2018

Data Sheet

Model No :

- *IFL123-SL01 for LA123WF1-SL01 panel*
- *IFL123-SL02 for LA123WF1-SL02 panel*

INTERFACE BOARD FOR LGD 12.3”, LA123WF1-SL01 & LA123WF1-SL02 WITH LED DRIVER

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Revision History

PCB Version	Rev. date	Revision Details
ES1	Dec. 2016	● Engineering Sample
R1	Feb. 2017	● Initial version issued
R2	Mar, 2017	● Changed BLCU IC to MP3391 ● Added a HDMI Connector for DVI Receiver ● Added an EEPROM for EDID ● Added a VR for Vcom adjustment ● Changed the board size ● Updated power consumption
R3	Feb, 2018	● Enlarge the PCB dimension from 179x54 mm (PCB ver.R2) to 198x63 mm (PCB ver. R3) ● Lengthening the width between the HDMI connector and LVDS Connector (CN4, LVDS-in Port) for easy plugging in the LVDS cable ● Adoption of Detachable Daughter Board for Backlight connector, refer to the page 7

1. Spec Summary

- **Digital Video Interface for LG LA123WF1-SL01 and LA123WF1-SL02**
- 2 input types are available, LVDS or DVI type.
- Support 8 bits direct Single-link LVDS Input mode (Can not be used with DVI type)
- Support 8 bits RGB 4:4:4 DVI Input mode (Can not be used with LVDS type)
- Integrated Backlight Controller with Analog and PWM dimming
- Integrated power management with single 12V input
- **Integrated power supply for VGH/VGL/VCOM**
- **Integrated Gamma reference voltage supply**
- Integrated EDID for DVI mode.
- Caution : the “DVI to HDMI” or “HDMI to HDMI” connection cable between users’ PC and this driving board is recommended to adopt max 1 meter long cable.

2. General Description

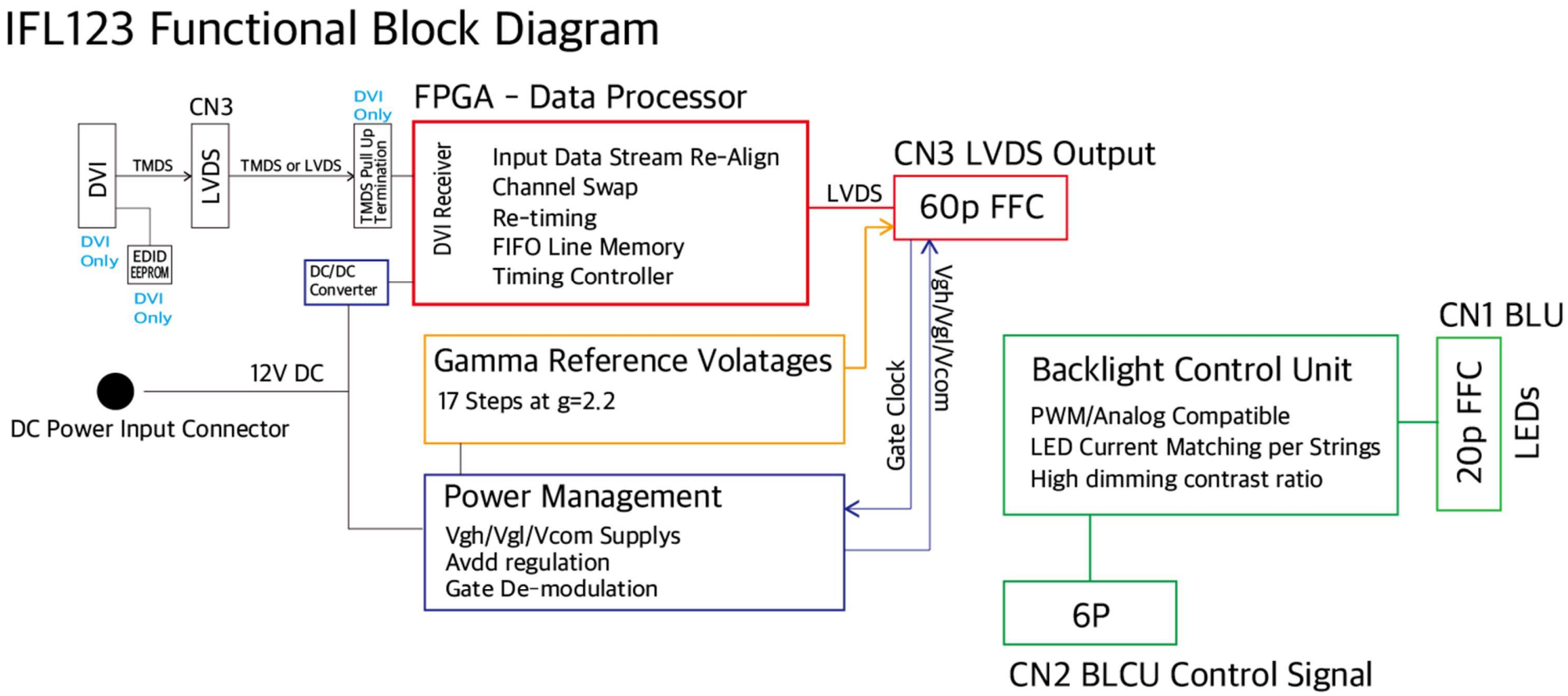
IFL123 is designed for ready to use application with LG LA123WF1-SL01 and SL02 panels. LG LA123WF1 LCD has unique LVDS mapping which prevents typical panel driving technology for ordinary usage.

