



User Manual

IDK-1121WR-30FHA1E

**TFT-LCD 21.5" FHD (LED
Backlight)**

ADVANTECH

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Contents

Chapter 1	Overview.....	1
1.1	General Description	2
1.2	Display Characteristics.....	2
	Table 1.1: Display Characteristics	2
1.3	Optical Characteristics	3
	Table 1.2: Display Characteristics	3
1.4	Functional Block Diagram	5
	Figure 1.1 Function block diagram	5
1.5	Absolute Maximum Ratings	6
	1.5.1 TFT LCD Module	6
	1.5.2 Backlight Unit.....	6
	1.5.3 Absolute Ratings of Environment.....	6
1.6	Outline Dimension.....	7
	1.6.1 IDK-1121WR-30FHA1E	7
Chapter 2	Electrical Characteristics.....	9
2.1	TFT LCD Power Consumption	10
	Table 2.1: Power specification.....	10
2.1.1	Signal Electrical Characteristics.....	11
	Table 2.2: Signal electrical characteristics	11
2.2	Backlight Driving Conditions	11
	Table 2.3: Backlight driving conditions	11
Chapter 3	Signal Characteristics.....	13
3.1	Pixel Format Image	14
3.2	Pin Description	14
	Table 3.1: Pin Description	14
3.3	The Input Data Format	16
3.4	Interface Timing	17
	3.4.1 Timing Characteristics	17
	3.4.2 Input Timing Diagram.....	17
3.5	Power ON/OFF Sequence	18
Chapter 4	Connector & Pin Assignment.....	19
4.1	TFT LCD Module.....	20
	4.1.1 Connector	20
	Table 4.1: Connector	20
	4.1.2 Pin Assignment.....	20
	Table 4.2: Pin Assignment.....	20
4.2	Backlight Unit	20
	4.2.1 Signal for LED light bar connector	20
	Figure 4.1	21
Chapter 5	Touch Screen & Touch Controller ...	23
5.1	Touch Screen.....	24
	5.1.1 Touch Characteristics	24
	5.1.2 Optical Characteristics	24

	5.1.3	Environment Characteristics.....	24
	5.1.4	Mechanical Characteristics.....	24
	5.1.5	Electronic Characteristics	24
	5.1.6	General specification	25
5.2		Touch controller	25
	5.2.1	Touch Controller Characteristics	25
	5.2.2	Pin Assignment and Description.....	26
		Figure 5.1 Board mounted header.....	27
	5.2.3	Physical dimension	28

Appendix A Handling Precautions 29

A.1		Optical Characteristics	30
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Chapter 1

Overview

1.1 General Description

IDK-1121W series is a Color Active Matrix Liquid Crystal Display composed of a TFT-LCD panel, a driver circuit, and backlight system. The screen format is intended to support the FHD (1920(H) x 1080(V)) screen and 16.7M colors (RGB 8-bits data). All input signals are dual LVDS interface. Driver board for the backlight is included.

1.2 Display Characteristics

The following are characteristics summary under 25°C condition:

Table 1.1: Display Characteristics

Item	Unit	Description
Screen Diagonal	[mm]	546.86(21.53")
Active Area	[mm]	476.64 (H) x 268.11 (V)
Pixels H x V		1920 (x3) x 1080
Pixel Pitch	[um]	248.25 (per one triad) × 248.25
Pixel Arrangement		R.G.B. Vertical Stripe
Display Mode		VA Mode, Normally Black
White Luminance (Center)	[cd/m ²]	300 (Typ.)
Contrast Ratio		5000 (Typ.)
Optical Response Time	[msec]	16 ms (Typ., on/off)
Nominal Input Voltage VDD	[Volt]	+5.0 V
Backlight Input Voltage	[Volt]	+12.0 V
Power Consumption	[Watt]	23W (Typ. Cell 3.5 + LED 19.2) (with LED driver board, all white pattern)
Weight	[Grams]	3100 (Typ.)
Physical Size	[mm]	496.5(W) x 292.2(H) x 20.75(D)
Electrical Interface		Dual channel LVDS
Support Color		16.7M colors (RGB 8 bits)
Surface Treatment		Anti-Glare, 3H
Temperature Range		N-series/R series
Operating	[°C]	0 to +60
Storage (Shipping)	[°C]	0 to +60
RoHS Compliance		RoHS Compliance
TCO Compliance		TCO 5.1 Compliance

1.3 Optical Characteristics

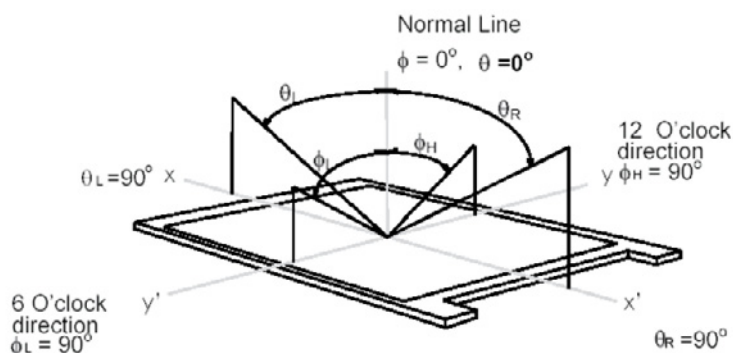
Table 1.2: Display Characteristics

Item	Unit	Conditions	Min.	Typ.	Max.	Note
Viewing Angle	[degree]	Horizontal (Right) CR = 10 (Left)	150	178	-	1
		Vertical (Up) CR = 10 (Down)	150	178	-	
Contrast ratio		Normal Direction	3000	5000	-	2
Response Time	[msec]	Raising Time (TrR)	-	10	12	3
		Falling Time (TrF)	-	6	7	
		Raising + Falling	-	16	19	
Color / Chromaticity Coordinates (CIE)		Red x	0.589	0.639	0.689	4
		Red y	0.283	0.333	0.383	
		Green x	0.284	0.334	0.384	
		Green y	0.573	0.623	0.673	
		Blue x	0.105	0.155	0.205	
		Blue y	0.000	0.048	0.098	
Color Coordinates (CIE) White		White x	0.263	0.313	0.363	
		White y	0.279	0.329	0.379	
Central Luminance	[cd/m ²]		240	300	-	5
Luminance Uniformity	[%]		75	80	-	6
Crosstalk (in 60Hz)	[%]				1.5	7
Flicker	dB				-20	8

