



MICO60C

DLP™ and Eco-friendly LED
projector series

CONTROL SPECIFICATIONS

Light Communication Protocol

Document Revision 1.0 (22 Nov 2010)



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Revision History

Revision	Date	Software Version	Description of Change
1.0	03 November 2010	1.7 or higher	Initial version.

1 Introduction

This document describes how to use the light communication protocol to control SIM2 projectors remotely. When the projects are connected to either RS232, WIFI or LAN you can control the projectors through this ASCII based protocol. All commands must end with a carriage return [CR] (ASCII hex 0D; “\n”) or vertical pipe (ASCII hex 7C; “|”) to signify that the projector can now read and execute the command. Command are case-sensitive.

This protocol supports two types of commands: key commands and parameters commands. Key commands mimic pressing a button on the remote control. Parameters commands tell the projector to write or read a value to a specific internal parameter. For this it is necessary to specify the parameter name, its value and which operation type to perform. For the key command it is necessary to specify only the action name.

Any command sent to the projector have, by default, a response from it, but it is possible to modify this propriety with a No-acknowledge label.

Any request to the projector start with the character “#”, and any response from it start with the character “\$”.

2 Protocol Specifications

The **request packet** is made up to 6 parts

1	2	3	4	5	6
Start Character	Target Address (optional)	Optional Flags	Parameter or Key name	Operation Type and/or Value	Termination character [TC]: Carriage Return or vertical pipe
#					[CR] or

Each part starts with the underscore character “_” plus a specification character, in lower case:

_t	Target Address (projector ID)
_o	Optional Flag
_p	Parameter Command
_k	Key Command
_d	Data: operation type or value

Example 1

Set brightness to 50.

The command to send is #_pBRIGHT_d50[CR]

Using a string way: “#_pBRIGHT_d50\n”

Example 2

If you have 2 projectors connected to your controller, one with ID=1 and the other with ID=2, and you want to change the brightness value to 75, in the projector with ID=1, you may send this command:

#_t01_pBRIGHT_d75[CR], or using a string way: “#_t01_pBRIGHT_d75\n”

The **response packet** is made of up to 5 parts

1	2	3	4	5
Start Character	Target Address (optional)	Parameter or Key name	Value or Error ID	Carriage Return
\$				[CR]

As the request packet, each part starts with the underscore character “_” plus a specification one. In the response packet could be present an error indication to specify a problem occurs performing the operation requested. In this case after the parameter or key names it could be present the characters “_e” following by a number. The number specify the error type.

Example 1

Set brightness to 50.

The command to send is #_pBRIGHT_d50[CR]

Using a string way: “#_pBRIGHT_d50\n”

The response from the projector is \$_pBRIGHT_d50[CR], or using a string way: “\$_pBRIGHT_d50\n”

Example 2

If you have 2 projectors connected to your controller, one with ID=1 and the other with ID=2, and you want to change the brightness value to 75, in the projector with ID=1, you may send this command:

#_t01_pBRIGHT_d75[CR], or using a string way: “#_t01_pBRIGHT_d75\n”

With this command only the projector with ID=1 performs it and responses. The response is \$_t01_pBRIGHT_d75[CR], or using a string way: “\$_t01_pBRIGHT_d75\n”

2.1 Request Packet: PC → Projector

Parameter Command #_tID_oOPTIONS_pPARAM_dDATA[TC]

Key Command #_tID_oOPTIONS_kKEY[TC]

2.2 Response Packet: Projector → PC

If requested command was successful

Parameter Command \$_tID_pPARAM_dDATA[CR]

Key Command \$_tID_kKEY[CR]

Otherwise (error occurs)

Parameter Command \$_tID_pPARAM_eERR[CR]

Key Command \$_tID_kKEY_eERR[CR]

