



User Manual

IDK-2115 Series

**15" XGA Ultra High Brightness
Display Kit with LED Backlight**

ADVANTECH

Enabling an Intelligent Planet

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Contents

Chapter 1	Overview.....	1
1.1	General Description	2
1.2	Specifications	2
1.2.1	LCD Panel.....	2
1.2.2	LED Driver Board.....	2
1.2.3	Touchscreen (R Series)	2
1.2.4	Environment.....	2
1.3	Mechanical Characteristics	3
1.4	Functional Block Diagram	3
	Figure 1.1 Function Block Diagram	4
1.5	Touchscreen Driver.....	4
1.6	Absolute Maximum Ratings	4
1.6.1	Absolute Ratings of TFT LCD Module	4
1.6.2	Absolute Ratings of Backlight Unit.....	4
1.6.3	Absolute Ratings of Environment.....	4
Chapter 2	Electrical Characteristics.....	5
2.1	Power Specifications.....	6
	Table 2.1: Power Specifications	6
2.1.1	Signal Electrical Characteristics.....	6
	Table 2.2: Signal Electrical Characteristics	6
2.2	Backlight Driver Conditions	7
	Table 2.3: Backlight Driver Conditions	7
Chapter 3	Signal Characteristics.....	9
3.1	Pixel Format Image	10
3.2	Pin Description	10
	Table 3.1: Pin Description	10
3.3	The Input Data Format	11
3.3.1	SEL68	11
3.4	Interface Timing	12
3.4.1	Timing Characteristics	12
	Table 3.2: Timing Characteristics	12
3.4.2	Input Timing Diagram.....	13
3.5	Power ON/OFF Sequence	13
Chapter 4	Connector & Pin Assignment.....	15
4.1	TFT LCD Module.....	16
4.1.1	Connector	16
	Table 4.1: Connector	16
4.1.2	Pin Assignment.....	16
	Table 4.2: Pin Assignment.....	16
4.2	Backlight Unit	16
4.2.1	Signal for LED Light Bar Connector.....	16
4.2.2	LED Driver Board.....	17
	Table 4.3: Specifications	17
	Table 4.4: Input Connector Pin Definition.....	17
	Table 4.5: Output Connector Pin Definition	18
	Figure 4.1 Dimensions.....	18

Chapter	5	Touchscreen & Touch Controller	19
5.1		Touchscreen (Optional: for IDK-2115R Only)	20
5.1.1		Touch Characteristics	20
5.1.2		Optical Characteristics	20
5.1.3		Environment Characteristics	20
5.1.4		Mechanical Characteristics	20
5.1.5		Electronic Characteristics	20
5.1.6		General Specifications	21
5.2		Touch Controller (Optional: - for IDK-2115R Only)	21
5.2.1		Touch Controller Characteristics	21
5.2.2		Pin Assignment and Description	22
		Figure 5.1 Board mounted header	23
5.2.3		Physical Dimensions	24
Appendix A		Optical Characteristics	25
A.1		Optical Characteristics	26
		Table A.1: Optical Characteristics	26
Appendix B		Handling Precautions	29
B.1		Optical Characteristics	30

Chapter 1

Overview

1.1 General Description

The Advantech IDK-2115 series comes with a 15" 1200 cd/m² industrial grade LCD display, and an LED driving board. The series is also available with flexible options for touchscreens and enhanced treatments such as an AR surface treatment and an optical bonding solution. IDK-2115 series supports 1200 cd/m² high brightness with low power consumption at a maximum consumption of 15.58 W. Equipped with a high level of brightness and wide operating temperature range, IDK-2115 provides superior sunlight readability and is perfect for applications whether in semi-outdoor or outdoor environments.

1.2 Specifications

1.2.1 LCD Panel

- **Display Size:** 15" LED backlight panel
- **Resolution:** 1024 x 768
- **Viewing Angle (U/D/L/R):** 70°/60°/80°/80°
- **Brightness:** 1200 cd/m²
- **Contrast Ratio:** 700:1
- **Response Time (ms):** 8 ms
- **Colors:** 262K/16.2M
- **Voltage:** 3.3V
- **Power Consumption:** 16.06W
- **Signal Interface:** 1 channel LVDS
- **Weight:** R series:1600g
N series:1350g
- **Dimensions (W x H x D):** R series: 326.5 x 253.5 x 14.6 mm
N series: 326.5 x 253.5 x 12.0 mm

