Video Converter, AVX-1920

MANUAL

V1.0

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Revision History

Amendment Date	Version
August 2009	V1.0

1 Introduction

The AVX-1920, a video converter and image processor, that turns a display or projector with a HDMI input into a powerful video display system with advanced features such as remote operation, flexible picture in picture, a wide range of color and image management functions as well as remote device control.

1.1 AVX-1920 Key Features

12-bit internal video processing with 10-bit color output
The AVX-1920 can output over 1 billion colors achieving unprecedented quality with the sharpest color.

Picture in Picture (PIP)
The AVX-1920 provides various scalable picture in picture modes, video-by-video & video-by-PC that enabling true format messaging applications.

On-Screen Markers
An innovative feature for specialist market needs the AVX-1920 supports input linked on-screen markers.

Advanced Image Control
A wide range of image and color management tools that give an unprecedented level of control and flexibility.

Wide Range of Inputs
The AVX-1920 supports HDMI, DVI, VGA, Component video, S-video and Composite video – with HDCP support on HDMI & DVI ports. Resolutions supported include all standard resolutions up to 1920x1080 (1080p).

Superior Professional Class Image Scaling
With powerful image up-scaling and down-scaling the AVX-1920 ensures input signals are adapted to whatever display is used.

Leading-Edge De-Interlacing
For both standard definition and HD resolutions the AVX-1920 utilizes the latest de-interlacing algorithms to ensure optimal quality output.
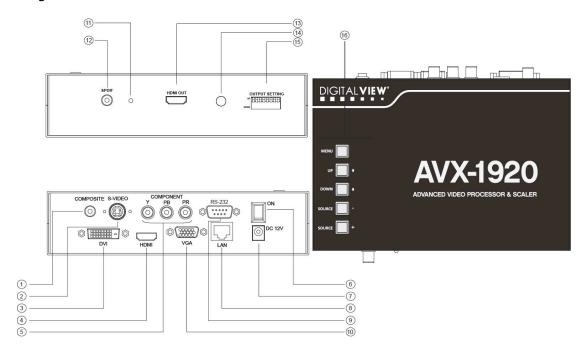
Selectable Output Resolutions
The AVX-1920 supports the native resolutions of all standard displays and projectors on the market.

1.2 Guide to the AVX-1920

Diagram 1 – AVX-1920

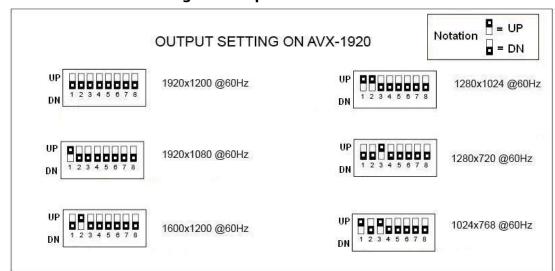| Item	Description	Type / Use
1	Composite Video input	RCA jack (yellow)
2	S-Video input	Mini DIN 5-pin connector
3	DVI input	DVI-D connector
4	HDMI input	HDMI type A connector
5	Component Video (YPbPr) input	RCA jack x3 (Red, Green, Blue)
6	Power On/Off switch	Rocker switch
7	12V DC power input	2.5mm power jack, center positive
8	Network, Ethernet	RJ45 connector
9	Serial port, RS-232	DB-9
10	VGA input	VGA DB-15-F connector
11	Power LED	On (green) / Off (clear)
12	Digital Audio output (SPDIF)	RCA jack (white)
13	HDMI output	HDMI type A connector
14	IR sensor	For use with DV remote control handset
15	Dip switch (8-pos)	Display output selection
16	Control buttons	OSD menu control

2 Setup

Basic setup involves 3 main steps:

1. Setting the DIP switches for the desired resolution output.
2. Connecting the proper cables and AC power adapter.
3. Switching on

2.1 Basic Setup Notes

The following provides a short introduction to the basic setup:

- **DIP Switch settings for output resolution**

- **Display**: There is a wide selection of displays in the marketplace that are suitable for use with the AVX-1920. Users are however recommended to consider the following:

   - As a general rule it is recommended to set the output resolution to the same resolution as the display to be used.

   - Aspect ratio: Many displays are widescreen with an aspect ratio of 16:9. However PAL/NTSC is 4:3. Consequently video output to widescreen displays may be stretched or shown with black bars.

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2.2 Operation & Control

The AVX-1920 functions and settings can be controlled a number of ways:

- The buttons located on the top of the AVX-1920; or
- Using the included Infra Red (IR) remote control handset;
- Via the RS-232 port (detail setup and control command protocols in appendix); or
- By network commands.

Buttons: The buttons on the AVX-1920 allow direct access to the On Screen Display (OSD) for the various functions and settings.

Controls	Buttons
Menu − Turns OSD menu On or Off (it will auto time off) − Back to previous OSD menu page	Menu button
Select down − Moves the selector to the next function (down)	SEL DN
Select up − Moves the selector to the previous function (up)	SEL UP
+ − Increase the OSD parameter values − Go into the sub-menu page from the top − Confirm to select the OSD function	+
- − Decrease the OSD parameter values − Go into the sub-menu page from the bottom	-
Reset to Factory Defaults	Press and hold SEL DN button, then power on the controller

IR Remote Control: The Digital View IR remote control for the AVX-1920 offers an alternative way to access the On Screen Display (OSD) for the various functions and settings.

IR control definition

BUTTON	FUNCTION
SOFT POWER BUTTON	Soft power ON/OFF button.
AV/TV BUTTON	Use to loop to the next the input source. (ARGB/Composite/S-Video/Component/..)
SEL UP (⋀) / SEL DN (⋁)	Use this button to direct control the hotkey function. Press the "SEL UP" button to increase the pre-set hotkey parameter value and the "SEL DN" button to decrease the pre-set hotkey parameter value. In OSD menu, pressing this button to select the items.
+ / - BUTTON	Use this button to direct control the hotkey function. Press the "+" button to increase the pre-set hotkey parameter value and the "-" button to decrease the pre-set hotkey parameter value. In OSD menu, pressing this button to adjust the settings.
PIP BUTTON	Use to display the PIP (picture in picture) window on screen.
OSD BACK BUTTON	Use to display the OSD menu and go to the previous OSD screen.
OSD NEXT BUTTON	Use to display the OSD menu and go to the next OSD screen.

