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Remote OSD Serial Protocol Description

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ArtistaMEDIA-II & Prisma-III A

Version 1.2

12.03.2019

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1 Revision History

Date	Rev.No.	Description	Page
27.05.2013	1.0	Initial Release	All
25.09.2015	1.1	Clarified notes of Main Source (0x3D) and PiP Source (0x3E) calls.	
12.03.2019	1.2	Added Read Firmware Revision	13

2 Introduction

This guide explains how to read and adjust the OSD settings of ArtistaMedia-II and Prisma-IIIa boards from your PC over the serial port. **Orange parts of this document are only related to ArtistaMedia-II boards** and **blue parts of this document are only related to Prisma-IIIa boards**.

3 Minimum requirements

- ArtistaMedia-II or Prisma-IIIa board and its serial interface
- ArtistaMedia-II or Prisma-IIIa firmware with Remote OSD capability

4 How to communicate with the board

4.1 Serial port configuration

The serial port RS-232 configuration that has been used for communicating with the board is given in Table 1 below.

Table 1

Property	Value
DTR Enable	False
EOF Enable	True
Handshaking	No handshaking
Input Buffer Size	8
Input Length	8
Input Mode	Binary
Null Discard	False
Output Buffer Size	8
Receive Threshold	0
RTS Enable	False
Settings	115200,n,8,1
Send Threshold	0

4.2 Request and response structure

To read and adjust the OSD menu controls and to execute the OSD menu functions, requests must be sent to the board from the COM port of the PC. Generally, the firmware responds to the request after executing the OSD function. But some of the commands respond before adjustment. Please refer to Table 5 for these commands and time delays before reading response packets in adjustment functions which respond after adjustment. For reading, this delay is by default 100ms. Also, there is a default delay of 100 ms before sending a second request. All Remote OSD commands return a response for read requests. Some do not have an adjust option. See Table 5 for details.

Remote OSD requests and responses are always 8-byte long. See Table 2 and Table 3 for the packet structures.

Remote OSD packets have two bytes reserved for input and output parameters. The two bytes are considered as a whole - as a signed integer. The sign bit is the most significant bit of the most significant byte (5th byte). These bytes are not controlled in read requests. In adjust requests if the firmware is not able to set the sent value then the firmware responds with the current value.

Table 2: Request Packet

Byte Order	Name	Explanation
1	Length	The length of the whole packet (Always 8)
2	Remote OSD Selection	Always 0x34(Hex), only for Table 6 0x35(Hex)
3	Remote OSD Function ID	ID of the adjuster function or information function. See Table 5.
4	Remote OSD Sub-function ID	See Section 4.4.
5	Remote OSD Function Input Parameter Most Significant Byte	Used if the requested Remote OSD function requires input. The most significant bit here is used as the sign bit.
6	Remote OSD Function Input Parameter Least Significant Byte	Used if the requested Remote OSD function requires input.
7	Remote OSD File Operation Byte	See Section 4.7
8	Checksum	See Section 4.3 for the calculation

Table 3: Response Packet

Byte Order	Name	Explanation
1	Length	The length of the whole packet (Always 8)
2	Remote OSD Selection	Always 0x34(Hex), only for Table 6 0x35(Hex)
3	Remote OSD Function ID	ID of the adjuster function or information function. See Table 5.
4	Remote OSD Sub-function ID + Status Info	See Section 4.4.
5	Remote OSD Function Output Parameter Most Significant Byte	The most significant bit here is used as the sign bit.
6	Remote OSD Function Output Parameter Least Significant Byte	-
7	Remote OSD File Operation Byte	See Section 4.7
8	Checksum	See Section 4.3 for the calculation

4.3 Calculating the Checksum

The calculation of the checksum is as follows: Add the first 7 bytes of the request, take the least significant 8 bits of this result and find the 2's complement of this result.

Example:

Suppose that the first 7 bytes to be sent are: 0x08, 0x34, 0x48, 0x02, 0x00, 0x01, 0xFF

By adding them you get: $0x08 + 0x34 + 0x48 + 0x02 + 0x00 + 0x01 + 0xFF = 0x186$

It exceeds 8 bits, so take the least significant 8 bits (0x86) and find the 2's complement:

Checksum = $0x100 - 0x86 = 0x7A$

To check if the checksum is correct, all 8 bytes are added together. If the least significant byte of the result is zero, then the checksum is correct: $0x08 + 0x34 + 0x48 + 0x02 + 0x00 + 0x01 + 0xFF + 0x7A = 0x200$

4.4 Remote OSD Sub-Function IDs

Sub-function ID is taken into account in all commands except "Connection Check" and "Protocol Version". In "Control Function" this byte is used, but the format changes. This special command will be explained in Section 4.8.1.15. Except for the above commands, sub-function ID structure is as in Table 4.

Table 4

Bit #	Name of Flag	0	1
0 (Least significant)	Input	Main Input related request	PIP Input related request
1	Read/Adjust	Read value of the selected control	Adjust value of the selected control
2	Min	-	Get minimum value of the control
3	Max	-	Get maximum value of the control
4	Disable ¹	Selected control is enabled	Selected control is disabled
5	Main Input Change ¹	No input change in main input	Detected input change in main input
6	PIP Input Change ¹	No input change in PIP input	Detected input change in PIP input
7	Respond time ¹	Respond after adjustment	Respond before adjustment

¹ These bits are available only in the Remote OSD response packet.

In Remote OSD functions, different actions are taken for different input channels (main and PIP channels). In order to inform the firmware about this selection, **input flag** is used. **Read/Adjust flag** is set to 0 when the sender wants to get the value of the selected function, and is set to 1 when the sender wants to set the value of the selected function. The minimum and maximum values of some functions change with respect to source type, resolution, refresh rate, etc. For these functions (see Table 5) min and max values need to be requested from the firmware. **Min** and **Max flags** cannot be "1" at the same time and can be used only in read operations. **Disable flag** is used for functions whose availability status changes (See Table 5, Always Enabled column). This flag is set to 1 in the response packet for read or adjust requests if the selected function is disabled. **Respond time flag** is set to 1 in the response packet if the response is sent before adjustment. Connection check can be used to check if the adjustment progress is finished or not for these adjustments.

Main input change flag is set to 1 after a change in the main source input. **PIP change input flag** is set to 1 after a change in the PIP source input. Both flags are carried on the response packet of any read or adjust request following the change. The possible conditions which can be regarded as a change in the source input are:

- Another input source has been selected using Remote OSD commands
- Another input source has been selected using “Input Select” of the on-board OSD
- The board has automatically switched to another input source, because the previously selected input source is no longer providing a valid input signal
- The resolution or the refresh rate of the input signal has been changed
- The power of the board has been switched off and on.

