User Manual

IDK-1110WP Series

10.1" WXGA Industrial Display
Kit with Touch Solution

ADVANTECH

Enabling an Intelligent Planet

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This warranty does not apply to any products which have been repaired or altered by persons other than repair personnel authorized by Advantech, or which have been subject to misuse, abuse, accident or improper installation. Advantech assumes no liability under the terms of this warranty as a consequence of such events.

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1. Collect all the information about the problem encountered. (For example, CPU speed, Advantech products used, other hardware and software used, etc.) Note anything abnormal and list any onscreen messages you get when the problem occurs.

2. Call your dealer and describe the problem. Please have your manual, product, and any helpful information readily available.

3. If your product is diagnosed as defective, obtain an RMA (return merchandise authorization) number from your dealer. This allows us to process your return more quickly.

4. Carefully pack the defective product, a fully-completed Repair and Replacement Order Card and a photocopy proof of purchase date (such as your sales receipt) in a shippable container. A product returned without proof of the purchase date is not eligible for warranty service.

5. Write the RMA number visibly on the outside of the package and ship it prepaid to your dealer.

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Chapter 1

Overview

1.1 General Description

The Advantech IDK-1110WP series comes with a 10.1" industrial grade LCD display and project capacitive touch. The series is also available with flexible options for LCD screens enhanced treatment such as Anti-Reflection surface treatment and optical bonding solution. IDK-1110WP series has low power consumption at the typical of 6.18 W. IDK-1110WP series is ideal for embedded applications which customers have maximum flexibility for mechanical design.

1.2 Specifications

1.2.1 LCD Panel

- **Display Size:** 10.1" LED backlight panel
- **Resolution:** 1280 x 800
- **Viewing Angle):** 85°/85°/85°/85°
- **Brightness:** 500 cd/m^2
- **Contrast Ratio:** 800:1
- **Response Time (ms):** 25
- **Colors:** 6 bit (262K)/8 bit (16.2 M)
- **Nominal Input Voltage:** 3.3V
- **Power Consumption:** 6.18 W
- **Signal Interface:** LVDS
- **Weight:** LCD: 360g; W/PCAP: 500g
- **Dimensions (W x H x D):** 230.7 x 152.55 x 6.5 mm

1.2.2 Touch Screen

- **Touch Screen:** Projective Capacitive
- **Light Transmission:** 90 ± 3%
- **Interface:** USB
- **Surface Treatment:** Clear

1.2.3 Environment

- **Operating Temperature:** -20~65 °C
- **Storage Temperature:** -25 ~ 70°C

1.3 LCD Functional Block Diagram

The following diagram shows the functional block of the 10.1 inches Color TFT-LCD Module:
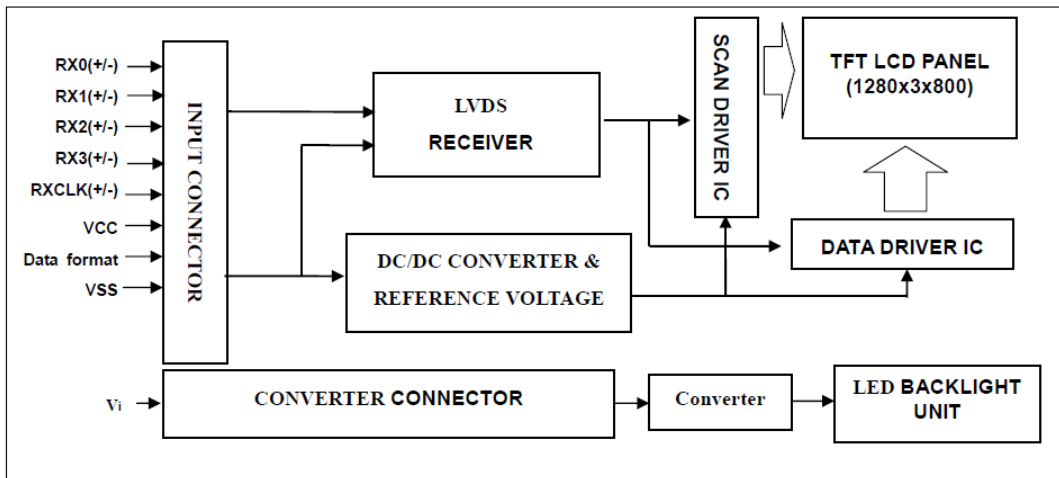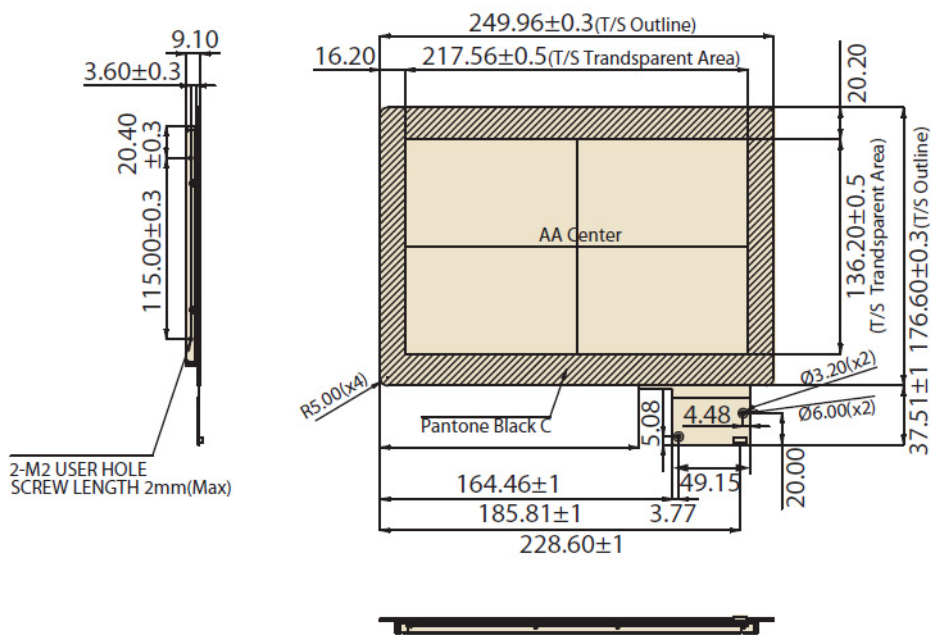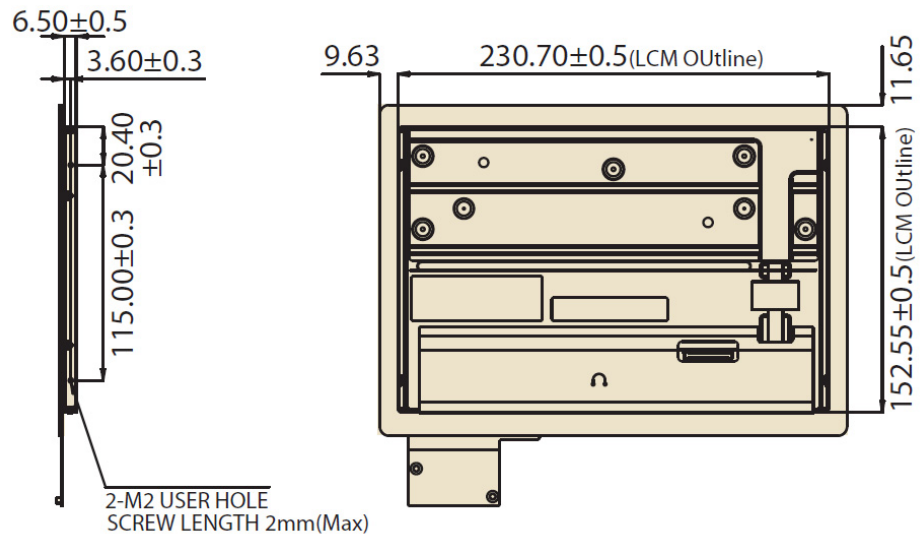

