

# HITACHI

## Television / Flat Panel Display (FPD) RS232C Communication Specification

Model: P50V702 (PDP V Model)  
P50X902 (PDP X Model)

Rev 1.0

Friday, May 16, 2008

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## Hardware Interface

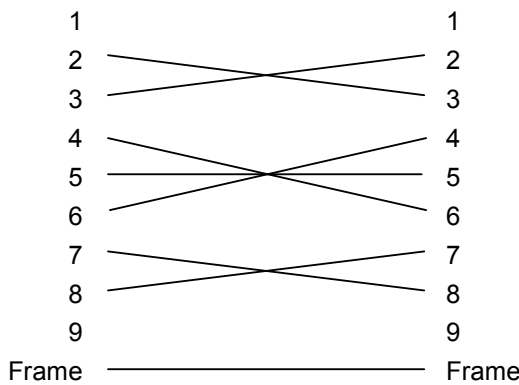
- D-Sub 9pin, Female
- RS232C standard
- Pin assignment



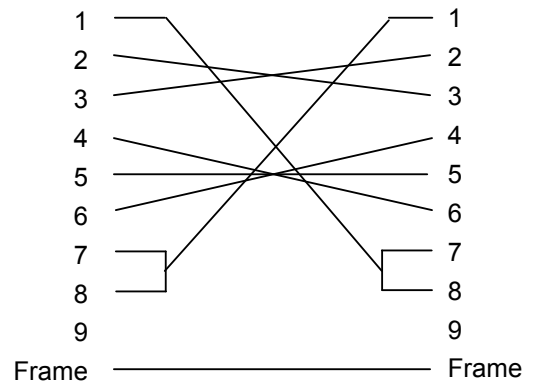
Pin #	Signal	Remark
1	NC	
2	RXD0	Controller to FPD
3	TXD0	FPD to Controller
4	DTR	FPD to Controller
5	GND	
6	NC	
7	RTS	FPD to Controller
8	CTS	Controller to FPD
9	NC	
Frame	GND	

- Acceptable cable connections (4 types)

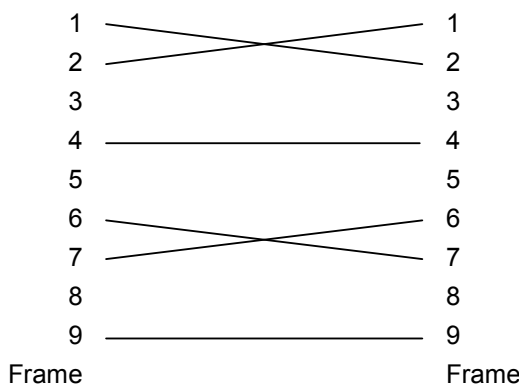
**Cable1**



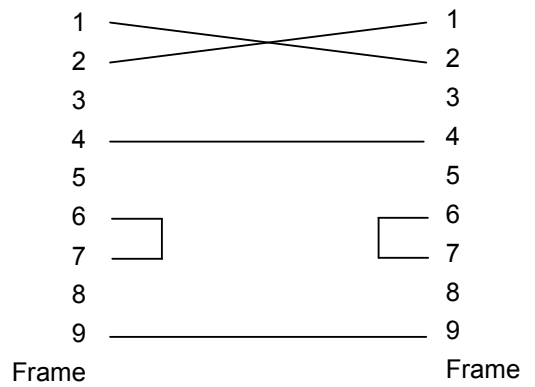
**Cable2**



**Cable3**



**Cable4**



## 1. Port Settings

- Bit Rate 9600 bps
- Data Length 7 bit or 8bit (default:7bit)
- Parity None
- Stop Bit 1 bit
- Flow Control None
- Communication Asynchronous

## 2. Command Format

- Terminal mode

In order to control FPD / TV, you need to set the terminal mode “ON”. The format is shown in the table below.

