Prizmatix

Prizmatix-LED-USB Serial API V4.15

For Firmware V4.15

The UHPTLCC-USB-PD and FC-LED-USB controller can be controlled from LabVIEW, MATLAB or any Hyper-Terminal like software capable of sending and receiving simple ASCII commands over a USB or RS232 interface. In order to send commands to the controller the COM port should be configured with following settings:

Bits per second: 57600

Data bits: 8

Parity: None

Stop Bits: 1

Flow Control: None

When the main power switch on back panel is switched to ON the controller device performs boot of internal microcontroller (up to 7sec).

- In case the LED System is equipped with Dial Potentiometer(s) for manual controls, initially the controller device reads the potentiometer(s) on front panel and set output power to that value – **manual control mode**. The light will be ON if the green button or toggle switch on front panel is engaged. The control of device will be manual even in case the USB cable is connected. When first power set command will be received from computer the device will switch to **computer control mode**.

- In case the LED System has only computer control (via USB or RS232) the system starts in **computer control mode**. The LED light will be ON if the green button or toggle switch on front panel is engaged, and appropriate power set command is received from the computer.

The controller device can accept following commands sent to the serial COM port (USB port or RS232 port).

Remark: All commands shall be followed by a newline character (ASCII 10, or '\n').

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Commands:

Command	Meaning
V:	Request for firmware version. Answer: CCC_AA.AA_B Where: CCC is control type: DAC or PWM AA.AA is the version of the firmware B is number of LEDs as written in EEPROM. Example of answer: DAC_03.00_01 If the EEPROM does not include this information, it will return the number of DACs actually founded. If the EEPROM data is not match the founded DACs the Firmware sends Error message. See Error Messages section below.

Command	Meaning
P:A,B,C,D….	Like legacy "I" command but set the power level in 12Bit range 0-4095. P- Prefix followed by column ":" A,B,C,D… -is a number between 0 to 4095 indicating desired power level. Each letter represents controlled LED Example A: P:4095 for max. power for system with only 1 LED Example B: P:4095,0,2500,1750 System with 4 LEDs: set 1st LED to max power, 2nd LED to OFF, 3rd LED to 2500 and 4th LED to 1750. This command sends back an echo. For example, if command is P:512 or P:0512 The echo will be P0512 The returned number is always of 4 characters.

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Command	Meaning
I:A,B,C,D….	**----- Legacy Command Don't Use for New Designs -----** Sets the power level in 10Bit range 0-1023. (Internally the level is multiplied by 4 so the DAC will receive 1023x4 for full power) I- Prefix followed by column ":" A,B,C,D… -is a number between 0 to 1023 indicating desired power level. Each letter represents controlled LED Example A: I:1023 for max. power for system with only 1 LED Example B: I:1023,0,500,750 System with 4 LEDs: set 1st LED to max power, 2nd LED to OFF, 3rd LED to 500 and 4th LED to 750. This command sends back an echo. For example, if command is I:512 or I:0512 The echo will be I0512 The returned number is always of 4 characters.

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Command	Meaning

MA,B,C,D….,0@	**----- Legacy Command Don't Use for New Designs -----**
	
	Sets the power level in 10Bit range 0-1023.
	
	(Internally the level is multiplied by 4 so the DAC will receive 1023x4 for full power)
	
	M- Prefix followed by first LED intensity (without space or semicolon)
	
	A,B,C,D… -is a number between 0 to 1023 indicating desired power level (0-1023). Each letter represents controlled LED
	
	Example A:
	
	`M1023,0@`
	
	for max. power for system with only 1 LED
	
	Example B:
	
	`M1023,0,500,750,0@`
	
	System with 4 LEDs: set 1st LED to max power, 2nd LED to OFF, 3rd LED to 500 and 4th LED to 750.
	
	Returns echo: 'A'

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General Information on Photosensor:

The Prizmatix photosensor is based on LITE-ON LTR-303ALS-01 Optical Sensor.

The LTR-303ALS has following controls: Gain, Integration-Time and Measurement-Rate.

The level of detected signal will be dependent on Gain and Integration-Time.

The Measurement-Rate will determine the frequency the data can be read from the sensor.

