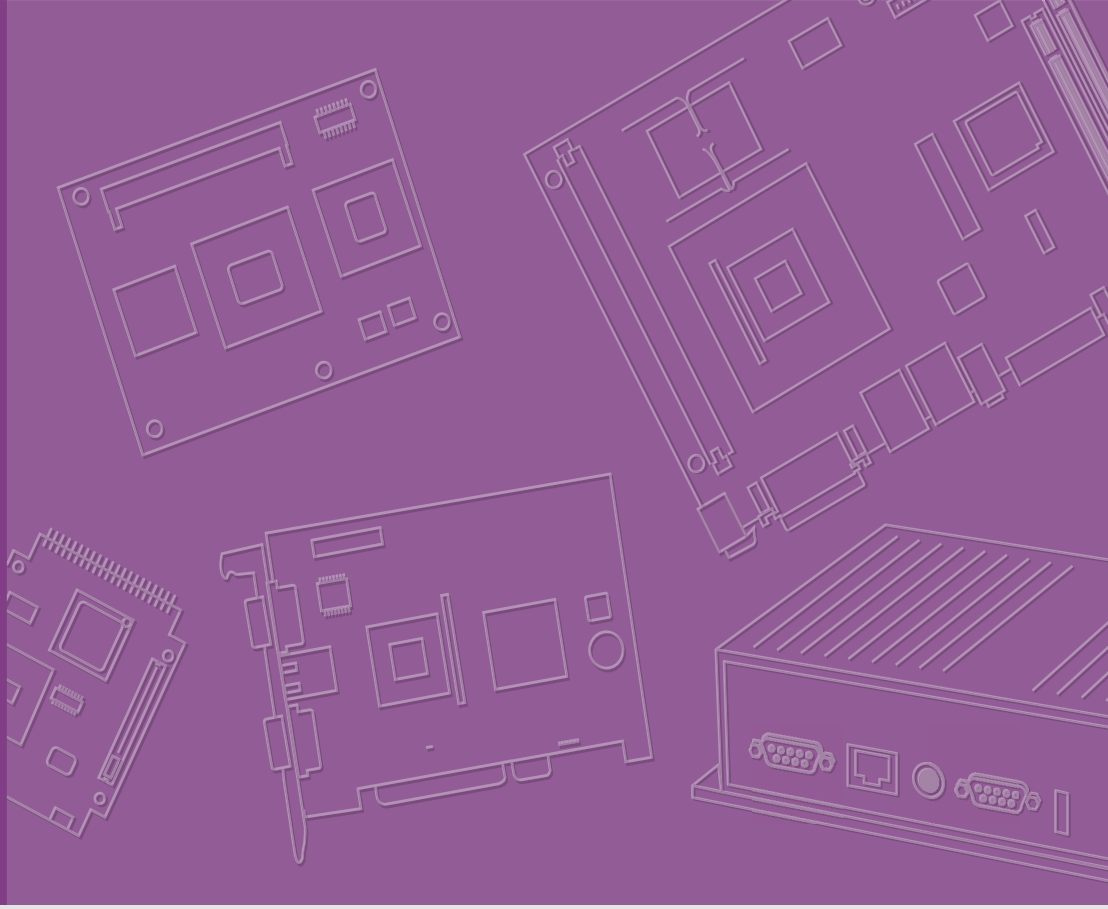

User Manual

IDK-1115P Series

15" XGA Industrial Display Kit with Projected Capacitive Touch Solution

ADVANTECH

Enabling an Intelligent Planet

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Acknowledgements

Part No. 2006111512 Edition 3

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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.

Contents

Chapter 1

Overview

1.1 General Description

The Advantech IDK-1115P series comes with a 15" industrial grade LCD Projected Capacitive Touch display with low power consumption. IDK-1115P series is ideal for embedded applications where customers want to have maximum flexibility in mechanical design.

1.2 Specifications

1.2.1 LCD Panel

- **Display Size:** 15", 4:3 panel
- **Resolution:** 1024 x 768
- **Viewing Angle (Horizontal / Vertical):** 88°/88°/88°/88°
- **Brightness:** 500 cd/m^2
- **Contrast Ratio:** 2500:1
- **Response Time (ms):** 23
- **Colors:** 6 Bit (262 K) / 8 Bit (16.7 M)
- **Nominal Input Voltage:** 3.3 V
- **Power Consumption:** 12.8 W
- **Signal Interface:** 1 channel LVDS
- **Weight:** 960 g
- **Dimensions (W x H x D):** 326.5 x 253.5 x 9.1 mm

1.2.2 Touch Screen

- **Touch Screen:** Projected Capacitive
- **Light Transmission:** 89 ± 3%
- **Interface:** USB
- **Surface Treatment:** Clear
- **Black Print:** Yes

1.2.3 Environment

- **Operating Temperature:** -20 ~ 70°C
- **Storage Temperature:** -30 ~ 80°C

1.3 LCD Functional Block Diagram

The following diagram shows the functional block of the 15 inches Color TFT-LCD Module:

