

**User Manual**

# **IDK-1110WR-series**

**TFT-LCD 10.1" WSVGA (LED  
Backlight)**

**ADVANTECH**

*Enabling an Intelligent Planet*

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# Chapter 1

Overview

## 1.1 General Description

This specification applies to the 10.1 inch color TFT LCD module IDK-1110WR-55WSA1E. IDK-1110WR-55WSA1E is designed with a wide viewing angle; wide operating temperature and long life LEDs backlight, making it well suited as display units for Industrial Applications. A LED driving board for backlight unit is included in this panel and the structure of the LED units is replaceable. IDK-1110WR-55WSA1E uses a built in timing controller and LVDS interface. The screen format is intended to support the WSVGA (1024(H) x 600(V)) screen and 262k colors (RGB 6-bits). IDK-1110WR-55WSA1E are a RoSH product.

## 1.2 Display Characteristics

The following characteristics are summarized on the table below for under 25°C conditions.

Items	Specifications	Unit
Screen Diagonal	10.1 (Diagonal)	inch
Active Area	222.72(H) x 125.28(V)	mm
Pixels H x V	1024 x 3(RGB) x 600	
Pixel Pitch	0.2715 x 0.2088	mm
Pixel Arrangement	R.G.B. Vertical Stripe	
Display Mode	TN, Normally White	
Nominal Input Voltage VDD	3.3 typ.	Volt
Typical Power Consumption	6.184 typ.	Watt
Weight	420 ± 10	Grams
Physical Size	235.0(W) x 145.8(H) x 10.25(D) (typ.)	mm
Electrical Interface	1 channel LVDS	
Surface Treatment	Anti-glare, Hardness 3H	
Support Color	262K(6-bit)	
Temperature Range		
Operating	-5 to + 60	°C
Storage (Non-Operating)	-20 to +70	°C
RoHS Compliance	RoHS Compliance	

## 1.3 Optical Characteristics

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

Item	Symbol	Conditions	Values			Unit	Note
			Min.	Typ.	Max.		
Viewing angle	$\theta L$	(CR ≥ 10 )	60	70	--	degree	1, 2
	$\theta R$		60	70	--		
	$\theta U$		60	70	--		
	$\theta D$		40	50	--		

Response time	TR	Normal	-	5	7	msec	3
	TF	$\theta=\phi=0^\circ$	-	20	28	msec	
Contrast ratio	CR		400	500	--	-	2
Color chromaticity	WX		0.26	0.31	0.36	-	1, 4
	WY		0.28	0.33	0.38	-	
	RX		0.54	0.59	0.64	-	
	RY		0.28	0.33	0.38	-	
	GX		0.29	0.34	0.39	-	
	GY		0.54	0.59	0.64	-	
	BX		0.11	0.16	0.21	-	
	BY		0.05	0.1	0.15	-	
Luminance	L		350	440	--	cd/m <sup>2</sup>	4
Luminance uniformity	YU		70	--	--	%	5

### 1.3.1 Measuring Condition

- Measuring surrounding: dark room
- Ambient temperature:  $25\pm 2^\circ$
- 15 min. warm-up time

### 1.3.2 Measuring Equipment

The optical characteristics are measured in a dark room. After 30 minutes operation, the optical properties are measured at the center point of the LCD screen. (Response time is measured by a Photo detector TOPCON BM-7 of view:  $1^\circ$  / Height: 120 mm.)

