

☐ Preliminary Specifications

☒ Final Specifications

Module	LCD Controller Board (AD Board) For LCD Display (4096x2160)
Model Name	AD-0095
Document Version	Rev.V5

Customer

Approved by

Date

Notice : This Specification is subject to change without notice.

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TWScreen

Revision History

Version	Date	Revised Content/Summary	Page	Remark
2	2019/12/09	First Edition	All	
3	2020/5/6	Modify data error, A. DC JACK D=2.5mm => DC JACK D=2.0mm B. 4-11 VGA Signal Input Pin NO.19 => 10	7 14	
4	2020/7/23	Add new description 1.General Function E. DisplayPort connector output (MST Daisy-Chain Output) (Optional) M. IR receiver (Optional)	4	
		Modify data error 2.Specification 1. Remove user control (up , down) optional 2. (internal power) 5V-standby => (external power) 5V-standby	5	
		Modify description 3-6. CN2 Power Input : 12V , 5V , 5V-Standby Power Input and Control Signal (Optional) => External Power Supply (Optional) 4-6. Power Input (Internal Power) => External Power Supply (Optional)	6 8	
5	2020/10/6	Modify drawing 5. LCD Controller Board Dimension	16	

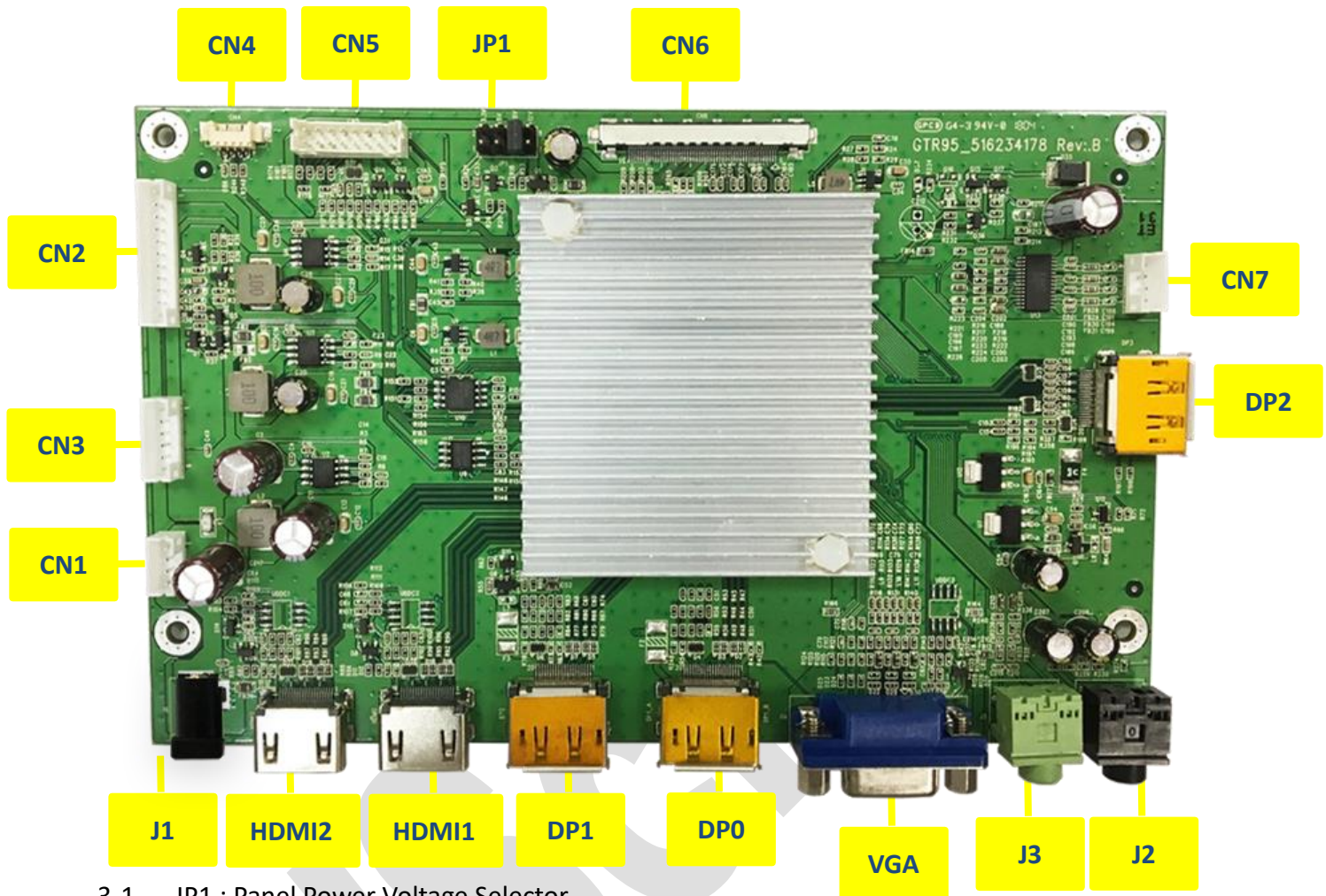
1. General Function

- A. Large size TFT-LCD module driver board
- B. Resolution up to 4096 x 2160 @ 60Hz
- C. 15 PIN D-SUB VGA connector input
- D. TWO DisplayPort 1.2 connector input
- E. DisplayPort connector output (MST Daisy-Chain Output) (Optional)
- F. TWO HDMI 2.0 connector input
- G. Support non-linear scaling from 4:3 to 16:9 or 16:9 to 4:3
- H. Support 4096x2160/60Hz 8-lane and 4-lane eDP panel
- I. Support 4096x2160/60Hz 8-lane V-by-one panel
- J. OSD (On Screen Display) control menu
- K. 10W+10W Class D audio amplifier (at 8 ohm)
- L. Audio input/output
- M. IR receiver (Optional)
- N. Light sensor control (Optional)
- O. Standby mode(DPMS) less than 0.5W

2. Specification

Model	AD-0095
Panel Interface	8-lane V-by-one / 8-lane eDP / 4-lane eDP
