Volanti 4K Displays

RS-232 Commands (DT)

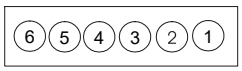
INSTRUCTIONS

The Volanti displays RS-232 commands can be used to monitor and adjust the settings of the display.

RS-232 Serial control (Baud rate 9600, 8 bits, 1 stop bit and no parity)

Physical connection :

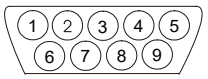
Controller side
Connector interface : CN8
Mating connector : Molex 51021-0600



Mating face of CN8

PIN#	Description
4	RS-232 Tx Data
5	Ground
6	RS-232 Rx Data

Computer side
Connector interface : Serial port
Mating connector : DB9 Female



Mating face of RS-232 DB9 Male

PIN#	Description
2	RS-232 Rx Data
3	RS-232 Tx Data
5	Ground

Remarks:
RS-232 connection cable, 300mm P/N 426171800-3 can be ordered separately.

Software connection:

- The OSD functions can be controlled by RS-232 commands.
- Use a custom-made application; or
- Use a serial control program, like Accessport, Telix; or
- The Microsoft Windows compatible Serial Utility program developed by DigitalView; or
- An AV room controller with RS-232 scripting;
- A microcontroller enabled device for specific functions.

Contact your local support for information.

NOTE: Answerback - commands are echoed

1. Commands to implement switch mount control buttons

Function	Command	Description	Remark
Menu button	0xf7	Menu button pressed	Button equivalent
Select-down button	0xfa	Select-down button pressed	Button equivalent
Select-up button	0xfb	Select-up button pressed	Button equivalent
Right/+ button	0xfc	Right/+ button pressed	Button equivalent
Left/- button	0xfd	Left/- button pressed	Button equivalent

2. Parameter setting - immediate, relative, reset and query

Function	Command	Description	Acknowledge (if enabled)
Volume control - left+right channel	0x80, “a” | “A”, nn | “+” | “-” | “r” | “R” | “?”	Set audio (L+R) volume = value/increment/decrement Reset Query	nn = 0x00~ 0x64 (0~100%) Default: 0x32 (50%)
Volume control - on/off (mute)	0x80, “m” | “M”, “0” | “1” | “r” | “R” | “?”	 Disable audio output. Enable audio output. Reset Query	“0” - audio off (mute). “1” - audio on. (Default)
Black level control	0x81, nn | “+” | “-” | “r” | “R” | “?” “m” “n” “i” , ss, nn “o”, ss,	Set brightness = value/increment/decrement Reset Query Current Source Maximum query Minimum query Set, Source, value Query, Source	nn = 0x00~ 0x64 (0~100%) Default: 0x32 (50%) ss- reference by Input main select(0x98)
Contrast control	0x82, “a” | “A”, nn | “+” | “-” | “r” | “R” | “?” “m” “n” “i ” , ss, nn “o”, ss,	Set all contrast = value/increment/decrement Reset Query Maximum query Minimum query Set, Source, value Query, Source	nn = 0x00~ 0x64 (0~100%) Default: 0x32 (50%) ss- reference by Input main select(0x98)
Saturation control	0x83, nn | “+” | “-” | “r” | “R” | “?” “m” “n”	Set color saturation = value/increment/decrement Reset Query Maximum query Minimum query	nn = 0x00~ 0x64 (0~100%) Default: 0x32 (50%)
Hue control	0x84, nn | “+” | “-” | “r” | “R” | “?” “m” “n”	Set tint = value/increment/decrement Reset Query Maximum query Minimum query	nn = 0x00~ 0x64 (0~100%) Default: 0x32 (50%)
Sharpness	0x8a, n | “+” | “-” | “m”| “n”| “r” | “R” | “?”	Set sharpness = value/increment/decrement Maximum query *1 Minimum query *1 Reset Query	nn = 0x00~ 0x34 ("0"~"4") Default: 0x32 ("2")
Aspect Ratio	0x8c, “0” | “1” | “9” | “A” |”F”	Set graphic image scaling mode = Value	Image expansion on/off. “0” – 1:1. “1” – Full screen. “9” – 4:3

