

Application Note
BDLxxxx

**RS232 SERIAL INTERFACE
COMMUNICATION PROTOCOL
(SICP VI.85)**

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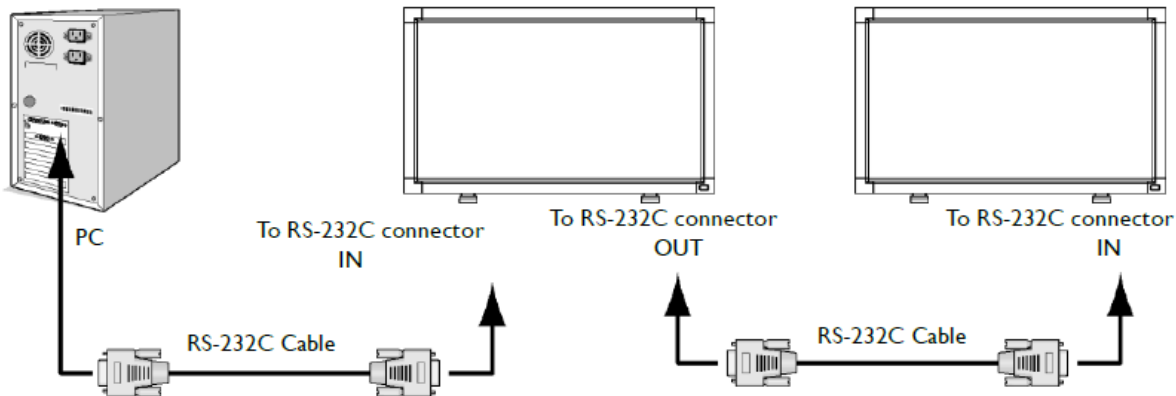
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1. INTRODUCTION

1.1 Purpose

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



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

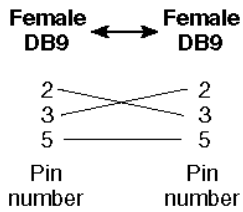
2.1 Physical Specifications

1. Baud Rate : 1200, 2400, 4800, 9600(default), 19200, 38400, 57600
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
3	TXD	Output from LCD Monitor
4	NC	
5	GND	
6	NC	
7	NC	
8	NC	
9	NC	
frame	GND	

Note: A crossover cable (null modem) is needed for connection to the host controller:



Philips Signage displays use RXD, TXD and GND pins for RS-232C control. For RS-232C cable, the reverse type cable should be used.

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.

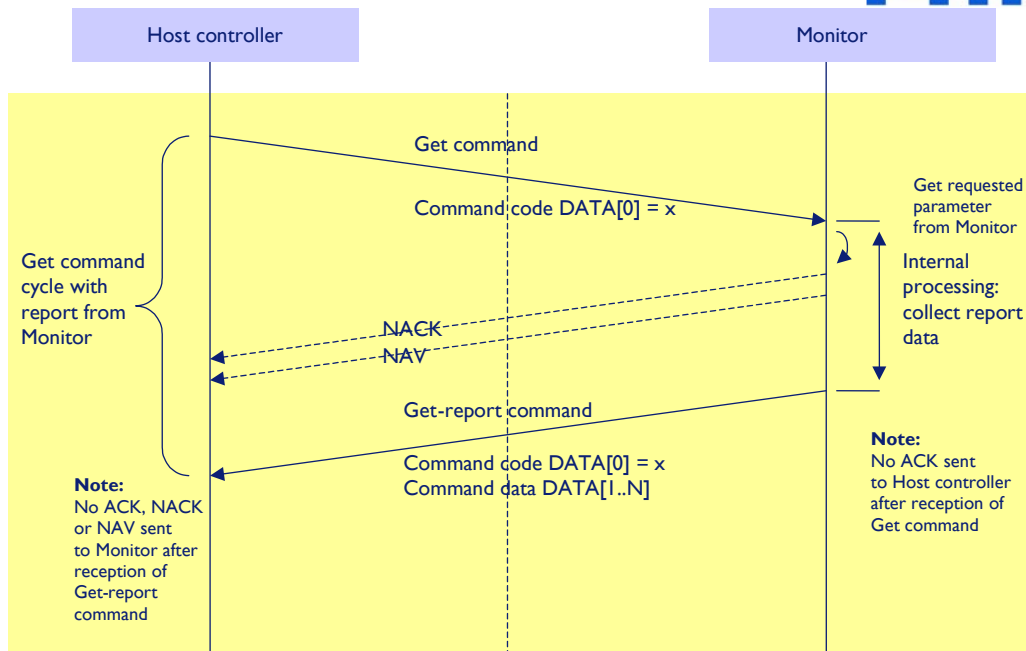


Figure 1: Explanation of mechanism of Get Command.

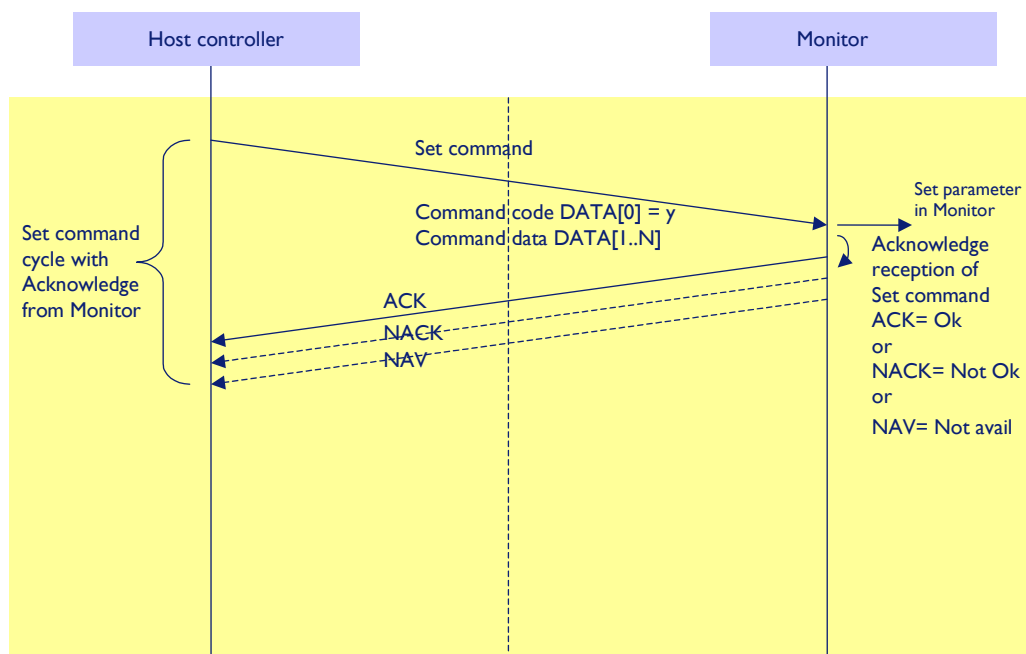


Figure 2: Explanation of mechanism of Set Command.

2.3 Command Format

The RS232 packet format:

MsgSize	Control	Data[0]	Data[1]	...	Data[N]	Checksum
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Every field of packet format consists of one byte – MsgSize = 1 byte, etc.

In detail:

Number of Field	Name of Field	Description
Byte 1:	MsgSize	Message Size has to be calculated in the following way: MsgSize + Control + Data(0) + ... + Data(N) + Checksum Range = 3 to 40 (0x3 to 0x28).
Byte 2:	Control	Message Control. Bit 7..0: Monitor ID Signal mode: Display Address range from 1 to 255 Broadcast mode: Display Address is 0 which indicates no ACK or Report is expected.
Byte 3 to Byte 39:	Data[0] to Data[N]	Data. This field can be also empty. If not empty then the range of Data Size, N = 0 to 36 (0x24).
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 = [MSG-SIZE] XOR [CONTROL] 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 ACK, NACK or NAV.