Optical Equipment: BM-7, DT-101, or equivalent

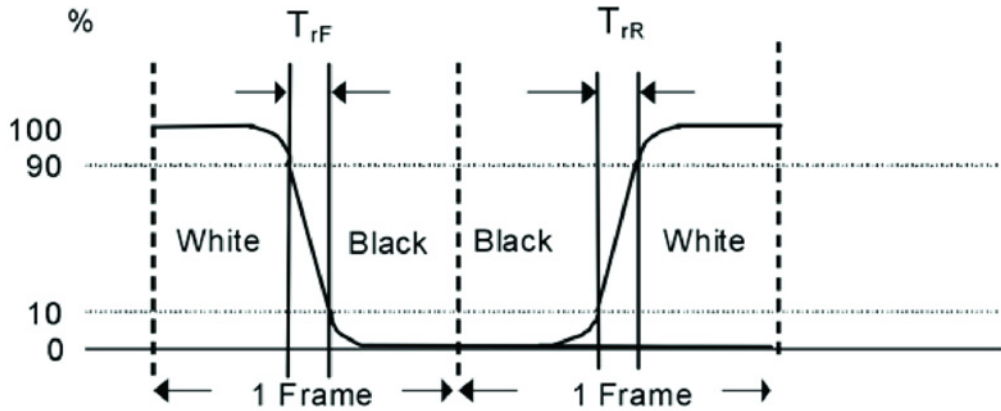
Note 1: Definition of viewing angle

Viewing angle is the measurement of contrast ratio at the screen center, over a 180° horizontal and 180° vertical range (off-normal viewing angles). The 180° viewing angle range is broken down as below: 90° (θ) horizontal left and right, and 90° (Φ) vertical high (up) and low (down). The measurement direction is typically perpendicular to the display surface with the screen rotated to its center to develop the desired measurement viewing angle.



Note 2: Contrast Ratio is measured by TOPCON SR-3

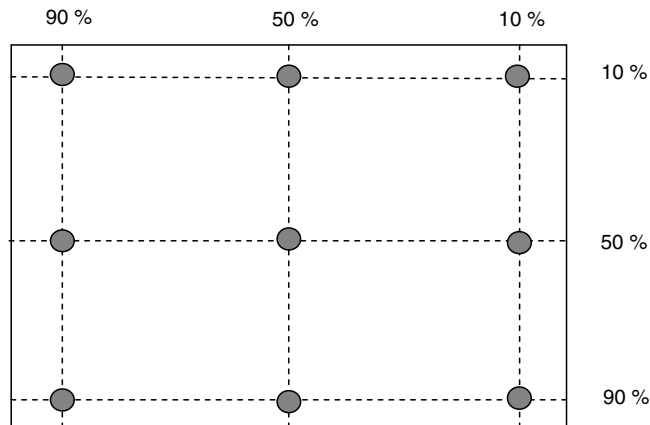
Note 3: Definition of Response time measured by Westar TRD-100A The output signals of photo detector are measured when the input signals are changed from “Full Black” to “Full White” (rising time, TrR), and from “Full White” to “Full Black” (falling time, TfF), respectively. The response time is interval between the 10% and 90% (1 frame at 60Hz) or amplitudes. TrR+ TfF = 16msec (typ.).



Note 4: Color chromaticity and coordinates (CIE) is measured by TOPCON SR-3

Note 5: Central luminance is measured by TOPCON SR-3

Note 6: Luminance uniformity of 9 points is defined as below and measured by TOPCON SR-3



$$\text{uniformity} = \frac{\text{Minimum Luminance in 9 points (1-9)}}{\text{Maximum Luminance in 9 points (1-9)}}$$

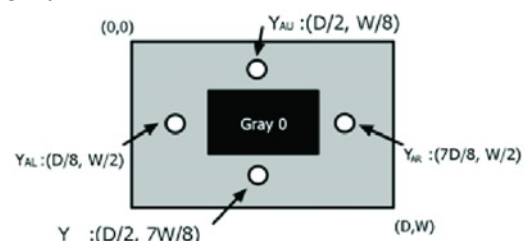
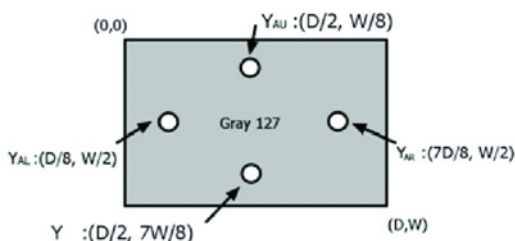
Note 7: Crosstalk is defined as below and measured by TOPCON SR-3

$$CT = |Y_B - Y_A| / Y_A * 100(\%)$$

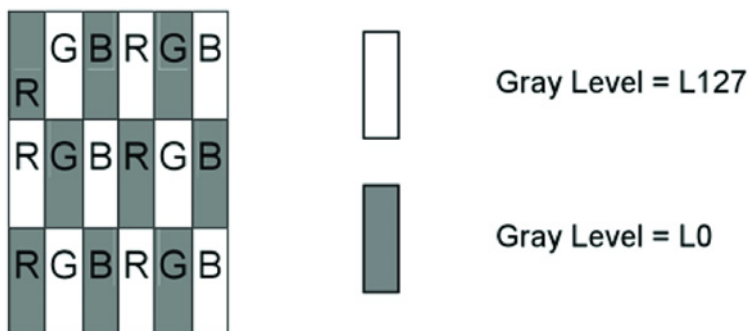
Where

Y_A = Luminance of measured location without gray level 0 pattern (cd/m²)

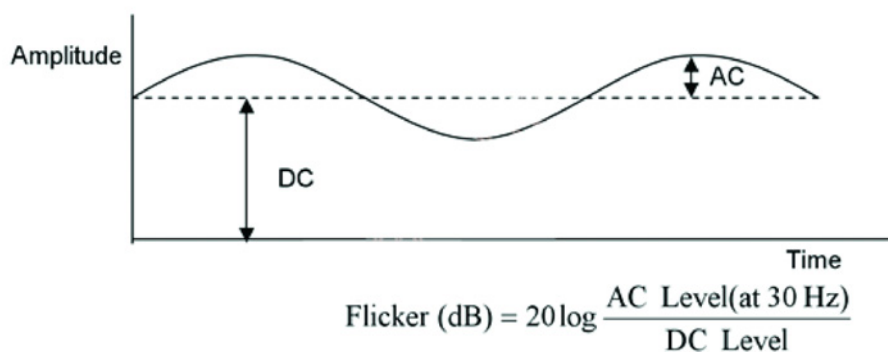
Y_B = Luminance of measured location with gray level 0 pattern (cd/m²)



Note 8: Test Pattern: Sub checker Pattern measured by TOPCON SR-3



Method: Record dB value with TRD-100



1.4 Functional Block Diagram

The following diagram shows the functional block of the 21.5 inches Color TFT-LCD Module:

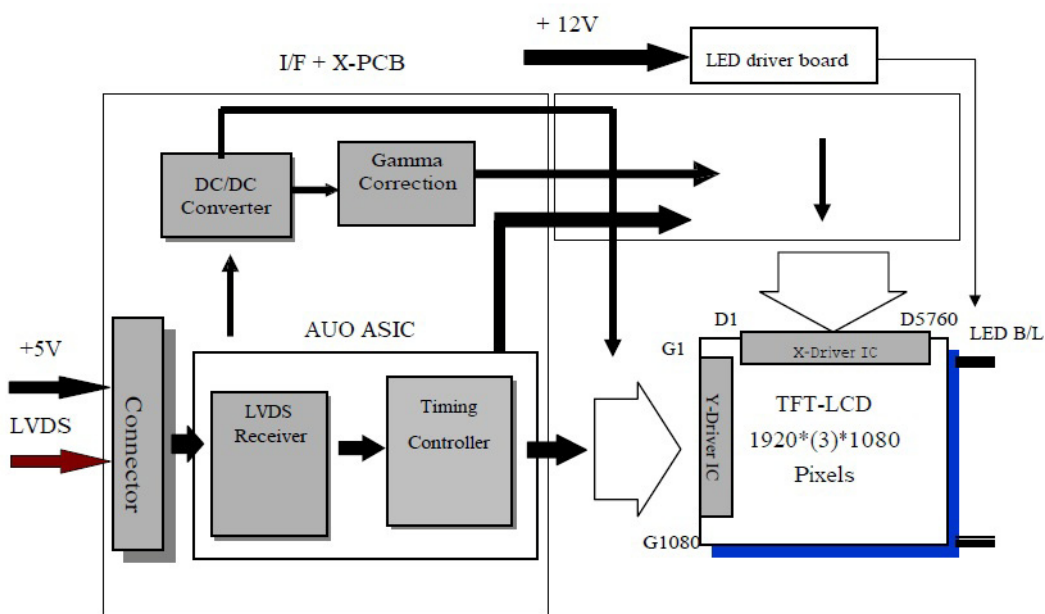


Figure 1.1 Function block diagram

1.5 Absolute Maximum Ratings

Absolute maximum ratings of the module is as following:

1.5.1 TFT LCD Module

Item	Symbol	Min.	Max.	Unit	Conditions
Logic/LCD Drive Voltage	VDD	0	5.5	[Volt]	Note 1,2

1.5.2 Backlight Unit

Item	Symbol	Min.	Max.	Unit	Conditions
LED light bar Input Voltage	VLED	10.8	13.2	[Volt]	Note 1,2

1.5.3 Absolute Ratings of Environment

Item	Symbol	Min.	Max.	Unit	Conditions
Operating Temperature	TOP	0	+60	[°C]	Note 3
Operation Humidity	HOP	5	+90	[%RH]	
Storage Temperature	TST	-20	+60	[°C]	
Storage Humidity	HST	5	90	[%RH]	

Note 1: Within Ta=25°C

Note 2: Permanent damage to the device may occur if exceeding maximum values

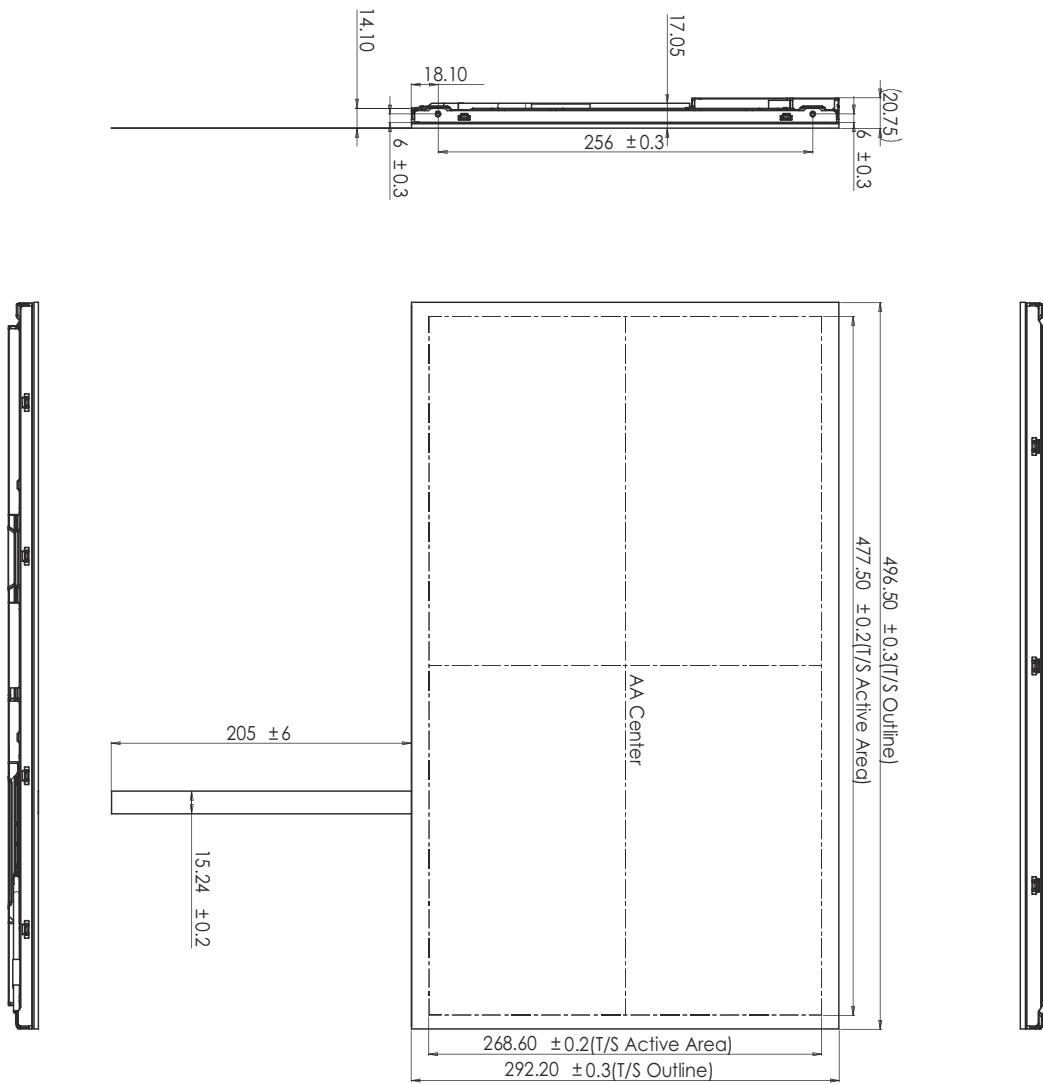
Note 3: For quality performance, please refer to AUO IIS (Incoming Inspection Standard).

Note 4: Operating Temperature (60°C) is defined as panel surface temperature.