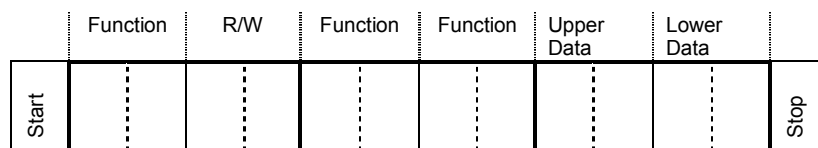
ON/OFF	Terminal mode (1 byte)	
	Byte No.	1
	Content of Command	ENQ (Terminal mode: ON)      EOT (Terminal mode: OFF)
	Code (HEX)	05      04

- When the terminal mode is ON, the remote controller and front panel keys are disabled, except power switch key on the front panel.
- The power cycle is not affected to the terminal mode status. In other words, the terminal mode status remains the same, even if the user turns on or off FPD / TV.
- The default is terminal mode is OFF.
- It unable to turn on terminal mode, either Factory adjust mode or the OSD cursor is under Event timer.

- Control command

The command format is a series of 14 bytes data, starting with STX code (0x02) and ending ETX (0x03). The series of data forms 6 bytes data written by ASCII code. The format is shown in the table below.

	Start	Command (12byte)												Stop
Receive Byte No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Content of Command	Start	1st (Function)		2nd (R/W)		3th upper byte (Sub func)		4th lower byte (Sub func)		5th upper byte (Data)		6th lower byte (Data)		Stop
Character(ASCII)	STX	0~F	0~F	0~F	0~F	0~F	0~F	0~F	0~F	0~F	0~F	0~F	0~F	ETX
Code(HEX)	02	*1	*1	*1	*1	*1	*1	*1	*1	*1	*1	*1	*1	03



- The terminal mode has to be ON to control the FPD.
- The OSD menu pops up when the FPD receives valid command. The type of OSD menu is shown in the section 3.

- The TV guide might be interrupt RS232C communication, so it would be recommended that “Auto guide” function is disabled to avoid TV guide show up at initial power up sequence.

The command is classified into three (3) types, Reset, Read and Write. The detail of command type is shown in the below.

Type	Action	Command					
		1st	2nd	3rd	4th	5th	6th
(a)	Reset	Command	Dummy	Dummy	Dummy	Dummy	Dummy
		(**)	00	00	00	00	00
(b)	Read	Command	Operation	Command	Command	Dummy	Dummy
		(**)	01	(**)	(**)	00	00
(c)	Write	Command	Operation	Command	Command	Data	Data
		(**)	00	(**)	(**)	(**)	(**)

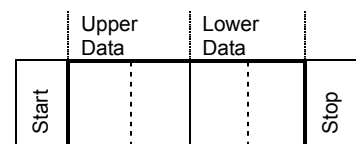
- The R/W flag defines as **Read: 01, Write 00**.
- The series of command is described with ASCII code, ‘0’-‘9’ is 0x30-0x39, ‘A’-‘F’ is 0x41-0x46.
- The return value may NOT the latest value if you read back just after sending a Write command. Please give an interval that is enough time to update the internal setting.

• Reply for Read (inquiry) command

The reply data for Read command is a series of 6 bytes data, starting STX (0x02) and ending ETX (0x03) code as shown in the table.

Byte No.	Reply (6 bytes)					
	1	2	3	4	5	6
Content of Command	Start	Data upper byte	Data lower byte	Data	Data	Stop
Character(ASCII)	STX	0~F	0~F	0~F	0~F	EXT
Code(HEX)	02	*1		*1		03

The bytes from 2<sup>nd</sup> through 5<sup>th</sup> byte indicate the return value as the result of Read command.



• Acknowledgement

The FPD returns acknowledgement as the result of command when it receives a command is valid. If it receives invalid command or series of data, it returns NAK (0x15) code.

ACK / NAK	Acknowledgement (1 byte)	
	Byte No.	1
	Content of Command	ACK / NAK
	Code(HEX)	06 / 15

### 3. Command Table

- Operations

The available operation commands are shown below.