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

3.1.1 Message-Report

Bytes	Bytes Description	Bits	Description
DATA[0]	0x00 = Communication Control - Report		Generic report message after Get or Set message
DATA[1]	Communication Control		0x06 = Acknowledge (ACK) 0x15 = Not Acknowledge (NACK) 0x18 = Not Available (NAV). Command not available, not relevant or cannot execute

Example

Send:

MsgSize	Control	Data (0)	Data (1)	Checksum	Description
0x05	0x01	0x00	0x01	0x05	

ACK reply: (Display address 01)

MsgSize	Control	Data (0)	Data (1)	Checksum	Description
0x05	0x01	0x00	0x06	0x02	Command is well executed.

Example

Send:

MsgSize	Control	Data (0)	Data (1)	Checksum	Description
0x05	0x01	0x17	0x01	0x12	

NACK reply: (Display address 01)

MsgSize	Control	Data (0)	Data (1)	Checksum	Description
0x05	0x01	0x00	0x15	0x11	No this command code-Data(0), the system will reply "NACK".

Example

Send:

MsgSize	Control	Data (0)	Data (1)	Checksum	Description
0x05	0x01	0x00	0x01	0x05	

NAV reply: (Display address 01)

MsgSize	Control	Data (0)	Data (1)	Checksum	Description
0x05	0x01	0x00	0x18	0x1C	Checksum error, the system will reply "NAV".

Example

Send:

MsgSize	Control	Data (0)	Data (1)	Checksum	Description
0x05	0x01	0x00	0x04	0x00	

NAV reply: (Display address 01)

MsgSize	Control	Data (0)	Data (1)	Checksum	Description
0x05	0x01	0x00	0x18	0x1C	No this parameter-Data(1), the system will reply "NAV".

Example

Send:

MsgSize	Control	Data (0)	Data (1)	Checksum	Description
0x05	0x01	0x00	0x01	0x05	

NAV reply: (Display address 01)

MsgSize	Control	Data (0)	Data (1)	Checksum	Description
0x05	0x01	0x00	0x18	0x1C	Command is correct, while system is already in stand-by mode, so reply "NAV".

Example

Send:

MsgSize	Control	Data (0)	Data (1)	Checksum	Description
0x05	0x01	0x00	0x01	0x05	

No reply: (Display address 01- not active ID)

MsgSize	Control	Data (0)	Data (1)	Checksum	Description
0x05	0x01	0x00	0x18	0x1C	Command is correct, while system would NOT reply any message due to it's not active.

Example

Send:

MsgSize	Control	Data (0)	Data (1)	Checksum	Description
0x05	0x01	0x00	0x01	0x05	

No reply: (Display address 00- Broadcast ID)

MsgSize	Control	Data (0)	Data (1)	Checksum	Description
0x05	0x01	0x00	0x18	0x1C	Command is correct, all systems would NOT reply any message due to "Daisy Chain's limitation- Collision might occur.

3.2 Platform and Version Labels

This command provides the SICP protocol version and the display Software version to the host controller.

3.2.1 Message-Get

Bytes	Bytes Description	Bits	Description
DATA[0]	0xA2 = Platform and Version Labels - Get		Request the SICP version
DATA[1]	Which Label		0x00 = Get SICP implementation version 0x01 = Get the software label and version information of the platform

Example: Get SICP version (Display address 01)

MsgSize	Control	Data (0)	Data (1)	Checksum
0x05	0x01	0xA2	0x00	0xA6

3.2.2 Message-Report

Bytes	Bytes Description	Bits	Description
DATA[0]	0xA2 = Platform and Version Label – Report		Request the internal Hardware version.
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.

4. MESSAGES - GENERAL

4.1 Power state

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

4.1.1 Message-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)

MsgSize	Control	Data (0)	Checksum
0x04	0x01	0x19	0x1C

4.1.2 Message-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)

MsgSize	Control	Data (0)	Data (1)	Checksum
0x05	0x01	0x19	0x02	0x1F

4.1.3 Message-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)

MsgSize	Control	Data (0)	Data (1)	Checksum
0x05	0x01	0x18	0x01	0x1D

4.2 User Input Control

The following commands are used to lock/unlock the Remote Control and the Local Keyboard functionality corresponding.

4.2.1 Message-Get

Bytes	Bytes Description	Bits	Description
DATA[0]	0xID = User Input Control – Get		Get the lock/unlock state

Example: (Display address 01)

MsgSize	Control	Data (0)	Checksum
0x04	0x01	0xID	0x18

4.2.2 Message-Report

Bytes	Bytes Description	Bits	Description
DATA[0]	0xID = User Input Control – Report		Report from display of lock/unlock state
DATA[1]	Bit meaning: 0 = locked 1 = unlocked	Bit 7..6	Not used
		Bit 1	Local Keyboard
		Bit 0	Remote Control

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

MsgSize	Control	Data (0)	Data (1)	Checksum
0x05	0x01	0xID	0x01	0x18

4.2.3 Message-Set

Bytes	Bytes Description	Bits	Description
DATA[0]	0xIC = User Input Control – Set		Set the lock/unlock state
DATA[1]	Bit meaning: 0 = locked 1 = unlocked	Bit 7..6	Not used.
		Bit 1	Local Keyboard
		Bit 0	Remote Control

Example: Unlock local Keyboard and unlock remote control (Display address 01)

MsgSize	Control	Data (0)	Data (1)	Checksum
0x05	0x01	0xIC	0x03	0x1B

4.2.4 Message-Get

Bytes	Bytes Description	Bits	Description
DATA[0]	0x1B = User Input Control State - Get		Get the lock/unlock state for All/Volume/Power

Example: (Display address 01)

MsgSize	Control	Data (0)	Checksum
0x04	0x01	0x1B	0x1E

4.2.5 Message-Report

Bytes	Bytes Description	Bits	Description
DATA[0]	0x1B = User Input Control State - Report		Report from display of lock/unlock state for Volume/Power
DATA[1]	User Input Control for Remote Control		0x01 = Lock all 0x02 = Lock all but Volume 0x03 = Lock all but Power
DATA[2]	User Input Control for Local Keyboard		0x01 = Lock all 0x02 = Lock all but Volume 0x03 = Lock all but Power

Example: Lock all except Volume key for both Remote Control and Local Keyboard (Display address 01)

MsgSize	Control	Data (0)	Data (1)	Data (2)	Checksum
0x06	0x01	0x1B	0x02	0x02	0x1C

4.2.6 Message-Set

Bytes	Bytes Description	Bits	Description
DATA[0]	0x1A = User Input Control State-Set		Set the lock/unlock state for Volume/Power
DATA[1]	User Input Control for Remote Control		0x01 = Lock all 0x02 = Lock all but Volume 0x03 = Lock all but Power
DATA[2]	User Input Control for Local Keyboard		0x01 = Lock all 0x02 = Lock all but Volume 0x03 = Lock all but Power

Example: Lock all except Volume key for both Remote Control and Local Keyboard (Display address 01)

MsgSize	Control	Data (0)	Data (1)	Data (2)	Checksum
0x06	0x01	0x1A	0x02	0x02	0x1D

4.3 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.

