Planar VM Series Displays

VM55LX-U2

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RoHS Compliance Statement

The Planar VM Series is fully RoHS compliant.

Part Number: 020-1359-02A

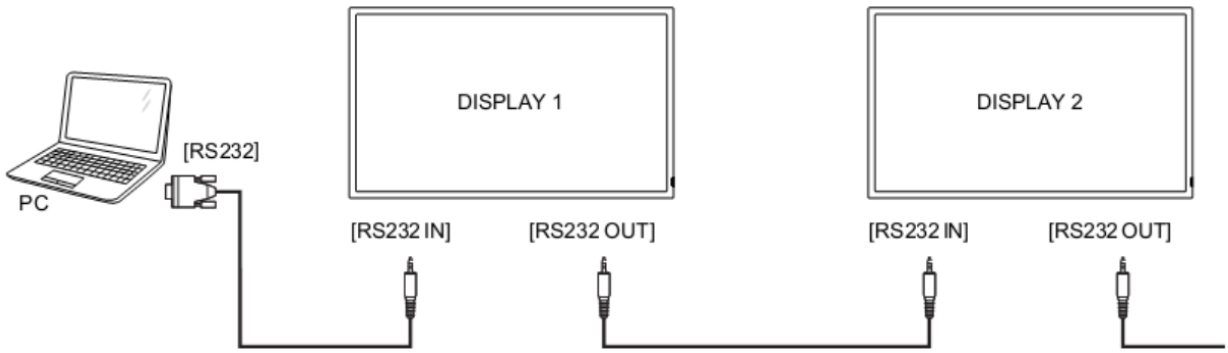
Table of Contents

Introduction

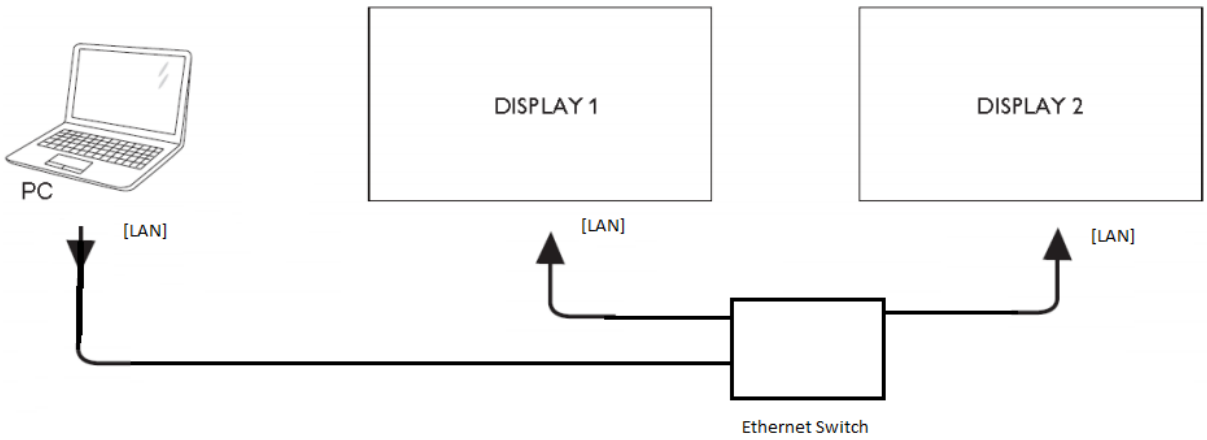
1. Purpose

The purpose of this document is to explain in detail the commands and steps that can be used to control a Planar VM Series display via RS232.

Example 1



Example 2



2. Definitions, Abbreviations and Acronyms

- ACK Acknowledge
- NAK Not Acknowledge
- NAV Not Available
- ID Identification

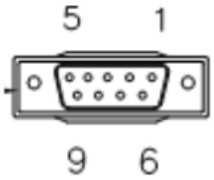
Command Packet Format

Note: The cable included in the accessory kit is a 2.5mm (TRRS, male) to DB-9 (female) adaptor.

3. Physical Specifications

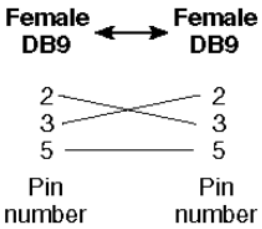
1. Baud Rate : 9600
2. Data bits: 8
3. Parity : None
4. Stop Bit : 1
5. Flow Control : None
6. The Pin Assignments for DB9 male connector:

Male D-Sub 9-Pin (outside view)



Pin#	Signal	Remark
1	NC	
2	RXD	Input to LCD Monitor = 1st Ring on 2.5mm
3	TXD	Output from LCD Monitor = Tip on 2.5mm
4	NC	
5	GND	Sleeve on 2.5mm
6	NC	
7	NC	

Note: Use a crossover cable (null modem) for connection to the host controller:



Planar VM Series displays use RXD, TXD and GND pins for RS232 control. For RS232 cable, use the reverse type cable.

4. Communication Procedure

Send control commands from a host controller via the RS232 connection. Do not send a new command until the previous command is acknowledged. However, if a response is not received within 500 milliseconds, a retry may be triggered. Every valid command receives an ACK. A command that is valid, but not supported in the current implementation, will be responded to with NAV (Not Available). If the command buffer is corrupt, (transmission errors) the command will be responded to with NAK. The display operates according to the received command. If the command is a valid “Get” command, the display responds with the requested info. If the command is a valid “Set” command allowed, the display performs the requested operation.

Note: For LAN control, the port number is 5000.

Note: When using LAN control, each LCD monitor in the wall needs to be connected directly to the LAN. Serial commands received through the LAN port will not be relayed through the “RS232 out” connector to subsequent monitors.