2.3 Request Packet fields

#	All commands, sent from PC to projector, start with '#' character																																																		
_t	Target projector identifier, this is a number from 01 to 99. This is an optional part, if it is not defined in the packet to send, any projector processes the received command. This is exact the same as you send a broadcast command.																																																		
_o	Optional flags part. In this field it is possible to specify some command proprieties. If it is necessary to set more than one option it is possible to insert more than one option label with its propriety parameter. At this moment there is only one Optional parameter: "NOACK". <ul style="list-style-type: none"> NOACK: no acknowledge; if the projector receives this parameter it performs the request command but does not send the relative response. This flags could be useful when you send a broadcast command, and you do not want to receive multiple response : one from any projector connected to your application. 																																																		
_p	Parameter command; this field indicates on which projector parameter the command will be applied. For example, if you want to change the brightness value you will write _pBRIGHT.																																																		
_d	<p>According to the command parameter, it is necessary to specify the operation to perform and/or its value. This data field can be:</p> <ul style="list-style-type: none"> ?VAL: get the parameter value from the projector ?MAX: get the minimum parameter value ?MIN: get the maximal parameter value ?DEF: get the default parameter value ?INC: get the minimum incremental value nnnn: a decimal number setting the parameter value in the command. The numbers with sign have this representation: _d-125 , with the minus character before its absolute number. MIN: set the parameter value to minimum MAX: set the parameter value to maximum DEF: set the parameter value to default value <p>Parameters type:</p> <ul style="list-style-type: none"> INFO: they give information , but do not apply any value. ENUM or STRING: they have a discrete number of possible values. POTENTIOMETER: they have a range of possible values. <p>Permissions</p> <table border="1"> <thead> <tr> <th>Parameters Type</th> <th colspan="9">Possible operations</th> </tr> <tr> <th></th> <th>?VAL</th> <th>?MAX</th> <th>?MIN</th> <th>?DEF</th> <th>?INC</th> <th>nnnn</th> <th>MIN</th> <th>MAX</th> <th>DEF</th> </tr> </thead> <tbody> <tr> <td>INFO</td> <td>X</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>ENUM or STRING</td> <td>X</td> <td></td> <td></td> <td></td> <td></td> <td>X</td> <td></td> <td></td> <td></td> </tr> <tr> <td>POTENTIOMETER</td> <td>X</td> <td>X</td> <td>X</td> <td>X</td> <td>X</td> <td>X</td> <td>x</td> <td>X</td> <td>X</td> </tr> </tbody> </table>	Parameters Type	Possible operations										?VAL	?MAX	?MIN	?DEF	?INC	nnnn	MIN	MAX	DEF	INFO	X									ENUM or STRING	X					X				POTENTIOMETER	X	X	X	X	X	X	x	X	X
Parameters Type	Possible operations																																																		
	?VAL	?MAX	?MIN	?DEF	?INC	nnnn	MIN	MAX	DEF																																										
INFO	X																																																		
ENUM or STRING	X					X																																													
POTENTIOMETER	X	X	X	X	X	X	x	X	X																																										
_k	Key commands mimic pressing a button on the remote control. The key command does not have the "_d" label.																																																		
[TC]	All commands must end with a carriage return (ASCII hex 0D; "\n") or vertical pipe (ASCII hex 7C; " ") to signify that projector can now read and execute the command.																																																		

2.4 Request Packet Examples

BRIGHTNESS parameter (BRIGHT) is a potentiometer type. It has a possible range values from 0 to 100, with a default value to 50.

- Set brightness=75, to projector ID=1:
#_t01_pBRIGHT_d75[CR]
- Get Brightness value, from projector ID=3:
#_t03_pBRIGHT_d?VAL[CR]
- Set brightness=75:
#_pBRIGHT_d75[CR]
In this case any projector receive the command, perform it, and send back it response.
- Set brightness=75, but I do not want to receive any response:
Tx: **#_oNOACK_pBRIGHT_d75[CR]**
Rx: **no response**
- Get the maximum value of Brightness:
#_pBRIGHT_d?MAX[CR]
- Get the minimum value of Brightness:
#_pBRIGHT_d?MIN[CR]
- Get the default value of Brightness:
#_pBRIGHT_d?DEF[CR]
- Get the minimum increment value of Brightness:
#_pBRIGHT_d?INC[CR]
- Set the maximum value of Brightness:
#_pBRIGHT_dMAX[CR]
After this command the brightness value will be 100.
- Set the minimum value of Brightness:
#_pBRIGHT_d?MIN[CR]
After this command the brightness value will be 0.
- Set the default value of Brightness:
#_pBRIGHT_d?DEF[CR]
After this command the brightness value will be 50.

SOURCE parameter is an enum type. It has a discrete number of possible values:

1. COMP = Component
2. SVID = Svideo
3. YPRPB
4. GRGB = Graphic RGB
5. HDMI1
6. HDMI2
7. SCART

- Set Source to HDMI1 to projector ID=1:

#_t01_pSOURCE_dHDMI1[CR]

- Get Source value, from projector ID=3:

#_t03_pSOURCE_d?VAL[CR]

- Set Source to HDMI1:

T #_pSOURCE_dHDMI1[CR]

In this case any projector receive the command, perform it, and send back it response.

- Get Source:

#_pSOURCE_d?VAL[CR]

In this case any projector receive the command send back it response.

- Set Source to HDMI1, but I do not want to receive any response:

Tx: #_oNOACK_pSOURCE_dHDMI1[CR]

Rx: no response

INFO1 parameter gives back a response with some information:

1. Projector ID
2. Working State
3. Signal State
4. Source
5. Active Memory
6. Aspect

- Get INFO1 info from projector ID=1:

#_t01_pINFO1_d?VAL[CR]

- Get INFO1 info:

#_pINFO1_d?VAL [CR]

In this case any projector receive the command send back it response.

2.5 Response Packet fields

\$	All response, sent from projector, after a requested command, start with '\$' character.
_t, _p, _d, _k	They have the same meaning like the request packet, except the label "_d", which report only the value about the relative parameter.
_e	Error code
[CR]	All returned packet ended with a carriage return (ASCII hex 0D; '\n') .