STOP (RGB) BUTTON	In input source selection mode, pressing this button to select ARGB source.
PLAY (YCrCb) BUTTON	In input source selection mode, pressing this button to select Component source.
TRACK (S-Vid) BUTTON	In input source selection mode, pressing this button to select S-Video source.
TRACK (Comp) BUTTON	In input source selection mode, pressing this button to select Composite source.
FREEZE BUTTON	Use this button to freeze and release the picture on your screen.

OSD Functions: The following shows the various functions and settings available through the OSD.

Picture:

Brightness total: `[− |▮| +]` Increase/decrease panel brightness level, 100 steps

Contrast total: 100 `[− |▮| +]` Increase/decrease panel contrast level, steps

Saturation steps `[− |▮| +]` Increase/decrease saturation, total: 100

Hue ** steps `[− |▮| +]` Increase/decrease Hue level, total: 100

Sharpness* steps `[− |▮| +]` Increase/decrease sharpness, total: 30

Position##

Aspect / Size ⊠
    - Fill Screen : Enable full screen expansion for lower resolution Image
    - Fill to Aspect Ratio: Enable fill screen expansion for lower resolution image according to aspect ratio
    - 4 : 3 : scaling format in 4:3
    - 16 : 9 : scaling format in 16:9
    - 16 : 10 : scaling format in 16:10
    - 2.35 : 1 : scaling format in 2.35:1
    - 2 : 1 : scaling format in 2:1
    - 1 : 1 : Display the exact image resolution on the screen without image expansion.
    - Custom Sizing* :
        - Overscan
        - Normal
        - Custom/Underscan ⊠

           H Size `[− |▮| +]`
           H Pan `[− |▮| +]`
           V Size `[− |▮| +]`
           V Pan `[− |▮| +]`

* : DISPLAY IN VIDEO MODE ONLY
** : FUNCTION IN ARGB/ DVI / VIDEO NTSC MODE ONLY
: FUNCTION IN ARGB MODE ONLY

Source: Select the input video signal

Main Port Change ⊠
VGA#
DVI
HDMI
Composite 1
S-Video 1
Component 1

PIP Port change⊠
PIP Off / VGA / Composite 1 / S-Video 1 / Component 1 / DVI / HDMI

PIP Size⊠: Off / PIP Size 1~18 / Size by Size / Size by Size Tall
The PIP capability on display input sources refer to Appendix VII – PIP mix table

PIP Position:

PIP Transparency: 6.25% ~ 100%
PIP Swap: Swap between the main window and PIP window

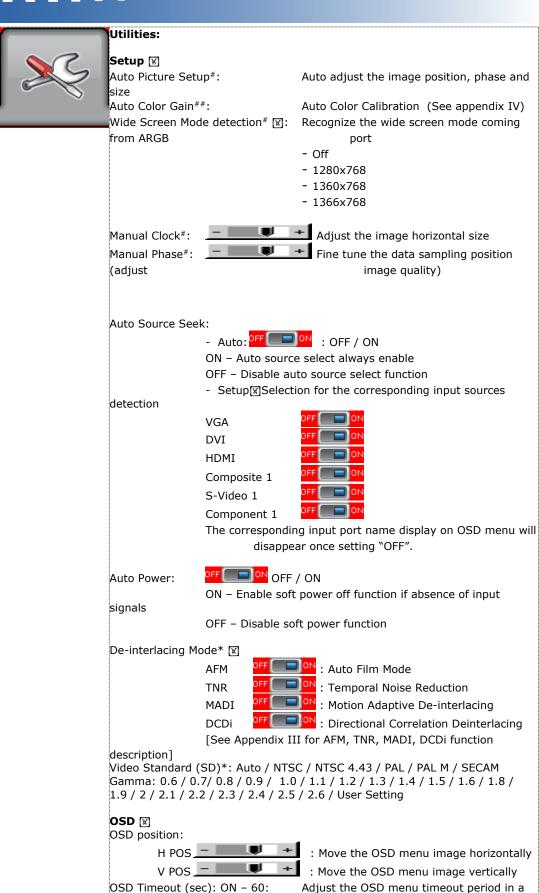PIP Auto Turn off: OFF ON :   OFF / ON
                                  ON: When PIP is no signal input after 30 seconds,   the PIP window will turn off automatically.

                                  OFF: PIP window keeps on

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Utilities:

Setup ⊠
Auto Picture Setup#:   Auto adjust the image position, phase and size
Auto Color Gain##:   Auto Color Calibration (See appendix IV)
Wide Screen Mode detection# ⊠:   Recognize the wide screen mode coming
from ARGB   port
                                                              - Off
                                                              - 1280x768
                                                              - 1360x768
                                                              - 1366x768

Manual Clock#:   [− ▣ +]   Adjust the image horizontal size
Manual Phase#:   [− ▣ +]   Fine tune the data sampling position
(adjust   image quality)

Auto Source Seek:
              - Auto: [OFF ▣ ON]   : OFF / ON
              ON – Auto source select always enable
              OFF – Disable auto source select function
              - Setup⊠Selection for the corresponding input sources
detection
              VGA   [OFF ▣ ON]
              DVI   [OFF ▣ ON]
              HDMI   [OFF ▣ ON]
              Composite 1   [OFF ▣ ON]
              S-Video 1   [OFF ▣ ON]
              Component 1   [OFF ▣ ON]
              The corresponding input port name display on OSD menu will
                            disappear once setting "OFF".