4.3.1 Message-Get

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

Example: (Display address 01)

MsgSize	Control	Data (0)	Checksum
0x04	0x01	0xA4	0xA1

4.3.2 Message-Report

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: Current Power state at Cold Start state: Last Status (Display address 01)

MsgSize	Control	Data (0)	Data (1)	Checksum
0x05	0x01	0xA4	0x02	0xA2

4.3.3 Message-Set

Bytes	Bytes Description	Bits	Description
DATA[0]	0xA3 = Power at Cold Start - Set		Set Power state at Cold Start
DATA[1]	Power 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)

MsgSize	Control	Data (0)	Data (1)	Checksum
0x05	0x01	0xA3	0x02	0xA5

5. MESSAGES - INPUT SOURCES

5.1 Input Source

This command is used to change the current input source.

5.1.1 Message-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		0x01 = VIDEO 0x01 = S-VIDEO 0x03 = COMPONENT 0x03 = CVI 2 (not applicable) 0x05 = VGA 0x05 = HDMI 2 0x06 = Display Port 2 0x06 = USB 2 0x07 = Card DVI-D 0x07 = Display Port or Display Port I 0x08 = Card OPS 0x08 = USB or USB I 0x09 = HDMI or HDMI I 0x09 = DVI-D
DATA[2]	Input Source Number		0x00 = VIDEO 0x01 = S-VIDEO 0x00 = COMPONENT 0x01 = CVI 2 (not applicable) 0x00 = VGA 0x01 = HDMI 2 0x00 = HDMI or HDMI I 0x01 = DVI-D 0x00 = Card DVI-D 0x01 = Display Port or Display Port I 0x00 = Card OPS 0x01 = USB or USB I 0x00 = USB 2 0x01 = Display Port 2
DATA[3]	OSD Style	Bit7	Not used.
		Bit6	Do not switch. Source is made current. set is updated with the details of this source; however, source change is performed. 1 = Do not switch. 0 = Switch
		Bit2.0	Source info. Display Style 0 = Reserved 1 = Source label
DATA[4]	Mute Style	Bit 7	(Reserved, value is 0)
		Bit 6	(Reserved, value is 0)
		Bit 5	(Reserved, value is 0)
		Bit 4	(Reserved, value is 0)
		Bit 3	(Reserved, value is 0)
		Bit 2	(Reserved, value is 0)
		Bit 1	(Reserved, value is 0)
Bit 0	(Reserved, value is 0)		

Example: Set on DVI-D with Source label displaying on OSD (Display address 01)

MsgSize	Control	Data (0)	Data (1)	Data (2)	Data (3)	Data (4)	Checksum
0x08	0x01	0xAC	0x09	0x01	0x01	0x00	0xAC

5.2 Current Source

5.2.1 Message-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)

MsgSize	Control	Data (0)	Checksum
0x04	0x01	0xAD	0xA8

5.2.2 Message-Report

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		0x00 = Reserved for smartcard 0x01 = Reserved for smartcard 0x02 = Reserved for smartcard 0x03 = Reserved for smartcard 0xFD = Input Source (normal state) 0xFE = Reserved for smartcard
DATA[2]	Input Source Number		<u>For Input Source Type: 0x00, 0x01, 0x02, 0x03</u> 0x01...0x63 = Channel Number (only for smartcard) For Input Source Type: 0xFD 0x01 = VIDEO 0x02 = S-VIDEO 0x06 = COMPONENT 0x07 = CVI 2 (not applicable) 0x08 = VGA 0x09 = HDMI 2 0x0A = HDMI or HDMI I 0x0B = DVI-D 0x0C = Card DVI-D 0x0D = Display Port or Display Port I 0x0E = Card OPS 0x0F = USB or USB I 0x10 = USB 2 0x11 = Display Port 2

Example: Current Input Source: VIDEO (Display address 01)

MsgSize	Control	Data (0)	Data (1)	Data (2)	Checksum
0x06	0x01	0xAD	0xFD	0x01	0x56

5.3 Auto Signal Detecting

5.3.1 Message-Get

Bytes	Bytes Description	Bits	Description
DATA[0]	0xAF = Auto Signal Detecting – Get		Command requests the display to report its current Auto Signal Detecting status

Example: (Display address 01)

MsgSize	Control	Data (0)	Checksum
0x04	0x01	0xAF	0xAA

5.3.2 Message-Report

Bytes	Bytes Description	Bits	Description
DATA[0]	0xAF = Auto Signal Detecting – Report		Command reports Auto Signal Detecting Setting
DATA[1]	On / Off		0x00 = Off 0x01 = On

Example: Current Display settings: Off and On (Display address 01)

MsgSize	Control	Data (0)	Data (1)	Checksum
0x05	0x01	0xAF	0x00	0xAB
0x05	0x01	0xAF	0x01	0xAA

5.3.3 Message-Set

Bytes	Bytes Description	Bits	Description
DATA[0]	0xAE = Auto Signal Detecting – Set		Command to change the Auto Signal Detecting setting of the display
DATA[1]	On / Off		0x00 = Off 0x01 = On

Example: Set the Display to the following: Auto Signal Detecting Off (Display address 01)

MsgSize	Control	Data (0)	Data (1)	Checksum
0x05	0x01	0xAE	0x00	0xAA

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

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)

MsgSize	Control	Data (0)	Checksum
0x04	0x01	0x33	0x36

6.1.2 Message-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]	Colour.		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

Example: All video parameters are set to 55 % (0x37) (Display address 01)

MsgSize	Control	Data (0)	Data (1)	Data (2)	Data (3)	Data (4)	Data (5)	Data (6)	Data (7)	Checksum
0x0B	0x01	0x33	0x37	0x37	0x37	0x37	0x37	0x37	0x03	0x3A

6.1.3 Message-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]	Colour.		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

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

MsgSize	Control	Data (0)	Data (1)	Data (2)	Data (3)	Data (4)	Data (5)	Data (6)	Data (7)	Checksum
0x0B	0x01	0x32	0x37	0x37	0x37	0x37	0x37	0x37	0x03	0x3B

The following commands are used to get/set the color temperature.

6.1.4 Message-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)

MsgSize	Control	Data (0)	Checksum
0x04	0x01	0x35	0x30

6.1.5 Message-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 0x01 = Nature 0x02 = 11000K(Not applicable) 0x03 = 10000K 0x04 = 9300K 0x05 = 7500K 0x06 = 6500K 0x07 = 5770K (Not applicable) 0x08 = 5500K(Not applicable) 0x09 = 5000K 0x0A = 4000K 0x0B = 3400K (Not applicable) 0x0C = 3350K (Not applicable) 0x0D = 3000K 0x0E = 2800K (Not applicable) 0x0F = 2600K (Not applicable) 0x10 = 1850K (Not applicable)

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

MsgSize	Control	Data (0)	Data (1)	Checksum
0x05	0x01	0x35	0x01	0x30

6.1.6 Message-Set

Bytes	Bytes Description	Bits	Description
DATA[0]	0x34 = Color Temperature – Set		Command to change the current color parameters
DATA[1]	Color temperature		0x00 = User 0x01 = Nature 0x02 = 11000K(Not applicable) 0x03 = 10000K 0x04 = 9300K 0x05 = 7500K 0x06 = 6500K 0x07 = 5770K (Not applicable) 0x08 = 5500K(Not applicable) 0x09 = 5000K

			0x0A = 4000K 0x0B = 3400K (Not applicable) 0x0C = 3350K (Not applicable) 0x0D = 3000K 0x0E = 2800K (Not applicable) 0x0F = 2600K (Not applicable) 0x10 = 1850K (Not applicable)
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Example: The current color temperature is set to Nature (Display address 01)

MsgSize	Control	Data (0)	Data (1)	Checksum
0x05	0x01	0x34	0x01	0x31

The following commands are used to get/set the color parameters for specific color temperature.

6.1.7 Message-Get

Bytes	Bytes Description	Bits	Description
DATA[0]	0x37 = Color Parameters – Get		Command requests the display to report its current color parameters.