	“r” | “R” | “?”	Reset Query	“A” – 16:9 “F” – 5:4 (Default – “1”)
Set display orientation	0x8e, n | “r” | “R” | “?”	Set display orientation = value Reset Query	 “0” – normal (default) “5” – 180 degree (Default – “0”)
Set OSD Menu Rotate	0x8f, n | “r” | “R” | “?”	Set OSD Menu orientation = value Reset Query	 “0” – normal “1” – 270 degree “2” – 180 degree “3” – 90 degree (Default - “0”)
OSD H position	0x90, nn | “+” | “-” | “r” | “R” | “?”	Set OSD horizontal position = value/increment/decrement Reset Query	nn = 0x00~ 0x64 (left ~ right) Default: 0x32 (middle)
OSD V position	0x91, nn | “+” | “-” | “r” | “R” | “?”	Set OSD vertical position = value/increment/decrement Reset Query	nn = 0x00~ 0x64 (top ~ bottom) Default: 0x32 (middle)
OSD transparency	0x92, nn | “+” | “-” | “r” | “R” | “?”	Set OSD transparency = value/increment/decrement Reset Query	nn = 0x00~ 0x64 (0~100%) Default: 0x00 (No transparency)
OSD menu timeout	0x93, nn | “+” | “-” | “r” | “R” | “?”	Select menu timeout = value/increment/decrement Reset Query	OSD menu timeout value. “ON” – Continuous. value – Round up to nearest available step. if value > max available step, set it to the max available step. “0x30 0x30” -- ON “0x30 0x42” – 11s “ (default) up to “0x33 0x43” – 60s
Input main select	0x98, nn | “+” | “-” | “r” | “R” | “?”	Select input main = HDMI or Display Port available Reset Query	 “0x48,0x31” HDMI "0x50,0x31" Display Port (Default – Display Port)
Auto source seek	0x99, “0” | “1” | “r” | “R” | “?”	Set exclusive or priority = Off/On Reset Query	“0” – Off. “1” – On Default: “1” (On)
GAMMA value select	0x9d, n | “r” | “R” “?”	Select GAMMA value = Value Reset Query	“n”: “5” – 1.8, “7” – 2.0, “2” – 2.2, (Default) “A” – 2.4 “C” – 2.6
Power Save	0x9f, “0” | “1” | “r” | “R” | “?”	Set power save option = On/Off Reset Query	“n”: “0” – Power save off “1” – Power save on (Default)
Hot key 1 (plus and minus keys)	0xa0, “1”, n |	Set Hotkey 1= Value	“1” – Volume “2” – Backlevel (Brightness)

			“3” – Contrast “4” –Saturation “5” – Input source “B” – No function “E” – Aspect “G” – Hue “H” – Backlight Brightness “L” – Sharpness
	“r” | “R” | “?”	Reset Query	(Default – Volume)
Hot key 2 (up and down keys)	0xa0, “2”, n |	Set Hotkey 2 = value	“1” – Volume “2” – Backlevel (Brightness) “3” – Contrast “4” –Saturation “5” – Input source “B” – No function “E” – Aspect “G” – Hue “H” – Backlight Brightness “L” – Sharpness
	“r” | “R” | “?”	Reset Query	(Default – Input)
Runtime counter	0xa1, nnnnn | “r” | “R” | “?”	Set runtime counter value = nnnnn (* 0.5 hour) Reset to zero Query	Runtime = nnnnn. Max. input = 0x1fffe (0x1fffe * 0.5 hour = 65535 hours) Runtime counter counts when backlight is on
Colour temperature select	0xb3, n	Select colour temperature = value	“2” – 6500K. (Default) “4” – USER. “5” – 9300K “6” – 7500K “7” – 5800K. “8” - sRGB
	“r” | “R” | “?”	Reset Query	(Default – 6500K)
	“i” , ss, n “o”, ss,	Set, Source, value Query, Source	ss - reference by Input main select(0x98).
Red level of User colour temperature	0xb4, nn | “+” | “-” | “r” | “R” | “?” “m” “n”	Set the level of the red channel for the user colour temp. = value/increment/decrement Reset Query Maximum query Minimum query	nn: 0x00~ 0xff (0~255) Default: 0x80
	“i” , ss, c, nn “o”, ss, c,	Set, Source, Temperature Group, value Query, Source	c – reference by Color Temperature ss - reference by Input main select(0x98).
Green level of User colour temperature	0xb5, nn | “+” | “-” | “r” | “R” | “?” “m” “n”	Set the level of the green channel for the user colour temp. = value/increment/decrement Reset Query Maximum query Minimum query	nn: 0x00~ 0xff (0~255) Default: 0x80