1.2.2 LED Driver Board

- **Efficiency:** 85%
- **Output Current & Voltage:** 800mA/17.7V
- **Dimensions (W x H x D):** 80 x 50 x 7 mm

1.2.3 Touchscreen (R Series)

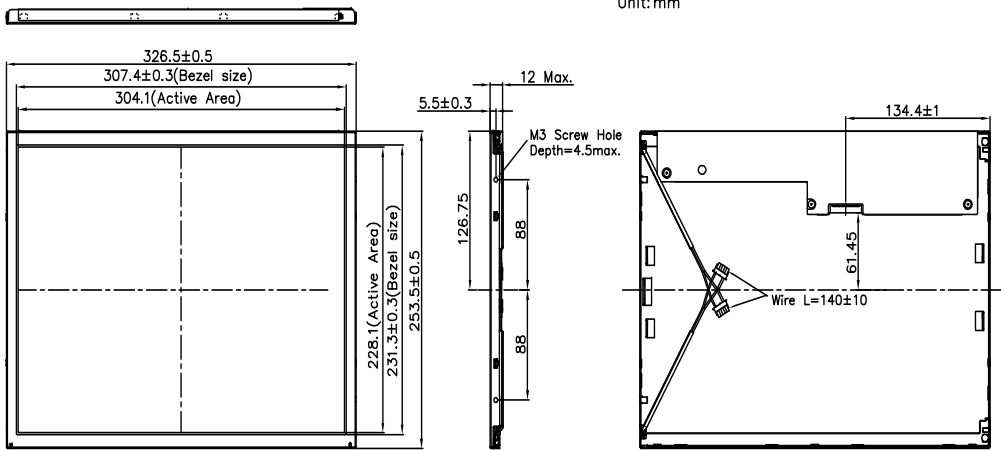
- **Touchscreen:** 5-Wire Resistive
- **Light Transmission:** 80 ± 3%
- **Durability:** 10 millions times

1.2.4 Environment

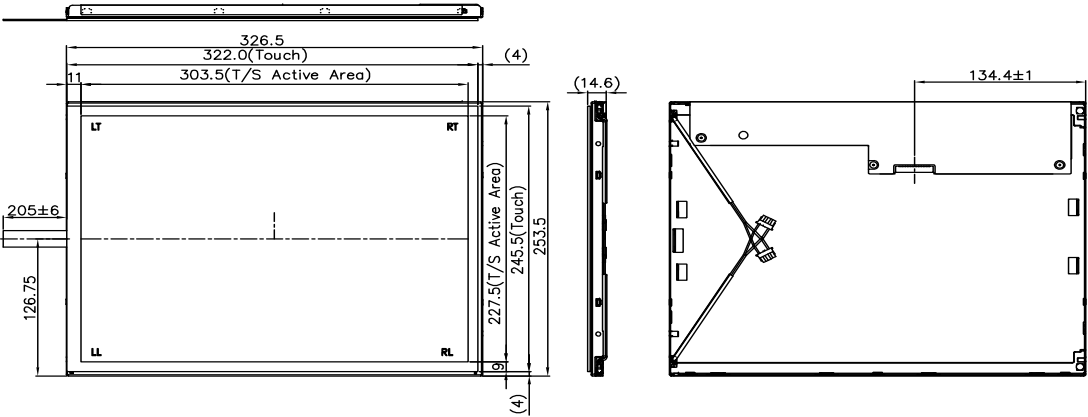
- **Operating Temperature:** -20~70 °C (IDK-2115R), -30~85 °C (IDK-2115N)
- **Storage Temperature:** -30 ~ 85°C
- **Humidity:** 8 ~ 90% @39°C, non-condensing