The projector always answers after a command except when the option _oNOACK is present.

2.6 Response Packet Examples

- Set brightness=75 (projector ID=1):
Tx: #_t01_pBRIGHT_d75[CR]
Rx: \$_t01_pBRIGHT_d75[CR]
- Get Brightness value, from projector ID=3:
Tx: #_t03_pBRIGHT_d?VAL[CR]
Rx: \$_t03_pBRIGHT_d75 [CR]
- Set brightness=75:
Tx: #_pBRIGHT_d75[CR]
Rx: \$_pBRIGHT_d75[CR]
- Set brightness=75:
Tx: #_oNOACK_pBRIGHT_d75[CR]
Rx: **no response**
- Get Brightness value, but there is no signal displayed to the projector:
Tx: #_pBRIGHT_d?VAL [CR]
Rx: \$_pBRIGHT_e10 [CR]
e10 = Error with ID =10

3 Error Condition

When a received command is not understood, or it is not valid or its execution makes an internal error from the projector, the response may include an error message. This message have an identifier error code, a decimal number, to indicate a specific error type.

The error message starts with the label “_e”: it will be present after the parameter or key name. See the example below:

Get Brightness, but there is no signal displayed:

Tx: #_pBRIGHT_d?VAL [CR]

Rx: \$_pBRIGHT_e10 [CR]

When the projector does not display any image, because there is no signal from a selected input, any parameters bind to this source have an invalid value in this state. This parameter is not available without signal in the projector.

3.1 Error Type Table

Error ID	Description
9	This parameter does not produce a response
10	Invalid parameter. Typical in no signal state
11	Invalid Operation Type
12	Unsupported Command
13	Value out of range
14 or 59	Parameter not available
15	Generic Syntax Error
16	Syntax Error: character ‘#’ not present in request packet
17	Syntax Error: termination character not present in request packet
18 or 54	Syntax Error: target ID not valid
19	Syntax Error: Optional field not valid
20	Syntax Error: characters “_d” present without a relative “_p” characters
21	Syntax Error: remote control mimic command not valid
22	Syntax Error: characters “_p” present without a relative “_d” characters
23	Memory number not found or invalid
24	STRING parameter type without initial or final character “”
57	Parameter execution timeout
58	Request or response packet to/from video board too long (more than 512 byte)
60	Parameter execution produces an internal error

4 Multiple request/response Packet

It is possible to send at the same time more than one command to the projector. This will be useful when it is necessary to send a list of consecutive commands to perform a specific action or state to the projector, or when it is necessary to read more than one parameter at the same time. To perform the multiple packet you must link together any single command with a character “,” (comma). The multiple request/response packet are available only for parameters command. For the key commands it is possible to send only one at the same time.

4.1 Request Packet: PC → Projector

Parameter Command

#_tID_oOPTIONS_pPARAM₁_dDATA₁,_pPARAM₂_dDATA₂, ...,_pPARAM_n_dDATA_n [CR]

Key Command

Not available

4.2 Response Packet: Projector → PC

If requested command was successful

Parameter Command

\$_tID_pPARAM₁_dDATA₁,_pPARAM₂_dDATA₂, ...,_pPARAM_n_dDATA_n [CR]

Otherwise (error occurs in the parameter “i”)

\$_tID_pPARAM₁_dDATA₁,...,_pPARAM_i_eERR_i,...,_pPARAM_n_dDATA_n [CR]

4.3 Examples

- Set brightness=75 and contrast=40 :
Tx: #_pBRIGHT_d75,_pCONTR_d40 [CR]
Rx: \$_pBRIGHT_d75,_pCONTR_d40 [CR]
- Get Brightness and contrast values:
Tx: #_pBRIGHT_d?VAL,_pCONTR_d?VAL [CR]
Rx: \$_pBRIGHT_d75,_pCONTR_d40 [CR]
- Select HDMI source and brightness=105:
Tx: #_pSOURCE_dHDMI1,_pBRIGHT_d105 [CR]
Rx: \$_pSOURCE_dHDMI1,_pBRIGHT_e10 [CR]

5 Key Commands

Parameter Name	Description
KEY00	
KEY01	
KEY02	
KEY03	
KEY04	
KEY05	
KEY06	
KEY07	
KEY08	
KEY09	
KEYCURU	Cursor Up
KEYCURL	Cursor Left
KEYCURR	Cursor Right
KEYCURD	Cursor Down
KEYMENL	Menu Left
KEYMENR	Menu Right
KEYESC	Esc
KEYSEL	Select
KEYFRZ	Freeze
KEYMEM	Memory
KEYF1	F1
KEYF2	F2
KEYAUTO	Auto
KEYASP	Aspect
KEYVCR	VCR
KEYPOFF	Power Off
KEYBLK	Blank
KEYINFO	Info

5.1 Example

Send the MENU LEFT key

#_kKEYMENL[CR]

Response packet:

- if command successful
- otherwise

\$_kKEYMENL[CR]

\$_kKEYMENL_eERR [CR]

6 Reserved characters

The request packet and the relative response have some reserved characters that will must not used for other reasons.