**Note1:** Definition of viewing angle range

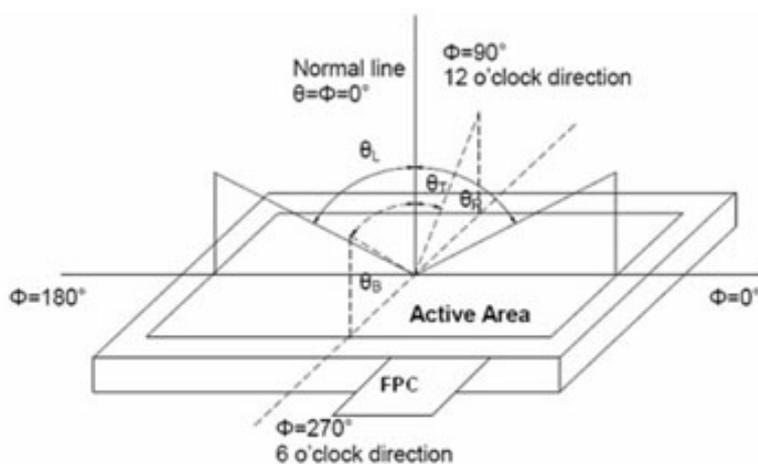


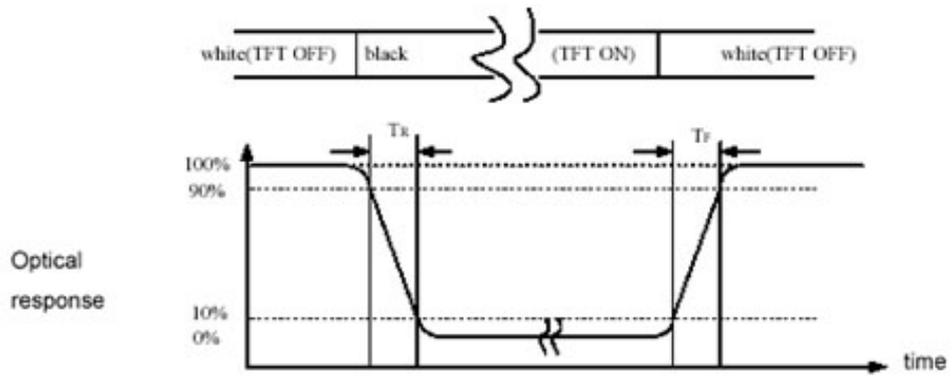
Fig. 1 Definition of viewing angle

**Note 2:** Definition of Contrast Ratio

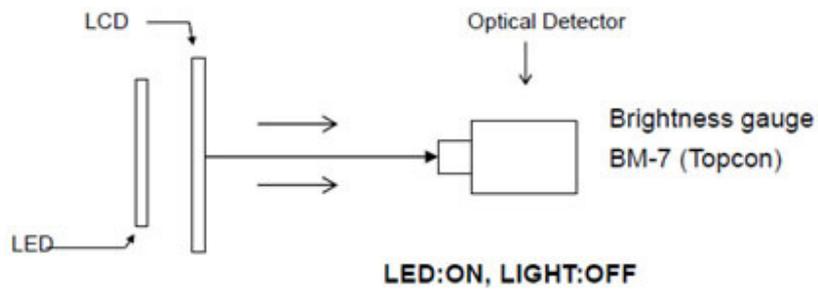
Contrast ratio is calculated with the following formula :

$$\text{Contrast Ratio (CR)} = (\text{White}) \text{ Luminance of ON} \div (\text{Black}) \text{ Luminance of OFF}$$

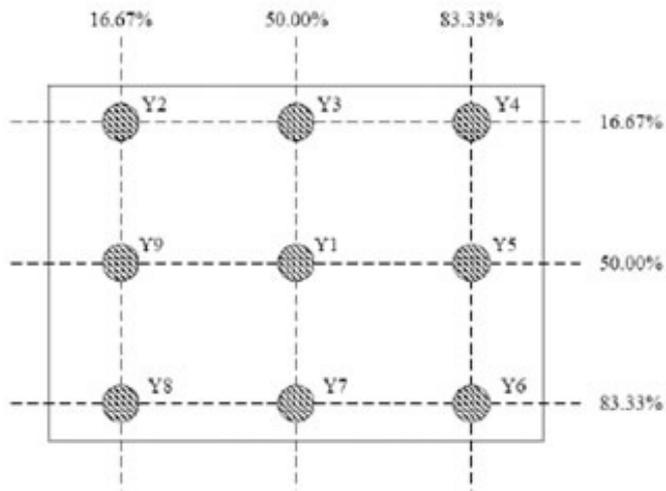
**Note 3:** Definition of Response time: Sum of TR and T



**Note 4:** Definition of optical measurement setup



**Note 5:** Definition of brightness uniformity



(Min Luminance of 9 points)

$$\text{Luminance uniformity} = \frac{\text{Min Luminance}}{\text{Max Luminance}} \times 100\%$$

**Note 6:** Rubbing Direction (The different Rubbing Direction will cause the different optimal view direction)

**Note 7:** Condition:  $T_a=25^\circ\text{C}$ , Life time is estimated data.

Definitions of failure:

