2020

Data Sheet



Programable LED Driver
: Max 6CH, 630mA, 65V, 23W supportable
Model No: CVT120-xxx...xxx
("xxx...xxx": the 'x' means the version No. of LG Part No.)

CONTENTS

Rev	vision	History	3
1.	Desig	n concept of Product	4
2.	Block	Diagram	4
3.	Elect	rical Characteristics	5
	3.1	Input Requirements	5
	3.2	Output Requirements	6
	3.2.1	Maximum Output Voltage and Current	6
	3.2.2	Over Voltage Protection (OVP)	6
4.	Dime	nsion (60 x 40 mm x 6.8mm) and Pictures	7
5.	Pin Ir	formation	8
6.	Powe	r Characteristics	9
	6.1	Ripple and Noise	9
	6.2	Overshoot	9
	6.3	In-rush	9
7.	Abso	lute Raring	9
	7.1	Temperature	9
	7.2	Humidity	9
8.	Relia	bility Test and Guarantee	10
	8.1	Environment Test	10
	8.2	Mean Time Between Failure (MTBF)	11
9.	Appe	ndix : LED Driver Setting Guide	13
	9.1	The Programming Environment	13
	9.2	The software Window on monitor for Setting Figures	13
	9.3	Pre-preparation and Guidance before software usage	14
	9.3.1	Selection of LED Driver model	14
	9.3.2	Selection of Connection Port	14
	9.3.3	Selection of "Verify Setting Value" Function	14
	9.3.4	Selection of "Backlight output Protection" Function.	14
	9.4	How to put parameter values in directly	16
	9.5	Simple way to put the values to change the setting	17
	9.6	Regarding the "Backlight output Protection" Function	18
10.	Ар	pendix – B : On & Off Status of 2 LEDs on the PCB	19

Revision History

Rev.	Date	Revision Details	Remarks
Α	Oct 16, 2018	Engineering Sample Issue	
В	Mar 18, 2019	Initial version start (the first product model)	
С	Apr 01, 2019	The second Production start	
	Apr 30, 2019	The addition of MTBF data	

1. Design concept of Product

This LED Driver has been designed to be user friendly and the parameters indicated below can be controlled by a special software program which will be provided by the manufacturer.

- -. The numbers of LED Channel of target LCD Module
- -. The level of current (at mA unit) for LED strings
- -. The forwarding Voltage (at V_f unit) level of LED rail

The unique point of this software program and hardware of this LED Driver is indicated as below:

-. A single hardware can be used for various kind of LCD models.

-. Users can change the setting figures (current, voltage, and number of channels) using the software program so that LED driver can be converted to their needs. The way it works is that the software will fix the desired setting figures in MCU contained in the hardware and then the hardware of this LED driver will perform as it has been encoded.

This model has max **6 channels** supportable and **630mA** level current supportable, Further details about users' manual will guide how to use this product, refer to the attached Appendix.

2. Block Diagram



Electrical Characteristics 3.

3.1 Input Requirements

			Ormalial		Values		1.1	Demerk
P	arameter		Symbol	Min	Тур	Max	Unit	Remark
Davies Ou			VBL	10.8	12	18	Vdc	** 4
Power Su	pply input volta	age	VBL	18	24	29	Vdc	
Dower Su	nali (Innut Cum		IBL	-	-	2.1	А	VBL = 12V Ext VBR-B =100%
Power Su	pply input Curr	ent	IBL	-	-	1.0	А	VBL = 24V Ext VBR-B =100%
Power Supply	Input Current (In-rush)	In-rush	-	-	6	A	VBL = 10.8V Ext VBR-B =100%
Power	Consumption		PBL	-	-	23	W	
	Op/Off	On	V on	2.4	-	5.25	Vdc	
	Un/Oli	Off	V off	-0.3	-	0.8	Vdc	
	Brightnes	ss Adjust	ExtVBR-B	3	-	100	%	On Duty ** 2
Input Voltage			High Level	2.4	-	5.25	Vdc	
System Signals	Dulas Dutu		Low Level	0.0	-	0.7	Vdc	HIGH : On duty
	Pulse Duty		PWM Freq.	100		240	Hz	±000 : Off duty ** 2
			Duty	2	-	100	%	
	Analog	Dimming	A-DIM	0	-	3	V	0V : Min Bright 3V :Max Bright