-. **LVDS data stream has to be re-aligned by from left/right order to odd/even order in order to see one unity screen. Without LVDS re-alignment, user will see odd/even pixel on left/right sides of LCD panel just like two separated screens.**
IFL123 has a high speed digital processor that realigns LVDS pixel mapping. Data processing delay is less than 1 line.

-. IFL123 also supplies power requirements for LCD panel such as Vgh, Vgl, Vcom and Gamma reference voltages with single DC12V input.

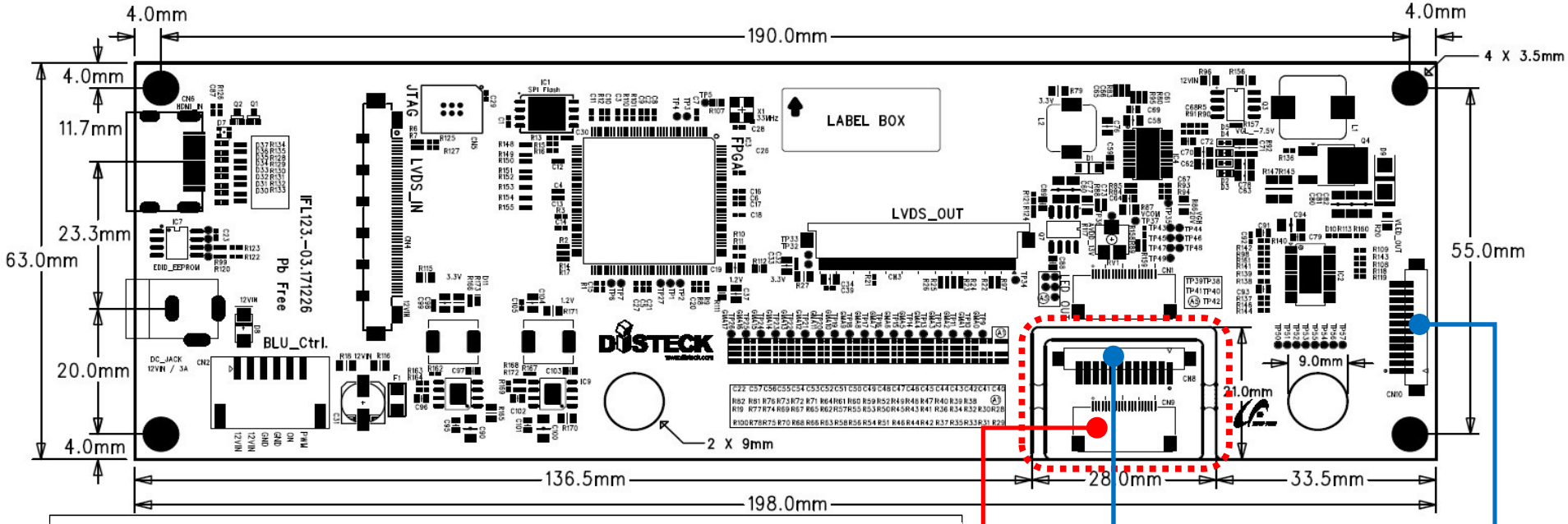
IFL123 provides backlight control unit with just in-place connector for BLU(LED) FFC cable from LA123WF1 panel side. Placement guide holes are crafted on the PCB for easier positioning when attaching the board to rear side of LCD panel.