Figure 1.1 Function block diagram

1.4 Mechanical Characteristics

Front View

Rear View

1.5 Touch Screen driver

Please down load the touchscreen driver from Advantech website.

1.6 Absolute Maximum Ratings

1.6.1 TFT LCD Module

Item	Symbol	Min.	Max.	Unit	Note
Logic/LCD Drive Voltage	VCC	-0.3	4	[Volt]	1, 2

1.6.2 Backlight Unit

Item	Symbol	Value		Unit	Note
		Min.	Max.		1, 2
Converter Voltage	V_i	-0.3	18	[Volt]	
Enable Voltage	EN	---	5.5	[Volt]	
Backlight Adjust	ADJ	---	5.5	[Volt]	

1.6.3 Absolute Environment Ratings

Item	Symbol	Min.	Max.	Unit	Conditions
Operating Temperature	TOP	-20	+65	[^{o}C]	
Storage Temperature	TST	-25	+70	[^{o}C]	

Note1: With in Ta= 25°C

Note2: Permanent damage to the device may occur if exceed maximum values

Relative Humidity (%RH)
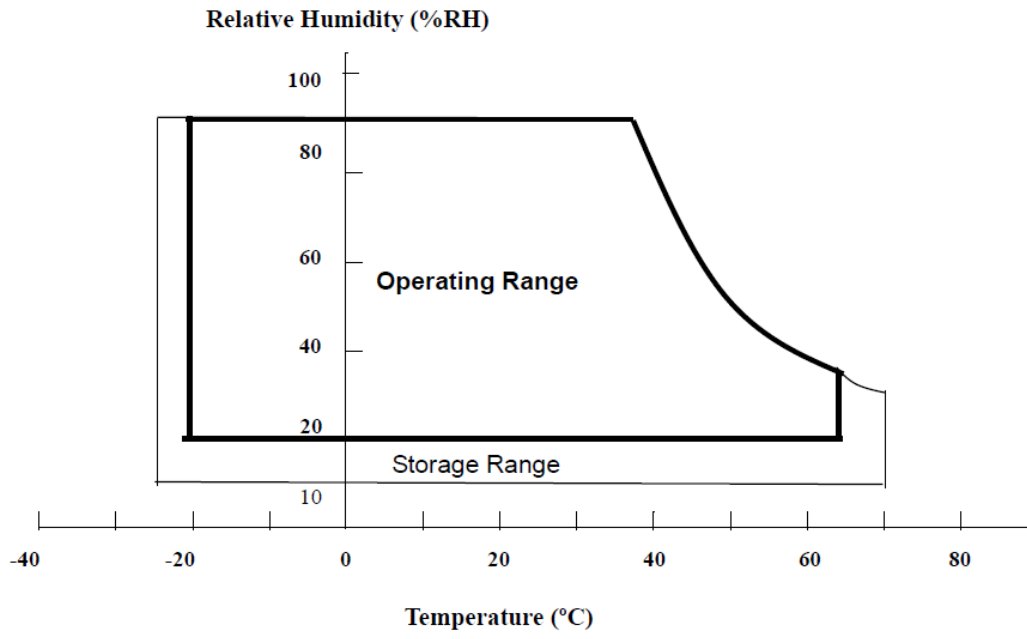
Chapter 2

Electrical Characteristics

2.1 TFT LCD Module

2.1.1 Power Specification

Input power specifications are as follows:

Table 2.1: Power specification

Parameter	Symbol	Value			Unit	Condition
		Min.	Typ.	Max.		
Logic/LCD Drive Voltage	VCC	3.0	3.3	3.6	[Volt]	±10%
Input Current	ICC	-	0.265	0.320	[A]	White Pattern(VCC=3.3V at 60Hz)
VCC Power	PCC	-	0.88	1.15	[Watt]	
Allowable Logic/LCD Drive Ripple Voltage	VCC$_{rp}$	-	-	100	[mV] p-p	With panel loading

2.1.2 Power sequence and control signal timing

Power sequence and control signal timing are shown in the following figure.

Table 2.2: Signal electrical characteristics

Symbol	Parameter	Min.	Typ.	Max.	Unit	Condition
VTH	Differential Input High Threshold	-	-	+100	[mV]	
VTL	Differential Input Low Threshold	-100	-	-	[mV]	
| VID |	Input Differential Voltage	200	-	600	[mV]	
VICM	Differential Input Common Mode Voltage	+1.0	+1.2	+1.4	[V]	
RT	Terminating Resistor	-	100	-	[Ohm]	-

Note1! *The module should be always operated within the above ranges.*

Note2! *Measurement conditions:*
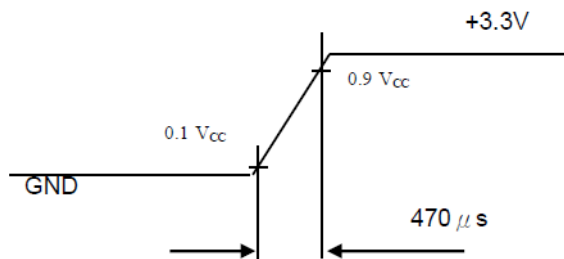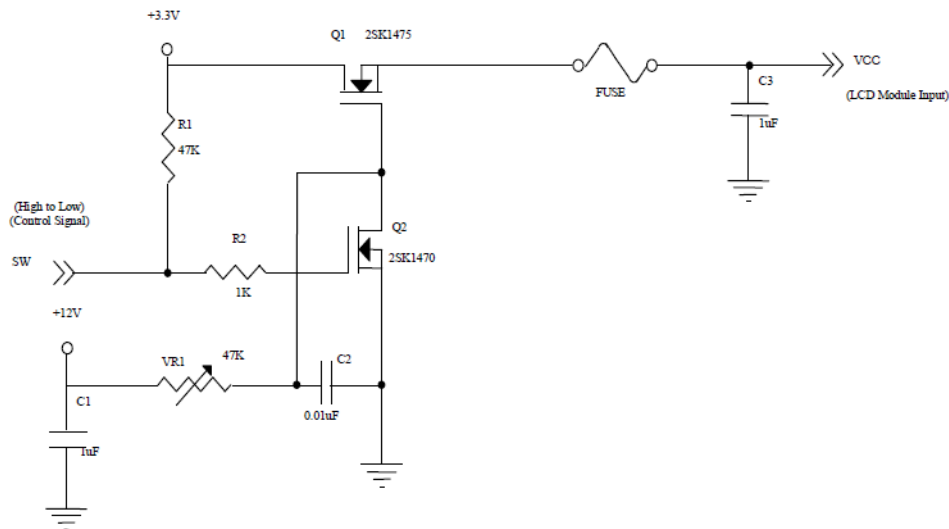
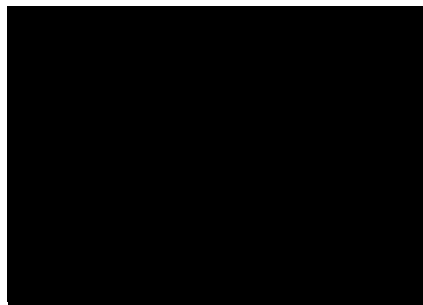**Note3!** *The specified power supply current is under the conditions at VDD =3.3V, Ta = 25 ± 2°C, DC Current and fv = 60 Hz, whereas a power dissipation check pattern below is displayed.*

a. White Pattern

b. Black Pattern


Active Area

Active Area

2.2 Backlight Unit

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

Table 2.3: Backlight driving conditions

Item	Symbol	Values Min.	Values Typ.	Values Max.	Unit	Condition
Input Voltage	V_{LED}	10.8	12	13.2	[Volt]	
Input Current	I_{LED}	-	0.45	0.50	[A]	@ Vi = 12V (Duty 100%)
Power Consumption	P_{LED}	-	5.3	5.8	[Watt]	@ Vi = 12V (Duty 100%)
PWM Dimming Frequency	F_{PWM}	190	200	20K	[Hz]	Note 2
PWM Control Duty Ratio		1	-	100	[%]	@200Hz
PWM Control Level	High Level	2.5	3.3	5.0	V	
	Low Level	0	-	0.15	V	
On Control Voltage	$V_{LED\ ON/OFF}$	2.5	3.3	5.0	[Volt]	
Off Control Voltage		-	0	0.8	[Volt]	
LED Life Time		-	50,000		[Hrs]	Note 3