** 1) The LED string voltage always has to be higher than the input voltage (max) and the difference must be at least 5V deviation.
** 2) To use PWM duty less than 10%, the frequency of dimming should be 120Hz or less

3.2 Output Requirements

3.2.1 Maximum Output Voltage and Current

Input Voltage	Constant Current	Applicable Numbers of	Maximum	Outp Currei	out Con nt per c (mA)	stant hannel	To Cons	tal Out stant Cเ (mA)	out Irrent
Condition (typical)	Range	Channel	Wattage	Min.	Тур.	Max.	Min.	Тур.	Max.
12V or 24V	15V ~ 65V	1CH ~ 6CHs	Up to 23W	10	-	630	30	-	630

The voltage and current per LED Backlight string are set according to the demand of LCD panel in use.

3.2.2 Over Voltage Protection (OVP)

The voltage will not exceed the upper trip limit.

The noise spikes that exceed the lower trip limit of less than 10μ s will not clamp the output voltage to zero.

Voltago	Over Voltage Protection	
voltage	Range[V]	Protection
Output	This LED Driver was designed based on the OVP setting at 20% ~ 30% higher level than the forwarding(string) voltage of panels in use.	Shut Down

4. Dimension (60 x 40 mm x 6.8mm) and Pictures





5. Pin Information



6. Power Characteristics

6.1 Ripple and Noise

The ripple and noise are defined as a periodic or random signal over frequency band at the 10Hz \sim 20MHz, measuring by an oscilloscope capable 20MHz bandwidth.



% The ripple & noise are measured at the 20MHz bandwidth by a 12" twisted pair-wire which is cut off through the 0.1uF & 47uF parallel capacitor.

- Test condition
 - Temperature: 25°C room temperature
 - Test equipment: PWM Dimming 100%

6.2 Overshoot

The output overshoot at the boot up must not exceed 25% than ordinary operating voltage value with or without under the working load condition.

6.3 In-rush

At the moment of turning on, the rise time of output voltage has to be shorter than 200msec, which is measured from the 10% point to the 90% point at the normal state

Test condition

- Temperature : 25°C room temperature
- Test equipment : Resistance load

7. Absolute Raring

7.1 Temperature

- Operating Temp. : $-35 \sim 85^{\circ}$ C (optional guarantee up to -40° C)
- Storage Temp. : $-35 \sim 85^{\circ}$ C (optional guarantee up to -40° C)

7.2 Humidity

- Operation humidity	:	20 ~ 85% non-condensate
- Storage humidity	:	5 ~ 95% non-condensate