1. LCM brightness becomes half of the minimum value.
2. LED doesn't light normally.

## 1.4 Block Diagram

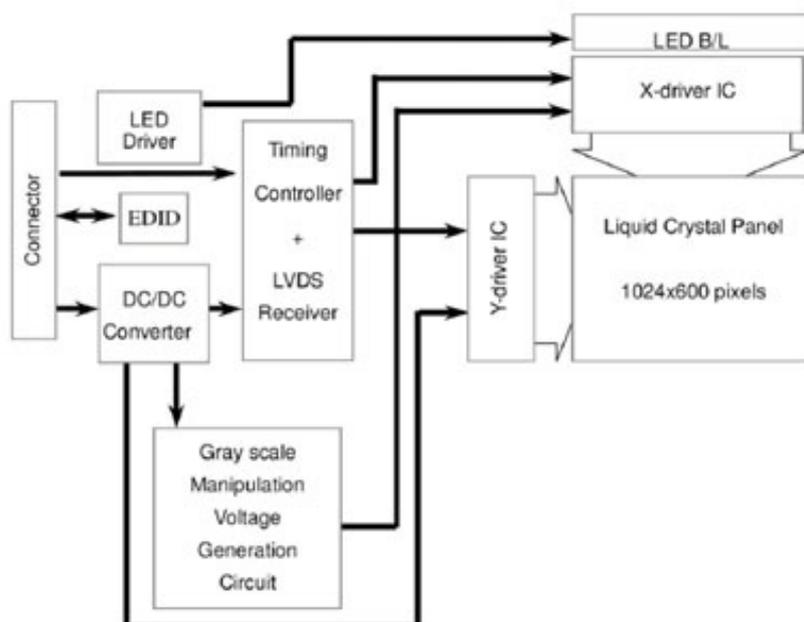


Figure 1.1 TFT LCD module

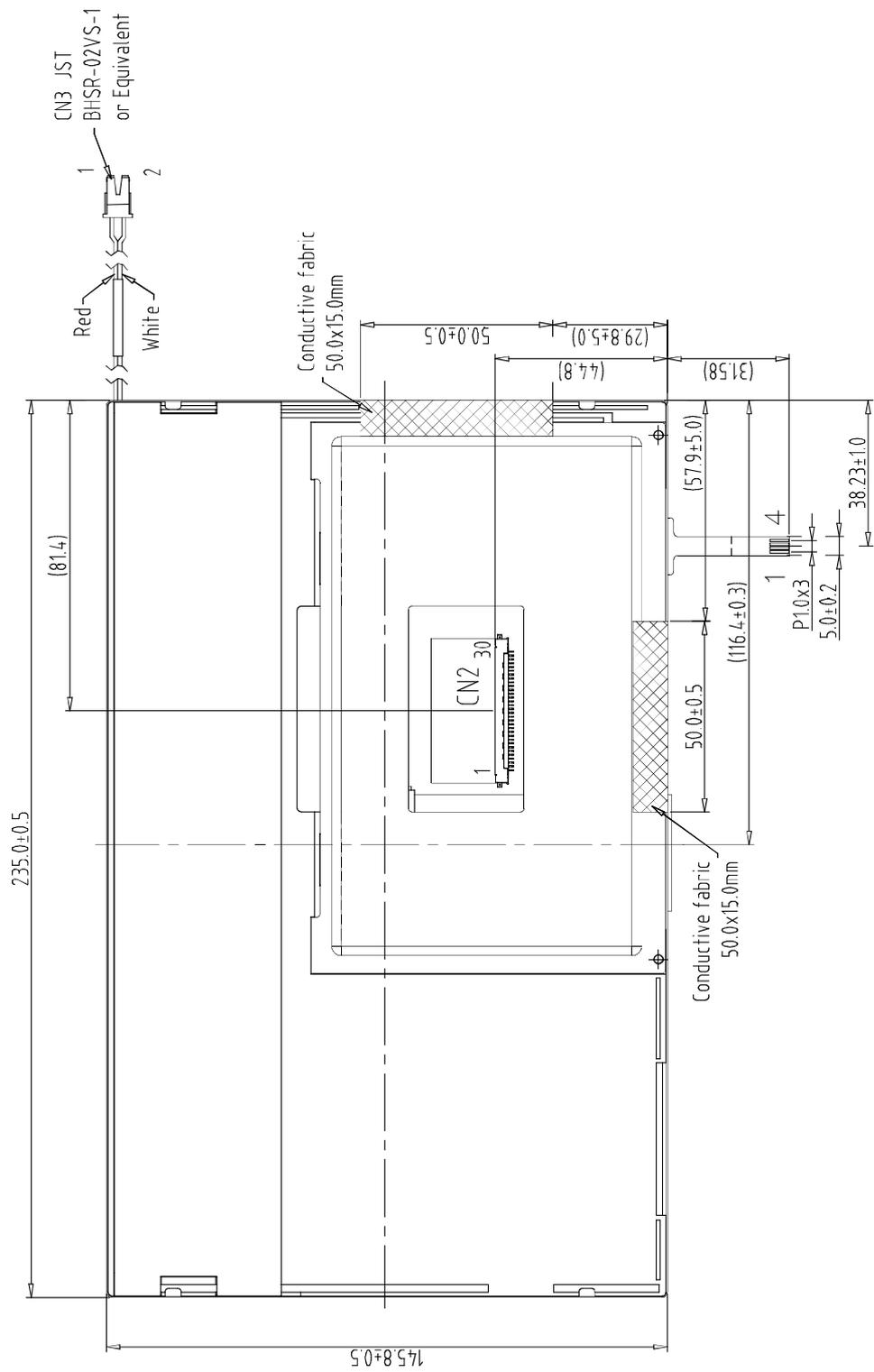
## 1.5 Absolute Maximum Ratings

### 1.5.1 Absolute Max Rating

Item	Symbol	Value		Unit	Note
		Min.	Max.		
LED Power Supply Voltage	$V_{LED}$	-0.3	15.0	V	GND=0
Logic Supply Voltage	$V_{DD}$	-0.3	5.0	V	
Operating Temperature	$T_{OPA}$	-5	60	°C	
Storage Temperature	$T_{STG}$	-20	70	°C	



