

Application Note
BDLxxxx

**RS232 SERIAL INTERFACE
COMMUNICATION PROTOCOL
(SICP VI.87)**

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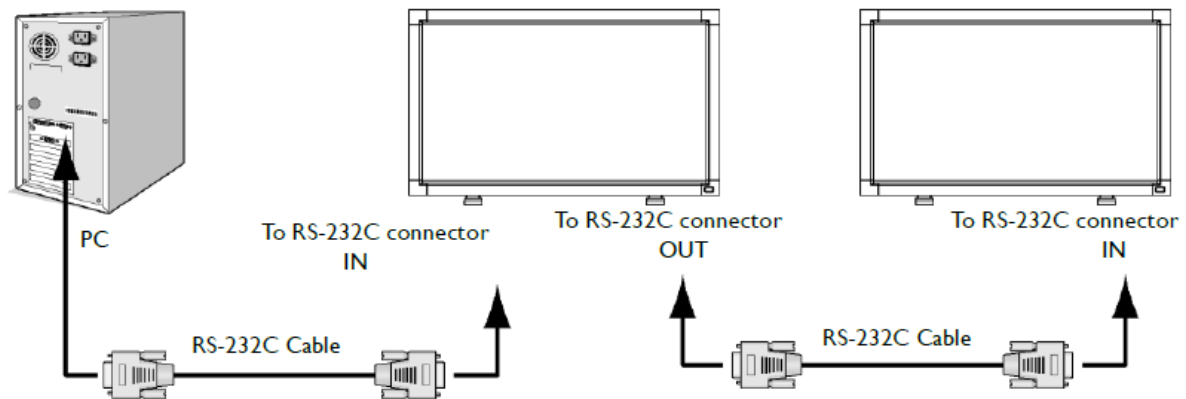
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1. INTRODUCTION

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

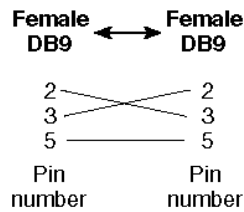
2.1 Physical Specifications

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.

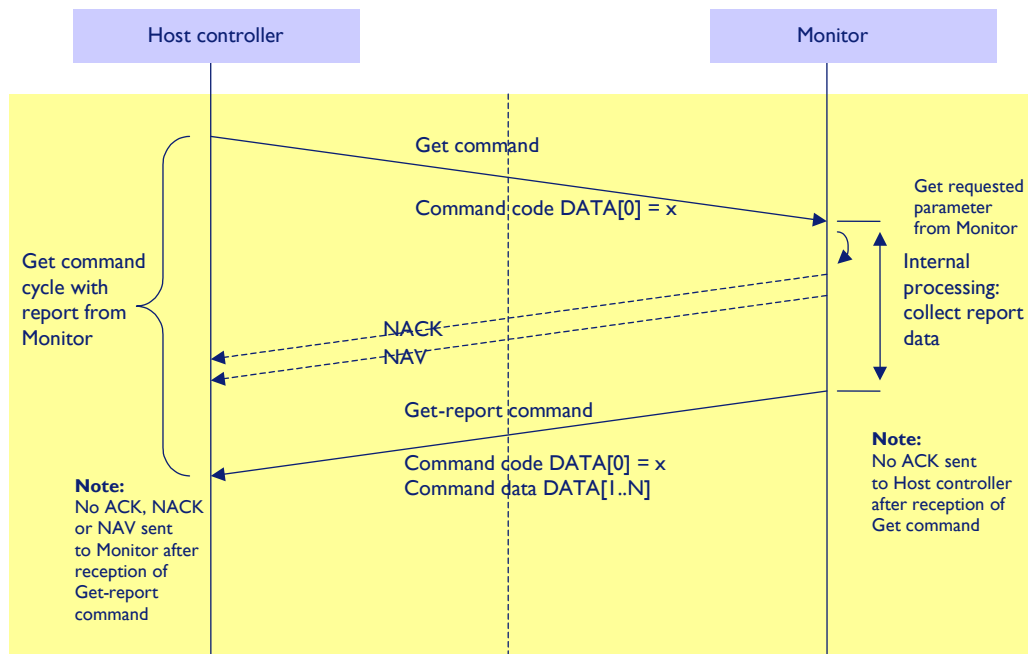


Figure 1: Explanation of mechanism of Get Command.

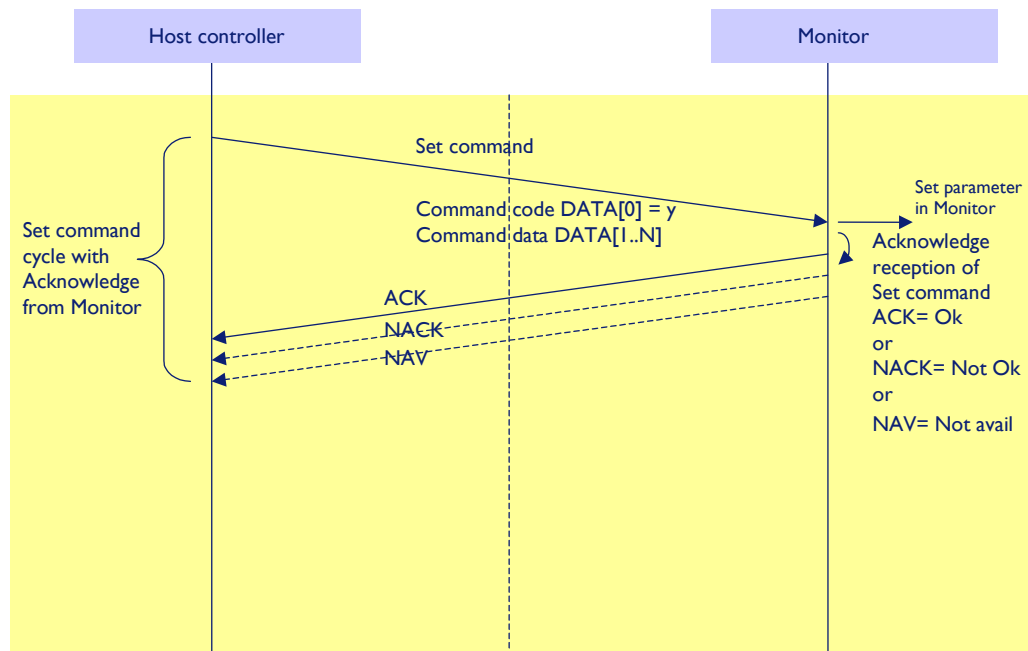


Figure 2: Explanation of mechanism of Set Command.