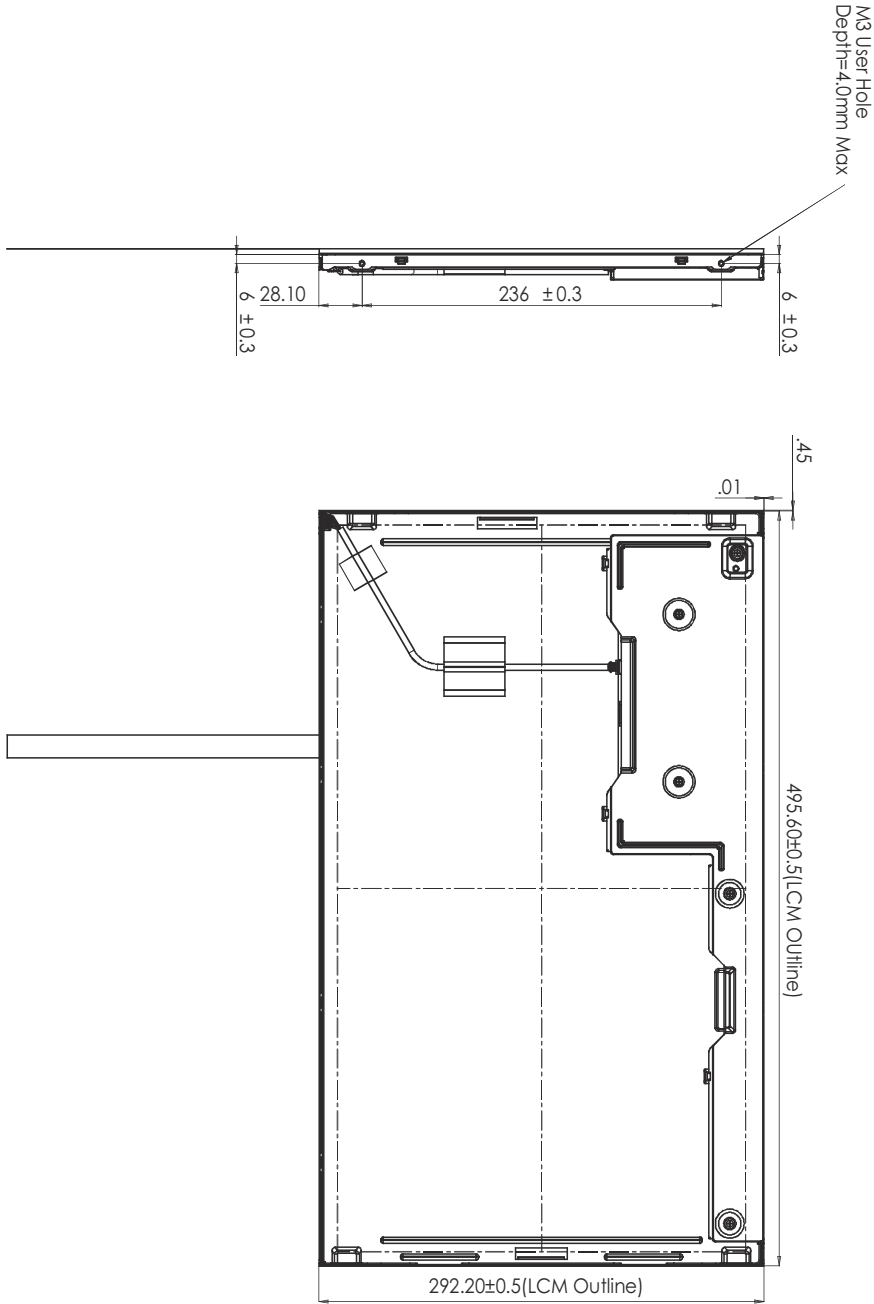
1.6 Outline Dimension

1.6.1 IDK-1121WR-30FHA1E

Front View



Rear View



Chapter 2

Electrical
Characteristics

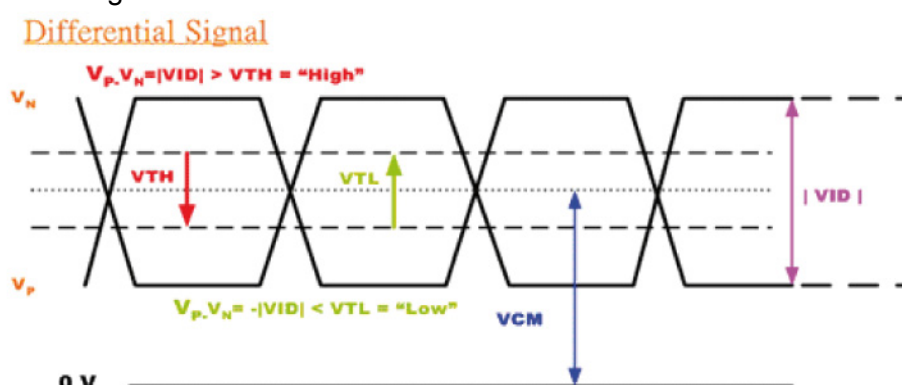
2.1.1 Signal Electrical Characteristics

Input signals shall be low or Hi-Z state when VDD is off.

Table 2.2: Signal electrical characteristics

Symbol	Parameter	Min.	Typ.	Max.	Unit	Condition
V_{TH}	Differential Input High Threshold	-	-	+100	[mV]	VCM = 1.2V, Note 1
V_{TL}	Differential Input Low Threshold	-100	-	-	[mV]	VCM = 1.2V Note 1
$ V_{ID} $	Input Differential Voltage	100	-	600	[mV]	Note 1
V_{CM}	Differential Input Common Mode Voltage	+1.0	+1.2	+1.5	[V]	VTH-VTL = 200mV (max) Note 1

Note LVDS Signal Waveform.



2.2 Backlight Driving Conditions

Following characteristics are measured under stable condition at 25°C.

Table 2.3: Backlight driving conditions

Item	Symbol	Value			Unit	Condition
		Min.	Typ.	Max		
Input Voltage	V_{CC}	10.8	12	13.2	Volt	
Input Current	I_{VCC}		1.6		A	100% Dimming
Power Consumption	P_{LED}		19.2	21	Watt	100% Dimming
PWM Dimming Frequency	F_{PWM}	200		20K	Hz	
Swing Voltage		4.8	5	5.5	Volt	100% Dimming
Dimming Duty Cycle		10		100	%	
Analog Dimming Voltage	V_{Analog}	1.5		5	Volt	Adjustable Dimming Range
LED Forward Current	I_F		80		mA	Ta = 25°C, Note1
Operating Life		50000			Hrs	Ta = 25°C, Note 2,3

Note1 Ta means ambient temperature.

Note2 If modules is driven by high current or at high ambient temperature & humidity condition. The operating life will be reduced.