5. Command Format

The RS232 packet format:

Header	Monitor ID	Category	Code0	Code1	Length	Data Control	Data[0]	…	Data[N]	Checksum

In Detail:

Number of Field	Name of Field	Description
Byte 1	Header	Header = 0xA6
Byte 2	Monitor ID	Monitor ID Range: 1 ~ 255 Signal Mode: Display Address range from 1 to 255 Broadcast Mode: Display Address is 0, so no ACK or Report is expected
Byte 3	Category	0x00
Byte 4	Code0 (Page)	0x00
Byte 5	Code1 (Function)	0x00
Byte 6	Length	Length has to be calculated in the following way: Length = N + 3
Byte 7	Data Control	Data Control = 0x01 (fixed)
Byte 8 ~ Byte 44	Data[0] ~ Data[N]	This field can be also empty. If not empty then the range of Data Size, N = 0 to 36.
Last Byte	Checksum	Checksum Range = 0 to 255 (0xFF). Algorithm: The EXCLUSIVE-OR (XOR) of all bytes in the message except the checksum itself. Checksum = [Header] XOR [Monitor ID] XOR … DATA[0] … XOR DATA[N]

System

6. Communication Control

This defines the feedback command from the monitor to the host controller. When the device receives a display command from the host controller the command reported to host controller will be ACK, NAK or NAV.

Note: There is no reply message when the wrong ID address is used.

6.1 Message Report

Number of Field	Name of Field	Description
Byte 1	Header	Header = 0x21
Byte 2	Monitor ID	Monitor ID Range: 1 ~ 255
Byte3	Category	0x00
Byte4	Page	0x00
Byte5	MsgLen	Length of message plus Checksum code. Calculate the length from Control Byte to Checksum Byte.
Byte6	Control	0x01
Byte7	Data[0]	Copy the received Command code
Byte8~Byte8+(N-1)	Data[1]~Data[N]	Returned data associated with command code
Byte 8+N	Checksum	XOR of all byte in reply/report packet (except checksum itself)

Example ACK Reply: (Display Address 01)

Header	Monitor ID	Category	Page	Length	Control	Data[0]	Data[1]	Checksum	Description
0x21	0x01	0x00	0x00	0x04	0x01	0x00	0x00	0x25	Command is well executed.

Example NAK Reply: (Display Address 01)

Header	Monitor ID	Category	Page	Length	Control	Data[0]	Data[1]	Checksum	Description
0x21	0x01	0x00	0x00	0x04	0x01	0x00	0x03	0x26	If the command code is Data(0), the system will reply “NAK.”

Example NAV Reply: (Display Address 01)

Header	Monitor ID	Category	Page	Length	Control	Data[0]	Data[1]	Checksum	Description
0x21	0x01	0x00	0x00	0x04	0x01	0x00	0x04	0x21	Checksum error- “NAV”. Command Code Data(1)-“NAV”.

7. Monitor Information

This command provides the SICP protocol and the display software versions to the host controller.

7.1 Model Number, FW Version, Build Date Message Get

Bytes	Bytes Description	Bits	Description
DATA[0]	0xA1 = Model Number & FW version of device with Date- Get		Request the Model Number and FW version of the device
DATA[1] to DATA[N]	Codes to request		0x00 = Model Number 0x01 = FW version 0x02 = Build Date

Example: Get model number (Display Address 01)

Header	Monitor ID	Category	Code0	Code1	Length	Data Control	Data[0]	Data[1]	Checksum
0xA6	0x01	0x00	0x00	0x00	0x04	0x01	0xA1	0x00	0x03

7.2 Model Number, FW Version, Build Date Message Report

Bytes	Bytes Description	Bits	Description
DATA[0]	0xA1 = Model Number & FW version of device with Date- Report		Request the Model number, FW version, FW build date
DATA[1] to DATA[N]	Character[0] to Character[N-1]		36 (0x24) characters maximum. No. of characters, N = 1 to 36 (0x24). The actual size determines the value of the message size byte.

General

8. Power State

Use this command to get/set the power state as defined below.

8.1 Power State Get

Bytes	Bytes Description	Bits	Description
DATA[0]	0x19 = Power State - Get		Command requests the display to report its current power state

Example: (Display Address 01)

Header	Monitor ID	Category	Code0	Code1	Length	Data Control	Data[0]	Checksum
0xA6	0x01	0x00	0x00	0x00	0x03	0x01	0x19	0xBC

8.2 Power State Report

Bytes	Bytes Description	Bits	Description
DATA[0]	0x19 = Power State - Report		Command reports power state
DATA[1]	Power State		0x01 = Power Off 0x02 = On

Example: Power State On (Display Address 01)

Header	Monitor ID	Category	Page	Length	Data Control	Data[0]	Data[1]	Checksum
0x21	0x01	0x00	0x00	0x04	0x01	0x19	0x02	0x3E

8.3 Power State Set

Bytes	Bytes Description	Bits	Description
DATA[0]	0x18 = Power State - Set		Command to change the Power State of the display
DATA[1]	Power State		0x01 = Power Off 0x02 = On

Example: Power State Deep Sleep (Display Address 01)

Header	Monitor ID	Category	Code0	Code1	Length	Data Control	Data[0]	Data[1]	Checksum
0xA6	0x01	0x00	0x00	0x00	0x04	0x01	0x18	0x01	0xBB

9. IR Remote Control Lock Functions

Use the following commands separately to lock or unlock the Remote Control and Keypad.