2.3 Command Format

The RS232 packet format:

MsgSize	Control	Group	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:	Group	<p>Group ID range: Off(for old command),1-254</p> <table border="1"> <tr> <th>Monitor ID</th><th>Group ID</th><th></th></tr> <tr> <td>0-255</td><td>0-254</td><td>range</td></tr> <tr> <td>0</td><td>0</td><td>broadcast</td></tr> <tr> <td>1-255</td><td>0</td><td>Control by Monitor ID</td></tr> <tr> <td>0-255</td><td>1-254</td><td>Control by Group ID</td></tr> </table>	Monitor ID	Group ID		0-255	0-254	range	0	0	broadcast	1-255	0	Control by Monitor ID	0-255	1-254	Control by Group ID
Monitor ID	Group ID																
0-255	0-254	range															
0	0	broadcast															
1-255	0	Control by Monitor ID															
0-255	1-254	Control by Group ID															
Byte 4 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	Group	Data (0)	Data (1)	Checksum	Description
0x06	0x01	0x00	0x00	0x01	0x06	

ACK reply: (Display address 01)

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

Example

Send:

MsgSize	Control	Group	Data (0)	Data (1)	Checksum	Description
0x06	0x01	0x00	0x17	0x01	0x11	

NACK reply: (Display address 01)

MsgSize	Control	Group	Data (0)	Data (1)	Checksum	Description
0x06	0x01	0x00	0x00	0x15	0x12	No this command code-Data(0), the system will reply "NACK".

Example

Send:

MsgSize	Control	Group	Data (0)	Data (1)	Checksum	Description
0x06	0x01	0x00	0x00	0x01	0x1E	

NAV reply: (Display address 01)

MsgSize	Control	Group	Data (0)	Data (1)	Checksum	Description
0x06	0x01	0x00	0x00	0x18	0x1F	Checksum error, the system will reply "NAV".

Example

Send:

MsgSize	Control	Group	Data (0)	Data (1)	Checksum	Description
0x06	0x01	0x00	0x00	0x04	0x03	

NAV reply: (Display address 01)

MsgSize	Control	Group	Data (0)	Data (1)	Checksum	Description
0x06	0x01	0x00	0x00	0x18	0x1F	No this parameter-Data(1), the system will reply "NAV".

Example

Send:

MsgSize	Control	Group	Data (0)	Data (1)	Checksum	Description
0x06	0x01	0x00	0x00	0x01	0x06	

NAV reply: (Display address 01)

MsgSize	Control	Group	Data (0)	Data (1)	Checksum	Description
0x06	0x01	0x00	0x00	0x18	0x1F	Command is correct, while system is already in stand-by mode, so reply "NAV".

Example

Send:

MsgSize	Control	Group	Data (0)	Data (1)	Checksum	Description
0x06	0x01	0x00	0x00	0x01	0x06	

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

MsgSize	Control	Group	Data (0)	Data (1)	Checksum	Description
0x06	0x01	0x00	0x00	0x18	0x1F	Command is correct, while system would NOT reply any message due to it's not active.

Example

Send:

MsgSize	Control	Group	Data (0)	Data (1)	Checksum	Description
0x06	0x01	0x00	0x00	0x01	0x06	

No reply: (Display address 00- Broadcast ID)

MsgSize	Control	Group	Data (0)	Data (1)	Checksum	Description
0x06	0x01	0x00	0x00	0x18	0x1F	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	Group	Data (0)	Data (1)	Checksum
0x06	0x01	0x00	0xA2	0x00	0xA5

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	Group	Data (0)	Checksum
0x05	0x01	0x00	0x19	0x1D

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	Group	Data (0)	Data (1)	Checksum
0x06	0x01	0x00	0x19	0x02	0x1C

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	Group	Data (0)	Data (1)	Checksum
0x06	0x01	0x00	0x18	0x01	0x1E

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]	0x1D = User Input Control – Get		Get the lock/unlock state

Example: (Display address 01)

MsgSize	Control	Group	Data (0)	Checksum
0x05	0x01	0x00	0x1D	0x19

4.2.2 Message-Report

Bytes	Bytes Description	Bits	Description
DATA[0]	0x1D = 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	Group	Data (0)	Data (1)	Checksum
0x06	0x01	0x00	0x1D	0x01	0x1B

4.2.3 Message-Set

Bytes	Bytes Description	Bits	Description
DATA[0]	0x1C = 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	Group	Data (0)	Data (1)	Checksum
0x06	0x01	0x00	0x1C	0x03	0x18

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	Group	Data (0)	Checksum
0x05	0x01	0x00	0x1B	0x1F

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	Group	Data (0)	Data (1)	Data (2)	Checksum
0x07	0x01	0x00	0x1B	0x02	0x02	0x1D

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	Group	Data (0)	Data (1)	Data (2)	Checksum
0x07	0x01	0x00	0x1A	0x02	0x02	0x1C

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	Group	Data (0)	Checksum
0x05	0x01	0x00	0xA4	0xA0

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	Group	Data (0)	Data (1)	Checksum
0x06	0x01	0x00	0xA4	0x02	0xA1

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	Group	Data (0)	Data (1)	Checksum
0x06	0x01	0x00	0xA3	0x02	0xA6

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. I = Do not switch. 0 = Switch
		Bit2.0	Source info. Display Style 0 = Reserved I = 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	Group	Data (0)	Data (1)	Data (2)	Data (3)	Data (4)	Checksum
0x09	0x01	0x00	0xAC	0x09	0x01	0x01	0x00	0xAD

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	Group	Data (0)	Checksum
0x05	0x01	0x00	0xAD	0xA9

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		For Input Source Type: 0x00, 0x01, 0x02, 0x03 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	Group	Data (0)	Data (1)	Data (2)	Checksum
0x07	0x01	0x00	0xAD	0xFD	0x01	0x57

5.3 Auto Signal Detecting / Failover

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	Group	Data (0)	Checksum
0x05	0x01	0x00	0xAF	0xAB

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 / All / All except USB / PC sources only / Video sources only / Failover		0x00 = Off 0x01 = All 0x02 = All except USB 0x03 = PC sources only 0x04 = Video sources only 0x05 = Failover

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

MsgSize	Control	Group	Data (0)	Data (1)	Checksum
0x06	0x01	0x00	0xAF	0x00	0xA8
0x06	0x01	0x00	0xAF	0x01	0xA9

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 / All / All except USB / PC sources only / Video sources only / Failover		0x00 = Off 0x01 = All 0x02 = All except USB 0x03 = PC sources only 0x04 = Video sources only 0x05 = Failover