Maximum Resolution	4096x2160
Vertical Refresh Rate	Max. 75Hz
Input Source	VGA Analog (15pin D-Sub) DisplayPort x 2 HDMI x 2 DC Jack 2.0mm
Audio Input/Output	3.5mm Earphone (1Vrms)
Audio AMP Output	10W+10W at 8 ohm SPK
Dot Clock Maximum (Pixel clock)	VGA / 210 MHz DisplayPort / 5.4G Hz HDMI / 6G Hz
User Controls	Power On/Off , Menu , Exit , Right , Left
Control signal	IR , Light Sensor (option)
Board Dimension	175 x 110 x 14.5 mm
Power consumption at normal mode (not included panel consumption and MHL charger)	5W Max
Voltage for LCD Panel	3.3V , 5V , 10V , 12V DC (Jump Select)
Input Voltage	DC 12V (external power) 12V/5V/5V-standby
Storage Temperature Limits	Temperature -40°C~70°C
Operation Temperature Limits	Temperature 0°C~50°C Humidity : Less than 85%

3. Interface



- 3-1. JP1 : Panel Power Voltage Selector
- 3-2. J1 : DC Jack Power Input : 12V (external power)
- 3-3. J2 : Audio Signal Output
- 3-4. J3 : VGA Signal Audio Input
- 3-5. CN1 : Power Input : 12V
- 3-6. CN2 : External Power Supply (Optional)
- 3-7. CN3 : Backlight Control : Backlight Power and Control Signal
- 3-8. CN4 : Uart Port Input (optional)
- 3-9. CN5 : OSD Key Input : OSD Key , Light Sensor and IR Control (Optional)
- 3-10. CN6 : V-By-One Signal Output & 8-Lane eDP Signal Output
- 3-11. CN7 : Speak Output
- 3-12. VGA : VGA Signal Input
- 3-13. DP0 : DisplayPort Signal Input (DP1.2)
- 3-14. DP1 : DisplayPort Signal Input (DP1.2)
- 3-15. DP2 : DisplayPort Signal Output : DP MST Daisy-Chain Output (Optional)
- 3-16. HDMI1 : HDMI Signal Input (HDMI2.0)
- 3-17. HDMI2 : HDMI Signal Input (HDMI2.0)

4. Signal input connections

4-1 Panel Power Voltage Selector For V-By-One Panel and eDP Panel

Location – JP1 : 2x4pin pitch 2.5mm

Pin Assign and Definition

Pin No.	Define
PIN1,PIN2 Short	Panel Power = 3.3V
PIN3,PIN4 Short	Panel Power = 5V
PIN5,PIN6 Short	Panel Power = 10V
PIN7,PIN8 Short	Panel Power = 12V