9.1 IR Remote Lock Status Get

Bytes	Bytes Description	Bits	Description
DATA[0]	0x1D = IR Remote Control Lock Status- Get		Get unlock all /lock all /lock all but power/lock all but volume/ primary/secondary status

Example: (Display Address 01)

Header	Monitor ID	Category	Code0	Code1	Length	Data Control	Data[0]	Checksum
0xA6	0x01	0x00	0x00	0x00	0x03	0x01	0x1D	0xB8

9.2 IR Remote Lock Status Report

Bytes	Bytes Description		Bits	Description
DATA[0]	0x1D = IR Remote Control Lock Status- Report			Report unlock all /lock all /lock all but power/lock all but volume/ primary/secondary status
DATA[1]	Status indicator byte for Remote Control			0x01 = Unlock All 0x02 = Lock All 0x03 = Lock All but Power 0x04 = Lock All but Volume 0x05 = Primary (Master) 0x06 = Secondary (daisy chain PD)

Example: Lock Keyboard and unlocked Remote Control (Display Address 01)

Header	Monitor ID	Category	Page	Length	Data Control	Data[0]	Data[1]	Checksum
0x21	0x01	0x00	0x00	0x04	0x01	0x1D	0x01	0x39

9.3 IR Remote Lock Status Set

Bytes	Bytes Description	Bits	Description
DATA[0]	0x1C = IR Remote Control Lock Status- Set		Set unlock all/lock all /lock all but power/lock all but volume/ Primary/Secondary status
DATA[1]	Status indicator byte for Remote Control		0x01 = Unlock All 0x02 = Lock All 0x03 = Lock All but Power 0x04 = Lock All but Volume 0x05 = Primary (Master) 0x06 = Secondary (Daisy chain PD)

Example: Unlock local remote control (Display Address 01)

Header	Monitor ID	Category	Code0	Code1	Length	Data Control	Data[0]	Data[1]	Checksum
0xA6	0x01	0x00	0x00	0x00	0x04	0x01	0x1C	0x01	0xBF

9.4 Keypad Lock Status Get

Bytes	Bytes Description	Bits	Description
DATA[0]	0x1B = Keypad Lock Status- Get		Set unlock all/lock all /lock all but power/lock all but volume/ Primary/Secondary status

Example: (Display Address 01)

Header	Monitor ID	Category	Code0	Code1	Length	Data Control	Data[0]	Checksum
0xA6	0x01	0x00	0x00	0x00	0x03	0x01	0x1B	0xBE

9.5 Keypad Lock Status Report

Bytes	Bytes Description	Bits	Description
DATA[0]	0x1B = Keypad Lock Status- Report		Report unlock all /lock all/lock all but power/ lock all but Volume
DATA[1]	Status Indicator Byte for Keypad		0x01 = Unlock All 0x02 = Lock All 0x03 = Lock All but Power 0x04 = Lock All but Volume

Example: Reporting status of Keypad indicating Lock All (Display Address 01)

Header	Monitor ID	Category	Page	Length	Data Control	Data[0]	Data[1]	Checksum
0x21	0x01	0x00	0x00	0x04	0x01	0x1B	0x02	0x3C

9.6 Keypad Lock Status Set

Bytes	Bytes Description	Bits	Description
DATA[0]	0x1A = Keypad Lock Status- Set		Report unlock all /lock all/lock all but power/ lock all but Volume
DATA[1]	Status Indicator Byte for Keypad		0x01 = Unlock All 0x02 = Lock All 0x03 = Lock All but Power 0x04 = Lock All but Volume

Example: Set Lock All on Keypad (Display Address 01)

Header	Monitor ID	Category	Code0	Code1	Length	Data Control	Data[0]	Data[1]	Checksum
0xA6	0x01	0x00	0x00	0x00	0x04	0x01	0x1A	0x01	0xB9

10. Power State at Cold Start

Use this command is to set, update, and store the cold start power state.

10.1 Power State at Cold Start Get

Bytes	Bytes Description	Bits	Description
DATA[0]	0xA4 = Power State at Cold Start - Get		Get Power State at Cold Start State

Example: (Display Address 01)

Header	Monitor ID	Category	Code0	Code1	Length	Data Control	Data[0]	Checksum
0xA6	0x01	0x00	0x00	0x00	0x03	0x01	0xA4	0x01

10.2 Power State at Cold Start Report

Bytes	Bytes Description	Bits	Description
DATA[0]	0xA4 = Power State at Cold Start- Report		Report from Power state at Cold Start state
DATA[1]	Power State at Cold Start		0x00 = Power Off 0x01 = Forced On 0x02 = Last Status

Example: Report status of Forced On for Power State at Cold Start (Display Address 01)

Header	Monitor ID	Category	Page	Length	Data Control	Data[0]	Data[1]	Checksum
0x21	0x01	0x00	0x00	0x04	0x01	0xA4	0x01	0x80

10.3 Power State at Cold Start Set

Bytes	Bytes Description	Bits	Description
DATA[0]	0xA3 = Power State at Cold Start- Set		Set Power State at Cold Start
DATA[1]	Power State at Cold Start		0x00 = Power Off 0x01 = Forced On 0x02 = Last Status

The value is stored and applied only when the display starts up from cold start power state the next time:

- Power Off: The monitor will automatically switch to Power Off mode (even if the last status was on) whenever the main power turns on, or resumes after a power interruption.
- Forced On: The monitor will automatically switch to Power On mode whenever the main power turns on or resumes after a power interruption.
- Last Status: The monitor will be automatically switch to the last status (either Power Off or On) whenever the main power turns on or resumes after a power interruption.

Example: Report status of Forced On for Power State at Cold Start (Display Address 01)

Header	Monitor ID	Category	Page	Length	Data Control	Data[0]	Data[1]	Checksum
0x21	0x01	0x00	0x00	0x04	0x01	0xA4	0x01	0x80

Input Sources

11. Input Source

Use this command to change the current input source.

