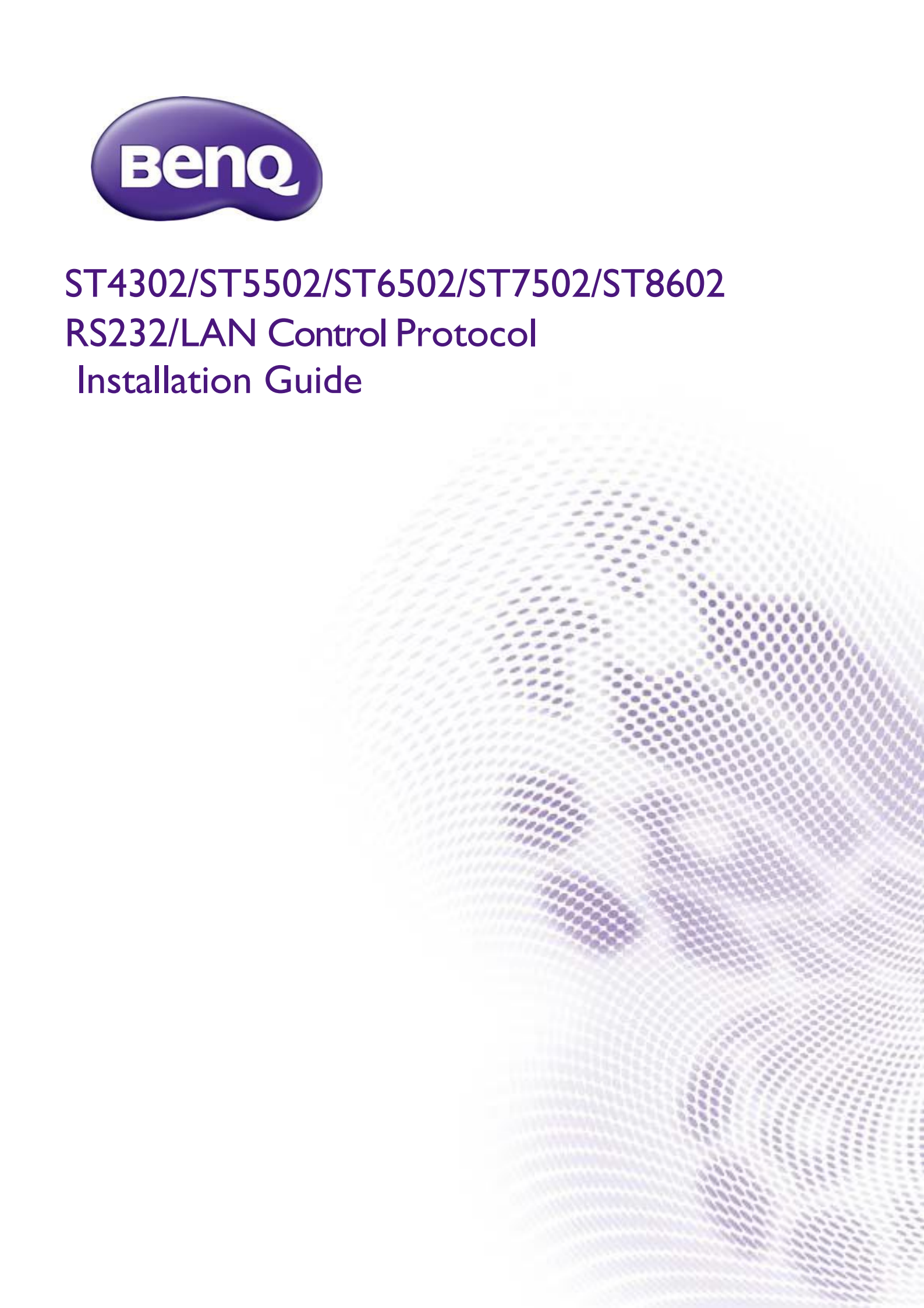
ST4302/ST5502/ST6502/ST7502/ST8602
RS232/LAN Control Protocol
Installation Guide



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Introduction

This document describes the hardware interface spec and software protocols of RS232 interface communication between Commercial Display and PC or other control unit with RS232 protocol. This set protocol allow users to assign the ID in the command to control the specify ID monitor. The set protocol contains two sections command: Set-Function and Get-Function

In this document, "PC" represents all the control units that can send or receive the RS232 protocol command.