## 1.6.2 Rear view





# Chapter 2

Electrical  
Characteristics

## 2.1 TFT LCD Module

Item	Symbol	Value			Unit	Note
		Min.	Typ.	Max.		
Power voltage	VDD	3.0	3.3	3.6	V	1
Current of power supply	IDD	-	0.3	-	A	VDD=3.3V Black Pattern
Power voltage for LED driver	VLED	4.5	5	5.5	V	
LED driver current of power supply	ILED	-	1.4		A	VLED=5V ADJ=100%

**Note** VDD-dip condition:

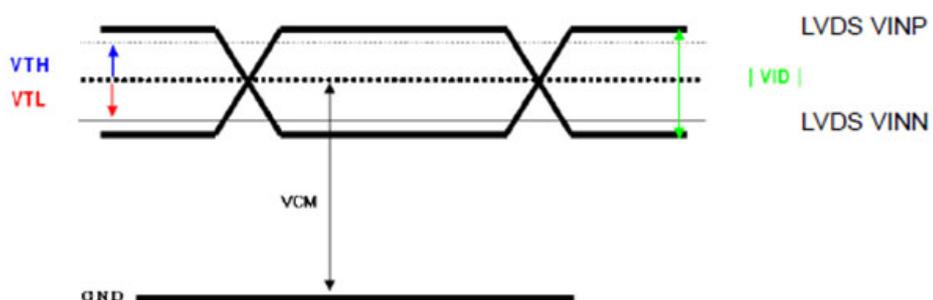
When  $2.7V \leq VDD < 3.0V$ ,  $t_d \leq 10ms$ .

$VDD > 3.0V$ , VDD-dip condition should be same as VDD-turn-con condition.

### 2.1.1 Signal Electrical Characteristics

Parameter	Symbol	Value			Unit	Remark
		Min.	Typ.	Max.		
Differential Input High Threshold	VTH	-	-	100	mV	VCM=1.2V
Differential Input Low Threshold	VTL	-100	-	--	mV	
Input current	IIN	-10	-	+10	$\mu A$	
Differential input Voltage	VID	0.2	-	0.6	V	
Common Mode Voltage Offset	VCM	$ VID /2$	1.25	2.4- $ VID /2$	V	

**Note** LVDS Signal Waveform.



## 2.2 Backlight Unit

### 2.2.1 Parameter guideline for LED backlight

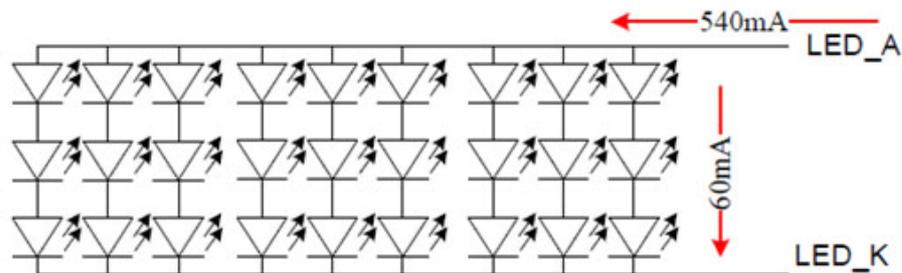
Following characteristics are measured under a stable condition using an inverter at 25°C (Room Temperature):

Parameter	Symbol	Value			Unit	Note
		Min.	Typ.	Max.		
LED Driver voltage	VLED	4.5	5	5.5	V	
Power Supply Current For LED Driver	ILED	-	1.4	-	A	VLED=5V VADJ=3.3V (duty 100%)
ADJ Input Voltage	V <sub>ADJ</sub>	-	3.3	VLED	V	duty=100%
LED_EN Voltage	V <sub>EN</sub>	-	3.3	-	V	
LED voltage	V <sub>AKL</sub>	-	9.6	10.8	V	I <sub>L</sub> = 540mA, Ta = 25°C
LED current	I <sub>L</sub>	-	540	-	mA	Note1
		-	460	-	mA	Note1
LED Life Time	-	-	50K	-	Hour	Note2

**Note1** The constant current source is needed for white LED back-light driving.

When LCM is operated over 60 deg.C ambient temperature, the IL of the LED back-light should be adjusted to 460mA max.

