit depth, regardless of whether payload ID is present or not.

Installation

In normal operation the 3GM uses between 4 and 6 watts of power. Because it is designed to use the outer case and the attached cables for heat dissipation, the case can feel warm to the touch. This is normal. Although the 3GM has been tested for proper operation in an ambient temperature up to 45 degrees Celsius (113 F), it is recommended to not position the 3GM in close proximity to other warm surfaces or airflow.

To install, connect BNC cables to the desired source and destination devices and apply +5VDC power to the converter (AJA power supply model DWP or DWP-U).

Specifications

Item	Specification
Video Inputs	2 HD-SDI, SDI (SMPTE 259/292/296/424), 2x BNC
Formats	3Gb, 1.5Gb, 270Mb Auto Select
Video Outputs	3G HD-SDI, HD-SDI, SDI, 3x BNC
Cable Equalization	270mb, 350m 1.5Gb, 200m 3Gb, 120m Cable Equalization (1694 coax)
Input/Output Return Loss	>15db, 270Mb - 3Gb
User Controls	External Dipswitch
Size	4.6” x 2.4” x 1” (117 x 61 x 25mm)
Power	+5VDC, Regulated, 6 Watts Requires Power Supply (AJA power supply model DWP or DWP-U recommended)

Note: 3GM is not recommended for use with AJA DRM chassis rackmount kit.

Dual Link to/from 3G level A Support

3G_A Mapping	Video Formats in SMPTE 425M + 372M: Image Size	Format	Pixel Depth	Frame/Field Rates	Monitor Output Formats: Color Space Convert	Chroma Resample	Image Size	Format	Pixel Depth	Frame/Field Rates
1	1920x1080	4:2:2 YCbCr	10bit	60, 60/1.001 and 50 progressive			1920x1080	4:2:2 (YCbCr)	10bit	60, 60/1.001 and 50 interlaced
2	1280x720	4:4:4:4 (RGB+A) (A opt.) (Note 1)	10bit	60, 60/1.001 and 50 progressive 30, 30/1.001, 25, 24, 24/1.001 progressive	Yes	Yes	1280x720	4:2:2(YCbCr) 4:2:2 (A opt.)	10bit	60, 60/1.001 and 50 progressive 30, 30/1.001, 25, 24, 24/1.001 progressive
	1280x720	4:4:4:4 (YCbCr+A) (A opt.) (Note 1)	10bit	60, 60/1.001 and 50 progressive 30, 30/1.001, 25, 24, 24/1.001 progressive		Yes	1280x720	4:2:2 (YCbCr) 4:2:2 (A opt.)	10bit	60, 60/1.001 and 50 progressive 30, 30/1.001, 25, 24, 24/1.001 progressive
	1920x1080 2048x1080	4:4:4:4 (RGB+A) (A opt.) (Note 1)	10bit	60, 60/1.001 and 50 interlaced 30, 30/1.001, 25, 24, 24/1.001 progressive	Yes	Yes	1920x1080 2048x1080	4:2:2 (YCbCr) 4:2:2 (A opt.)	10bit	60, 60/1.001 and 50 interlaced 30, 30/1.001, 25, 24, 24/1.001 progressive
	1920x1080 2048x1080	4:4:4:4 (YCbCr+A) (A opt.) (Note 1)	10bit	60, 60/1.001 and 50 interlaced 30, 30/1.001, 25, 24, 24/1.001 progressive		Yes	1920x1080 2048x1080	4:2:2 (YCbCr) 4:2:2 (A opt.)	10bit	60, 60/1.001 and 50 interlaced 30, 30/1.001, 25, 24, 24/1.001 progressive
3	1920x1080 2048x1080	4:4:4 (RGB)	12 bit	60, 60/1.001 and 50 interlaced 30, 30/1.001, 25, 24, 24/1.001 progressive	Yes	Yes	1920x1080 2048x1080	4:2:2 (YCbCr)	10bit	60, 60/1.001 and 50 interlaced 30, 30/1.001, 25, 24, 24/1.001 progressive
	1920x1080 2048x1080	4:4:4 (YCbCr)	12bit	60, 60/1.001 and 50 interlaced 30, 30/1.001, 25, 24, 24/1.001 progressive		Yes	1920x1080 2048x1080	4:2:2 (YCbCr)	10bit	60, 60/1.001 and 50 interlaced 30, 30/1.001, 25, 24, 24/1.001 progressive
4	1920x1080	4:2:2:4 (YCbCr+A) (A opt.)	12bit	60, 60/1.001 and 50 interlaced 30, 30/1.001, 25, 24, 24/1.001 progressive			1920x1080	4:2:2 (YCbCr) 4:2:2 (A opt.)	10bit	60, 60/1.001 and 50 interlaced 30, 30/1.001, 25, 24, 24/1.001 progressive

Note 1: In all cases, A is 10-bit with an 8-bit payload.
Note 2: 4:4:4 XYX monitoring is not supported.