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

MsgSize	Control	Group	Data (0)	Data (1)	Checksum
0x06	0x01	0x00	0xAE	0x00	0xA9

5.3.4 Message-Get

Bytes	Bytes Description	Bits	Description
DATA[0]	0xA6 = Failover – Get		Command requests the display to report its current Failover status

Example: (Display address 01)

MsgSize	Control	Group	Data (0)	Checksum
0x05	0x01	0x00	0xA6	

5.3.5 Message-Report

Bytes	Bytes Description	Bits	Description
DATA[0]	0xA6 = Failover – Report		Command reports Failover Setting
DATA[1]	HDMI / Component / Composite / DisplayPort / DVI-D / VGA / OPS / USB		1 st priority: 0x00 = HDMI 0x01 = Component 0x02 = Composite 0x03 = DisplayPort 0x04 = DVI-D 0x05 = VGA 0x06 = OPS 0x07 = USB
DATA[2]	HDMI / Component / Composite / DisplayPort / DVI-D / VGA / OPS / USB		2 nd priority: 0x00 = HDMI 0x01 = Component 0x02 = Composite 0x03 = DisplayPort 0x04 = DVI-D 0x05 = VGA 0x06 = OPS 0x07 = USB
DATA[3]	HDMI / Component / Composite / DisplayPort / DVI-D / VGA / OPS / USB		3 rd priority: 0x00 = HDMI 0x01 = Component 0x02 = Composite 0x03 = DisplayPort 0x04 = DVI-D 0x05 = VGA 0x06 = OPS 0x07 = USB
DATA[4]	HDMI / Component / Composite / DisplayPort / DVI-D / VGA / OPS / USB		4 th priority: 0x00 = HDMI 0x01 = Component 0x02 = Composite 0x03 = DisplayPort 0x04 = DVI-D 0x05 = VGA 0x06 = OPS 0x07 = USB
DATA[5]	HDMI / Component / Composite / DisplayPort / DVI-D / VGA / OPS / USB		5 th priority: 0x00 = HDMI 0x01 = Component 0x02 = Composite 0x03 = DisplayPort 0x04 = DVI-D 0x05 = VGA 0x06 = OPS 0x07 = USB
DATA[6]	HDMI / Component / Composite / DisplayPort / DVI-D / VGA / OPS / USB		6 th priority: 0x00 = HDMI 0x01 = Component 0x02 = Composite 0x03 = DisplayPort 0x04 = DVI-D 0x05 = VGA 0x06 = OPS 0x07 = USB

DATA[7]	HDMI / Component / Composite / DisplayPort / DVI-D / VGA / OPS / USB		7th priority: 0x00 = HDMI 0x01 = Component 0x02 = Composite 0x03 = DisplayPort 0x04 = DVI-D 0x05 = VGA 0x06 = OPS 0x07 = USB
DATA[8]	HDMI / Component / Composite / DisplayPort / DVI-D / VGA / OPS / USB		8th priority: 0x00 = HDMI 0x01 = Component 0x02 = Composite 0x03 = DisplayPort 0x04 = DVI-D 0x05 = VGA 0x06 = OPS 0x07 = USB

Example: Current Display settings: Sources priority = HDMI – Component – Composite – DisplayPort – DVI-D – VGA – OPS – USB (Display address 01)

MsgSize	Control	Group	Data (0)	Data (1)	Data (2)	Data (3)	Data (4)	Data (5)
0x0D	0x01	0x00	0xA6	0x00	0x01	0x02	0x03	0x04
Data (6)	Data (7)	Data (8)	Checksum					
0x05	0x06	0x07	AI					

5.3.6 Message-Set

Bytes	Bytes Description	Bits	Description
DATA[0]	0xA5 = Failover – Set		Command to change the Failover setting of the display
DATA[1]	HDMI / Component / Composite / DisplayPort / DVI-D / VGA / OPS / USB		1st priority: 0x00 = HDMI 0x01 = Component 0x02 = Composite 0x03 = DisplayPort 0x04 = DVI-D 0x05 = VGA 0x06 = OPS 0x07 = USB
DATA[2]	HDMI / Component / Composite / DisplayPort / DVI-D / VGA / OPS / USB		2nd priority: 0x00 = HDMI 0x01 = Component 0x02 = Composite 0x03 = DisplayPort 0x04 = DVI-D 0x05 = VGA 0x06 = OPS 0x07 = USB
DATA[3]	HDMI / Component / Composite / DisplayPort / DVI-D / VGA / OPS / USB		3rd priority: 0x00 = HDMI 0x01 = Component 0x02 = Composite 0x03 = DisplayPort 0x04 = DVI-D 0x05 = VGA 0x06 = OPS 0x07 = USB

DATA[4]	HDMI / Component / Composite / DisplayPort / DVI-D / VGA / OPS / USB		4th priority: 0x00 = HDMI 0x01 = Component 0x02 = Composite 0x03 = DisplayPort 0x04 = DVI-D 0x05 = VGA 0x06 = OPS 0x07 = USB
DATA[5]	HDMI / Component / Composite / DisplayPort / DVI-D / VGA / OPS / USB		5th priority: 0x00 = HDMI 0x01 = Component 0x02 = Composite 0x03 = DisplayPort 0x04 = DVI-D 0x05 = VGA 0x06 = OPS 0x07 = USB
DATA[6]	HDMI / Component / Composite / DisplayPort / DVI-D / VGA / OPS / USB		6th priority: 0x00 = HDMI 0x01 = Component 0x02 = Composite 0x03 = DisplayPort 0x04 = DVI-D 0x05 = VGA 0x06 = OPS 0x07 = USB
DATA[7]	HDMI / Component / Composite / DisplayPort / DVI-D / VGA / OPS / USB		7th priority: 0x00 = HDMI 0x01 = Component 0x02 = Composite 0x03 = DisplayPort 0x04 = DVI-D 0x05 = VGA 0x06 = OPS 0x07 = USB
DATA[8]	HDMI / Component / Composite / DisplayPort / DVI-D / VGA / OPS / USB		8th priority: 0x00 = HDMI 0x01 = Component 0x02 = Composite 0x03 = DisplayPort 0x04 = DVI-D 0x05 = VGA 0x06 = OPS 0x07 = USB

Example: Set the Display to the following: Sources priority = HDMI – Component – Composite – DisplayPort – DVI-D – VGA – OPS - USB (Display address 01)

MsgSize	Control	Group	Data (0)	Data (1)	Data (2)	Data (3)	Data (4)	Data (5)
0x0D	0x01	0x00	0xA5	0x00	0x01	0x02	0x03	0x04
Data (6)	Data (7)	Data (8)	Checksum					
0x05	0x06	0x07	0xA0					

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	Group	Data (0)	Checksum
0x05	0x01	0x00	0x33	0x37

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, 0x05 = D-image(DICOM gamma)

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

[illegible]

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, 0x05 = D-image(DICOM gamma)

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

[illegible]

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	Group	Data (0)	Checksum
0x05	0x01	0x00	0x35	0x31

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 1 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) 0x12 = User 2

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

MsgSize	Control	Group	Data (0)	Data (1)	Checksum
0x06	0x01	0x00	0x35	0x01	0x33

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 1 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) 0x12 = User 2
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Example: The current color temperature is set to Nature (Display address 01)

MsgSize	Control	Group	Data (0)	Data (1)	Checksum
0x06	0x01	0x00	0x34	0x01	0x32

The following commands are used to get/set the color temperature 100K/step adjustment.

