



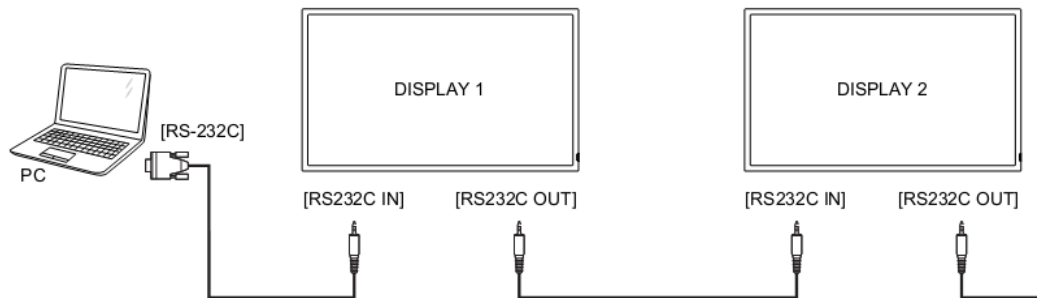
PN-55D3

Control Command

1. INTRODUCTION

1.1 Purpose

The purpose of this document is to explain in detail the commands and steps that can be used to control a display via RS232C / LAN.



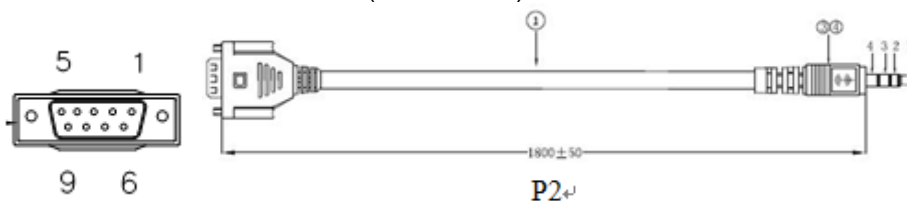
1.2 Definitions, Abbreviations and Acronyms

PBS	Professional Business Solutions
RC	Remote Control
ACK	Acknowledge
NACK	Not Acknowledge
NAV	Not Available
ID	Identification
0xXX	Hexadecimal notation

2. COMMAND PACKET FORMAT

2.1 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 Female connector:
Female D-Sub 9-Pin (outside view)



Pin #	Signal	Remark
1	NC	
2	TXD	Output from LCD Monitor
3	RXD	Input to LCD Monitor
4	NC	
5	GND	
6	NC	
7	NC	
8	NC	
9	NC	
frame	GND	

Displays use RXD, TXD and GND pins for RS-232C control.

Pin assignment

2.2 Communication Procedure

Control commands can be sent from a host controller via the RS232 connection. A new command should not be sent 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 a NAV (Not Available). If the command buffer is corrupt (transmission errors) the command will be responded to with a NACK. 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. Figure1 and Figure2 explain the mechanism of the Get and Set commands.