Note1! *LED current is measured by utilizing a high frequency current meter as shown below:*
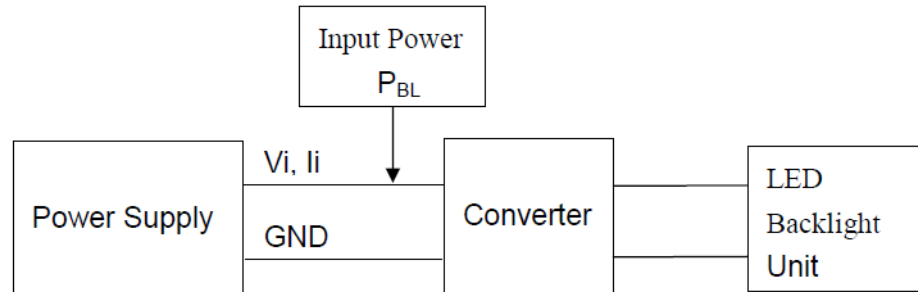
*Note2!* *At 200 Hz PWM control frequency, duty ratio range is restricted from 1% to 100%*

Note3! *The lifetime of LED is defined as the time when it continues to operate under the conditions at Ta = 25 ±2°C and Duty 100% until the brightness becomes ≤50% of its original value. Operating LED under high temperature environment will reduce life time and lead to color shift.*

Power sequence and control signal timing are shown in the following figure.
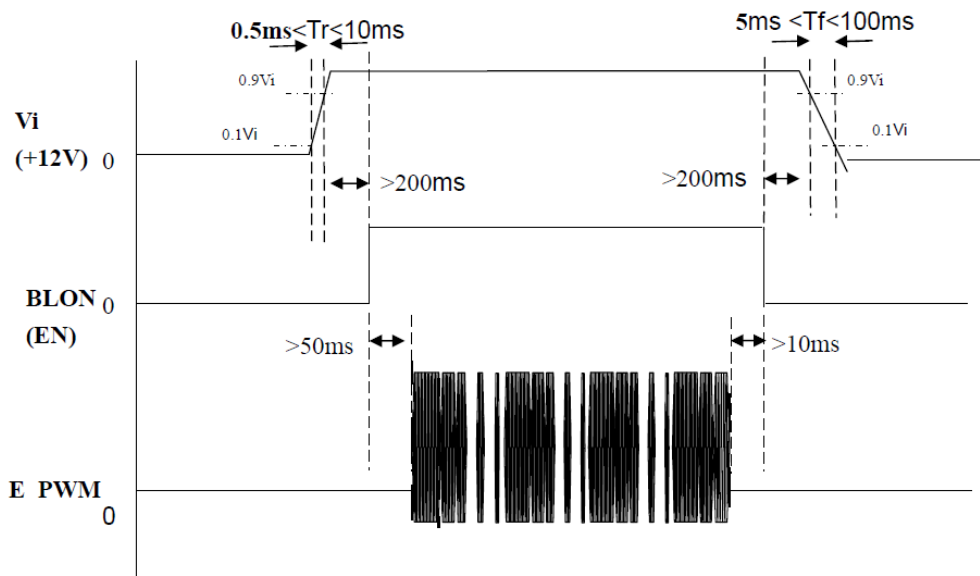
> **Note!** *While the system is turned ON or OFF, the power sequences must follow as below descriptions.*
>
> *Turn ON sequence: Vi(+12V) → BLON → E_PWM signal*
>
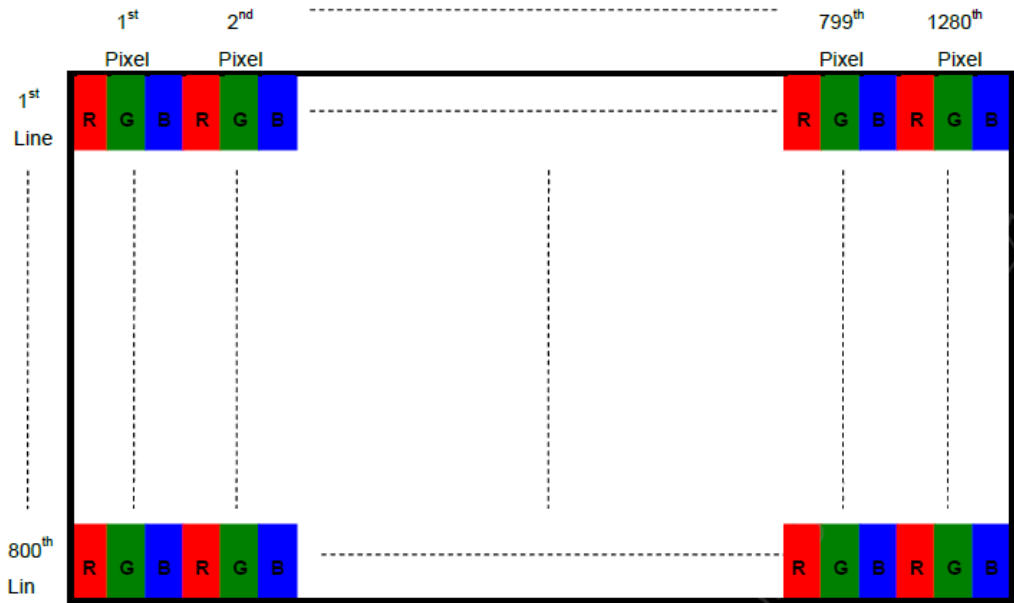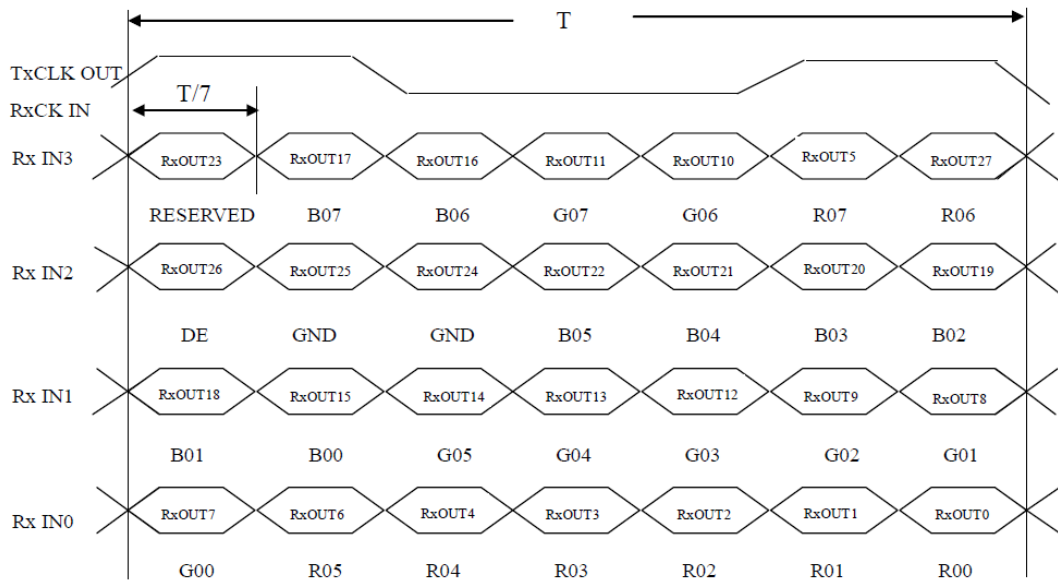> *Turn OFF sequence: E_PWM signal → BLON → Vi(+12V)*