6.1.10 Message-Get

Bytes	Bytes Description	Bits	Description
DATA[0]	0x12 = Color Temperature 100K steps – Get		Command requests the display to report its current color temperature 100K steps.

Example: (Display address 01)

MsgSize	Control	Group	Data (0)	Checksum
0x05	0x01	0x00	0x12	0x16

6.1.11 Message-Report

Bytes	Bytes Description	Bits	Description
DATA[0]	0x12 = Color Temperature 100K – Report		Command reports to the host controller the current color temperature 100K steps of the display.
DATA[1]	Color temperature steps		20 to 100 of the user selectable range of the display. 0x14(20) = 2000K 0x15(21) = 2100K 0x16(22) = 2200K 0x61(97) = 9700K 0x62(98) = 9800K 0x63(99) = 9900K 0x64(100) = 10000K

Example: The current color temperature is set to 10000K (Display address 01)

MsgSize	Control	Group	Data (0)	Data (1)	Checksum
0x06	0x01	0x00	0x12	0x64	0x71

6.1.12 Message-Set

Bytes	Bytes Description	Bits	Description
DATA[0]	0x11 = Color Temperature 100K steps – Set		Command to change the current color temperature 100K steps
DATA[1]	Color temperature		20 to 100 of the user selectable range of the display. 0x14(20) = 2000K 0x15(21) = 2100K 0x16(22) = 2200K 0x61(97) = 9700K 0x62(98) = 9800K 0x63(99) = 9900K 0x64(100) = 10000K

Example: The current color temperature is set to 10000K (Display address 01)

MsgSize	Control	Group	Data (0)	Data (1)	Checksum
0x06	0x01	0x00	0x11	0x64	0x72

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	Group	Data (0)	Checksum
0x05	0x01	0x00	0x3B	0x3F

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	Group	Data (0)	Data (0)	Checksum
0x06	0x01	0x00	0x3B	0x03	0x3F

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	Group	Data (0)	Data (0)	Checksum
0x06	0x01	0x00	0x3A	0x03	0x3E

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	Group	Data (0)	Checksum
0x05	0x01	0x00	0x39	0x3D

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	Group	Data (0)	Data (1)	Data (2)	Data (3)	Data (4)	Checksum
0x09	0x01	0x00	0x39	0x37	0x37	0x37	0x37	0x31

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	Group	Data (0)	Data (1)	Data (2)	Data (3)	Data (4)	Checksum
0x09	0x01	0x00	0x38	0x37	0x37	0x37	0x37	0x30

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	Group	Data (0)	Checksum
0x05	0x01	0x00	0x3D	0x39

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	Group	Data (0)	Data (1)	Data (2)	Data (3)	Data (4)	Checksum
0x09	0x01	0x00	0x3D	0x01	0x02	0x00	0x00	0x36

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].Bit1..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	Group	Data (0)	Data (1)	Data (2)	Data (3)	Data (4)	Checksum
0x09	0x01	0x00	0x3C	0x01	0x02	0x00	0x00	0x37

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	Group	Data (0)	Checksum
0x05	0x01	0x00	0x85	0x81

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	Group	Data (0)	Data (1)	Data (2)	Checksum
0x07	0x01	0x00	0x85	0xFD	0x08	0x76

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	Group	Data (0)	Data (1)	Data (2)	Checksum
0x07	0x01	0x00	0x84	0xFD	0x01	0x7E

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	Group	Data (0)	Checksum
0x05	0x01	0x00	0x45	0x41

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	Group	Data (0)	Data (1)	Checksum
0x06	0x01	0x00	0x45	0x4D	0x0F

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	Group	Data (0)	Data (1)	Checksum
0x06	0x01	0x00	0x44	0x4D	0x0E

Bytes	Bytes Description	Bits	Description
DATA[0]	0x41 = Volume +/- – Set		Adjust volume up/down
DATA[1]	Volume up/down.		0 : down, 1: up

Example: Set the Display Volume up (0x01) (Display address 01)

MsgSize	Control	Group	Data (0)	Data (1)	Checksum
0x06	0x01	0x00	0x41	0x01	0x47

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	Group	Data (0)	Data (1)	Data (2)	Data (3)	Checksum
0x08	0x01	0x00	0xB8	0x0A	0x4D	0x32	0xC4

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	Group	Data (0)	Checksum
0x05	0x01	0x00	0x43	0x47

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	Group	Data (0)	Data (1)	Data (2)	Checksum
0x07	0x01	0x00	0x43	0x50	0x5D	0x48

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	Group	Data (0)	Data (1)	Data (2)	Checksum
0x07	0x01	0x00	0x42	0x4D	0x4D	0x44

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	Group	Data (0)	Data (1)	Checksum
0x06	0x01	0x00	0x0F	0x02	0x0A

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	Group	Data (0)	Data (1)	Data (2)	Checksum
0x07	0x01	0x00	0x0F	0x4D	0x00	0x44

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	Group	Data (0)	Checksum
0x05	0x01	0x00	0xDE	0xDA

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	Group	Data (0)	Data (1)	Checksum
0x06	0x01	0x00	0xDE	0x01	0xD8

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	Group	Data (0)	Data (1)	Checksum
0x06	0x01	0x00	0xDD	0x02	0xD8

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	Group	Data (0)	Data (1)	Data (2)	Checksum
0x07	0x01	0x00	0x70	0x40	0x00	0x36

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	Group	Data (0)	Checksum
0x05	0x01	0x00	0x2F	0x2B

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	Group	Data (0)	Data (1)	Checksum
0x06	0x01	0x00	0x2F	0x1C	0x34

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	Group	Data (0)	Checksum
0x05	0x01	0x00	0x15	0x11

