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PROMATE ELECTRONIC CO., LTD.

Product Specification

Part No.: 90LM150X1MEA0F

Description: 15” High Brightness TFT-LCD Module

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Approved By			Checked By	Prepared By
Department		Date		
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Marketing				
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Production			? Production	? Production

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Record of Revision

Version	Revise Date	Page Affected	Content
0.1	Jan./09th/2007	-	1st draft

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Contents:

1. General Description:

This specification is applied to the 15 inch TFT-LCD module。 This display supports the XGA (1024x768) screen format and 26.2K colors (RGB 6-bits input data). With reliable open frame design which integrates the ultra-high bright LED light bar and LED control board. It makes the perfect kit for your application.

2. Target Market

- Marine application
- Industrial Monitor/Out door Kiosk/ATM/POI/PID/Gas Pump
- Display in Vehicle for after market

The other applications that demand high reliability and functionality should contact our sales representative first.

3. Assembly Notes

The following guidelines are provided for installation and handling precaution while you are going to operate/ assemble this module.

①. Handle the module with care as static charge my damage the components.
②. Regulated DC is required. If an unregulated power supply is provided, it may affect/ damage operation, performance and lifetime of this module.
③. The module is not user serviceable or repairable. Warranty does not cover user's error in connecting to the module and is invalidated by unauthorized modification or repair.
④. Additional consideration should be given to:
   - Electrical insulation
   - Grounding
   - EMI shielding
   - Cable/ accessory
   - Heat and ventilation
   - Other issues may affect safety or human body

4. Main Features

4.1 General features

- RoHS compliance
- Lead free components
- Low EMI/EMC
- Operating temperature (-15°C~+60°C) and storage temperature (-20°C ~+60°C)
- Life time 50,000 hrs for panel, and MTBF 50,000 hrs for module

4.2 LCD Panel

- 1,000 nits brightness at central point, (min. 800 nits)
- Uniformity: typ. 80% (9 points)

4.3 LED Driving Board

- Typ, 12V ±10% power in,
- Built-in fan connectors (up to 4 sets), 12V power in
- Built-in Heater connectors (up to 2 sets)
- Built-in light sensor connector
- Would accept dimming control signal (DC level and PWM signal)
- Over voltage/currency protection, output short/open protection.
- Built-in one thermal sensor on board