	“i” , ss, c, nn “o”, ss, c	Set, Source, Temperature Group, value Query, Source	c – reference by Color Temperature ss - reference by Input main select(0x98).
Blue level of User colour temperature	0xb6, nn | “+” | “-” | “r” | “R” | “?” “m” “n” “i” , ss, c, nn “o”, ss, c	Set the level of the blue channel for the user colour temp. = value/increment/decrement Reset Query Maximum query Minimum query Set, Source, Temperature Group, value *1 Query, Source *1	nn: 0x00~ 0xff (0~255) Default: 0x80 c – reference by Color Temperature ss - reference by Input main select(0x98).
Video horizontal resolution enquiry	0xb7	Horizontal resolution (in pixels) in 3 to 4 digit hex number	“nnn” = horizontal resolution
Video vertical resolution enquiry	0xb8	Vertical resolution (in lines) in 3 digit hex number	“nnn” = vertical resolution
Video horizontal sync frequency	0xb9	Horizontal sync frequency (in units of 100Hz) in 3 digit hex number	“nnn” = horizontal frequency
Video vertical sync frequency	0xba	Vertical sync frequency (in units of Hz) in 3 digit hex number and 1 char	“nnnc” = vertical frequency nnn = 3 digit hex c= “i” (interlace) or “p” (progressive)
OSD status enquiry	0xbb	Status of OSD	“0” – OSD turned off “1” – OSD turned on
OSD turn off	0xbd	Turn off the OSD.	“0” – fail. “1” – successful.
Backlight control	0xe0, nn | “+” | “-” | “R” | “r” | “?”	Set Backlight level = value/increment/decrement Reset Query	nn = 0x00~ 0x64 (0~100%) Default: 0x64 (100%)
Backlight On/Off	0xe1, “0” | “1” | “R” | “r” “?”	 Backlight Off / Backlight On Reset Query	“0” – Backlight Off “1” – Backlight On. (Default) “?”–Query Backlight On/Off
Backlight DA/PWM	0xe5 “0” | “1” | “R” | “r” “?”	Set backlight control method: PWM / DA Reset Query	“0” – PWM (Default) “1” – D/A
Backlight PWM frequency	0xe6, nnn | “+” | “-” | “R” | “r” | “?”	Set backlight PWM frequency = value/increase 20Hz/decrease 20Hz Reset Query	Value 100Hz : “0”,”6”,”4” 120Hz : “0”,”7”,”8” 140Hz : “0”,”8”,”C” 160Hz : “0”,”A”,”0” (Default) 180Hz : “0”,”B”,”4”’ 200Hz : “0”,”C”,”8” 220Hz : “0”,”D”,”C” 240Hz : “0”,”F”,”0” 260Hz : “1”,”0”,”4” 280Hz : “1”,”1”,”8” 300Hz : “1”,”2”,”C” 320Hz : “1”,”4”,”0” 340Hz : “1”,”5”,”4” 360Hz : “1”,”6”,”8” 380Hz : “1”,”7”,”C” 400Hz : “1”,”9”,”0” 420Hz : “1”,”A”,”4” 440Hz : “1”,”B”,”8”
Backlight Invert	0xe7	Set invert backlight level :	“0” – Off (Default)

	“0” | “1” | “R” | “r” “?”	Off / On Reset Query	“1” – On
Minimum backlight level	0xee, “0x5C” nn | “+” | “-” | “R” | “r” | “?”	Set minimum backlight level= value/increment/decrement Reset Query	Minimum Backlight value. nn: 0x00 ~ 0x32 (0~50%) Default: “0””5” (5%)
OSD switch mount Lock	“0xee”, “0x62” “0” |”1” ”?”	 Unlock / Lock Query	“0”- Unlock (Default) “1”- Lock, no response to OSD switch mount keys
Default Power	“0xee”, “0x6B”, “0x50” “0”| “1”| “?”	Default power state after supplying power to controller Off On Query	 “0” - default power off “1” - default power on
Query Light Sensor value	0xee,0x70,0x50, 0x35 0x33,0x3F	Query value	e.g. 1735.7–> 0x36 0x43 0x37 0x2E 0x37)
Query on board temperature sensor value	0xee,0x70,0x50, 0x3B 0x34,0x3F	Query value	e.g. +25.5 –> 0x2B 0x30 0x31 0x39 0x2E 0x35)
Panel timing setting	"0xee", "0x74", 0x30, nnn | 0x31, nnn | 0x32, nnn | 0x33, n | 0x34, n | 0x35, n | 0x36, nnnn | 0x37, nnnn | 0x38, nnnn | 0x39, nnnn | 0x3A, nnnn | 0x3B, nnnn | 0x3C, nnnn | 0x3D, nnnn | 0x3E, nnnn | 0x3F, nnnn | 0x40, nn | 0x41, nn | 0x42, nnn | 0x43, nnn | 0x44, nnn| 0x45, nnnn | 0x46, nnnn | 0x47, nnnn | 0x48, nnnn | 0x49, nnnn | 0x4A, nnnn | 0x4B	Panel timing setting 0x30= typical frame rate 0x31= max frame rate 0x32= min frame rate 0x33= panel style 0x34= eDP phy rate 0x35=LVDS/Vx1 output ports 0x36=Hsync back porch 0x37=Display horizontal width 0x38=Vertical total typical 0x39=Vertical total max 0x3A=Vertical total min 0x3B=Vsync back porch 0x3C=Display vertical height 0x3D=Horizontal total typical 0x3E=Horizontal total max 0x3F=Horizontal total min 0x40=Hsync width 0x41=Vsync height 0x42 = Pixel clock typical 0x43 = Pixel clock max 0x44 = Pixel clock min 0x45 = Panel power on time T1 0x46 = Panel power on time T2 0x47 = Panel power on time T3 0x48 = Panel power off time T4 0x49= Panel power off time T5 0x4A = Panel power off time T6 Read all panel timing checksum	Set panel timing to SRAM of DT-4096. If cmd 2nd parameter is n = 0x3F, it dumps the values of SRAM Please note “n” is BCD decimal value in ASCII. e.g. 610 is set as 0x36 0x31 0x30 4=Vx1, 5=eDP1.2 0=RBR, 1=HBR, 2=HBR2 0=1ports,1=2ports,2=4ports,3=8ports (default) in MHz in MHz in MHz in ms in ms in ms in ms in ms in ms checksum, which is found by adding values of parameter 0x30 to 0x4A

