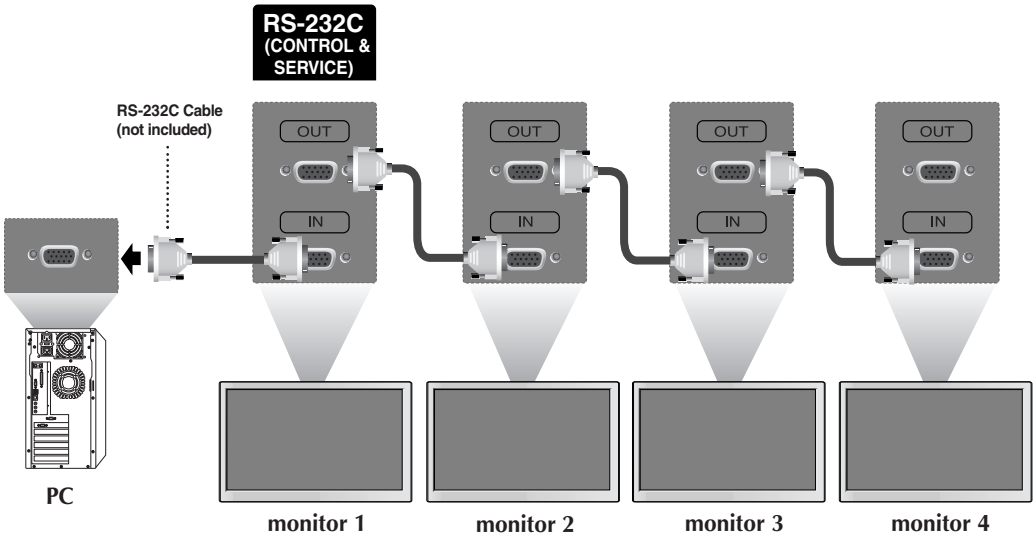
Controlling the Multiple Product

Use this method to connect several products to a single PC.
You can control several products at a time by connecting them to a single PC.

Connecting the cable

Connect the RS-232C cable as shown in the picture.

* The RS-232C protocol is used for communication between the PC and product. You can turn the product on/off, select an input source or adjust the OSD menu from your PC.



Communication Parameter

- ▶ Baud Rate : 9600bps (UART)
- ▶ Data Length : 8bits
- ▶ Parity Bit : None
- ▶ Stop Bit : 1bit
- ▶ Flow Control : None
- ▶ Communication Code : ASCII code

Command Reference List

	COMMAND1	COMMAND2	DATA(Hexa)
01. Power	k	a	00H - 01H
02. Input Select	k	b	02H - 09H
03. Aspect Ratio	k	c	01H - 09H
04. Screen Mute	k	d	00H - 01H
05. Volume Mute	k	e	00H - 01H
06. Volume Control	k	f	00H - 64H
07. Contrast	k	g	00H - 64H
08. Brightness	k	h	00H - 64H
09. Color	k	i	00H - 64H
10. Tint	k	j	00H - 64H
11. Sharpness	k	k	00H - 64H
12. OSD Select	k	l	00H - 01H
13. Remote Lock/ key Lock	k	m	00H - 01H
14. Balance	k	t	00H - 64H
15. Color Temperature	k	u	00H - 03H
16. Abnomal state	k	z	FFH
17. ISM mode	j	p	00H - 08H
18. Auto configuration	j	u	01H
19. Key	m	c	Key Code
20. Tile Mode	d	d	00H - 44H
21. Tile H Size	d	g	00H - 64H
22. Tile V Size	d	h	00H - 64H
23. Tile ID Set	d	i	00H - 10H
24. Elapsed time return	d	l	FFH
25. Temperature value	d	n	FFH
26. Lamp fault check	d	p	FFH

Transmission / Receiving Protocol

Transmission

[Command1][Command2][ ][Set ID][ ][Data][Cr]