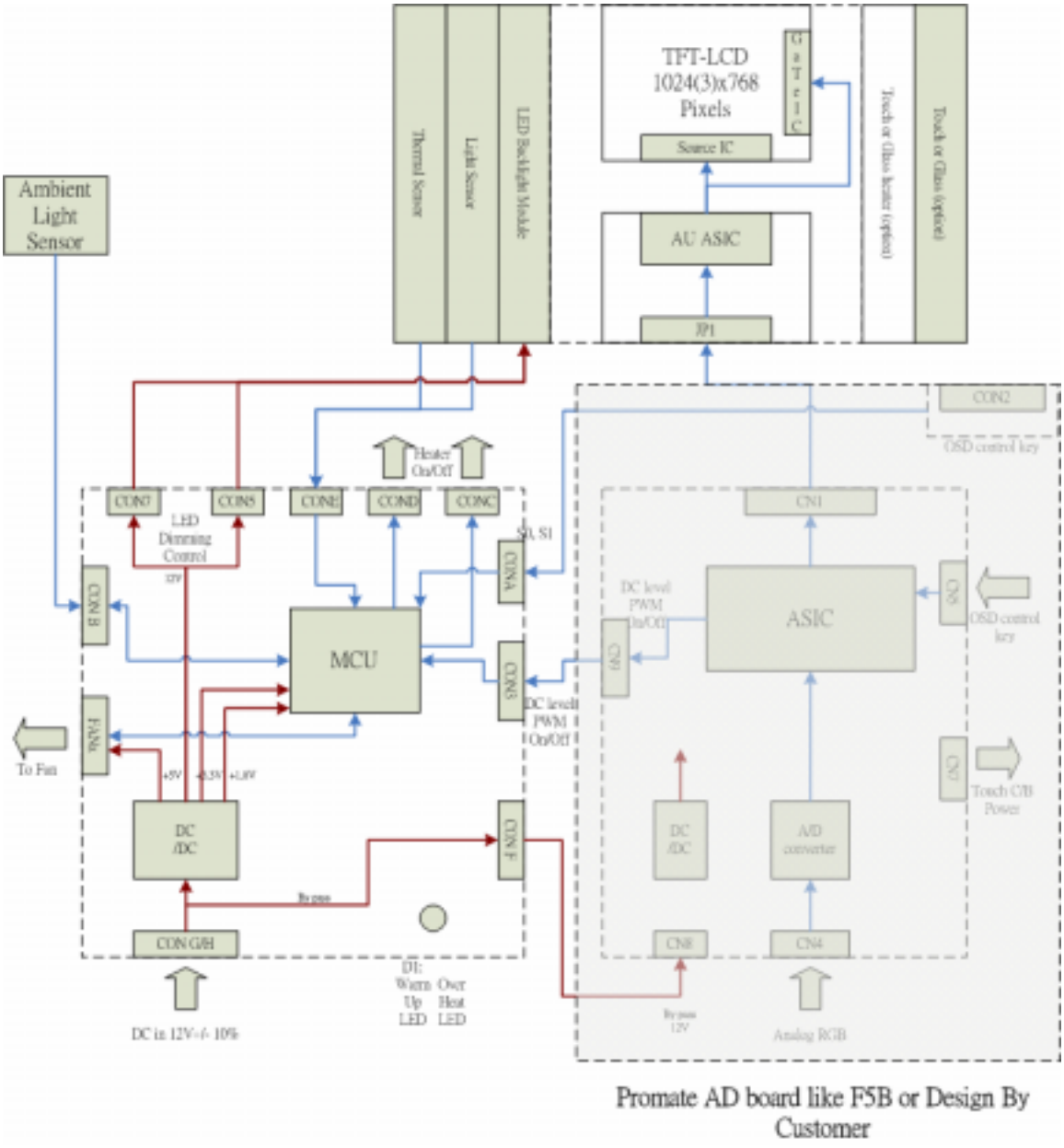
4.4 Firmware

- Two method dimming control, auto dimming (cooperate with external light sensor) and OSD dimming adjustment
- Thermal management. While ambient temperature is over 45°C, the fans will be started. While ambient temperature is under 40°C, the fans will be stopped.

4.5 Mechanical

- Front&side mount metal frame
- Built-in heat sink, but fans are not including.

5. Functional Diagram



6. Physical Characteristics

Items	Unit	Specification	Remark
Screen Diagonal	[inch]	15	
Active Area	[mm]	304.128 (H) x 228.096 (V)	
Pixels H x V		1024(x3) x 768	
Pixel Pitch	[mm]	0.297 x 0.297	
Outline Dimension	[mm]	TBD	
Weight	[Grams]	TBD	
Electrical Interface		Signal channel LVDS	
Surface Treatment		Anti-reflection, 2H hard coating	Panel surface
Mounting Method		Front mounting	