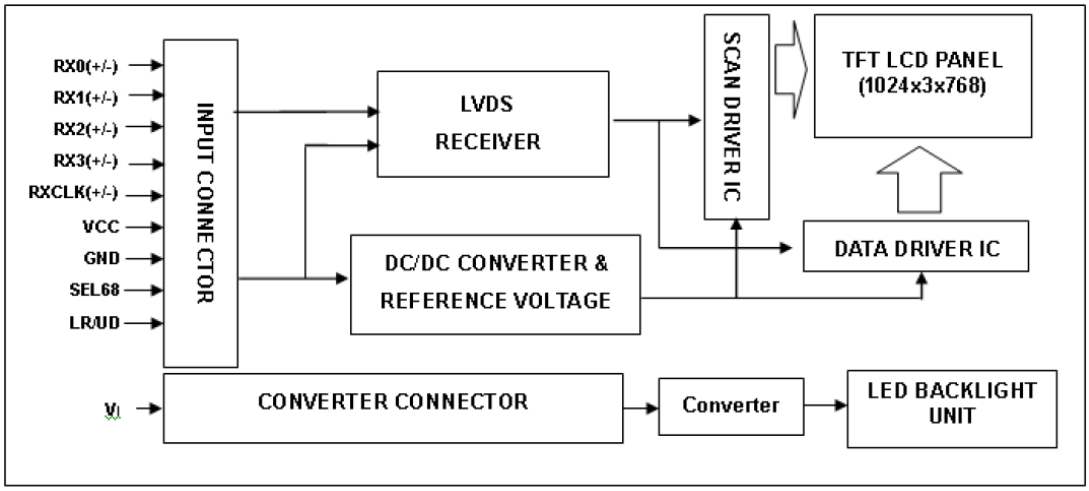


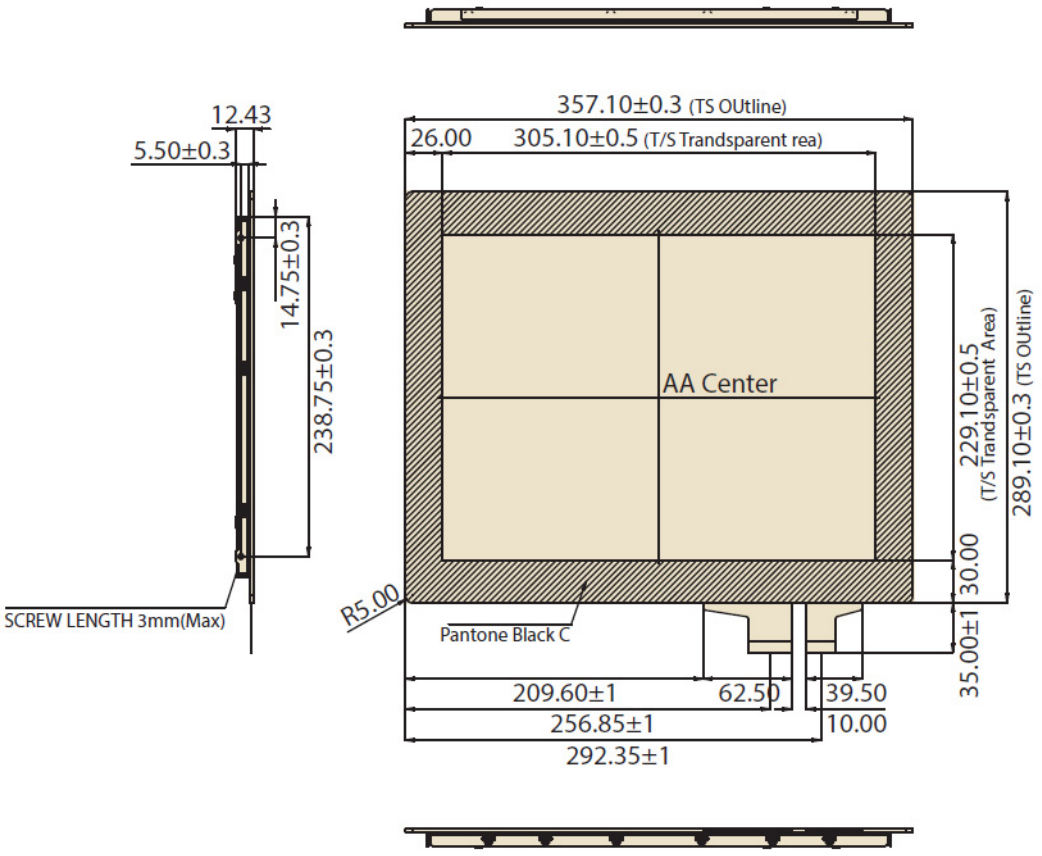
Figure 1.1 Function block diagram

1.4 Mechanical Characteristics

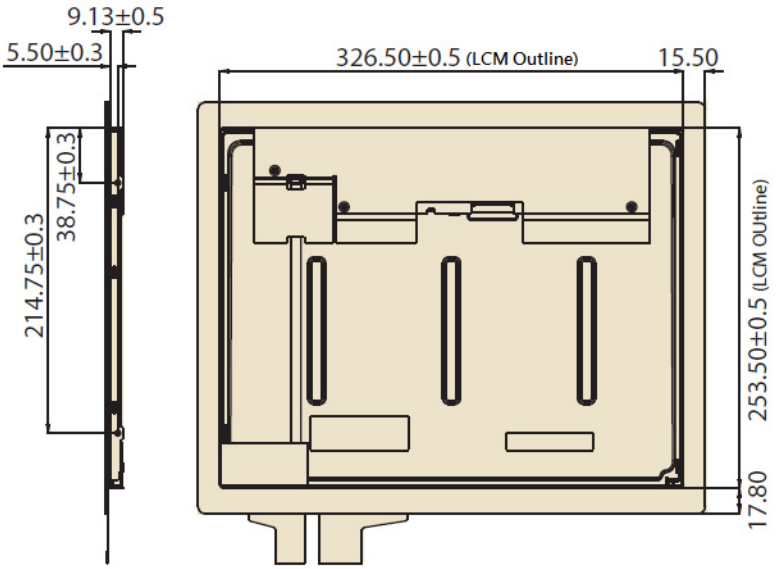
1.4.1 LCD with projected capacitive touch screen

Front View

Unit: mm

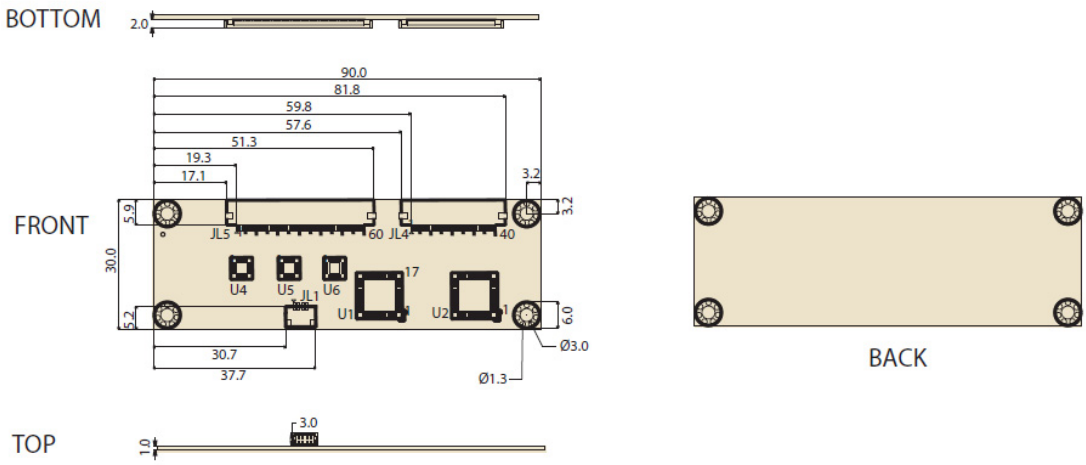


Rear View



Note: Tolerances unless marked are ±0.5mm

1.4.2 Touch Controller



1.5 Touch Screen driver

- Windows 2000, XP, 2003: single touch, mouse driver
- Windows Vista: single touch, inbox driver
- Windows 7, 8, 10: five touch, inbox driver
- Linux: Ubuntu, Android, other versions of Linux support, please refer to Advantech website

1.6 Absolute Maximum Ratings

1.6.1 TFT LCD Module

Item	Symbol	Min.	Max.	Unit	Conditions
Logic/LCD Drive Voltage	Vcc	-0.3	4	[Volt]	Note 1

1.6.2 BACKLIGHT UNIT

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Converter Voltage	Vi	-0.3	18	[V]	1, 2
Enable Voltage	EN	---	5.5	[V]	
Backlight Adjust	Dimming	---	5.5	[V]	

Note 1: Permanent damage to the device may occur if maximum values are exceeded. Function operation should be restricted to the conditions described under Normal Operating Conditions.