Auto Power: [OFF ▣ ON] OFF / ON
              ON – Enable soft power off function if absence of input
signals
              OFF – Disable soft power function

De-interlacing Mode* ⊠
              AFM   [OFF ▣ ON] : Auto Film Mode
              TNR   [OFF ▣ ON] : Temporal Noise Reduction
              MADI   [OFF ▣ ON] : Motion Adaptive De-interlacing
              DCDi   [OFF ▣ ON] : Directional Correlation Deinterlacing
              [See Appendix III for AFM, TNR, MADI, DCDi function
description]
Video Standard (SD)*: Auto / NTSC / NTSC 4.43 / PAL / PAL M / SECAM
Gamma: 0.6 / 0.7/ 0.8 / 0.9 / 1.0 / 1.1 / 1.2 / 1.3 / 1.4 / 1.5 / 1.6 / 1.8 /
1.9 / 2 / 2.1 / 2.2 / 2.3 / 2.4 / 2.5 / 2.6 / User Setting

OSD ⊠
OSD position:
              H POS [− ▣ +]   : Move the OSD menu image horizontally
              V POS [− ▣ +]   : Move the OSD menu image vertically
OSD Timeout (sec): ON – 60:   Adjust the OSD menu timeout period in a
step of 5
                                                              seconds (max 60 seconds)

RS-232 Control: The AVX-1920 can be controlled through the RS-232 port using the commands as summarized in Appendix II below. This provides comprehensive access to the functions and settings as provided by the OSD commands.

Network Control: The AVX-1920 provides two choices for control over a network:

- Browser based: With the default network port firmware the AVX-1920 network connection includes a web server and a default suite of web pages providing access to features and settings. Suitably qualified developers can customize these web pages.
- Direct control: The RS-232 command set (Appendix II) can be accessed over the network. This requires either an RS-232 program with virtual RS-232 port or a suitably written application. It will also require a change to the AVX-1920 network port firmware.

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APPENDIX I – SIGNAL SUPPORT MODE TABLE

ARGB (P1) PORT :

Mode	Resolution	Clk [MHz]	Horizontal freq [KHz]	Vertical freq [Hz]	Sync Mode
T_70	720x400 70Hz	28.322	31.469	70.087	Digital Separate Sync
T_70	720x400 70Hz	28.322	31.469	70.087	Sync On Green
V_60	640x480 60Hz	25.175	31.469	59.940	Digital Separate Sync
V_60	640x480 60Hz	25.175	31.469	59.940	Sync On Green
V_60	640x480 60Hz	25.175	31.469	59.940	Composite Sync
V_72	640x480 72Hz	31.500	37.861	72.809	Digital Separate Sync
V_72	640x480 72Hz	31.500	37.861	72.809	Sync On Green
V_72	640x480 72Hz	31.500	37.861	72.809	Composite Sync
V_75	640x480 75Hz	31.500	37.500	75.000	Digital Separate Sync
V_75	640x480 75Hz	31.500	37.500	75.000	Sync On Green
V_75	640x480 75Hz	31.500	37.500	75.000	Composite Sync
SV_56	800x600 56Hz	36.000	35.156	56.250	Digital Separate Sync
SV_56	800x600 56Hz	36.000	35.156	56.250	Sync On Green
SV_56	800x600 56Hz	36.000	35.156	56.250	Composite Sync
SV_60	800x600 60Hz	40.000	37.879	60.317	Digital Separate Sync
SV_60	800x600 60Hz	40.000	37.879	60.317	Sync On Green
SV_60	800x600 60Hz	40.000	37.879	60.317	Composite Sync
SV_72	800x600 72Hz	50.000	48.077	72.188	Digital Separate Sync
SV_72	800x600 72Hz	50.000	48.077	72.188	Sync On Green
SV_72	800x600 72Hz	50.000	48.077	72.188	Composite Sync
SV_75	800x600 75Hz	49.500	46.875	75.000	Digital Separate Sync
SV_75	800x600 75Hz	49.500	46.875	75.000	Sync On Green

SV_75	800x600 75Hz	49.500	46.875	75.000	Composite Sync
X_60	1024x768 60Hz	65.000	48.363	60.004	Digital Separate Sync
X_60	1024x768 60Hz	65.000	48.363	60.004	Sync On Green
X_60	1024x768 60Hz	65.000	48.363	60.004	Composite Sync
X_70	1024x768 70Hz	75.000	56.476	70.069	Digital Separate Sync
X_70	1024x768 70Hz	75.000	56.476	70.069	Sync On Green
X_70	1024x768 70Hz	75.000	56.476	70.069	Composite Sync
X_75	1024x768 75Hz	78.750	60.023	75.029	Digital Separate Sync
X_75	1024x768 75Hz	78.750	60.023	75.029	Sync On Green
X_75	1024x768 75Hz	78.750	60.023	75.029	Composite Sync
SX_60	1280x1024 60Hz	108	63.81	60.020	Digital Separate Sync
SX_60	1280x1024 60Hz	108	63.81	60.020	Sync On Green
SX_60	1280x1024 60Hz	108	63.81	60.020	Composite Sync
SX_75	1280x1024 75Hz	135	79.976	75	Digital Separate Sync
SX_75	1280x1024 75Hz	135	79.976	75	Sync On Green
SX_75	1280x1024 75Hz	135	79.976	75	Composite Sync
UX_60	1600x1200 60Hz	162	75.000	60	Digital Separate Sync
UX_60	1600x1200 60Hz	162	75.000	60	Sync On Green
UX_60	1600x1200 60Hz	162	75.000	60	Composite Sync
WUX_60	1920x1080 60Hz	172.8	67.5	60	Digital Separate Sync
WUX_60	1920x1080 60Hz	172.8	67.5	60	Sync On Green
WUX_60	1920x1080 60Hz	172.8	67.5	60	Composite Sync
WUX_60	1920x1200 60Hz	193.2	74.5	60	Digital Separate Sync
WUX_60	1920x1200 60Hz	193.2	74.5	60	Sync On Green
WUX_60	1920x1200 60Hz	193.2	74.5	60	Composite Sync

COMPOSITE, S-VIDEO & COMPONENT VIDEO INPUT PORT :

System	Resolution	Horizontal freq [KHz]	Vertical freq [Hz]
NTSC	720x480i	15.7	60
NTSC 4.43	720x480i	15.7	60
PAL	720x576i	15.6	50
PAL M	720x576i	15.6	50
SECAM	720x576i	15.6	50

Appendix II – RS-232 control protocols

RS-232 Serial control (Baud rate 2400, 8 bits, 1 stop bit and no parity)
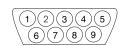*Physical connection:*

AVX-1920 side
Connector interface: Serial

Computer side
Connector interface: Serial

Mating connector: DB9 Male

Mating connector: DB9 Male

PIN#	Description
2	RS-232 Rx Data
3	RS-232 Tx Data
5	Ground

PIN#	Description
2	RS-232 Rx Data
3	RS-232 Tx Data
5	Ground

Software connection:

The OSD function can be controlled through sending the RS-232 protocol.
The RS-232 program can be custom-made to fit for application or it can be used the serial control program, like Accessport, Telix or Serial Utility program developed by DigitalView. Please contact your local support for information.