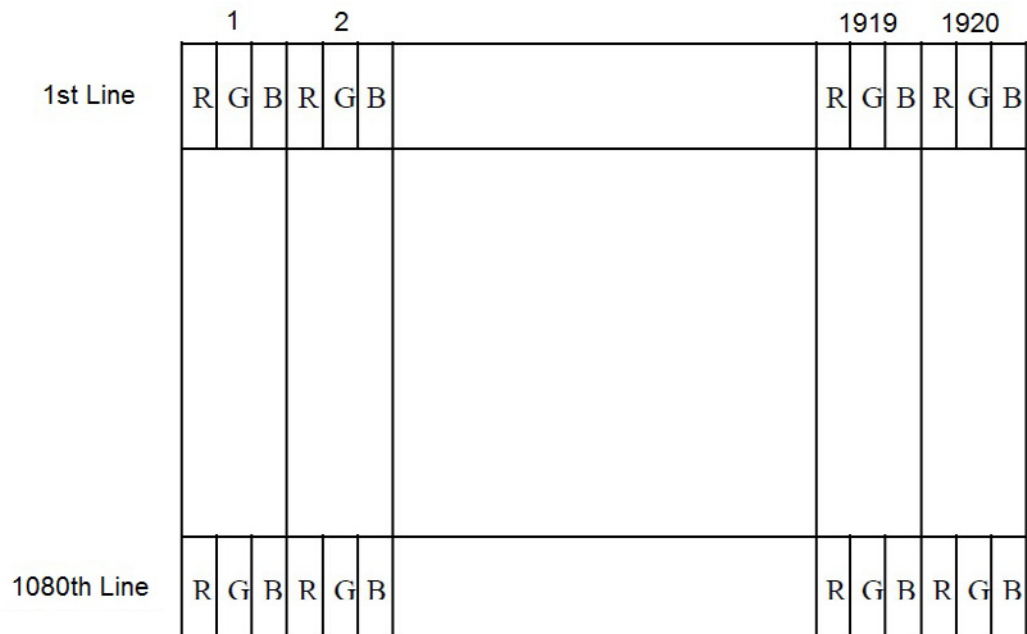
Note3 Operating life means brightness goes down to 50% of initial brightness. Typical operating life time is estimated data.

Chapter 3

Signal Characteristics

3.1 Pixel Format Image

Following figure shows the relationship between input signal and LCD pixel format.



3.2 Pin Description

The module using a pair of LVDS receiver SN75LVDS82 (Texas Instruments) or compatible. LVDS is a differential signal technology for LCD interface and high speed data transfer device. Transmitter shall be SN75LVDS83 (negative edge sampling) or compatible. The first LVDS port (RxOxxx) transmits odd pixels while the second LVDS port (RxExxx) transmits even pixels.

Table 3.1: Pin Description

Pin No.	Symbol	Description
1	RxO0-	Negative LVDS differential data input (Odd data)
2	RxO0+	Positive LVDS differential data input (Odd data)
3	RxO1-	Negative LVDS differential data input (Odd data)
4	RxO1+	Positive LVDS differential data input (Odd data)
5	RxO2-	Negative LVDS differential data input (Odd data, H-Sync, V-Sync, DSPTMG)
6	RxO2+	Positive LVDS differential data input (Odd data, H-Sync, V-Sync, DSPTMG)
7	VSS	Power Ground
8	RxOC-	Negative LVDS differential clock input (Odd clock)
9	RxOC+	Positive LVDS differential clock input (Odd clock)
10	RxO3-	Negative LVDS differential data input (Odd data)
11	RxO3+	Positive LVDS differential data input (Odd data)
12	RxE0-	Negative LVDS differential data input (Even data)
13	RxE0+	Positive LVDS differential data input (Even data)
14	VSS	Power Ground

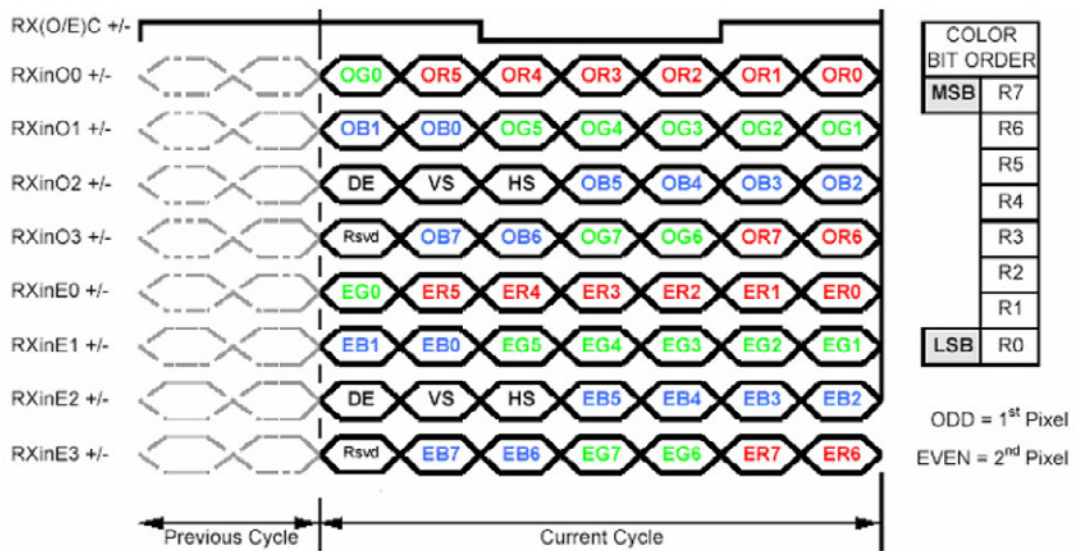
Table 3.1: Pin Description

15	RxE1-	Negative LVDS differential data input (Even data)
16	RxE1+	Positive LVDS differential data input (Even data)
17	VSS	Power Ground
18	RxE2-	Negative LVDS differential data input (Even data)
19	RxE2+	Positive LVDS differential data input (Even data)
20	RxEC-	Negative LVDS differential clock input (Even clock)
21	RxEC+	Positive LVDS differential clock input (Even clock)
22	RxE3-	Negative LVDS differential data input (Even data)
23	RxE3+	Positive LVDS differential data input (Even data)
24	VSS	Power Ground
25	NC	No connection (for AUO test only. Do not connect)
26	NC	No connection (for AUO test only. Do not connect)
27	NC	No connection (for AUO test only. Do not connect)
28	VDD	Power +5V
29	VDD	Power +5V
30	VDD	Power +5V

Note1: Input signals of odd and even clock shall be the same timing.

Note2: Please follow VESA.

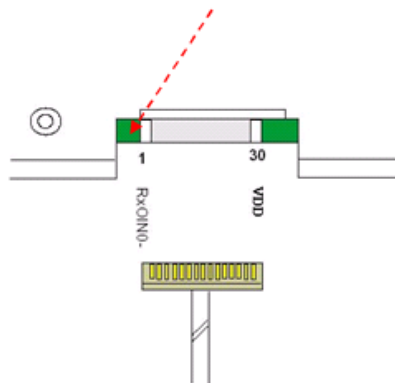
3.3 The Input Data Format



Note1: Normally DE mode only. VS and HS on EVEN channel are not used.

Note2: Please follow VESA.