* [Command 1]: First command. (j, k, m, d)
* [Command 2]: Second command.
* [Set ID]: Set up the Set ID number of product.
  range : 1~99. by setting '0', server can control all products.
  * In case of operating with more than 2 sets using set ID as '0' at the same time, it should not be checked the ack message.
  Because all sets will send the ack message, so it's impossible the check the whole ack messages.
* [DATA]: To transmit command data.
  Transmit 'FF' data to read status of command.
* [Cr]: Carriage Return
  ASCII code '0x0D'
* [ ]: ASCII code Space (0x20)'

OK Acknowledgement

[Command2][ ][Set ID][ ][OK][Data][x]

* The Product transmits ACK (acknowledgement) based on this format when receiving normal data. At this time, if the data is data read mode, it indicates present status data. If the data is data write mode, it returns the data of the PC computer.

Error Acknowledgement

[Command2][ ][Set ID][ ][NG][Data][x]

* If there is error, it returns NG

Transmission / Receiving Protocol

01. Power(Command : a)

▶ To control Power On/Off of the Set.

Transmission

[k][a][ ][Set ID][ ][Data][Cr]

Data 0 : Power Off 1 : Power On

Acknowledgement

[a][ ][Set ID][ ][OK][Data][x]

▶To show the status of Power On/Off.

Transmission

[k][a][ ][Set ID][ ][FF][Cr]

Acknowledgement

[a][ ][Set ID][ ][OK][Data][x]

Data 0 : Power Off 1 : Power On

02. Input Select (Command : b) (Main Picture Input)

▶ To select input source for the Set.
You can also select an input source using the INPUT button on the remote control.

Transmission

[k][b][ ][Set ID][ ][Data][Cr]

Data 2 : AV
4 : Component 1
5 : Component 2
6 : RGB (DTV)
7 : RGB (PC)
8 : HDMI (DTV)
9 : HDMI (PC)

Acknowledgement

[b][ ][Set ID][ ][OK][Data][x]

Data 2 : AV
4 : Component 1
5 : Component 2
6 : RGB (DTV)
7 : RGB (PC)
8 : HDMI (DTV)
9 : HDMI (PC)

Transmission / Receiving Protocol

03. Aspect Ratio(Command : c) (Main picture format)

▶ To adjust the screen format.
You can also adjust the screen format using the ARC (Aspect Ratio Control) button on remote control or in the Screen menu.

Transmission

[k][c][ ][Set ID][ ][Data][Cr]

Data 1 : Normal Screen (4:3)
2 : Wide Screen (16 :9)
3 : Horizon (Spectacle)
4 : Zoom1
5 : Zoom2
6 : Original
7 : 14 : 9
8 : Full (Europe version only)
9 : 1 : 1 (PC)

Acknowledgement

[c][ ][Set ID][ ][OK][Data][x]

04. Screen Mute(Command : d)

▶ To select screen mute on/off.

Transmission

[k][d][ ][Set ID][ ][Data][Cr]

Data 0 : Screen mute off (Picture on)
1 : Screen mute on (Picture off)

Acknowledgement

[d][ ][Set ID][ ][OK][Data][x]

Transmission / Receiving Protocol

05. Volume Mute(Command : e)

▶ To control On/Off of the Volume Mute.

Transmission

[k][e][ ][Set ID][ ][Data][Cr]

Data 0 : Volume Mute On (Volume Off)
1 : Volume Mute Off (Volume On)

Acknowledgement

[e][ ][Set ID][ ][OK][Data][x]

Data 0 : Volume Mute On (Volume Off)
1 : Volume Mute Off (Volume On)

06. Volume Control(Command : f)

▶ To adjust Volume .

Transmission

[k][f][ ][Set ID][ ][Data][Cr]

Data Min : 00H ~ Max : 64H
(Hexadecimal code)

Acknowledgement

[f][ ][Set ID][ ][OK][Data][x]

Data Min : 00H ~ Max : 64H

• Refer to 'Real data mapping' page A7.

Transmission / Receiving Protocol

07. Contrast(Command : g)

▶ To adjust screen contrast.
You can also adjust the contrast in the Picture menu.

Transmission

[k][g][ ][Set ID][ ][Data][Cr]

Data Min : 00H ~ Max : 64H
• Refer to 'Real data mapping' as shown below.