There are 6 Groups LED shown as below, VLEDA-LEDK=9.6V ,Ta=25°C

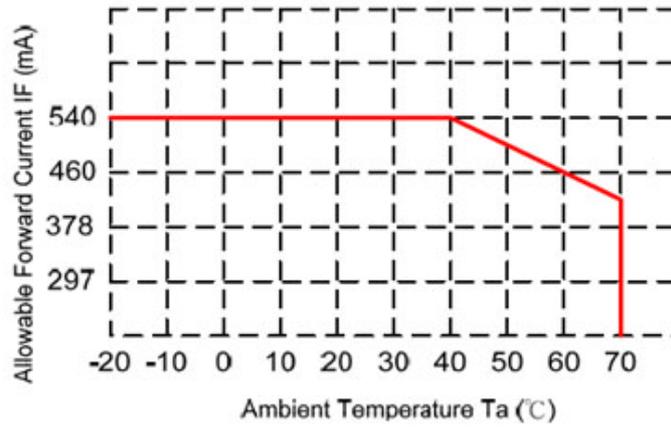


**Note1** Condition: Ta=25°C, continuous lighting

Life time is estimated data. Definitions of failure:

- 1.LCM brightness becomes half of the minimum value.
- 2.LED doesn't light normally.

When LCM is operated over 40°C ambient temperature, the ILED should be followed:



# Chapter 3

## Signal Characteristics

## 3.1 Electrical Interface Connection

CN1 (Input signal): CSTAR DS100-430-H23 (equivalent JAE FI-XB30SSRL-HF16)

Pin No.	Symbol	Description	Note
1	GND	Ground	
2	VDD	3.3V Power	
3	VDD	3.3V Power	
4	V_EDID	3.3V Power for EDID	
5	NC	No connection	
6	CLK_EDID	EDID Clock Input	
7	DATA_EDID	EDID Data Input	
8	RXIN0-	LVDS Signal - channel0-	
9	RXIN0+	LVDS Signal+ channel0+	
10	GND	Ground	
11	RXIN1-	Data Input channel1-	
12	RXIN1+	Data Input channel1+	
13	GND	Ground	
14	RXIN2-	Data Input channel2-	
15	RXIN2+	Data Input channel2+	
16	GND	Ground	
17	RXCLKIN-	Data Input CLK-	
18	RXCLKIN+	Data Input CLK+	
19	GND	Ground	
20	NC	No connection	
21	NC	No connection	
22	GND	Ground	
23	GND	Ground	
24	NC	No connection	
25	NC	No connection	
26	NC	No connection	
27	NC	No connection	
28	NC	No connection	
29	NC	No connection	
30	NC	No connection	