11.1 Input Source Set

Bytes	Bytes Description	Bits	Description
DATA[0]	0xAC = Input Source- Set		Command requests the display to set the current input source
DATA[1]	Input Source Type		0x05 = VGA 0x06 = HDMI 2 0x0A = DisplayPort 0x0B= OPS 0x0D= HDMI 1 0x0E = DVI-D 0x0F = HDMI 3 0x10= BROWSER 0x11= CMS 0x16= Media Player 0x17= PDF Player 0x18= Custom 0x19 = HDMI 4
DATA[2]	Reserved		(Reserved, value is 0)
DATA[3]	Reserved		(Reserved, value is 0)
DATA[4]	Reserved		(Reserved, value is 0)

Note: Certain sources only apply to specific models

- DisplayPort, HDMI 3, HDMI 4: 65/75/86 Only
- DVI-D: 43/55 Only

Example: Set on DVI-D (Display Address 01)

Header	Monitor ID	Category	Code0	Code1	Length	Data Control	Data[0]	Data[1]	Data[2]	Data[3]	Data[4]	Checksum
0xA6	0x01	0x00	0x00	0x00	0x07	0x01	0xAC	0x0E	0x00	0x00	0x00	0x03

12. Current Source

12.1 Current Source Get

Bytes	Bytes Description	Bits	Description
DATA[0]	0xAD = Current Source-Get		Command requests the display to report the current input source in use.

Example: (Display Address 01)

Header	Monitor ID	Category	Code0	Code1	Length	Data Control	Data[0]	Checksum
0xA6	0x01	0x00	0x00	0x00	0x03	0x01	0xAD	0x08

12.2 Current Source Report

Bytes	Bytes Description	Bits	Description
DATA[0]	0xAD = Current Source-Report		Command reports to the host controller the current input source used the display.
DATA[1]	Input Source Type/Number		0x05 = VGA 0x06 = HDMI 2 0x0A = DisplayPort 0x0B= OPS 0x0D= HDMI 1 0x0E = DVI-D 0x0F = HDMI 3 0x10= BROWSER 0x11= CMS 0x16= Media Player 0x17= PDF Player 0x18= Custom 0x19 = HDMI 4
DATA[2]	Reserved		(Reserved, value is 0)
DATA[3]	Reserved		(Reserved, value is 1)
DATA[4]	Reserved		(Reserved, value is 0)

Example: Current Input Source: DVI-D (Display Address 01)

Header	Monitor ID	Category	Page	Length	Data Control	Data[0]	Data[1]	Data[2]	Data[3]	Data[4]	Checksum
0x21	0x01	0x00	0x00	0x07	0x01	0xAD	0x0E	0x00	0x01	0x00	0x84

Video

13. Video Parameters

Use the following commands to get/set video parameters as defined below.

13.1 Video Parameters Get

Bytes	Bytes Description	Bits	Description
DATA[0]	0x33 = Video Parameters-Get		Command requests the display to report its current video parameters.

Example: (Display Address 01)

Header	Monitor ID	Category	Code0	Code1	Length	Data Control	Data[0]	Checksum
0xA6	0x01	0x00	0x00	0x00	0x03	0x01	0x33	0x96

13.2 Video Parameters Report

Bytes	Bytes Description	Bits	Description
DATA[0]	0x33 = Video Parameters-Report		Command reports to the host controller the current video parameters of the display.
DATA[1]	Brightness		0 to 100 (%) of the user selectable range of the display
DATA[2]	Color		0 to 100 (%) of the user selectable range of the display
DATA[3]	Contrast		0 to 100 (%) of the user selectable range of the display
DATA[4]	Sharpness		0 to 100 (%) of the user selectable range of the display
DATA[5]	Tint (Hue)		0 to 100 (%) of the user selectable range of the display
DATA[6]	Black Level		0 to 100 (%) of the user selectable range of the display
DATA[7]	Gamma Selection		0x01= Native, 0x02 = S gamma, 0x03 = 2.2, 0x04 = 2.4 0x05 = D-image(DICOM gamma)

Example: Video parameters are set to 55 % (0x37) and Gamma Curve is set to 2.2 (Display Address 01)

Header	Monitor ID	Category	Page	Length	Data Control	Data[0]	Data[1]	Data[2]	Data[3]	Data[4]	Data[5]	Data[6]	Data[7]	Checksum
0x21	0x01	0x00	0x00	0x0A	0x01	0x33	0x37	0x37	0x37	0x37	0x37	0x37	0x03	0x1B

13.3 Video Parameters Set

Bytes	Bytes Description	Bits	Description
DATA[0]	0x32 = Video Parameters-Set		Command to change the current video parameters
DATA[1]	Brightness		0 to 100 (%) of the user selectable range of the display
DATA[2]	Color		0 to 100 (%) of the user selectable range of the display
DATA[3]	Contrast		0 to 100 (%) of the user selectable range of the display
DATA[4]	Sharpness		0 to 100 (%) of the user selectable range of the display
DATA[5]	Tint (Hue)		0 to 100 (%) of the user selectable range of the display
DATA[6]	Black Level		0 to 100 (%) of the user selectable range of the display
DATA[7]	Gamma Selection		0x01= Native, 0x02 = S gamma, 0x03 = 2.2, 0x04 = 2.4, 0x05 = D-image(DICOM gamma)

Example: Set all video parameters to 0x37 (55 %) (Display Address 01)

Header	Monitor ID	Category	Code0	Code1	Length	Data Control	Data[0]	Data[1]	Data[2]	Data[3]	Data[4]	Data[5]	Data[6]	Data[7]	Checksum
0xA6	0x01	0x00	0x00	0x00	0x0A	0x01	0x32	0x37	0x37	0x37	0x37	0x37	0x37	0x03	0xAC

13.4 Color Temperature Get

Bytes	Bytes Description	Bits	Description
DATA[0]	0x35 = Color Temperature-Get		Command requests the display to report its current color temperature.