These flags appear as set in the response packets until the sender makes a connection check request. Only power, power off type, source input change, protocol version, control function and board type operations can be done without clearing these flags. For other controls, main input should be stable and these flags should be cleared using connection check. If the “Remote OSD Function ID” in the response packet is different from the request packet (if 0x00), this also means that you should make connection check.

4.5 Remote OSD Command Table

Table 5

Function Name	Function ID (Hex)	Response after adjust	Read Only	Always Enabled	Minimum Value	Maximum Value	Adjust Delay (sec)	Number of Saved Value Sets in File Operations	Value Meanings
Connection Check	0x00	-	√	√	-	-	-	None	1: Valid Sync 2: Powered Off 3: No Sync
Scheme	0x01	√	X	X	0	4	0,3	1-Set	0: Normal 1: Vivid 2: Cinema 3: Game 4: Sport
Brightness	0x02	√	X	X	-128	127	0,1	Multiple-Set ¹	
Contrast	0x03	√	X	√	128	384	0,1	Multiple-Set	
Saturation	0x04	√	X	X	0	512	0,1	Multiple-Set	
Hue	0x05	√	X	X	-180	180	0,1	Multiple-Set	
Sharpness	0x06	√	X	√	0	24	0,15	4-Set: Main Video=0, Pip Video=1, Main Graphics=2, Pip Graphics=3	
Reset Scheme	0x07	√	X	√	-	-	0,1	None	
Color Temperature	0x08	√	X	√	0	7	0,1	Multiple-Set	0: User 1: 4200K 2: 5000K 3: 5400K 4: 6500K 5: 7200K 6: 9300K 7: sRGB
Red Gain	0x09	√	X	X	128	384	0,1	Multiple-Set	
Green Gain	0x0A	√	X	X	128	384	0,1	Multiple-Set	
Blue Gain	0x0B	√	X	X	128	384	0,1	Multiple-Set	
Red Offset	0x0C	√	X	X	-50	50	0,1	Multiple-Set	
Green Offset	0x0D	√	X	X	-50	50	0,1	Multiple-Set	
Blue Offset	0x0E	√	X	X	-50	50	0,1	Multiple-Set	
ADC Calibration	0x51	√	X	X	-	-	1,0	None	
Noise Reduction: CCS Mode	0x0F	√	X	X	0	2	0,15	1-Set	0: Off 1: Adaptive 2: Normal

Function Name	Function ID (Hex)	Response after adjust	Read Only	Always Enabled	Minimum Value	Maximum Value	Adjust Delay (sec)	Number of Saved Value Sets in File Operations	Value Meanings
Noise Reduction: MPEG NR	0x46	√	X	X	0	63	0,15	1-Set	
Noise Reduction: Dynamic NR Mode	0x10	√	X	X	0	4	0,15	1-Set	0: Off 1: Adaptive 2: Low 3: Medium 4: High
Noise Reduction: MPEG NR Mode	0x45	√	X	X	0	1	0,15	1-Set	0: Off 1: On
Video Processing: Main DCDi	0x11	√	X	X	0	1	0,15	1-Set	0: Off 1: On
Video Processing: Main MADi Mode	0x12	√	X	X	0	2	0,15	1-Set	0: Off 1: Adaptive 2: Normal
Film Mode Detection	0x13	√	X	X	0	3	0,15	1-Set	0: Off 1: Video-3:2-2:2 2: Video-3:2 3: Video-2:2
Film Display Mode	0x14	√	X	X	0	2	0,15	1-Set	0: Normal 3:2 1: Force 3:3 2: Force 2:2
Aspect Ratio ²	0x15	√	X	X	0	4	1,0	2-Set 6-Set (for every input type)	0: Full Screen 1: Letter Box(Expand) 2: Pillar Box(Expand) 3: Panoramic 4: 1:1
Pip Mode	0x16	√	X	X	0	4	1,5	1-Set	0: Off 1: Large Pip 2: Small Pip 3: PAP 4: PAP-Tall
PIP Vertical Position	0x17	√	X	X	0	100	0,7	1-Set	
PIP Horizontal Position	0x18	√	X	X	0	100	0,7	1-Set	
Pip Transparency	0x4F	√	X	X	0	15	0,7	1-Set	
Tiling Horizontal Total	0x49	√	X	√	1	8	1,0	1-Set	
Tiling Vertical Total	0x4A	√	X	√	1	8	1,0	1-Set	
Tiling Horizontal Start	0x4B	√	X	√	1	8	1,0	1-Set	
Tiling Vertical Start	0x4C	√	X	√	1	8	1,0	1-Set	
Tiling Status	0x4D	√	X	X	0	1	1,0	1-Set	0: Off 1: On
Auto Adjust	0x19	X	X	X	-	-	12, CCC ³	None	
VGA Vertical Position	0x1A	√	X	X	FWR ⁴	FWR	0,1	None	
VGA Horizontal Position	0x1B	√	X	X	FWR	FWR	0,1	None	

Function Name	Function ID (Hex)	Response after adjust	Read Only	Always Enabled	Minimum Value	Maximum Value	Adjust Delay (sec)	Number of Saved Value Sets in File Operations	Value Meanings
Phase	0x1C	√	X	X	0	63	0,1	None	
Clock	0x1D	√	X	X	FWR	FWR	0,1	None	
Mode Selection 350/400	0x1F	√	X	X	0	1	0,2	1-Set	0: 640 1: 720
Mode Selection 768	0x20	√	X	X	0	3	0,2	1-Set	0: 1280 1: 1360 2: 1366 3: 1368
Mode Selection 1050	0x3A	√	X	X	0	1	0,2	1-Set	0: 1400 1: 1680
HDMI/DVI Video Width	0x21	√	X	X	0	100	0,5	1-Set	
HDMI/DVI Video Height	0x22	√	X	X	0	100	0,5	1-Set	
HDMI/DVI Horizontal Start	0x23	√	X	X	0	100	0,5	1-Set	
HDMI/DVI Vertical Start	0x24	√	X	X	0	100	0,5	1-Set	
Mode Selection 1080p (HDMI/DVI)	0x1E	√	X	X	0	1	0,2	1-Set	0: Video 1: Graphics
Mode Selection 720p (HDMI/DVI)	0x3B	√	X	X	0	1	0,2	1-Set	0: Video 1: Graphics
SOG Video Width	0x25	√	X	X	0	100	0,7	1-Set	
SOG Video Height	0x26	√	X	X	0	100	0,7	1-Set	
SOG Horizontal Start	0x27	√	X	X	0	100	0,7	1-Set	
SOG Vertical Start	0x28	√	X	X	0	100	0,7	1-Set	
NTSC Video Width	0x29	√	X	X	-30	16	0,5	1-Set	
NTSC Video Height	0x2A	√	X	X	-30	0	0,5	1-Set	
NTSC Horizontal Start	0x2B	√	X	X	6	30	0,5	1-Set	
NTSC Vertical Start	0x2C	√	X	X	-6	3	0,5	1-Set	
PAL Video Width	0x2D	√	X	X	-30	16	0,5	1-Set	
PAL Video Height	0x2E	√	X	X	-30	-1	0,5	1-Set	
PAL Horizontal Start	0x2F	√	X	X	0	30	0,5	1-Set	
PAL Vertical Start	0x30	√	X	X	-6	2	0,5	1-Set	
OSD Horizontal Start	0x31	√	X	√	0	254	0,15	1-Set	
OSD Vertical Start	0x32	√	X	√	0	254	0,15	1-Set	
OSD Blend	0x33	√	X	√	0	10	0,15	1-Set	
OSD Timeout	0x34	√	X	√	0	60	0,15	1-Set	
OSD Horizontal Flip	0x35	√	X	X	0	1	0,15	1-Set	0: Off 1: On
OSD Vertical Flip	0x36	√	X	X	0	1	0,15	1-Set	0: Off 1: On
OSD Rotation	0x37	√	X	X	0	3	0,15	1-Set	0: Off 1: 90° 2: 180° 3: 270°