Note 2: Specified values are for lamp (Refer to 2.2 for further information).

Chapter 2

Electrical Characteristics

2.1 TFT LCD Module

2.1.1 Power Specification

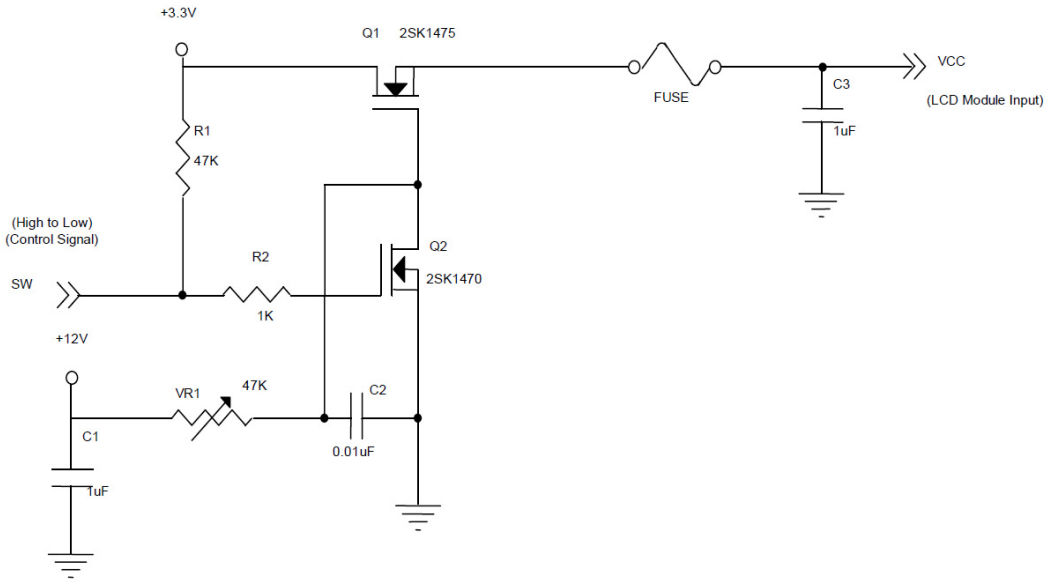
Input power specifications are as follows:

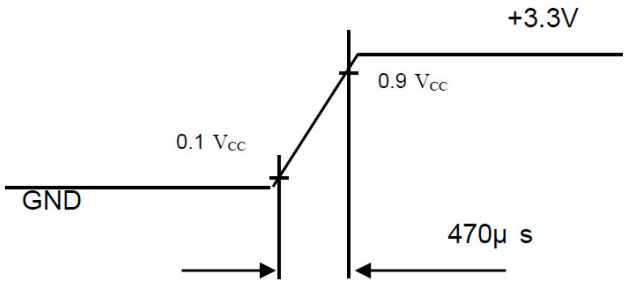
Table 2.1: Power specification

Parameter		Symbol	Value			Unit	Note
			Min.	Typ.	Max.		
Power Supply Voltage		V_{CC}	3.0	3.3	3.6	[V]	-
Ripple Voltage		V_{RP}	-	-	100	[mVp-p]	
Rush Current		I_{RUSH}	-	-	2.0	[A]	2
Power Supply Current	White	I_{CC}	-	800	960	[mA]	3a
	Black		-	670	800	[mA]	3b
LVDS differential input voltage		Vid	200	-	600	[mV]	
LVDS common input voltage		Vic	1.0	1.2	1.4	[V]	
Differential Input Voltage for LVDS Receiver Threshold	"H" Level	V_{IH}	-	-	100	[mV]	-
	"L" Level	V_{IL}	-100	-	-	[mV]	-
Terminating Resistor		R_T	-	100	-	[Ohm]	-

Note 1: The module should be always operated within above ranges.

Note 2: Measurement conditions:





Note 3: The specified power supply current is under the conditions at V_{DD} =3.3V, Ta = 25 ± 2°C, DC Current and f_v = 60 Hz, whereas a power dissipation check pattern below is displayed.

a. White Pattern

b. Black Pattern

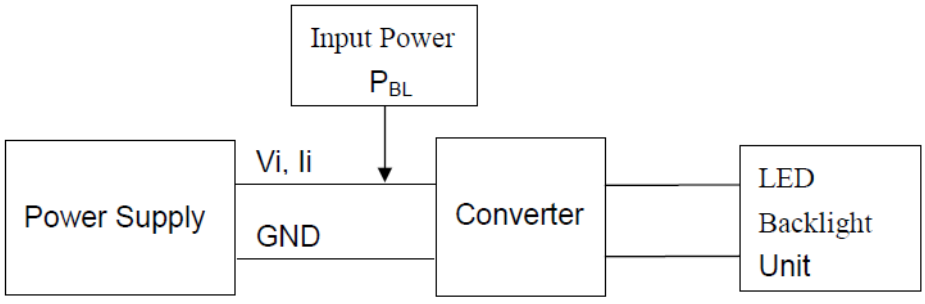
2.2 Backlight Unit

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

Table 2.2: Backlight driving conditions

Parameter		Symbol	Values			Unit	
			Min.	Typ.	Max.		
Converter Power Supply Voltage		V_i	10.8	12.0	13.2	[V]	
Converter Power Supply Current		I_i	0.5	0.65	0.8	[A]	@ Vi = 12V (Duty 100%)
Backlight Power Consumption		P_{BL}	-	7.8	9.6	[W]	@ Vi = 12V (Duty 100%)
EN Control Level	Backlight on	-	2.0	3.3	5.0		
	Backlight off		0	---	0.8		
PWM Dimming Control Level	High	-	2.0	3.3	5.0	[V]	
	Low Hight	-	0	-	0.15	[V]	
PWM Dimming Control Duty Ratio		-	1	-	100	[%]	@200Hz
PWM Dimming Control Frequency		f_{PWM}	190	200	20k	[Hz]	2
LED Life Time		L_L	50,000	70,000	-	[Hrs]	3