	0x4C	Read all panel timing parameter	Read all parameters from SRAM and dump each timing starting with 0xEE 0x74 0xYY nnnn to facilitate saving dump data to file for send back to DT-4096 later
	0x4D, n |	0x4D Output Display Bit Mode	1-8bit, 2-10bit
	0x4E, n |	0x4E Panel Display Division	1 - 1 division (no division) 2 - 2 division 4 - 4 division 8 - 8 division
	0x57	Write all panel timing parameters from SRAM into EEPROM	"1": Success "0": Fail
User EDID	"0xee", "0x76", "nn",	Command Select Port	"nn" = "0x50, 0x31": DP "0x48,0x31" : HDMI
EDID Block map for blocks 0 – 128	"S" |"s" "n,n+1....(256 BYTE) "	Send 128 BYTE EDID in ASCII Code Format (256BYTE)	return "1" Success return "0" Fail
EDID Block map for blocks 129 – 254 if more than 128 blocks used	"E" |"e" "n,n+1....(256 BYTE) "	Send 128 BYTE EDID in ASCII Code Format (256BYTE)	return "1" Success return "0" Fail
Reset	"R" | "r"	Reset to use pre-defined EDID instead of user EDID of selected port	return "1" Success return "0" Fail
Light Sensor Setting	0xee,0x78	Light Sensor Settings	
	"0x30", "n" |	0x30 = Light Sensor Mode	n = "0x30": Disable, "0x31": Enable,
	"0x31", "nnn" |	0x31 = Level 1 value	nnn = 0 ~ 1800 : 0x30,0x30,0x30
	"0x32", "nnn" |	0x32 = Level 2 value	~ 0x37,0x30,0x38
	"0x33", "nnn" |	0x33 = Level 3 value	
	"0x34", "nnn" |	0x34 = Level 4 value	
	"0x35", "nnn" |	0x35 = Level 5 value	
	"0x36", "nnn" |	0x36 = Level 6 value	
	"0x37", "nnn" |	0x37 = Level 7 value	
	"0x38", "nnn" |	0x38 = Level 8 value	
	"0x39", "nnn" |	0x39 = Level 9 value	
	"0x3A", "nnn" |	0x3A = Level 10 value	
	"0x3B", "nnn" |	0x3B = Level 11 value	
	"0x3C", "nnn" |	0x3C = Level 12 value	
	"0x3D", "nnn" |	0x3D = Backlight 1 value	nnn = 0 ~ 100 : 0x30,0x30,0x30 ~ 0x30,0x36,0x34
	"0x3E", "nnn" |	0x3E = Backlight 2 value	Or
	"0x3F", "nnn"|	0x3F = Backlight 3 value	nnn = 0 ~ 255: 0x30,0x30,0x30
	"0x40", "nnn" |	0x40 = Backlight 4 value	~ 0x30,0x46,0x46
	"0x41", "nnn" |	0x41 = Backlight 5 value	nnn = OFF: 0x45,0x45,0x45
	"0x42", "nnn" |	0x42 = Backlight 6 value	
	"0x43", "nnn" |	0x43 = Backlight 7 value	