Example: (Display address 01)

MsgSize	Control	Data (0)	Checksum
0x04	0x01	0x37	0x32

6.1.8 Message-Report

Bytes	Bytes Description	Bits	Description
DATA[0]	0x37 = Color Parameters – Report		Command reports to the host controller the current color 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]	Red color offset value		0 to 255 of the user selectable range of the display.
DATA[5]	Green color offset value		0 to 255 of the user selectable range of the display.
DATA[6]	Blue color offset value		0 to 255 of the user selectable range of the display.

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

MsgSize	Control	Data (0)	Data (1)	Data (2)	Data (3)	Data (4)	Data (5)	Data (6)	Checksum
0x0A	0x01	0x37	0xFF	0xFF	0xFF	0xFF	0xFF	0xFF	0x3C

6.1.9 Message-Set

Bytes	Bytes Description	Bits	Description
DATA[0]	0x36 = Color Parameters – Set		Command to change the current color parameters
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]	Red color offset value		0 to 255 of the user selectable range of the display.
DATA[5]	Green color offset value		0 to 255 of the user selectable range of the display.
DATA[6]	Blue color offset value		0 to 255 of the user selectable range of the display.

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

MsgSize	Control	Data (0)	Data (1)	Data (2)	Data (3)	Data (4)	Data (5)	Data (6)	Checksum
0x0A	0x01	0x36	0xFF	0xFF	0xFF	0xFF	0xFF	0xFF	0x3D

6.2 Picture Format

This command is used to control the display screen format.

6.2.1 Message-Get

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)

MsgSize	Control	Data (0)	Checksum
0x04	0x01	0x3B	0x3E

6.2.2 Message-Report

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 0x01 = Custom 0x02 = Real 0x03 = Full 0x04 = 21:9 0x05 = Dynamic

* For further explanations, please see section 6.2.3 – Message-Set.

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

MsgSize	Control	Data (0)	Data (0)	Checksum
0x05	0x01	0x3B	0x03	0x3C

6.2.3 Message-Set

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 0x01 = Custom 0x02 = Real 0x03 = Full 0x04 = 21:9 0x05 = Dynamic

The display shall respond with NAV if it receives a Picture Format that is not relevant to its Display Aspect Ratio. The display shall ignore the [Picture Format - Set] if it receives a Picture Format that it cannot execute.

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

MsgSize	Control	Data (0)	Data (0)	Checksum
0x05	0x01	0x3A	0x03	0x3D

This command is used to control the VGA video parameters.

Value in(0,10,20,30,40,50,60,70,80,90,100)

6.2.4 Message-Get

Bytes	Bytes Description	Bits	Description
DATA[0]	0x39 = VGA Video Parameters – Get		Command requests the display to report its VGA current video parameters.

Example: (Display address 01)

MsgSize	Control	Data (0)	Checksum
0x04	0x01	0x39	0x3C

6.2.5 Message-Report

Bytes	Bytes Description	Bits	Description
DATA[0]	0x39 = VGA Video Parameters – Report		Command reports to the host controller the VGA current video parameters of the display.
DATA[1]	Clock		0 to 100 (%) of the user selectable range of the display.
DATA[2]	Clock Phase		0 to 100 (%) of the user selectable range of the display.
DATA[3]	H. position		0 to 100 (%) of the user selectable range of the display.
DATA[4]	V. Position		0 to 100 (%) of the user selectable range of the display.

Example: All VGA video parameters are set to 55 % (0x37) (Display address 01)

MsgSize	Control	Data (0)	Data (1)	Data (2)	Data (3)	Data (4)	Checksum
0x08	0x01	0x39	0x37	0x37	0x37	0x37	0x30

6.2.6 Message-Set

Bytes	Bytes Description	Bits	Description
DATA[0]	0x38 = VGA Video Parameters – Set		Command to change the VGA current video parameters
DATA[1]	Clock(Invalid)		0 to 100 (%) of the user selectable range of the display.
DATA[2]	Clock Phase(Invalid)		0 to 100 (%) of the user selectable range of the display.
DATA[3]	H. position		0 to 100 (%) of the user selectable range of the display.
DATA[4]	V. Position		0 to 100 (%) of the user selectable range of the display.

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

MsgSize	Control	Data (0)	Data (1)	Data (2)	Data (3)	Data (4)	Checksum
0x08	0x01	0x38	0x37	0x37	0x37	0x37	0x31

6.3 Picture-in-Picture (PIP)

This command is used to control PIP on/off with different locations.

6.3.1 Message-Get

Bytes	Bytes Description	Bits	Description
DATA[0]	0x3D = Picture-in-Picture – Get		Command requests the display to get the specified PIP settings.

Example: Get PIP setting (Display address 01)

MsgSize	Control	Data (0)	Checksum
0x04	0x01	0x3D	0x38

6.3.2 Message-Report

Bytes	Bytes Description	Bits	Description
DATA[0]	0x3D = Picture-in-Picture – Report		Command reports to the host controller the current PIP settings.
DATA[1]	Picture-in-Picture	Bit 7..1	(reserved, default 0)
		Bit 0	PIP on/off 0 = off 1 = on Note: The size of the PIP window is platform-dependent. If the size is other than half-screen (i.e. Picture-by-Picture), DATA[2].Bit 1.0 may be used to specify the window position.
DATA[2]	Additional PIP parameters	Bit 7..3	(reserved, default 0)
		Bit 2..0	Position of the PIP window: 0x00 = 00 = position 0 (typically bottom-left) 0x01 = 01 = position 1 (typically top-left) 0x02 = 10 = position 2 (typically top-right) 0x03 = 11 = position 3 (typically bottom-right) 0x04 = Others.
DATA[3]			(reserved, default 0)
DATA[4]			(reserved, default 0)

Example: Current PIP setting is enabling and located at position 2 (Display address 01)

MsgSize	Control	Data (0)	Data (1)	Data (2)	Data (3)	Data (4)	Checksum
0x08	0x01	0x3D	0x01	0x02	0x00	0x00	0x37

6.3.3 Message-Set

Bytes	Bytes Description	Bits	Description
DATA[0]	0x3C = Picture-in-Picture – Set		Command requests the display to set the specified PIP settings.
DATA[1]	Picture-in-Picture	Bit 7..1	(reserved, default 0)
		Bit 0	PIP on/off 0 = off 1 = on Note: The size of the PIP window is platform-dependent. If the size is other than half-screen (i.e. Picture-by-Picture), DATA[2].Bit 1.0 may be used to specify the window position.
DATA[2]	Additional PIP parameters	Bit 7..2	(reserved, default 0)
		Bit 1..0	Position of the PIP window: 0x00 = 00 = position 0 (typically bottom-left) 0x01 = 01 = position 1 (typically top-left) 0x02 = 10 = position 2 (typically top-right) 0x03 = 11 = position 3 (typically bottom-right)
DATA[3]			(reserved, default 0)
DATA[4]			(reserved, default 0)

Example: Set PIP ON, top-right (Display address 01)

MsgSize	Control	Data (0)	Data (1)	Data (2)	Data (3)	Data (4)	Checksum
0x08	0x01	0x3C	0x01	0x02	0x00	0x00	0x36

6.4 PIP Source

This command is used to control the PIP source setting.

6.4.1 Message-Get

Bytes	Bytes Description	Bits	Description
DATA[0]	0x85 = PIP Source – Get		Command requests the display to report its current PIP source setting.

This command is used to get the source for the PIP window when PIP feature is activated.