Function Name	Function ID (Hex)	Response after adjust	Read Only	Always Enabled	Minimum Value	Maximum Value	Adjust Delay (sec)	Number of Saved Value Sets in File Operations	Value Meanings
OSD Zoom	0x38	√	X	X	0	1	0,15	1-Set	0: Off 1: On
Factory Reset	0x39	X	X	√	-	-	28-20, CCC	None	
Speed Mode	0x48	√	X	√	0	1	0,15	1-Set	0: Off 1: On
Input Search	0x50	√	X	√	0	1	0,1	1-Set	0: Off 1: On
Auto Brightness	0x3C	√	X	X	0	1	0,3	1-Set	0: Off 1: On
Main Source Input ⁷	0x3D	X	X	√	0	2 5-7	33-25, CCC	1-Set	1: HDMI1 2: HDMI2 0: VGA 1: DVI 2: Composite 3: S-Video 4: Component 5: RGB+CS 6: Composite2 7: HDMI
PIP Source Input ⁸	0x3E	√	X	X	0	5-7	0,2	1-Set	0: VGA 1: DVI 2: Composite 3: S-Video 4: Component 5: RGB+CS 6: Composite2 7: HDMI
Power ⁵	0x3F	√	X	√	0	1	0,1	1-Set	0: Off 1: On
Power Off Type ⁵	0x47	√	X	√	0	1	0,15	1-Set	0: Quasi 1: Full
Control Function ⁶	0x40	-	√	√	-	-	-	None	
Horizontal Resolution	0x41	-	√	√	-	-	-	None	
Vertical Resolution	0x42	-	√	√	-	-	-	None	
Refresh Rate	0x43	-	√	√	-	-	-	None	
Protocol Version	0x44	-	√	√	-	-	-	None	

Function Name	Function ID (Hex)	Response after adjust	Read Only	Always Enabled	Minimum Value	Maximum Value	Adjust Delay (sec)	Number of Saved Value Sets in File Operations	Value Meanings
Board Type	0x4E	-	√	√	-	-	-	None	4: ArtistaMedia-II 5: Prisma-IIIa
Volume	0x80	√	X	√	0	31	0,15	1-Set	
Balance	0x81	√	X	√	0	20	0,15	1-Set	
Bass	0x82	√	X	√	0	20	1,0	1-Set	
Treble	0x83	√	X	√	0	20	1,0	1-Set	
Stereo	0x84	√	X	√	0	1	0,15	1-Set	0: Stereo 1: Mono
Mute(Speakers)	0x85	√	X	√	0	1	0,3	1-Set	0: Off 1: On(Muted)
Audio input port for HDMI1 (external port)	0x8D	√	X	X	0	5	0,2	1-Set	0: Audio Off 1: Line-In 2: Internal 5: HDMI Audio
Audio input port for HDMI2 (internal port)	0x8E	√	X	X	0	5	0,2	1-Set	0: Audio Off 1: Line-In 2: Internal 5: HDMI Audio

¹ See Section 4.7 for detailed explanation

² See Section 4.8.1.6 for detailed explanation

³ CCC: Check the connection continuously. See Section 4.8.1.2 for detailed explanation of this function

⁴ FWR: Make firmware request to get this function's minimum and maximum values

⁵ See Section 4.8.1.1 for detailed explanation

⁶ See Section 4.8.1.15 for detailed explanation

⁷ It is not possible to switch to an input port when this port is disabled in the FW. Ports can be enabled with SW tools from DataDisplay (MarsRover) or by using customized FW versions. In our standard FW ports 0 to 5 are enabled on Prisma-IIIa and ports 1 and 2 are enabled on ArtistaMedia-II.

⁸ Not all combinations of Main- and PIP input ports are possible. The possible combinations are listed in the datasheet of Prisma-IIIa. ArtistaMedia-II does not support PIP.

Table 6

Function Name	Function ID (Hex)	Response after adjust	Read Only	Always Enabled	Minimum Value	Maximum Value	Adjust Delay (sec)	Number of Saved Value Sets in File Operations	Value Meanings
Firmware Version	0x35	-	√	√	-	-	-	None	Firmware Version response bit (14:10).bit (9:5). bit (4:0)

4.6 Availability of Controls

Table 7

Function Name	Function ID (Hex)	Disabled according to another setting	Disabled according to changed input and resolution	Supported for only main input	Disabled according to used firmware	Description
Scheme	0x01				√	Available if firmware saves settings according to active scheme. <i>Control Function → Firmware Properties → BIT0 will be "1" if this control is available.</i>
Brightness ⁷	0x02	√			√	Not available if "Light Sensor" is supported by the firmware and "Auto Brightness" is "On". <i>Control Function → Firmware Properties → BIT3 will be "1" if "Light Sensor" is supported by firmware.</i>
Saturation	0x04		√			Available if the resolution is not graphics mode.
Hue	0x05		√			
Red Gain	0x09	√				Available if "Color Temperature" setting is "User".
Green Gain	0x0A	√				
Blue Gain	0x0B	√				
Red Offset	0x0C	√				
Green Offset	0x0D	√				
Blue Offset	0x0E	√				
ADC Calibration	0x51		√	√		Available for only main input and analog input types.
CCS Mode	0x0F		√	√		Available for only main input and resolution of main input should be video mode or interlaced input.
Dynamic NR Mode	0x10		√	√		
MPEG NR Mode	0x45		√	√		
MPEG NR	0x46		√	√		
Main DCDi	0x11		√	√		
Main MADI Mode	0x12		√	√		
Film Mode Detection	0x13		√	√		Available for only main input and resolution of main input should be video mode or interlaced input. Also, "Film Mode Detection" setting should be "Video-3:2-2:2" or "Video-3:2" and panel parameters should be defined for Film Display Mode.
Film Display Mode	0x14	√	√	√		
Aspect Ratio	0x15					Normally this control is enabled if "Tiling Status" setting is not "On". But, "Letter Box (Expand)", "Pillar Box (Expand)", "Panoramic" and "1:1" options are not available according to input resolution, panel resolution and "Pip Mode" combination.