Wire arrangement

Wire Arrangement		
P1	Color	P2
1	Black	1
2	Brown	3
3	Red	2
4	Orange	4
5	Yellow	5
6	Green	6
7	Blue	7
8	Purple	8
9	Gray	9
Case	Drain wire	Case

RS232 pin assignment

Pin	Description	Pin	Description
1	NC	2	RXD
3	TXD	4	NC
5	GND	6	NC
7	RTS	8	CTS
9	NC		

Use of crossover (null modem) cable requires use with PC.

Communication setting

Baud rate select: 9600bps (fixed)/ Data bits: 8 bits (fixed)

Parity: None (fixed)/ Stop Bits: 1(fixed)

Command message reference

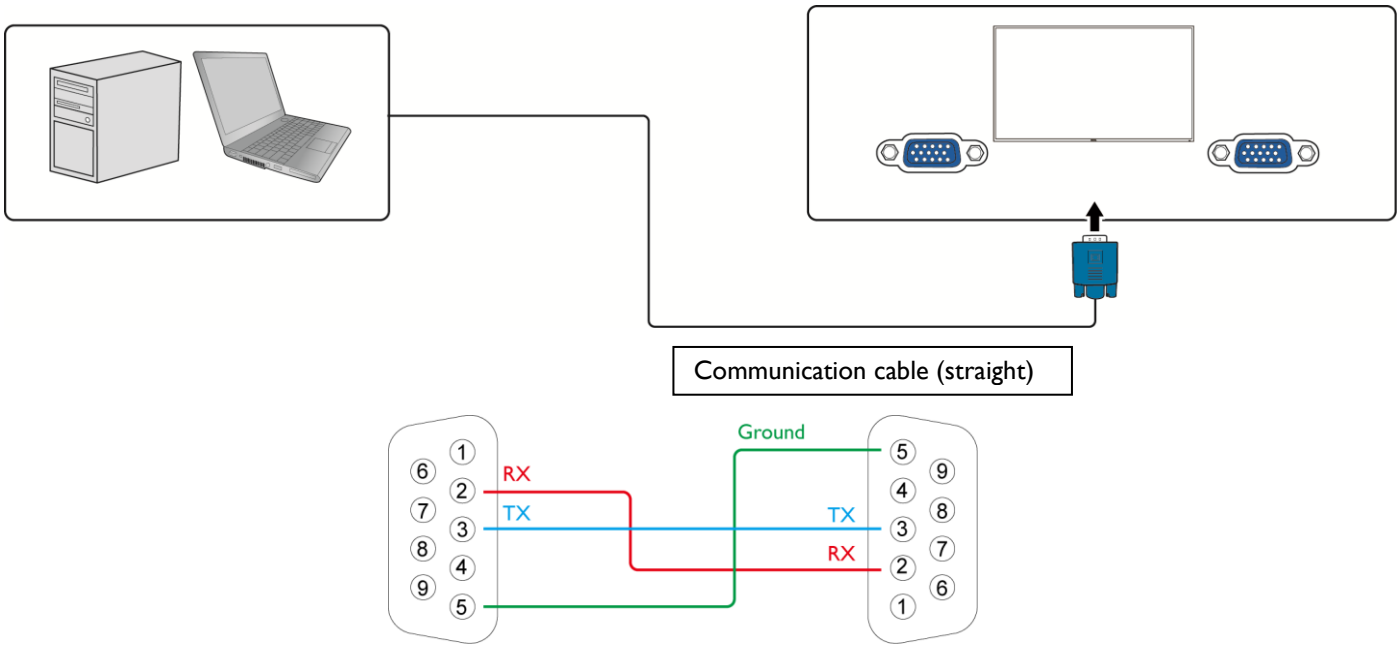
PC sends to Monitor command packet followed by "CR". Every time PC sends control command to the Monitor, the Monitor shall response as follows:

1. If the message is received correctly, it will send "+" (02Bh) followed by "CR" (00Dh).
2. If the message is received incorrectly, it will send "-" (02Dh) followed by "CR" (00Dh).