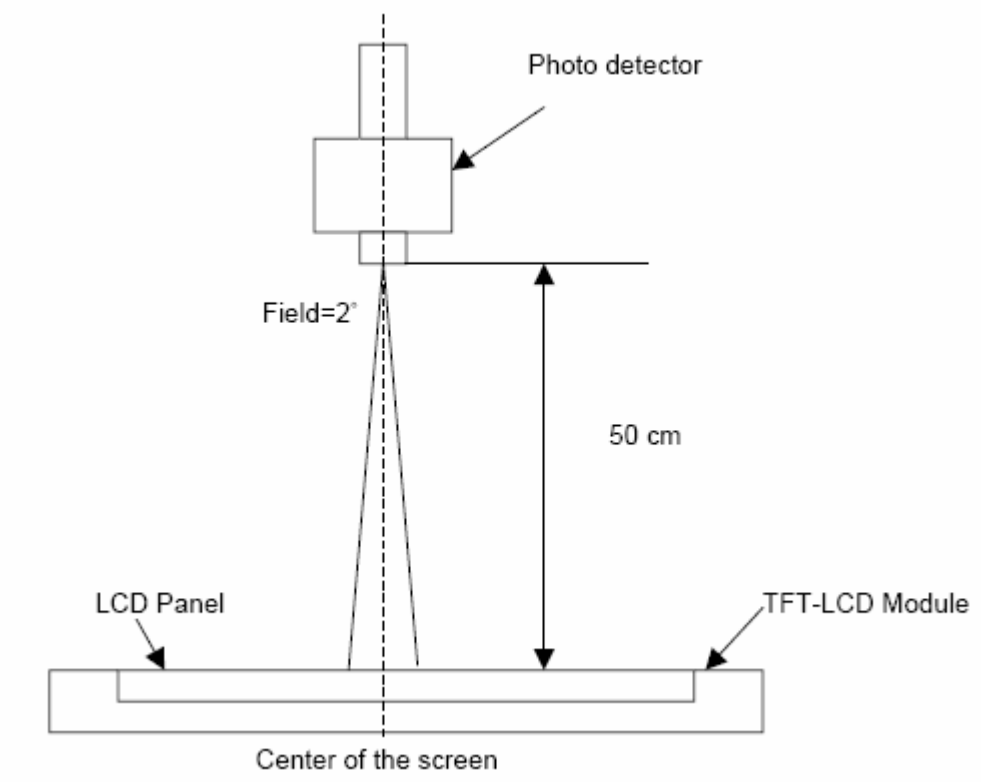
7. Absolute Maximum Ratings

Item	Symbol	Min.	Max.	Unit	Remark
Logic/LCD Drive Voltage	VDD	-0.3	+3.6	[V]	
Input Power Current	IL	-	5	[A]	ADC
Input Power Voltage	VL	10	14	[V]	VDC
Operating Temperature	TOP	-15	60	[°C]	
Operating Humidity	HOP	8	90	[%RH]	
Storage Temperature	TST	-20	60	[°C]	
Storage Humidity	HST	8	90	[%RH]	

Note 1: The temperature here is the ambient temperature.

8. Optical Characteristics

Item	Unit	Conditions		Min.	Typ.	Max.
Viewing Angle	[degree]	CR≧10	Top		40	
			Down		60	
			Left		60	
			Right		60	
Contrast Ratio					TBD	
Response Time	[msec]	Raising time			4	
		Falling time			12	
		Raising + Falling			16	
Color Chromaticity Coordinates (CIE)		Red x			TBD	
		Red y			TBD	
		Green x			TBD	
		Green y			TBD	
		Blue x			TBD	
		Blue y			TBD	
		White x		0.28	0.31	0.34
		White y		0.30	0.33	0.36
Brightness Uniformity	[%]			75	80	
White Luminance	[nits]			800	1000	



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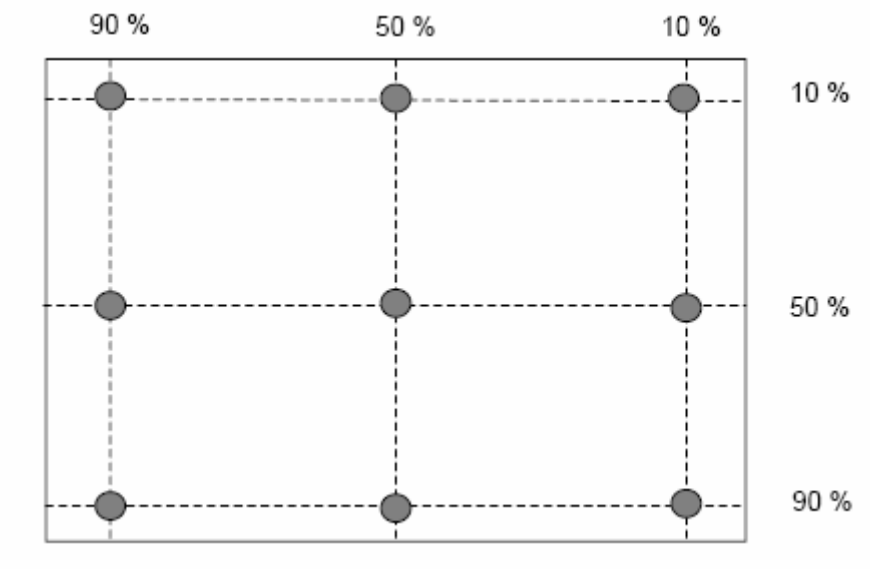
Note 1: Brightness uniformity of these 9 points is defined as below.



9. Electrical Characteristics

Note: All specification is defined at +25°C ambient temperature unless specified defined.

9.1 LED Characteristics

Items	Symbol	Unit	Min.	Typ.	Max.	Condition
Forward Voltage	V_F	[V]	2.8	-	3.8	I_F=100mA
Luminous Intensity	Iv	[cd]	6.7	-	10.4	I_F=100mA
Storage Temperature	ST	[°C]	-40		100	
Operation Temperature	OT	[°C]	-30		85	

9.2 LED Control Board Characteristics

Items	Symbol	Units	Min.	Typ.	Max.
LED Voltage	V_{LED}	[V]	10	12	14
LED Current	I_{LED}	[A]	-	5	TBD

9.3 Connectors and Pin Assignment (LED driving board)

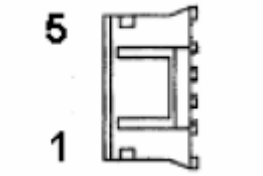
Connectors in LED driving board listed as below