Chapter   3

Signal Characteristics

3.1 Pixel Format Image

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

3.2 The Input Data Format

3.3 Pin Description

The module uses LVDS receivers- I-PEX 20455-040E-12 or Tyco_5-2069716-3.

Table 3.1: Pin Description		
Pin No.	Symbol	Description
1	VCCS	Power Supply +3.3V(typical)
2	VCCS	Power Supply +3.3V(typical)
3	VCCS	Power Supply +3.3V(typical)
4	Data format	L or NC: 8bit Input Mode H: 6bit Input Mode
5	NC	No Connection (Reserve)
6	NC	No Connection (Reserve)
7	NC	No Connection (Reserve)
8	Rxin0-	Negative LVDS Differential Data Input
9	Rxin0+	Positive LVDS Differential Data Input
10	VSS	Ground
11	Rxin1-	Negative LVDS Differential Data Input
12	Rxin1+	Positive LVDS Differential Data Input
13	VSS	Ground
14	Rxin2-	Negative LVDS Differential Data Input
15	Rxin2+	Positive LVDS Differential Data Input
16	VSS	Ground
17	RxCLK-	Negative LVDS Differential Clock Input
18	RxCLK+	Positive LVDS Differential Clock Input
19	VSS	Ground
20	Rxin3-	Negative LVDS Differential Data Input
21	Rxin3+	Positive LVDS Differential Data Input
22	VSS	Ground
23	NC	No Connection (Reserve)
24	NC	No Connection (Reserve)
25	VSS	Ground
26	VSS	Ground
27	LED_PWM	PWM Control Signal od LED Converter
28	LED_EN	Enable Control Signal od LED Converter
29	LED_GND	LED Ground
30	LED_GND	LED Ground
31	LED_GND	LED Ground
32	LED_GND	LED Ground
33	LED_GND	LED Ground
34	NC	No Connection (Reserve)
35	NC	No Connection (Reserve)
36	LED_VCCS	LED Power Supply
37	LED_VCCS	LED Power Supply
38	LED_VCCS	LED Power Supply
39	LED_VCCS	LED Power Supply
40	LED_VCCS	LED Power Supply

Data format Pin

System Board | Panel Board

Data format Pin

10.0K ohm

IC / Driver System

GND
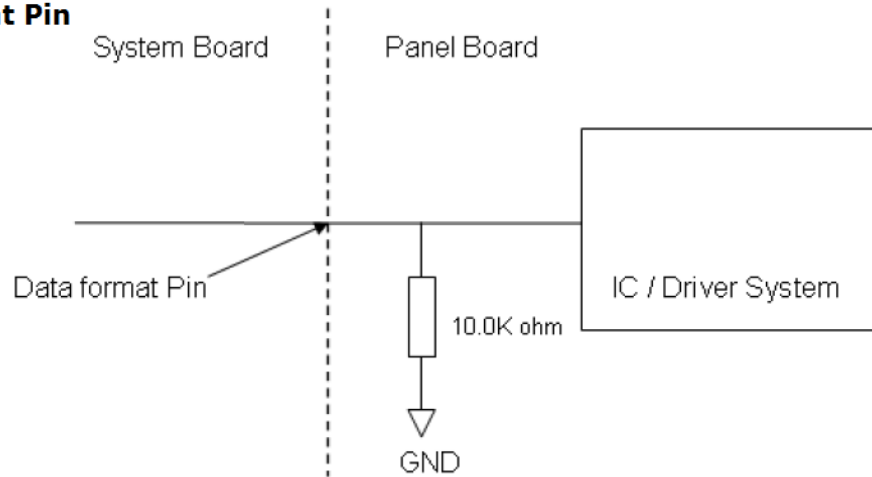
3.4 Interface Timing

3.4.1 Timing Characteristics

The input signal timing specifications are shown as the following table and timing diagram.