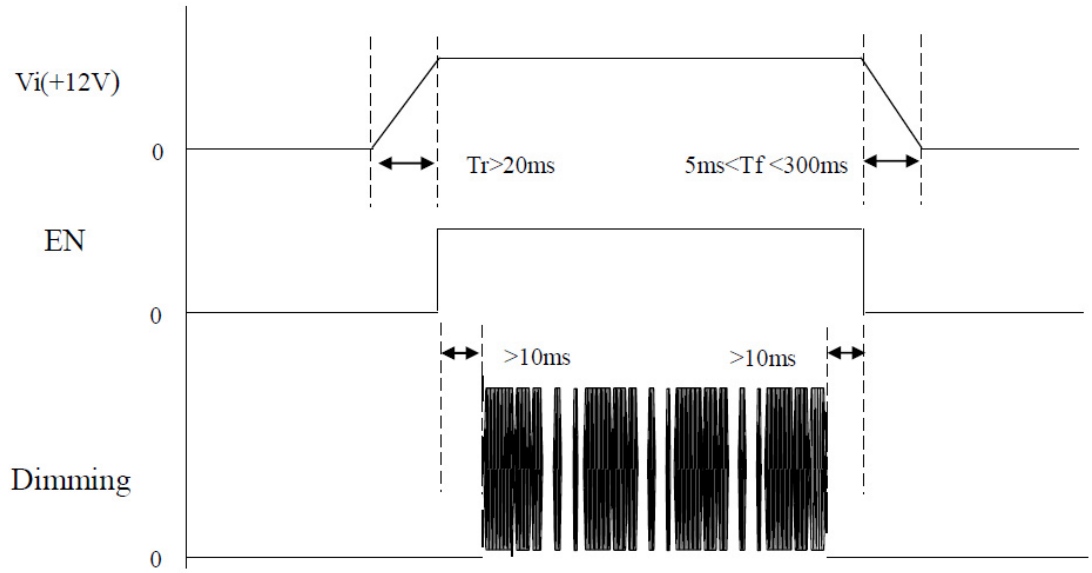
Note 1: LED current is measured by utilizing a high frequency current meter as shown below:



Note 2: At 20k Hz PWM control frequency, duty ratio range is restricted from 20% to 100%.

Note 3: The lifetime of LED is estimated data and 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.

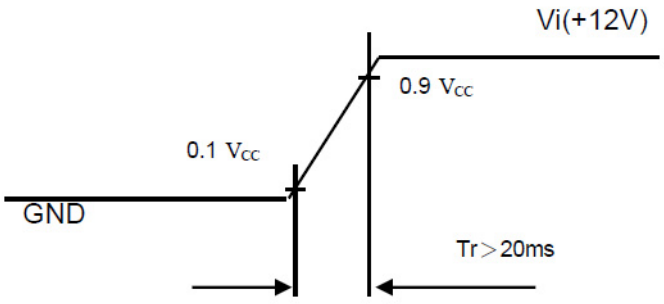


Note! *While system is turned ON or OFF, the power sequences must follow as below descriptions.*

Turn ON sequence: Vi(+12V) → EN → Dimming

Turn OFF sequence: Dimming → EN → Vi(+12V)

Note 4: The lifetime of LED is estimated data and 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.

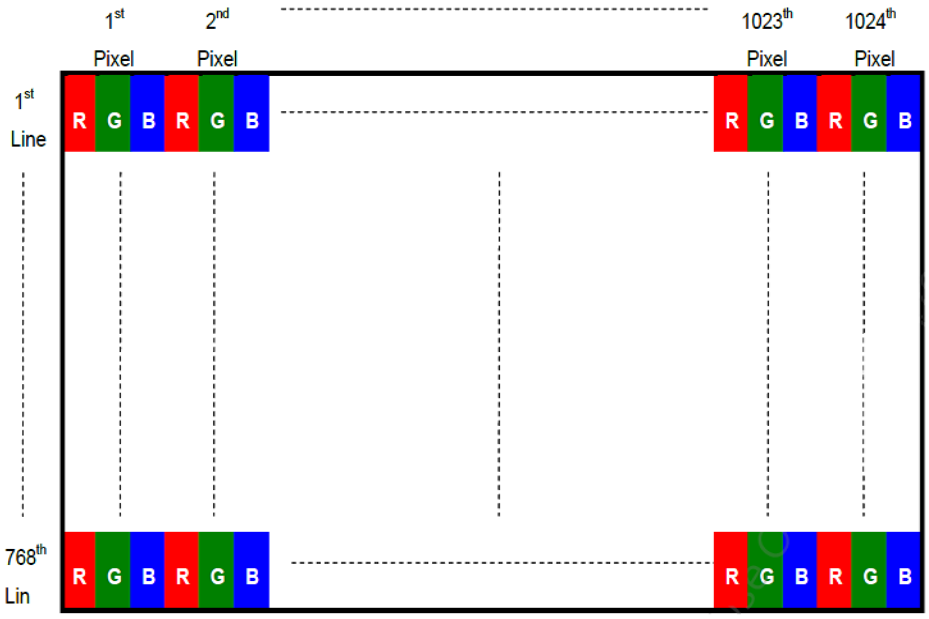


Chapter 3

Signal Characteristics

3.1 Pixel Format Image

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



3.2 Input Signal Timing Specifications

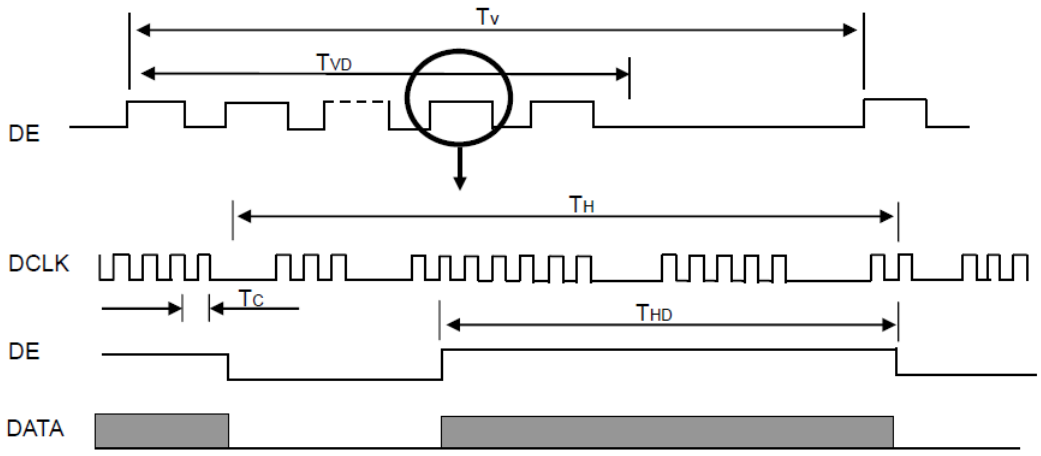
The input signal timing specifications are shown as the following table and timing diagram.