3. Block Diagram

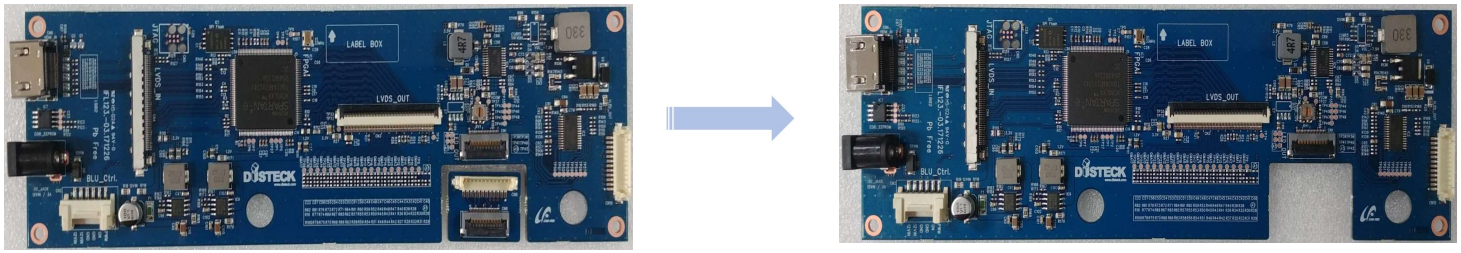


4. Dimension and Picture

4.1 Dimension (198 x 63 mm)



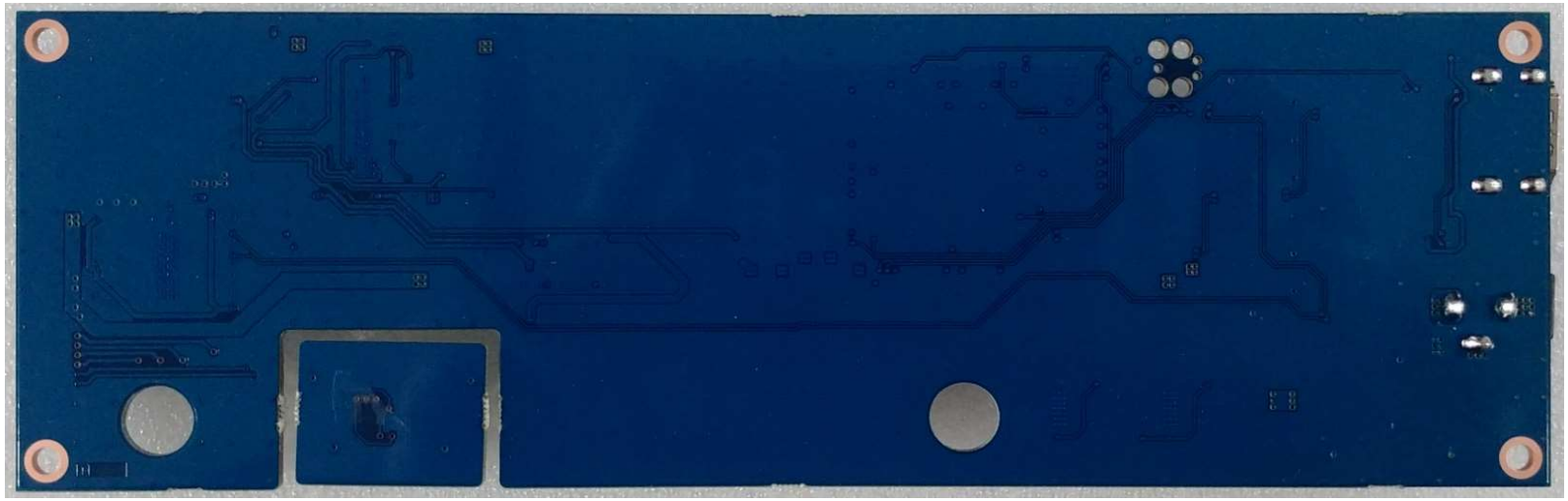
It is a Daughter Board for LED Power Cable connection in between the built-in Backlight Cable on LCD Module and this IFL 123 Board, which can be separated from the PCB of IFL123 board. When user needs to fit up the main board PCB at a different level, user **can detach** this daughter board and connect it with wire cable like right side style in blue color.