Example: Get PIP source setting (Display address 01)

MsgSize	Control	Data (0)	Checksum
0x04	0x01	0x85	0x80

6.4.2 Message-Report

Bytes	Bytes Description	Bits	Description
DATA[0]	0x85 = PIP Source – Get		Command requests the display to report its current PIP source setting.
DATA[1]	Source Type		0xFD = Input Source (normal state) 0xFE = Reserved for smartcard
DATA[2]	Source Number		0x01 = VIDEO 0x03 = S-VIDEO 0x06 = COMPONENT 0x08 = VGA 0x09 = HDMI 2 0x0A = HDMI or HDMI 1 0x0B = DVI-D 0x0C = Card DVI-D (not applicable) 0x0D = Display Port or Display Port 1 0x0E = Card OPS 0x0F = USB or USB 1 0x10 = USB 2 0x11 = Display Port 2

Example: Get PIP source report (Display address 01)

MsgSize	Control	Data (0)	Data (1)	Data (2)	Checksum
0x06	0x01	0x85	0xFD	0x08	0x77

6.4.3 Message-Set

This is the PIP source selection command

Bytes	Bytes Description	Bits	Description
DATA[0]	0x84 = PIP Source – Set		Command requests the display to set the specified PIP source.
DATA[1]	Source Type		0xFD = Input Source (normal state) 0xFE = Reserved for smartcard
DATA[2]	Source Number		0x01 = VIDEO 0x03 = S-VIDEO 0x06 = COMPONENT 0x08 = VGA 0x09 = HDMI 2 0x0A = HDMI or HDMI I 0x0B = DVI-D 0x0C = Card DVI-D 0x0D = Display Port or Display Port I 0x0E = Card OPS 0x0F = USB or USB I 0x10 = USB 2 0x11 = Display Port 2

This command is used to select the source for the PIP window before the PIP feature is activated.

Example: Set source PIP to VIDEO (Display address 01)

MsgSize	Control	Data (0)	Data (1)	Data (2)	Checksum
0x06	0x01	0x84	0xFD	0x01	0x7F

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

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)

MsgSize	Control	Data (0)	Checksum
0x04	0x01	0x45	0x40

7.1.2 Message-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: Current Display settings: Volume:77% (0x4D) (Display address 01)

MsgSize	Control	Data (0)	Data (1)	Checksum
0x05	0x01	0x45	0x4D	0x0C

7.1.3 Message-Set

Bytes	Bytes Description	Bits	Description
DATA[0]	0x44 = Volume – Set		
DATA[1]	Volume.		0 to 100 (%) of the user selectable range of the display.

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

MsgSize	Control	Data (0)	Data (1)	Checksum
0x05	0x01	0x44	0x4D	0x0D

7.2 Volume Limits

This command is used to set the volume limit (minimum, maximum and switch on volume).

7.2.1 Message-Set

Bytes	Bytes Description	Bits	Description
DATA[0]	0xB8 = Volume Limits- Set		The 3 values must conform to the rule : Min <= Switch On <= Max
DATA[1]	Minimum Volume		0 to 100 (%) of the user selectable range of the display.
DATA[2]	Maximum Volume		0 to 100 (%) of the user selectable range of the display.
DATA[3]	Switch On Volume		0 to 100 (%) of the user selectable range of the display.

Example: Set the Display to the following: 10% (0x0A), 77% (0x4D), 50% (0x32) (Display address 01)

MsgSize	Control	Data (0)	Data (1)	Data (2)	Data (3)	Checksum
0x07	0x01	0xB8	0x0A	0x4D	0x32	0xCB

7.3 Audio Parameters

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

7.3.1 Message-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)

MsgSize	Control	Data (0)	Checksum
0x04	0x01	0x43	0x46

7.3.2 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:80% (0x50) , Bass:93% (0x5D) (Display address 01)

MsgSize	Control	Data (0)	Data (1)	Data (2)	Checksum
0x06	0x01	0x43	0x50	0x5D	0x49

7.3.3 Message-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 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)

MsgSize	Control	Data (0)	Data (1)	Data (2)	Checksum
0x06	0x01	0x42	0x4D	0x4D	0x45

8 MISCELLANEOUS

8.1 Operating Hours

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

8.1.1 Message-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)

MsgSize	Control	Data (0)	Data (1)	Checksum
0x05	0x01	0x0F	0x02	0x09

8.1.2 Message-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] and DATA[2] form the MSByte and LSByte, respectively, of the 16-bit-wide Operational Hours value.

Example: Current Display Operation Hours counter value (Display address 01)

MsgSize	Control	Data (0)	Data (1)	Data (2)	Checksum
0x06	0x01	0x0F	0x4D	0x00	0x45

8.2 Power Saving Mode

This command is used for dimming back light power consumption control. Different levels of power consumptions can be achieved by using this command.

8.2.1 Message-Get

Bytes	Bytes Description	Bits	Description
DATA[0]	0xDE = Smart Power – Get		Command requests the display to get the specified Power Saving Mode.

Example: Get the Smart Power Level (Display address 01)

MsgSize	Control	Data (0)	Checksum
0x04	0x01	0xDE	0xDB

8.2.2 Message-Report

Bytes	Bytes Description	Bits	Description
DATA[0]	0xDE = Smart Power – Report		Command reports Power Saving Mode Setting
DATA[1]	Level of Smart Power control		0x00 = OFF 0x01 = Low (defined to be same as OFF) 0x02 = Medium 0x03 = High

Example: Current Display settings: Power Saving Mode setting is Low (Display address 01)

MsgSize	Control	Data (0)	Data (1)	Checksum
0x05	0x01	0xDE	0x01	0xDB

8.2.3 Message-Set

Bytes	Bytes Description	Bits	Description
DATA[0]	0xDD = SmartPower – Set		Command requests the display to set the specified Power Saving Mode.
DATA[1]	Level of SmartPower control		For the currently-defined Type = 0: 0x00 = OFF (no special action, default mode) 0x01 = Low (defined to be same as OFF) 0x02 = Medium 0x03 = High (highest power-saving mode)

Example: Set the Display to Medium SmartPower Level (Display address 01)

MsgSize	Control	Data (0)	Data (1)	Checksum
0x05	0x01	0xDD	0x02	0xDB

Note1: This command controls the level of power-saving when the display is active-on.

Note2: Exactly how this feature is implemented, or whether it can be done at all, depends on the platform. It is possible that the picture-quality might be compromised as a trade-off.

8.3 Auto Adjust

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

8.3.1 Message-Set

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)

MsgSize	Control	Data (0)	Data (1)	Data (2)	Checksum
0x06	0x01	0x70	0x40	0x00	0x37

8.4 Temperature Sensors

8.4.1 Message-Get

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)

MsgSize	Control	Data (0)	Checksum
0x04	0x01	0x2F	0x2A

8.4.2 Message-Report

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.

Example: Current Temp Sensor read out: Sensor 1 = 28°C (Display address 01)

MsgSize	Control	Data (0)	Data (1)	Checksum
0x05	0x01	0x2F	0x1C	0x37

8.5 Serial Code

8.5.1 Message-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)

MsgSize	Control	Data (0)	Checksum
0x04	0x01	0x15	0x10

8.5.2 Message-Report

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)

Example: Current Display settings: Serial Code = HA1A0917123456 (Display address 01)

MsgSize	Control	Data (0)	Data (1)	Data (2)	Data (3)	Data (4)	Data (5)	Data (6)	Data (7)
0x12	0x01	0x15	0x48	0x41	0x31	0x41	0x30	0x39	0x31

Data (8)	Data (9)	Data (10)	Data (11)	Data (12)	Data (13)	Data (14)	Checksum
0x37	0x31	0x32	0x33	0x34	0x35	0x36	0x77

8.6 Tiling

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

8.6.1 Message-Get

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

Example: (Display address 01)

MsgSize	Control	Data (0)	Checksum
0x04	0x01	0x23	0x26

8.6.2 Message-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 ... 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 ... See Note 2

Note 1:

- (1) For Zero Bezel models, the maximum Position value is 150 (hexadecimal value is 0x96).
- (2) For other models, the maximum Position value is 25 (hexadecimal value is 0x19).
- (3) The Position is counted from left to right, then up to down in the Tiling Wall.