Reserved character	Description
'#'	Hash: starter request packet
'\$'	Dollar: starter response packet
'\n' or ' '	Carriage return or pipe: termination
'_'	Underscore: used to specify the parameter, remote key and parameter data: "_k", "_p", "_d"
','	Comma: used to separate multiple request or response packet
'?'	Question: used to give the parameter value
''''	Double apex: used

7 Parameter Commands

Parameter Name	Operation Types	Description	Value	Details	Examples
SOURCE	ENUM	Source Selection	COMP SVID YPRPB GRGB HDMI1 HDMI2 SCART	COMP = Component SVID = Svideo GRGB = Graphic RGB	Tx: #_pSOURCE_dHDMI1[CR] Rx: \$_pSOURCE_dHDMI1[CR]
BRIGHT	POT. ⁽¹⁾	Brightness	MAX = 100 DEF = 50 MIN = 0	No work in no-signal or testpattern	Tx: #_pBRIGHT_d50[CR] Rx: \$_pBRIGHT_d50[CR] Tx: #_pBRIGHT_dMAX[CR] Rx: \$_pBRIGHT_d100[CR] Tx: #_pBRIGHT_dMIN[CR] Rx: \$_pBRIGHT_d0[CR] Tx: #_pBRIGHT_dDEF[CR] Rx: \$_pBRIGHT_d50[CR] Tx: #_pBRIGHT_d?VAL[CR] Rx: \$_pBRIGHT_d50[CR] Tx: #_pBRIGHT_d?MAX[CR] Rx: \$_pBRIGHT_d100[CR]

(1) POT. = POTENTIOMETER

Parameter Name	Operation Types	Description	Value	Details	Examples
					Tx: #_pBRIGHT_d?MIN[CR] Rx: \$_pBRIGHT_d0[CR] Tx: #_pBRIGHT_d?DEF[CR] Rx: \$_pBRIGHT_d50[CR]
CONTR	POT.	Contrast	MAX = 100 DEF = 50 MIN = 0	No work in no-signal or testpattern	Tx: #_pCONTR_d65[CR] Rx: \$_pCONTR_d65[CR] Tx: #_pCONTR_d?VAL[CR] Rx: \$_pCONTR_d65[CR] Same examples as BRIGHT for MAX, MIN and DEF
GAMMA	ENUM		1.0 1.5 1.8 2.0 2.2 2.35 2.5 2.8 USER	No work in no-signal or testpattern	Tx: #_pGAMMA_d2.0[CR] Rx: \$_pGAMMA_d2.0[CR] Tx: #_pGAMMA_d?VAL[CR] Rx: \$_pGAMMA_d2.0[CR]
CINMODE	ENUM	Cinema Mode	AUTO VIDEO FILM		Tx: #_pCINMD_dVIDEO[CR] Rx: \$_pCINMD_dVIDEO[CR] Tx: #_pCINMD_d?VAL[CR] Rx: \$_pCINMD_dVIDEO[CR]

Parameter Name	Operation Types	Description	Value	Details	Examples
PRIMCOL	ENUM	Primaries Colors	NATIVE HDTV EBU SMPTEC AUTO USER1 USER2 USER3	No work in no-signal or testpattern	Tx: #_pPRIMCOL_dHDTV[CR] Rx: \$_pPRIMCOL_dHDTV[CR] Tx: #_pPRIMCOL_d?VAL[CR] Rx: \$_pPRIMCOL_dHDTV[CR]
WHITE	ENUM	White Point	HIGH MED LOW NATIVE D75 D65 USER	No work in no-signal or testpattern	Tx: #_pWHITE_dD75[CR] Rx: \$_pWHITE_dD75[CR] Tx: #_pWHITE_d?VAL[CR] Rx: \$_pWHITE_dD75[CR]
DYNBLK	ENUM	Dynamic Black	OFF VIDEO SPORT MOVIE		Tx: #_pDYNBLK_dSPORT[CR] Rx: \$_pDYNBLK_dSPORT[CR] Tx: #_pDYNBLK_d?VAL[CR] Rx: \$_pDYNBLK_dSPORT[CR]

Parameter Name	Operation Types	Description	Value	Details	Examples
UWX	POT.	User White X	MAX = 550 DEF = 300 MIN = 150	No work in no-signal or testpattern	Tx: #_pUWX_d270[CR] Rx: \$_pUWX_d270[CR] Tx: #_pUWX_d?VAL[CR] Rx: \$_pUWX_d270[CR] Same examples as BRIGHT for MAX, MIN and DEF
UWY	POT.	User White Y	MAX = 500 DEF = 300 MIN = 200	No work in no-signal or testpattern	Tx: #_pUWY_d270 [CR] Rx: \$_pUWY_d270 [CR] Tx: #_pUWY_d?VAL[CR] Rx: \$_pUWY_d270[CR] Same examples as BRIGHT for MAX, MIN and DEF
LENSF_X	POT.	Lens Focus In place of <u>X</u> character there is one character like this: R = Right L = Left	MAX = 10 DEF = 1 MIN = 1	It is not possible to read the value	Tx: #_pLENSFR_d7[CR] Rx: \$_pLENSFR_d7[CR] Tx: #_pLENSFR_d?VAL [CR] Rx: \$_pLENSFR_e11[CR] Same examples for the Right.