NO	Name	Description
1	CON 3	Connector for LED backlight control
2	CON 5	Connector for LED light bar power output
3	CON 7	Connector for LED light bar power output
4	CON A	Connector for dimming mode selection
5	CON B	Connector for light sensor
6	CON C	Connector for heater on/off control
7	CON D	Connector for heater on/off control
8	CON E	Connector for LED light bar light sensor and thermal sensor signal
9	CON F	Connector for power output
10	CON G	Connector for power input
11	FAN 1~4	Connector for fan control

9.3.1 CON 3, connector for LED backlight control

Connector used: JST S7B-PH-SM4-TB (2.0mm) 5P or equivalent (90D)

Pin No.	Pin Assignment	Remark
1	NC	
2	PWM dimming control	
3	LED dimming control DC level (0~5V)	0V: Max.brightness, 5V: Min.Brightness
4	GND	
5	LED backlight on/off control (0 or +5V)	0V: Off, 5V: On



Note: The minimum brightness is only 1 nit

9.3.2 CON 5, connector for LED light bar power output

Connector used: BL125-17RLTAND or equivalent

Pin No.	Pin Assignment	Remark
1	High voltage for LED line A1~A4	
2	Low voltage for LED line A1	
3	High voltage for LED line A1~A4	
4	Low voltage for LED line A2	
5	High voltage for LED line A1~A4	
6	Low voltage for LED line A3	
7	High voltage for LED line A1~A4	
8	Low voltage for LED line A4	
9	High voltage for LED line B1~B4	
10	Low voltage for LED line B1	
11	High voltage for LED line B1~B4	
12	Low voltage for LED line B2	
13	High voltage for LED line B1~B4	
14	Low voltage for LED line B3	
15	High voltage for LED line B1~B4	
16	Low voltage for LED line B4	
17	NC	No connection

9.3.3 CON 7, connector for LED light bar power output

Connector used: BL125-17RLTAND or equivalent

Pin No.	Pin Assignment	Remark
1	High voltage for LED line C1~C4	
2	Low voltage for LED line C1	
3	High voltage for LED line C1~C4	
4	Low voltage for LED line C2	
5	High voltage for LED line C1~C4	
6	Low voltage for LED line C3	
7	High voltage for LED line C1~C4	
8	Low voltage for LED line C4	

9	High voltage for LED line D1~D4	
10	Low voltage for LED line D1	
11	High voltage for LED line D1~D4	
12	Low voltage for LED line D2	
13	High voltage for LED line D1~D4	
14	Low voltage for LED line D3	
15	High voltage for LED line D1~D4	
16	Low voltage for LED line D4	
17	NC	No connection

9.3.4 CON A, connector for dimming mode selection

Connector used: JST STB-PH-SM4-TB (2.0mm) 4P or equivalent (90D)

Pin No.	Pin Assignment	Remark
1	NC	No connection
2	Luminance control switch status (S0)	0V: low, 5V: high
3	Luminance control switch status (S1)	0V: low, 5V: high
4	Ground	

9.3.5 CON B, connector for ambient light sensor

Connector used: JST S7B-PH-SM4-TB (2.0mm) 6P or equivalent (180D)

Pin No.	Pin Assignment	Remark
1	+3.3V power input	
2	GND	Grounding
3	REXT	Reference voltage level
4	PD	Mode selection
5	SCL	Clock input
6	SDA	Data input

9.3.6 CON C, connector for heater on/off control

Connector used: JST S7B-PH-SM4-TB (2.0mm) 2P or equivalent (90D)

Pin No.	Pin Assignment	Remark
1	Heater on/off control	0V: Off; +3.3V: On
2	NC	No connection

9.3.7 CON D, connector for heater on/off control

Connector used: JST S7B-PH-SM4-TB (2.0mm) 2P or equivalent (90D)

Pin No.	Pin Assignment	Remark
1	Heater on/off control	0V: Off; +3.3V: On
2	NC	No connection

9.3.8 CON E, connector for light sensor and thermal sensor of LED backlight

Connector used: BL125-13RLTAND or equivalent (90D)

Pin No.	Pin Assignment	Remark
1	SDA	Light sensor data input
2	SCL	Light sensor clock data input
3	PD2	Mode selection
4	REXT	Reference voltage level
5	GND	Ground
6	VDD	+3.3V power output for light sensor
7	GND	Ground
8	VO	Thermal sensor voltage data input
9	VS+	+5V power output for thermal sensor
10	NC	No connection
11	NC	No connection
12	NC	No connection
13	NC	No connection