Example: (Display Address 01)

Header	Monitor ID	Category	Code0	Code1	Length	Data Control	Data[0]	Checksum
0xA6	0x01	0x00	0x00	0x00	0x03	0x01	0x35	0x90

13.5 Color Temperature Report

Bytes	Bytes Description	Bits	Description
DATA[0]	0x35 = Color Temperature-Report		Command reports to the host controller the current color temperature of the display.
DATA[1]	Color Temperature		0x00 = User 1 0x01 = Native 0x03 = 10000K 0x04 = 9300K 0x05 = 7500K 0x06 = 6500K 0x09 = 5000K 0x0A = 4000K 0x0D = 3000K 0x12 = User 2

Example: Color temperature is set to Nature (Display Address 01)

Header	Monitor ID	Category	Page	Length	Data Control	Data[0]	Data[1]	Checksum
0x21	0x01	0x00	0x00	0x04	0x01	0x35	0x01	0x10

13.6 Color Temperature Set

Bytes	Bytes Description	Bits	Description
DATA[0]	0x34 = Color Temperature-Set		Command reports to the host controller the current color temperature of the display.
DATA[1]	Color Temperature		0x00 = User 1 0x01 = Native 0x03 = 10000K 0x04 = 9300K 0x05 = 7500K 0x06 = 6500K 0x09 = 5000K 0x0A = 4000K 0x0D = 3000K 0x12 = User 2

Example: The current Color Temperature is set to Nature (Display Address 01)

Header	Monitor ID	Category	Code0	Code1	Length	Data Control	Data[0]	Data[1]	Checksum
0xA6	0x01	0x00	0x00	0x00	0x04	0x01	0x34	0x01	0x97

13.7 Color Parameters Get

Bytes	Bytes Description	Bits	Description
DATA[0]	0x37 = Color Parameters-Get		Command requests the current video parameters of the display.

Example: (Display Address 01)

Header	Monitor ID	Category	Code0	Code1	Length	Data Control	Data[0]	Checksum
0xA6	0x01	0x00	0x00	0x00	0x03	0x01	0x37	0x92

13.8 Color Parameters Report

Bytes	Bytes Description	Bits	Description
DATA[0]	0x37 = Color Parameters-Report		Command reports to the host controller the current video parameters of the display.
DATA[1]	Red Color Gain Value		0 to 255 of the user selectable range of the display
DATA[2]	Green Color Gain Value		0 to 255 of the user selectable range of the display
DATA[3]	Blue Color Gain Value		0 to 255 of the user selectable range of the display

Example: All Color Parameters are set to 255 (0xFF) (Display Address 01)

Header	Monitor ID	Category	Page	Length	Data Control	Data[0]	Data[1]	Data[2]	Data[3]	Data[4]	Data[5]	Data[6]	Checksum
0x21	0x01	0x00	0x00	0x09	0x01	0x37	0xFF	0xFF	0xFF	0xFF	0xFF	0xFF	0x1F

13.9 Color Parameters Set

Bytes	Bytes Description	Bits	Description
DATA[0]	0x36 = Color Parameters-Set		Command sets the video parameters of the display.
DATA[1]	Red Color Gain Value		0 to 255 of the user selectable range of the display
DATA[2]	Green Color Gain Value		0 to 255 of the user selectable range of the display
DATA[3]	Blue Color Gain Value		0 to 255 of the user selectable range of the display

Example: All color parameters are set to 255 (0xFF) (Display Address 01)

Header	Monitor ID	Category	Code0	Code1	Length	Data Control	Data[0]	Data[1]	Data[2]	Data[3]	Data[4]	Data[4]	Data[5]	Checksum
0xA6	0x01	0x00	0x00	0x00	0x09	0x01	0x36	0xFF	0xFF	0xFF	0xFF	0xFF	0xFF	0x99

14. Zoom Mode

Use this command to control the display screen format.

14.1 Zoom Mode Get

Bytes	Bytes Description	Bits	Description
DATA[0]	0x3B = Zoom Mode-Get		Command requests the display to report its current picture format.

Example: (Display Address 01)

Header	Monitor ID	Category	Code0	Code1	Length	Data Control	Data[0]	Checksum
0xA6	0x01	0x00	0x00	0x00	0x03	0x01	0x3B	0x9E

14.2 Zoom Mode Report

Bytes	Bytes Description	Bits	Description
DATA[0]	0x3B = Zoom Mode – Report		Command report to the host controller the current picture format of the display.
DATA[1]	Zoom Mode	Bit 7..4	Not used
		Bit 3..0	0x00 = 4:3 0x01 = Custom 0x02 = Real 0x03 = Full 0x04 = 21:9

Example: Current Picture Format is Widescreen on Full Display (Display Address 01)

Header	Monitor ID	Category	Page	Length	Data Control	Data[0]	Data[1]	Checksum
0x21	0x01	0x00	0x00	0x04	0x01	0x3B	0x03	0x1D

14.3 Zoom Mode Set

Bytes	Bytes Description	Bits	Description
DATA[0]	0x3A = Zoom Mode-Set		Command requests the display to set the specified picture format.
DATA[1]	Zoom Mode	Bit 7..4	Not used.
		Bit 3..0	0x00 = 4:3 0x01 = Custom 0x02 = 1:1 0x03 = Full 0x04 = 21:9

Example: Set Picture Format to Widescreen on Full Display (Display Address 01)

Header	Monitor ID	Category	Code0	Code1	Length	Data Control	Data[0]	Data[1]	Checksum
0xA6	0x01	0x00	0x00	0x00	0x04	0x01	0x3A	0x03	0x9B

Audio

15. Volume

Use this command to set/get the volume as defined below.