Function Name	Function ID (Hex)	Disabled according to another setting	Disabled according to changed input and resolution	Supported for only main input	Disabled according to used firmware	Description
Pip Mode	0x16				√	Not available if firmware does not support pip option. <i>Control Function</i> → <i>Firmware Properties</i> → <i>BIT1</i> will be "1" if this control is available.
PIP Vertical Position	0x17	√			√	Not available if firmware does not support pip option. Also, "Pip Mode" setting should be "Large Pip" or "Small Pip". <i>Control Function</i> → <i>Firmware Properties</i> → <i>BIT1</i> will be "1" if pip option is available.
PIP Horizontal Position	0x18	√			√	
Pip Transparency	0x4F	√			√	
Tiling Status	0x4D	√			√	
Auto Adjust	0x19		√			Available if input type is VGA.
VGA Vertical Position	0x1A		√			
VGA Horizontal Position	0x1B		√			
Phase	0x1C		√			
Clock	0x1D		√			
Mode Selection 350/400	0x1F		√			
Mode Selection 768	0x20		√			
Mode Selection 1050	0x3A		√			
HDMI/DVI Video Width	0x21		√			Available if the resolution is video mode and adjusted input type is HDMI. Also, "Aspect Ratio" setting shouldn't be "Panoramic" while "Tiling Status" is "Off".
HDM/DVII Video Height	0x22		√			
HDMI/DVI Horizontal Start	0x23		√			
HDMI/DVI Vertical Start	0x24		√			
Mode Selection 1080p (HDMI/DVI)	0x1E		√			Available if input type is HDMI/DVI. Also, "Aspect Ratio" setting shouldn't be "Panoramic" while "Tiling Status" is "Off".
Mode Selection 720p (HDMI/DVI)	0x3B		√			
SOG Video Width	0x25		√			Available if input type is Component. Also, "Aspect Ratio" setting shouldn't be "Panoramic" while "Tiling Status" is "Off".
SOG Video Height	0x26		√			
SOG Horizontal Start	0x27		√			
SOG Vertical Start	0x28		√			

Function Name	Function ID (Hex)	Disabled according to another setting	Disabled according to changed input and resolution	Supported for only main input	Disabled according to used firmware	Description
NTSC Video Width	0x29		√			Available if the resolution is NTSC and adjusted input type is S-Video, or Composite. Also, "Aspect Ratio" setting shouldn't be "Panoramic" while "Tiling Status" is "Off".
NTSC Video Height	0x2A		√			
NTSC Horizontal Start	0x2B		√			
NTSC Vertical Start	0x2C		√			
PAL Video Width	0x2D		√			Available if the resolution is NTSC and adjusted input type is S-Video, or Composite. Also, "Aspect Ratio" setting shouldn't be "Panoramic" while "Tiling Status" is "Off".
PAL Video Height	0x2E		√			
PAL Horizontal Start	0x2F		√			
PAL Vertical Start	0x30		√			
OSD Horizontal Flip	0x35	√				Available if "OSD Rotation" option is "Off".
OSD Vertical Flip	0x36	√				
OSD Rotation	0x37	√			√	Available according to panel size and "OSD Zoom" setting.
OSD Zoom	0x38	√			√	Available according to panel size and "OSD Rotation" setting.
Auto Brightness	0x3C				√	Available if firmware supports Light Sensor. <i>Control Function</i> → <i>Firmware Properties</i> → <i>BIT3</i> will be "1" if this control is available.
PIP Source Input	0x3E				√	Not available if firmware does not support pip option. <i>Control Function</i> → <i>Firmware Properties</i> → <i>BIT1</i> will be "1" if this control is available.
Audio input port (HDMI1)	0x8D				√	Not available if firmware does not support HDMI1 input.
Audio input port (HDMI2)	0x8E				√	Not available if firmware does not support HDMI2 input.

4.7 File Operations

All settings are saved in the NVRAM of the firmware. Some of these functions have a different variable for each input type or scheme (multiple set). See Table 5, Column “Number of Saved Value Sets in File Operations”.

If saving type is input (port) dependent and board is ArtistaMedia-II, there are 2-sets of variables (HDMI1, HDMI2).

If saving type is input (port) dependent and board is Prisma-IIIa, there are 5 to 8-sets of variables (VGA, DVI, Composite, S-Video, Component, RGB+CS, Composite2, HDMI).

If saving type is scheme dependent there are 5-sets of variables (Normal, Vivid, Cinema, Game, Sport). See Section 4.8.1.15.2 to get information related with getting saving type using “Control Function”.

“Aspect Ratio” always has 2-sets of variables each for different input (port) type with ArtistaMedia-II.

“Aspect Ratio” always has 5 to 8-sets of variables each for different input (port) type with Prisma-IIIa.

“Sharpness” always has 2-sets (for main video input, main graphics input) with ArtistaMedia-II.

“Sharpness” always has 4-sets (for main video input, PIP video input, main graphics input, PIP graphics input) with Prisma-IIIa.

These are special cases.

The Remote OSD functions to get and set these value-sets are intended for saving firmware settings to a file or loading the settings from a saved file. For example with file operations you can get the aspect ratio value of Component Video input when there is RGB input at the main display and HDMI1/DVI input at the PIP display. If the request is not a file operation, the File Operation byte (7th byte) must be 0xFF. If it is a file operation for a multi-set control, the selected inputs/schemes’ value must be sent; while if it is a file operation for a 1-set control, 0x80 must be sent (See Table 8).

Table 8

File Operation Type				File Operation Byte
Not File Operation				0xFF
1-Set				0x80
Multi Set	Normal		VGA	0x00
	Vivid	HDMI1	DVI	0x01
	Cinema	HDMI2	Composite	0x02
	Game		S-Video	0x03
	Sport		Component	0x04
			RGB+CS	0x05
			Composite2	0x06
			HDMI	0x07
				0x08
				0x09

In file operations, only the Read/Adjust flag is important for the sender. There is no min or max defined for file operations. Main and PIP inputs do not make a difference either. However in responses, Main and PIP input change flags have to be checked.

Loading from a previously saved file means to adjust the variables using “file operation adjust”. The adjustment operation is executed if the sent value is within the defined range of the function. Otherwise the adjustment is not executed and the current values remain. All the adjustments are done after sending the “Main Source Input” file adjust command (so, this command should be at the end of file operations). After this, connection check has to be done to clear input change flags.