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	Group	Data (0)	Data (1)	Data (2)	Data (3)	Data (4)	Data (5)	Data (6)	Data (7)
0x13	0x01	0x00	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	0x76

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	Group	Data (0)	Checksum
0x05	0x01	0x00	0x23	0x27

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 = 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) × 15 + H Monitors

Example: If H Monitors = 12 and V Monitors = 6, the Data[4] value will be (6–1) × 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 = MOD(Data[4], 5) (Data[4] ÷ 5, take the remainder)

V Monitors = INT(Data[4], 5) + 1 (Data[4] ÷ 5, take the quotient and plus one)

Data[4] = (V Monitors – 1) × 5 + H Monitors

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

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	Group	Data[0]	Data (1)	Data (2)	Data (3)	Data (4)	Checksum
0x09	0x01	0x00	0x23	0x01	0x00	0x02	0x12	0x3A

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

Data[4] value will be: $(2-1) \times 5 + 3 = 8$

MsgSize	Control	Group	Data[0]	Data (1)	Data (2)	Data (3)	Data (4)	Checksum
0x09	0x01	0x00	0x23	0x01	0x00	0x02	0x08	0x20

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

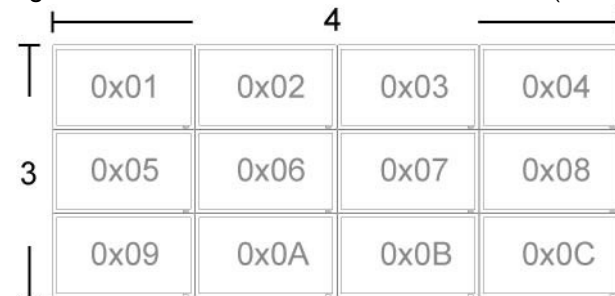


Figure 4. The hexadecimal Position value in a 5x5 (H Monitors x V Monitors) Tiling Wall.

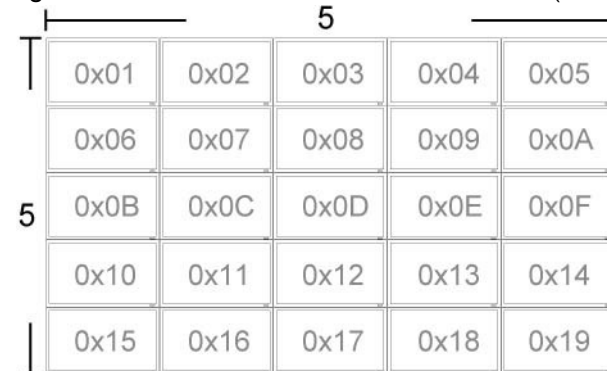
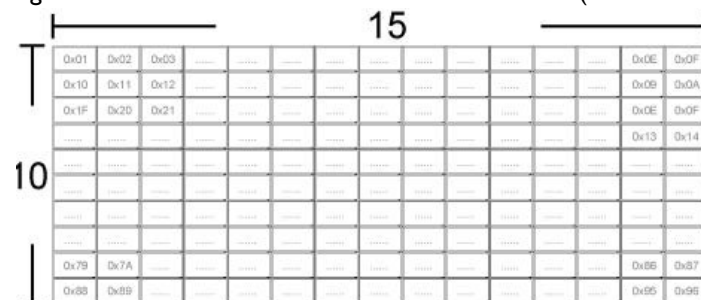


Figure 5. The hexadecimal Position value in a 15x10 (H Monitors x V Monitors) Tiling Wall.



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	Group	Data[0]	Data (1)	Data (2)	Data (3)	Data (4)	Checksum
0x09	0x01	0x00	0x22	0x01	0x00	0x02	0x12	0x3B

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	Group	Data[0]	Data (1)	Data (2)	Data (3)	Data (4)	Checksum
0x09	0x01	0x00	0x22	0x01	0x02	0x00	0x00	0x29

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	Group	Data[0]	Data (1)	Data (2)	Data (3)	Data (4)	Checksum
0x09	0x01	0x00	0x22	0x01	0x00	0x02	0x08	0x21

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	Group	Data[0]	Data (1)	Data (2)	Data (3)	Data (4)	Checksum
0x09	0x01	0x00	0x22	0x01	0x02	0x00	0x00	0x29

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	Group	Data (0)	Checksum
0x05	0x01	0x00	0x25	0x21

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	Group	Data (0)	Data (1)	Checksum
0x06	0x01	0x00	0x25	0x00	0x22
0x06	0x01	0x00	0x25	0x01	0x23

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	Group	Data (0)	Data (1)	Checksum
0x06	0x01	0x00	0x24	0x00	0x23

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	Group	Data (0)	Checksum
0x05	0x01	0x00	0x27	0x23

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	Group	Data (0)	Data (1)	Checksum
0x06	0x01	0x00	0x27	0x00	0x20
0x06	0x01	0x00	0x27	0x01	0x21

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	Group	Data (0)	Data (1)	Checksum
0x06	0x01	0x00	0x26	0x00	0x21

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	Group	Data (0)	Checksum
0x06	0x01	0x00	0x2D	0x2A

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	Group	Data (0)	Data (1)	Checksum
0x06	0x01	0x00	0x2D	0x00	0x2A

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	Group	Data (0)	Data (1)	Checksum
0x06	0x01	0x00	0x2C	0x00	0x2B

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	Group	Data (0)	Checksum
0x05	0x01	0x00	0x29	0x2D

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	Group	Data (0)	Data (1)	Checksum
0x06	0x01	0x00	0x29	0x00	0x2E

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	Group	Data (0)	Data (1)	Checksum
0x06	0x01	0x00	0x28	0x00	0x2F

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	Group	Data (0)	Checksum
0x05	0x01	0x00	0x1F	0x1B

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	Group	Data (0)	Data (1)	Checksum
0x06	0x01	0x00	0x1F	0x00	0x18

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	Group	Data (0)	Data (1)	Checksum
0x06	0x01	0x00	0x1E	0x00	0x19

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	Group	Data (0)	Checksum
0x05	0x01	0x00	0x2B	0x2F

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	Group	Data (0)	Data (1)	Checksum
0x06	0x01	0x00	0x2B	0x00	0x2C

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	Group	Data (0)	Data (1)	Checksum
0x06	0x01	0x00	0x2A	0x00	0x2D

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	Group	Data (0)	Checksum
0x05	0x01	0x00	0x51	0x55

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	Group	Data (0)	Data (1)	Checksum
0x06	0x01	0x00	0x51	0x00	0x56