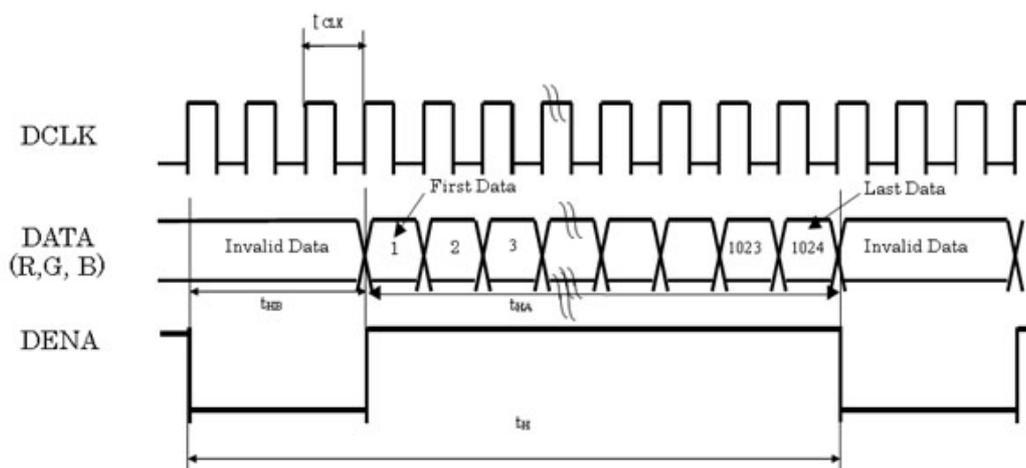
## 3.2 Interface Timing

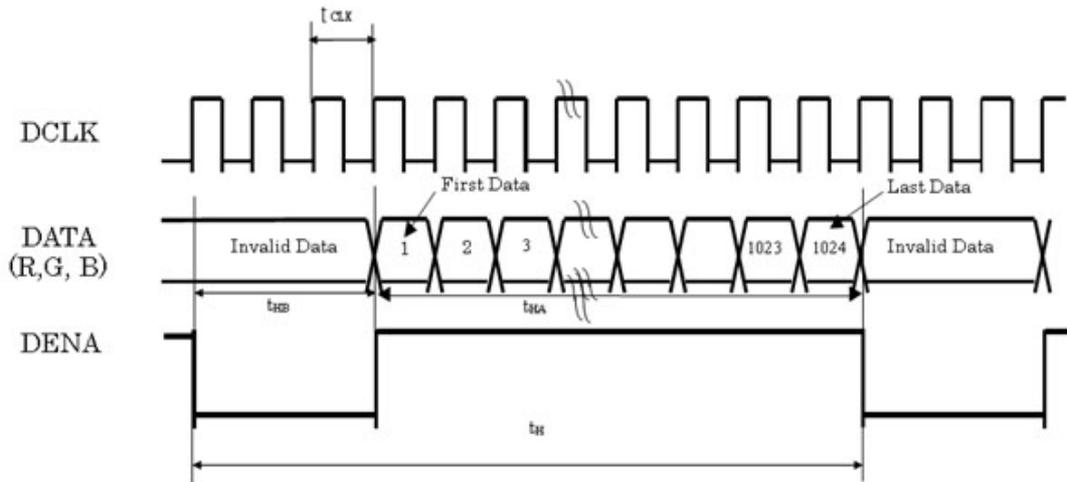
### 3.2.1 Timing Characteristics

DE mode only

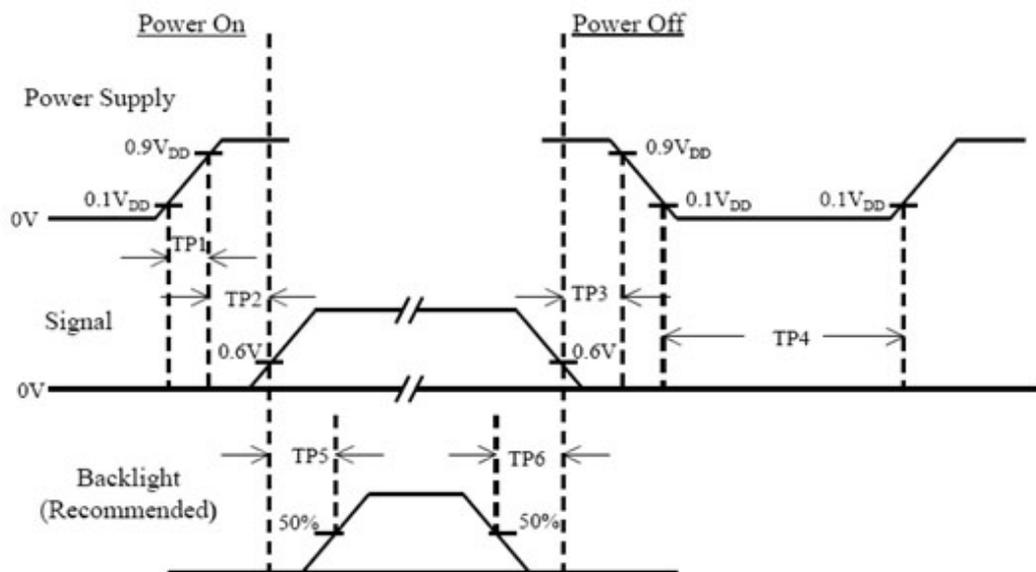
Table 3.1: Timing Characteristics							
Item		Symbol	Min.	Typ.	Max.	Unit	
LVDS input signal sequence	CLK Frequency	tCLK	41	51.2	57	MHz	
LCD input signal sequence (input LVDS Transmitter)	Horizontal	Horizontal total Timing	$T_H$	1214	1344	1364	tCLK
		Horizontal Effective Timing	$T_{HA}$	1024	1024	1024	tCLK
	Vertical	Horizontal Blank Time	$T_{HB}$	190	320	340	tCLK
		Vertical total Time	$T_V$	615	635	645	t <sub>H</sub>
		Vertical Effective Time	$T_{VA}$	600	600	600	t <sub>H</sub>
		Vertical Blank Time	$T_{VB}$	15	35	45	t <sub>H</sub>

### 3.2.2 Input Timing Diagram





### 3.3 Power ON/OFF Sequence



**Power ON/OFF Sequence Timing**

Item	Min.	Typ.	Max.	Unit
TP1	0.5	-	10	msec
TP2	0	-	50	msec
TP3	0	-	50	msec
TP4	500	-	-	msec
TP5	200	-	-	msec
TP6	200	-	-	msec

**Note1** The supply voltage of the external system for the module input should be the same as the definition of VDD

**Note2** Apply the lamp voltage within the LCD operation range. When the back-light turns on before the LCD operation or the LCD turns off before the back-light turns off, the display may momentarily become white.