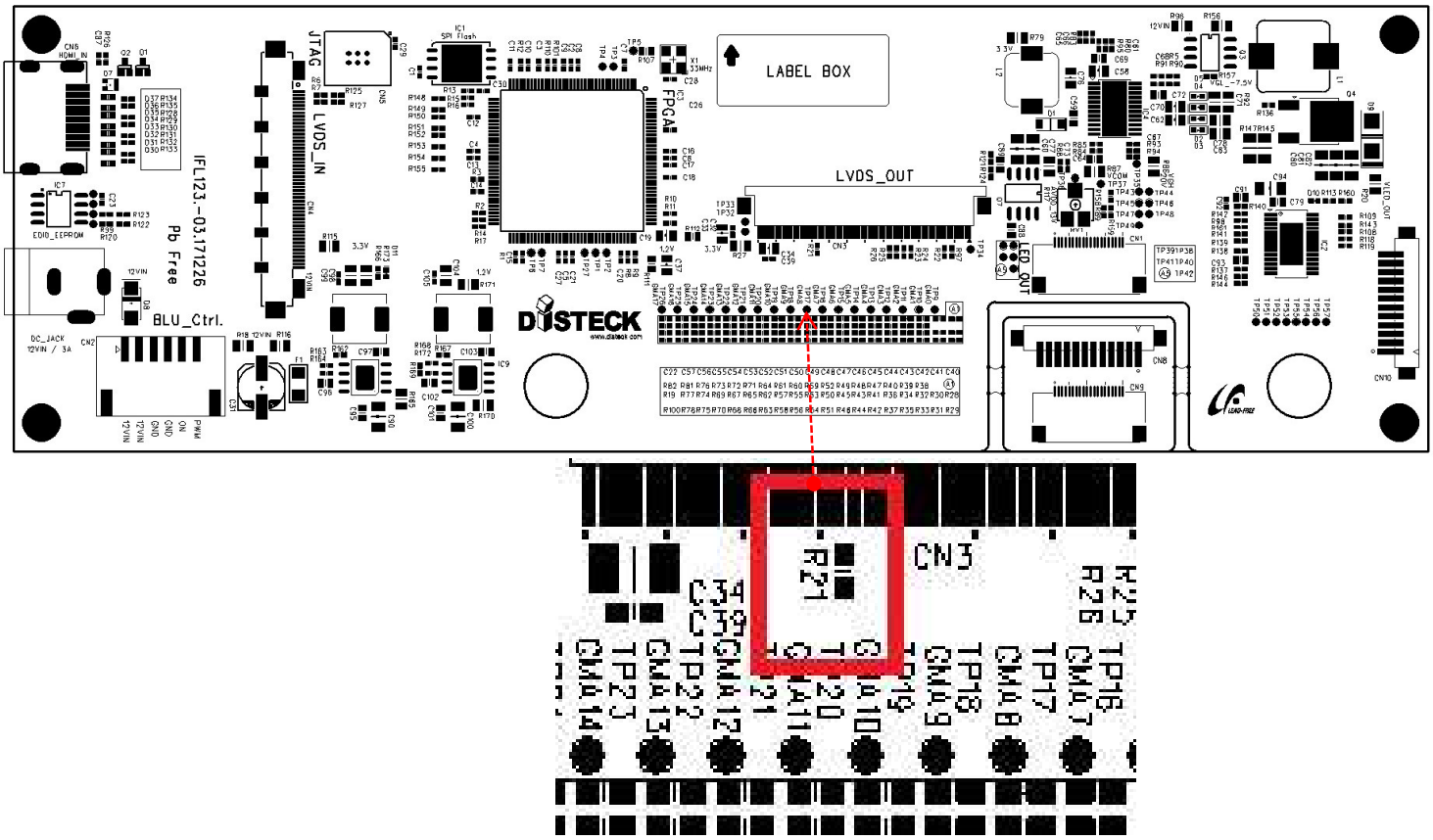
4.2 Picture

4.2.1 TOP

4.2.2 BOTTOM



4.3 Classification of LCD Model



There are 2 versions of LG 12.3” LCD Displays.

-. LA123WF1-SL01 : the pin no 43 on CN1 (60 pins) is V_{DD} .

-. LA123WF1-SL02 : the pin no 43 on CN1 (60 pins) is NC .

The driving board (IFL123-SLx) has been designed to support the above both models without hardware change any more.

However if any user wants to classify two different models by hardware setting, user ca remove the above resister “R21” (0 ohm 1005 Type) from the board for the LA123WF1-SL02 setting.

5. Connectors and Pin information

5.1 Connector Information

CONN	Class	Direction	Service
CN1	BLU	Output	BLU LED Connection
CN2	Control	Input	BACKLIGHT ON/OFF, DIMMING CONTROL
CN3	LVDS	Input/Output	60p Dual-Link LVDS output and powers
CN4	LVDS	Input	51P Dual-Link LVDS Input with power
CN5	JTAG	Input/Output	JTAG Port for programming and debugging
CN6	HDMI	Input	DVI Input using HDMI connector
CN7	POWER	Input	DC 12V Input Barrel Jack for DVI mode

5.2 Mating Part Number Information

CONN	Service	Description	Direction	Board Side (Wafer)	Mating (Housing)
CN1	BLU	LED Strings	FFC	HIROSE FH28-20S-0.5SH	Provided with LCD panel
CN2	BLCU	Backlight Control	Right-Angle	Yeon-Ho SMW200-H06G	Yeon-Ho SMH200-06
CN3	LVDS	LVDS Output	FFC	Yeon-Ho 05002HR-60J05 Bottom Contact	0.5mm Pitch FFC
CN4	LVDS	LVDS Input	Right-angle	JAE Elec. FI-RE51S-HF	JAE Elec. FI-RE51HL FI-RE51CL
CN5	JTAG	FPGA Programming	Contact	Tag-o-Connect TC2030-MCP-FP	Tag-o-Connect TCP2030
CN6	DVI	DVI Input	Right-Angle	Standard HDMI	Standard HDMI
CN7	POWER	12V Input for DVI Positive on center pin	Right-angle	DC-005	EIAJ / DIN 5.0mm Diameter

5.3.1 CN1 Backlight Unit Connector

Pin No.	Function	Pin No.	Function	Pin No.	Function	Pin No.	Function	Pin No.	Function
1	Anode1	5	Anode4	9	NC	13	Cathode3	17	NC
2	Anode2	6	NC	10	Cathode1	14	Cathode4	18	NC
3	NC	7	NC	11	Cathode2	15	NC	19	Thermistor+
4	Anode3	8	NC	12	NC	16	NC	20	Thermistor-