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	Group	Data (0)	Data (1)	Checksum
0x06	0x01	0x00	0x50	0x00	0x57

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	Group	Data (0)	Checksum
0x05	0x01	0x00	0x53	0x57

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	Group	Data (0)	Data (1)	Checksum
0x06	0x01	0x00	0x53	0x00	0x54

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	Group	Data (0)	Data (1)	Checksum
0x06	0x01	0x00	0x52	0x00	0x55

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	Group	Data (0)	Checksum
0x05	0x01	0x00	0x55	0x51

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, 2, 4, 6, 8, 10, 20, 30, 40, 50, Auto		0x00 = Off 0x02 = 2 seconds 0x04 = 4 seconds 0x06 = 6 seconds 0x08 = 8 seconds 0x0A = 10 seconds 0x14 = 20 seconds 0x1E = 30 seconds 0x28 = 40 seconds 0x32 = 50 seconds 0x3C = Auto

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

MsgSize	Control	Group	Data (0)	Data (1)	Checksum
0x06	0x01	0x00	0x55	0x00	0x52

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, 2, 4, 6, 8, 10, 20, 30, 40, 50, Auto		0x00 = Off 0x02 = 2 seconds 0x04 = 4 seconds 0x06 = 6 seconds 0x08 = 8 seconds 0x0A = 10 seconds 0x14 = 20 seconds 0x1E = 30 seconds 0x28 = 40 seconds 0x32 = 50 seconds 0x3C = Auto

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

MsgSize	Control	Group	Data (0)	Data (1)	Checksum
0x06	0x01	0x00	0x54	0x00	0x53

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><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>值</td></tr><tr><td>6</td><td>Color Temperature</td><td>值</td></tr><tr><td>7</td><td>Color Parameters: Red Gain/Green Gain/Blue Gain/Red Offset/Green Offset/Blue Offset</td><td>值</td></tr><tr><td>8</td><td>Picture Format</td><td>值</td></tr><tr><td>9</td><td>nVGA Video Parameters: Clock/Clock Phase/Hor Position/Ver Position</td><td>值</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>值</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>值</td></tr><tr><td>17</td><td>OSD Rotating</td><td>值</td></tr><tr><td>18</td><td>Information OSD Feature</td><td></td></tr><tr><td>19</td><td>MEMC Effect</td><td>值</td></tr><tr><td>20</td><td>Touch Feature</td><td>值</td></tr><tr><td>21</td><td>Noise Reduction Feature</td><td>值</td></tr><tr><td>22</td><td>Scan Mode Feature</td><td>值</td></tr><tr><td>23</td><td>Scan Conversion Feature</td><td>值</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	值	6	Color Temperature	值	7	Color Parameters: Red Gain/Green Gain/Blue Gain/Red Offset/Green Offset/Blue Offset	值	8	Picture Format	值	9	nVGA Video Parameters: Clock/Clock Phase/Hor Position/Ver Position	值	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	值	14	Smart Power		15	Tiling: Position/V.Monitor/H.Monitor(Clear Tiling , Position=1, V.Monitor=1, H.Monitor=1)		16	Light Sensor	值	17	OSD Rotating	值	18	Information OSD Feature		19	MEMC Effect	值	20	Touch Feature	值	21	Noise Reduction Feature	值	22	Scan Mode Feature	值	23	Scan Conversion Feature	值	24	Switch On Delay (Tiling) Feature	
1	User Input Control: Local KeyBoard/Remote Control																																																																										
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3	Power at Cold Start																																																																										
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5	Video Parameters: Brightness/Contrast/Sharpness/Color/Tint/Black Level/Gamma	值																																																																									
6	Color Temperature	值																																																																									
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23	Scan Conversion Feature	值																																																																									
24	Switch On Delay (Tiling) Feature																																																																										

Example: Set the Display to factory reset

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

8.17 Power On logo

The command is used to set/get the Power On logo status as it is defined as below.

8.17.1 Message-Get

Bytes	Bytes Description	Bits	Description
DATA[0]]	0x3F = Power On logo status – Get		Command requests the display to report its current Power On logo status

Example: (Display address 01)

MsgSize	Control	Group	Data (0)	Checksum
0x05	0x01	0x00	0x3F	0x3B

8.16.2 Message-Report

Bytes	Bytes Description	Bits	Description
DATA[0]]	0x3F = Power On logo status – Report		Command reports the Power On logo enabled or disabled
DATA[1]]	Off / On		0x00 = Off 0x01 = On

Example: Current Display Power On logo setting: Off (Display address 01)

MsgSize	Control	Group	Data (0)	Data (1)	Checksum
0x06	0x01	0x00	0x3F	0x00	0x38

8.16.3 Message-Set

Bytes	Bytes Description	Bits	Description
DATA[0]]	0x3E = Power On logo status – Set		Command to set the Power On logo of the display enabled or disabled
DATA[1]]	Off / On		0x00 = Off 0x01 = On

Example: Set the Display to the following: Power On logo Off (Display address 01)

MsgSize	Control	Group	Data (0)	Data (1)	Checksum
0x06	0x01	0x00	0x3E	0x00	0x39

8.18 Fan Speed

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

8.18.1 Message-Get

Bytes	Bytes Description	Bits	Description
DATA[0]]	0x62 = Fan Speed status – Get		Command requests the display to report its current Fan Speed status

Example: (Display address 01)

MsgSize	Control	Group	Data (0)	Checksum
0x05	0x01	0x00	0x62	0x66

8.17.2 Message-Report

Bytes	Bytes Description	Bits	Description
DATA[0]]	0x62 = Fan Speed status – Report		Command reports the Fan Speed status enabled or disabled
DATA[1]]	Off / Auto / Low / Middle / High		0x00 = Off 0x01 = Auto 0x02 = Low 0x03 = Middle 0x04 = High

Example: Current Display Fan Speed settings: Off (Display address 01)

MsgSize	Control	Group	Data (0)	Data (1)	Checksum
0x06	0x01	0x00	0x62	0x00	0x65

8.17.3 Message-Set

Bytes	Bytes Description	Bits	Description
DATA[0]]	0x61 = Fan Speed status – Set		Command to set the Fan Speed status of the display enabled or disabled
DATA[1]]	Off / Auto / Low / Middle / High		0x00 = Off 0x01 = Auto 0x02 = Low 0x03 = Middle 0x04 = High

Example: Set the Display to the following: Fan Speed Off (Display address 01)

MsgSize	Control	Group	Data (0)	Data (1)	Checksum
0x06	0x01	0x00	0x61	0x00	0x66

8.19 APM status

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

8.19.1 Message-Get

Bytes	Bytes Description	Bits	Description
DATA[0]]	0xD1 = APM status – Get		Command requests the display to report its current APM status