Signal	Item	Symbol	Min.	Typ.	Max.	Unit	Note
LVDS Clock	Frequency	F_c	53.35	65	80	[MHz]	-
	Period	T_c	12.5	15.38	18.75	[ns]	
	Input cycle to cycle jitter	T_{rcl}	---	---	200	[ns]	(a)
	Input Clock to data skew	TLVCCS	-0.02*Tc	-	0.02*Tc	[ps]	(b)
	Spread spectrum modulation range	F_{clkin_mod}	-	-	1.02*Fc	[MHz]	(c)
	Spread spectrum modulation frequency	F_{SSM}	-	-	200	[KHz]	
Vertical Display Term	Frame Rate	Fr	55	60	70	[Hz]	Tv=Tvd+Tvb
	Total	Tv	780	806	840	[Th]	-
	Active Display	Tvd	768	768	768	[Th]	-
	Blank	Tvb	Tv-Tvd	38	Tv-Tvd	[Th]	-
Horizontal Display Term	Total	Th	1240	1344	1360	[Tc]	Th=Thd+Thb
	Active Display	Thd	1024	1024	1024	[Tc]	
	Blank	Thb	Th-Thd	320	Th-Thd	[Tc]	

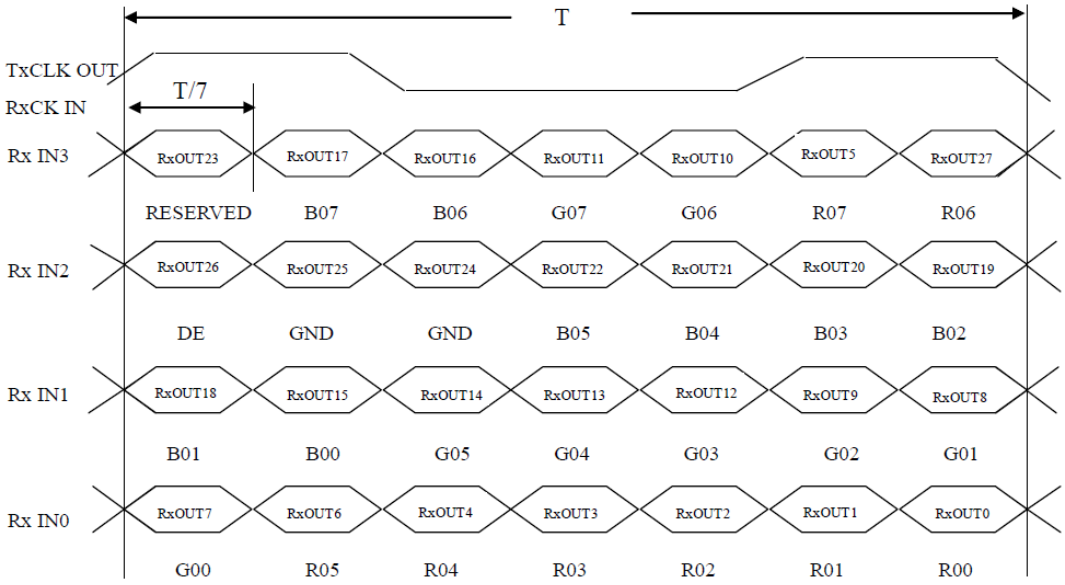
Note 1: Because this module is operated by DE only mode, Hsync and Vsync input signals should be set to low logic level or ground. Otherwise, this module would operate abnormally.

Note 2: The Tv (Tvd+Tvb) value must be an integer, otherwise, the module will operate abnormally.

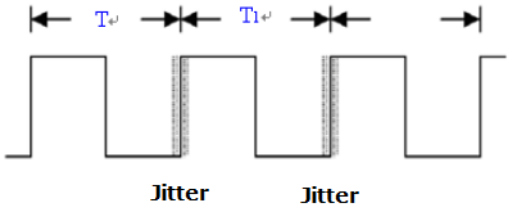
INPUT SIGNAL TIMING DIAGRAM

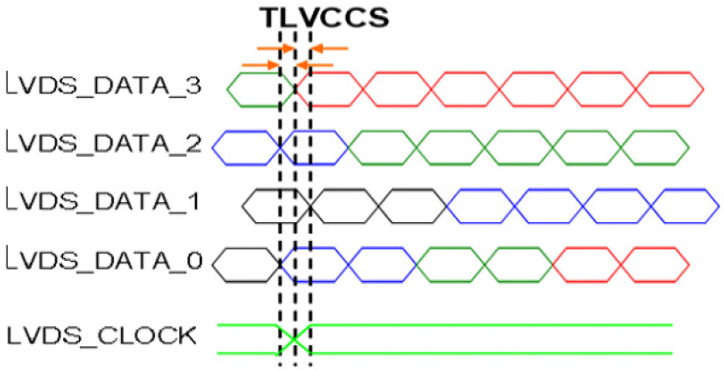


TIMING DIAGRAM of LVDS

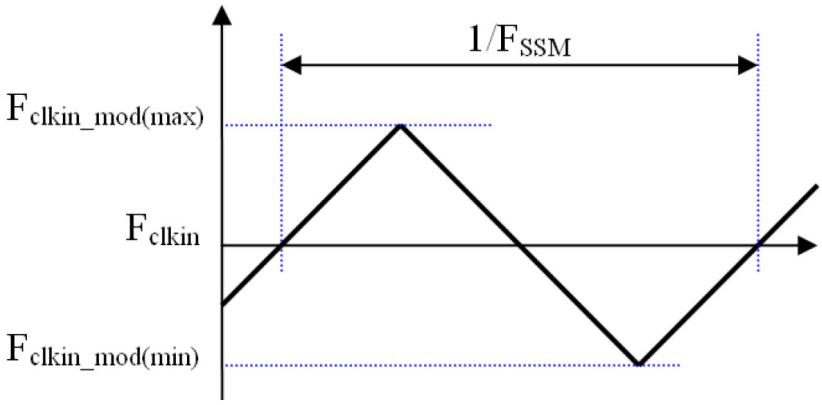


Note (a) The input clock cycle-to-cycle jitter is defined as below figures. Trcl = I T1 – TI





Note (b) The SSCG (Spread spectrum clock generator) is defined as below figures.



3.3 Pin Description

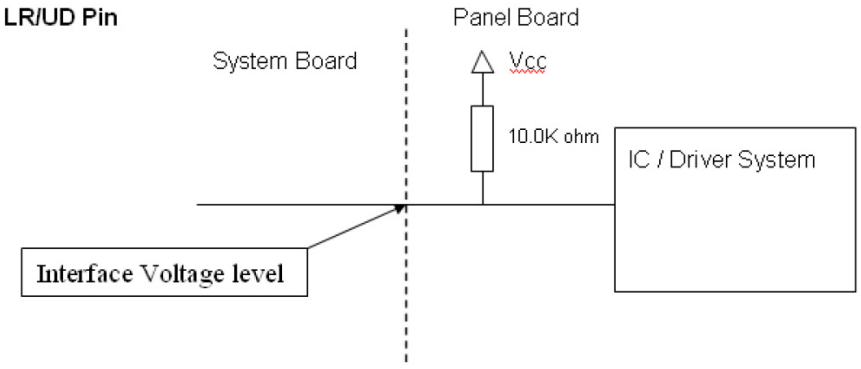
The module uses "Cvilux CID520D1HR0-NH" connectors or equivalent. We also suggest "Hirose DF14-20S-1.25C" connectors or equivalent.