Parameter Name	Operation Types	Description	Value	Details	Examples
LENSZ_X	POT.	Lens Zoom In place of <u>X</u> character there is one character like this: I = IN O = OUT	MAX = 10 DEF = 1 MIN = 1	It is not possible to read the value	Tx: #_pLENSZI_d4[CR] Rx: \$_pLENSZI_d4[CR] Tx: #_pLENSZI_d?VAL[CR] Rx: \$_pLENSZI_e11[CR] Tx: #_pLENSZO_d5[CR] Rx: \$_pLENSZO_d5[CR] Tx: #_pLENSZO_d?VAL[CR] Rx: \$_pLENSZO_e11[CR]
LENSH_X	POT.	Lens Shift In place of <u>X</u> char. there is one character like this: U: Up D: Down L: Left R: Right	MAX = 10 DEF = 1 MIN = 1	It is not possible to read the value	Tx: #_pLENSHU_d4[CR] Rx: \$_pLENSHU_d4[CR] Tx: #_pLENSHU_d?VAL[CR] Rx: \$_pLENSHU_e11[CR] Same examples for Down, Left and Right
ASPECT	ENUM		NOR ANM LET PAN P2P UR1 UR2 UR3	NOR = Normal ANM = Anamorphic LET = Letterbox PAN = Panoramic P2P = Pixel to Pixel UR1 = User 1 UR2 = User 2 UR3 = User 3	Tx: #_pASPECT_dANM[CR] Rx: \$_pASPECT_dANM[CR] Tx: #_pASPECT_d?VAL[CR] Rx: \$_pASPECT_dANM[CR]

Parameter Name	Operation Types	Description	Value	Details	Examples
ASP_{xx}	ENUM	<p>Aspect Settings</p> <p>In place of <u>xx</u> characters there are 2 characters: NO = Normal AN = Anamorphic LT = Letterbox PA = Panoramic PP = Pixel to Pixel</p>	<p>SCR_y in place of <u>y</u> character there is: 0 = OFF 1 = ON</p>	<p>Possible values: SCR_y : SCR0 or SCR1</p>	<p>Tx: #_pASPLT_dSCR0[CR] Rx: \$_pASPLT_dSCR0[CR]</p> <p>Tx: #_pASPLT_d?VAL[CR] Rx: \$_pASPLT_dSCR0[CR]</p>
ASPU_x		<p>User Aspect Settings</p> <p>In place of <u>x</u> character there is a number: 1 = User 1 2 = User 2 3 = User 3</p> <p>In place of <u>vh</u> characters there is a value of one character like this: H = Horizontal V = Vertical</p>	<p>SCR_yH_hV_v</p> <p><u>y</u>: same as ASP_{xx}</p> <p><u>h</u>: user aspect horizontal value</p> <p><u>v</u>: user aspect vertical value</p>	<p>The horizontal and vertical values range will be indicated with the commands ASPU12RGE and ASPU3RGE</p> <p>View also Limitations Table.</p>	<p>Set Aspect User 1 with: Screen = ON Horiz = -7 Vert = 5</p> <p>Tx: #_pASPU1_dSCR1H-7V5[CR] Rx: \$_pASPU1_dSCR1H-7V5[CR]</p> <p>Tx: #_pASPU1_d?VAL[CR] Rx: \$_pASPU1_dSCR1H-7V5 CR]</p>

Parameter Name	Operati on Types	Description	Value	Details	Examples
ASPAVAIL	INFO	Get the available Aspect ratio.	LT\underline{x}PA\underline{y}PP\underline{z} where \underline{x} , \underline{y} and \underline{z} could have the value 1 or 0: 0 = not avail 1 = avail	For specific resolutions some aspect ratios are not available. Example: in 1920x1080p@24Hz Panoramic ratio is not supported. This is a read only parameter. View also Limitations Table.	Signal = 1600x1200@60Hz Tx: #_pASPAVAIL_d?VAL[CR] Rx: \$_pASPAVAIL_dLTOPA1PP0[CR]
ASPU12RGE	INFO	Get user 1 or 2 aspect ratio values range	HM\underline{xx}m\underline{yy}VM\underline{zz}m\underline{hh} H=Horizontal M=Max m=min V=Vertical \underline{xx} = max Hor. value \underline{yy} = min Hor. value \underline{zz} = max Vert. value \underline{hh} = min Vert. Value	This is a read only parameter. View also Limitations Table.	Signal = 1600x1200@60Hz Tx: #_pASPU12RGE_d?VAL[CR] Rx: \$_pASPU12RGE_dHM03m-3VM03m-3[CR] that is Horizontal: Max= 3; Min= -3 Vertical: Max= 3; Min= -3
ASPU3RGE	INFO	Get user 3 aspect ratio values range	HM\underline{xx}m\underline{yy}VM\underline{zz}m\underline{hh} same as ASPU12RGE	This is a read only parameter. View also Limitations Table.	Signal = 1600x1200@60Hz Tx: #_pASPU3RGE_d?VAL[CR] Rx: \$_pASPU3RGE_dHM10m-10VM06m-10[CR] that is Horizontal: Max= 10; Min= -10