8. Reliability Test and Guarantee

8.1 Environment Test

Adopted Test			Test method		
Intermittent Operating Stability Test	The pow seconds	ver supply unit should be at maximum load, after its	On&Off for 25,000 hours at an intervelocities of the set of the se	al of 10	
Low Temp. Operating Test	The pow hours. T	er supply unit is left in ope his should be satisfied with	eration at a minimum temperature (-30°C nout applying the electrical characteristic) for 200 s.	
High Temp. & High Humidity Operating Test	The pow 200 hour	er supply unit is left at an o s. This should be satisfied	operating temperature (85°C) in 85% hur without applying the electrical characte	nidity for ristics.	
Low Temp. Storage Test	Low Temp. Storage Test The power supply unit should be left at minimum temperature (-35°C) for 96 or more. Then the switching regulator is left at room temperature and hum an hour or more and then the electrical characteristics should be satisfied				
	The pow more af Afterwar	ver supply unit is left at at ter 10 consecutive temp ds, the electrical character	room temperature and humidity for ar perature cycles are performed while istics should be satisfied.	i hour or heated.	
		Consecutive Cycle	Temperature		
		10 minutes	25℃		
		30 minutes	25°C → -35°C		
Heat cycle Operating Test		240 minutes	Minimum temperature(-35℃)		
		30 minutes	-35°C → 25°C		
		10 minutes	25℃		
		30 minutes	25℃ → 85℃		
		240 minutes	Maximum temperature (85℃)		
		30 minutes	85℃ → 25℃		
Vibration Test	The pow Vibrati Sweep There sh	er supply unit is left at belo on amplitude: 1.5mm, Freo Time: 1Min, each of each hould be no damage to its a	bw environment condition for 2 hours or quency: 10-5-10Hz, X, Y, and Z for 2 hours or more. appearance and structure.	more ;	
Appearance Test	There sh damage excessiv	nould be no contaminant o (adverse effect) on the re unevenness or scratche	r dirt on the switching regulator that ma electrical characteristics. There shoul s on the plated or painted surface.	ay cause d be no	

8.2 Mean Time Between Failure (MTBF)

This LED Driver has been designed by 50,000 MTBF with 90% reliability index under below environment.

- Input voltage : 12V DC
- Duty cycle : 6hours ON, 2hours OFF
- Ambient Temp : 25 ± 2°C
- Humidity : prevailing condition



It measured by Lambda Predict Program, "Reliasoft" made. And it calculates by the Telcordia SR-332 Issue 3

The MTBF : **281,830** hours (the calculation data refers to next page)



Name: LED DRIVER [CVT-120] Failure Rate(t=INF) (FITs): 7110.2452 Category: Telcordia SR-332 Issue 3 User Name: Lee Eungak