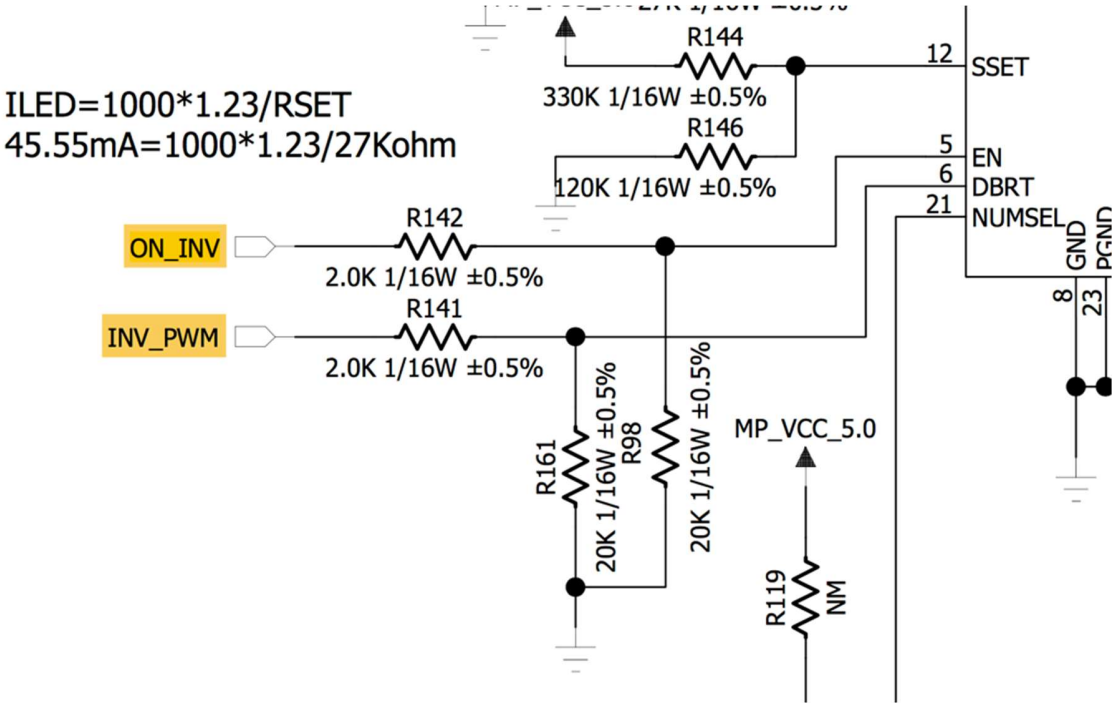
- Thermistor is not being used on this board.

5.3.2 CN2 Backlight Control Unit Signal (LVDS Version Only)

Pin No.	Function	Pin No.	Function
1	Vin	4	GND
2	Vin	5	ON_INV
3	GND	6	INV_PWM

- Backlight On/Off control
- DC Dimming Input or PWM Dimming Input
- Pin 5 and Pin 6 are internally pulled down with 20K ohm resistor after 2K ohm serial damping resistor.