Remark: The Integration-Time ≤ Measurement-Rate

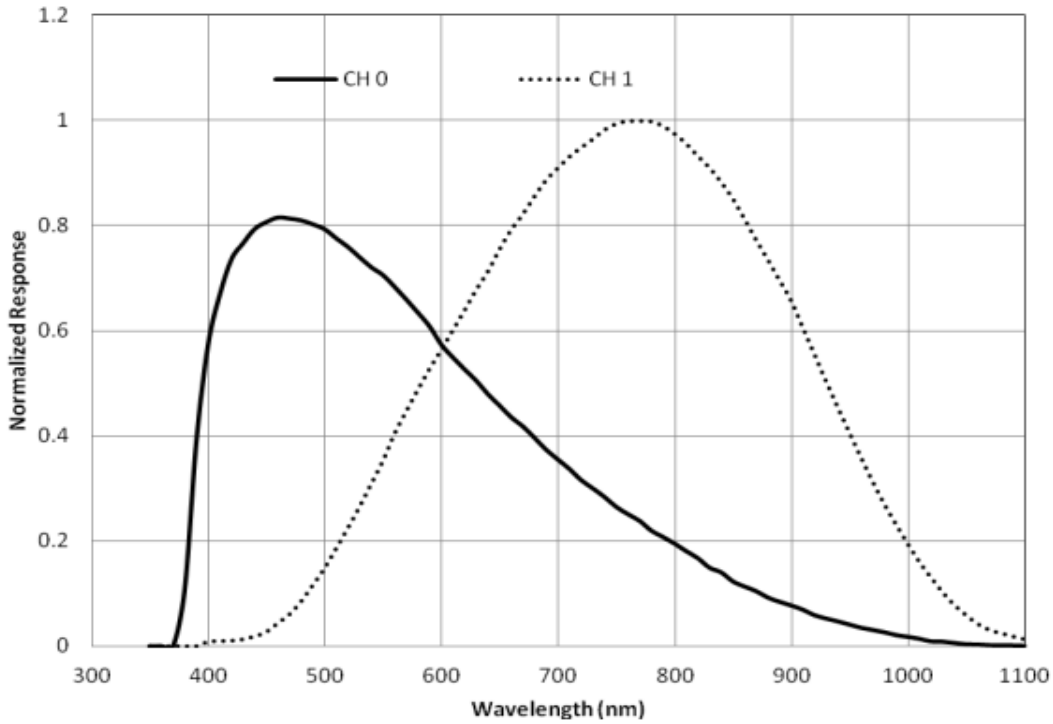
Default settings are:

Gain = 5 (X48)

Integration-Time = 400ms

Measurement-Rate = 500ms

Fig.:



Responsivity as function of wavelength for the Photosensor.

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Command	Meaning
R:	Reading of Photosensor value when the system has only one Photosensor Response: R0,xxxxx,yyyyy Where xxxxx and yyyyy are decimal representations of the intensity (fixed size 5 positions 16bit). xxxxx – is Visible sensor value yyyyy – is NIR sensor (Near IR) value
R:A	Reading of Photosensors values for system with multiple Photosensors R:A A - Number of the LED (**Remark**: LEDs numbering is 0,1,2…) Response: RA,xxxxx,yyyyy Where xxxxx and yyyyy are decimal representations of the intensity (fixed size 5 positions 16bit). xxxxx – is Visible sensor value yyyyy – is NIR sensor (Near IR) value

<table>
<tr><th>Command</th><th>Meaning</th></tr>
<tr><td>G:0,A</td><td>Get the Photosensor Gain value

G:0,A – read Gain value of LED#A
A - Number of the LED

Example:
Send: G:0,0 – to get the Gain value of LED#0

Response: GA,Z

Where the “A” is the number of the LED
Where the “Z” is a single digit representing photosensor gain (See table below).</td></tr>
<tr><td>G:1,Z,A</td><td>Set of the Photosensor Gain value

G:1,Z,A

A = Number of LED

Set the Photosensor Gain value of LED#A

Response: GA,Z

Where the “A” is the number of the LED
Where the “Z” is a single digit representing photosensor gain:

<table><tr><th>Gain Command</th><th>Photosensor Gain</th></tr><tr><td>1</td><td>X1</td></tr><tr><td>2</td><td>X2</td></tr><tr><td>3</td><td>X4</td></tr><tr><td>4</td><td>X8</td></tr><tr><td>5</td><td>X48</td></tr><tr><td>6</td><td>X96</td></tr></table>