Category	Location No.	Failure Rate(t=INF) (FITs)	MTBF (hrs)	Contribution	Quantity
Capacitor	C100	3548.2371	281,830	0.499	1
Capacitor	C101	0.1944	5,144,600,000	2.73E-05	1
Capacitor	C102	3120.1449	320,500	0.4388	1
Capacitor	C103	0.165	6,061,400,000	2.32E-05	1
Capacitor	C104	0.0769	13,008,000,000	1.08E-05	1
Capacitor	C105	0.0169	59,237,000,000	2.37E-06	1
Capacitor	C108	0.0375	26 658 000 000	5.28E-06	1
Capacitor	C200	0.131	7,631,800,000	1.84E-05	1
Capacitor	C201	0.0231	43,378,000,000	3.24E-06	1
Capacitor	C202	0.0231	43,378,000,000	3.24E-06	1
Capacitor	C203	0.0231	43,378,000,000	3.24E-06	1
Capacitor	C204	0.0231	43,378,000,000	3.24E-06	1
Capacitor	C205	0.017	58,995,000,000	2.38E-06	1
Capacitor	C206	0.0551	18,151,000,000	7.75E-06	1
Capacitor	C208	0.0551	18,151,000,000	7.75E-06	1
Capacitor	C209	0.0551	18,151,000,000	7.75E-06	1
Connector	CN100	0.9799	1 020 500 000	0.0001	1
Connector	CN101	0.9799	1,020,500,000	0.0001	1
Connector	CN102	0.9799	1,020,500,000	0.0001	1
Connector	CN200	0.9799	1,020,500,000	0.0001	1
Diode	D100	119.7204	8,352,800	0.0168	1
External	F100	-	-	0	1
IC, Analog/Linear	IC100	34.7497	28,777,000	0.0049	1
IC, Analog/Linear	IC200	12.0648	82,886,000	0.0017	1
IC, Microcontroller	IC201	226.1077	4,422,700	0.0318	1
Inductor	L100	2.2011	454,330,000	0.0003	1
External	LIUI	2.2011	454,550,000	0.0003	1
External	LEDI			0	1
External	PCB	-	-	0	1
Transistor	0100	21.7259	46,028,000	0.0031	1
Transistor	Q200	12.2777	81,448,000	0.0017	1
Resistor, Fixed	R100	0.1525	6,557,300,000	2.14E-05	1
Resistor, Fixed	R101	0.1525	6,557,300,000	2.14E-05	1
Resistor, Fixed	R102	0.1525	6,557,300,000	2.14E-05	1
Resistor, Fixed	R103	0.1525	6,557,300,000	2.14E-05	1
Resistor, Fixed	R105	0.1525	6,557,300,000	2.14E-05	1
Resistor, Fixed	R106	0.1525	6,557,300,000	2.14E-05	1
Resistor, Fixed	R107	0.1525	6,557,300,000	2.14E-05	1
Resistor Fixed	R100	0.1525	3 513 400 000	4 00E-05	1
Resistor, Fixed	R110	0.1525	6,557,300,000	2.14E-05	1
Resistor, Fixed	R111	0.1525	6,557,300,000	2.14E-05	1
Resistor, Fixed	R113	0.1525	6,557,300,000	2.14E-05	1
Resistor, Fixed	R114	0.1525	6,557,300,000	2.14E-05	1
Resistor, Fixed	R115	0.1525	6,557,300,000	2.14E-05	1
Resistor, Fixed	R116	0.1525	6,557,300,000	2.14E-05	1
Resistor, Fixed	R117	0.1525	6,557,300,000	2.14E-05	1
Resistor, Fixed	R118	0.1525	6,557,300,000	2.14E-05	1
Resistor Fixed	R119 R120	0.1525	6,557,300,000	2.14E-05	1
Resistor, Fixed	R200	0.1525	6,557,300,000	2.14E-05	1
Resistor, Fixed	R201	0.1525	6,557,300,000	2.14E-05	1
Resistor, Fixed	R202	0.1525	6,557,300,000	2.14E-05	1
Resistor, Fixed	R203	0.1525	6,557,300,000	2.14E-05	1
Resistor, Fixed	R204	0.1525	6,557,300,000	2.14E-05	1
Resistor, Fixed	R205	0.1525	6,557,300,000	2.14E-05	1
Resistor, Fixed	R206	0.1525	6,557,300,000	2.14E-05	1
Resistor, Fixed	R207	0.1525	6,557,300,000	2.14E-05	1
Resistor, Fixed	R208	0.1525	6,557,300,000	2.14E-05	1
Resistor Fixed	R210	0.1525	6 557 300,000	2.14E-05	1
Resistor, Fixed	R211	0.1525	6,557,300,000	2.14E-05	1
Resistor, Fixed	R212	0.1525	6,557,300,000	2.14E-05	1
Resistor, Fixed	R214	0.1525	6,557,300,000	2.14E-05	1
Resistor, Fixed	R215	0.1525	6,557,300,000	2.14E-05	1
Resistor, Fixed	R216	0.1525	6,557,300,000	2.14E-05	1
Resistor, Fixed	R217	0.1525	6,557,300,000	2.14E-05	1
Resistor, Fixed	R218	0.1525	6,557,300,000	2.14E-05	1
Resistor, Fixed	R219	0.1525	6,557,300,000	2.14E-05	1
		Minimum	281,830		

~ 12 ~

9. Appendix : LED Driver Setting Guide

9.1 The Programming Environment



9.2 The software Window on monitor for Setting Figures

This software is designed to be used on Microsoft OS/"Windows"

- URL link to the software can be provided when the users purchase this LED Drivers which they use to adjust the specifications according to their needs.
- > This will only be given under a contract tailored to this particular need.
- Once users click and run the URL link, the software program will be installed and an icon (for the shortcut purpose) will appear on the Desktop.
- When a user double-click the icon, a window on monitor screen shown below will pop up for user's selection of setting figures complying with the target LCD electrical spec requirement.