1.3 Mechanical Characteristics

IDK-2115N Series



IDK-2115R Series



1.4 Functional Block Diagram

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

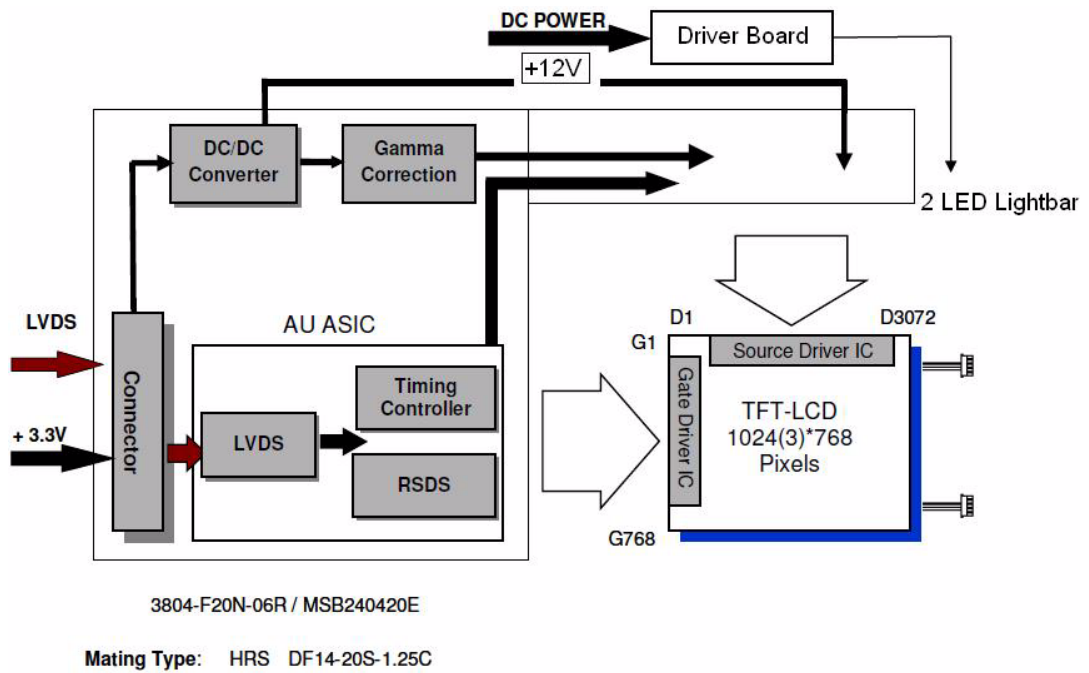


Figure 1.1 Function Block Diagram

1.5 Touchscreen Driver

The touchscreen driver CD-ROM is in the accessories box with the product.

1.6 Absolute Maximum Ratings

Absolute maximum ratings of the module is as following:

1.6.1 Absolute Ratings of TFT LCD Module

Item	Symbol	Min.	Max.	Unit	Conditions
Logic/LCD Drive Voltage	V _{in}	0.3	+3.6	[Volt]	Note 1, 2

1.6.2 Absolute Ratings of Backlight Unit

Item	Symbol	Min.	Max.	Unit	Conditions
LED Light Bar Current	I _{Led}	390*2	400*2	[mA]	Note 1, 2

1.6.3 Absolute Ratings of Environment

Item	Symbol	Min.	Max.	Unit	Conditions
Operating Temperature	TOP	-20	+70	[°C]	Note 3
Operation Humidity	HOP	8	90	[%RH]	
Storage Temperature	TST	-30	+85	[°C]	
Storage Humidity	HST	8	90	[%RH]	