Acknowledgement

[g][ ][Set ID][ ][OK][Data][x]

* Real data mapping
0 : Step 0
:
A : Step 10
:
F : Step 15
10 : Step 16
:
64 : Step 100

08. Brightness(Command : h)

▶ To adjust screen brightness.
You can also adjust the brightness in the Picture menu.

Transmission

[k][h][ ][Set ID][ ][Data][Cr]

Data Min : 00H ~ Max : 64H
• Refer to 'Real data mapping' as shown below.

Acknowledgement

[h][ ][Set ID][ ][OK][Data][x]

* Real data mapping
0 : Step
:
A : Step 10
:
F : Step 15
10 : Step 16
:
64 : Step 100

Transmission / Receiving Protocol

09. Color(Command : i) (Video only)

▶ To adjust the screen color.
You can also adjust the color in the Picture menu.

Transmission

[k][i][ ][Set ID][ ][Data][Cr]

Data Min : 00H ~ Max : 64H
(Hexadecimal code)

• Refer to 'Real data mapping' page A7.

Acknowledgement

[i][ ][Set ID][ ][OK][Data][x]

Data Min : 00H ~ Max : 64H

10. Tint(Command : j) (Video only)

▶ To adjust the screen tint.
You can also adjust the tint in the Picture menu.

Transmission

[k][j][ ][Set ID][ ][Data][Cr]

Data Red: 00H ~ Green: 64H
(Hexadecimal code)

• Refer to 'Real data mapping' page A7.

Acknowledgement

[j][ ][Set ID][ ][OK][Data][x]

Data Red: 00H ~ Green: 64H

* Tint Real data mapping
0 : Step -50
:
64 : Step 50

Transmission / Receiving Protocol

11. Sharpness(Command : k) (Video only)

▶ To adjust the screen Sharpness.
You can also adjust the sharpness in the Picture menu.

Transmission

[k][k][ ][Set ID][ ][Data][Cr]

Data Min : 00H ~ Max : 64H
(Hexadecimal code)

• Refer to 'Real data mapping' page A7.

Acknowledgement

[k][ ][Set ID][ ][OK][Data][x]

Data Min : 00H ~ Max : 64H

12. OSD Select(Command : l)

▶ To control OSD on/off to the set.

Transmission

[k][l][ ][Set ID][ ][Data][Cr]

Data 0 : OSD Off 1 : OSD On

Acknowledgement

[l][ ][Set ID][ ][OK][Data][x]

Data 0 : OSD Off 1 : OSD On

13. Remote Lock /Key Lock (Command : m)

▶ To control Remote Lock on/off to the set.
This function, when controlling RS-232C, locks the remote control and the local keys.

Transmission

[k][m][ ][Set ID][ ][Data][Cr]

Data 0 : Off 1 : On

Acknowledgement

[m][ ][Set ID][ ][OK][Data][x]

Data 0 : Off 1 : On

Transmission / Receiving Protocol

14 Balance(Command : t)

▶ To adjust the sound balance.

Transmission

[k][t][ ][Set ID][ ][Data][Cr]

Data Min : 00H ~ Max : 64H
(Hexadecimal code)

• Refer to 'Real data mapping' page A7.

Acknowledgement

[t][ ][Set ID][ ][OK][Data][x]

Data Min : 00H ~ Max : 64H

* Balance : L50 ~ R50

15. Color Temperature (Command : u)

▶ To adjust the screen color temperature.

Transmission

[k][u][ ][Set ID][ ][Data][Cr]

Data 0 : Normal
1 : Cool
2 : Warm
3 : User

Acknowledgement

[u][ ][Set ID][ ][OK][Data][x]

Data 0 : Normal
1 : Cool
2 : Warm
3 : User

Transmission / Receiving Protocol

16. Abnomal state (Command : z)

▶ Abnormal State : Used to Read the power off status when Stand-by mode.