😼 LED Driver Setting					2- 8 B	1 <u>0178</u> 9		×
Port State : Close		Model S © CV	elect T120	o cv	Г230	о сут	LULT	
	Par	nel List 🛛					~	
Backlight output Protect	ion	-						
Vorifu Sotting Value								
M veniy setting value	Channel C	urrent set pe	r Channel	Maximum V	/oltage Setting	-		-
	~		mA		~ \	,	Send	
Read Setting Value Char	nnel Ch	Current	mA	Voltage		V Ge	t Model In	fo
Measure Value Chai	nnel Ch	Current	mA	Voltage	×	,		
					V1.	2 www.c	listeck.	com

9.3 **Pre-preparation and Guidance before software usage**

9.3.1 Selection of LED Driver model

> Choose a model for your driver (one among the CVT120 or CVT230 or CVT_ULT)

9.3.2 Selection of Connection Port

- Choose a Port for connection between the users' working PC and the LED Driver in use. When users press the Tool Bar, all port names are shown on the Tool Bar Menu, then select one of them.
- If a user does not know or remember which Port has to be selected as the connection Port, the user is requested to check the "Device Manager" function on Windows Menu in order to verify which Port on his/her PC is adoptable.

9.3.3 Selection of "Verify Setting Value" Function

- The selection of this function is a software default mode, but if any users don't prefer it, users can make it to Disable Mode by checking the box by oneself.
- > This function has been programed in a built-in MCU of this LED Driver hardware.
- This process judges the users' setting figures (Nos of CH, Current/Channel, forwarding Voltage level) to see whether those figures are at valid levels or not based on the supportable setting levels of hardware.
- If the input values (figures put in by the user) are out of service level, this function will hold the figures of 3 parameters to prevent any hardware damage on the LED Driver and/or target LCD panel.
- > The Chapter 9.4 and 9.5 on next pages will refer to this process once again.

9.3.4 Selection of "Backlight output Protection" Function.

This function is also a software default mode and has nothing to do with entering the programing of setting values but only to be used after all the values have been put in. This function is used as a process to determine whether or not the final values are suitable for the execution of the target LCD panel connected to the LED Driver.

- Check the box in order to enable the state of final judgement process which would have been programed in the MCU built-in on the LED Driver hardware at this point.
- > The division 9.6 will refer to this process once again.

LED Driver Setting				1953		×
Port State : Close Port		Model Select © CVT120	O CVT230	0 C1	/T_ULT	
☑ Backlight output ☑ Verify Setting Va	t Protection alue Channel	Press this Tool Bar, the see all Ports List of working PC, refer to no Current set per Channel	en User can connected ext page Maximum Voltage S	ietting		
Read Setting Value	Channel	Ch Current	mA Voltage	v [Get Model I	Info
Measure Value on Operating	Channel	Ch Current	mA Voltage [V 	w.disteck	.com

~ 14 ~

User can verify which kinds of "Com Port" is available for the correct Port from below window when user check by "Device Manager" menu on Windows OS like below.

For example, if user can find out a "Com Port" like below red dotted box, that is the correct Port user can select in Tool Bar List.

a u	evice Manager	<u>(00)</u> 3	\times
ile	Action View Help		
	YHJ-COM		
>	8 Bluetooth		
>	Computer		
>	Disk drives		
>	lisplay adapters		
>	DVD/CD-ROM drives		
>	Firmware		
>	🙀 Human Interface Devices		
>	IDE ATA/ATAPI controllers		
>	🚽 Jungo		
>	🧱 Keyboards		
>	Mice and other pointing devices		
>	Monitors		
>	🚰 Network adapters		
>	Portable Devices		
~	 ₽ Ports (COM & LPT) ♥ Prolific USB-to-Serial Comm Port(COM3) ♥ 통신 포트(COM1) 		
>	🚍 Print queues		
>	🖻 Printers		
>	Processors		
>	Security devices		
>	📲 Software components		
>	Software devices		
>	Sound, video and game controllers		
>	Storage controllers		
	🏣 System devices		
>	It is a second for the second seco		
>	Universal Senal Bus controllers		

9.4 How to put parameter values in directly

This is the way to settle the 3 parameter values directly by users.