4.8 Sample Request and Response Packets with Explanations

This section includes examples referring to both regular commands and commands with special conditions and behaviour. The commands not included here follow the default rules and tables.

4.8.1 Read and Adjust Examples

4.8.1.1 Power

Power Off Type:

Both boards have two different power off types:

- Full Power-Off: The board goes to this mode if it is powered off via power button of keypad or infrared remote control while the “Power Off Type“ setting is 1. If the board is in this mode it cannot be powered on using the remote osd protocol, since the serial port does not work in this mode.
- Quasi Power-Off: The board goes to this mode if it is powered off via remote osd protocol, or if the board is powered off via power button of keypad or infrared remote control while the “Power Off Type“ setting is 0.

Power consumption of these power off types:

ArtistaMedia-II	Current Consumpition	Unit
12V Full Power-Off	350	mA
12V Quasi Power-Off	530	mA

Prisma-IIIa	Current Consumpition	Unit
12V Full Power-Off	17	mA
12V Quasi Power-Off	240	mA

Request Explanations	Request (Hex)	Response (Hex)	Response Explanations
Length	0x08	0x08	Length
Remote OSD	0x34	0x34	Remote OSD
Power Off type	0x47	0x47	Power Off type
Main read	0x00	0x00	Main read
-	0x00	0x00	1: Full Power Off
	0x00	0x01	
Not file operation	0xFF	0xFF	Not file operation
Checksum	0x7E	0x7D	Checksum

In the example above, there is a read request for “Power Off Type“ and “Power Off Type“ is 1 (FullPower Off).

Power Off :

Request Explanations	Request (Hex)	Response (Hex)	Response Explanations
Length	0x08	0x08	Length
Remote OSD	0x34	0x34	Remote OSD
Power	0x3F	0x3F	Power
Main Adjust	0x02	0x02	Main Adjust
Adjust to 0:Off	0x00	0x00	Adjusted to 0:Off
	0x00	0x00	
Not file operation	0xFF	0xFF	Not file operation
Checksum	0x84	0x84	Checksum

In the example above, there is a "Power Off" request and adjustment is done successfully.

Power On :

Request Explanations	Request (Hex)	Response (Hex)	Response Explanations
Length	0x08	0x08	Length
Remote OSD	0x34	0x34	Remote OSD
Power	0x3F	0x3F	Power
Main Adjust	0x02	0x02	Main Adjust
Adjust to 1:On	0x00	0x00	Adjusted to 1:On
	0x01	0x01	
Not file operation	0xFF	0xFF	Not file operation
Checksum	0x83	0x83	Checksum

4.8.1.2 Connection Check

Request Explanations	Request (Hex)	Response (Hex)	Response Explanations
Length	0x08	0x08	Length
Remote OSD	0x34	0x34	Remote OSD
Connection check	0x00	0x00	Connection check
Read	0x00	0x00	Read
-	0x00	0x00	1: Valid Sync
	0x00	0x01	
Not file operation	0xFF	0xFF	Not file operation
Checksum	0xC5	0xC4	Checksum

In this example, there is a “Connection Check” request to check the board’s status. Response is “Valid Sync “(0x0001), means “board is powered on and main signal is stable”. All controls can be used after getting this answer till there is input/resolution change or power status change.

If response is “Powered Off”(0x0002) means board is powered off. Only limited controls available in this state (“Connection Check”, “Power”, “Control Function”, “Protocol Version” and “Board Type”).

If response is “No Sync”(0x0003), this means board is powered on but, main input is not stable. Only limited controls available in this state(“Main Source Input”, “Connection Check”, “Power”, “Power Off Type“, “Control Function”, “Protocol Version” and “Board Type”).

This function needs to be executed for the controls respond before adjustment. Controls respond before adjustment can be checked from Table 5. Find in the adjust delay column the worst case delay. If the abbreviation “CCC” is found next to the worst case delay, this means that there is no delay period to be considered. In this case connection check requests must be sent again and again until “Valid Sync” response is received. If “CCC” is not seen, then connection check request must be sent after the given adjust delay period. A connection check “Valid Sync” response will be received when the main source is stable for the board.

“Connection Check” is also used to clear “Main input change flag” and “Pip input change flag“. See Section 4.4.

4.8.1.3 Brightness

Request Explanations	Request (Hex)	Response (Hex)	Response Explanations
Length	0x08	0x08	Length
Remote OSD	0x34	0x34	Remote OSD
Brightness control	0x02	0x02	Brightness control
Main read	0x00	0x00	Main read
-	0x00	0x00	Brightness value
	0x00	0x40	
Not file operation	0xFF	0xFF	Not file operation
Checksum	0xC3	0x83	Checksum

In the example above, there is a read request for the current main input’s brightness value. The response gives the information that the current brightness value of the main input is 0x0040 (Hex) (0x0040=64(Dec)).

4.8.1.4 Image Scheme

Request Explanations	Request (Hex)	Response (Hex)	Response Explanations
Length	0x08	0x08	Length
Remote OSD	0x34	0x34	Remote OSD
Scheme control	0x01	0x01	Scheme Control
Main adjust	0x02	0x02	Main adjust
Adjust to 1: Vivid	0x00	0x00	Adjusted to 1: Vivid
	0x01	0x01	
Not file operation	0xFF	0xFF	Not file operation
Checksum	0xC1	0xC1	Checksum

In the example above, there is an adjust request for the “Scheme” setting. After changing “Scheme” setting, color setting should be updated (brightness, contrast, saturation, hue, color temperature and red/green/blue gain/offset); because “Scheme” setting can change all these settings.

4.8.1.5 Clock

Request Explanations	Request (Hex)	Response (Hex)	Response Explanations
Length	0x08	0x08	Length
Remote OSD	0x34	0x34	Remote OSD
Clock	0x1D	0x1D	Clock
Main minimum value	0x04	0x04	Main minimum value
-	0x00	0x06	Clock level minimum value
	0x00	0xA6	
Not file operation	0xFF	0xFF	Not file operation
Checksum	0xA4	0xF8	Checksum

In this example, there is a read request for the minimum value of the main clock control. The response gives the information that the minimum value of the main clock control is 0x06A6 (Hex) (0x06A6 = 1702(Dec)).

4.8.1.6 Aspect Ratio

Normally this control is enabled if “Tiling Status” setting is not “On”. But, “Letter Box (Expand)”, “Pillar Box (Expand)”, “Panoramic” and “1:1” options are not available according to input resolution, panel resolution and “Pip Mode” combination.

If you choose one of these options and this option is not available, no adjustment is done; the current value is returned.