Transmission

[k][z][ ][Set ID][ ][Data][Cr]

Data FF : Read
0 : Normal (Power on and signal exist)
1: No signal (Power on)
2 : Turn the monitor off by remote control
3 : Turn the monitor off by sleep time function
4 : Turn the monitor off by RS-232C function
6 : AC down
8 : Turn the monitor off by off time function
9 : Turn the monitor off by auto off function

Acknowledgement

[z][ ][Set ID][ ][OK][Data][x]

17. ISM mode(Command: j p)

▶ Used to select the afterimage preventing function.

Transmission

[j][p][ ][Set ID][ ][Data][Cr]

Data 1 : Inversion
2 : Orbiter
4 : White Wash
8 : Normal

Acknowledgement

[p][ ][Set ID][ ][OK][Data][x]

Transmission / Receiving Protocol

18. Auto Configure(Command: j u)

▶ To adjust picture position and minimize image shaking automatically. it works only in RGB(PC) mode.

Transmission

[j][u][ ][Set ID][ ][Data][Cr]

Data 1 : To set

Acknowledgement

[u][ ][Set ID][ ][OK][Data][x]

19. Key(Command : m c)

▶ To send IR remote key code.

Transmission

[m][c][ ][Set ID][ ][Data][Cr]

Data Key code : Refer to page A18.

Acknowledgement

[c][ ][Set ID][ ][OK][Data][x]

Transmission / Receiving Protocol

20. Tile Mode(Command : d d)

▶ Change a Tile Mode.

Transmission

[d][d][][Set ID][][Data][x]

Data	Description
00	Tile mode is off.
12	1 x 2 mode(column x row)
13	1 x 3 mode
14	1 x 4 mode
...	...
44	4 x 4 mode

* The data can not be set to 0X or X0 except 00.

Acknowledgement

[d][][00][][OK/NG][Data][x]

Transmission / Receiving Protocol

21. Tile H Size(Command : d g)

▶To set the Horizontal size.

Transmission

[d][g][][Set ID][][Data][x]

Data Min : 00H ~ Max : 64H

Acknowledgement

[g][][Set ID][][OK/NG][Data][x]

22. Tile V Size(Command : d h)

▶To set the Vertical size.

Transmission

[d][h][][Set ID][][Data][x]

Data Min : 00H ~ Max : 64H

Acknowledgement

[h][][Set ID][][OK/NG][Data][x]

Transmission / Receiving Protocol

23. Tile ID Set(Command : d i)

▶ To assign the Tile ID for Tiling function .

Transmission

[d][i][][Set ID][][Data][x]

Data Min : 00H ~ Max : 10H
(Hexadecimal code)

Acknowledgement

[i][][Set ID][][OK/NG][Data][x]

24. Elapsed time return(Command : d l)

▶ To read the elapsed time.

Transmission

[d][l][][Set ID][][Data][x]

* The data is always FF(in Hex).

Acknowledgement

[l][][Set ID][][OK/NG][Data][x]

* The data means used hours.
(Hexadecimal code)

Transmission / Receiving Protocol

25. Temperature value (Command : d n)

▶ To read the inside temperature value.

Transmission

[d][n][][Set ID][][Data][x]

* The data is always FF(in Hex).

Acknowledgement

[n][][Set ID][][OK/NG][Data][x]

* The data is 1 byte long in Hexadecimal.

26. Lamp fault Check(Command : d p)

▶ To check lamp fault.

Transmission

[d][p][][Set ID][][Data][x]

* The data is always FF(in Hex).

Acknowledgement

[p][][Set ID][][OK/NG][Data][x]

Data 0 : Lamp Fault
1: Lamp OK

IR Codes

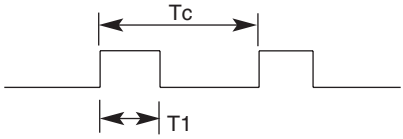
How to connect

▶ Connect your wired remote control to Remote Control port on the Product.