1. Commands to implement switch mount control buttons

Function	Command	Description	Remark
Menu button	0xf7	Menu button pressed	Button equivalent
Select-down button	0xfa	Select-down button pressed	Button equivalent
Select-up button	0xfb	Select-up button pressed	Button equivalent
Right/+ button	0xfc	Right/+ button pressed	Button equivalent
Left/- button	0xfd	Left/- button pressed	Button equivalent

2. Parameter setting - immediate, relative, reset and query

Function	Command	Description	Acknowledge (if enabled)
Brightness control	0x81, nn | "+" | "-" | "r" | "R" | "?"	Set brightness = value/increment/decrement Reset Query	Brightness. Range : "4""E"-"B""2" Default : "8""0"
Contrast control - all channels	0x82, "a" | "A", nn | "+" | "-" | "r" | "R" | "?"	Set all contrast = value/increment/decrement Reset Query	Contrast Range : "1""C"-"E""4" Default : "8""0"
Saturation control	0x83, nn | "+" | "-" | "r" | "R" | "?"	Set saturation = value/increment/decrement Reset Query	Range : "0""1"-"F""F" Default : "8""0"
Hue control	0x84, nn | "+" | "-" | "r" | "R" | "?"	Set hue = value/increment/decrement Reset Query	NTSC tint (In NTSC mode only) Range : "5""3"-"9""F" Default : "7""9"
Phase (tuning) control	0x85, nn | "+" | "-" | "?"	Set dot clock phase = value/increment/decrement Query	Dot clock phase. (In PC mode only)
Image H position	0x86, nnnn | "+" | "-" | "?"	Set img_hpos = value/increment/decrement Query	Image horizontal position. (In PC mode only)
Image V position	0x87, nnnn | "+" | "-" | "?"	Set img_vpos = value/increment/decrement Query	Image vertical position. (In PC mode only)
Sharpness	0x8a, nn | "+" | "-" | "r" | "R" | "?"	Set sharpness = value/increment/decrement Reset Query	Sharpness. (Video Mode Source only) Range : "F""4"-"0""C" Default : "0""0"
Frequency	0x8b, nnnn | "+" | "-" | "?"	Set frequency = Value/increment/decrement Query	Graphic mode H active size (in pixels)
Scaling Mode	0x8c, "0" | "1" | "2" | "3" | "9" | "A" | "B" | "C" | "D" | "r" | "R" | "?"	Set graphic image scaling mode = value Reset Query	Image expansion on/off. "0" – 1:1 "1" – fill screen "2" – fill to aspect ratio "9" – 4:3 "A" – 16:9 "B" – 16:10 "C" – 2.35:1 "D" – 2:1

OSD H position	0x90, nnn | "+" | "-" | "r" | "R" | "?"	Set osd_hpos = value/increment/decrement Reset Query	OSD horizontal position. Range : "0""0"-"F""F" Default : "8""0"
OSD V position	0x91, nnn | "+" | "-" | "r" | "R" | "?"	Set osd_vpos = value/increment/decrement Reset Query	OSD vertical position. Range : "0""0"-"F""F" Default : "8""0"
OSD Transparency	0x92, n | "+" | "-" | "r" | "R" | "?"	Set OSD transparency = value/increment/decrement Reset Query	OSD transparency. "0" – ON "1" - OFF
OSD menu timeout	0x93, nn | "+" | "-" | "r" | "R" | "?"	Select menu timeout = value/increment/decrement Reset Query	OSD menu timeout value. "0""0" – Continuous. value – Round up to nearest available step. if value > max available step, set it to the max available step. Range : "0""5"-"3""C" Default : "0""A"
Select OSD language	0x95, n | "r" | "R" | "?"	Select language = English, Chinese,… Reset Query	"0" – English. "2" - French "3" – Spanish "6" - German "8" – Chinese
Input main select	0x98, nn | "+" | "-" | "r" | "R" | "?"	Select input main = PC or VIDEO or next available Reset Query	Main selected. "0x41,0x31" ARGB "0x42,0x31" Composite 1 "0x43,0x31" S-video 1 "0x44,0x31" Component 1 "0x46,0x31" DVI "0x48,0x31" HDMI
Auto Source Seek	0x99, nn , "0" | "1" | "?" | "o"	Set Auto source enable = *1 Source Disable/ Enable Query Valid Source query	"nn" = "0x41,0x31"- ARGB "0x42,0x31"- Composite 1 "0x43,0x31"- S-video 1 "0x44,0x31"- Component 1 "0x46,0x31"- DVI "0x48,0x31" HDMI
Source Layout	0x9a, n | "r" | "R" | "?"	Select source layout = Single, PIP, PBP, PBPT Reset, Query	Query: "0"- Single "1"- Picture in Picture (PIP) "2"- Picture by Picture (PBP) "3"- Picture by Picture Tall (PBPT)