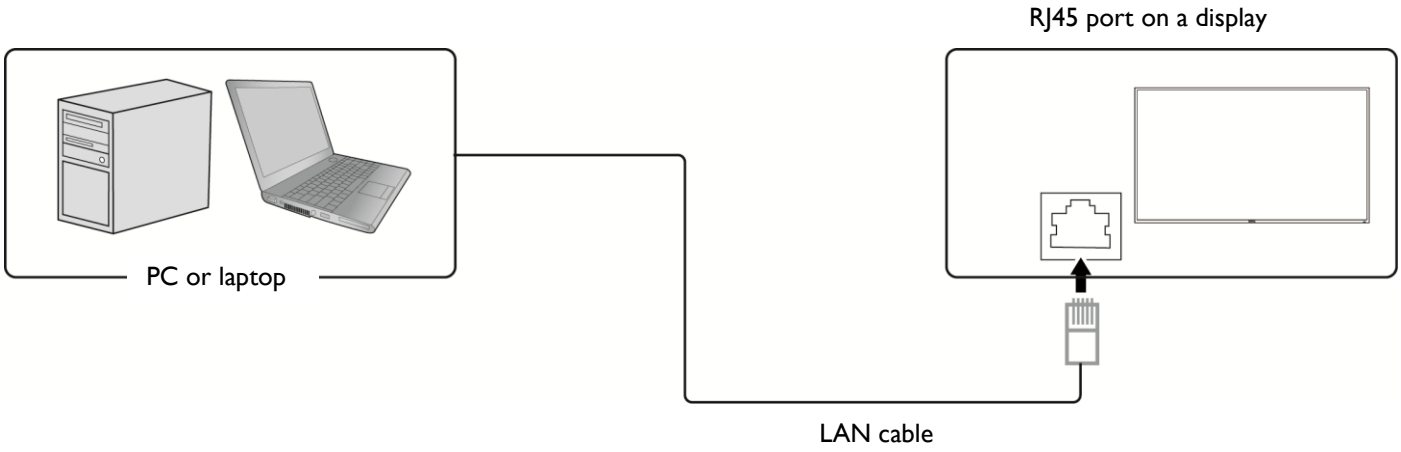
Connections and communication settings

Choose one of the connections and set up properly before RS232 control.