9.3.9 CON F, connector for power output

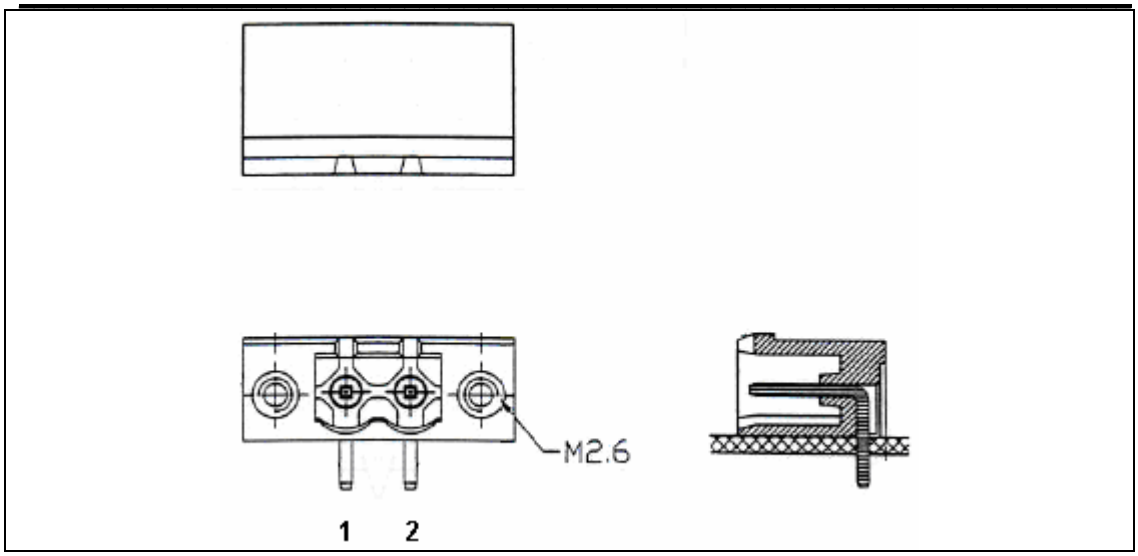
Connector used: JS-1116-004W (pitch: 2.5mm) or equivalent (180D)

Pin No.	Pin Assignment	Remark
1	+12V power output	By pass 12V directly
2	GND	Ground
3	GND	Ground
4	+12V power output	By pass 12V directly

9.3.10 CON G, connector for power input

Connector used: DECA ME050-5002 DIP 2P (90D)

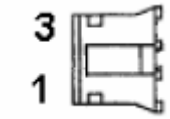
Pin No.	Pin Assignment	Remark
1	GND	Grounding
4	+12V power input	12V ± 10%



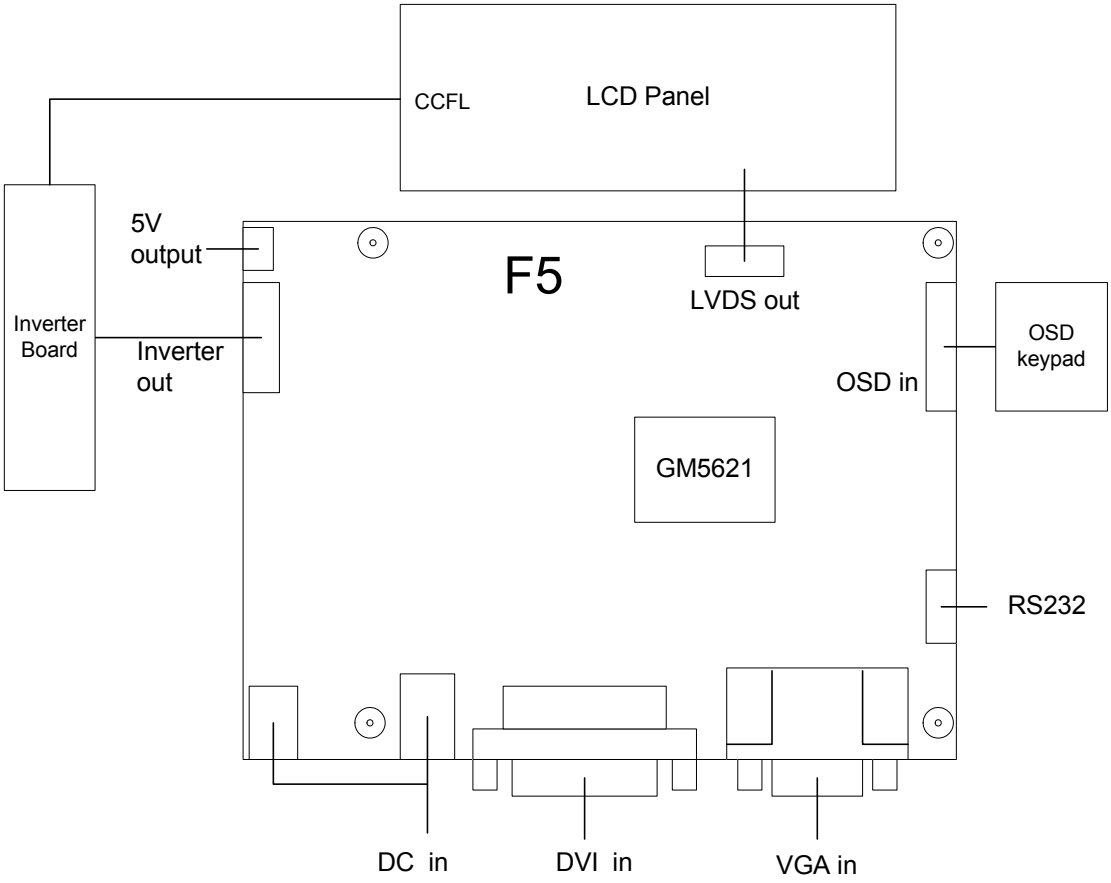
9.3.11 FAN 1~4, connector for fans (up to 4 fans)