Table 3.2: Timing Characteristics							
Signal	**Item**	**Symbol**	**Min.**	**Typ.**	**Max.**	**Unit**	
DCLK	Pixel Clock	$1/T_C$	60.40	71.1	74.7	MHz	
DE	Vertical Total Time	T_V	810	823	829	T_H	
	Vertical Address Time	T_{VD}	800	800	800	T_H	
	Horizontal Total Time	T_H	1362	1440	1480	T_C	
	Horizontal Address Time	T_{HD}	1280	1280	1280	T_C	

Note1!

Because this module is operated by DE only mode, Hsync and Vsync input signals should be set to low logic level or ground. Otherwise, this module will operate abnormally.
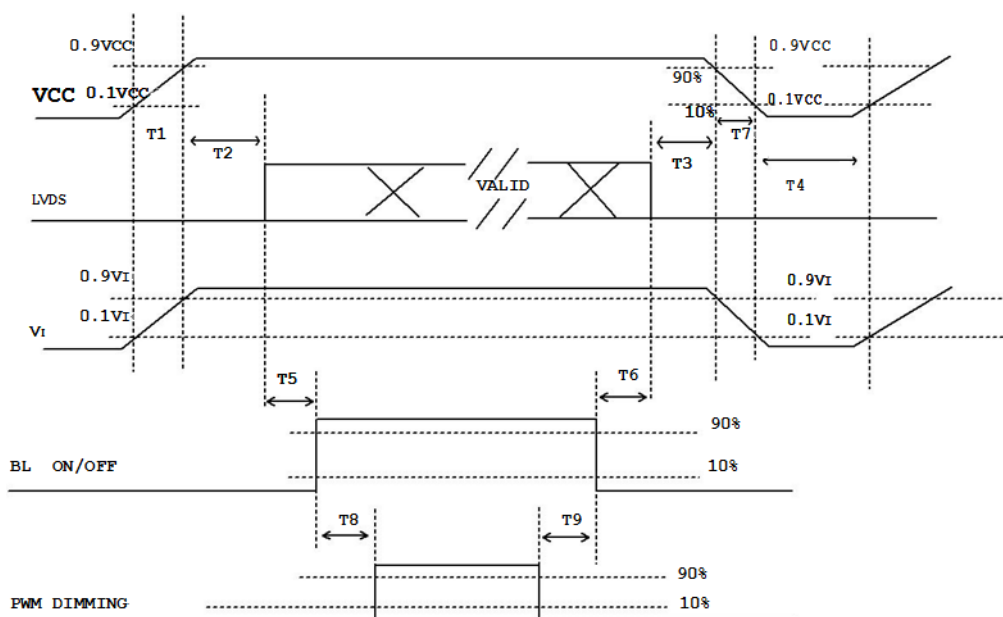
3.4.2 Timing Diagram
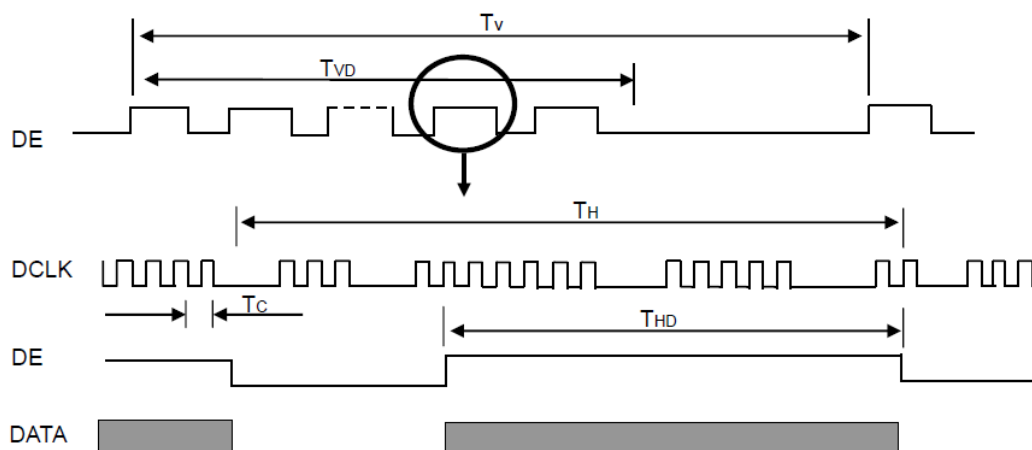
3.5 Power ON/OFF Sequence

To prevent a latch-up or DC operation of LCD assembly, the power on/off sequence should be as the diagram below

Note1!   *Please avoid floating state of interface signal at an invalid period.*

Note2!   *When the interface signal is invalid, be sure to bring down the power supply of LCD VCC to 0 V.*

Power Sequence Timing

Parameter	Value			Unit
	Min.	Typ.	Max.	
T1	0.5	-	50	[ms]
T2	0	-	50	[ms]
T3	0	-	50	[ms]
T4	500	-	-	[ms]
T5	200	-	-	[ms]
T6	200	-	-	[ms]
T7	5	-	300	[ms]
T8	10	-	-	[ms]
T9	10	-	-	[ms]

Chapter 4

Touchscreen & Touch Controller

4.1 Touchscreen

4.1.1 Touch Characteristics

IDK-1110WP series products use projected capacitive touchscreens.