**Note3** In case of VDD = off level, please keep the level of input signal on the low or keep a high impedance.

**Note4** TP4 should be measured after the module has been fully discharged between power off and on period.

**Note5** Interface signal shall not be kept at high impedance when the power is on.



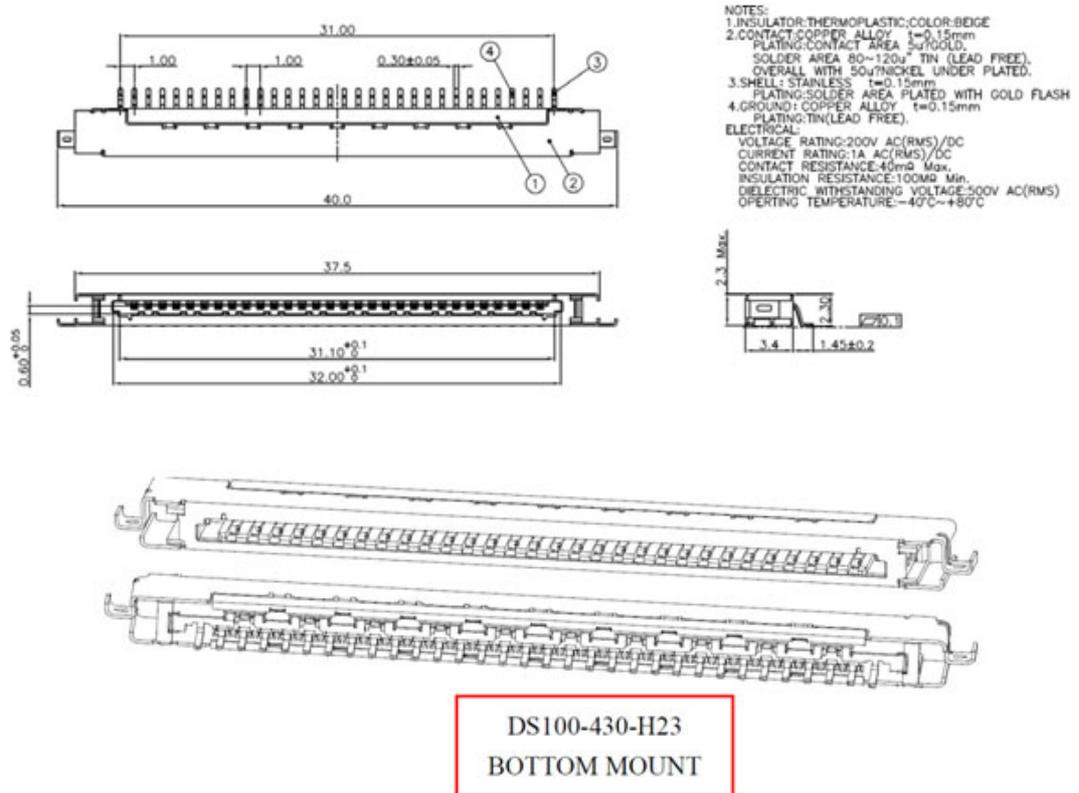
# Chapter 4

## Display Connector Definition

## 4.1 TFT LCD Signal(CN1): LVDS Connector

**Table 4.1: Connector**

Connector Name / Description	Signal Connector
Manufacture	CSTAR or compatible
Connector Model Number	CSTAR DS100-430-H23compatible



## 4.2 LED Backlight Unit (CN1): LED Backlight Connector

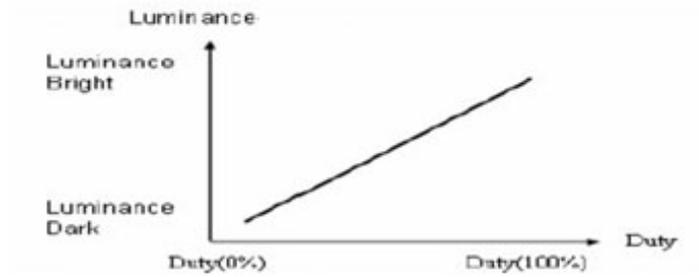
Connector Name / Designation	LED Connector
Manufacturer	BHSR-02VS-1
Connector Model Number	BHSR-02VS-1 (JST) or compatible

Pin No.	Symbol	Description
1	A	Anode for LED backlight
2	K	Cathode for LED backlight



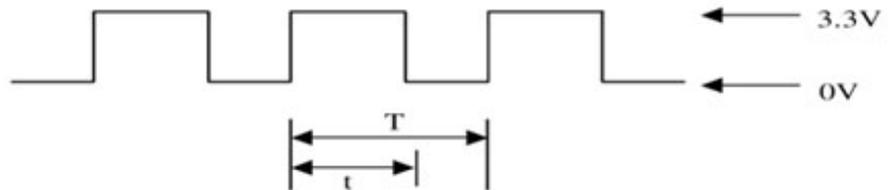
**[Note]**

(1) ADJ can adjust brightness to control Pin. Pulse duty the bigger the brighter.