Example: See Figure 3 for the hexadecimal Position value in a 4x3 (H Monitors x V Monitors) Tiling Wall.

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

Example: See Figure 5 for the hexadecimal Position value in a 15x10 (H Monitors x V Monitors) Tiling Wall.

Note 2:

- (1) For Zero Bezel models, the maximum H Monitors are 15 and the maximum V Monitors are 10. The formulas for DATA[4], V Monitors, and H Monitors are as follows:

$$H\ Monitors = \text{MOD}(\text{Data}[4], 15) \quad (\text{Data}[4] \div 15, \text{ take the remainder})$$

$$V\ Monitors = \text{INT}(\text{Data}[4], 15) + 1 \quad (\text{Data}[4] \div 15, \text{ take the quotient and plus one})$$

$$\text{Data}[4] = (V\ Monitors - 1) \times 15 + H\ Monitors$$

Example: If H Monitors = 12 and V Monitors = 6, the Data[4] value will be $(6-1) \times 15 + 12 = 87$

- (2) For other models, the maximum H Monitors and V Monitors are 5, and the formulas for DATA[4], V Monitors, and H Monitors are as follows:

$$H\ Monitors = \text{MOD}(\text{Data}[4], 5) \quad (\text{Data}[4] \div 5, \text{ take the remainder})$$

$$V\ Monitors = \text{INT}(\text{Data}[4], 5) + 1 \quad (\text{Data}[4] \div 5, \text{ take the quotient and plus one})$$

$$\text{Data}[4] = (V\ Monitors - 1) \times 5 + H\ Monitors$$

Example: If H Monitors = 4 and V Monitors = 3, the Data[4] value will be $(3-1) \times 5 + 4 = 14$.

Example for BDL4675XU, Display address 01,
Set the display as follows:

8.6.3 Message-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 ... See Note 1 at 8.6.2
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 ... See Note 2 at 8.6.2

Example for BDL4675XU, Display address: 01

Set the display as follows:

Tiling enabled: Yes

Frame comp.: No

Position: 2

H Monitors: 3

V monitors: 2

Data[4] value will be $(2-1) \times 15 + 3 = 18$ (hex value: 0x12)

MsgSize	Control	Data[0]	Data (1)	Data (2)	Data (3)	Data (4)	Checksum
0x08	0x01	0x22	0x01	0x00	0x02	0x12	0x3A

Example for BDL4675XU, Display address 01

Set the display as follows:

Tiling enabled: Yes

Frame comp., Position, H Monitors, V Monitors: Keep as before

MsgSize	Control	Data[0]	Data (1)	Data (2)	Data (3)	Data (4)	Checksum
0x08	0x01	0x22	0x01	0x02	0x00	0x00	0x28

Example for BDL4230E, Display address 01

Set the display as follows:

Tiling enabled: Yes

Frame comp.: No

Position: 2

H Monitors: 3

V monitors: 2

MsgSize	Control	Data[0]	Data (1)	Data (2)	Data (3)	Data (4)	Checksum
0x08	0x01	0x22	0x01	0x00	0x02	0x08	0x20

Example for BDL4230E, Display address 01

Set the display as follows:

Tiling enabled: Yes

Frame comp., Position, H Monitors, V Monitors: Keep as before

MsgSize	Control	Data[0]	Data (1)	Data (2)	Data (3)	Data (4)	Checksum
0x08	0x01	0x22	0x01	0x02	0x00	0x00	0x28

8.7 Light Sensor

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

8.7.1 Message-Get

Bytes	Bytes Description	Bits	Description
DATA[0]	0x25 = Light Sensor – Get		Command requests the display to report its current light sensor status

Example: (Display address 01)

MsgSize	Control	Data (0)	Checksum
0x04	0x01	0x25	0x20

8.7.2 Message-Report

Bytes	Bytes Description	Bits	Description
DATA[0]	0x25 = Light Sensor – Report		Command reports Light Sensor Setting
DATA[1]	On / Off		0x00 = Off 0x01 = On

Example: Current Display settings: Off and On (Display address 01)

MsgSize	Control	Data (0)	Data (1)	Checksum
0x05	0x01	0x25	0x00	0x21
0x05	0x01	0x25	0x01	0x20

8.7.3 Message-Set

Bytes	Bytes Description	Bits	Description
DATA[0]	0x24 = Light Sensor – Set		Command to change the Light Sensor setting of the display
DATA[1]	On / Off		0x00 = Off 0x01 = On

Example: Set the Display to the following: Light Sensor Off (Display address 01)

MsgSize	Control	Data (0)	Data (1)	Checksum
0x05	0x01	0x24	0x00	0x20

8.8 OSD Rotating

The command is used to set/get the OSD menu direction as it is defined as below.

8.8.1 Message-Get

Bytes	Bytes Description	Bits	Description
DATA[0]	0x27 = OSD Rotating – Get		Command requests the display to report its current OSD rotating status

Example: (Display address 01)

MsgSize	Control	Data (0)	Checksum
0x04	0x01	0x27	0x22

8.8.2 Message-Report

Bytes	Bytes Description	Bits	Description
DATA[0]	0x27 = OSD Rotating – Report		Command reports OSD Rotating Setting
DATA[1]	On / Off		0x00 = Off 0x01 = On

Example: Current Display settings: Off and On (Display address 01)

MsgSize	Control	Data (0)	Data (1)	Checksum
0x05	0x01	0x27	0x00	0x23
0x05	0x01	0x27	0x01	0x22

8.8.3 Message-Set

Bytes	Bytes Description	Bits	Description
DATA[0]	0x26 = OSD Rotating – Set		Command to change the OSD Rotating setting of the display
DATA[1]	On / Off		0x00 = Off 0x01 = On

Example: Set the Display to the following: OSD Rotating Off (Display address 01)

MsgSize	Control	Data (0)	Data (1)	Checksum
0x05	0x01	0x26	0x00	0x22

8.9 Information OSD

The command is used to set/get the Information OSD Feature as it is defined as below.

8.9.1 Message-Get

Bytes	Bytes Description	Bits	Description
DATA[0]	0x2D = Information OSD Feature – Get		Command requests the display to report its current Information OSD Feature status

Example: (Display address 01)

MsgSize	Control	Data (0)	Checksum
0x04	0x01	0x2D	0x28

8.9.2 Message-Report

Bytes	Bytes Description	Bits	Description
DATA[0]	0x2D = Information OSD Feature – Report		Command reports the Information OSD Feature enabled or disabled
DATA[1]	Off, 1 - 60		0x00 = Off 0x01 – 0x3C = 1 - 60

Example: Current Display Information OSD Feature settings: Off (Display address 01)

MsgSize	Control	Data (0)	Data (1)	Checksum
0x05	0x01	0x2D	0x00	0x29

8.9.3 Message-Set

Bytes	Bytes Description	Bits	Description
DATA[0]	0x2C = Information OSD Feature – Set		Command to set the Information OSD Feature of the display enabled or disabled
DATA[1]	Off, 1 - 60		0x00 = Off 0x01 – 0x3C = 1 - 60

Example: Set the Display to the following: Information OSD Feature: Off (Display address 01)

MsgSize	Control	Data (0)	Data (1)	Checksum
0x05	0x01	0x2C	0x00	0x28

8.10 MEMC Effect

The command is used to set/get the MEMC effects as it is defined as below.