Equivalent Circuit Diagram

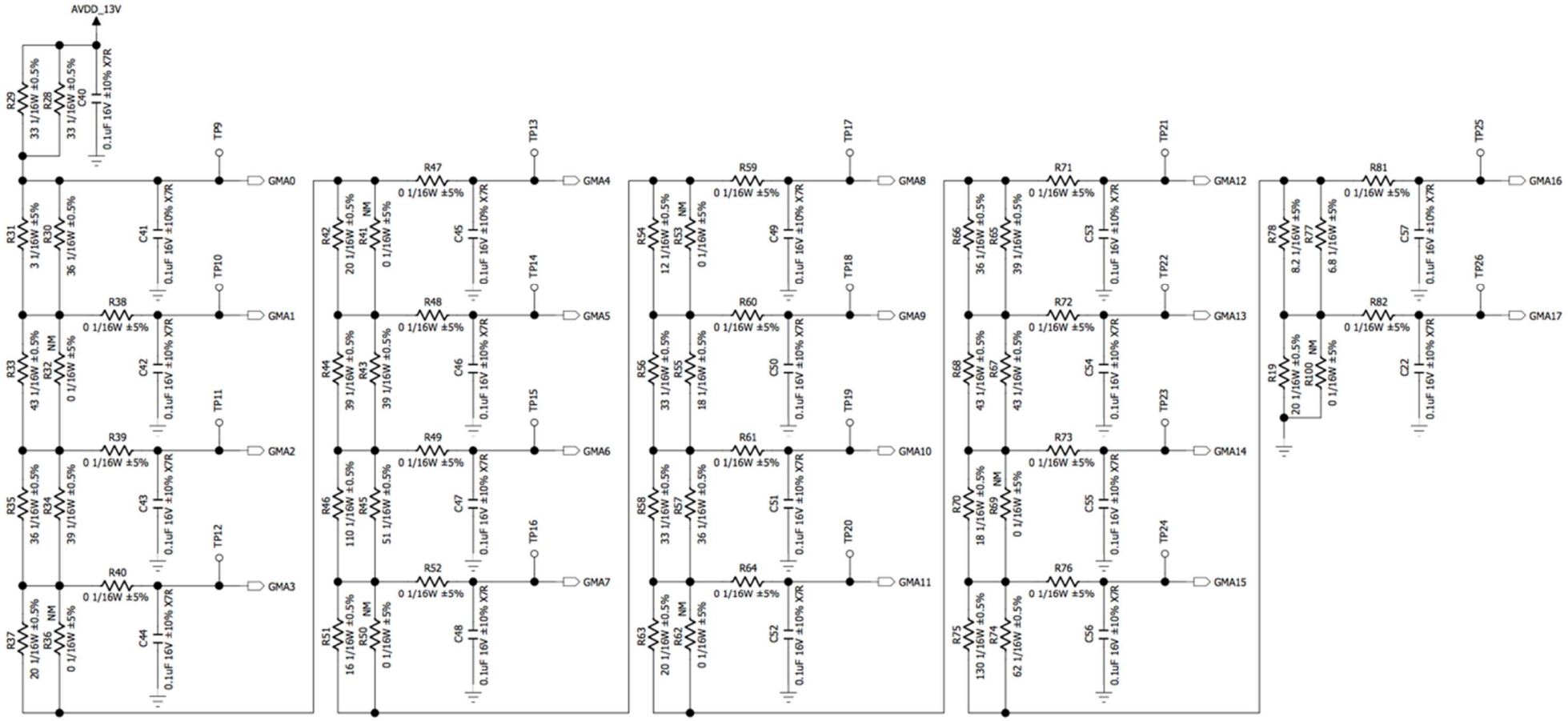


5.3.3 CN3 LVDS Output

Pin No.	Function	Pin No.	Function	Pin No.	Function	Pin No.	Function	Pin No.	Function
1	VGL	2	NC	3	VGH	4	VGH	5	GM_CLK
6	GM_EN	7	Panel Vcc	8	GND	9	RD1-	10	RD1+
11	RC1-	12	RC1+	13	RB1-	14	RB1+	15	RA1-
16	RA1+	17	GND	18	CLK1-	19	CLK1+	20	GND
21	SCAN L/R	22	SCAN U/D	23	VCOM	24	VDD	25	GMA0
26	GMA1	27	GMA2	28	GMA3	29	GMA4	30	GMA5
31	GMA6	32	GMA7	33	GMA8	34	GMA9	35	GMA10
36	GMA11	37	GMA12	38	GMA13	39	GMA14	40	GMA15
41	GMA16	42	GMA17	43	VDD(NC)	44	RD2-	45	RD2+
46	RC2-	47	RC2+	48	RB2-	49	RB2+	50	RA1-
51	RA1+	52	GND	53	CLK2-	54	CLK2+	55	GND
56	NC	57	VCOM	58	NC	59	Panel VCC	60	GND

- Pin 6 is pulled up with 4.7K ohm.
- Pin 21 is pulled down with 4.7K ohm.
- Pin 22 is pulled up with 4.7K ohm.
- Pin 43 is not connected in case of SL02 Revision panel.

Equivalent Circuit Diagram for Gamma reference voltages



5.3.4 CN4 LVDS Input (LVDS Version Only)

Pin No.	Function	Pin No.	Function	Pin No.	Function	Pin No.	Function	Pin No.	Function
1	GND	2	ON_INV	3	INV_PWM	4	SCL	5	SDA
6	NC	7	NC	8	GND	9	NC	10	GND
11	GND	12	RO0-	13	RO0+	14	RO1-	15	RO1+
16	RO2-	17	RO2+	18	RO3-	19	RO3+	20	GND
21	ROCLK-	22	ROCLK+	23	GND	24	NC	25	NC
26	GND	27	GND	28	RECLK-	29	RECLK+	30	GND
31	RE0-	32	RE0+	33	RE1-	34	RE1+	35	RE2-
36	RE2+	37	RE3-	38	RE3+	39	NC	40	NC
41	GND	42	GND	43	GND	44	GND-	45	GND
46	GND	47,48	Panel VCC	49,50,51	12V IN				

Pin 47 and 48 are not required for normal operation. Leave opened. Do not connect any.