Note3: 8-bit in



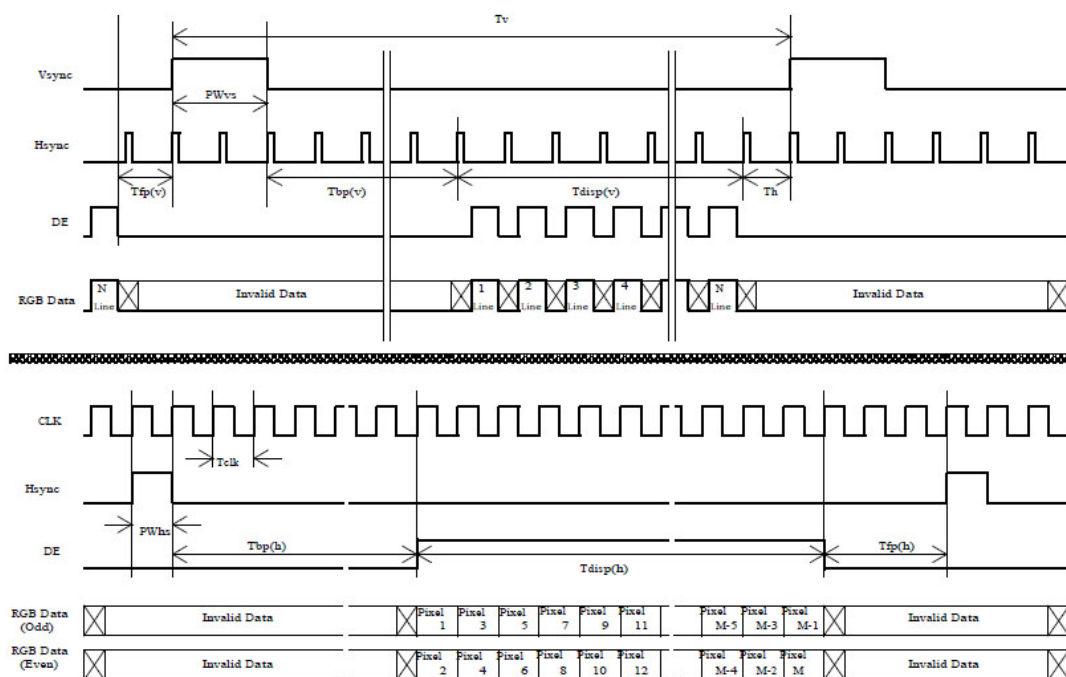
3.4 Interface Timing

3.4.1 Timing Characteristics

Signal Name	Item	Symbol	Min.	Typ.	Max.	Unit
Clock	Frequency	1/ TClock	40	72	83	MHz
Frame Rate	Frequency	1/Tv	50	60	75	Hz
Vertical Section	Period	TV	1088	1120	2047	T_line
	Active	TVD	1080	1080	1080	
	Blanking	TVB	8	40	967	
Horizontal Section	Period	TH	1034	1060	2047	T_clock
	Active	THD	960	960	960	
	Blanking	THB	74	100	1087	

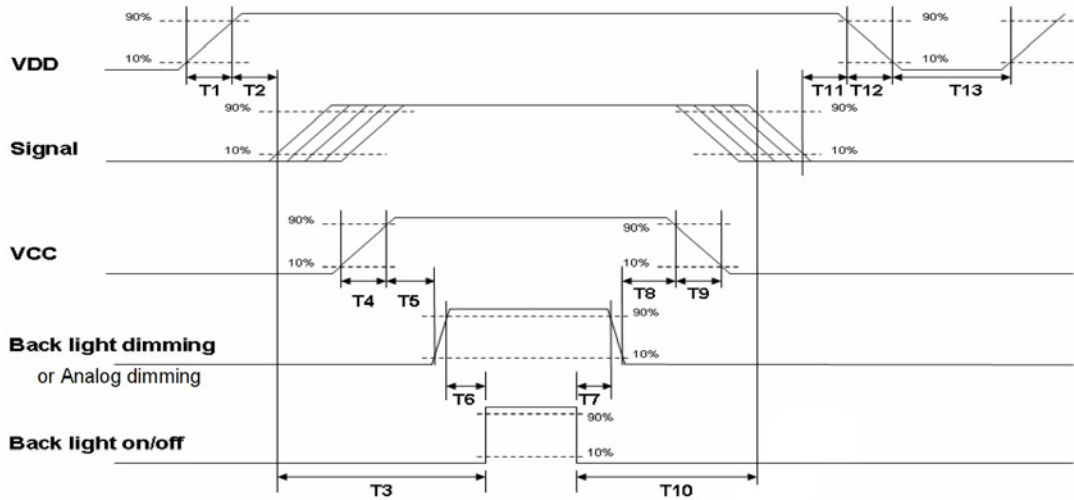
Note: DE mode.

3.4.2 Input Timing Diagram



3.5 Power ON/OFF Sequence

VDD power and lamp on/off sequence is as follows. Interface signals are also shown in the chart. Signals from any system shall be Hi-Z state or low level when VDD is off.



Power Sequence Timing

Parameter	Value			Unit
	Min.	Typ.	Max.	
T1	0.5	-	10	[ms]
T2	30	40	50	[ms]
T3	200	-	-	[ms]
T4	0.5	-	10	[ms]
T5	10	-	-	[ms]
T6	10	-	-	[ms]
T7	0	-	-	[ms]
T8	10	-	-	[ms]
T9	-	-	10	[ms]
T10	110	-	-	[ms]
T11	0	16	50	[ms]
T12	-	-	10	[ms]
T13	1000	-	-	[ms]

Chapter 4

Connector & Pin
Assignment

4.1 TFT LCD Module

The physical connector interface is described below. These connectors are capable of accommodating the following signals and components.

4.1.1 Connector

Table 4.1: Connector

Connector Name / Description	Interface Connector / Interface card
Manufacture	JAE or compatible
Type Part Number	JAE (FI-XB30SRL-HF11) or equivalent
Mating Housing Part Number	FI-X30HL (JAE) or compatible

4.1.2 Pin Assignment

Table 4.2: Pin Assignment

Pin No.	Signal Name	Pin No.	Signal Name
1	RxOIN0-	2	RxOIN0+
3	RxOIN1-	4	RxOIN1+
5	RxOIN2-	6	RxOIN2+
7	GND	8	RxOCLKIN-
9	RxOCLKIN+	10	RxOIN3-
11	RxOIN3+	12	RxEIN0-
13	RxEIN0+	14	GND
15	RxEIN1-	16	RxEIN1+
17	GND	18	RxEIN2-
19	RxEIN2+	20	RxECLKIN-
21	RxECLKIN+	22	RxEIN3-
23	RxEIN3+	24	GND
25	NC	26	NC
27	NC	28	VDD
29	VDD	30	VDD

4.2 Backlight Unit

The physical connector interface is described below. These connectors are capable of accommodating the following signals and components.