8.10.1 Message-Get

Bytes	Bytes Description	Bits	Description
DATA[0]	0x29 = MEMC Effect – Get		Command requests the display to report its current MEMC effect status

Example: (Display address 01)

MsgSize	Control	Data (0)	Checksum
0x04	0x01	0x29	0x2C

8.10.2 Message-Report

Bytes	Bytes Description	Bits	Description
DATA[0]	0x29 = MEMC Effect – Report		Command reports the MEMC effect level
DATA[1]	Off/Low/Medium/High		0x00 = Off 0x01 = Low 0x02 = Medium 0x03 = High

Example: Current Display MEMC settings: Off (Display address 01)

MsgSize	Control	Data (0)	Data (1)	Checksum
0x05	0x01	0x29	0x00	0x2D

8.10.3 Message-Set

Bytes	Bytes Description	Bits	Description
DATA[0]	0x28 = MEMC Effect – Set		Command to set the MEMC level of the display for various picture motion performance
DATA[1]	Off/Low/Medium/High		0x00 = Off 0x01 = Low 0x02 = Medium 0x03 = High

Example: Set the Display to the following: MEMC Effect Off (Display address 01)

MsgSize	Control	Data (0)	Data (1)	Checksum
0x05	0x01	0x28	0x00	0x2C

8.11 Touch Feature

The command is used to set/get the Touch Feature as it is defined as below.

8.11.1 Message-Get

Bytes	Bytes Description	Bits	Description
DATA[0]	0x1F = Touch Feature – Get		Command requests the display to report its current Touch Feature status

Example: (Display address 01)

MsgSize	Control	Data (0)	Checksum
0x04	0x01	0x1F	0x1A

8.11.2 Message-Report

Bytes	Bytes Description	Bits	Description
DATA[0]	0x1F = Touch Feature – Report		Command reports the Touch Feature enabled or disabled
DATA[1]	On / Off		0x00 = Off 0x01 = On

Example: Current Display Touch Feature settings: Off (Display address 01)

MsgSize	Control	Data (0)	Data (1)	Checksum
0x05	0x01	0x1F	0x00	0x1B

8.11.3 Message-Set

Bytes	Bytes Description	Bits	Description
DATA[0]	0x1E = Touch Feature – Set		Command to set the Touch Feature of the display enabled or disabled
DATA[1]	On /Off		0x00 = Off 0x01 = On

Example: Set the Display to the following: Touch Feature Off (Display address 01)

MsgSize	Control	Data (0)	Data (1)	Checksum
0x05	0x01	0x1E	0x00	0x1A

8.12 Noise Reduction

The command is used to set/get the Noise reduction Feature as it is defined as below.

8.12.1 Message-Get

Bytes	Bytes Description	Bits	Description
DATA[0]	0x2B = Noise Reduction Feature – Get		Command requests the display to report its current Touch Feature status

Example: (Display address 01)

MsgSize	Control	Data (0)	Checksum
0x04	0x01	0x2B	0x2E

8.12.2 Message-Report

Bytes	Bytes Description	Bits	Description
DATA[0]	0x2B = Noise reduction Feature – Report		Command reports the Noise Reduction Feature enabled or disabled
DATA[1]	Off / Low / Middle / High		0x00 = Off 0x01 = Low 0x02 = Middle 0x03 = High

Example: Current Display Noise Reduction Feature settings: Off (Display address 01)

MsgSize	Control	Data (0)	Data (1)	Checksum
0x05	0x01	0x2B	0x00	0x2F

8.12.3 Message-Set

Bytes	Bytes Description	Bits	Description
DATA[0]	0x2A = Noise reduction Feature – Set		Command to set the Noise Reduction Feature of the display enabled or disabled
DATA[1]	Off / Low / Middle / High		0x00 = Off 0x01 = Low 0x02 = Middle 0x03 = High

Example: Set the Display to the following: Noise Reduction Feature Off (Display address 01)

MsgSize	Control	Data (0)	Data (1)	Checksum
0x05	0x01	0x2A	0x00	0x2E

8.13 Scan Mode

The command is used to set/get the Scan Mode Feature as it is defined as below.

8.13.1 Message-Get

Bytes	Bytes Description	Bits	Description
DATA[0]	0x51 = Scan Mode Feature – Get		Command requests the display to report its current Scan Mode Feature status

Example: (Display address 01)

MsgSize	Control	Data (0)	Checksum
0x04	0x01	0x51	0x54

8.13.2 Message-Report

Bytes	Bytes Description	Bits	Description
DATA[0]	0x51 = Scan Mode Feature – Report		Command reports the Scan Mode Feature enabled or disabled
DATA[1]	Overscan / Underscan		0x00 = Overscan 0x01 = Underscan

Example: Current Display Scan Mode Feature settings: Overscan (Display address 01)

MsgSize	Control	Data (0)	Data (1)	Checksum
0x05	0x01	0x51	0x00	0x55

8.13.3 Message-Set

Bytes	Bytes Description	Bits	Description
DATA[0]	0x50 = Scan Mode Feature – Set		Command to set the Scan mode Feature of the display enabled or disabled
DATA[1]	Overscan / Underscan		0x00 = Overscan 0x01 = Underscan

Example: Set the Display to the following: Scan Mode Feature Overscan (Display address 01)

MsgSize	Control	Data (0)	Data (1)	Checksum
0x05	0x01	0x50	0x00	0x54

8.14 Scan Conversion

The command is used to set/get the Scan Conversion Feature as it is defined as below.

8.14.1 Message-Get

Bytes	Bytes Description	Bits	Description
DATA[0]	0x53 = Scan Conversion Feature – Get		Command requests the display to report its current Scan Conversion Feature status

Example: (Display address 01)

MsgSize	Control	Data (0)	Checksum
0x04	0x01	0x53	0x56

8.14.2 Message-Report

Bytes	Bytes Description	Bits	Description
DATA[0]	0x53 = Scan Conversion Feature – Report		Command reports the Scan Conversion Feature enabled or disabled
DATA[1]	Progressive / Interlace		0x00 = Progressive 0x01 = Interlace

Example: Current Display Scan Conversion Feature settings: Progressive (Display address 01)

MsgSize	Control	Data (0)	Data (1)	Checksum
0x05	0x01	0x53	0x00	0x57

8.14.3 Message-Set

Bytes	Bytes Description	Bits	Description
DATA[0]	0x52 = Scan Conversion Feature – Set		Command to set the Scan Conversion Feature of the display enabled or disabled
DATA[1]	Progressive / Interlace		0x00 = Progressive 0x01 = Interlace

Example: Set the Display to the following: Scan Conversion Feature Progressive (Display address 01)

MsgSize	Control	Data (0)	Data (1)	Checksum
0x05	0x01	0x52	0x00	0x56

8.15 Switch On Delay (Tiling)

The command is used to set/get the Switch On Delay (Tiling) Feature as it is defined as below.
Value in(OFF(0), 2, 4, 6, 8, 10, 20, 30, 40, 50, Auto(60))

8.15.1 Message-Get

Bytes	Bytes Description	Bits	Description
DATA[0]	0x55 = Switch On Delay (Tiling) Feature – Get		Command requests the display to report its current Switch On Delay (Tiling) Feature status

Example: (Display address 01)

MsgSize	Control	Data (0)	Checksum
0x04	0x01	0x55	0x50

8.15.2 Message-Report

Bytes	Bytes Description	Bits	Description
DATA[0]	0x55 = Switch On Delay (Tiling) Feature – Report		Command reports the Switch On Delay (Tiling) Feature enabled or disabled
DATA[1]	Off, 1 – 50, Auto		0x00 = Off 0x01 – 0x32 = 1 – 50 0x33 = Auto

Example: Current Display Switch On Delay (Tiling) Feature settings: Off (Display address 01)

MsgSize	Control	Data (0)	Data (1)	Checksum
0x05	0x01	0x55	0x00	0x51

8.15.3 Message-Set

Bytes	Bytes Description	Bits	Description
DATA[0]	0x54 = Switch On Delay (Tiling) Feature – Set		Command to set the Switch On Delay (Tiling) Feature of the display enabled or disabled
DATA[1]	Off, 1 – 50, Auto		0x00 = Off 0x01 – 0x32 = 1 – 50 0x33 = Auto

Example: Set the Display to the following: Switch On Delay (Tiling) Feature: Off (Display address 01)

MsgSize	Control	Data (0)	Data (1)	Checksum
0x05	0x01	0x54	0x00	0x50

8.16 Factory Reset

The command is used to set/get the Factory Reset as it is defined as below.