5.3.5 CN5 JTAG Connector

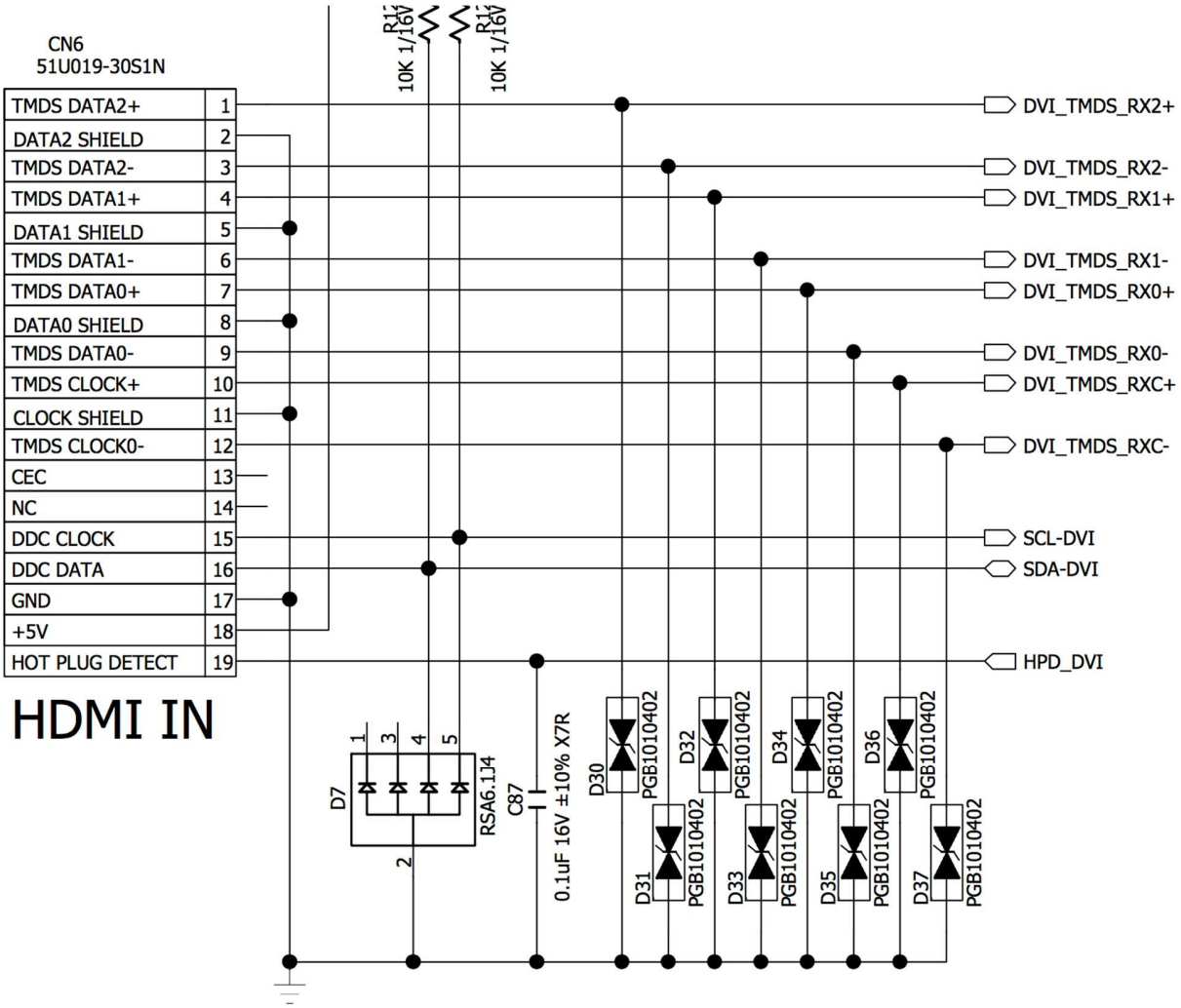
Internal Use only

5.3.6 CN6 HDMI Connector (HDMI Version Only)

Pin No.	Function	Pin No.	Function	Pin No.	Function	Pin No.	Function	Pin No.	Function
1	Data2 +	5	GND	9	Data1 -	13	NC	17	GND
2	GND	6	Data1 -	10	Clock +	14	NC	18	+5V
3	Data2 -	7	Data0 +	11	GND	15	SCL	19	HPD
4	Data1 +	8	GND	12	Clock -	16	SDA		

- All TMDS Data lines are protected with ultra low capacitance ESD diodes including Clocks.
- SCL and SDA are protected with 6.1V Zener diode.
- Pin 19 HPD is internally pulled up with 10K ohm with an active switch.

Equivalent Circuit Diagram



5.3.7 CN7 DC Connector (HDMI Version Only)

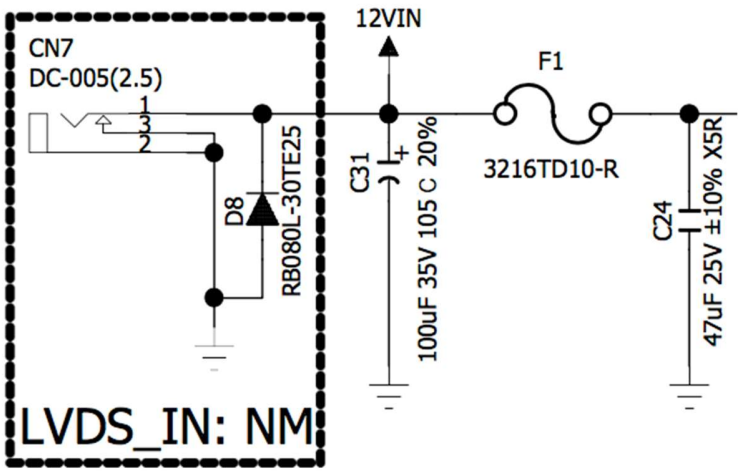
Pin No.	Function
1	Vin
2	GND
3	SENSE

Pin 3 Sense is not used.

5.3.8 F1 Fuse

Size : 3216 SMD
Rating : TBD

Equivalent Circuit Diagram



6. Electronic Characteristics

6.1 Operating Range

Symbol	Description	Min	Typ.	Max	Unit
Vcc12	Voltage for Board and Panel	+10.5	+12.0	+16.5	Vrms (DC)
Ivcc12	Current for Board and Panel		1.56A	2.0A	