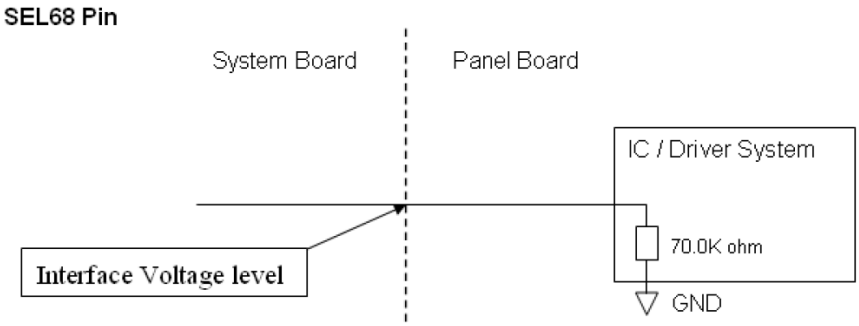
Table 3.1: Pin Description

Pin No.	Symbol	Function	Polarity	Note
1	VCC	Power Supply +3.3V(typical)		
2	VCC	Power Supply +3.3V(typical)		
3	NC	No Connection		Note2
4	LR/UD	Reverse Scan Control H or NC = Normal Mode. L = Horizontal / Vertical Reverse Scan.		Note1
5	RX0-	LVDS Differential Data Input	Negative	
6	RX0+	LVDS Differential Data Input	Positive	
7	GND	Ground		
8	RX1-	LVDS Differential Data Input	Negative	
9	RX1+	LVDS Differential Data Input	Positive	
10	NC	No Connection		Note2
11	RX2-	LVDS Differential Data Input	Negative	
12	RX2+	LVDS Differential Data Input	Positive	
13	GND	Ground		
14	RXCLK-	LVDS Differential Data Input	Negative	
15	RXCLK+	LVDS Differential Data Input	Positive	
16	GND	Ground		
17	RX3-	LVDS Differential Data Input	Negative	
18	RX3+	LVDS Differential Data Input	Positive	
19	NC	No Connection		Note2
20	SEL68	LVDS 6/8 bit select function control, High -> 6bit Input Mode Low or NC -> 8bit Input Mode		Note1

Note 1: “Low” stands for 0V. “High” stands for 3.3V. “NC” stands for “No Connection”.

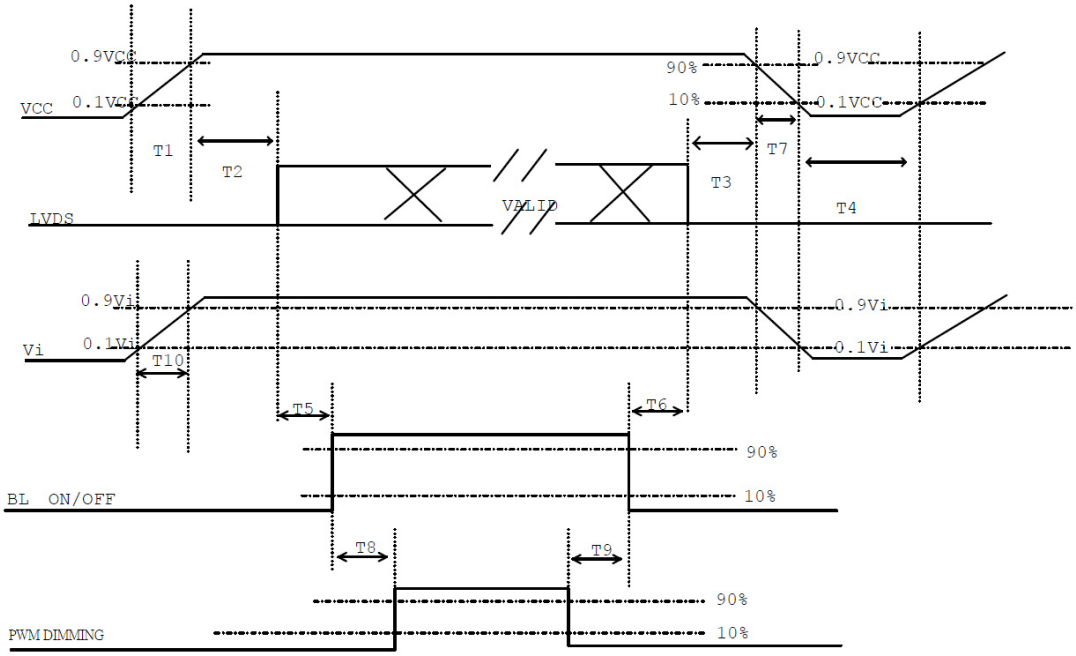
Note 2: Pin3, Pin10, Pin19 input signals should be set to no connection or ground for this module to operate normally.





3.4 Power ON/OFF Sequence

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



Note 1: Please avoid a floating state of interface signal at an invalid period.

Note 2: When the interface signal is invalid, be sure to pull down the power supply of LCD VCC to 0 V.

Note 3: The backlight converter power must be turned on after the power supply for the logic and the interface signal to be valid. The backlight converter power must be turned off before the power supply for the logic and the interface signal to be invalid.

Power Sequence Timing

Parameter	Value			Unit
	Min.	Typ.	Max.	
T1	0.5	-	10	[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]
T10	20	-	50	[ms]

3.5 Scanning Direction

The following figures show the screen seen from the front view. The arrow indicates the direction of scan.

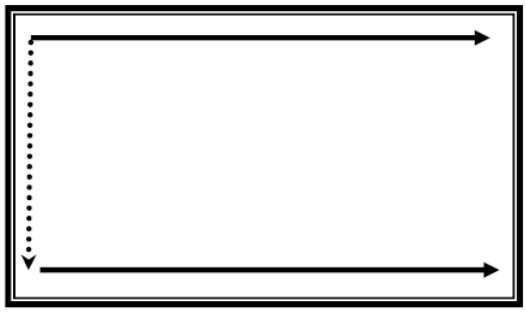


Figure 3.1 Normal scan (pin 4, LR/UD = High or NC)

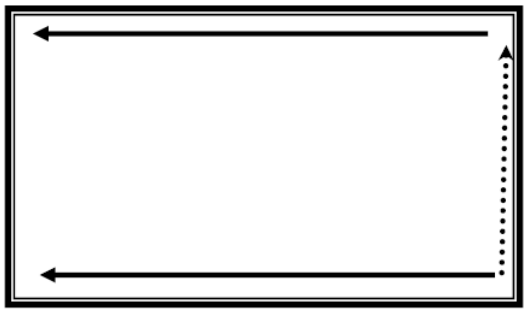


Figure 3.2 Reverse scan (pin 4, LR/UD = Low)

Chapter 4

Connector & Pin Assignment

4.1 TFT LCD Module

Below, the physical interface is described for the connector on module. These connectors are capable of accommodating the following signals and components.