Parameter Name	Operation Types	Description	Value			Details	Examples
							Vertical: Max= 6; Min= -10
KEYST_x	POT.	Keystone In place of <u>x</u> character there is one character like this: H = Horizontal V = Vertical	MAX = 30 DEF = 0 MIN = -30				Tx: #_pKEYSTH_d23[CR] Rx: \$_pKEYSTH_d23[CR] Tx: #_pKEYSTH_d?VAL[CR] Rx: \$_pKEYSTH_d23[CR] Same examples for Vertical Keystone Same examples as BRIGHT for MAX, MIN and DEF
TP	ENUM	Test Pattern	FOCUS ZOOM NONE			NONE = No Testpattern	Tx: #_pTP_dFOCUS[CR] Rx: \$_pTP_dFOCUS[CR] Tx: #_pTP_d?VAL[CR] Rx: \$_pTP_dFOCUS[CR]
DPYMOD	ENUM	Display Mode	NORM OVLP			NORM = Normal OVLP = Overlap	Tx: #_pDPYMOD_dNORM[CR] Rx: \$_pDPYMOD_dNORM[CR] Tx: #_pDPYMOD_d?VAL[CR] Rx: \$_pDPYMOD_dNORM[CR]

Parameter Name	Operation Types	Description	Value			Details	Examples
INFO1	INFO	Projector ID	INFOPID	1..99			<p>Projector have a stable image displayed: Tx: #_pINFO1_d?VAL[CR] Rx: \$_pINFOPID_d01,_pINFOWST_dNOR, _pINFOSST_dPRS,_pINFOSRC_dHDMI1, _pINFOMEM_d04,_pINFOASP_dp2P[CR]</p> <p>Where pINFOPID_d01 = Projector ID is 01 pINFOWST_dNOR = Working State is Normal pINFOSST_dPRS = Source State is Present : projector display a stable image on the screen pINFOSRC_dHDMI1 = Source is HDMI1 pINFOMEM_d04 = fourth memory was applied pINFOASP_dp2P = The image have "Pixel to Pixel" aspect ratio</p> <p>Projector is in No-Signal State: Tx: #_pINFO1_d?VAL[CR] Rx: \$_pINFOPID_d01,_pINFOWST_dTP, _pINFOSST_dNOS,_pINFOSRC_dCOMP, _pINFOMEM_d04,_pINFOASP_e10[CR]</p> <p>Where pINFOPID_d01 = Projector ID is 01 pINFOWST_dTP = Working State is TestPattern pINFOSST_dNOS = Source State = No signal Present pINFOSRC_dCOMP = Last Source was COMP pINFOMEM_d04 = fourth memory was applied pINFOASP_e10 = The aspect parameter have the error ID=10: Invalid parameter – No Signal</p>
		Working State	INFOWST	TP FZ BK NOR		TP = TestPattern FZ = Freeze BK = Blank NOR = Normal	
		Signal State	INFOSST	PRS NOS		PRS = Present NOS = NO Signal	
		Source	INFOSRC			Same values as SOURCE parameter	
		Active Memory	INFOMEM			Memory ID = 1..25 0 = no mem. activated	
		Aspect	INFOASP			Same values as ASPECT parameter	