RS232 serial port connection



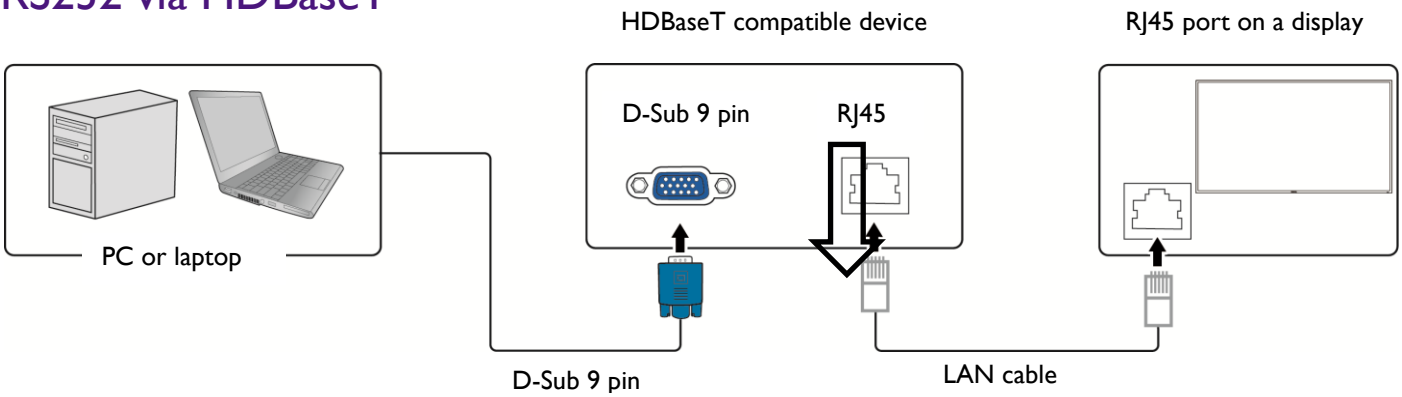
RS232 via LAN



Find the Wired LAN IP address of the connected display from the OSD menu and make sure the display and the computer are within the same network.

IP Protocol Port: 4660

RS232 via HDBaseT



Protocol Command Description

Item	Description
Length	Total Bytes of Message excluding "CR"
Display ID	Identification for each of display
Command Type	Identify command type, "s" (0x73h): Set Command "g" (0x67h): Get Command "r" (0x72h): Reply Command "+" (0x2Bh): Valid command Reply "-" (0x2Dh): Invalid command Reply
Command	Function command code: One byte ASCII code
Value [1~3]	Three bytes ASCII that defines the value

CR	0x0D

Set-function listing

The PC can control the LCD Monitor for specific actions. The Set-Function command allows you to control the LCD monitor behavior in a remote sit through the RS232 port. The Set-Function packet format consists of 11 bytes.

Set-function description

Item	Description
Length	Total Bytes of Message excluding "CR"
Display ID	Identification for each of display display ID is “01” for LAN control
Command Type	Identify command type, "s" (0x73h): Set Command
Command	Function command code: One byte ASCII code
Value [1~3]	Three bytes ASCII that defines the value
CR	0x0D

Set-function format

Send: (Command Type="s")

Name	Length	ID	Command type	Command	Value1	Value2	Value3	CR
Byte count	1 Byte	2 Byte	1 Byte	1 Byte	1 Byte	1 Byte	1 Byte	1 Byte
Bytes order	1	2~3	4	5	6	7	8	9

Reply: (Command Type="+" or "-")

Name	Length	ID	Command type	CR
Byte count	1 Byte	2 Byte	1 Byte	1 Byte
Bytes order	1	2~3	4	5

Example 1: Set Brightness as 76 for Display -02 and this command is valid.

Send (Hex Format)

Name	Length	ID	Command type	Command	Value1	Value2	Value3	CR

Hex	0x38	0x30 0x32	0x73	0x24	0x30	0x37	0x36	0x0D

Reply (Hex Format)

Name	Length	ID	Command type	CR
Hex	0x34	0x30 0x31	0x2B	0x0D

Example 2: Set Brightness as 176 for Display -02 and this command is NOT valid.

Send (Hex Format)

Name	Length	ID	Command type	Command	Value1	Value2	Value3	CR
Hex	0x38	0x30 0x32	0x73	0x24	0x31	0x37	0x36	0x0D

Reply (Hex Format)

Name	Length	ID	Command type	CR
Hex	0x34	0x30 0x31	0x2D	0x0D

Example 3: Set Tint as 32 for Display -03 and this command is valid.

Send (Hex Format)

Name	Length	ID	Command type	Command	Value1	Value2	Value3	CR
Hex	0x38	0x30 0x33	0x73	0x27	0x30	0x33	0x32	0x0D

Reply (Hex Format)

Name	Length	ID	Command type	CR

Hex	0x34	0x30 0x31	0x2B	0x0D

Example 4: Set Tint as 75 for Display -03 and this command is NOT valid.

Send (Hex Format)

Name	Length	ID	Command type	Command	Value1	Value2	Value3	CR
Hex	0x38	0x30 0x33	0x73	0x27	0x30	0x37	0x35	0x0D

Reply (Hex Format)

Name	Length	ID	Command type	CR
Hex	0x34	0x30 0x31	0x2D	0x0D

Example 5: Set Brightness as 76 for all Display and this command is valid.