Video System (Composite, S-video and Component Only)	0x9b, "0" | "1" | "2" | "3" | "r" | "R" | "S" | "s"| "?"	Set video system = Auto/NTSC/PAL/SECAM Reset Video State Query Query	Query "0" – Auto. "1" – NTSC_M_358 "2" – PAL_N_443 "3" – SECAM "4" – NTSC_M_443 "5" - PAL_M_358 "7" – PAL_M_443 "9" – PAL_N_358 Video State Query "0" – No video. "1" – NTSC "2" – PAL "3" – SECAM "4" – NTSC 443 "5" – PAL M 358
GAMMA value select	0x9d, n | "r" | "R" "?"	Select GAMMA value = Value Reset Query	GAMMA value: "0" – 1.0, "1" – 1.6 "2" – 2.2, "3" – User Defined "4" – 1.7, "5" – 1.8, "6" – 1.9, "7" – 2.0, "8" – 2.1, "9" – 2.3, "A" – 2.4, "B" – 2.5, "C" – 2.6, "D" – 0.6, "E" – 0.7, "F" – 0.8, "G" – 0.9, "H" – 1.1, "I" – 1.2, "J" – 1.3, "K" – 1.4, "L" – 1.5
Auto power off	0x9f, "0" | "1" | "r" | "R" | "?"	Set power down option = On/Off Reset Query	"0" – Off. "1" – On.
Hotkey 1	0xa0, "1", n | "r" | "R" | "?"	Set Hotkey 1= Value Reset Query	"2" – brightness. "3" – contrast. "4" – colour. "5" – input source. "7" – zoom "8" – freeze "9" – PIP "B" – No function "D" – PIP Swap "E" – Aspect Ratio "G" – Hue "I" – Auto Picture Setup
Hotkey 2	0xa0, "2", n | "r" | "R" | "?"	Set Hotkey 2 = value Reset Query	"2" – brightness. "3" – contrast. "4" – colour. "5" – input source. "7" – zoom "8" – freeze "9" – PIP "B" – No function "D" – PIP Swap "E" – Aspect Ratio "G" – Hue "I" – Auto Picture Setup

Runtime counter	0xa1, nnnnn | "r" | "R" | "?"	runtime counter value = nnnnn (* 0.5 hour) Reset Query	Runtime = nnnnn.
PIP brightness control	0xa2, nn | "+" | "-" | "r" | "R" | "?"	Set PIP window brightness = value/increment/decrement Reset Query	PIP window brightness. Range : "4""E"-"B""2" Default : "8""0"
PIP contrast control	0xa3, nn | "+" | "-" | "r" | "R" | "?"	Set PIP window contrast = value/increment/decrement Reset Query	PIP window contrast. Range : "1""C"-"E""4" Default : "8""0"
PIP H position	0xa4, nnn | "+" | "-" | "r" | "R" | "?"	Set PIP_hpos = value/increment/decrement Reset Query	PIP window horizontal position. Range : "0""0""0"-"0""6""4" Default : "0""5""5"
PIP V position	0xa5, nnn | "+" | "-" | "r" | "R" | "?"	Set PIP_vpos = value/increment/decrement Reset Query	PIP window vertical position. Range : "0""0""0"-"0""6""4" Default : "0""1""4"
PIP window size select	0xa6, nn | "r" | "R" | "?"	Select PIP window size = PIP window size value Reset Query	Main selected. PIP off if "nn" = "0""0". "0""0"~"1""2" "0""0" ~ "1""2" "1""9" : Size by Size "1""A" : Size by Size Tall
PIP source select	0xa7, n | "r" | "R" | "?"	Select input main = Video source value Reset Query	Main selected. 0x41, 0x31 : ARGB 0x42, 0x31 : Composite 0x43, 0x31 : S-video 0x44, 0x31 : Component 0x46, 0x31 : DVI 0x48, 0x31 : HDMI
Zoom level	0xa8, nnnn | "+" | "-" | "r" | "R" | "?"	Set Zoom level = value/increment/decrement Reset Query	Zoom level. Min : 0x30 0x30 0x30 0x30 (Default) Max : 0x30 0x30 0x41 0x33
Zoom H position	0xa9, nnnn | "+" | "-" | "r" | "R" | "?"	Set Zoom_hpos = value/increment/decrement Reset Query	Zoom window horizontal position. Default : 0x30 0x30 0x30 0x30 The min and max values will change depends on input resolution.
Zoom V position	0xaa, nnnn | "+" | "-" | "r" | "R" | "?"	Set Zoom_vpos = value/increment/decrement Reset Query	Zoom window vertical position. Default : 0x30 0x30 0x30 0x30 The min and max values will change depends on input resolution.

Horizontal Size	0xad, nnn | "+" | "-" | "r" | "R" | "?"	Set horizontal size for Aspect Size = value/increment/decrement Reset Query	Scalar horizontal stretch PAL(576i) / NTSC (480i) : Min : 0x30 0x30 0x30 (Default) Max : 0x30 0x46 0x30
Vertical Size	0xb0, nnn | "+" | "-" | "r" | "R" | "?"	Set Vertical Size for Aspect Size = value/increment/decrement Reset Query	Scalar vertical stretch. PAL(576i) / NTSC (480i) : Min : 0x30 0x30 0x30 (Default) Max : 0x30 0x46 0x30
Horizontal Pan	0xb1, nnn | "+" | "-" | "r" | "R" | "?"	Set horizontal pan position for Aspect Size = value/increment/decrement Reset Query	Scalar horizontal pan position PAL(576i) / NTSC (480i) : Assume max H-Size & max V-size : Min : 0x46 0x38 0x38 Max : 0x30 0x37 0x38 Default : 0x30 0x30 0x30 The min and max values will change depends on different value of H-Size, V- Size and input resolution.
Vertical Pan	0xb2, nnn | "+" | "-" | "r" | "R" | "?"	Set Vertical pan position for Aspect Size = value/increment/decrement Reset Query	Scalar vertical pan position PAL(576i) / NTSC (480i) : Assume max H-Size & max V-size : Min : 0x46 0x38 0x38 Max : 0x30 0x37 0x38 Default : 0x30 0x30 0x30 The min and max values will change depends on different value of H-Size, V- Size and input resolution.
Colour temperature select	0xb3, n | "r" | "R" | "?"	Select colour temperature = value Reset Query	Main selected. "0" – 9300K. "1" – 8000K. "2" – 6500K. "3" – 5000K. "4" - User
Red level for selected colour temperature	0xb4, nn | "+" | "-" | "r" | "R" | "?"	Set the level of the red channel for the selected colour temp. = value/increment/decrement Reset Query	Red level for selected colour temperature. Range : "9""C"-"F""F" Default : "E""C"
Green level for selected colour temperature	0xb5, nn | "+" | "-" | "r" | "R" | "?"	Set the level of the green channel for the selected colour temp. = value/increment/decrement Reset Query	Green level for selected colour temperature. Range : "9""C"-"F""F" Default : "E""C"