Parameter Name	Operati on Types	Description	Value		Details	Examples	
INFO2	INFO	Horizontal Frequency	INFOHFR		[KHz]	<p>State</p> <p>Projector have a stable image displayed: Tx: #_pINFO2_d?VAL [CR] Rx: \$_pINFOHFR_d68.3,_pINFOVFR_d60, _pINFOHRS_d1920,_pINFOVRS_d1080, _pINFOSYT_dDHD,_pINFOCOL_dRGB, _pINFOCME_d1,_pINFOGMA_d2.0[CR]</p> <p>Where pINFOHFR_d68.3 = Horiz. Frequency is 68.3 KHz pINFOVFR_d60 = Vertical Frequency is 60Hz pINFOHRS_d1920 = Horiz. Resolution is 1920 pixels pINFOVRS_d1080 = Vertical Res. is 1080 pixels pINFOSYT_dDHD = Sync Type is Digital HDMI-D pINFOCOL_dRGB = Color Space is RGB pINFOCME_d1 = Color Management is Enabled pINFOGMA_d2.0 = Gamma is 2.0</p> <p>Projector is in No Signal State: Tx: #_pINFO2_d?VAL[CR] Rx: \$_pINFOHFR_e10,_pINFOVFR_e10, _pINFOHRS_e10,_pINFOVRS_e10, _pINFOSYT_e10,_pINFOCOL_e10, _pINFOCME_d1,_pINFOGMA_d2.0[CR]</p> <p>Where pINFOHFR_e10 = Hor. Freq. have error ID=10 pINFOVFR_e10 = Vertical Frequency is invalid pINFOHRS_e10 = Horizontal Resolution is invalid pINFOVRS_e10 = Vertical Resolution is invalid pINFOSYT_e10 = Sync Type is invalid pINFOCOL_e10 = Color Space is invalid pINFOCME_d1 = Color Management is Enabled pINFOGMA_d2.0 = Gamma is 2.0</p>	
		Vertical Frequency	INFOVFR		[Hz]		
		Horizontal Resolution	INFOHRS		[pixel]		
		Vertical Resolution	INFOVRS		[pixel]		
		Sync Type	INFOSYT	ND CMP SOY H/V C/V SOG DHH DHD			ND = No Data CMP = Composite SYO = Sync On Y SOG = Sync On Green DHH = Digital HDMI-H DHD = Digital HDMI-D
		Color Space	INFOCOL	ND RGB YP YC2 YC4			ND = No Data YP = YprPb YC2 = YCbCr422 YC4 = YCbCr444
		Color Management Enables	INFOCME	0 1			
Gamma	INFOGMA			Same values as GAMMA			

Parameter Name	Operation Types	Description	Value			Details	Examples
						parameter	
INFO3	INFO	Video Board Firmware Version	INFOVFV			Three numbers Ex: 602	Tx: #_pINFO3_d?VAL [CR] Rx: \$_pINFOVFV_d602,_pINFOPFV_d40, _pINFODFV_d20, _pINFOPSN_d000550092911242014, _pINFOISN_d1004233004, _pINFOLIFE_d236[CR] Where pINFOVFV_d602 = Video Projector Board firmware version is 602 pINFOPFV_d40 = Power-On firmware version is 40 pINFODFV_d20 = DLP firmware version is 20 pINFOPSN_d000550092911242014 = Projector serial number is 000550092911242014 pINFOISN_d1004233004 = Internal (service) Projector Serial Number is 1004233004 pINFOLIFE_d236 = Product Life time is 236 hours
		PowerOn Firmware Version	INFOPFV			Two numbers Ex: 40	
		DLP Firmware Version	INFODFV			Two numbers Ex: 20	
		Product Serial Number	INFOPSN			18 numbers Ex: 000550092911242014	
		Internal Serial Number	INFOISN			10 numbers Ex: 1004233004	
		Product Life time	INFOLIFE			Number of hours	

8 Limitations Table

Mode	Resolution	Aspect Ratio					Aspect User 1/2		Aspect User 3		KeyStone
		Standard	Anamor.	Letter b.	Panor.	Pixel2P.	H	V	H	V	H & V
VGA	640x480@60Hz	support	support	no support	support	support	-10~+10	-10~+10	-10~+10	-10~+10	-30~+30
	640x480@72Hz	support	support	no support	support	support	-10~+10	-10~+10	-10~+10	-10~+10	-30~+30
	640x480@75Hz	support	support	no support	support	support	-10~+10	-10~+10	-10~+10	-10~+10	-30~+30
	640x480@85Hz	support	support	no support	support	support	-10~+10	-10~+10	-10~+10	-10~+10	-30~+30
SVGA	800x600@56Hz	support	support	no support	support	support	-10~+10	-10~+10	-10~+10	-10~+10	-30~+30
	800x600@60Hz	support	support	no support	support	support	-10~+10	-10~+10	-10~+10	-10~+10	-30~+30
	800x600@72Hz	support	support	no support	support	support	-10~+10	-10~+10	-10~+10	-10~+10	-30~+30
	800x600@75Hz	support	support	no support	support	support	-10~+10	-10~+10	-10~+10	-10~+10	-30~+30
	800x600@85Hz	support	support	no support	support	support	-10~+10	-10~+10	-10~+10	-10~+10	-30~+30
XGA	1024x768@60Hz	support	support	no support	support	support	-10~+10	-10~+10	-10~+10	-10~+10	-30~+30
	1024x768@70Hz	support	support	no support	support	support	-10~+10	-10~+10	-10~+10	-10~+10	-30~+30
	1024x768@75Hz	support	support	no support	support	support	-10~+10	-10~+10	-10~+10	-10~+10	-30~+30
	1024x768@85Hz	support	support	no support	support	support	-10~+10	-10~+10	-10~+10	-10~+10	-30~+30
WXGA	1280x768@60Hz	support	support	no support	support	support	-10~+10	-10~+10	-10~+10	-10~+10	-30~+30
SXGA	1280x1024@60Hz	support	support	no support	support	support	-10~+10	-10~+10	-10~+10	-10~+10	-30~+30
	1280x1024@75Hz	support	support	no support	support	support	-10~+10	-10~+10	-10~+10	-10~+10	-30~+30
	1280x1024@85Hz	support	support	no support	support	support	-10~+10	-10~+10	-10~+10	-10~+10	-30~+30
WSXGA+	1680x1050@59.94Hz	support	support	no support	support	support	-10~+10	-3~+10	-10~+10	-3~+10	-30~+30
UXGA	1600x1200@60Hz	support	support	no support	support	no support	-3~+3	-3~+3	-10~+10	-10~+6	-30~+30
IBM Industry Standard											
DOS	720x400@70Hz	support	support	no support	support	support	-10~+10	-10~+10	-10~+10	-10~+10	-30~+30
MAC/Apple Industry Standard											
MAC	640x480@67Hz	support	support	no support	support	support	-10~+10	-10~+10	-10~+10	-10~+10	-30~+30
	832x624@75Hz	support	support	no support	support	support	-10~+10	-10~+10	-10~+10	-10~+10	-30~+30
	1024x768@75Hz	support	support	no support	support	support	-10~+10	-10~+10	-10~+10	-10~+10	-30~+30