Send (Hex Format)

Name	Length	ID	Command type	Command	Value1	Value2	Value3	CR
Hex	0x38	0x39 0x39	0x73	0x24	0x30	0x37	0x36	0x0D

No Reply.

Set-function table

Set Function	Len	Cmd Type	Cmd Code(HEX)	RS232/LAN
Power	8	s	21	000 :Monitor Off (Backlight off +mute)
				001 :Monitor On (Backlight on + last status)
				002 : Standby (android off)
				003 : Reboot System
Video Source	8	s	22	000 : VGA
				001 : HDMI1
				002: HDMI2
				007 : DisplayPort

				101 : android
Contrast	8	s	23	000 ~ 100
Brightness	8	s	24	000 ~ 100
Sharpness	8	s	25	000 ~ 100
Aspect Ratio	8	s	31	000 : Full
				001 : 4:3
				002 : 1:1
				003 : 16:9
Language	8	s	32	000: English
				001: Français
				002: Español
				003: 繁中
				004: 简中
				005: Português
				006: German
				007: Dutch
				008: Polish
				009: Russia
				010:Czech
				011:Danish
				012:Swedish
				013:Italian
				014:Romanian
				015:Norwegian
				016:Finnish
				017:Greek
				019:Arabic
				020:Japanse
				021: Thailand
				022: Korean
				023 : Hungarian
				024 : Persian
				025 : Vietnamese
				026 : Turkish
				027 : Indonesian
Sound Mode	8	s	33	001 : Standard
				005: Custom
Volume	8	s	35	000 ~ 100
Mute	8	s	36	000: Off

				001: On
Balance	8	s	39	000~100
Treble	8	s	37	000~100
Bass	8	s	38	000~100
Remote control command	8	s	40	000 : Vol +
				001 : Vol -
				010 : Remote up
				011 : Remote down
				012 : Remote left
				013 : Remote right
				014 : Remote OK
				020 : Remote Menu Key
				021 : Remote Input source
				022 : Remote Exit
				040 : X-Sign
				043 : Android Setting
IR Control	8	s	42	000: Disable
				001: Enable
Button&IR Control	8	s	43	000: Disable
				001: Enable
Button Control	8	s	45	000: Disable
				001: Enable
Picture Mode		s	81	000: Standard
				001: Bright
				002 : Soft
				003: Custom
				004 : Vivid
Saturation / Chroma	8	s	82	000 ~ 100
Hue	8	s	83	000 ~ 100
Backlight	8	s	84	000 ~ 100
DCR	8	s	85	000: Off
				001: On
Color Temp	8	s	86	000 : Cool
				001 : Standard
				002 : Warm

Auto Adjustment Execute	8	s	8F	
RTC Year	8	s	98	000 ~ 099
RTC Month	8	s	99	001 ~ 012
RTC Day	8	s	9A	001 ~ 031
RTC Hour	8	s	9B	000 ~ 023
RTC Minute	8	s	9C	000 ~ 059
Power Save	8	s	A9	000: Off 001: Low 002: High
Switch on status	8	s	AB	000 : Power Off 001 : Force On 002 : Last Status
On/Off Timer	14	s	E0	Byte1~Byte9 (1) Byte1: Decide which Timer is selected, and its enable/disable setting. Byte1[3:0]=0x1~0x07. There are totally 7 Timers, this value is used to decide which Timer is selected. Byte1[7]: Reserved, should be 0. Byte1[6]: The Timer is enable or not. Byte1[6]=1 means enable. Byte1[5]: The On Timer is enable or not. Byte1[5]=1 means enable. Byte1[4]: The Off Timer is enable or not. Byte1[4]=1 means enable. (2) Byte2: The Day of the On/Off Timer. bit0 for Sunday, bit1 for Monday, bit2 for Tuesday, bit3 for Wednesday, bit4 for Thursday, bit5 for Friday, bit6 for Saturday, bit7 for Everyday. (3) Byte3: The Hour of the On Timer. Byte3=0x00~0x17. (4) Byte4: The Minute of the On Timer. Byte4=0x00~0x3B. (5) Byte5: The Hour of the Off Timer. Byte5=0x00~0x17. (6) Byte6: The Minute of the Off Timer. Byte6=0x00~0x3B. (7) Byte7: Select the Video Source.(depends on actual I/O) 0x00=VGA, 0x01=HDMI1, 0x02=HDMI2, 0x03=AV, 0x04=YPbPr, 0x05=S-Video, 0x06=DVI, 0x07=DisplayPort, 0x08=SDI, 0x09=Multi-Media. 0x0A=Network, 0x0B=USB Display, 0x21=HDMI3, 0x22=HDMI4, 0x23=HDMI5, 0x1F=VGA2, 0x20=VGA3, 0x21=VGA4, 0x29=DP2, 0x2A=DP3, 0x2B=DP3,