Connector used: JST S7B-PH-SM4-TB (2.0mm) 3P or equivalent (90D)

Pin No.	Pin Assignment	Remark
1	GND	Ground, black cable
2	Vfan , power input +12V	+12V
3	Fspeed	PWM signal to MCU to read the speed of fan



9.4 Connectors and Pin Assignment (F5B driving board)



Ref.	Purpose	Description
J1	Connector for 5V output	JST B2B-XH-A DIP 2Pin P=2.5mm
J2	Jumper set for panel selection	Pitch 2.0mm, 2*4 PIN HEADER
J12	Jumper set for on/off voltage of backlight control	Pitch 2.0mm, 2*2 PIN HEADER
J13	Jumper set for backlight control method	Pitch 2.0mm, 3*1 PIN HEADER
J14	Jumper set for impedance of inverter	Pitch 2.0mm, 3*1 PIN HEADER
JP1/ JP2/ JP3	Connector for panel voltage selection	Pitch=2.0mm, 2*1 PIN HEADER
JP9	Connector for 12V input	Header 2Pins P=3.96mm 90º DIP
JP10	Connector for VGA input	Pitch 2.0mm, 15 PIN through hole (Reserved)
CN1	Connector for RS232 interface	WAFER 4PIN P=2.54mm 180º
CN2	DC jack for power supply	S.C.SCD438DCS01000 Pin:2.5mm
CN3	15 Pin D-Sub for VGA input	VGA CONNECTOR 15PIN D-SUB
CN4	Connector for DVI input	DVI-D 25PIN CA-24DVI2SDR-A-2
CON1	LVDS Signal output	JST SM30B-SRDS-G 2*15PIN P=1mm
CON2	Connector for Inverter	JST S7B-PH-SM3-TB
CON3	Connector for OSD	WAFER 12PIN P=1.25mm 90º
SW1	Switch for Reset	MISAKI TC003-PS11AT-A

9.4.1 J1, connector of 5V output for touch controller

Connector used: JST B2B-XH-A DIP 2Pin P=2.5mm or Equivalent

Pin No.	Pin Assignment	I/O	Pin Description
1	+5V	O	DC +5V output (100mA)
2	GND	-	Ground

9.4.2 J2, jumper set for panel selection

Connector used: Pitch 2.0mm, 2*4 PIN HEADER

Brand	Model Name	Size	Resolution	R3	R4	R5	R6
AU	G150XG01 M150XN07 V1	15"	1024x768	OFF	OFF	OFF	ON
AU	G150XG02 G150XG03 M150XN07 V2 T150XG01	15"	1024x768	OFF	ON	OFF	OFF

9.4.3 J12, jumper set for on/off voltage of backlight control

Connector Used: Pitch=2.0mm, 2*2 PIN HEADER

Pin No.	Panel size	Pin Description
1	17", 19"	3.3V
2	8.4" , 10.4" , 12.1" , 15"	5V