No.	Setting Item	Command			OSD Menu	E2PROM	Command Type
	Function	1 <sup>st</sup> (HEX)	R/W	3 <sup>rd</sup> 4 <sup>th</sup> (HEX)			
1	POWER	6E	R/W	0000	Info	Write	(b) / (c)
2	INPUT	6F	R/W	0000	Info	Write	(b) / (c)
3	VOLUME	27	R/W	0000	Volume Bar		(b) / (c)
4	BALANCE	28	R/W	0000	Audio Menu		(b) / (c)
5	TREBLE	2B	R/W	0000	Audio Menu		(b) / (c)
6	BASS	2A	R/W	0000	Audio Menu		(b) / (c)
7	AUDIO MUTE	29	R/W	0000	Audio Menu		(b) / (c)
8	PICTURE MODE	A4	R/W	0003	Day/Night		(b) / (c)
9	CONTRAST	59	R/W	0000	Video Menu		(b) / (c)
10	BRIGHTNESS	1F	R/W	0000	Video Menu		(b) / (c)
11	COLOR	10	R/W	0000	Video Menu		(b) / (c)
12	TINT	13	R/W	0000	Video Menu		(b) / (c)
13	SHARPNESS	14	R/W	0000	Video Menu		(b) / (c)
14	COLOR TEMPARATURE	60	R/W	0000	Video Menu		(b) / (c)
15	ASPECT	40	R/W	0000	Aspect (Info OSD)		(b) / (c)
16	INFO	B2	W	0000	Info		(c)
17	DIRECT 0~9 KEY	D0	W	0000	CH # or Picture #	Write	(c)
18	-(Hyphen)	D0	W	0001	-	Write	(c)
19	SELECT	D0	W	0002	SELECT	Write	(c)
20	AUTO MOVIE MODE	D4	R/W	0000	Video Menu		(b) / (c)
21	EXIT	D9	W	0000	Exit OSD		(c)
22	Energy Saving	1A	R/W	0000	E.Save	Write	(b) / (c)

- The command #17 (Direct 0-9 key) works as numerical keys for entering CH number if current channel is "Cable or Air".
- The command #18 and #19 works as -keys and SELECT keys.
- The command #21 (Exit) works as Exit key on the remote controller.

- Variable range

	Setting Item	5 <sup>th</sup> /6 <sup>th</sup> Variable Range	Initial Data	Remarks
1	POWER	0:Off 1:On	0 (off)	
2	INPUT	0:Input1 1:Input2 2:Input3 5:Cable or Air 9: Photo Input B:HDMI1 C:HDMI2 D:HMDI3	-	
3	VOLUME	0~60	20	
4	BALANCE	0~20	10	
5	TREBLE	0~30	15	
6	BASS	0~30	15	
7	AUDIO MUTE	0:Off 1:On 2.Soft Mute	0	
8	PICTURE MODE	0:Dynamic 1:Day 2:Night 3:Pro Mode	0	
9	CONTRAST	0~62(STEP)	62	
10	BRIGHTNESS	0~62(STEP)	31	
11	COLOR	0~62(STEP)	31	
12	TINT	0~62(STEP)	31	
13	SHARPNESS	0~62(STEP)	31	
14	COLOR TEMPARATURE	0:High 1:Medium 2:Standard 3:D.Cinema	-	
15	ASPECT	0: 16:9 Standard1 1: 16:9 Zoom 2: 4:3 Standard 3: 4:3 Expanded 4: 4:3 Zoom1 5: 4:3 Zoom2 6: 16:9Standard2 7: FULL 8: NORMAL 9: REAL	-	
16	INFO	0:Off 1:On	0	
17	DIRECT 0~9 KEY	KEY CODE: 0~9	-	
18	-(Hyphen)	0	-	
19	SELECT	0	-	
20	(delete)	(delete)		
	AUTO MOVIE MODE	0:Off	0	
	X Series	1:Original		
	PDP V Model	2:Smooth		
21	EXIT	0	-	
22	Energy Saving	0:Min 1:Medium 2:Max	0	

➤ The FPD respond NAK if the value is out of range or the setting is not available

## Appendix

### A. ASCII Code Reference

Hex Character	Hex Code
0	30
1	31
2	32
3	33
4	34
5	35
6	36
7	37
8	38
9	39
A	41
B	42
C	43
D	44
E	45
F	46

### B. Power On Command - Example

	Start	Command (12byte)												Stop
Receive Byte No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Contents of Commands	Start	1st (Function)		2nd (R/W)		3th upper byte (Sub func)		4th lower byte (Sub func)		5th upper byte (Data)		6th lower byte (Data)		Stop
Character(HEX)	STX	0~F	0~F	0~F	0~F	0~F	0~F	0~F	0~F	0~F	0~F	0~F	0~F	ETX

- Start (STX): 0x02
- 1<sup>st</sup> (Function): "6E"
- 2<sup>nd</sup> (R/W): "00" (write)
- 3<sup>rd</sup> (Sub func): "00" (upper)
- 4<sup>th</sup> (Sub func): "00" (lower)
- 5<sup>th</sup> (data): "00" (upper)
- 6<sup>th</sup> (data): "01" (lower)
- End (ETX): 0x03