Blue level for selected colour temperature	0xb6, nn | "+" | "-" | "r" | "R" | "?"	Set the level of the blue channel for the selected colour temp. = value/increment/decrement Reset Query	Blue level for selected colour temperature. Range : "9""C"-"F""F" Default : "E""C"
Graphic horizontal resolution enquiry	0xb7	Horizontal resolution (in pixels) in 3 digit hex number	"nnn" = horizontal resolution
Graphic vertical resolution enquiry	0xb8	Vertical resolution (in lines) in 3 digit hex number	"nnn" = vertical resolution
Graphic horizontal sync frequency enquiry	0xb9	Horizontal sync frequency (in units of 100Hz) in 3 digit hex number	"nnn" = horizontal frequency
Graphic vertical sync frequency enquiry	0xba	Vertical sync frequency (in units of Hz) in 3 digit hex number and 1 char	"nnnn" = vertical frequency nnn = 3 digit hex c= "i" or "p" interlace or Progressive 0xba added the interlace(i) or Progressive(p) feedback.
OSD status enquiry	0xbb	Status of OSD	"0" – OSD turned off "1" – OSD turned on
OSD turn off	0xbd	Turn off the OSD.	"1" – successful.
Set gamma data for user defined gamma curve	0xbf, mm, c, "?" 0xbf, "R" | "r" 0xbf, mm, c, nn	Query gamma data for color c index mm (c = 0 for color Red, c=1 for color Green, c=2 for color Blue) Set user gamma curve to linear Set gamma data for color c index mm. (If c= 3, then gamma data for red, green & blue will be set at the same time.)	"nn" = gamma data "1" "nn" = gamma data
Color Monochrome mode selection (Output Channel Select)	0xe2 "0" | "1" | "2" | "3" | | "4" | "5" | "6" | "R" | "r"| "?"	Off/ Blue Only/ Red Only/ Green Only/ Blue Mono/ Red Mono/ Green Mono/	"0" – Off "1" – Blue Only "2" – Red Only "3" – Green Only "4" – Blue Mono "5" – Red Mono "6" – Green Mono
PIP Swap	0xe3	Swap Main and PIP source	"0" - Fail. "1" - Successful.
Red Offset for selected colour temperature	0xe8, nn | "+" | "-" | "r" | "R" | "?"	Set the Offset of the red channel for the selected colour temp. = value/increment/decrement Reset Query	Red Offset for selected colour temperature.

Green Offset for selected colour temperature	0xe9, nn | "+" | "-" | "r" | "R" | "?"	Set the Offset of the green channel for the selected colour temp. = value/increment/decrement Reset Query	Green Offset for selected colour temperature.
Blue Offset for selected colour temperature	0xea, nn | "+" | "-" | "r" | "R" | "?"	Set the Offset of the blue channel for the selected colour temp. = value/increment/decrement Reset Query	Blue Offset for selected colour temperature.
PIP Window Transparency	0xed, nn | "+" | "-" | "R" | "r" | "?"	Select PIP Transparency Level PIP Transparency value Reset Query	PIP Transparency "0"F" = 6.25% "0"E" = 12.5% "0"D" = 18.75% "0"C" = 25% "0"B" = 31.25% "0"A" = 37.5% "0"9" = 43.75% "0"8" = 50% "0"7" = 56.25% "0"6" = 62.5% "0"5" = 68.75% "0"4" = 75% "0"3" = 81.25% "0"2" = 87.5% "0"1" = 93.75% "0"0" = 100%.
PIP Window Auto Off	"0xee", "0x41" "0" |"1" "?"	Auto Off / Auto On Query	"0"- Off "1"- On
ScreenMarker	"0xee", "0x42" "0" |"1"	Screen Marker Off / Screen Marker On	"0"- Off "1"- On
CenterMarker	"0xee", "0x43" "0" |"1"	Center Marker Off / Center Marker On	"0"- Off "1"- On
AspectMarker	"0xee", "0x44" "0" |"1"	Preliminary 4:3 /16:9	"0"- 4:3 "1"- 16:9
Marker Background Transparency	"0xee", "0x45" "0" |"1" |"2" |"3"	Preliminary 0% /25%/50%/95%	"0"- 0% "1"- 25% "2"- 50% "3"- 95%

Safe Area Marker	"0xee", "0x46" "0x53"~"0x63"	Preliminary 64%~98%	"36", "33"- 98% "36", "32"- 96% "36", "31"- 94% "36", "30"- 92% "35", "46"- 90% "35", "45"- 88% "35", "44"- 86% "35", "43"- 84% "35", "42"- 83% "35", "41"- 81% "35", "39"- 79% "35", "38"- 77% "35", "37"- 76% "35", "36"- 74% "35", "35"- 72% "35", "34"- 71% "35", "33"- 69% "35", "32"- 67% "35", "31"- 66% "35", "30"- 64%
Custom Sizing	0xef, "0" | "1" | "2" "?"	Custom sizing selection : Overscan / Normal / Custom Query	"0" – Overscan "1" – Custom/Underscan "2" – Normal