4.1.1 Connector

Table 4.1: Connector

Connector Name	LCM Connector Part Number	User's Connector Part Number
Interface connector	Cvilux CID520D1HR0-NH or equivalent	Hirose DF14-20S-1.25C or equivalent
Back light connector	Cvilux CI4205M2HRP-NH or equivalent	Cvilux CI4205SL000 or equivalent

4.1.2 Interface Pin Assignment

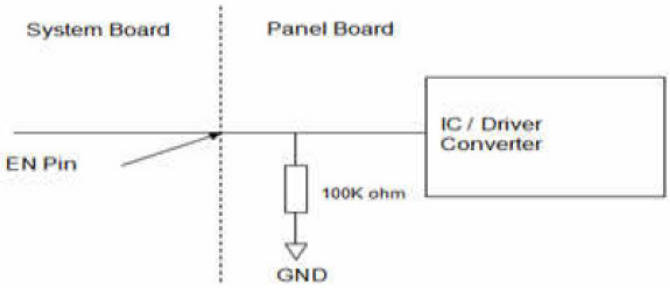
Table 4.2: Pin Assignment

Pin No.	Symbol	Pin No.	Symbol
1	VCC	11	RX2-
2	VCC	12	RX2+
3	NC	13	GND
4	LR/UD	14	RXCLK-
5	RX0-	15	RXCLK+
6	RX0+	16	GND
7	GND	17	RX3-
8	RX1-	18	RX3+
9	RX1+	19	NC
10	NC	20	SEL68

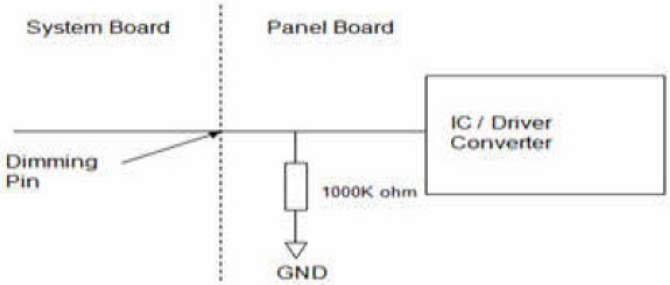
4.1.3 Backlight Unit Pin Assignment

Pin	Symbol	Description	Remark
1	Vi	Converter input voltage	12V
2	VGND	Converter ground	Ground
3	EN	Enable pin	3.3V
4	Dimming	Backlight adjust	PWM dimming (Hi: 3.3VDC, Lo: 0VDC)
5	NC	Not Connect	

EN Pin



Dimming Pin



Chapter 5

Touchscreen & Touch Controller

5.1 Touchscreen

5.1.1 Touch Characteristics

IDK-1115P series products use projected capacitive touchscreens.

5.1.2 Optical Characteristics

Item	Specifications
Transparency	89 ± 3%
Haze	< 3%

5.1.3 Mechanical Characteristics

Item	Specifications
Surface	Hardness Mohs 5
Cover lens thickness	1.80mm
Overall thickness	2.2±0.20mm
Static force requires breaking the glass	>23kgf
Controller and tail type	COB (Chip on Control Board)
FPC tail bending radius	R 1.0mm
Holding force for tail	Peeling upward 90deg with 500gw without impact to electric performance
Top surface finish type	Clear

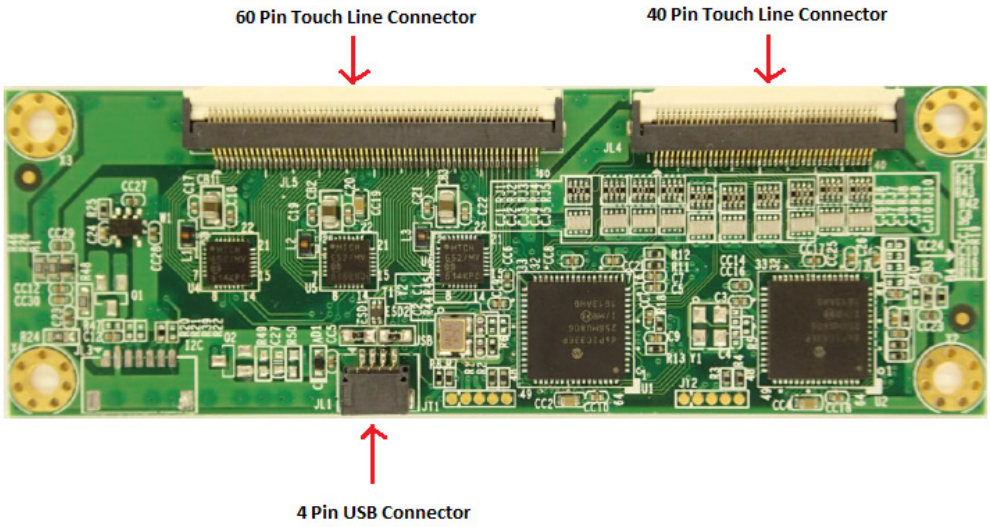
5.2 Touch Controller

5.2.1 Touch Controller Characteristics

Parameter		Feature
Number of sensing line		38
Number of driving line		57
Interface		USB, Full-speed, 12Mbps
ADC resolution		10bits (Typical)
Firmware resolution		2048 x 2048 (Typical)
Response time		Average < 30ms
Sampling rate	1 finger touch	150 Hz (Typical)
	5 fingers touch	100 Hz (Typical)
Operating voltage		+5Vdc, ±5%
Power consumption	Working mode	84.2mA @ 5Vdc
	Idle mode	65.3mA @ 5Vdc
	Sleep mode	1.42mA @ 5Vdc

5.2.2 Pin Assignment and Description

5.2.2.1 Connector Location



5.2.2.2 Interface Pin Definition

Pin No.	Signal Name	Signal Function
1	VCC	Positive power supply
2	D-	D- pin of internal USB transceiver
3	D+	D+ pin of internal USB transceiver
4	GND	Ground