4.2.1 Signal for LED light bar connector

Pin No.	Signal Name	Description
1	GND	Ground
2	GND	Ground
3	GND	Ground
4	BL_DIM_P	Back light dimming, 3,3 V
5	BL_EN	Back light enable, 5 V
6	---	NC

7	V12	Input voltage, 12 V
8	V12	Input voltage, 12 V
9	V12	Input voltage, 12 V

4.2.1.1 LED input connector pin define (PIN1):

Connector Name / Designation	LED Connector
Manufacturer	Sin Sheng or compatible
Connector Model Number	MS24049HJ
Mating Model Number	P24049 or compatible

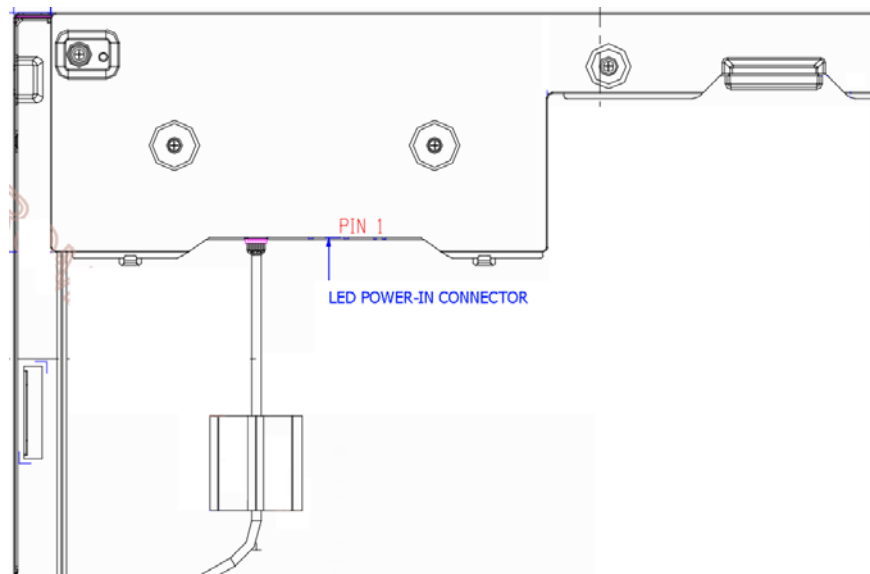


Figure 4.1

Chapter 5

Touch Screen & Touch
Controller

5.1 Touch Screen

5.1.1 Touch Characteristics

The touch panel is a resistance type used with flat LCD displays. Touches via finger or stylus send coordinate points to the PC from voltage changes at the contact point.

5.1.2 Optical Characteristics

	Item	Specification	Remarks
1	TRANSPARENCY	80% ± 3%	BYK-Gardner
2	HAZE	8.0% ± 3%	BYK-Gardner

5.1.3 Environment Characteristics

	Item	Specification	Remarks
1	Operation temperature	-20°C ~ 70°C	
2	Storage temperature	-40°C ~ 80°C	
3	Operation Humidity	20% ~ 80%RH	Non condensing
4	Storage Humidity	20% ~ 90%RH	

Note! All terms under 1 atmosphere.

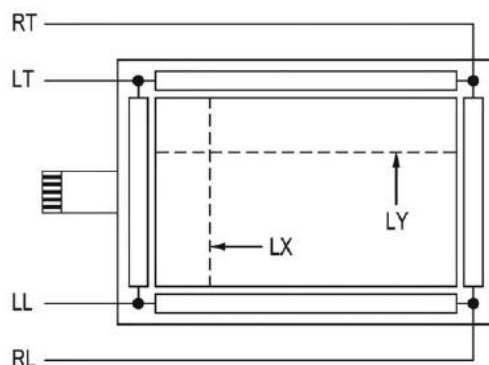


5.1.4 Mechanical Characteristics

	Item	Specification	Remarks
1	Hardness of surface	Pencil hardness 3H.	JIS K-5600-5-4 750gf, 45 degree
2	FPC peeling strength	1) 5N (5N Min.) 2) 19.6N (19.6N Min.)	1) Peeling upward by 90° 2) Peeling downward by 90°
3	Operation force	Pen 0.05N~1.96N Finger (5~200gf)	Dot-Spacer Within “guaranteed active area”, but not on the age and Dot-Spacer.

5.1.5 Electronic Characteristics

	Item	Specification	Remarks
1	Rated Voltage	DC 7V max.	
2	Loop Resistance	X axis: 20Ω ~ 500Ω(Figure as bellow) Y axis: 20Ω ~ 500Ω(Figure as bellow)	FPC connector
3	Linearity	X ≤1.5% (Figure as bellow) Y ≤1.5% (Figure as bellow)	Reference: 250gf
4	Chattering	≤ 15ms Max	
5	Insulation Resistance	≥ 20MΩ min (DC 25V)	

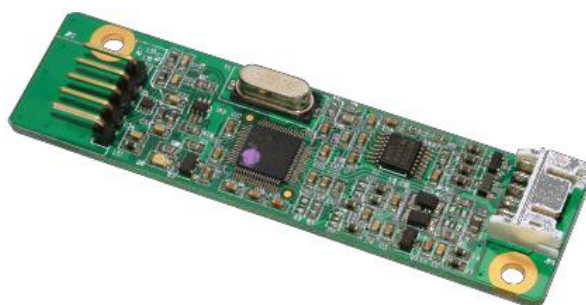


5.1.6 General specification

Item	Specification
1	Frame size 496.50±0.30 X 292.20±0.30 mm
2	View Area 481.50±0.20 X 272.60±0.20 mm
3	Active Area 477.50±0.20 X 268.60±0.20 mm
4	Total Thickness 3.20±0.20 mm
5	Tail length 205.00±6.00 mm

5.2 Touch controller

Advantech ETM-RES04C Touch Control Board, is the ultimate combo board. This touch panel controller provides optimum performance of your analog resistive touch panels for 5-wire models. It communicates with the PC system directly through USB and RS-232 connectors. The design is superior in sensitivity, accuracy and friendly operation. The touch panel driver emulates mouse left and right button functions.



5.2.1 Touch Controller Characteristics

5.2.1.1 Specifications

Electrical Features

- +5 Vdc/ 100 mA typical, 50mV peak to peak maximum ripple and noise.
- Bi-directional RS-232 serial communication and USB 1.1 full speed
- Report rate of RS-232 is 180 points/sec (max.). And, USB is 200 points/sec (max.)
- Unaffected by environmental EMI
- Panel resistance of 5-wire resistive model is from 50 to 200 ohm (Pin to pin on same layer)

- Touch resistance under 3K ohm

Serial Interface

- EIA 232E (Serial RS-232)
- No parity, 8 data bits, 1 stop bit, 9600 baud (N, 8, 1, 9600)
- Supports Windows 2000/ Vista/ XP/ 7, Windows CE 5.0/ 6.0/ 7.0, Windows NT4, Linux, DOS, QNX

USB Interface

- Conforms to USB Revision 1.1 full speed.
- If the USB is connected to the controller, the controller will communicate over the USB, and will not communicate over the serial port.
- Support Windows 2000/ Vista/ XP/ 7, Windows CE 5.0/ 6.0/ 7.0, Linux, QNX