- User can put values in each box located on the left side of "Send" Button. (ex. number of channels, current level/mA, forwarding Voltage/Vf)
- > Once this input process is done, click "Send".
- If the entered figures are acceptable, the software program of the built-in MCU inside the LED Driver allows download process to save well the values in the MCU and then the LED Driver will perform the output values.
- If the entered figures are NOT acceptable, the selected "Verify Setting Values" function in the MCU will reject the download process.

Also, the window shown below will appear as a failure notice(warning).

Then user has to check the values and so need to try new acceptable values or stop this process.

Not	Suppor	ted va	lue

- When the download process is complete without any of waring window shown above, user needs to proceed to the last process. The process is to check the downloading status. To determine whether the download is done or not by using the "Read Setting Value" function.
- Press the "Read Setting Value" button, then the adopted values will be shown on the 3 boxes located on the right side of Read Setting Value Button.
- If those values are the same as the above input values in the 3 boxes, every process is well executed – Confirmed -.

LED Driver Setting		- 0	×
Port State : Close Port	✓ Model Select ● CVT120 O C	VT230 O CVT_UL	T
	Panel List	~	
🛙 Backlight outpu	ut Protection		
☑ Verify Setting V	'alue Channel Current set per Channel Maximu	n Voltage Setting	hr
	mA L	V	· •
Read Setting Value	Channel Ch Current mA Voltag	je V Get Moo	lel Info

9.5 Simple way to put the values to change the setting

If the user is not familiar with the required spec values or if the required spec values are Unknown / not clear

- Press the panel list tool bar and select your panel (*the list only contains the panels that manufacturer has tested. Manufacturer regularly updates with new models and the updated URL which includes the existing as well as the newly added models will be provided accordingly. In this case, the product users need to uninstall the program and the new software must be installed as instructed in the section 9.2 using the updated URL).
- This will automatically generate the correct parameter values for your panel in each box (the parameter values will appear on the three boxes)
- > Once this input process is done, Click "Send".
- If the entered figures are acceptable, the software program of the built-in MCU of this LED Driver will allow users to download the values and the LED Driver will perform the output values.
- If the entered figures are NOT acceptable, the selected "Verify Setting Values" function in the MCU will reject the download process.

Also, the window shown below will appear as a failure notice(warning).

Then user has to check the values and so need to try new acceptable values or stop the process.

krodel Select		
* CV-122	O CYT2ED	C CVL AI
zere Lst		-
na santanaan i		
an Antabatan	No lance sprace	ŝen:
		· Record
		A GENODEL
	Pere Lat	SeeLst

- When the download process is complete without any of waring window shown above, users need to proceed to the last process. The process is to check the downloading status. To determine whether the download is done or not by using the "Read Setting Value" function.
- Press the "Read Setting Value" button, then the adopted values will be shown on the 3 boxes located on the right side of Read Setting Value Button.
- If those values are the same as the above input values in the 3 boxes, every process is well executed – Confirmed -.

💀 LED Driver Setting	- D >	<
Port S Port S Port S Port S Current set? Innolux 15: 67: M19806E-L30 Port Innolux 18: 67: M19806E-L30 Innolux 18: 67: M19806E-L32 Innolux 18: 67: M19806E-L30 Innolux 18: 67: M19806E-L30 Innolux 18: 67: M19806E-L30 Innolux 18: 67: M19806E-L30 Innolux 20: M200HL-L30 Innolux 20: M20H	Model Select © CVT120 O CVT230 O CVT_ULT Panel List	
☑ Bac Innoiux 21.5" M(219HC)-L3N" Innoiux 21.5" M(219HC)-L3N" Innoiux 21.5" M(219HC)-L3N of version" Innoiux 21.5" M(219HL-30 new version") Innoiux 21.5" M(219HL-30 new version") Innoiux 21.5" M(219HL-30 new version") Innoiux 21.5" M(219HL-30 new version") Innoiux 21.5" M(219HL-30 new version") Innoiux 21.5" M(219HL-30 new version") Innoiux 21.5" M(219HL-30 new version") Innoiux 21.5" M(219HL-30 new version") Innoiux 21.5" M(219HL-30 new version") Innoiux 21.5" M(219HL-30 new version") Innoiux 22.5" M(219HL-30 new version") Innoiux 22.5" M(219HL-30 new version") Innoiux 22.5" M(239HL-30 new version") Innoiux 22" M(239HL-30 new version") Innoiux 23" M(239HL-30 new version") Innoiux 23" M(239HL-30 new version") Innoiux 23" M(239HL-30 new version") Innoiux 23" M(239HL-30 new version")	Current set per Channel Maximum Voltage Setting	
Read Setting Channel	Ch Current mA Voltage V Get Model Info	
Measure Value Channel	Ch Current mA Voltage V V1.2 www.disteck.co	m