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

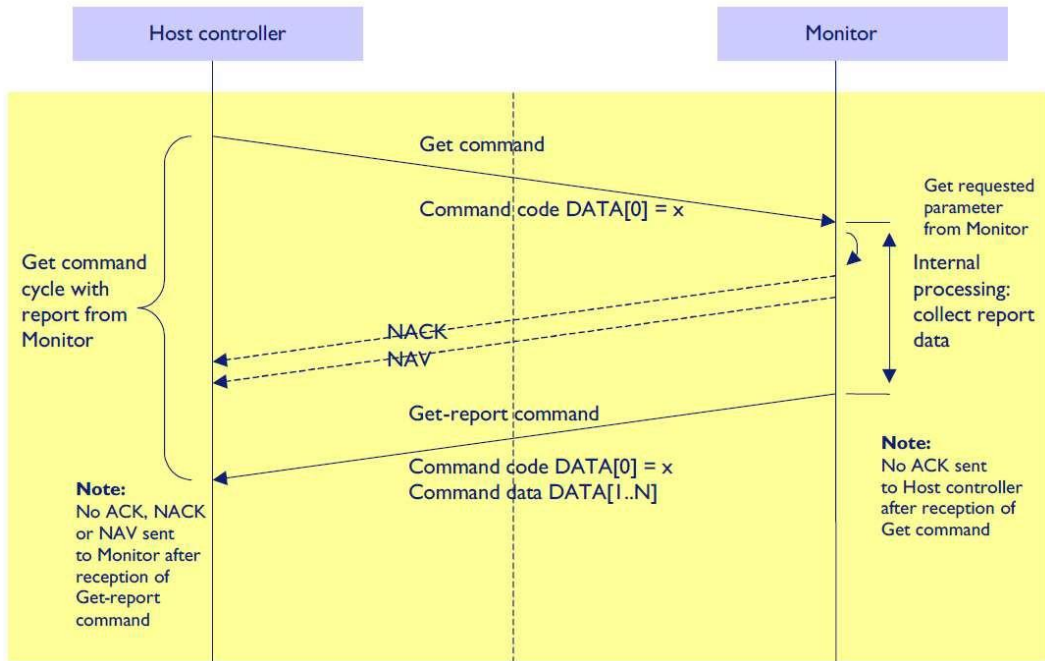


Figure 1: Explanation of mechanism of Get Command.

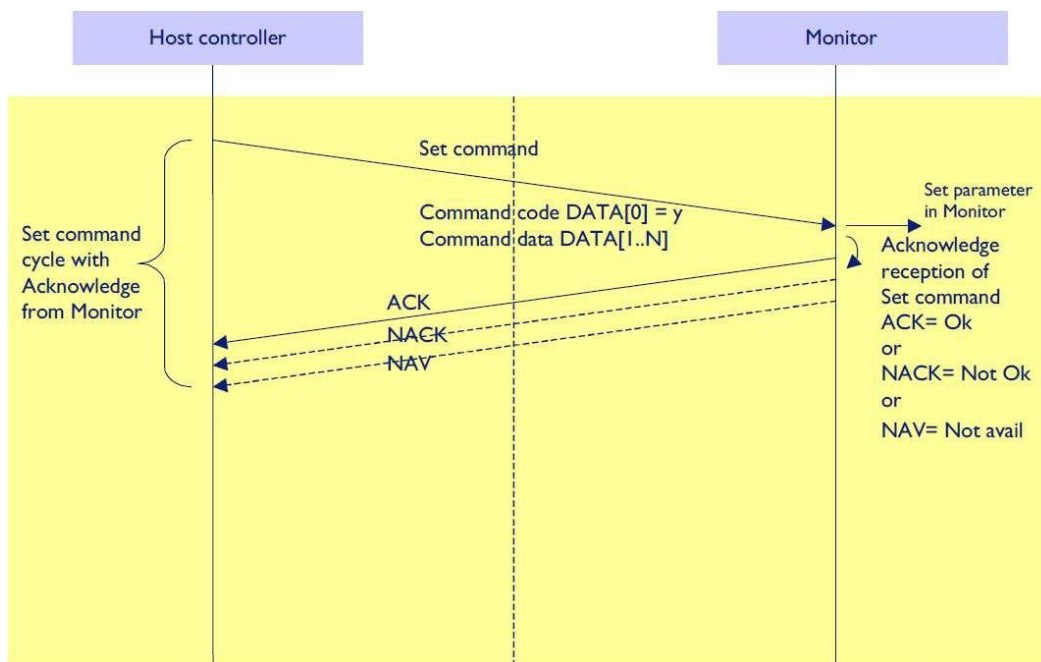


Figure 2: Explanation of mechanism of Set Command.

2.3 Command Format

The Command packet format:

Header	Monitor ID	Category	Code 0	Code 1	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 Single mode: Display Address range from 1 to 255 Broadcast mode: Display Address is 0 which indicates no ACKor Report is expected.
Byte 3	Category	Category = 0x00 (fixed)
Byte 4	Code0 (Page)	Page = 0x00 (fixed)
Byte 5	Code1 (Function)	Reserve (0x00 fixed)
Byte 6	Length	Length of message plus checksum code. Calculate the length from Control byte to Checksum byte. Length has to be calculated in the following way: Length = N + 3
Byte 7	Data Control	Data Control = 0x01 (fixed)
Byte 8	Data[0]	Command code
Byte 9 ~ Byte 44	Data[1]~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]

3. MESSAGES - SYSTEM

3.1 Communication Control

This defines the feedback command from monitor to host controller when it receives the display command from the host controller, depending on the commands availability, the command reported back to host controller can be one of the status (0x00: Completed, 0x01: Limit Over, 0x02: Limit Over, 0x03: Command canceled or 0x04: Parse Error).