6.2 Power Consumption

Test Condition

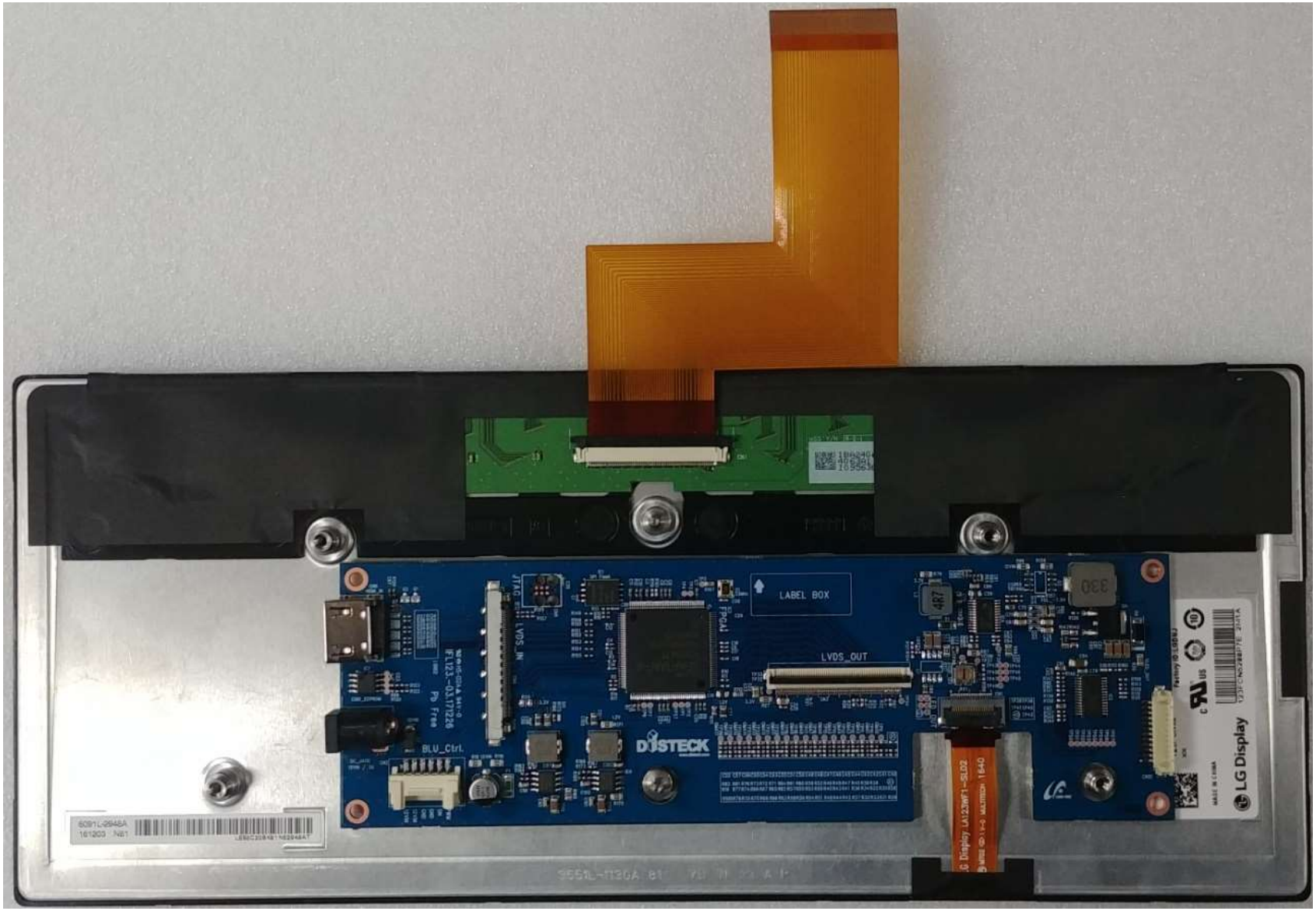
DC12.0V, Ta=25℃, Input Port = DVI, LCD Panel = LG Display LA123WF1-SL01
Video Format = RGB 4:4:4 1920x720 at 60Hz

Power Consumption

Max 19 W with LG LA123WF1-SL01 / LA123WF1-SL02 and IFL123 Board

7. Pictures

7.1 Assembled Picture with LG LA123WF1 Panel + IFL123 Board


LABEL BOX
LVDS_OUT
LVDS_IN
JTAG
BLU_Ctrl.
DISTECK
LG Display

8. Miscellaneous Data

8.1 Operating Temperature

Recommended

0 ~ 45 ℃

Absolute

-10 ~ 60 ℃

8.2 Storage Temperature

Non-operational

-20 ~ 60 ℃ (Non-condensing)

8.3 LVDS(HDMI) Input Timing Information

Hactive = 1920

Hblank = 128

Htotal = 1920+128

Vactive = 720

Vblank = 10

Vtotal = 720+10

Pixel Clock = 89.7MHz at 60Hz

All parameters must be **EVEN** numbers.

8.4 Timing information for Raspberry Pi

Add following information to CONFIG.txt at Rasberry Pi bootloader.

- hdmi_group=2
- hdmi_mode=87
- hdmi_timings=1920 0 0 2 126 720 0 2 2 4 0 0 0 60 0 89456640 8

8.5 Dimming Information

IFL123SR supports both Analog dimming and PWM dimming.

8.5.1 PWM Dimming

Vmin=0V
Vmax=3.3V
Fpwm = 100Hz ~ 20KHz

Apply PWM to BLU_PWM of CN2 pin6.
Recommended Fpwm = 180Hz

8.5.2 Analog Dimming

DC Range

0.2V to 1.2V

Apply DC voltage to BLU_PWM of CN2 pin6.
Please refer to CN2 for equivalent circuit for pull down resistor information.

8.6 Packaging

8.6.1 Packing

Packed with anti-static PE bag with sealing.

8.6.2 Carton Structure

TBD

8.6.3 Boxing

TBD

8.6.4 Palette

TBD

8.7 Electrostatic Discharge Caution

The board has limited built-in ESD protection.
he board has limited built-in ESD protection.
The board should be placed in conductive foam during storage or handling to prevent electrostatic damage to the board.

9. Ordering Information

9.1 Input Module

Order Code	Description	Status
IFL123-L1	Interface board for LA123WF1-SL01	AVAILABLE
IFL123-L1-DVI	Interface board for LA123WF1-SL01 with DVI	AVAILABLE
IFL123-L2	Interface board for LA123WF1-SL02	AVAILABLE
IFL123-L2-DVI	Interface board for LA123WF1-SL02 with DVI	AVAILABLE