4.1.2 Optical Characteristics

Item	Specifications
Transparency	90%　3%
Haze	7.0%　3%

4.1.3 Mechanical Characteristics

| Item	Specifications
Surface Hardness	Mohs 5
Cover Lens Thickness	1.10mm
Overall Thickness	1.50±0.20mm
Static Force Required for Breaking the Glass	>20kgf
Controller and Tail Type	COF (Chip on FPC tail)
FPC Tail Bending Radius	R2.5mm
Holding Force for Tail	Peeling upward 90deg with 500gw without impact to electric performance.
Connector Pins & Pitch	5pins, pitch is 1.25mm
Top Surface Finish Type	Clear

4.2 Touch Controller

Advantech's IDK-1110WP series projective capacitive touch screen adopts a COF (Chip on FPC) design so an extra touch control board is not required. This communicates with a PC system directly through USB connectors. The superior design is sensitive, accurate and user friendly.

4.2.1 Electrical Specifications

Item	Specifications
Positional Accuracy	The percentage of positional inaccuracy is less than 2.0% as defined below. X direction of linearity: $\Delta x/X$ *100%. Y direction of linearity: $\Delta y/Y$ *100%
Operating Voltage	5V
Measurement Resolution	2048
Activation Force	Zero force
The COF Tail Interface	USB
Power Consumption	Typical – Standby Mode: 26.2 mA / 5V
	Active Mode: 41.2 mA / 5V Sleep Mode: 2.78 mA / 5V
Sample Rate	Single Touch 150 sps / Multi (5) touch 100 sps (Sample-rate is may be effected by different firmware)

4.2.2 Pin Assignment and Description

4.2.2.1 Connector and LED Location
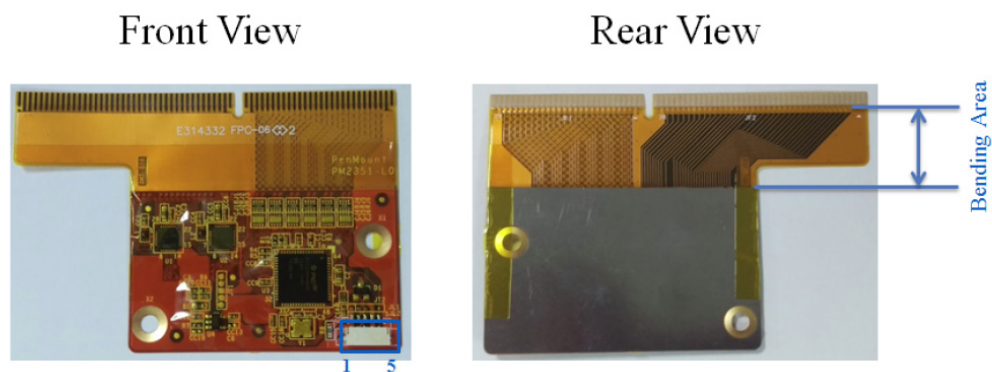
4.2.2.2 USB interface connector and pin assignment

The USB interface connector is a 5-pin and pitch 1.25mm connector. (UTY 1W 1258WOR0-05K) The pins are numbered as shown in the table below.

Pin No.	Symbol	Remark
1	VCC	5V
2	RXD	
3	TXD	
4	Ground	
5	SW	Pull low voltage to disable touch function, releasing this pin will re-enable touch function.

Appendix A

LCD Optical Characteristics
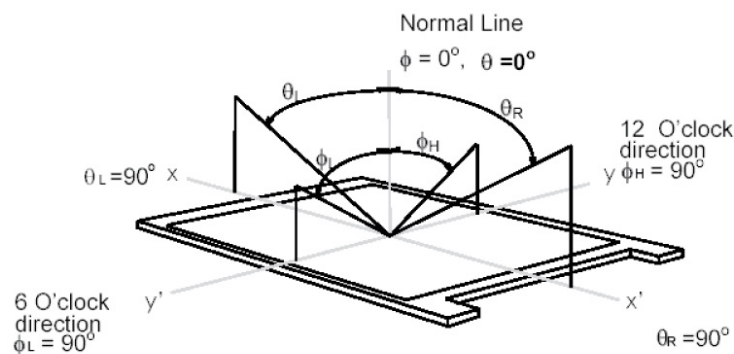
A.1 LCD Module Optical Characteristics

The optical characteristics are measured under stable conditions at 25°C (Room Temperature):
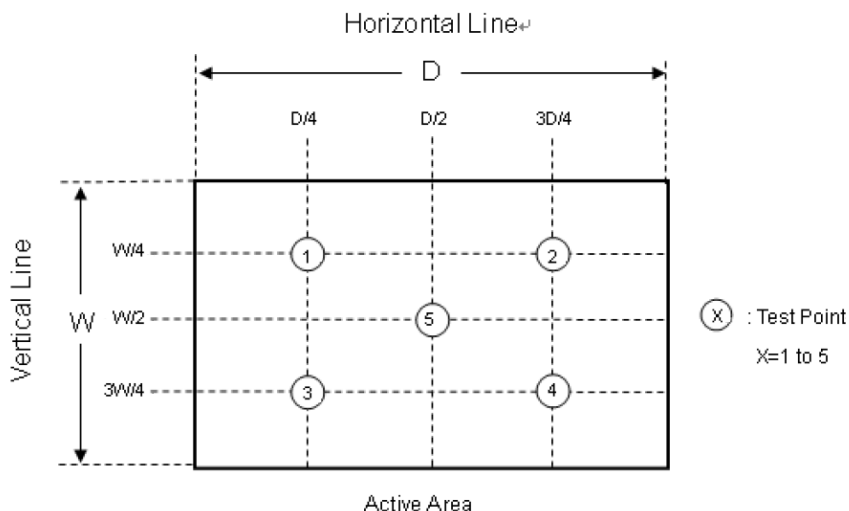
Table A.1: Optical Characteristics						
Item	Conditions	Min.	Typ.	Max.	Unit	Note
Viewing Angle	Horizontal CR10	80/80	85/85	-	[degree]	1 USB2000
	Vertical CR = 10	80/80	85/85	-		
Luminance Uniformity		70	-	-	[%]	2, 3 USB2000
Color coordinates (CIE 1931)	White x	0.263	0.313	0.363	-	4 CS-1000T
	White y	0.279	0.329	0.379		
Response Time	Rising	-	14	17	[ms]	4,5
	Falling	-	11	14		
Color Temperature		-	6500		[K]	
White Luminance		400	500	-	[cd/m2]	4 USB2000
Contrast Ratio		600	800	-		4 CS-1000T