Note: Report status ACK(0x00), NACK(0x03) or NAV(0x04) for Phoenix platform.

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

3.1.1 Message-Report

Number of Field	Name of Field	Description
Byte 1	Header	Header = 0x21
Byte 2	Monitor ID	Monitor ID Range : 1 ~ 255
Byte 3	Category	Category = 0x00 (fixed)
Byte 4	Code0 (Page)	Page = 0x00 (fixed)
Byte 5	Length	Length of message plus checksum code. Calculate the length from Control byte to Checksum byte. Length = 0x04
Byte 6	Data Control	Data Control = 0x01 (fixed)
Byte 7	Command	0x00(Communication Control)
Byte8~Byte8+(N-1)	Status	0x00: Completed Normal response. 0x01: Limit Over The packets was received normally, but the data value was over the upper limit. 0x02: Limit Over The packets was received normally, but the data value was over the lower limit. 0x03: Command canceled The packet is received normally but either the value of data is incorrect or request is not permitted for the current host value. 0x04: Parse Error Received not defined format data or check sum Error.
Byte 8+N	Checksum	Check Sum XOR of all byte in reply/report packet(except checksum itself). The total from Byte1 to Byte8 calculated by XOR

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 NACK 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	No this command code-Data(0),

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	1. Checksum error, the system will reply "NAV". No this parameter-Data(1), the system will reply "NAV".

4. MESSAGES – GENERAL

4.1 Platform and Version Labels

This command provides the model name of platform and the display Software version to the host controller

4.1.1 Message-Get (0xA2 = Platform Labels)

Bytes	Bytes Description	Bits	Description
DATA[0]	0xA2 = Platform Labels - Get		Request the SICP version.
DATA[1]	Which Label		0x01 = Get the platform label

Example: Get Platform label (Display address 01)

Header	Monitor ID	Category	Code0	Code1	Length	Data Control	Data[0]	Data[1]	Checksum
0xA6	0x01	0x00	0x00	0x00	0x04	0x01	0xA2	0x01	0x01

4.1.2 Message-Report (0xA2 = Platform Labels)

Bytes	Bytes Description	Bits	Description
DATA[0]	0xA2 = Platform Label – Report		Request the internal Hardware version.
DATA[1] to DATA[N]	Character[0] to Character[N-1]		Platform label = AGN

Example: Report Platform label (**AGN**)(Display address 01)

Header	Monitor ID	Category	Page	Length	Data Control	Data[0]	Data[1]	Data[2]	Data[3]	Checksum
0x21	0x01	0x00	0x00	0x06	0x01	0xA2	0x41	0x47	0x4E	0xCD

4.1.3 Message-Get (0xA1 = Model name)

Bytes	Bytes Description	Bits	Description
DATA[0]	0xA1 = Get Model name of device		Request the Model name of the device
DATA[1]	Codes to request		0x00 = Model Name

Example: Get Model name (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

4.1.4 Message-Report (0xA1 = Report Model name)

Bytes	Bytes Description	Bits	Description
DATA[0]	0xA1 = Report - Model Name		Request the Model name
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.

Example: Report Model name (**PN-55D3**) (Display address 01)

Header	Monitor ID	Category	Page	Length	Data Control	Data[0]	Data[1]	Data[2]	Data[3]	Data[4]
0x21	0x01	0x00	0x00	0x0A	0x01	0xA1	0x50	0x4E	0x2D	0x35
Data[5]	Data[6]	Checksum								
0x35	0x33	0xCE								

4.2 Power state

This command is used to set/get the power state as it is defined as below.

4.2.1 Message-Get (0x19 = Power state)

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

4.2.2 Message-Report (0x19 = Power state)

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

4.2.3 Message-Set (0x18 = Power state)

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: Set Display Power On (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	0x02	0xB8

Example: Set Display Power Off (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

4.3 Lock Functions for IR-Remote Control

The following commands are used to lock/unlock the Remote Control.