Remote Control IR Code

▶ Output waveform

single pulse, modulated with 37.917KHz signal at 455KHz

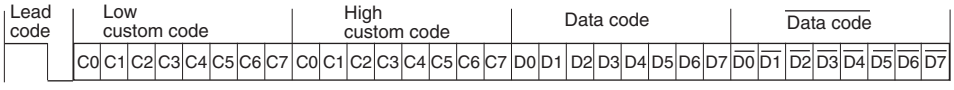


Carrier frequency

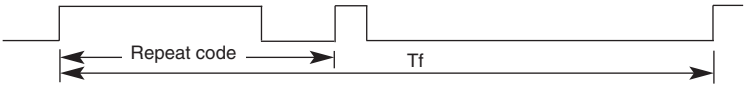
FCAR = 1/Tc = fosc/12
Duty ratio = T1/Tc = 1/3

▶ Configuration of frame

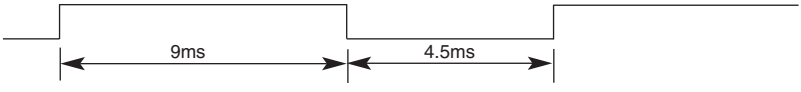
• 1st frame



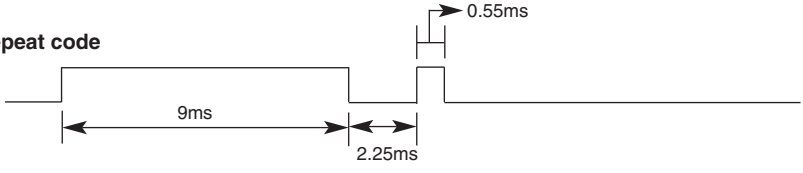
• Repeat frame



▶ Lead code

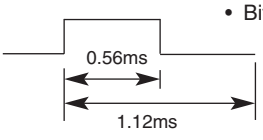


▶ Repeat code

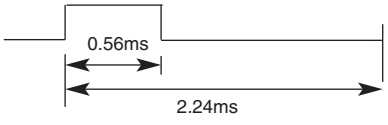


▶ Bit description

• Bit "0"

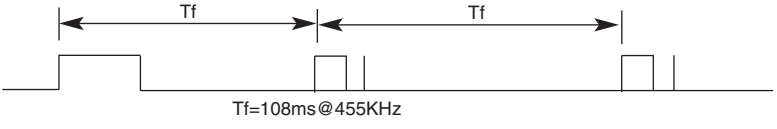


• Bit "1"



▶ Frame interval : Tf

• The waveform is transmitted as long as a key is depressed.



IR Codes

Code(Hexa)	Function	Note
00	▲	R/C Button
01	▼	R/C Button
02	VOL(▶)	R/C Button
03	VOL(◀)	R/C Button
08	POWER ON/OFF	PR/C Button (Power On/Off)
C4	POWER ON	Discrete IR Code(Only Power On)
C5	POWER OFF	Discrete IR Code(Only Power On)
09	MUTE	R/C Button
98	AV	R/C Button
0B	INPUT	R/C Button
0E	SLEEP	R/C Button
43	MENU	R/C Button
5B	EXIT	R/C Button
6E	PSM	R/C Button
44	SET	R/C Button
10	Number Key 0	R/C Button
11	Number Key 1	R/C Button
12	Number Key 2	R/C Button
13	Number Key 3	R/C Button
14	Number Key 4	R/C Button
15	Number Key 5	R/C Button
16	Number Key 6	R/C Button
17	Number Key 7	R/C Button
18	Number Key 8	R/C Button
19	Number Key 9	R/C Button
5A	AV	Discrete IR Code(Input AV Selection)
BF	COMPONENT1	Discrete IR Code(Input COMPONENT1 Selection)
D4	COMPONENT2	Discrete IR Code(Input COMPONENT2 Selection)
D5	RGB PC	Discrete IR Code(Input RGB PC Selection)
D7	RGB DTV	Discrete IR Code(Input RGB DTV Selection)
C6	HDMI/DVI	Discrete IR Code(Input HDMI/DVI Selection)
79	ARC	R/C Button
76	ARC (4:3)	Discrete IR Code(Only 4:3 mode)
77	ARC (16:9)	Discrete IR Code(Only 16:9 mode)
AF	ARC (ZOOM)	Discrete IR Code(Only ZOOM1, ZOOM2 mode)
99	AUTO CONFIC	Discrete IR Code