Note1: With in T_a= 25°C

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

Chapter 2

Electrical
Characteristics

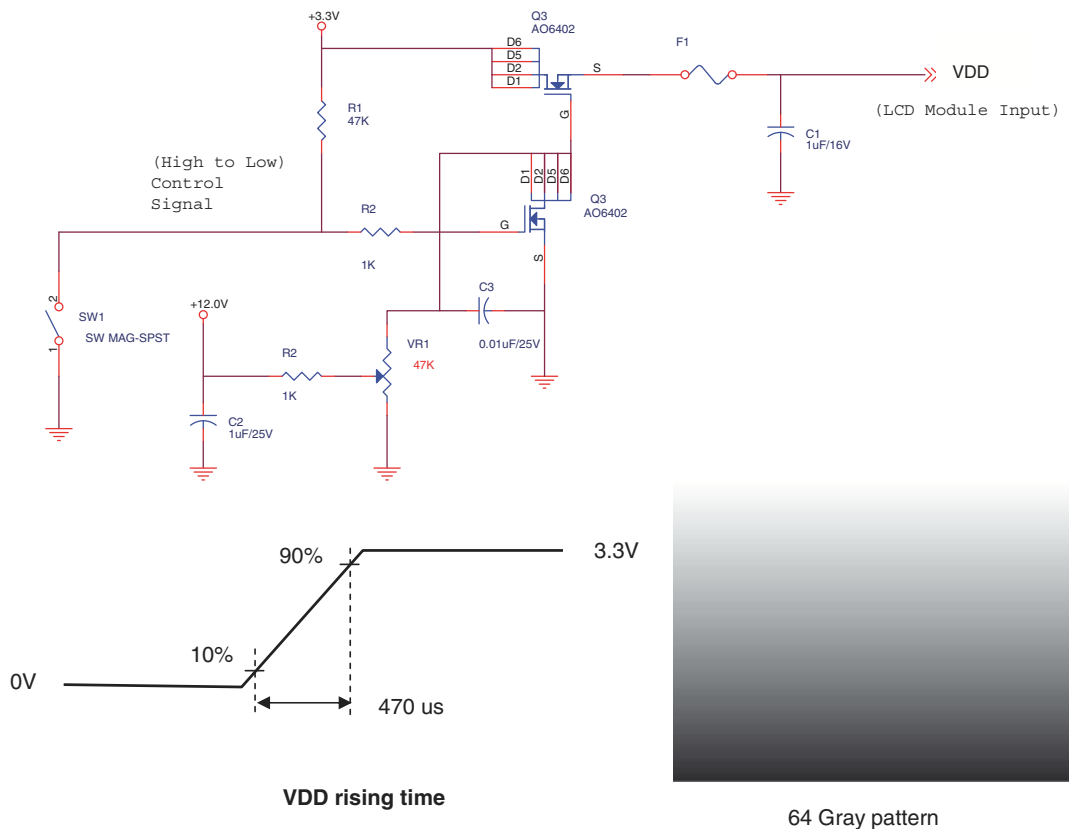
2.1 Power Specifications

Input power specifications are as follows:

Table 2.1: Power Specifications

Symbol	Parameter	Min.	Typ.	Max.	Unit	Condition
VDD	Logic/LCD Drive Voltage	3.0	3.3	3.6	[Volt]	10%
IDD	Input Current	-	550	660	[mA]	64 Gray Bar Pattern (VDD=3.3V, at 60Hz)
PDD	VDD Power	-	1.9	2.2	[Watt]	64 Gray Bar Pattern (VDD=3.3V, at 60Hz)
IRush	Inrush Current	-	-	3	[A]	Note 1

Note1: Measurement condition:



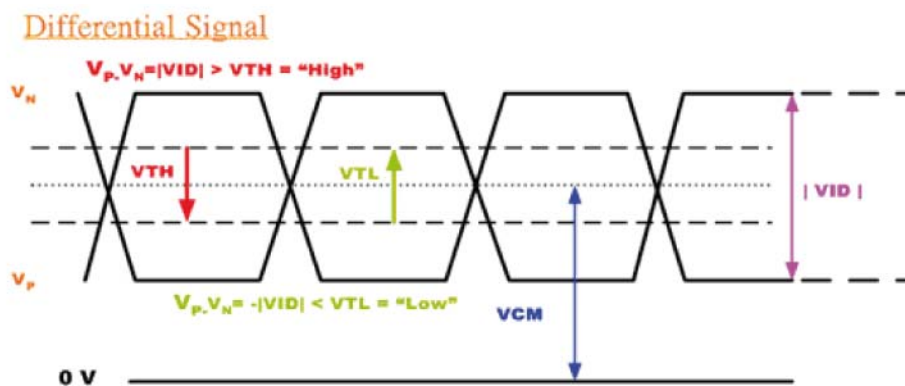
2.1.1 Signal Electrical Characteristics

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

Table 2.2: Signal Electrical Characteristics

Symbol	Parameter	Min.	Typ.	Max.	Unit	Condition
VTH	Differential Input High Threshold	-	-	100	[mV]	VCM=1.2V
VTL	Differential Input Low Threshold	-100	-	-	[mV]	VCM=1.2V
VID	Input Differential Voltage	100	400	600	[mV]	
VICM	Differential Input Common Mode Voltage	1.1	-	1.45	[V]	VTH / VTL = 100mV

Note: LVDS Signal Waveform.