Note: Connector ACES 50224-00401-001

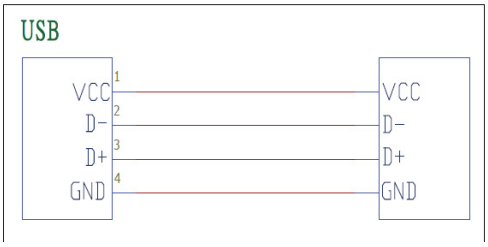


Figure 5.1 Interface Pin Definition

Appendix A

Optical Characteristics

A.1 LCD Module Optical Characteristics

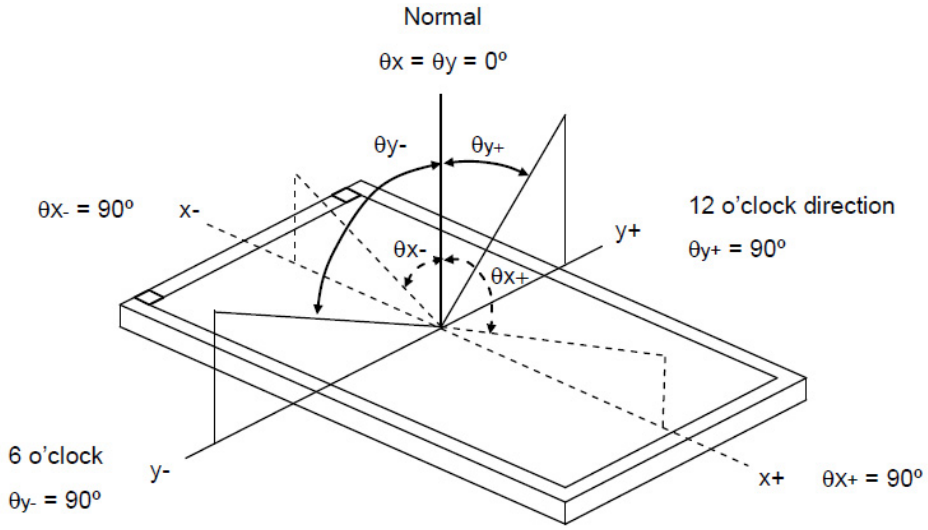
The optical characteristics are measured under stable conditions at 25°C (Room Temperature):

Table A.1: Optical Characteristics

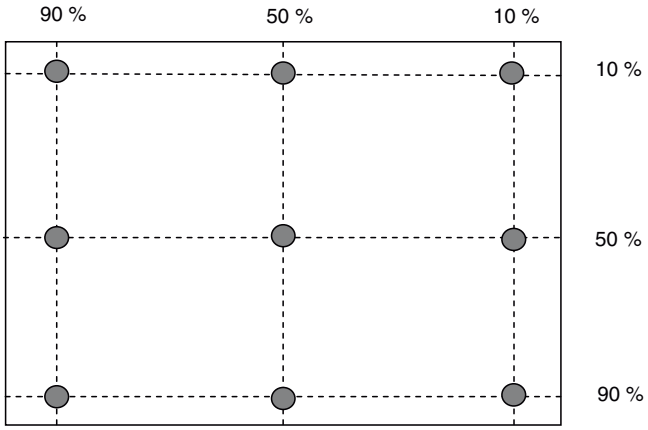
Item	Conditions	Min.	Typ.	Max.	Unit	Note
Viewing Angle	Horizontal CR = 10	160	176	-	[degree]	1
	Vertical CR = 10	160	176	-		
Luminance Uniformity	9 Points	75	80	-	[%]	2, 3
Color coordinates (CIE 1931)	White x	0.263	0.313	0.363	-	4
	White y	0.279	0.329	0.379		
Response Time	Rising	-	16	21	[ms]	4,5
	Falling	-	7	14		
Color Temperature		-	6500		[K]	
White Luminance		380	500	-	[cd/m2]	4
Contrast Ratio		1800	2500	-		4

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 9 points position

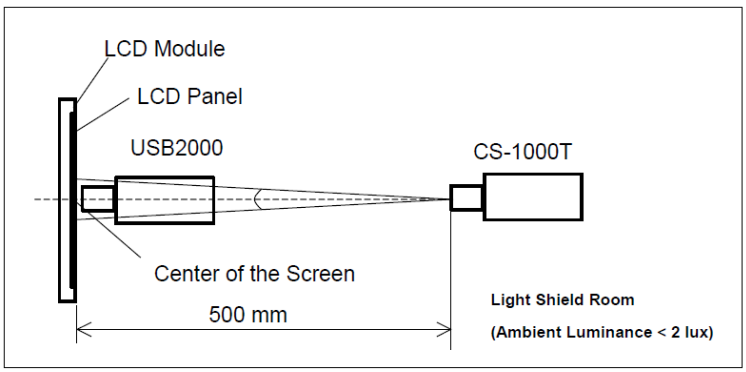


Note3 9-point luminance uniformity is defined by dividing the maximum luminance values by the minimum test point luminance

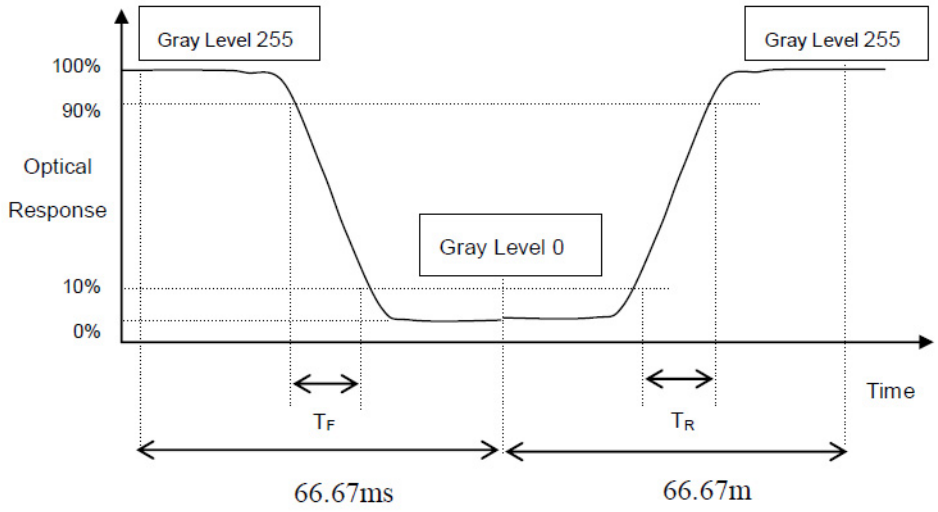
$$\delta_{W9} = \frac{\text{Minimum Brightness of nine points}}{\text{Maximum Brightness of nine points}}$$

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 Backlight for 20 minutes in a windless room.



Note5 Definition of Response Time (T_R, T_F):



Note 6 Definition of Contrast Ratio (CR):

The contrast ratio can be calculated by the following expression.

Contrast Ratio (CR) = L255 / L0

L255: Luminance of gray level 255

L0: Luminance of gray level 0

CR = CR (5)

CR (X) is corresponding to the Contrast Ratio of the point X at Figure in Note 2.

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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Please verify specifications before quoting. This guide is intended for reference purposes only.

All product specifications are subject to change without notice.