Example: (Display address 01)

MsgSize	Control	Group	Data (0)	Checksum
0x05	0x01	0x00	0xD1	0xD5

8.18.2 Message-Report

Bytes	Bytes Description	Bits	Description
DATA[0]]	0xD1 = APM status – Report		Command reports the APM enabled or disabled
DATA[1]]	Off / On		0x00 = Off 0x01 = On

Example: Current Display APM setting: Off (Display address 01)

MsgSize	Control	Group	Data (0)	Data (1)	Checksum
0x06	0x01	0x00	0xD1	0x00	0xD6

8.18.3 Message-Set

Bytes	Bytes Description	Bits	Description
DATA[0]]	0xD0 = APM status – Set		Command to set the APM enabled or disabled
DATA[1]]	Off / On		0x00 = Off 0x01 = On

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

MsgSize	Control	Group	Data (0)	Data (1)	Checksum
0x06	0x01	0x00	0xD0	0x00	0xD7

8.20 Power saving mode status

The command is used to set/get the Power Saving Mode status as it is defined as below.

8.20.1 Message-Get

Bytes	Bytes Description	Bits	Description
DATA[0]]	0xD3 = Power Saving mode status – Get		Command requests the display to report its current Power Saving Mode status

Example: (Display address 01)

MsgSize	Control	Group	Data (0)	Checksum
0x05	0x01	0x00	0xD3	0xD7

8.19.2 Message-Report

Bytes	Bytes Description	Bits	Description
DATA[0]]	0xD3 = Power Saving Mode status – Report		Command reports the Power Saving Mode enabled or disabled
DATA[1]]	Off / On		0x00 = RGB Off & Video Off 0x01 = RGB Off, Video On 0x02 = RGB On, Video Off 0x03 = RGB On & Video On

Example: Current Display Power Saving Mode setting: RGB & Video Off (Display address 01)

MsgSize	Control	Group	Data (0)	Data (1)	Checksum
0x06	0x01	0x00	0xD3	0x00	0xD4

8.19.3 Message-Set

Bytes	Bytes Description	Bits	Description
DATA[0]]	0xD2 = Power Saving Mode status – Set		Command to set the Power Saving Mode enabled or disabled
DATA[1]]	Off / On		0x00 = RGB Off & Video Off 0x01 = RGB Off, Video On 0x02 = RGB On, Video Off 0x03 = RGB On & Video On

Example: Set the Display to the following: Power Saving Mode RGB & Video Off (Display address 01)

MsgSize	Control	Group	Data (0)	Data (1)	Checksum
0x06	0x01	0x00	0xD2	0x00	0xD5

9. Scheduling

9.1 Scheduling Parameters

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

9.1.1 Message-Get

Bytes	Bytes Description	Bits	Description
DATA[0]	0x5B = Scheduling Parameters – Get		Command requests the display to report its current Scheduling parameters.
DATA[1]	Page		1 to 7 of the scheduling pages

Example: (Display address 01)

MsgSize	Control	Group	Data (0)	Data (1)	Checksum
0x06	0x01	0x00	0x5B	0x01	0xnn

9.1.2 Message-Report

Bytes	Bytes Description	Bits	Description
DATA[0]	0x5B = Scheduling Parameters – Report		Command reports to the host controller the current Scheduling parameters of the display.
DATA[1]	Page		0: Page disable 1: Page enable
DATA[2]	Start time hour		0 to 23 of the start time hour 24: NULL
DATA[3]	Start time minute		0 to 59 of the start time minute 60: NULL
DATA[4]	End time hour		0 to 23 of the end time hour 24: NULL
DATA[5]	End time minute		0 to 59 of the end time minute 60: NULL
DATA[6]	Video source		0 to 100 (%) of the user selectable range of the display. For video source: 0x00 = NULL 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
DATA[7]	Working day(s)		To set the scheduling working days. Bit0 = 1: every week Bit1 = Monday Bit2 = Tuesday Bit3 = Wednesday Bit4 = Thursday Bit5 = Friday

			Bit6 = Saturday Bit7 = Sunday
--	--	--	----------------------------------

Example: Report page I with HDMI starts at 06:30 and ends at 22:00 every day.

MsgSize	Control	Group	Data (0)	Data (1)	Data (2)	Data (3)	Data (4)	Data (5)
0x0C	0x01	0xnn	0x5B	0x01	0x06	0x1E	0x16	0x00
Data (6)	Data (7)	Checksum						
0x0A	0xFF	0xnn						

9.1.3 Message-Set

Bytes	Bytes Description	Bits	Description
DATA[0]	0x5A = Scheduling Parameters – Set		Command to change the current Scheduling parameters
DATA[1]	Page		BIT 7-BIT4: 1 to 7 of the scheduling pages BIT 3-BIT0: 0: Page disable 1: Page enable
DATA[2]	Start time hour		0 to 23 of the start time hour 24: NULL
DATA[3]	Start time minute		0 to 59 of the start time minute 60: NULL
DATA[4]	End time hour		0 to 23 of the end time hour 24: NULL
DATA[5]	End time minute		0 to 59 of the end time minute 60: NULL
DATA[6]	Video source		0 to 100 (%) of the user selectable range of the display. For video source: 0x00 = NULL 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
DATA[7]	Working day(s)		To set the scheduling working days. Bit0 = 1: every week Bit1 = Monday Bit2 = Tuesday Bit3 = Wednesday Bit4 = Thursday Bit5 = Friday Bit6 = Saturday Bit7 = Sunday

Example: Set page I with HDMI starts at 06:30 and ends at 22:00 every day.

MsgSize	Control	Group	Data (0)	Data (1)	Data (2)	Data (3)	Data (4)	Data (5)
0x0C	0x01	0x00	0x5A	0x10	0x06	0x1E	0x16	0x00
Data (6)	Data (7)	Checksum						
0x0A	0xFF	0xnn						

10. Group ID

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

10.1.1 Message-Get

Bytes	Bytes Description	Bits	Description
DATA[0]	0x5D = Group ID - Get		Command requests the display to report its Group ID

Example: (Display address 01)

MsgSize	Control	Group	Data (0)	Checksum
0x05	0x01	0x00	0x5D	0xnn

10.1.2 Message-Report

Bytes	Bytes Description	Bits	Description
DATA[0]	0x5D = group ID - Report		Command reports Group ID
DATA[1]	Group ID		Group ID range: Off(for old command),1-254 0x01-0xFE = 1-254 0xFF = Off, It is for the old command.