4.3.1 Message-Get (0x1D = IR-Remote Control)

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

Example: Get IR remote control status (Display address 01)

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

4.3.2 Message-Report (0x1D = IR-Remote Control)

Bytes	Bytes Description	Bits	Description
DATA[0]	0x1D = Report - Lock Status – IR –Remote Control		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: Unlocked IR 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

4.3.3 Message-Set (0x1C = IR-Remote Control)

Bytes	Bytes Description	Bits	Description
DATA[0]	0x1C = Set - Lock State – IR – Remote Control		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 all 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

4.4 Lock Functions for Keypad Control

The following commands are used to lock/unlock the Keypad.

4.4.1 Message-Get (0x1B = Keypad Lock Status)

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

Example: Get Keypad lock status (Display address 01)

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

4.4.2 Message-Report (0x1B = Keypad Lock Status)

Bytes	Bytes Description	Bits	Description
DATA[0]	0x1B = Report - Keypad Status		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 for (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

4.4.3 Message-Set (0x1A = Keypad Lock Status)

Bytes	Bytes Description	Bits	Description
DATA[0]	0x1A = Set – Keypad Lock Status		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: Unlock all on Keypad for (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

4.5 Power state at Cold Start

Command is used to set the cold start power state, the cold start power state are updated and stored by this command.

4.5.1 Message-Get (0xA4 = Power at Cold Start)

Bytes	Bytes Description	Bits	Description
DATA[0]	0xA4 = Power 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

4.5.2 Message-Report (0xA4 = Power at Cold Start)

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

Example: Report status of Forced On for power 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	0x02	0x83

4.5.3 Message-Set (0xA3 = Power at Cold Start)

Bytes	Bytes Description	Bits	Description
DATA[0]	0xA3 = Power 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 it is applied only when the display starts up from cold start power state the next time:

Power Off :

The monitor will be automatically switched to Power Off mode (even if the last status was on) whenever the mains power is turned on or resumed after the power interruption.

Forced On:

The monitor will be automatically switched to ON mode whenever the mains power is turned on or resumed after the power interruption.

Last Status:

The monitor will be automatically switched to the last status (either Power Off or On) whenever the mains power is turned on or resumed after the power interruption.

Example: Set Power state at cold start to last status (Display address 01)

Header	Monitor ID	Category	Code0	Code1	Length	Data Control	Data[0]	Data[1]	Checksum
0xA6	0x01	0x00	0x00	0x00	0x04	0x01	0xA3	0x02	0x03

5. MESSAGES - INPUT SOURCES

5.1 Input Source

This command is used to change the current input source.

5.1.1 Message-Set (0xAC = Input Source)

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 0x0A = Display Port 0x0B = OPS 0x0D= HDMI
Data[2]	Reserve		0x00 fixed
Data[3]	Reserve		0x00 fixed
Data[4]	Reserve		0x00 fixed

Example: Set on HDMI (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	0x0D	0x00	0x00	0x00	0x00

5.2 Current Source

5.2.1 Message-Get (0xAD = Current Source)

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

5.2.2 Message-Report (0xAD = Current Source)

Bytes	Bytes Description	Bits	Description
DATA[0]	0xAD = Current Source – Report		Command reports to the host controller the current input source in use by the display.
DATA[1]	Input Source Type/Number		0x05 = VGA 0x0A = Display Port 0x0B = OPS 0x0D= HDMI
DATA[2]	Reserved		0x00 fixed
DATA[3]	Reserved		0x01 fixed
DATA[4]	Reserved		0x000 fixed

Example: Current Input Source: HDMI (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	0x0D	0x00	0x01	0x00	0x87

6. MESSAGES - VIDEO

6.1 Video Parameters

The following commands are used to get/set video parameters as it is defined below.