3. Other control

Function	Command	Description	Acknowledge (if enabled)
Select RS-232 acknowledge	0xc1, "0" | "1"	Disable/enable command acknowledge.	"0" – acknowledge disabled. "1" – acknowledge enabled.
Auto-setup	0xc3	Start auto-setup of current vmode.	"0" – fail. "1" – successful.
Command availability	0xc4, n	Check whether a command is available.	"0" – not available. "1" – available.
Auto-calibration	0xc5	Start auto-calibration of gain of the RGB amplifier.	"0" – fail. "1" – successful.
Freeze frame	0xc6, "0" | "1"	Unfreeze / freeze frame	"0" – unfreeze. "1" – freeze.
Soft Power On/ Off	0xc8, "0" | "1" | "?"	Soft power off/on query	"0" – Turn off the LCD power and backlight. Turn off memory controller, Power down DVI Power down ADC, Power down Fclk PLL "1" – Turn on the unit
Query video input status	0xc9	Query the status of the primary & pip status	"nn,nn" = input status "nn,xx" digit = primary status: "0","0" : invalid "A","1" ARGB "B","1" Composite "C","1" S-video "D","1" Component "F","1" DVI "H" "1" HDMI "xx,nn"= PIP input status: "0","0": invalid "A","1" ARGB "B","1" Composite "C","1" S-video "D","1" Component "F","1" DVI "H" "1" HDMI
Video de-interlace method	0xca, "0" | "1" "r" | "R" "?"	De-interlace mode Reset Query	"3" "1"- enable AFM "3" "0"- disable AFM "4" "1"- enable TNR "4" "0"- disable TNR "5" "1"- enable MADI "5" "0"- disable MADI "7" "1"- enable DCDi "7" "0"- disable DCDi
Query BIOS version	0xcb, "0"	Read BIOS version	BIOS version "VV.YY.ZZ" VV = V0 or E0, V0 = Release version E0 = Engineering Sample YY= Version Number ZZ= Customer Number

Reset parameter	0xce	Reset all parameters to default value	"1" – successful.
Wide Screen Mode Selection	0xd9, "0"	"1"| "2" "r"	"R" "?"	Wide Screen Mode Reset Query	"0" – Normal Mode "1" – 1280x768 "2" – 1366x768 "3" – 1360x768
ScreenMarker	"0xee", "0x42" "0" |"1"	Screen Marker Off / Screen Marker On	"0"- Off "1"- On
CenterMarker	"0xee", "0x43" "0" |"1"	Center Marker Off / Center Marker On	"0"- Off "1"- On
AspectMarker	"0xee", "0x44" "0" |"1"	Preliminary 4:3 /16:9	"0"- 4:3 "1"- 16:9
Marker Background Transparency	"0xee", "0x45" "0" |"1" |"2" |"3"	Preliminary 0% /25%/50%/95%	"0"- 0% "1"- 25% "2"- 50% "3"- 95%
Safe Area Marker	"0xee", "0x46" "0x53"~"0x63"	Preliminary 64%~98%	"36", "33"- 98% "36", "32"- 96% "36", "31"- 94% "36", "30"- 92% "35", "46"- 90% "35", "45"- 88% "35", "44"- 86% "35", "43"- 84% "35", "42"- 83% "35", "41"- 81% "35", "39"- 79% "35", "38"- 77% "35", "37"- 76% "35", "36"- 74% "35", "35"- 72% "35", "34"- 71% "35", "33"- 69% "35", "32"- 67% "35", "31"- 66% "35", "30"- 64%

The following commands for sending texts by using RS-232 command.

Function	Command	Description	Acknowledge (if enabled
Send Line	0xF0, |"S" |"LL"|"TEXT"| "0x0A" Return "1"	"S" = "0x53 or 0x73" Send command ------------------------------------- ---- "LL" = "0x30,0x31~0x30,0x34" Line number (Rang 0~4 lines) ------------------------------------- ---- "Text"= ASCII code, "0x20~0x7E" Character(Rang 0~34) ------------------------------------- ---- 0x0A = End of line	"S" – Send Command "LL" – Line Number "Text" – Character "0x0A" – End of Line "1" - successful.
e.g Display "Send Text" message on screen: RS232 Code:"0xF0 0x53 0x30 0x31 0x53 0x65 0x6E 0x64 0x20 0x54 0x65 0x78 0x74 0x0A" Return Code: "0xF0 0x53 0x30 0x31 0x53 0x65 0x6E 0x64 0x20 0x54 0x65 0x78 0x74 0x0A 0x31"			
Clear Line	0xF0, |"C" |"LL"| Return "nn"	"C" = "0x43 or 0x63" Clear command ------------------------------------- ---- "LL" = "0x30,0x31~0x30,0x34" Line number (Rang 0~4 lines)	"C" – Clear command "LL" – Line Number "nn" – Return Line number
e.g. Clear Line 1 RS232 Code: "0xF0 0x43 0x30 0x31" Return Code: "0xF0 0x43 0x30 0x31 0x30 0x31"			
Text Window Horizontal Position	0xF0, |"H" |"ss"| Return "nn"	"H" = "0x48 or 0x68" ------------------------------------- -----"nn" = "0x30,0x30~0x46,0x46"	"H" – Horizontal Position command "ss" – Set Horizontal Position number "nn" – Return Position number
e.g. Set Text Window Horizontal Position RS232 Code: "0xF0 0x48 0x30 0x31" Return Code: "0xF0 0x48 0x30 0x31 0x30 0x31"			
Text Window Vertical Position	0xF0, |"V" |"ss"| Return "nn"	"V" = "0x56 or 0x76" ------------------------------------- -----"nn" = "0x30,0x30~0x46,0x46"	"V" – Vertical Position command "ss" – Set Vertical Position number "nn" – Return Position number
e.g. Set Text Window Vertical Position RS232 Code: "0xF0 0x56 0x30 0x31" Return Code: "0xF0 0x56 0x30 0x31 0x30 0x31"			

Left offset*	0xF0, |"O" |"SSS"| Return "nnn"	"O" = "0x4F or 0x6F" Set Left Offset command -- "SSS" = "0x30,0x30,0x30~ 0x33,0x46,0x46" Offset Value (Rang 000~3ff)	"O" – Left Offset Command "SSS"- Offset Value (pixels "nnn"- Return Value(pixels)

e.g. Set Left Offset = 100 pixels (0x64 (HEX))
RS232 Code: "0xF0 0x4F 0x30 0x36 0x34"
Return Code: "0xF0 0x4F 0x30 0x36 0x34 0x30 0x36 0x34"