Request Explanations	Request (Hex)	Response (Hex)	Response Explanations
Length	0x08	0x08	Length
Remote OSD	0x34	0x34	Remote OSD
Aspect ratio	0x15	0x15	Aspect Ratio
PIP adjust	0x03	0x03	PIP adjust
Adjust to 3: Panoramic	0x00	0x00	Not adjusted. Current value (0: Full Screen) returned.
	0x03	0x00	
Not file operation	0xFF	0xFF	Not file operation
Checksum	0xAA	0xAD	Checksum

In the above example, the sender wants to set the aspect ratio of pip input value to “panoramic”, but no adjustment is done because panoramic is not available.

4.8.1.7 Hue

Request Explanations	Request (Hex)	Response (Hex)	Response Explanations
Length	0x08	0x08	Length
Remote OSD	0x34	0x34	Remote OSD
Hue control	0x05	0x05	Hue Control
Main read	0x00	0x10	Disabled control
-	0x00	0x00	Not valid.
	0x00	0x00	
Not file operation	0xFF	0xFF	Not file operation
Checksum	0xC0	0xB0	Checksum

In this example, there is a read request for the current main input's hue value. Disabled flag is set in the response. So, detected mode of main input is graphics mode.

4.8.1.8 PIP Vertical Position

Request Explanations	Request (Hex)	Response (Hex)	Response Explanations
Length	0x08	0x08	Length
Remote OSD	0x34	0x34	Remote OSD
PIP Vertical Position	0x17	0x17	PIP Size control
PIP read	0x01	0x11	Disabled control
-	0x00	0x00	-
	0x00	0x14	
Not File Op	0xFF	0xFF	Not File Op
Checksum	0xAD	0x99	Checksum

In this example, there is a read request for the "PIP Vertical Position". As the PIP OSD is opened in the sender side, the read request has been made as a PIP read. Disabled flag is set in the response. "PIP Vertical Position" control is disabled when the current PIP mode is not set to "Large PIP" or "Small PIP".

4.8.1.9 Auto Brightness

"Auto Brightness" is a setting which available with custom firmwares. See Section 4.8.1.15.2.

Request Explanations	Request (Hex)	Response (Hex)	Response Explanations
Length	0x08	0x08	Length
Remote OSD	0x34	0x34	Remote OSD
Auto Brightness	0x3C	0x3C	Auto Brightness
Main Adjust	0x02	0x02	Main Adjust
Adjust to 1: On	0x00	0x00	Adjusted to 1: On
	0x01	0x01	
Not File Op	0xFF	0xFF	Not File Op
Checksum	0x86	0x86	Checksum

In this example, there is an adjust request for "Auto Brightness" and adjustment is done successfully. After adjusting "Auto Brightness" to "On", "Brightness" adjustment will not be available till setting "Auto Brightness" changed to "Off".

4.8.1.10 Main Source Input

Request Explanations	Request (Hex)	Response (Hex)	Response Explanations
Length	0x08	0x08	Length
Remote OSD	0x34	0x34	Remote OSD
Main source input	0x3D	0x3D	Main source input
Main adjust	0x02	0x82	Main adjust, Response sent before adjustment
Adjust to 0: VGA	0x00	0x00	Adjusted to 0: VGA
	0x00	0x00	
Not File Operation	0xFF	0xFF	Not File Op
Checksum	0x86	0x06	Checksum

In this example, there is an adjust request (it can be done with either main adjust (0x02), or PIP adjust (0x03), which does not affect the current function) to set the main source input to VGA. Response sent before adjustment for this command. You should send a connection check request in order to understand if the firmware is ready to communicate and make new adjustments, and also to prevent receiving the main input change flag in the following responses.

If Connection Check's answer is "Valid Input", this mean input is set to the selected input or another available input (if firmware supports input search -input search is enabled with standard firmwares-). User should read the main and the PIP input sources after making a connection check; because inputs can be changed due to input search.

You should keep sending connection check requests again and again until a "Valid Input" is received. The worst-case waiting period is given in Table 5, column "Adjust delay". For example, you can send connection check requests with 1 second intervals until a response is received. The delay of the answer depends on the combination of the currently available source types.

If response is still "No Sync"(0x0003), this mean main input is not stable. Only limited controls available in this state ("Main Source Input", "Connection Check", "Power", "Power Off Type", "Control Function", "Protocol Version" and "Board Type").

4.8.1.11 Film Mode Detection

In this example, there is an adjust request for "Film Mode Detection". The adjustment operation has been performed.

Request Explanations	Request (Hex)	Response (Hex)	Response Explanations
Length	0x08	0x08	Length
Remote OSD	0x34	0x34	Remote OSD
Film Mode Detection	0x13	0x13	Film Mode Detection
Main Adjust	0x02	0x02	Main Adjust
Adjust to 0: Off	0x00	0x00	Adjust to 0: Off
	0x00	0x02	
Not File Operation	0xFF	0xFF	Not File Operation
Checksum	0xB0	0xAE	Checksum

After adjusting "Film Mode Detection", enabled/disabled status of "Film Display Mode" can be checked. Because enabled/disabled status of "Film Display Mode" can be changed according to "Film Mode Detection" setting.

Status checking is done afterwards:

Request Explanations	Request (Hex)	Response (Hex)	Response Explanations
Length	0x08	0x08	Length
Remote OSD	0x34	0x34	Remote OSD
Film Display Mode	0x14	0x14	Film Display Mode
Main Read	0x00	0x10	Disabled Function
-	0x00	0x00	-
	0x00	0x00	
Not File Operation	0xFF	0xFF	Not File Operation
Checksum	0xB1	0xA1	Checksum

“Film Display Mode” function has become disabled.

4.8.1.12 Protocol Version

Request Explanations	Request (Hex)	Response (Hex)	Response Explanations
Length	0x08	0x08	Length
Remote OSD	0x34	0x34	Remote OSD
Protocol version	0x44	0x44	Protocol version
Main Read	0x00	0x00	Main Read
-	0x00	0x04	Protocol version 1.0.0
	0x00	0x00	
Not File Operation	0xFF	0xFF	Not File Operation
Checksum	0x81	0x7D	Checksum

This example shows a protocol version request. This is a read only Remote OSD function. Certain bits in the response show certain segments of the version info. The least significant five bits (4:0) show the least significant digit, the next five bits (9:5) show the middle digit and the next five bits (14:10) show the most significant digit. In the above example the received value is 0x40.

The version digits are:

$$(0x0400 \vee 0x7C00) \gg 10 = 1$$

$$(0x0400 \vee 0x03E0) \gg 5 = 0$$

$$(0x0400 \vee 0x001F) = 0,$$

which makes the version 1.0.0. The first two digits correspond to major changes.