6.1.1 Message-Get (0x33 = Video Parameters)

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

6.1.2 Message-Report (0x33 = Video Parameters)

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		0x00=Native ,0x01=1.8 ,0x02=1.85 ,0x03=1.9 ,0x04=1.95 , 0x05=2.0 ,0x06=2.05 ,0x07=2.1 ,0x08=2.15 , 0x09=2.2 ,0x0A=2.25 ,0x0B=2.3 ,0x0C=2.35 , 0x0D=2.4 ,0x0E=2.45 ,0x0F=2.5 ,0x10=2.55 ,0x11=2.6

Example: All 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	0x50	0x37	0x32	0x14	0x32	0x32	0x01	0x58

6.1.3 Message-Set (0x32 = Video Parameters)

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		0x00=Native ,0x01=1.8 ,0x02=1.85 ,0x03=1.9 ,0x04=1.95 , 0x05=2.0 ,0x06=2.05 ,0x07=2.1 ,0x08=2.15 , 0x09=2.2 ,0x0A=2.25 ,0x0B=2.3 ,0x0C=2.35 , 0x0D=2.4 ,0x0E=2.45 ,0x0F=2.5 ,0x10=2.55 ,0x11=2.6

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

Header	Monitor ID	Category	Code 0	Code 1	Length	Data Control	Data[0]	Data[1]	Data[2]	Data[3]	Data[4]	Data[5]	Data[6]	Data[7]	Check sum	
0xA6	0x01	0x00	0x00	0x00	0x0A	0x01	0x32	0x37	0x37	0x37	0x37	0x37	0x37	0x37	0x03	0x9D

6.2 Color Temperature

6.2.1 Message-Get (0x35 = Color Temperature)

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

6.2.2 Message-Report (0x35 = Color Temperature)

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 = User1 0x01=Native 0x04 = 9300K 0x05 = 7500K 0x06 = 6500K 0x08 = 5500K 0x0D = 3200K 0x12 = User 2

Example: The current color temperature is set to Native (Display address 01)

Header	Monitor ID	Category	Page	Length	Data Control	Data[0]	Data[1]	Checksum
0x21	0x01	0x00	0x00	0x04	0x01	0x35	0x01	0x11

6.2.3 Message-Set (0x34 = Color Temperature)

Bytes	Bytes Description	Bits	Description
DATA[0]	0x34 = Color Temperature – Report		Command reports to the host controller the current color temperature of the display.
DATA[1]	Color temperature		0x00 = User1 0x01=Native 0x04 = 9300K 0x05 = 7500K 0x06 = 6500K 0x08 = 5500K 0x0D = 3200K 0x12 = User 2

Example: The current color temperature is set to Native (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

6.3 Color Parameters

6.3.1 Message-Get (0x37 = Color Parameters)

Bytes	Bytes Description	Bits	Description
DATA[0]	0x37 = Color Parameters –Get		Command reports to the host controller 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

6.3.2 Message-Report (0x37 = Color Parameters)

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.
DATA[4]	Reserve		Reserve fixed 0x80
DATA[5]	Reserve		Reserve fixed 0x80
DATA[6]	Reserve		Reserve fixed 0x80

Example: All color parameters are set to 128 (0x80) (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	0x80	0x80	0x80	0x80	0x80	0x80	0x1F

6.4 Picture Format

This command is used to control the display screen format.

6.4.1 Message-Get (0x3B = Picture Format)

Bytes	Bytes Description	Bits	Description
DATA[0]	0x3B = Picture Format –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

6.4.2 Message-Report (0x3B = Picture Format)

Bytes	Bytes Description	Bits	Description
DATA[0]	0x3B = Picture Format –Report		Command report to the host controller the current picture format of the display.
DATA[1]	Picture Format*	Bit 7..4	Not used.
		Bit 3..0	Picture Format. 0x00=Normal(4:3) 0x02 = Real (1:1) 0x03 = Full 0x04 = LetterBox 0x06 = 16:9

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

6.4.3 Message-Set (0x3A = Picture Format)

Bytes	Bytes Description	Bits	Description
DATA[0]	0x3A = Picture Format –Set		Command requests the display to set the specified picture format
DATA[1]	Picture Format	Bit 7..4	Not used.
		Bit 3..0	Picture Format. 0x00=Normal(4:3) 0x02 = Real (1:1) 0x03 = Full 0x04 = LetterBox 0x06 = 16:9

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

7. MESSAGES - AUDIO

7.1 Volume

This command is used to set/get the Volume as it is defined as below.

7.1.1 Message-Get (0x45 = Volume)

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

The interface to set Software must be such that they also modify the variables representing these current parameters. 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

7.1.2 Message-Report (0x45 = Volume)

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: Current Display settings: 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

7.1.3 Message-Set (0x44 = Volume)

Bytes	Bytes Description	Bits	Description
DATA[0]	0x44 = Volume - Set		
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[2]*	Checksum
0xA6	0x01	0x00	0x00	0x00	0x05	0x01	0x44	0x4D	0x14	0xBE

7.2 Audio Parameters

This command is used to set/get the audio parameters as it is defined as below.