4-2 DC Jack Power Input (external power)

Location – J1 : DC JACK D=2.0mm 12V DC Input

4-3 Audio Signal Output

Location – J2 : SCJ349D00US0G04G 5P Black or equivalent

Pin Assign and Definition

Pin No.	SYMBOL
1,2	Audio R-CH Output
3,4	Audio L-CH Output
5	GND

4-4 VGA Signal Audio Input (1Vrms)

Location – J3 : SCJ349D00US0G04G 5P Green or equivalent

Pin Assign and Definition

Pin No.	SYMBOL
1,2	Audio R-CH Output
3,4	Audio L-CH Output
5	GND

4-5 Power Input

Location – CN1 : 4pin wafer pitch 2.0mm STM M24264 or equivalent

Pin Assign and Definition

Pin No.	SYMBOL
1	+12V
2	+12V
3	GND
4	GND

4-6 External Power Supply (Optional)

Location – CN2 : 11pin wafer pitch 2.0mm STM M242611 or equivalent

Pin Assign and Definition

Pin No.	SYMBOL	Pin No.	SYMBOL	Pin No.	SYMBOL
1	12V Normal IN	5	5V Normal IN	9	Backlight ON/OFF Control Hi => ON , Low => OFF
2	12V Normal IN	6	5V Normal IN	10	Backlight Adjust 0~5V or PWM
3	GND	7	GND	11	12V Normal and 5V Normal ON/OFF Hi => ON , Low => OFF
4	GND	8	5V Standby IN	---	-----

4-7 Backlight Control

Location – CN3 : 6pin wafer pitch 2.0mm STM M24266 or equivalent

Pin Assign and Definition

Pin No.	SYMBOL	Pin No.	SYMBOL
1	GND	4	Backlight ON/OFF Control Hi => ON , Low => OFF
2	GND	5	+12V
3	Backlight Adjust 0~5V or PWM Output	6	+12V

4-8 OSD Key Input : OSD Key , Light Sensor and IR Control (Optional)

Location – CN5 : 2x8 16pin wafer pitch 2.0mm STM MD24215P16 or equivalent

Pin Assign and Definition

Pin No.	SYMBOL	Pin No.	SYMBOL	Pin No.	SYMBOL
1	VCC 3.3V	7	LS SCL (Optional)	13	Right Key
2	IR IN (Optional)	8	LS SDA (Optional)	14	Left Key
3	GND	9	Power Key	15	NC
4	GND	10	Menu Key	16	NC
5	LED G	11	Exit Key	---	-----
6	LED O	12	NC	---	-----

4-9-1 V-By-One Signal Output

Location – CN6 : 51pin connector JAE FI-RE51S-HF or equivalent

Pin Assign and Definition

Pin No.	SYMBOL	Description
51	Vin	Power input (+12V)
50	Vin	Power input (+12V)
49	Vin	Power input (+12V)
48	Vin	Power input (+12V)
47	Vin	Power input (+12V)
46	Vin	Power input (+12V)
45	Vin	Power input (+12V)
44	Vin	Power input (+12V)
43	N.C.	No Connection
42	GND	Ground
41	GND	Ground
40	GND	Ground
39	GND	Ground
38	GND	Ground
37	N.C.	
36	N.C.	
35	N.C.	
34	SDA	SDA-V-by-one
33	SCL	SCL-V-by one
32	N.C	
31	N.C.	
30	N.C.	

29	N.C	
28	N.C	
27	HTPDN	Hot plug detect output,
26	LOCKN	Lock detect output,
25	GND	Ground
24	RX0N	1st Pixel Negative V by One differential data input lane 0.
23	RX0P	1 st Pixel Positive V by One differential data input lane 0.
22	GND	Ground
21	RX1N	2 nd Pixel Negative V by One differential data input lane 1.
20	RX1P	2 nd Pixel Positive V by One differential data input lane 1.
19	GND	Ground
18	RX2N	3 rd Pixel Negative V by One differential data input lane 2.
17	RX2P	3 rd Pixel Positive V by One differential data input lane 2.
16	GND	Ground
15	RX3N	4 th Pixel Negative V by One differential data input lane 3.
14	RX3P	4 th Pixel Positive V by One differential data input lane 3.
13	GND	Ground
12	RX4N	5 th Pixel Negative V by One differential data input lane 4.
11	RX4P	5 th Pixel Positive V by One differential data input lane 4.
10	GND	Ground
9	RX5N	6 th Pixel Negative V by One differential data input lane 5.
8	RX5P	6 th Pixel Positive V by One differential data input lane 5.
7	GND	Ground
6	RX6N	7 th Pixel Negative V by One differential data input lane 6.
5	RX6P	7 th Pixel Positive V by One differential data input lane 6.
4	GND	Ground
3	RX7N	8 th Pixel Negative V by One differential data input lane 7.
2	RX7P	8 th Pixel Positive V by One differential data input lane 7.
1	GND	Ground