Example: Group ID = 1 (Display address 01)

MsgSize	Control	Group	Data (0)	Data (1)	Checksum
0x06	0x01	0x01	0x5D	0x01	0xnn

10.1.3 Message-Set

Bytes	Bytes Description	Bits	Description
DATA[0]	0x5C = Group ID Set		Command to set the Group ID
DATA[1]	Group ID		Group ID range: Off(for old command),1-254 0x01-0xFE = 1-254 0xFF = Off, It is for the old command.

Example: set the Group ID = 1 (Display address 01)

MsgSize	Control	Group	Data (0)	Data (1)	Checksum
0x06	0x01	0x00	0x5C	0x01	0xnn

II. 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	
Failover Get		√	0xA6	
Failover Set	√		0xA5	
Video parameters Get		√	0x33	Brightness, etc. Add DICOM gamma
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 up/down Set	√		0x41	
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	

Command name	Set Command	Get Command	Command Code	Remarks
OSD Rotating Get		√	0x27	
OSD Rotating Set	√		0x26	
MEMC Effect Get		√	0x29	
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	
Scheduling Get		√	0x5B	
Scheduling Set	√		0x5A	
Group ID Get		√	0x5D	
Group ID Set	√		0x5C	
Power On logo Get		√	0x3F	
Power On logo Set	√		0x3E	
Fan Speed status Get		√	0x62	
Fan Speed status Set	√		0x61	
APM status Get		√	0xD1	
APM status Set	√		0xD0	
Power Save status Get		√	0xD3	
Power Save status Set	√		0xD2	
Color Temperature 100K – Get		√	0x12	
Color Temperature 100K – Set	√		0x11	

12. Revision history

V1.6 → V1.7 (To modify some commands)

Command name	Set Command	Get Command	Command Code	Remarks
Power state at cold start Get		√	0xA4	
Power state at cold start Set	√		0xA3	
Picture-in-picture Get		√	0x3D	
Picture-in-picture Set	√		0x3C	
PIP source Get		√	0x85	
PIP source Set	√		0x84	
Smart power Get		√	0xDE	Dimming backlight

Command name	Set Command	Get Command	Command Code	Remarks
Smart power Set	√		0xDD	Dimming backlight

V1.7 → V1.8 (To support some commands)

Command name	Set Command	Get Command	Command Code	Remarks
Light Sensor Get		√	0x25	
Light Sensor Set	√		0x24	
OSD Rotating Get		√	0x27	
OSD Rotating Set	√		0x26	
MEMC Effect Get		√	0x29	
MEMC Effect Set	√		0x28	
Touch Feature Get		√	0x1F	
Touch Feature Set	√		0x1E	

V1.8 → V1.82 (Add some more commands)

Command name	Set Command	Get Command	Command Code	Remarks
User Input Control State Get		√	0x1B	
User Input Control State Set	√		0x1A	
Color Temperature Get		√	0x35	
Color Temperature Set	√		0x34	
Color Parameters Get		√	0x37	
Color Parameters Set	√		0x36	

V1.82 → V1.84 (Change definition of byte 2)

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 (first case)	Message Control. Bit 7..6: (reserved; set to 00) Bit 5..0: Monitor ID [Display Address range from 0 to 64]
Byte 2:	Control for Broadcast commands	Message Control. Bit 7: Does not allow Replies. Set to 1 to indicate no ACK or Report is expected. Bit 6: (reserved; set to zero) Bit 5..0: Monitor ID [Display Address range from 0 to 64] Reserved for RS232 chaining: all zeroes means all devices in the chain.

Number of Field	Name of Field	Description
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Byte 1:	MsgSize	<p>Message Size has to be calculated in the following way: $\text{MsgSize} + \text{Control} + \text{Data}(0) + \dots + \text{Data}(N) + \text{Checksum}$ Range = 3 to 40 (0x3 to 0x28).</p>
Byte 2:	Control	<p>Message Control. Bit 7..0: Monitor ID</p> <p>Signal mode: Display Address range from 1 to 255 Broadcast mode: Display Address is 0 which indicates no ACK or Report is expected.</p>

V1.84 → V1.85 (add some more commands)

Command name	Set Command	Get Command	Command Code	Remarks
VGA Video Parameters Get		√	0x39	
VGA Video Parameters Set	√		0x38	
Information OSD Features Get		√	0x2D	
Information OSD Features Set	√		0x2C	
Noise Reduction Get		√	0x2B	
Noise Reduction Set	√		0x2A	
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	

V1.85 → V1.86

- I. Add Group byte

Byte 3:	Group	Group ID range: Off(for old command),1-254		
		Monitor ID	Group ID	
		0-255	0-254	range
		0	0	broadcast
		1-255	0	Control by Monitor ID
		0-255	1-254	Control by Group ID

2. Add DICOM gamma in video parameters

DATA[7]	Gamma Selection	0x01= Native, 0x02 = S gamma, 0x03 = 2.2, 0x04 = 2.4, 0x05 = D-image(DICOM gamma)
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3. Add scheduling/Group commands

Command name	Set Command	Get Command	Command Code	Remarks
Scheduling Get			0x5B	
Scheduling Set			0x5A	
Group ID Get			0x5D	
Group ID Set			0x5C	

V1.86 → V1.87

- I. Add Power On logo/Fan Speed status commands.

Command name	Set Command	Get Command	Command Code	Remarks
Power On logo Get		√	0x3F	
Power On logo Set	√		0x3E	
Fan Speed status Get		√	0x62	
Fan Speed status Set	√		0x61	
APM status Get		√	0xD1	
APM status Set	√		0xD0	
Power Save status Get		√	0xD3	
Power Save status Set	√		0xD2	

Color Temperature 100K – Get		✓	0x12	
Color Temperature 100K – Set	✓		0x11	

2. Add User 2 option in Color Temperature control.

Bytes	Bytes Description	Bits	Description
DATA[0]	0x35 = Color Temperature – Report		Command reports to the host controller the current color temperature of the display.
DATA[1]	Color temperature		0x00 = User 1 0x01 = 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) 0x12 = User 2

3. User can adjust color temperature by 100K/step.

Bytes	Bytes Description	Bits	Description
DATA[0]	0x12 = Color Temperature 100K – Report		Command reports to the host controller the current color temperature 100K steps of the display.
DATA[1]	Color temperature steps		20 to 100 of the user selectable range of the display. 0x14(20) = 2000K 0x15(21) = 2100K 0x16(22) = 2200K 0x61(97) = 9700K 0x62(98) = 9800K 0x63(99) = 9900K 0x64(100) = 10000K



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