7.2.1 Message-Get (0x43 = Audio Parameters)

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

7.2.2 Message-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:50% (0x32) , Bass:50% (0x32) (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	0x32	0x32	0x67

7.2.3 Message-Set (0x42 = Audio Parameters)

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 to set Software must be such that they modify the variables representing these current parameters

Example: Set the Display to the following: Treble:77% (0x4D) , Bass:77% (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

8. MISCELLANEOUS

8.1 Operating Hours

The command is used to record the working hours of the display.

8.1.1 Message-Get (0x0F = Misc Info)

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

8.1.2 Message-Report (0x0F = Misc Info)

Bytes	Bytes Description	Bits	Description
DATA[0]	0x0F = Misc Info – Report		Command reports current Operating Hours
DATA[1] to DATA[2]	Operating Hours		Operating Hours: DATA[1] and DATA[2] form the MSByte and LSByte, respectively, of the 16-bit-wide Operational Hours value. Current source status. (for Phoenix platform only) DATA[1]: 0x00 DATA[2]: 0x01 = signal loss / 0x02 = signal stable.

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	0x00	0x0A	0x21

8.2 Auto Adjust

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

8.2.1 Message-Set (0x70 = Video Alignment)

Bytes	Bytes Description	Bits	Description
DATA[0]	0x70 = Video Alignment – 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

8.3 Serial Code

8.3.1 Message-Get (0x15 = Serial Code)

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

8.3.2 Message-Report (0x15 = Serial Code)

Bytes	Bytes Description	Bits	Description
DATA[0]	0x15 = Serial Code – Report		Command reports Serial Code
DATA[1]	1 st Character		Character acc. ASCII character map (HEX)
DATA[2]	2 nd Character		
DATA[3]	3 rd Character		
DATA[14]	14 th Character		Character acc. ASCII character map (HEX)
DATA[16]	16 th Character		Character acc. ASCII character map (HEX)

Example: Current Display settings: Serial Code = PDQ65AB123456789 (Display address 01)

Header	Monitor ID	Category	Page	Length	Control	Data[0]	Data[1]	Data[2]	Data[3]	Data[4]
0x21	0x01	0x00	0x00	0x13	0x01	0x15	0x50	0x44	0x51	0x36

Data[5]	Data[6]	Data[7]	Data[8]	Data[9]	Data[10]	Data [11]	Data[12]	Data[13]	Data[14]	Data[15]
0x35	0x41	0x42	0x31	0x32	0x33	0x34	0x35	0x36	0x37	0x38

Data[16]	Checksum
0x39	0x53

8.4 Temperature Sensors

8.4.1 Message-Get (0x2F = Temperature Sensor)

Bytes	Bytes Description	Bits	Description
DATA[0]	0x2F = Temperature Sensor – Get		Command requests the display to report its value of the temperature sensors ($\pm 3^{\circ}\text{C}$).

Example: (Display address 01)

Header	Monitor ID	Category	Code0	Code1	Length	Data Control	Data[0]	Checksum
0xA6	0x01	0x00	0x00	0x00	0x03	0x01	0x2F	0x8A

8.4.2 Message-Report (0x2F = Temperature Sensor)

Bytes	Bytes Description	Bits	Description
DATA[0]	0x2F = Temperature Sensor – Report		Command reports Temperature sensor value
DATA[1]	Temperature Sensor 1		0-100 in Celsius degrees represented in hex.
DATA[2]	Reserve		Fixed 0x00

Example: Current Temp Sensor read out: Sensor 1 = 39°C (Display address 01)

Header	Monitor ID	Category	Page	Length	Control	Data[0]	Data[1]	Data[2]	Checksum
0x21	0x01	0x00	0x00	0x05	0x01	0x2F	0x27	0x00	0x2C

8.5 IR Remote Command

The command is used to send IR Key to Control display.