9.6 Regarding the "Backlight output Protection" Function

This function is used to detect any possible error during the final product test which is done after completing all the procedures aforementioned including connecting the target LCD Panel with the users' Driving Board.

- Once the assembly work is done, the computer signal cable is to be connected and plugin 12V DC Power Jack in order to test the final product.
- At this point, if no video image appears and the backlight of LCD Panel does not turn on, they may be due to the failures described below:

-. Case A

During the input process of setting values, parameter values exceeding the spec requirement level of the target LCD panel may have been applied.

-. Case B

The target LCD panel may have been connected to a wrong product by the user.

(When a different LCD panel is connected by a mistake and its spec requirements need higher level values than what has been applied to the LED Driver, the panel may be turned on but the brightness of the display will be more dim than its typical level.)

In the Case A and B, the status of two LEDs on this Driver PCB shows "On" and "Off" oscillation and will finally stay "Off", (please see the explanation below and next page)

🖳 LED Driver Setting			1 <u>007</u> 03		×
Port State : Close Port Open Close	Model Select	С) CVT.	LULT	
	Panel List			~	
☑ Backlight output Pr	otection				
✓ Verify Setting Value	2				
	Channel Current set per Channel Maximum Voltage	Setting		Send	
Read Setting Value	Channel Ch Current mA Voltage	v	Get	Model I	nfo
Measure Value on Operating	Channel Ch Current mA Voltage	V V1.2	www.d	listeck	.com

10. Appendix – B : On & Off Status of 2 LEDs on the PCB

Before power on condition (Factory Default)
 LED 1 and LED2 are all "Off" condition



After fit up all connections (refer to the division 9.1, 9.4 & 9.5 / page13, 15 & 16)
 LED 1 is "On" (color in Orange) and LED2 is "Off" condition



• starting the test of "Function Enable" (refer to the division 9.6 / page17)

-. LED 1 is "On" (color in Orange) and LED2 is "On" (color in Green) however, LED 2 will be On for 3 seconds and switch to Off for another 3 seconds, in other words the LED 2 will oscillate total 4 times between "On" and "Off" status at interval for 3 seconds and eventually be "Off" status if the setting values are out of range from LCD Panel spec level.



During this status of "On" and "Off" oscillation, inside this LED Driver, the software program is going through following processes :

- The software logic program installed inside MCU is checking the number of Channels, Current (at mA), forwarding Voltage of the connected LCD panel.
- The software program will compare verify the checked requirements (information of the panel) and setting values through the division 9.4 or 9.5 process, then judge whether the setting values are within the permitted range of LCD rating or not.

Ultimately, when all the input values and the target LCD spec requirement match, LED 2 will keep going the status of "On" in Green color but if not, LED 2 will be blinking continuously. On condition that the LED 2 is status "On & Off", consequently there is nothing going out current from LED Driver.



When user see the "Off" status finally, user has to check the LCD spec requirement in relevant spec sheet and so resettle the LED Driver through the process 9.4 or 9.5

It must be noted that LED 1 will always in Orange color from the status 9.1 throughout the rest of all the procedures.