				0x65=Android, 0x66=OPS,0xFF=Last Channel (8) Byte8~9 are reserved, and should be 0x00.
WOL	8	s	F0	000: Off
				001: On
Image Noise Reduction	8	s	F1	000 : Off
				001 : on

Get-function listing

The PC can interrogate the LCD Monitor for specific information. The Get-Function packet format consists of 5 bytes which are similar to the Set-Function packet structure. Note that the "Value" byte is always = 00.

Get-function description

Item	Description
Length	Total Bytes of messages excluding "CR"
Display ID	Identification for each of display
Command Type	Identify command type, "g" (0x67h): Get Command
Command	Function command code: One byte ASCII code

Value [1~3]	Three bytes ASCII that defines the value NOTE: To get backlight senor, thermal sensor, and ambient sensor, you need four bytes ASCII that defines the value and the length is 9.
CR	0x0D

Get-function format

Send: (Command Type="g")

Name	Length	ID	Command type	Command	Value1	Value2	Value3	CR
Byte count	1 Byte	2 Byte	1 Byte	1 Byte	1 Byte	1 Byte	1 Byte	1 Byte
Bytes order	1	2~3	4	5	6	7	8	9

Reply: (Command Type="r" or "-")

If the Command is valid, Command Type ="r"

Name	Length	ID	Command type	Command	Value1	Value2	Value3	CR
Byte count	1 Byte	2 Byte	1 Byte	1 Byte	1 Byte	1 Byte	1 Byte	1 Byte
Bytes order	1	2~3	4	5	6	7	8	9

If the Command is Not valid, Command Type="-"

Name	Length	ID	Command type	CR
Byte count	1 Byte	2 Byte	1 Byte	1 Byte
Bytes order	1	2~3	4	5

Example 1: Get Brightness from Display -05 and this command is valid.

The Brightness value is 67.

Send (Hex Format)

Name	Length	ID	Command type	Command	Value1	Value2	Value3	CR

Hex	0x38	0x30 0x35	0x67	0x62	0x30	0x30	0x30	0x0D

Reply (Hex Format)

Name	Length	ID	Command type	Command	Value1	Value2	Value3	CR
Hex	0x38	0x30 0x35	0x72	0x62	0x30	0x36	0x37	0x0D

Example 3: Get Tint from Display -0007 and this command is valid.

The Tint value is 32.

Send (Hex Format)

Name	Length	ID	Command type	Command	Value1	Value2	Value3	CR
Hex	0x38	0x30 0x37	0x67	0X65	0x30	0x30	0x30	0x0D

Reply (Hex Format)

Name	Length	ID	Command type	Command	Value1	Value2	Value3	CR
Hex	0x38	0x30 0x37	0x72	0x65	0x30	0x33	0x32	0x0D

Example 4: Get Tint from Display -07, but the Brightness command ID is error and it is NOT in the command table.