8.16.1 Message-Set

Bytes	Bytes Description	Bits	Description																																																																								
DATA[0]	0x56 = Factory Reset – Set		Command to do the Factory Reset of the display																																																																								
			<table border="1"> <tr> <td>1</td> <td>User Input Control: Local KeyBoard/Remote Control</td> <td></td> </tr> <tr> <td>2</td> <td>User Input Control State: Remote Control State/Local Keyboard State</td> <td></td> </tr> <tr> <td>3</td> <td>Power at Cold Start</td> <td></td> </tr> <tr> <td>4</td> <td>Auto Signal Detecting</td> <td></td> </tr> <tr> <td>5</td> <td>Video Parameters: Brightness/Contrast/Sharpness/Color/Tint/Black Level/Gamma</td> <td>√</td> </tr> <tr> <td>6</td> <td>Color Temperature</td> <td>√</td> </tr> <tr> <td>7</td> <td>Color Parameters: Red Gain/Green Gain/Blue Gain/Red Offset/Green Offset/Blue Offset</td> <td>√</td> </tr> <tr> <td>8</td> <td>Picture Format</td> <td>√</td> </tr> <tr> <td>9</td> <td>nVGA Video Parameters: Clock/Clock Phase/Hor Position/Ver Position</td> <td>√</td> </tr> <tr> <td>10</td> <td>Picture-in-Picture (Disable PIP function) :PIP Off</td> <td></td> </tr> <tr> <td>11</td> <td>Volume</td> <td></td> </tr> <tr> <td>12</td> <td>Volume Limits: Max/Min/SwitchOn (After reset, put Max=100 , Min=0 , SwitchOn=0)</td> <td></td> </tr> <tr> <td>13</td> <td>Audio Parameters: Treble/Bass</td> <td>√</td> </tr> <tr> <td>14</td> <td>Smart Power</td> <td></td> </tr> <tr> <td>15</td> <td>Tiling: Position/V.Monitor/H.Monitor(Clear Tiling , Position=1, V.Monitor=1, H.Monitor=1)</td> <td></td> </tr> <tr> <td>16</td> <td>Light Sensor</td> <td>N</td> </tr> <tr> <td>17</td> <td>OSD Rotating</td> <td>N</td> </tr> <tr> <td>18</td> <td>Information OSD Feature</td> <td></td> </tr> <tr> <td>19</td> <td>MEMC Effect</td> <td>N</td> </tr> <tr> <td>20</td> <td>Touch Feature</td> <td>N</td> </tr> <tr> <td>21</td> <td>Noise Reduction Feature</td> <td>√</td> </tr> <tr> <td>22</td> <td>Scan Mode Feature</td> <td>√</td> </tr> <tr> <td>23</td> <td>Scan Conversion Feature</td> <td>√</td> </tr> <tr> <td>24</td> <td>Switch On Delay (Tiling) Feature</td> <td></td> </tr> </table>	1	User Input Control: Local KeyBoard/Remote Control		2	User Input Control State: Remote Control State/Local Keyboard State		3	Power at Cold Start		4	Auto Signal Detecting		5	Video Parameters: Brightness/Contrast/Sharpness/Color/Tint/Black Level/Gamma	√	6	Color Temperature	√	7	Color Parameters: Red Gain/Green Gain/Blue Gain/Red Offset/Green Offset/Blue Offset	√	8	Picture Format	√	9	nVGA Video Parameters: Clock/Clock Phase/Hor Position/Ver Position	√	10	Picture-in-Picture (Disable PIP function) :PIP Off		11	Volume		12	Volume Limits: Max/Min/SwitchOn (After reset, put Max=100 , Min=0 , SwitchOn=0)		13	Audio Parameters: Treble/Bass	√	14	Smart Power		15	Tiling: Position/V.Monitor/H.Monitor(Clear Tiling , Position=1, V.Monitor=1, H.Monitor=1)		16	Light Sensor	N	17	OSD Rotating	N	18	Information OSD Feature		19	MEMC Effect	N	20	Touch Feature	N	21	Noise Reduction Feature	√	22	Scan Mode Feature	√	23	Scan Conversion Feature	√	24	Switch On Delay (Tiling) Feature	
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Example: Set the Display to factory reset

MsgSize	Control	Data (0)	Checksum
0x04	0x01	0x56	0x53

9. Command summary

Command name	Set Command	Get Command	Command Code	Remarks
Communication Control	√	√	0x00	Generic report
Platform and version labels		√	0xA2	
Power state Get		√	0x19	
Power state Set	√		0x18	
User Input Control State Get		√	0x1B	
User Input Control State Set	√		0x1A	
User Input Control Get		√	0x1D	
User Input Control Set	√		0x1C	
Power state at cold start Get		√	0xA4	
Power state at cold start Set	√		0xA3	
Input Source	√		0xAC	
Current Source		√	0xAD	
Auto Signal Detecting Get		√	0xAF	
Auto Signal Detecting Set	√		0xAE	
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	√		0x36	
VGA Video Parameters Get		√	0x39	
VGA Video Parameters Set	√		0x38	
Picture Format Get		√	0x3B	
Picture Format Set	√		0x3A	
Picture-in-picture Get		√	0x3D	
Picture-in-picture Set	√		0x3C	
PIP source Get		√	0x85	
PIP source Set	√		0x84	
Volume Get		√	0x45	
Volume Set	√		0x44	
Volume limits	√		0xB8	
Audio parameters Get			0x43	
Audio parameters Set			0x42	
Miscellaneous info		√	0x0F	Operating hours
Smart power Get		√	0xDE	Dimming backlight
Smart power Set	√		0xDD	Dimming backlight
Auto Adjust	√		0x70	VGA only
Temperature Get		√	0x2F	
Serial Code Get		√	0x15	
Tiling Get		√	0x23	
Tiling Set	√		0x22	
Light Sensor Get		√	0x25	
Light Sensor Set	√		0x24	
OSD Rotating Get		√	0x27	
OSD Rotating Set	√		0x26	
MEMC Effect Get		√	0x29	

Command name	Set Command	Get Command	Command Code	Remarks
MEMC Effect Set	√		0x28	
Information OSD Features Get		√	0x2D	
Information OSD Features Set	√		0x2C	
Noise Reduction Get		√	0x2B	
Noise Reduction Set	√		0x2A	
Touch Feature Get		√	0x1F	
Touch Feature Set	√		0x1E	
Scan Mode Get		√	0x51	
Scan Mode Set	√		0x50	
Scan Conversion Get		√	0x53	
Scan Conversion Set	√		0x52	
Switch On Delay Get		√	0x55	
Switch On Delay Set	√		0x54	
Factory Reset Set	√		0x56	



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