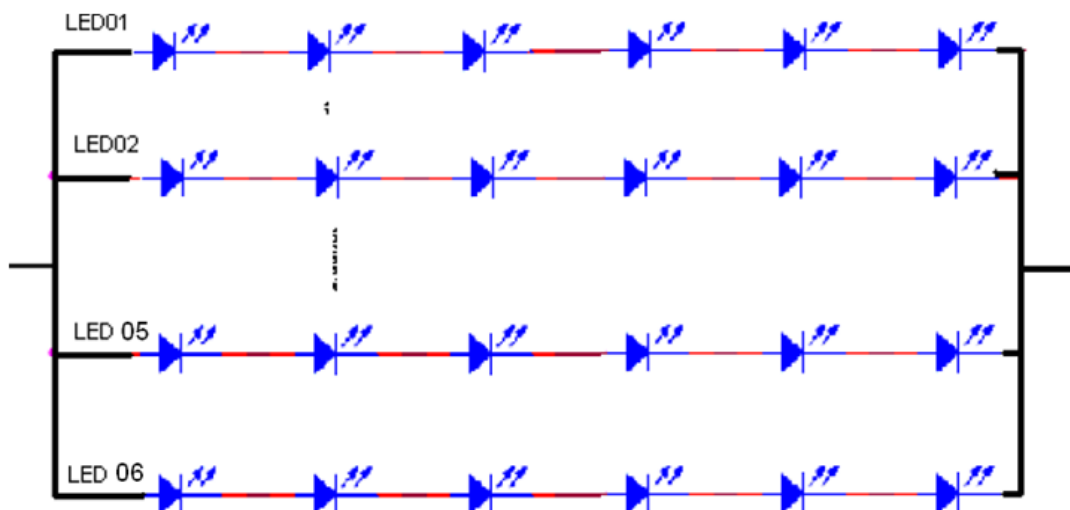
2.2 Backlight Driver Conditions

Parameter guidelines for LED Light Bar Driver is operation under stable conditions at 25°C (Room Temperature):

Table 2.3: Backlight Driver Conditions						
Item	Symbol	Values			Unit	Condition
		Min.	Typ.	Max.		
LED Voltage	VL	17.7		17.7	V	Note 2
LED Current	IL	390		400	mA	Note 2
LED Life Time	-	50,000	-	-	Hr	Note 1

Note1 "LED Life Time" is defined for module brightness decrease to 50% original brightness with an ambient temperature of 25°C and typical LED Current at 400mA.

Note2 "LED Driver" condition is defined for each LED module (6 LED serial; one LED includes one Chip).



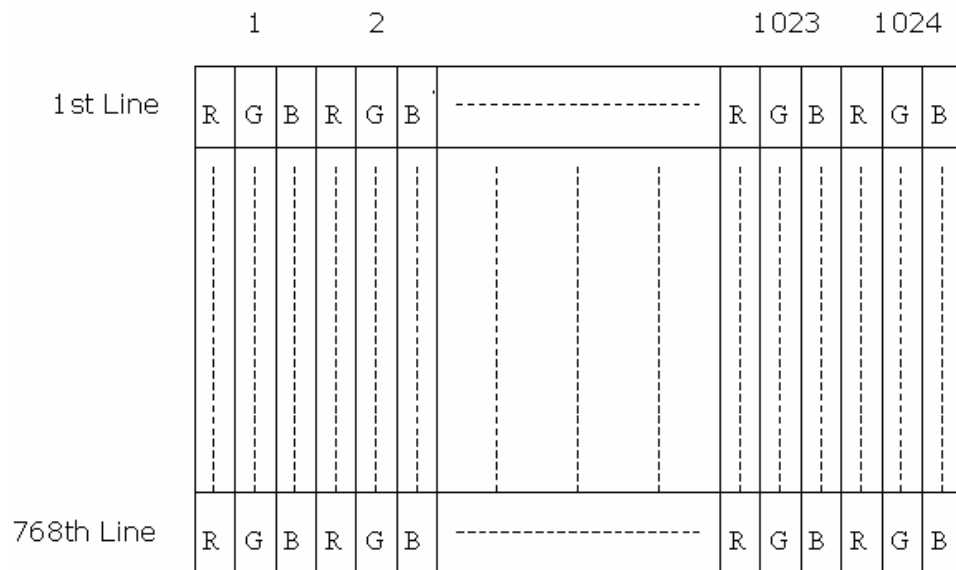
Note3 The variance of LED Light Bar power consumption is 10%. Calculator value for reference ($IL \times VL \times 2 = P_{LED}$)