(2) ADJ Signal=0~3.3V · Operation Frequency :

Dimming Range		
PWM Frequency (F)	Duty Cycle (Min.)	Duty Cycle (Max.)
100Hz < F < 500Hz	5%	100%
500Hz < F < 20KHz	10%	100%



$$\text{Duty Cycle} = t / T * 100\%$$

# Chapter 5

Touch Screen

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## 5.1 Touch Characteristics

### Electronic Characteristics

Item	Specification	Remarks
1 Rated Voltage	DC 7V max.	
2 Resistance	X axis: 250Ω ~ 1200Ω(FILM) Y axis: 100Ω ~ 600Ω(GLASS)	FPC at connector
3 Chattering	10ms Max At connector pin	
4 Insulation Resistance	25MΩ min (DC 25V)	

# Chapter 6

Touch Controller

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## 6.1 Touch Controller Characteristics

Advantech ETM-RES05C Touch Control Board is the ultimate combo board. This touch panel controller provides optimal performance of your analog resistive touch panels for 4 wire models. It communicates with a PC system directly through USB and RS-232 connectors. The touch panel driver emulates mouse left and right button functions.

## 6.2 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 4-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)
- Support 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

## 6.3 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

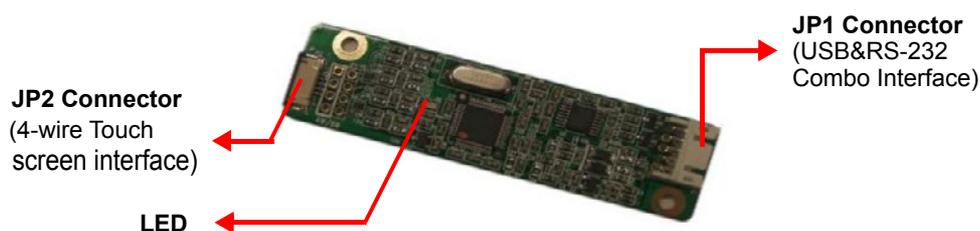
**Acquired RoHS certificate**

Regulatory FCC-B, CE approvals

Dimension: 75 mm x 20 mm x 10 mm

## 6.4 Pin Assignment and Description

### 6.4.1 Connector and LED Location

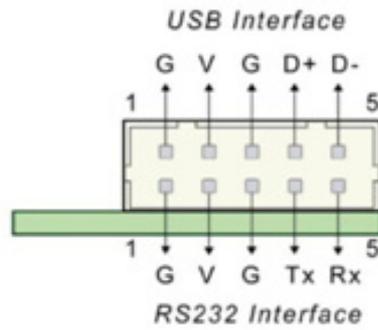


### 6.4.2 Combo Interface Connector, JP1, Pins and Signal Descriptions

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

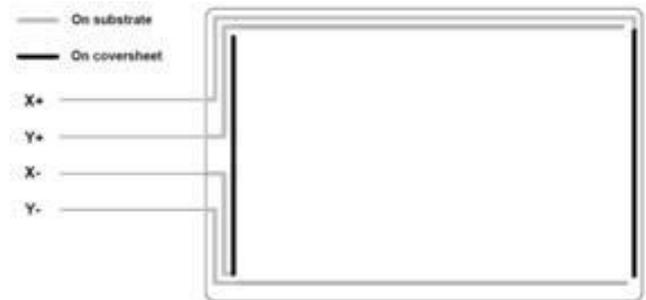
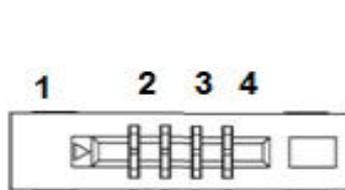


**Figure 6.1 Board mounted header**

### 6.4.3 Touch Screen Connector, JP2, Pins and Signal Descriptions

The Touch Screen connector, JP2, is a FFC/FPC SMD 1.0mm 4-pins 90 degree, Female type connector. The pins are numbered as shown in the table below.

TS4 Pin #	Signal Name	Signal Description
1	YB	Bottom
2	XL	Left
3	YT	Top
4	XR	Right



4-Wire Touch Screen ZIF connector

4-Wire Screen viewed from cover sheet side

# Appendix **A**

## Handling Precautions

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## A.1 Handling Precautions

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

1. Since the front polarizer is easily damaged, be careful 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 human earth when handling.
7. Do not open or modify the Module Assembly.
8. Do not press the reflector sheet at the back of the module to any directions.
9. In case a Module has to be put back into the packing container slot after it was taken out from the container, please press the far ends 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, do not twist nor bend the TFT Module even momentary. When designing the enclosure, it should be taken into consideration that no bending/twisting forces are applied to the TFT Module from outside. Otherwise the TFT Module may be damaged.
12. Small amount of materials having no flammability grade are used in the LCD module. The LCD module should be supplied by power complied with requirements of Limited Power Source (IEC60950 or UL1950), or be applied exemption.

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