8.5.1 Message-Set

Bytes	Bytes Description	Bits	Description
DATA[0]	0xFD = IR Remote Command		Command to simulate the IR Remote to send IR Key to display
DATA[1]	IR KEY		0xA0: Power 0xA1: Menu 0xA2: Input 0xA3: Vol_Up 0xA4: Vol_Down 0xA5: Mute 0xA6: Cursor_Up 0xA7: Cursor_Down 0xA8: Cursor_Left 0xA9: Cursor_Right 0xB1: OK 0xB2: Return 0xC1: Red 0xC2: Green 0xC3: Yellow 0xC4: Blue 0xD1: Format 0xD2: Info 0x00: Btn_0 0x01: Btn_1 0x02: Btn_2 0x03: Btn_3 0x04: Btn_4 0x05: Btn_5 0x06: Btn_6 0x07: Btn_7 0x08: Btn_8 0x09: Btn_9

Example: Send Power Key (Display address 01)

Header	Monitor ID	Category	Code0	Code1	Length	Data Control	Data[0]	Data[1]	Checksum
0xA6	0x01	0x00	0x00	0x00	0x04	0x01	0xFD	0xA0	0xFF

9. UniWall

9.1 UniWall

The command is used to set/get the UniWall status as it is defined as below.

9.1.1 Message-Get (0x23 = UniWall)

Bytes	Bytes Description	Bits	Description
DATA[0]	0x23 = UniWall – Get		Command requests the display to report UniWall 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

9.1.2 Message-Report (0x23 = UniWall)

Bytes	Bytes Description	Bits	Description
DATA[0]	0x23 = UniWall – Report		Command reports UniWall 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 UniWall

Example1: See Figure 3 for the hexadecimal Position value in a 4x3 (H Monitors x V Monitors) UniWall

Example: See Figure 4 for the hexadecimal Position value in a 5x5 (H Monitors x V Monitors) UniWall

Example: See Figure 5 for the hexadecimal Position value in a 15x15 (H Monitors x V Monitors) UniWall

Note 2:

(1) The maximum H Monitors are 15 and the maximum V Monitors are 15.

The formulas for DATA [4], V Monitors, and H Monitors are as follows:

H Monitors = MOD (Data [4], 15) (Data [4] ÷ 15, take the remainder)

V Monitors = INT (Data [4], 15) + 1 (Data [4] ÷ 15, take the quotient and plus one)

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

Example 1:

Set the display as follows:

Data[1] : UniWall enabled: Yes

Data[2] : Framecomp.: No

Data[3] : Position: 2

H Monitors: 4 , V monitors: 3

Data[4] value will be: $(3-1) \times 15 + 4 = 34$ (hex value: 0x22)

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	0x23	0x01	0x00	0x02	0x22	0x24

Figure 3. The hexadecimal Position value in a 4x3 (H Monitors x V Monitors) UniWall.