4.8.1.13 Resolution and Refresh Rate

Request Explanations	Request (Hex)	Response (Hex)	Response Explanations
Length	0x08	0x08	Length
Remote OSD	0x34	0x34	Remote OSD
Horizontal Resolution	0x41	0x41	Horizontal Resolution
PIP Read	0x01	0x01	PIP Read
-	0x00	0x05	H Resolution value of PIP input
	0x00	0x00	
Not File Operation	0xFF	0xFF	Not File Operation
Checksum	0x83	0x7E	Checksum

In this example, there is a read request for the PIP input’s horizontal resolution value. The response gives 0x0500(Hex). (0x0500=1280(Dec)). Resolution and refresh rate functions are read only.

In refresh rate function, the response sent is rounded value of the real value. For example if the refresh rate is 60.1 Hz, the firmware sends 60(Dec) in the response packet.

4.8.1.14 Board Type

Request Explanations	Request (Hex)	Response (Hex)	Response Explanations
Length	0x08	0x08	Length
Remote OSD	0x34	0x34	Remote OSD
Board Type	0x4E	0x4E	Board Type
Main Read	0x00	0x00	Main Read
-	0x00	0x00	4: ArtistaMedia-II
	0x00	0x04	
Not File Operation	0xFF	0xFF	Not File Operation
Checksum	0x77	0x73	Checksum

In this example, there is a read request for the “Board Type”. “Board Type” is ArtistaMedia-II. This control can be used to be sure about the connected board.

4.8.1.15 Control Function

Control function is for making checks that are related to more than one item of the OSD or making checks related with firmware's available functions and properties. Unlike the other commands, control functions use the sub-function byte for the control's type. Table 9 shows the sub-function IDs and the responses for the control functions.

Table 9

Control Function Name	Sub-function ID	Return value meanings	
Supported Inputs by firmware	0x00	<i>Least Significant Byte</i> BIT1: HDMI1 BIT2: HDMI2	<i>Least Significant Byte</i> BIT0: VGA BIT1: DVI BIT2: Composite BIT3: S-Video BIT4: Component BIT5: RGB+CS BIT6: Composite2 BIT7: HDMI
Firmware Properties	0x01	BIT0: Save type BIT1: Pip Availability BIT2: Display's aspect ratio BIT3: Light Sensor support	
Are OSD functions available for PIP Input	0x02	0: Not available 1: Available	
Are video controls available for main input	0x03	0: Not available 1: Available	
Are video controls available for pip input	0x04	0: Not available 1: Available	
Position menu type of main input	0x05	1: HDMI Graphics Menu 2: HDMI Video Menu 8: No menu	0: VGA Graphics Menu 1: DVI Graphics Menu 2: DVI Video Menu 3: SOG menu 4: PAL menu 5: NTSC menu 6: No menu
Position menu type of pip input	0x06		0: VGA Graphics Menu 1: DVI Graphics Menu 2: DVI Video Menu 3: SOG menu 4: PAL menu 5: NTSC menu 6: No menu

4.8.1.15.1 Supported Inputs by firmware

Request Explanations	Request (Hex)	Response (Hex)	Response Explanations
Length	0x08	0x08	Length
Remote OSD	0x34	0x34	Remote OSD
Control Function	0x40	0x40	Control Function
Supported Inputs	0x00	0x00	Supported Inputs
-	0x00	0xFF	0x00 & 0xFF: All of the inputs are available for Prisma-IIIa
Not File Operation	0xFF	0xFF	Not File Operation
Checksum	0x85	0x86	Checksum

In the above example the supported inputs by Prisma-IIIa firmware is checked. All the inputs are available.

4.8.1.15.2 Firmware Properties

Request Explanations	Request (Hex)	Response (Hex)	Response Explanations
Length	0x08	0x08	Length
Remote OSD	0x34	0x34	Remote OSD
Control Function	0x40	0x40	Control Function
Firmware Properties	0x01	0x01	Are OSD functions available for PIP Input
-	0x00	0x00	
-	0x00	0x07	
Not File Operation	0xFF	0xFF	Not File Operation
Checksum	0x84	0x7D	Checksum

In the above example firmware properties is checked.

- Save type (BIT0): There are two types of saving color settings (Brightness, contrast, saturation, hue, color temperature and red/green/blue gain/offset).
 1. Scheme Dependent: This is the default setting. Color settings are saved according to selected scheme (normal, vivid, cinema, game, sport). BIT0 is 1 for this case.
 2. Port Dependent: Color settings are saved according to selected main input. BIT0 is 0 for this case. "Scheme" control is disabled for this case.

Save type is "Scheme Dependent" with this example.

- Pip Availability (BIT1): If BIT1 is set, firmware supports PIP property. If PIP is not supported, "PIP Source Input", "Pip Mode", "PIP Vertical Position", "PIP Horizontal Position" controls are not available. Also, firmware will set disabled flag if you make read or adjust requests for these controls. Pip is available with this example.
- Display Aspect Ratio (BIT2): This control can be used to name the "Aspect Ratio" types.
 1. (16:9): Display aspect ratio is 16:9 if BIT2 is 1. "Pillar Box" and "Letter Box Expand" names are used with this kind of displays.
 2. (4:3): Display aspect ratio is 4:3 if BIT2 is 0. "Pillar Box Expand" and "Letter Box" names are used with this kind of displays.

Display aspect ratio is 16:9 with this example.

- Light Sensor Support (BIT3): If BIT3 is set, firmware supports light sensor. If light sensor is not supported, "Auto Brightness" control is not available. Also, firmware will set disabled flag if you make read or adjust requests for this control. If firmware supports light sensor and "Auto Brightness" setting is "On", "Brightness" control is not available. Light sensor is not supported with this example.

4.8.1.15.3 Are OSD functions available for PIP Input

When there is no signal at the PIP input, pip input related controls can not be used. In Remote OSD Control commands, the distinction between main menu and the PIP menu are done with a single bit (Input Flag, 0th bit) in the sub-function byte. This control function has to return true before setting this flag in order to read and adjust OSD functions for PIP input.

Request Explanations	Request (Hex)	Response (Hex)	Response Explanations
Length	0x08	0x08	Length
Remote OSD	0x34	0x34	Remote OSD
Control Function	0x40	0x40	Control Function
Are OSD functions available for PIP Input	0x02	0x02	Are OSD functions available for PIP Input
-	0x00	0x00	0: PIP functions not available
-	0x00	0x00	
Not File Operation	0xFF	0xFF	Not File Operation
Checksum	0x83	0x83	Checksum

For example: If selected pip input is HDMI/DVI and sync not detected, HDMI/DVI position controls can not be used.

4.8.1.15.4 Are video controls available for main/pip input

Video controls are available only in specific cases (only for main input and if the detected mode is video mode or interlaced input).

Video controls are "CCS Mode", "Dynamic NR Mode", "MPEG NR Mode", "MPEG NR" "Main DCDi", "Main MADi Mode", "Film Mode Detection", "Film Display Mode".