15.1 Volume Get

Bytes	Bytes Description	Bits	Description
DATA[0]	0x45 = Volume-Get		Command requests the display to report its current Volume level

- To mute the display, send Volume = 0. This command does not overwrite the system mute status of the display.

Example: (Display Address 01)

Header	Monitor ID	Category	Code0	Code1	Length	Data Control	Data[0]	Checksum
0xA6	0x01	0x00	0x00	0x00	0x03	0x01	0x45	0xE0

15.2 Volume Report

Bytes	Bytes Description	Bits	Description
DATA[0]	0x45 = Volume-Report		Command reports current volume level
DATA[1]	Volume		0 to 100 (%) of the user selectable range of the display

Example: Volume 77% (0x4D) (Display Address 01)

Header	Monitor ID	Category	Page	Length	Data Control	Data[0]	Data[1]	Checksum
0x21	0x01	0x00	0x00	0x04	0x01	0x45	0x4D	0x2D

15.3 Volume Set

This command can set the volume level for speaker and audio out, individually.

Bytes	Bytes Description	Bits	Description
DATA[0]	0x44 = Volume- Set		Command requests the display to set the specified volume parameters.
DATA[1]	Volume		0 to 100 (%) of the user selectable range of the display.
DATA[2]	Audio Out Volume Level		0 to 100 (%) of the user selectable range of the display.

Example: Set the Display Volume to 77% (0x4D) (Display Address 01)

Header	Monitor ID	Category	Code0	Code1	Length	Data Control	Data[0]	Data[1]	Data[1]	Checksum
0xA6	0x01	0x00	0x00	0x00	0x04	0x01	0x44	0x4D	0x4D	0xE7

16. Audio Parameters

Use this command to set/get the audio parameters as defined below.

16.1 Audio Parameters Get

Bytes	Bytes Description	Bits	Description
DATA[0]	0x43 = Audio Parameters-Get		Command requests the display to report its current audio parameters

Example: (Display Address 01)

Header	Monitor ID	Category	Code0	Code1	Length	Data Control	Data[0]	Checksum
0xA6	0x01	0x00	0x00	0x00	0x03	0x01	0x43	0xE6

16.2 Audio Parameters Report

Bytes	Bytes Description	Bits	Description
DATA[0]	0x43 = Audio Parameters-Report		Command reports Audio Parameters
DATA[1]	Treble		0 to 100 (%) of the user selectable range of the display
DATA[2]	Bass		0 to 100 (%) of the user selectable range of the display

Example: Current Display Settings: Treble 80% (0x50), Bass 93% (0x5D) (Display Address 01)

Header	Monitor ID	Category	Page	Length	Data Control	Data[0]	Data[1]	Data[2]	Checksum
0x21	0x01	0x00	0x00	0x05	0x01	0x43	0x50	0x50	0x67

16.3 Audio Parameters Set

Bytes	Bytes Description	Bits	Description
DATA[0]	0x42 = Audio Parameters-Set		Command to change the Audio Parameters of the display.
DATA[1]	Treble		0 to 100 (%) of the user selectable range of the display
DATA[2]	Bass		0 to 100 (%) of the user selectable range of the display

The interface software must be set to modify the variables outlined by the parameters above.

Example: Set the Display: Treble 77% (0x4D), Bass77% (0x4D) (Display Address 01)

Header	Monitor ID	Category	Code0	Code1	Length	Data Control	Data[0]	Data[1]	Data[2]	Checksum
0xA6	0x01	0x00	0x00	0x00	0x05	0x01	0x42	0x4D	0x4D	0xE1

Miscellaneous

17. Operating Hours

Use this command to record the working hours of the display.

17.1 Miscellaneous Info Get

Bytes	Bytes Description	Bits	Description
DATA[0]	0x0F = Misc. Info - Get		Command requests the display to report from miscellaneous information parameters
DATA[1]	Item		0x02 = Operating Hours (All other values are reserved)

Example: (Display Address 01)

Header	Monitor ID	Category	Code0	Code1	Length	Data Control	Data[0]	Data[1]	Checksum
0xA6	0x01	0x00	0x00	0x00	0x04	0x01	0x0F	0x02	0xAF

17.2 Miscellaneous Info Report

Bytes	Bytes Description	Bits	Description
DATA[0]	0x0F = Misc. Info-Report		Command reports current Operating Hours
DATA[1] to DATA[2]	Operating Hours		DATA[1] forms MSByte DATA[2] forms LSByte 16-bit-wide operational hours value

Example: Current Display Operation Hours Counter Value (Display Address 01)

Header	Monitor ID	Category	Page	Length	Data Control	Data[0]	Data[1]	Data[2]	Checksum
0x21	0x01	0x00	0x00	0x05	0x01	0x0F	0x4D	0x00	0x66

18. Auto Adjust

This command works for VGA (host controller) video auto adjust.