Touch Resolution

- 2,048 x 2,048 resolution

Response Time

- Max. 20 ms

5.2.1.2 Environmental Feature

Reliability

- MTBF is 200,000 hours

Temperature Ranges

- Operating : -25°C ~ 85°C
- Storage : -25°C ~ 85°C

Relative Humidity

- 95% at 60°C, RH Non-condensing

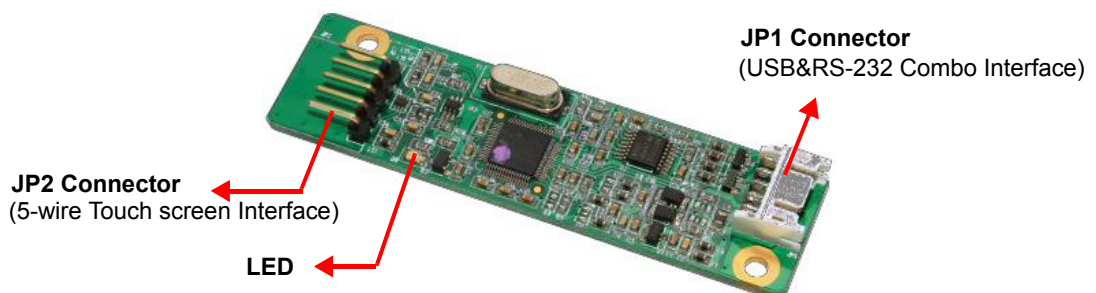
Acquired RoHS certificate

Regulatory FCC-B, CE approvals

Dimension: 75 mm x 20 mm x 10 mm

5.2.2 Pin Assignment and Description

5.2.2.1 Connector and LED Location



5.2.2.2 Combo Interface Connector, JP1, Pins and signal descriptions

The combo interface connector, USB and RS-232, is a box 2.0mm 10-pins 90 degree, Male type with lock connector, intended to be used with single wired pins in 5+5 pins header. The pins are numbered as shown in the table below.

USB Pin #	Signal Name	Signal Function	RS-232 Pin #	Signal Name	Signal Function
1	G	Ground	1	G	Ground
2	V	USB Power	2	V	Power
3	G	Ground	3	G	Ground
4	D+	USB D+	4	TxD	Serial Port
5	D-	USB D-	5	RxD	Serial Port

Signal Name	DB-9 pin #	RS-232 pin #	Sourced by	Signal Description
RxD	2	5	ctrl	serial data from controller to host
TxD	3	4	host	serial data from host to controller

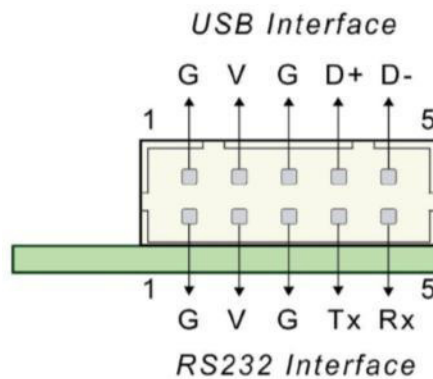
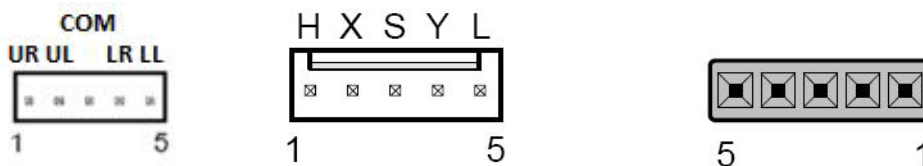


Figure 5.1 Board mounted header

5.2.2.3 Touch Screen Connector, JP2, Pins and signal descriptions

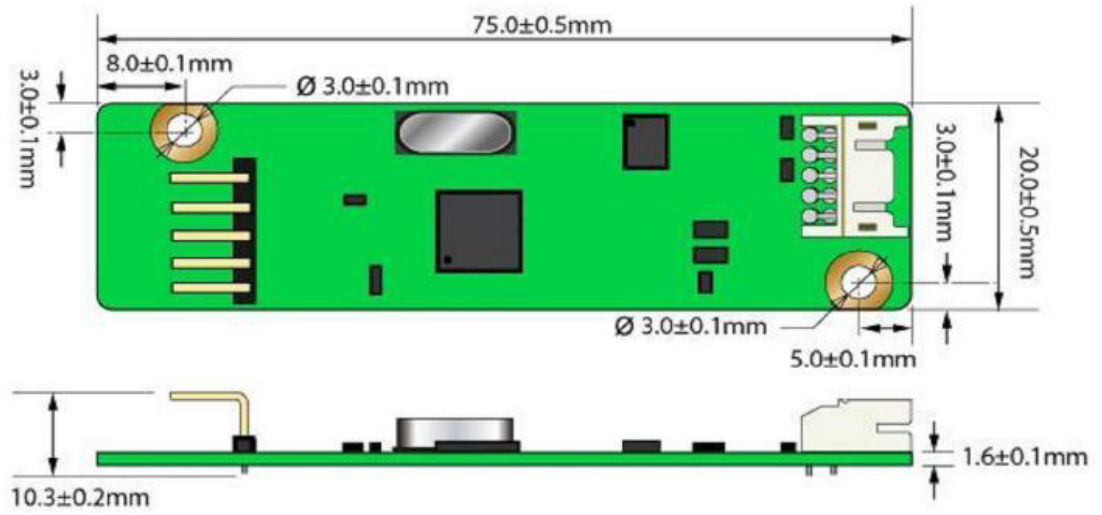
The Touch Screen connector, JP2, is a single row by 2.54mm 5-pins 90 degree, Male type connector. The pins are numbered as shown in the table below.

JP2 Pin #	Signal Name	Signal Description
1	H / UR	Drive signal attached to the touchscreen substrate upper right corner when viewed from a user's perspective.
2	Y / UL	Drive signal attached to the substrate upper left corner.
3	COM	-
4	X / LR	Drive signal attached to the substrate lower right corner.
5	L / LL	Drive signal attached to the substrate lower left corner.



5.2.3 Physical dimension

ETM-RES04C-EEH4EE Touch Control Board (Unit: mm)



Appendix **A**

Handling Precautions

A.1 Optical Characteristics

The optical characteristics are measured under stable conditions at 25°C (Room Temperature)

1. Since the front polarizer is easily damaged, pay attention not to scratch it.
2. Be sure to turn off the power supply when inserting or disconnecting from the input connector.
3. Wipe off water drops immediately. Long contact with water may cause discoloration or spots.
4. When the panel surface is soiled, wipe it with absorbent cotton or other soft cloth.
5. Since the panel is made of glass, it may break or crack if dropped or bumped on hard surface.
6. Since CMOS LSI is used in this module, take care of static electricity and insure you are earthed when handling.
7. Do not open or modify the Module Assembly.
8. Do not press the reflector sheet at the back of the module from any direction.
9. In case if a Module has to be put back into the packing container slot after it was taken out, please press the far end of the LED light bar reflector edge softly, otherwise the TFT Module may be damaged.
10. At the insertion or removal of the Signal Interface Connector, be sure not to rotate nor tilt the Interface Connector of the TFT Module.
11. After installation of the TFT Module into an enclosure, no bending/twisting forces should be applied to the TFT Module. Otherwise the TFT Module may be damaged.
12. Small amounts of materials having a no flammability grade are used in the LCD module. The LCD module should be supplied by power complying with the requirements of Limited Power Source (IEC60950 or UL1950)

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