Request Explanations	Request (Hex)	Response (Hex)	Response Explanations
Length	0x08	0x08	Length
Remote OSD	0x34	0x34	Remote OSD
Control Function	0x40	0x40	Control Function
Are video controls available for main input	0x03	0x03	Are video controls available for main input
-	0x00	0x00	1: Video controls are available for main input
-	0x00	0x01	
Not File Operation	0xFF	0xFF	Not File Operation
Checksum	0x82	0x81	Checksum

In the example above, video controls are available.

Same control could be done also for pip input. But because of controller capabilities the response is always 0x0000 (disabled).

4.8.1.15.5 Position menu type of main/pip input

Position menu controls change according to selected input and detected resolution (Table 10). This control can be used to check which menu type is available for the current state of main/pip input.

Table 10

Response	Available Controls	Description
0: VGA Graphics Menu	"Auto Adjust " "VGA Vertical Position " "VGA Horizontal Position" "Phase" "Clock" "Mode Selection 350/400" "Mode Selection 768" "Mode Selection 1050"	Input is VGA.
1: HDMI/DVI Graphics Menu	"Mode Selection 1080p" "Mode Selection 720p"	Resolution is graphics mode and input is HDMI/DVI.
2: HDMI/DVI Video Menu	"HDMI/DVI Video Width" "HDMI/DVI Video Height" "HDMI/DVI Horizontal Start" "HDMI/DVI Vertical Start" "Mode Selection 1080p" "Mode Selection 720p"	Resolution is video mode and input is HDMI/DVI. Also, "Aspect Ratio" setting shouldn't be "Panoramic" while "Tiling Status" is "Off".
3: SOG Menu	"SOG Video Width" "SOG Video Height" "SOG Horizontal Start" "SOG Vertical Start"	Input is Component Video. Also, "Aspect Ratio" setting shouldn't be "Panoramic" while "Tiling Status" is "Off".
4: PAL Menu	"PAL Video Width" "PAL Video Height" "PAL Horizontal Start" "PAL Vertical Start"	Resolution is PAL and input is S-Video or Composite. Also, "Aspect Ratio" setting shouldn't be "Panoramic" while "Tiling Status" is "Off".
5: NTSC Menu	"NTSC Video Width" "NTSC Video Height" "NTSC Horizontal Start" "NTSC Vertical Start"	Resolution is NTSC and input is S-Video or Composite. Also, "Aspect Ratio" setting shouldn't be "Panoramic" while "Tiling Status" is "Off".
6: No Menu	---	Other cases("Aspect Ratio" setting is "Panoramic" while "Tiling Status" is "On" or input is not stable/detected)
8: No Menu	---	Other cases("Aspect Ratio" setting is "Panoramic" while "Tiling Status" is "On" or input is not stable/detected)

Request Explanations	Request (Hex)	Response (Hex)	Response Explanations
Length	0x08	0x08	Length
Remote OSD	0x34	0x34	Remote OSD
Control Function	0x40	0x40	Control Function
Position menu type of pip input	0x03	0x03	Position menu type of pip input
-	0x00	0x00	2: Video menu type is "HDMI/DVI Video Menu"
	0x00	0x02	
Not File Operation	0xFF	0xFF	Not File Operation
Checksum	0x82	0x80	Checksum

In the example above, position menu type is checked for pip input. Position menu type is "HDMI/DVI Video Menu", so available controls are "HDMI/DVI Video Width", "HDMI/DVI Video Height", "HDMI/DVI Horizontal Start", "HDMI/DVI Vertical Start", "Mode Selection 1080p" and "Mode Selection 720p".

This control is useful to enable/disable group of controls together.

Also, disabled flag will be set in the response if you make read/adjust request for other position controls.

4.8.2 File Operation Examples

4.8.2.1 Color Temperature

Request Explanations	Request (Hex)	Response (Hex)	Response Explanations
Length	0x08	0x08	Length
Remote OSD	0x34	0x34	Remote OSD
Color temperature control	0x08	0x08	Color Temperature control
Read	0x00	0x00	Read
-	0x00	0x00	Not adjusted. Current value (0: 7200K) returned.
	0x00	0x05	
File Op. for "Normal" or "VGA"	0x00	0x00	File Op. for "Normal" or "VGA"
Checksum	0xBC	0xB7	Checksum

In the above example, saved (in NVRAM) "Color Temperature" value for the "VGA" input or "Normal" scheme is requested. See Section 4.7 for detailed information.

4.8.2.2 PIP Mode

Request Explanations	Request (Hex)	Response (Hex)	Response Explanations
Length	0x08	0x08	Length
Remote OSD	0x34	0x34	Remote OSD
PIP Mode	0x16	0x16	PIP Mode
Adjust	0x02	0x02	Adjust
Adjust to 1: "Large Pip"	0x00	0x00	Adjusted to 1: "Large Pip"
	0x01	0x01	
File Op. for 1-Set value	0x80	0x80	File Op. for 1-Set value
Checksum	0x2B	0x2B	Checksum

In this example, "PIP Mode" adjust is requested. This is a one-set function. Setting will be active after "Main Source Input" file adjust command is executed. See Section 4.7.

4.8.3 Input Change Examples

See Section 4.4 for explanation about input changes.

4.8.3.1 Main Input Change

Request Explanations	Request (Hex)	Response (Hex)	Response Explanations
Length	0x08	0x08	Length
Remote OSD	0x34	0x34	Remote OSD
Brightness control	0x02	0x00	-
Main read	0x00	0x20	Main Input change
-	0x00	0x00	-
	0x00	0x00	
Not file operation	0xFF	0xFF	Not file operation
Checksum	0xC3	0xA5	Checksum

In this example, brightness read request has been sent for the main input. Before this request, main input has changed. Therefore the main input change flag in the sub-function byte is set. The response value should not be taken into account. The sender should follow the procedure described in Section 4.4 and Section 4.8.1.2 should be followed.

4.8.3.2 PIP Input Change

Request Explanations	Request (Hex)	Response (Hex)	Response Explanations
Length	0x08	0x08	Length
Remote OSD	0x34	0x34	Remote OSD
PIP Mode	0x16	0x00	-
Adjust	0x02	0x40	PIP Input change
Adjust to 1: Single	0x00	0x00	-
	0x01	0x00	
File Op. for 1-Set value	0x80	0xFF	File Op. for 1-Set value
Checksum	0x2B	0x85	Checksum

In this example, PIP mode file operation adjustment request has been sent. Before this request, PIP input has changed. PIP input change flag in the sub-function byte is set. The response value should not be taken into account. The sender should follow the procedure described in Section 4.4 and Section 4.8.1.2 should be followed with one difference: PIP input change does not affect the main input source. Therefore the sender does not need to read the main input source related controls again.

4.9 Problems in Communication

If you cannot communicate with the board the possible reasons are:

- The cables are not connected properly.
- Firmware does not support Remote OSD protocol.

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