Send (Hex Format)

Name	Length	ID	Command type	Command	Value1	Value2	Value3	CR
Hex	0x38	0x30 0x37	0x67	0XD7	0x30	0x30	0x30	0x0D

Reply (Hex Format)

Name	Length	ID	Command type	CR

Hex	0x34	0x30 0x31	0x2D	0x0D

Example 5: Get backlight sensor from Display -0007 and this command is valid.

The lux value is 1786 (ASCII code).

Send (Hex Format)

Name	Length	ID	Command type	Command	Value1	Value2	Value3	Value4	CR
Hex	0x39	0x30 0x37	0x67	0X6F	0x30	0x30	0x30	0x30	0x0D

Reply (Hex Format)

Name	Length	ID	Command type	Command	Value1	Value2	Value3	Value4	CR
Hex	0x39	0x30 0x37	0x72	0X6F	0x31	0x37	0x38	0x36	0x0D

Example 6: Get ambient sensor from Display -0007 and this command is valid.

The lux value is 1568 (ASCII code).

Send (Hex Format)

Name	Length	ID	Command type	Command	Value1	Value2	Value3	Value4	CR
Hex	0x39	0x30 0x37	0x67	0X70	0x30	0x30	0x30	0x30	0x0D

Reply (Hex Format)

Name	Length	ID	Command type	Command	Value1	Value2	Value3	Value4	CR
Hex	0x39	0x30 0x37	0x72	0X70	0x31	0x35	0x36	0x38	0x0D

Example 7: Get thermal sensor from Display -0007 and this command is valid.

The value is +075 degree (ASCII code).

NOTE: Positive degree is "+"ASCII code and negative degree is "-"ASCII code.

Send (Hex Format)

Name	Length	ID	Command type	Command	Value1	Value2	Value3	Value4	CR
Hex	0x39	0x30 0x37	0x67	0X71	0x30	0x30	0x30	0x30	0x0D

Reply (Hex Format)

Name	Length	ID	Command type	Command	Value1	Value2	Value3	Value4	CR
Hex	0x39	0x30 0x37	0x72	0X71	0x2B	0x30	0x37	0x35	0x0D

Example 8: Get Running Hours from Display -0007 and this command is valid. The value is 21,356 hours (ASCII code).

Send (Hex Format)

Name	Length	ID	Command type	Command	Value1	Value2	Value3	Value4	Value5	CR
Hex	0x3A	0x30 0x37	0x67	0X76	0x30	0x30	0x30	0x30	0x30	0x0D

Reply (Hex Format)

Name	Length	ID	Command type	Command	Value1	Value2	Value3	Value4	Value5	CR
Hex	0x3A	0x30 0x37	0x72	0X76	0x32	0x31	0x33	0x35	0x36	0x0D

PC Get-function command to LCD Monitor

Get Function	Len	Cmd Type	Cmd Code (Hex)	RS232/LAN
Model Info	20	g	20	(1) Input value: Byte1 - Byte2 - Byte3…Byte15 Byte2~Byte11=0x00 Byte1=0x01: Get Customer Name Byte1=0x02: Get Customer Model Name Byte1=0x04: Get Scaler Firmware Version Byte1=0x05: Get LAN Firmware Version Byte1=0x06: Get Serial Number (2) Return value: Byte1 - Byte2 - Byte3…Byte15 The Byte1 value at the return value should be the same as the value of Byte1 at input value. Byte2~Byte15 should be ASCII format. Ex: If Customer=Generic, Byte1=0x01, Byte2='G', Byte3='e',...Byte8='c', Byte9~Byte11=0x00. Ex: If the Scaler Firmware Version=1.02, Byte1=0x03, Byte2='1', Byte3='.', Byte4='0', Byte5='2', Byte6~Byte11=0x00.
Signal Status	8	g	22	000: Signal unstable
				001: Signal stable (Active Sync exists)
Treble	8	g	37	000~100
Bass	8	g	38	000~100
Balance	8	g	39	000~100
Contrast	8	g	61	000 ~ 100
Brightness	8	g	62	000 ~ 100
Sharpness	8	g	63	000 ~ 100
Sound Mode	8	g	65	001: Standard
				005: Custom
Volume	8	g	66	000 ~ 100
Mute	8	g	67	000: Off
				001: On
IR Control	8	g	68	000: Disable
				001: Enable
Button&IR Control	8	g	69	000: Disable