9.4.4 J13, jumper set for backlight control method

Connector Used: Pitch=2.0mm, 3*1 PIN HEADER

Pin No.	Panel size	Pin Description
1,2	8.4" , 10.4" , 12.1" , 17", 19"	Negative adjustment
2,3	15"	Positive adjustment

9.4.5 J14, jumper for impedance of inverter

Connector Used: Pitch=2.0mm, 3*1 PIN HEADER

Pin No.	Panel size	Pin Description
1,2	17", 19"	3.3V
2,3	8.4" , 10.4" , 12.1" , 15"	5V

9.4.6 JP1, jumper set for panel selection

Connector Used: Pitch=2.0mm, 2*1 PIN HEADER

Pin No.	Panel Size	Pin Description
1,2	Reserve	12V

9.4.7 JP2, jumper set for panel selection

Connector Used: Pitch=2.0mm, 2*1 PIN HEADER

Pin No.	Panel Size	Pin Description
1,2	17", 19"	5V

9.4.8 JP3, jumper set for panel selection

Connector Used: Pitch=2.0mm, 2*1 PIN HEADER

Pin No.	Panel Size	Pin Description
1,2	8.4" , 10.4" , 12.1" , 15"	3.3V

9.4.9 JP9, connector for 12V input

Connector Used: Header 2Pins P=3.96mm 90º DIP

Pin No.	Pin Assignment	I/O	Pin Description
1	+12V	I	DC +12V input
2	GND	-	Ground

9.4.10 JP10, connector for VGA input (reserved)

Connector Used: Pitch 2.0mm, 15 PIN through hole

Pin No.	Symbol	I/O	Description
1	GND	-	Ground
2	VGA-R	I	R Signal Input
3	GND	-	Ground
4	VGA-G	I	G Signal Input
5	GND	-	Ground
6	VGA-B	I	B Signal Input
7	GND	-	Ground
8	GND	-	Ground
9	VGAHSYNC	I	H-Sync Signal Input
10	VGA-5V		VGA Detect Pin
11	VGAVSYNC	I	V-Sync Signal Input
12	GND	-	Ground
13	VGA-CON		VGA Ground
14	VGA-SDA	I/O	DDC SDA Signal Input/Output
15	VGA-SCL	I	DDC SCL Signal Input

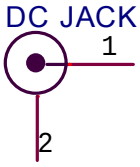
9.4.11 CN1, connector for RS232 interface

Connector Used: WAFER 4PIN P=2.54mm 180º

Pin No.	Symbol	I/O	Description
1	VOUT	PWR	DC 5V Voltage Output
2	RXD	-	Serial Receive Data (for Firmware Update)
3	TXD	-	Serial Transmit Data (for firmware Update)
4	GND	PWR	Ground

9.4.12 CN2, DC jack for power supply

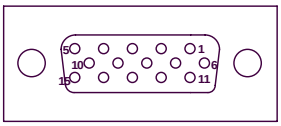
Connector Used: S.C.SCD438DCS01000 Pin: 2.5mm



Pin No.	Pin Assignment	I/O	Pin Description
1	Vin	PWR	DC 12 Voltage Input
2	GND	PWR	Ground

9.4.13 CN3, connector for VGA input

Connector Used: VGA CONNECTOR 15PIN D-SUB



Pin No.	Pin Assignment	I/O	Pin Description	Remark
1	RED	I	RED Video Input Signal	
2	GREEN	I	GREEN Video Input Signal	
3	BLUE	I	BLUE Video Input Signal	
4	NC	-	No Connection	
5	GND	-	Ground	
6	GND	-	GND for RED video signal	
7	GND	-	GND for GREEN video signal	
8	GND	-	GND for BLUE video signal	
9	VGA5V	I	VGA5V	
10	SYNC. RETURN	I	GND for Sync. signal	
11	NC	-	No Connection	
12	DDC data	I/O	Serial Data I/O Pin for DDC	
13	HSYNC.	I	Horizontal Sync. Signal	
14	V SYNC.	I	Vertical Sync. Signal	
15	DDC clock	I/O	Serial Clock I/O Pin for DDC	

9.4.14 CN4, connector for DVI input

Connector used: DVI-D 25PIN CA-24DVI2SDR-A-2

Pin no	Symbol	I/O	Description	Remark
1	RX2-	I	Negative differential data 2 pin	
2	RX2+	I	Positive differential data 2 pin	
3	GND	P	TMDS Data2 Shield	
4	NC		No Connection	
5	NC		No Connection	
6	DDC_SCL	I	DDC Clock	
7	DDC_SDA	I	DDC Data	