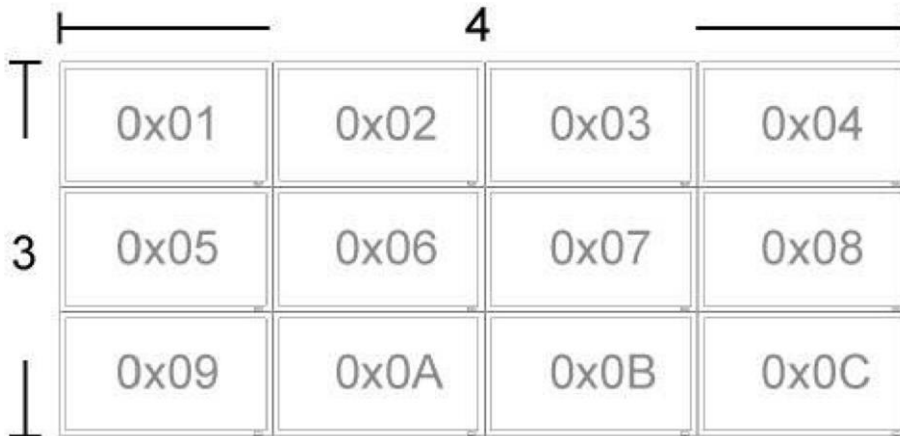
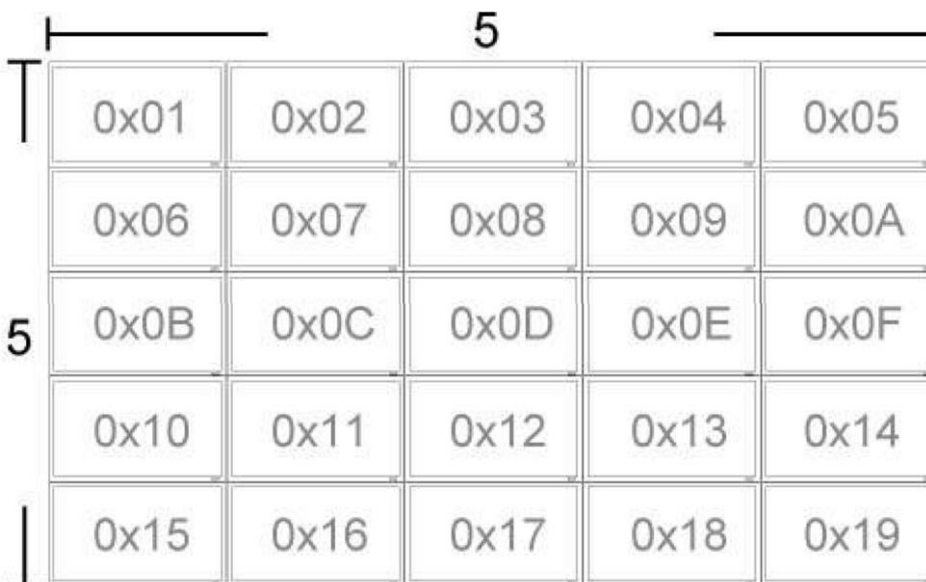


Figure 4. The hexadecimal Position value in a 5x5 (H Monitors x V Monitors) UniWall Wall.



9.1.3 Message-Set (0x22 = UniWall)

Bytes	Bytes Description	Bits	Description
DATA[0]	0x22 = UniWall – Set		Command reports UniWall 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 See Note 1 at 9.1.2
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 See Note 2 at 9.1.2

Example: Set the Display to the following: UniWall 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	0x01	0x00	0x02	0x12	0x92

Example: Set the Display to the following: UniWall Enabled: Yes, Frame comp.: keep as before, Position: Keep as before, VMonitors, 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

9.2 Tilling Preset

This command is used to set the Tilling Preset as it is defined as below.

9.2.1 Message-Set (0x24 = Tilling Preset)

Bytes	Bytes Description	Bits	Description
DATA[0]	0x24 = Tilling preset – Set		
DATA[1]	Action		0x00 = Save 0x01 = Recall
DATA[2]	Preset		Preset number: 0x00 : Preset 1 0x01 : Preset 2 til 0x09 : Preset 10

Example: Save parameter of tiling into Preset1 (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

10. Command summary

Command name	Set Command	Get Command	Command Code	Remarks
Communication Control	√	√	0x00	Generic report
Platform labels		√	0xA2	
Model name		√	0xA1	
Power state Get		√	0x19	
Power state Set	√		0x18	
Lock Status-IR-Remote Control Get		√	0x1D	
Lock Status-IR-Remote Control Set	√		0x1C	
Keypad Lock Status Get		√	0x1B	
Keypad Lock Status Set	√		0x1A	
Power state at cold start Get		√	0xA4	
Power state at cold start Set	√		0xA3	
Input Source	√		0xAC	
Current Source		√	0xAD	
Video parameters Get		√	0x33	Brightness, etc.
Video parameters Set	√		0x32	
Color temperature Get		√	0x35	
Color temperature Set	√		0x34	
Color parameters Get		√	0x37	
Color parameters Set				
Picture Format Get		√	0x3B	
Picture Format Set	√		0x3A	
Volume Get		√	0x45	
Volume Set	√		0x44	
Audio parameters Get		√	0x43	
Audio parameters Set	√		0x42	
Miscellaneous info Get		√	0x0F	Operating hours
Auto Adjust	√		0x70	VGA only
Serial Code Get		√	0x15	
Temperature Get		√	0x2F	
UniWall Get		√	0x23	
UniWall Set	√		0x22	
Tiling Preset Set	√		0x24	

11. Revision History

Date	Version	Description
2022-01-04	1.0	Initial version