4-9-2 8-Lane eDP Signal Output

Location – CN6 : 51pin connector JAE FI-RE51S-HF or equivalent

Pin Assign and Definition

Pin No.	SYMBOL	Description
51	Vin	Power input (+12V)
50	Vin	Power input (+12V)
49	Vin	Power input (+12V)

48	Vin	Power input (+12V)
47	Vin	Power input (+12V)
46	Vin	Power input (+12V)
45	Vin	Power input (+12V)
44	Vin	Power input (+12V)
43	N.C.	No Connection
42	GND	Ground
41	GND	Ground
40	GND	Ground
39	GND	Ground
38	GND	Ground
37	2 nd AUX_CH_P	
36	2 st AUX_CH_N	
35	N.C	
34	N.C	
33	N.C	
32	1 st AUX_CH_P	
31	1 st AUX_CH_N	
30	N.C	
29	N.C	
28	N.C	
27	1st HPD	Hot plug detection
26	2 nd HPD	Hot plug detection
25	GND	Ground
24	2 nd Lane0_N	Negative eDP differential data input
23	2 nd Lane0_P	Positive eDP differential data input
22	GND	Ground
21	2 nd Lane1_N	Negative eDP differential data input
20	2 nd Lane1_P	Positive eDP differential data input
19	GND	Ground
18	2 nd Lane2_N	Negative eDP differential data input
17	2 nd Lane2_P	Positive eDP differential data input
16	GND	Ground
15	2 nd Lane3_N	Negative eDP differential data input
14	2 nd Lane3_P	Positive eDP differential data input
13	GND	Ground
12	1 st Lane0_N	Negative eDP differential data input
11	1 st Lane0_P	Positive eDP differential data input

10	GND	Ground
9	1 st Lane1_N	Negative eDP differential data input
8	1 st Lane1_P	Positive eDP differential data input
7	GND	Ground
6	1 st Lane2_N	Negative eDP differential data input
5	1 st Lane2_P	Positive eDP differential data input
4	GND	Ground
3	1 st Lane3_N	Negative eDP differential data input
2	1 st Lane3_P	Positive eDP differential data input
1	GND	Ground

4-9-3 4-Lane eDP Signal Output

Location – CN6 : 51pin connector JAE FI-RE51S-HF or equivalent

Pin Assign and Definition

Pin No.	SYMBOL	Description
51	Vin	Power input (+12V)
50	Vin	Power input (+12V)
49	Vin	Power input (+12V)
48	Vin	Power input (+12V)
47	Vin	Power input (+12V)
46	Vin	Power input (+12V)
45	Vin	Power input (+12V)
44	Vin	Power input (+12V)
43	N.C.	No Connection
42	GND	Ground
41	GND	Ground
40	GND	Ground
39	GND	Ground
38	GND	Ground
37	NC	
36	NC	
35	N.C	
34	N.C	
33	N.C	
32	1 st AUX_CH_P	
31	1 st AUX_CH_N	
30	N.C	

29	N.C	
28	N.C	
27	HPD	Hot plug detection
26	NC	
25	GND	Ground
24	Lane0_P	Positive eDP differential data input
23	Lane0_N	Negative eDP differential data input
22	GND	Ground
21	Lane1_P	Positive eDP differential data input
20	Lane1_N	Negative eDP differential data input
19	GND	Ground
18	Lane2_P	Positive eDP differential data input
17	Lane2_N	Negative eDP differential data input
16	GND	Ground
15	Lane3_P	Positive eDP differential data input
14	Lane3_N	Negative eDP differential data input
13	GND	Ground
12	NC	
11	NC	
10	GND	Ground
9	NC	
8	NC	
7	GND	Ground
6	NC	
5	NC	
4	GND	Ground
3	NC	
2	NC	
1	GND	Ground