8	NC		No Connection	
9	RX1-	I	Negative differential data 1 pin	
10	RX1+	I	Positive differential data 1 pin	
11	GND	P	TMDS Data1 Shield	
12	NC		No Connection	
13	NC		No Connection	
14	+5V	P	+5 V Power	
15	NC		No Connection	
16	H_PLUG	I	Hot Plug Detect	
17	RX0-	I	Negative differential data 0 pin	
18	RX0+	I	Positive differential data 0 pin	
19	GND	P	TMDS Data0Shield	
20	NC		No Connection	
21	NC		No Connection	
22	NC		No Connection	
23	RXC+	I	Positive differential clock pin	
24	RXC-	I	Negative differential clock pin	
25	NC	-	For DVI-D insert	

9.4.15 CON1, LVDS signal output

Connector used: JST SM30B-SRDS-G 2*15PIN P=1mm

Pin No.	Symbol	I/O	Description
1	RXE0-	O	Negative LVDS differential data output(Even data)
2	RXO0-	O	Negative LVDS differential data output(Odd data)
3	RXE0+	O	Positive LVDS differential data output(Even data)
4	RXO0+	O	Positive LVDS differential data output(Odd data)
5	GND	-	Power Ground
6	GND	-	Power Ground
7	RXE1-	O	Negative LVDS differential data output(Even data)
8	RXO1-	O	Negative LVDS differential data output(Odd data)
9	RXE1+	O	Positive LVDS differential data output(Even data)
10	RXO1+	O	Positive LVDS differential data output(Odd data)
11	RXE2-	O	Negative LVDS differential data output(Even data)
12	RXO2-	O	Negative LVDS differential data output(Odd data)
13	RXE2+	O	Positive LVDS differential data output(Even data)
14	RXO2+	O	Positive LVDS differential data output(Odd data)
15	GND	-	Power Ground
16	GND	-	Power Ground
17	RXEC-	O	Negative LVDS differential clock output(Even clock)
18	RXOC-	O	Negative LVDS differential clock output(Odd clock)
19	RXEC+	O	Positive LVDS differential clock output(Even clock)
20	RXOC+	O	Positive LVDS differential clock output(Odd clock)
21	RXE3-	O	Negative LVDS differential data output(Even data)
22	RXO3-	O	Negative LVDS differential data output(Odd data)
23	RXE3+	O	Positive LVDS differential data output(Even data)
24	RXO3+	O	Positive LVDS differential data output(Odd data)
25	GND	-	Power Ground
26	GND	-	Power Ground

27	GND	-	Power Ground
28	VCC	O	+3.3V/+5V/+12V power output
29	VCC	O	+3.3V/+5V/+12V power output
30	VCC	O	+3.3V/+5V/+12V power output

9.4.16 CON2, connector for inverter

Connector Used: JST S7B-PH-SM3-TB

Pin No.	Pin Assignment	I/O	Pin Description
1	VOUT	O	+12V Output for Inverter board
2	VOUT	O	+12V Output for Inverter board
3	GND	-	Ground
4	GND	-	Ground
5	BKLON	O	Output for Inverter On/Off control +5v On 0v Off
6	-	-	-
7	BRIGHT	O	Output Voltage terminal for CCFL back-light control

9.4.17 CON3, connector for OSD

Connector Used: WAFER 12PIN P=1.25mm 90º

Pin No.	Pin Assignment	I/O	Pin Description
1	VOUT	Power	+3.3V Power output
2	LED_G	O	Output terminal for GREEN Color LED Indicator
3	LED_O	O	Output terminal for ORANGE Color LED Indicator
4	KEY ON/OFF	I	Power On/Off Switch
5	RIGHT	I	Right Selection
6	DOWN	I	DOWN Selection
7	LEFT	I	Left Selection
8	UP	I	UP Selection
9	RESERVED	I	Reserved
10	RESERVED	I	Reserved
11	RESERVED	-	Reserved
12	GND	-	Gnd

9.4.18 SW1, switch for reset

Connector Used: MISAKI TC003-PS11AT-A

Pin No.	Pin Assignment	I/O	Pin Description
1	On	-	Button depressed
2	Off	-	Button released

10. Environment Testing Items

No.	Items	Conditions	Remark
1	High Temperature Storage	60°C, 120 hrs	
2	Low Temperature Storage	-20°C, 120 hrs	
3	High Temperature Operating	60°C, 120 hrs	
4	Low Temperature Operating	-15°C, 120 hrs	
5	High Temperature and High Humidity (Operation)	50°C, 80%RH, 120 hrs	

11. Mechanical Drawing (TBD)