KEY: Not Supported
Only supported in with payload ID

Dual Link to/from 3G level B Support

3G_B Mapping	Video Formats in SMPTE 425M + 372M: Image Size	Format	Pixel Depth	Frame/Field Rates	Monitor Output Formats: Color Space Convert	Chroma Resample	Image Size	Format	Pixel Depth	Frame/Field Rates
1	1920x1080	4:2:2 YCbCr	10bit	60, 60/1.001 and 50 progressive			1920x1080	4:2:2 (YCbCr)	10bit	60, 60/1.001 and 50 interlaced
2	1280x720	4:4:4:4 (RGB+A) (A opt.) (Note 1)	10bit	60, 60/1.001 and 50 progressive 30, 30/1.001, 25, 24, 24/1.001 progressive	Yes	Yes	1280x720	4:2:2 (YCbCr) 4:2:2 (A opt.)	10bit	60, 60/1.001 and 50 progressive 30, 30/1.001, 25, 24, 24/1.001 progressive
	1280x720	4:4:4:4 (YCbCr+A) (A opt.) (Note 1)	10bit	60, 60/1.001 and 50 progressive 30, 30/1.001, 25, 24, 24/1.001 progressive		Yes	1280x720	4:2:2 (YCbCr) 4:2:2 (A opt.)	10bit	60, 60/1.001 and 50 progressive 30, 30/1.001, 25, 24, 24/1.001 progressive
	1920x1080 2048x1080	4:4:4:4 (RGB+A) (A opt.) (Note 1)	10bit	60, 60/1.001 and 50 interlaced 30, 30/1.001, 25, 24, 24/1.001 progressive	Yes	Yes	1920x1080 2048x1080	4:2:2 (YCbCr) 4:2:2 (A opt.)	10bit	60, 60/1.001 and 50 interlaced 30, 30/1.001, 25, 24, 24/1.001 progressive
	1920x1080 2048x1080	4:4:4:4 (YCbCr+A) (A opt.) (Note 1)	10bit	60, 60/1.001 and 50 interlaced 30, 30/1.001, 25, 24, 24/1.001 progressive		Yes	1920x1080 2048x1080	4:2:2 (YCbCr) 4:2:2 (A opt.)	10bit	60, 60/1.001 and 50 interlaced 30, 30/1.001, 25, 24, 24/1.001 progressive
3	1920x1080 2048x1080	4:4:4 (RGB)	12 bit	60, 60/1.001 and 50 interlaced 30, 30/1.001, 25, 24, 24/1.001 progressive	Yes	Yes	1920x1080 2048x1080	4:2:2 (YCbCr)	10bit	60, 60/1.001 and 50 interlaced 30, 30/1.001, 25, 24, 24/1.001 progressive
	1920x1080 2048x1080	4:4:4 (YCbCr)	12bit	60, 60/1.001 and 50 interlaced 30, 30/1.001, 25, 24, 24/1.001 progressive		Yes	1920x1080 2048x1080	4:2:2 (YCbCr)	10bit	60, 60/1.001 and 50 interlaced 30, 30/1.001, 25, 24, 24/1.001 progressive
4	1920x1080	4:2:2:4 (YCbCr+A) (A opt.)	12bit	60, 60/1.001 and 50 interlaced 30, 30/1.001, 25, 24, 24/1.001 progressive			1920x1080	4:2:2 (YCbCr) 4:2:2 (A opt.)	10bit	60, 60/1.001 and 50 interlaced 30, 30/1.001, 25, 24, 24/1.001 progressive

Note 1: In all cases, A is 10-bit with an 8-bit payload.
Note 2: 4:4:4 XYX monitoring is not supported.

KEY: Not Supported
Only supported in with payload ID