Note1 Definition of viewing angle

Viewing angle is the measurement of contrast ratio ≥10, 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: 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.
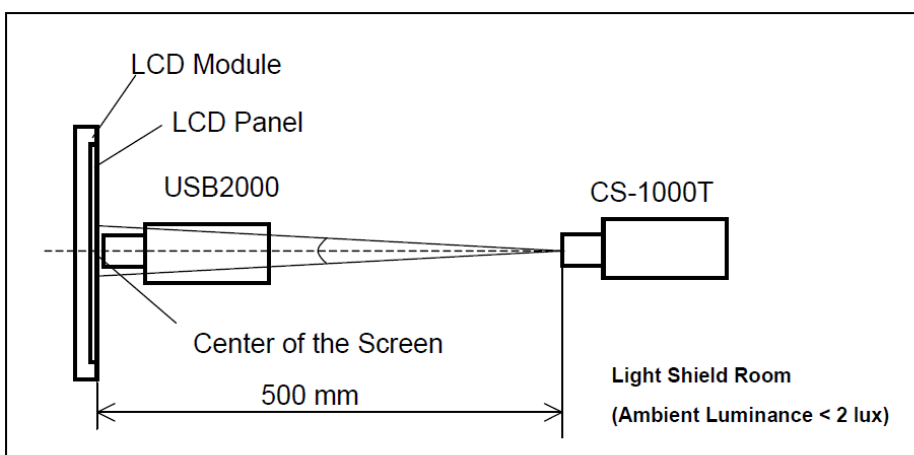
Note2 5 points position

Horizontal Line

D

D/4   D/2   3D/4

Vertical Line

W

W/4

W/2

3W/4

①   ②

⑤

③   ④

Ⓧ : Test Point
X=1 to 5

Active Area

Note3 5-point luminance uniformity is defined by dividing the maximum luminance values by the minimum test point luminance

$$\delta_{W5} \ = \ \frac{\text{Minimum [L (1) ~ L (5)]}}{\text{Maximum [L (1) ~ L (5)]}}$$

Note4 Measurement method

The LCD module should be stabilized at given temperature for 20 minutes to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting the backlight for 20 minutes in a stable, windless and dark room.

LCD Module

LCD Panel

USB2000

CS-1000T

Center of the Screen

500 mm

Light Shield Room

(Ambient Luminance < 2 lux)

Note5 Definition of response time

The output signals of the photo detector are measured when the input signals are changed from "Full Black" to "Full White" (rising time), and from "Full White" to "Full Black "(falling time), respectively. The response time is an interval between 10% and 90% of amplitudes. Please refer to the figure below.
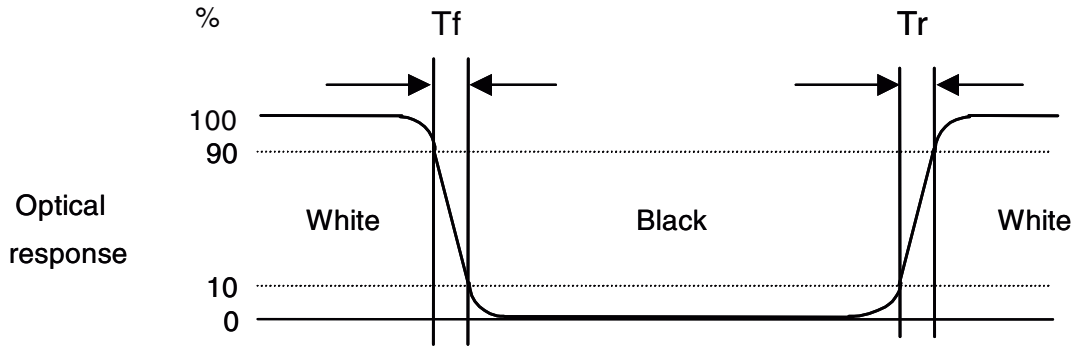
Appendix B

Handling Precautions

B.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 very 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 another soft cloth.
5.   Since the panel is made of glass, it may break or crack if dropped or bumped on a hard surface.
6.   Since the CMOS LSI is used in this module, be careful of static electricity and ensure you ground yourself first before handling.
7.   Do not open or modify the Module Assembly.
8.   Do not press the reflector sheet at the back of the module in any direction.
9.   In case a Module has to be put back into the packing container slot after it has been taken, please touch the far ends of the LED light bar reflector edge softly, otherwise the TFT Module may get damaged.
10. At the insertion or removal of the signal interface connector, be sure not to rotate nor tilt the Interface Connector on the TFT Module.
11. After installation of the TFT Module into an enclosure, do not twist nor bend the TFT Module even momentary. During integration of 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 get damaged.
12. A small amount of materials having no flammability grade are used in the LCD module. The LCD module should be supplied by power compliant with the requirements of Limited Power Source (IEC60950 or UL1950), or be applied exempt thereof.

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