18.1 Auto Adjust Set

Bytes	Bytes Description	Bits	Description
DATA[0]	0x70 = Auto Adjust-Set		Command requests the display to make auto adjustment on VGA input source.
DATA[1]	Item		0x40 = Auto Adjust (*All other values are reserved *)
DATA[2]			(Reserved, Default 0)

Example: (Display Address 01)

Header	Monitor ID	Category	Code0	Code1	Length	Data Control	Data[0]	Data[1]	Data[2]	Checksum
0xA6	0x01	0x00	0x00	0x00	0x05	0x01	0x70	0x40	0x00	0x93

19. Serial Code

19.1 Serial Code Get

Bytes	Bytes Description	Bits	Description
DATA[0]	0x15 = Serial Code- Get		Command requests the display to report its Serial Code Number (Production code) 14 digits

Example: (Display Address 01)

Header	Monitor ID	Category	Code0	Code1	Length	Data Control	Data[0]	Checksum
0xA6	0x01	0x00	0x00	0x00	0x03	0x01	0x15	0xB0

19.2 Serial Code Report

Bytes	Bytes Description	Bits	Description
DATA[0]	0x15 = Serial Code- Report		Command reports Serial Code
DATA[1]	1st Character		Character acc. ASCII character map (HEX)
DATA[2]	2nd Character		
DATA[3]	3rd Character		
…	…		…
DATA[14]	14th Character		Character acc. ASCII character map (HEX)

20. Tiling

Use this command to set/get the tiling status as outlined below.

20.1 Tiling Get

Bytes	Bytes Description	Bits	Description
DATA[0]	0x23 = Tiling- Get		Command requests the display to report Tiling status.

Example: (Display Address 01)

Header	Monitor ID	Category	Code0	Code1	Length	Data Control	Data[0]	Checksum
0xA6	0x01	0x00	0x00	0x00	0x03	0x01	0x23	0x86

20.2 Tiling Report

Bytes	Bytes Description	Bits	Description
DATA[0]	0x23 = Tiling- Report		Command reports Tiling Setting
DATA[1]	Enable		0x00 = No 0x01 = Yes
DATA[2]	Frame comp.		0x00 = No 0x01 = Yes
DATA[3]	Position		0x01 = position 1 0x02 = position 2 till See Note 1
DATA[4]	V monitors, H monitors		0x00 = don't care 0x01 = V monitors =1 H monitors =1 0x02 = V monitors =1 H monitors =2 till See Note 2

Note 1:

1. The maximum Position value is 225 (hexadecimal value is 0xE1).
2. The Position is counted from left to right, then up to down in the Tiling Wall.

Example: See Figure 1 for the hexadecimal Position value in a 4x3 (H Monitors x V Monitors) Tiling Wall.
Example: See Figure 2 for the hexadecimal Position value in a 5x5 (H Monitors x V Monitors) Tiling Wall.
Example: See Figure 3 for the hexadecimal Position value in a 15x10 (H Monitors x V Monitors) Tiling Wall

Note 2:

1. The maximum H Monitors are 15 and the maximum V Monitors are 15.
   Data [4] = (V Monitors – 1) x 15 + H Monitors

Example: If H Monitors = 12 and V Monitors = 6, the Data [4] value will be (6–1) x 15 + 12 = 87
See Figure 3 for the hexadecimal Position value in a 4x3 (H Monitors x V Monitors) Tiling Wall.

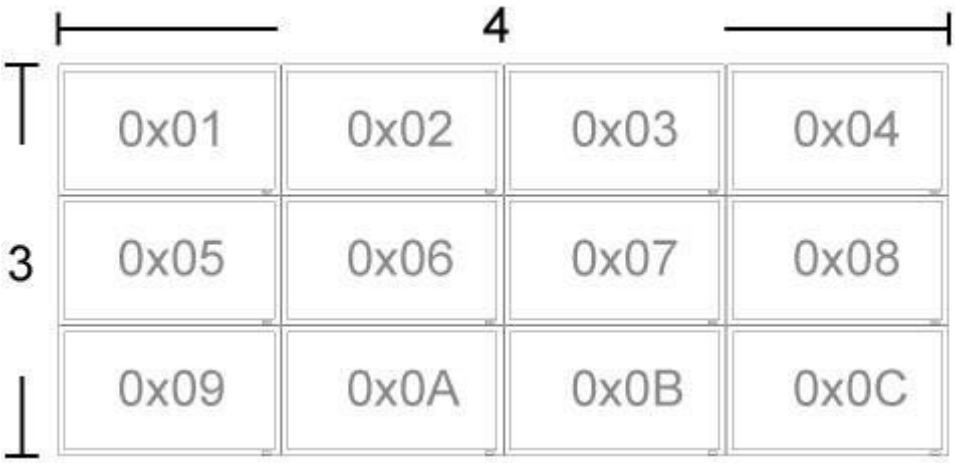


Figure 1

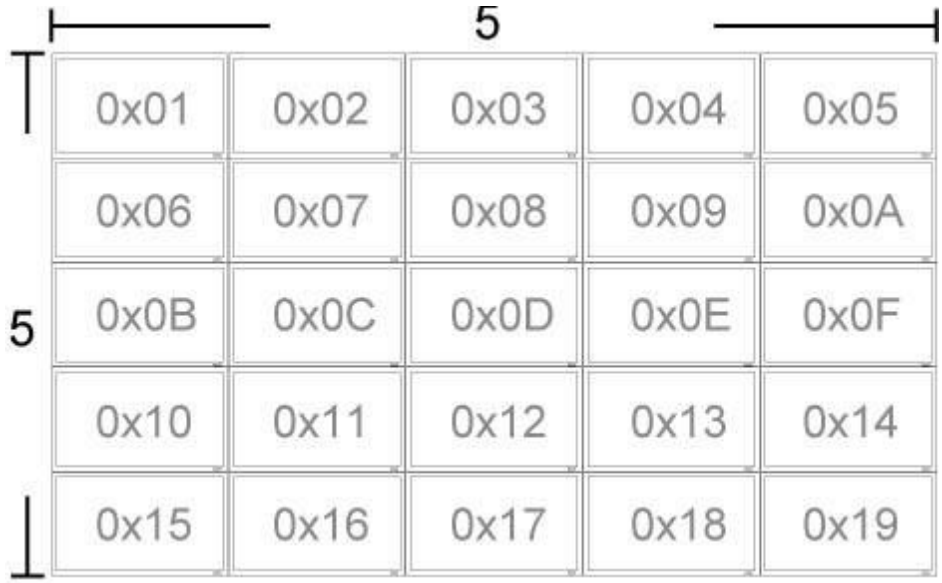


Figure 2: The hexadecimal Position value in a 5x5 (H Monitors x V Monitors) Tiling Wall.