	“0x44”, “nnn” | “0x45”, “nnn” | “0x46”, “nnn” | “0x47”, “nnn” | “0x48”, “nnn” |	0x44 = Backlight 8 value 0x45 = Backlight 9 value 0x46 = Backlight 10 value 0x47 = Backlight 11 value 0x48 = Backlight 12 value	
	0x3F”|	Query	“0x31”: Success “0x30”: Fail
	“0x57”|**	Write all light sensor parameters from SRAM into EEPROM	

3. Other control

Function	Command	Description	Acknowledge (if enabled)
Select RS-232 acknowledge	0xc1, “0” | “1”	Disable/enable command acknowledge.	“0” – acknowledge disabled. “1” – acknowledge enabled. (Default)
Command availability	0xc4, nn / nnnn	Check whether a command is available.	“0” – not available. “1” – available. e.g “0x81” command send “0xc4 0x38 0x31” feedback “0xc4 0x38 0x31 0x31”
Power On/Off	0xc8, “0” | “1” | “?”	Soft power on/off off/on query	“0” – soft power off. “1” – soft power on.
Query video input status	0xc9	Query the status of the displaying video windows source	Input status nn nn: “0”,”0” : Invalid / No video source “H,”1” : HDMI “P,”1” : DP
Query BIOS version	0xcb, “0”	Read BIOS version	BIOS version “VV.YY.ZZ” VV = Vx or Ex, (x is version digit) V = Release version E = Engineering Sample YY= Version Number ZZ= Customer Number
Query PCBA number	0xcb, “1”	Read PCBA number	“nnnnn” = PCBA number DT-4096= “41782”
Query Revision Number	0xcb, “3”	Read Revision Number	“nn” = Revision number AA in firmware version no. “VV.YY.ZZ.AA”
Test Pattern	0xcd, “0” “1”|“2”|“3”|“4”|“5”|“6”| ”7”|”8”	 Off Pattern: Red|Green|Blue|White|Black|ColorBar|SMPTEColor Bar|8 Bit GreyBar	n: action value
Reset parameters	0xce	Reset all parameters to default value	“1” – successful.
Reset all parameters	0xcf	Reset all parameters, including user color temperature setting, for all video modes to default value	“1” - successful.
CopyRight	0xf8, "C" |	Command Read CopyRight	 return "DIGITALVIEW LTD."

n = 1-byte ascii-coded hex number, e.g., parameter value of 0x1 is represented by “1” (0x31).
mn or nn = 2-byte ascii-coded hex number, e.g., parameter value of 0x1e is represented by “1”, “e” | “E” (0x31, 0x6e|0x4e).

The RS-232 command strings sent in one time can support up to 380 bytes via CN8 port
The RS-232 command string sent in one time can support up to 50 bytes via J1 port.

n = 1-byte ascii-coded hex number, e.g., parameter value of 0x1 is represented by “1” (0x31).
mn or nn = 2-byte ascii-coded hex number, e.g., parameter value of 0x1e is represented by “1”, “e” | “E” (0x31, 0x6e|0x4e).

Please refer to the ASCII to Hex convert table below.

Hex to ASCII conversion table

Hex	ASCII	Hex	ASCII	Hex	ASCII	Hex	ASCII
0x30	0	0x41	A	0x61	a	0x2B	+
0x31	1	0x42	B	0x62	b	0x2D	-
0x32	2	0x43	C	0x63	c	0x3F	?
0x33	3	0x44	D	0x64	d		
0x34	4	0x45	E	0x65	e		
0x35	5	0x46	F	0x66	f		
0x36	6	0x47	G	0x67	g		
0x37	7	0x48	H	0x68	h		
0x38	8	0x49	I	0x69	i		
0x39	9	0x4A	J	0x6A	j		
		0x4B	K	0x6B	k		
		0x4C	L	0x6C	l		
		0x4D	M	0x6D	m		
		0x4E	N	0x6E	n		
		0x4F	O	0x6F	o		
		0x50	P	0x70	p		
		0x51	Q	0x71	q		
		0x52	R	0x72	r		
		0x53	S	0x73	s		
		0x54	T	0x74	t		
		0x55	U	0x75	u		
		0x56	V	0x76	v		
		0x57	W	0x77	w		
		0x58	X	0x78	x		
		0x59	Y	0x79	y		
		0x5A	Z	0x7A	z		

DDC/CI support at HDMI & Display port

This controller supports the following DDC/CI functions at HDMI & Display port :

- Brightness (Backlight brightness)
- Contrast
- Color Temperature (6500K/7500K/9300K/sRGB/User)
- Sharpness
- Input Source (HDMI & Displayport)
- Power mode (Power on/off)
- Restore factory defaults (exclude user color temperature, brightness)
- Volume