Background Transparency*	0xF0, |"B"|"N"| Return "n"	"B" = "0x42 or 0x62" Set Transparency command -- "N" = "0x30~0x46" Transparency Value (Rang 00~0F)	"B" - Transparency command "N" – Transparency Value "n"- Return Value 0x00 =opaque

Set background Transparency value is 8
RS232 Code: "0xF0 0x42 0x38"
Return Code: "0xF0 0x42 0x38 0x38"

Text Window Horizontal Size	0xF0, |"X" |"SSS"| Return "nnn"	"X" = "0x58" Set Horizontal Size command -- "SSS" = "0x31,0x45,0x30~ 0x37,0x38,0x30" Horizontal Size Value (Range 000~3ff)	"X" –Horizontal Size "SSS"- Size Value (pixels) "nnn"- Return Value(pixels)

e.g Set Text Window Horizontal Size = 640 pixels (0x280 (HEX))
RS232 Code: "0xF0 0x58 0x32 0x38 0x30"
Return Code: "0xF0 0x58 0x32 0x38 0x30 0x32 0x38 0x30"

* Note :
Please set the "Background Transparency" and "Left offset" commands before the "Send Line" command.

n = 1-byte ascii-coded hex number, e.g., parameter value of 0x1 is represented by "1" (0x31).
mn or nn = 2-byte ascii-coded hex number, e.g., parameter value of 0x1e is represented by "1", "e" | "E" (0x31, 0x6e|0x4e).

Please refer to the ASCII to Hex convert table below.

Hex to ASCII conversion table

Hex	ASCII	Hex	ASCII	Hex	ASCII	Hex	ASCII
0x30	0	0x41	A	0x61	a	0x2B	+
0x31	1	0x42	B	0x62	b	0x2D	-
0x32	2	0x43	C	0x63	c	0x3F	?
0x33	3	0x44	D	0x64	d		
0x34	4	0x45	E	0x65	e		
0x35	5	0x46	F	0x66	f		
0x36	6	0x47	G	0x67	g		
0x37	7	0x48	H	0x68	h		
0x38	8	0x49	I	0x69	i		
0x39	9	0x4A	J	0x6A	j		
		0x4B	K	0x6B	k		
		0x4C	L	0x6C	l		
		0x4D	M	0x6D	m		
		0x4E	N	0x6E	n		
		0x4F	O	0x6F	o		
		0x50	P	0x70	p		
		0x51	Q	0x71	q		
		0x52	R	0x72	r		
		0x53	S	0x73	s		
		0x54	T	0x74	t		
		0x55	U	0x75	u		
		0x56	V	0x76	v		
		0x57	W	0x77	w		
		0x58	X	0x78	x		
		0x59	Y	0x79	y		
		0x5A	Z	0x7A	z		

Appendix III – Function description for de-interlacing mode AFM, TNR, MADI, DCDi

AFM = Auto Film Mode:
It is a frame based method that used for the input ODD and EVEN fields have a fixed relation between each other, such as static image, 3:2 pull down mode.
If two fields are correctly merged, it can get the best quality. But if it merges two wrong fields, it will have artifact and get the worst quality.

TNR = Temporal Noise Reduction:
It is a frame-based method which assume field-to-field have a fixed relationship.
If the object moving too fast, it will have image artifact and get worst quality.

MADI = Motion adaptive de-interlacing:
It is a pixel based method which used for the input fields have no fixed relation between them
If the object moving very too fast, it will get worst quality.

DCDi = Directional Correlation Deinterlacing :
It is a digital enhancement method developed by Faroudja. DCDi technology is primarily used for improving the image quality of low resolution images. This is done by deinterlacing the image and blending rough edges occurring in diagonal lines.
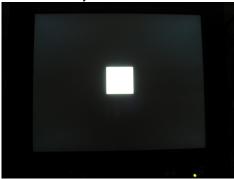
Appendix VII – PIP mix table

	VGA	Composite	S-Video	Component	DVI	HDMI
VGA	X	✓	✓	✓	✓	✓
Composite	✓	X	✓	✓	✓	✓
S-Video	✓	✓	X	✓	✓	✓
Component	✓	✓	✓	X	✓	✓
DVI	✓	✓	✓	✓	X	X
HDMI	✓	✓	✓	✓	X	X

Appendix VIII – Auto Color Gain

      The Auto Color Gain function is supported in the ARGB mode only and is designed to calibrate the controller to the incoming video signal. In order to calibrate correctly, the display <u>must</u> be displaying an image containing both black and white data (see illustration below) when the function is used. The internal processor of the video controller chip will then execute a process to adjust the relative values of the RGB signals to achieve the best performance. The parameters of the corrected RGB values are then stored in the controller and are unaffected by the Reset Factory Defaults function.

<u>Warning</u> - If the Auto Color Gain is executed without an appropriate image being displayed, then the process will set incorrect values and the display colors will be distorted. If this occurs, then it can either be corrected by performing the process correctly or if this is not possible then the Reset Color Gain function can be used. This function will reset the stored RGB values to a set of approximate values.

WARRANTY

The products are warranted against defects in workmanship and material for a period of three (3) year from the date of purchase provided no modifications are made to it and it is operated under normal conditions and in compliance with the instruction manual.

The warranty does not apply to:
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- Product that has been altered or repaired except by the manufacturer (or with the manufacturer's consent).
- Product that has subjected to misuse, accidents, abuse, negligence or unusual stress whether physical or electrical.
- Ordinary wear and tear.

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CAUTION

Whilst care has been taken to provide as much detail as possible for use of this product it cannot be relied upon as an exhaustive source of information. This product is for use by suitably qualified persons who understand the nature of the work they are doing and are able to take suitable precautions and design and produce a product that is safe and meets regulatory requirements.

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Do not use this product near water, for example, near a bathtub, wash bowl, kitchen sink, laundry tub, in a wet basement or near a swimming pool.

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The manufacturer's liability for damages to customer or others resulting from the use of any product supplied hereunder shall in no event exceed the purchase price of said product.

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Depending on the features desired, customer/purchaser may be required to obtain a license with the relevant organizations.

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