NOTE: the default value of Photosensor Gain is 5 (Corresponds to Gain=x48)</td></tr>
<tr><th>Command</th><th>Meaning</th></tr>
</table>

E:0,A	Get the Photosensor Integration-Time value E:0,A get the Integration-Time time for the LED#A Response: EA,W Where the "A" is the number of the LED Where the "W" is a single digit representing photosensor Integration-Time (See table below).
E:1,W,A Or	Set of the Photosensor Integration-Time value E:1,W,A Where the "W" is the Integration-Time Where the "A" is the number of LED Example: Send: E:1,2,0 – to set the Integration-Time value of LED#0 to 2 (100ms) Echo: E1,2,0
E:1,W,A,B	If you would like to set the Measurement-Rate as well, you need to send additional parameter "B": E:1,W,A,B Where the "W" and "A" as above Where the "B" is the Measurement-Rate (see table below) Example: Send: E:1,2,0,4 - to set the Integration-Time value of LED#0 to 2 (100ms) and Measurement-Rate to 4 (1000ms) Echo: E1,2,0,4 **Remark**: Integration-Time ≤ Measurement-Rate **Remark**: If "B" not used the value of "B" will be changed to default 3 (500 ms).

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Integration-Time Command #	Photosensor Integration-Time
1	50 msec
2	100 msec
3	150 msec
4	200 msec
5	250 msec
6	300 msec
7	350 msec
8	400 msec

Measurement-Rate Command #	Photosensor Measurement-Rate
0	50 msec
1	100 msec
2	200 msec
3	500 msec
4	1000 msec
5 or 6 or 7	2000 msec

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Command	Meaning
For Read: S:{0,2} For Write: S:1,A ---------- S:0 S:2 ---------- S:1,A	Read or Write LED name(s). The LED name will be displayed above the LED Power slider in PC software. A - The LED name (Color or Wavelength-Type) of all installed LEDs The name is in format C-D where: C is “LED name”, D is the “LED type”. Examples for C (LED Name): “White”, “UV” Examples for C-D (LED Name and Type): “365-SR”, “650-EP” in these examples SR, EP are suffixes of LED product lines. ---------- **To read**: S:0 Returns LED names without suffixes with word “LED” as prefix. Example of return string: SLED White,LED UV,LED 365,LED 650 S:2 Returns full information if available: 250-DI,300-SR,400-FR Example of return string: SWhite,UV,365-SR,650-EP ---------- **To write**: S:1,A where A is a string with full information for all LEDs For example: S:1,White,UV,365-SR,650-EP No Echo for this command

Command	Meaning
C:	Request for number of LEDs (as read from EEPROM) Returns: CA where A is a number of LEDs written in EEPROM. Example: C5 System with 5 LEDs **Remark**: This command maybe not applicable to UHP-M-USB, UHP-F-USB

Command	Meaning
D: or D:0	Request for data from the firmware (for LED#0) D: or D:0 – returns answer in format DA,B,C,D Every letter A,B,C,D is of 5 chars and the meaning" A – DAC setting (values range 0 to 4095) B – Photosensor Vis photodiode value (See Photosensor command below) C – Photosensor NIR photodiode value (See Photosensor command below) **Remark**: If DAC value was not changed within 1sec the command returns old values. ***Don't send this command too frequently(!).*** If Photosensor disconnected B and C return 0. If Photosensor is in saturation B and C return 65,535 **Remark**: Photosensor saturation occurs when B+C=65535
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D:0,2	D:0,2 Returns the current power levels for each LED in the system Example return for 5 LED system: D2,1000,2000,0,555,512
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D:0,3	D:0,3 Returns the current default state for each LED in the system. When the LED system is powered ON each LED will be in this default level. For systems without manual control, if this parameter was never defined the system will be powered with all LEDs off. Example for 5 LEDs system: Sent Command: D:0,3 Echo: D3,100,1000,4095,0,2000 **Remark**: If the default values were never defined the Echo will be: D3,-1
D:1,3,A	Set the default state for each LED in the system. When the LED system is powered ON each LED will be in this default level.

	D:1,3,A A – is default value for each LED. Example for 5 LEDs system: D:1,3,100,1000,4095,0,2000 Echo: D1,3,100,1000,4095,0,2000