Mode	Resolution	Aspect Ratio					Aspect User 1/2		Aspect User 3		KeyStone
		Standard	Anamor.	Letter b.	Panor.	Pixel2P.	H	V	H	V	H & V
EDTV/HDTV											
480i	720(1440)x480i@59.94Hz	support	support	support	support	support	-10~+10	-10~+10	-10~+10	-10~+10	-30~+30
480i	720(1440)x480i@60Hz	support	support	support	support	support	-10~+10	-10~+10	-10~+10	-10~+10	-30~+30
576i	720(1440)x576i@50Hz	support	support	support	support	support	-10~+10	-10~+10	-10~+10	-10~+10	-30~+30
480p	720x480@59.94Hz	support	support	support	support	support	-10~+10	-10~+10	-10~+10	-10~+10	-30~+30
480p	720x480@60Hz	support	support	support	support	support	-10~+10	-10~+10	-10~+10	-10~+10	-30~+30
480p	848x480@47.95Hz	support	support	support	support	support	-10~+10	-10~+10	-10~+10	-10~+10	-30~+30
480p	848x480@59.94Hz	support	support	support	support	support	-10~+10	-10~+10	-10~+10	-10~+10	-30~+30
576p	720x576@50Hz	support	support	support	support	support	-10~+10	-10~+10	-10~+10	-10~+10	-30~+30
720p	1280x720@47.95Hz	support	support	support	support	support	-10~+10	-10~+10	-10~+10	-10~+10	-30~+30
720p	1280x720@48Hz	support	support	support	support	support	-10~+10	-10~+10	-10~+10	-10~+10	-30~+30
720p	1280x720@50Hz	support	support	support	support	support	-10~+10	-10~+10	-10~+10	-10~+10	-30~+30
720p	1280x720@59.94Hz	support	support	support	support	support	-10~+10	-10~+10	-10~+10	-10~+10	-30~+30
720p	1280x720@60Hz	support	support	support	support	support	-10~+10	-10~+10	-10~+10	-10~+10	-30~+30
1035i	1920x1035i@60Hz	support	support	support	no support	support	-1~+1	0	0	-10~+6	-30~+30 (Only support when overscan & Aspect H/V =0)
1080i	1920x1080i@50Hz	support	support	support	no support	support	-1~+1	0	0	-10~+6	-30~+30 (Only support when overscan & Aspect H/V =0)
1080i	1920x1080i@59.94Hz	support	support	support	no support	support	-1~+1	0	0	-10~+6	-30~+30 (Only support when overscan & Aspect H/V =0)
1080i	1920x1080i@60Hz	support	support	support	no support	support	-1~+1	0	0	-10~+6	-30~+30 (Only support when overscan & Aspect H/V =0)
1080p	1920x1080p@23.98Hz	support	support	support	no support	support	-3~+3	-3~+3	-10~+6	-10~+6	-30~+30
1080p	1920x1080p@24Hz	support	support	support	no support	support	-3~+3	-3~+3	-10~+6	-10~+6	-30~+30
1080p	1920x1080p@25Hz	support	support	support	no support	support	-3~+3	-3~+3	-10~+6	-10~+6	-30~+30
1080p	1920x1080p@29.97Hz	support	support	support	no support	support	-3~+3	-3~+3	-10~+6	-10~+6	-30~+30
1080p	1920x1080p@30Hz	support	support	support	no support	support	-3~+3	-3~+3	-10~+6	-10~+6	-30~+30
1080p	1920x1080p@50Hz	support	support	support	no support	support	-3~+3	-3~+3	-10~+6	-10~+6	-30~+30