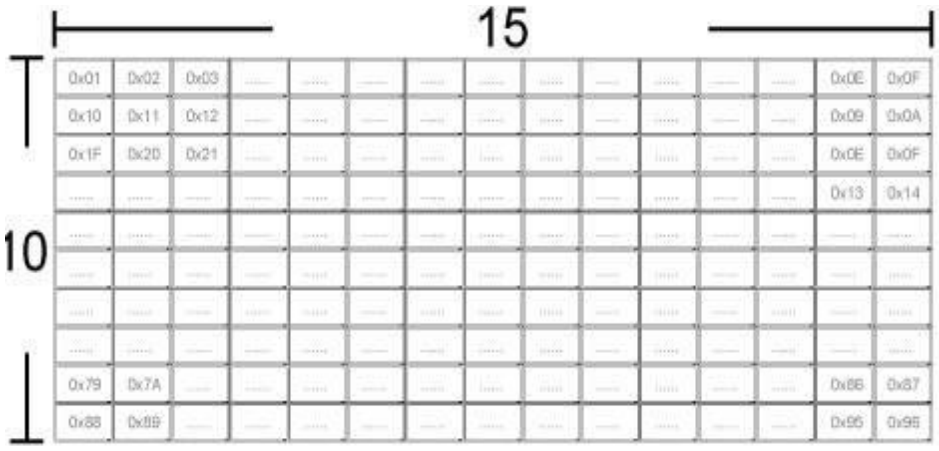


Figure 3: The hexadecimal Position value in a 15x10 (H Monitors x V Monitors) Tiling Wall.

20.3 Tiling Set

Bytes	Bytes Description	Bits	Description
DATA[0]	0x22 = Tiling- Set		Command reports Tiling Setting
DATA[1]	Enable		0x00 = No 0x01 = Yes
DATA[2]	Frame comp.		0x00 = No 0x01 = Yes 0x02 = don't overwrite (keep previous value)
DATA[3]	Position		0x00 = don't overwrite (keep previous value) 0x01 = position 1 0x02 = position 2 till
DATA[4]	V monitors, H monitors		0x00 = don't overwrite (keep previous value) 0x01 = V monitors =1 H monitors =1 0x02 = V monitors =1 H monitors =2 till

Example: Set the Display to the following: Tiling Enabled Yes, Frame comp. No, Position 2, V Monitors=2, H monitors = 3 (Display Address 01)

Header	Monitor ID	Category	Code0	Code1	Length	Data Control	Data[0]	Data[1]	Data[2]	Data[3]	Data[4]	Checksum
0xA6	0x01	0x00	0x00	0x00	0x07	0x01	0x22	0x00	0x00	0x02	0x08	0x89

Example: Set the Display to the following: Tiling Enabled: Yes, Frame comp: keep as before, Position: Keep as before, V Monitors, H monitors: keep as before (Display Address 01)

Header	Monitor ID	Category	Code0	Code1	Length	Data Control	Data[0]	Data[1]	Data[2]	Data[3]	Data[4]	Checksum
0xA6	0x01	0x00	0x00	0x00	0x07	0x01	0x22	0x01	0x02	0x00	0x00	0x80

21. Tiling Preset

21.1 Tiling Preset Set

Bytes	Bytes Description	Bits	Description
DATA[0]	0x24 = Tiling Preset- Set		Command requests the display to report Tiling status.
DATA[1]	Action		0x00 = Save 0x01 = Recall
DATA[2]	Preset		Preset number: 0x00 = Preset1 0x01 = Preset2 till 0x09 = Preset10

Example: Save parameters of tiling into Preset 1 (Display Address 01)

Header	Monitor ID	Category	Code0	Code1	Length	Data Control	Data[0]	Data[1]	Data[2]	Checksum
0xA6	0x01	0x00	0x00	0x00	0x05	0x01	0x24	0x00	0x00	0x87

Command Summary

Command Name	Set Command	Get Command	Command Code	Remarks
Monitor Information		√	0xA1	
Power State Get		√	0x19	
Power State Set	√		0x18	
Keypad Lock Status Get		√	0x1B	
Keypad Lock Status Set	√		0x1A	
IR Remote Lock Status Get		√	0x1D	
IR Remote Lock Status Set	√		0x1C	
Power State at Cold Start Get		√	0xA4	
Power State at Cold Start Set	√		0xA3	
Current Source Get		√	0xAC	
Input Source Set	√		0xAD	
Auto Signal Detecting Get		√	0xAF	
Auto Signal Detecting Set	√		0xAE	
Video Parameters Get		√	0x33	Brightness, etc.
Video Parameters Set	√		0x32	Brightness, etc.
Color Temperature Get		√	0x35	
Color Temperature Set	√		0x34	
Color Parameters Get		√	0x37	
Color Parameters Set	√		0x36	
Zoom Mode Get		√	0x3B	
Zoom Mode Set	√		0x3A	
Volume Get		√	0x45	
Volume Set	√		0x44	
Audio Parameters Get		√	0x43	
Audio Parameters Set	√		0x42	
Miscellaneous Info		√	0x0F	Operating hours
Auto Adjust	√		0x70	VGA only
Serial Code Get		√	0x15	
Tiling Get		√	0x23	
Tiling Set	√		0x22	
Tiling Preset Set	√		0x24	