4-10 Speak Output

Location – CN7 : 4pin wafer pitch 2.0mm STM M24264 or equivalent

Pin Assign and Definition

Pin No.	SYMBOL
1	SPK_L+
2	SPK_L-
3	SPK_R-

4	SPK_R+
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4-11 VGA Signal Input

Location – VGA : 15pin Hi-Density Female D-SUB

Pin Assign and Definition

Pin No.	SYMBOL	Pin No.	SYMBOL	Pin No.	SYMBOL
1	RED IN	6	R-GND	11	GND
2	GREEN IN	7	G-GND	12	SDA DDC
3	BLUE IN	8	B-GND	13	SYNC H
4	GND	9	PC 5V	14	SYNC V
5	GND	10	DET	15	SCL DDC

4-12 DisplayPort Signal Input (DP1.2)

Location – DP0 : DisplayPort Connector

Pin Assign and Definition

Pin No.	SYMBOL	Pin No.	SYMBOL	Pin No.	SYMBOL
1	LANE3-	8	GND	15	AUX_CHP
2	GND	9	LANE1+	16	DP DET
3	LANE3+	10	LANE0-	17	AUX_CHN
4	LANE2-	11	GND	18	HPD
5	GND	12	LANE0+	19	RETURN
6	LANE2+	13	GND	20	DP_5V
7	LANE1-	14	GND	---	-----

4-13 DisplayPort Signal Input (DP1.2)

Location – DP1 : DisplayPort Connector

Pin Assign and Definition

Pin No.	SYMBOL	Pin No.	SYMBOL	Pin No.	SYMBOL
1	LANE3-	8	GND	15	AUX_CHP
2	GND	9	LANE1+	16	DP DET
3	LANE3+	10	LANE0-	17	AUX_CHN
4	LANE2-	11	GND	18	HPD
5	GND	12	LANE0+	19	RETURN
6	LANE2+	13	GND	20	DP_5V
7	LANE1-	14	GND	---	-----

4-14 DisplayPort Signal Output (MST Daisy-Chain Output) (Optional)

Location – DP2 : DisplayPort Connector

Pin Assign and Definition

Pin No.	SYMBOL	Pin No.	SYMBOL	Pin No.	SYMBOL
1	LANE3-	8	GND	15	AUX_CHP
2	GND	9	LANE1+	16	DP DET
3	LANE3+	10	LANE0-	17	AUX_CHN
4	LANE2-	11	GND	18	HPD
5	GND	12	LANE0+	19	RETURN
6	LANE2+	13	GND	20	DP_5V
7	LANE1-	14	GND	---	-----

4-15 HDMI Signal Input (HDMI2.0)

Location – HDMI1 : HDMI Connector

Pin Assign and Definition

Pin No.	SYMBOL	Pin No.	SYMBOL	Pin No.	SYMBOL
1	HDMI1_DATA2+	8	GND	15	HDMI1_DDC_SCL
2	GND	9	HDMI1_DATA0-	16	HDMI1_DDC_SDA
3	HDMI1_DATA2-	10	HDMI1_CLK+	17	GND
4	HDMI1_DATA1+	11	GND	18	HDMI1_5V
5	GND	12	HDMI1_CLK-	19	HDMI1_HPD
6	HDMI1_DATA1-	13	NC	---	-----
7	HDMI1_DATA0+	14	NC	---	-----

4-16 HDMI Signal Input (HDMI2.0)

Location – HDMI2 : HDMI Connector

Pin Assign and Definition

Pin No.	SYMBOL	Pin No.	SYMBOL	Pin No.	SYMBOL
1	HDMI1_DATA2+	8	GND	15	HDMI1_DDC_SCL
2	GND	9	HDMI1_DATA0-	16	HDMI1_DDC_SDA
3	HDMI1_DATA2-	10	HDMI1_CLK+	17	GND
4	HDMI1_DATA1+	11	GND	18	HDMI1_5V
5	GND	12	HDMI1_CLK-	19	HDMI1_HPD
6	HDMI1_DATA1-	13	NC	---	-----
7	HDMI1_DATA0+	14	NC	---	-----

5. LCD Controller Board Dimension