	Function		R/W		Function		Function		Upper Data		Lower Data		
STX	6	E	0	0	0	0	0	0	0	0	0	1	ETX

	Function		R/W		Function		Function		Upper Data		Lower Data		
02h	36h	45h	30h	30h	30h	30h	30h	30h	30h	30h	30h	31h	03h

## C. Sample command codes – Write

Function	Value	ASCII	HEX
Power	On	6E0000000001	36 45 30 30 30 30 30 30 30 30 30 30 31
Power	Off	6E0000000000	36 45 30 30 30 30 30 30 30 30 30 30 30
Input	Input 1	6F0000000000	36 46 30 30 30 30 30 30 30 30 30 30 30
Input	Input 2	6F0000000001	36 46 30 30 30 30 30 30 30 30 30 30 31
Input	Input 3	6F0000000002	36 46 30 30 30 30 30 30 30 30 30 30 32
Input	Cable or Air	6F0000000005	36 46 30 30 30 30 30 30 30 30 30 30 35
Volume	0	270000000000	32 37 30 30 30 30 30 30 30 30 30 30 30
Balance	20	280000000014	32 38 30 30 30 30 30 30 30 30 30 31 34
Treble	16	2B0000000010	32 42 30 30 30 30 30 30 30 30 30 31 30
Bass	16	2A0000000010	32 41 30 30 30 30 30 30 30 30 30 31 30
Audio Mute	Off	290000000000	32 39 30 30 30 30 30 30 30 30 30 30 30
Audio Mute	On	290000000001	32 39 30 30 30 30 30 30 30 30 30 30 31
Picture Mode	Dynamic	A40000030000	41 34 30 30 30 30 30 30 33 30 30 30 30
Picture Mode	Day	A40000030001	41 34 30 30 30 30 30 30 33 30 30 30 31
Picture Mode	Night	A40000030002	41 34 30 30 30 30 30 30 33 30 30 30 31
Contrast	59	59000000003B	35 39 30 30 30 30 30 30 30 30 30 33 42
Brightness	29	1F000000001D	31 46 30 30 30 30 30 30 30 30 30 31 44
Color	29	10000000001D	31 30 30 30 30 30 30 30 30 30 30 31 44
Tint	29	13000000001D	31 33 30 30 30 30 30 30 30 30 30 31 44
Sharpness	29	14000000001D	31 34 30 30 30 30 30 30 30 30 30 31 44
Color Temperature	High	600000000000	36 30 30 30 30 30 30 30 30 30 30 30 30
Color Temperature	Medium	600000000001	36 30 30 30 30 30 30 30 30 30 30 30 31
Color Temperature	Standard	600000000002	36 30 30 30 30 30 30 30 30 30 30 30 32
Color Temperature	D.Cinema	600000000003	36 30 30 30 30 30 30 30 30 30 30 30 33
Aspect Ratio	16:9 Standard1	400000000000	34 30 30 30 30 30 30 30 30 30 30 30 30
Aspect Ratio	16:9 Zoom	400000000001	34 30 30 30 30 30 30 30 30 30 30 30 31
Aspect Ratio	4:3 Standard	400000000002	34 30 30 30 30 30 30 30 30 30 30 30 32
Aspect Ratio	4:3 Expanded	400000000003	34 30 30 30 30 30 30 30 30 30 30 30 33
Aspect Ratio	4:3 Zoom1	400000000004	34 30 30 30 30 30 30 30 30 30 30 30 34
Aspect Ratio	4:3 Zoom 2	400000000005	34 30 30 30 30 30 30 30 30 30 30 30 35
Info	On	B20000000001	42 32 30 30 30 30 30 30 30 30 30 30 31
Info	Off	B20000000000	42 32 30 30 30 30 30 30 30 30 30 30 30
Direct CH 0~9	0	D00000000000	44 30 30 30 30 30 30 30 30 30 30 30 30
Direct -(Hyphen)	-	D00000010000	44 30 30 30 30 30 30 30 31 30 30 30 30
Direct SELECT	SELECT	D00000020000	44 30 30 30 30 30 30 30 32 30 30 30 30
Auto Movie Mode	Off	D40000000000	44 34 30 30 30 30 30 30 30 30 30 30 30
Auto Movie Mode	Original	D40000000001	44 34 30 30 30 30 30 30 30 30 30 30 31