				001: Enable
Video Source	8	g	6A	000 : VGA
				001 : HDMI1
				002: HDMI2
				007 : DisplayPort
				101 : android
Power	8	g	6C	000 :Monitor Off (Backlight off +mute)
				001 :Monitor On (Backlight on + last status)
Button Control	8	g	73	000: Disable
				001: Enable
Operation Time	10	g	76	00000 ~ 99999
Aspect Ratio	8	g	77	000 : Full
				001 : 4:3
				002 : 1:1
				003 : 16:9
Language	8	g	78	000: English
				001: Français
				002: Español
				003: 繁中
				004: 简中
				005: Português
				006: German
				007: Dutch
				008: Polish
				009: Russia
				010:Czech
				011:Danish
				012:Swedish
				013:Italian
				014:Romanian
				015:Norwegian
				016:Finnish
				017:Greek
				019:Arabic
				020:Japanse
				021: Thailand
				022: Korean
				023 : Hungarian

				024 : Persian
				025 : Vietnamese
				026 : Turkish
				027 : Indonesian
Picture Mode	8	g	B1	000: Standard
				001: Bright
				002 : Soft
				003 : Custom
				004 : Vivid
Chroma/Saturation	8	g	B2	000 ~ 100
Hue	8	g	B3	000 ~ 100
Backlight	8	g	B4	000 ~ 100
DCR	8	g	B5	000: Off
				001: On
Color Temp	8	g	B6	000 : Cool
				001 : Standard
				002 : Warm
RTC Year	8	g	C8	000 ~ 099
RTC Month	8	g	C9	001 ~ 012
RTC Day	8	g	CA	001 ~ 031
RTC Hour	8	g	CB	000 ~ 023
RTC Minute	8	g	CC	000 ~ 059
Power Save	8	g	D9	000 : Off
				001 : Low
				002 : High
Switch on Status	8	g	DA	000 : Power Off
				001 : Force On
				002 : Last Status
On/Off Timer	14	g	E0	
Network Setting	14	g	E1	Input Value: Byte1 - Byte2 - Byte3…Byte9 (1) Byte1=0x00: IP Setup Mode Byte1=0x01: IP Address Byte1=0x02: Get Subnet Mask Byte1=0x03: Default Gateway Byte1=0x04: Primary DNS Byte1=0x05: Secondary DNS Byte1=0x06: current using interface MAC

				Address Byte1=0x07: Ethernet (RJ45) MAC Address (2) Byte2~9 are reserved, should be 0x00. Return value: Byte1 - Byte2 - Byte3…Byte9 The Byte1 at the return value should be the same as the value of Byte1 at Input value. Byte2~Byte15 should be hex value format (1) If Byte1=0x00(IP Setup Mode) at Input value, the return value should be Byte1=0x00 Byte2=0x00: Manual 0x01: DHCP Byte3~9 are reserved, should be 0x00. (2) If Byte1=0x01(IP Address) at Input value, the return value should be Ex: IP address=169.254.81.38 Byte1=0x01 (same as Byte1 at Input value) Byte2=0xA9 (=169), Byte3=0xFE (=254), Byte4=0x51(=81), Byte5=0x26 (=38) Byte6~9 are reserved, should be 0x00. (3) If Byte1=0x02~0x05 at Input value, refer to (2) (4) If Byte1=0x06(MAC Address) at Input value, the return value should be Ex: MAC address=00:22:64:7E:2C:82 Byte1=0x06 (same as Byte1 at Input value) Byte2=0x00, Byte3=0x22, Byte4=0x64, Byte5=0x7E, Byte6=0x2C, Byte7=0x82 Byte8~9 are reserved, should be 0x00.
WOL	8	g	F0	000: Off
				001: On
Image Noise Reduction	8	g	F1	000 : Off
				001 : On