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 uses a pair of SN75LVDS82 (Texas Instruments) or compatible LVDS receivers. LVDS is a differential signal technology for LCD interfaces and high speed data transfer devices. Transmitter should 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	VDD	Power Supply,3.3V(typical)
2	VDD	Power Supply,3.3V(typical)
3	VSS	Ground
4	GND	Ground
5	RxIN1-	LVDS Differential Data Input (R0, R1, R2, R3, R4, R5, G0)
6	RxIN1+	
7	VSS	Ground
8	RxIN2-	LVDS differential data input Pair 1
9	RxIN2+	LVDS Differential Data Input (G1, G2, G3, G4, G5, B0, B1)
10	VSS	Ground
11	RxIN3-	LVDS differential data input Pair 2
12	RxIN3+	LVDS Differential Data Input (B2, B3, B4, B5, HS, VS, DE)
13	VSS	Ground
14	RxCLKIN-	LVDS differential Colock input Pair
15	RxCLKIN+	
16	GND	Ground

Table 3.1: Pin Description

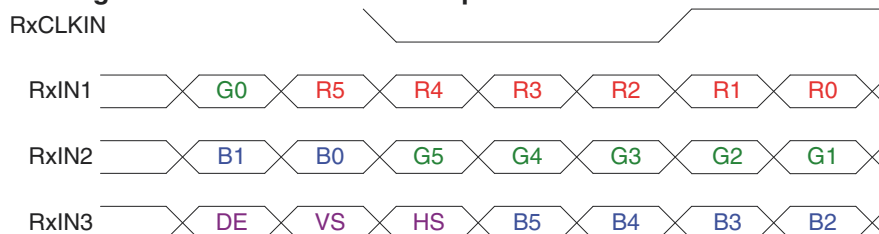
17	RxIN4-	LVDS receiver signal channel 3, NC for 6 bit LVDS Input
18	RxIN4+	LVDS Differential Data Input (R6, R7, G6, G7, B6, B7)
19	VSS	Ground
20	SEL68	Selection for 6bits/8bits LVDS data input *Note1

Note1: Input signals are in low status when VDD is off.

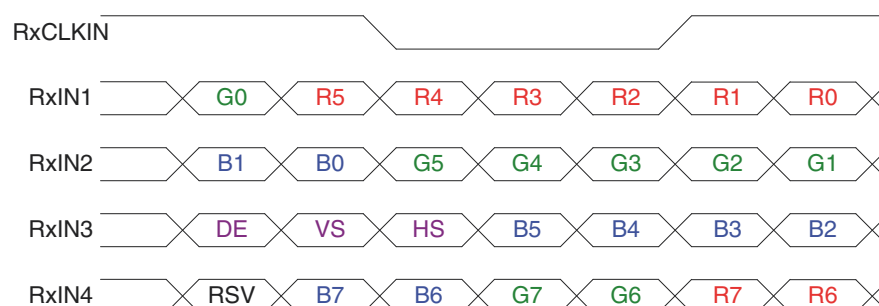
3.3 The Input Data Format

3.3.1 SEL68

SEL68 = "High" or "NC" for 6-bit LVDS Input



SEL68 = "Low" for 8-bit LVDS Input



Note1: Please follow PSWG.

Note2: R/G/B data 7:MSB, R/G/B data 0:LSB

Signal Name	Description	Remark
R7	Red Data 7	
R6	Red Data 6	
R5	Red Data 5	
R4	Red Data 4	Red-pixel Data, For 8 bits LVDS input, MSB: R7; LSB:R0
R3	Red Data 3	
R2	Red Data 2	
R1	Red Data 1	
R0	Red Data 0	

G7	Green Data 7	
G6	Green Data 6	
G5	Green Data 5	
G4	Green Data 4	Green-pixel Data, For 8 bits LVDS input, MSB: G7; LSB:G0
G3	Green Data 3	
G2	Green Data 2	
G1	Green Data 1	
G0	Green Data 0	
B7	Blue Data 7	
B6	Blue Data 6	
B5	Blue Data 5	
B4	Blue Data 4	Blue-pixel Data, For 8 bits LVDS input, MSB: B7; LSB:B0
B3	Blue Data 3	
B2	Blue Data 2	
B1	Blue Data 1	
B0	Blue Data 0	
RxCLKIN	LVDS Data Clock	
DE	Data Enable Signal	When the signal is high, the pixel data is valid to be displayed.
VS	Vertical Synchronous Signal	
HS	Horizontal Synchronous Signal	

Note: Output signals from any system shall be low or Hi-Z state when VDD is off.

3.4 Interface Timing

3.4.1 Timing Characteristics

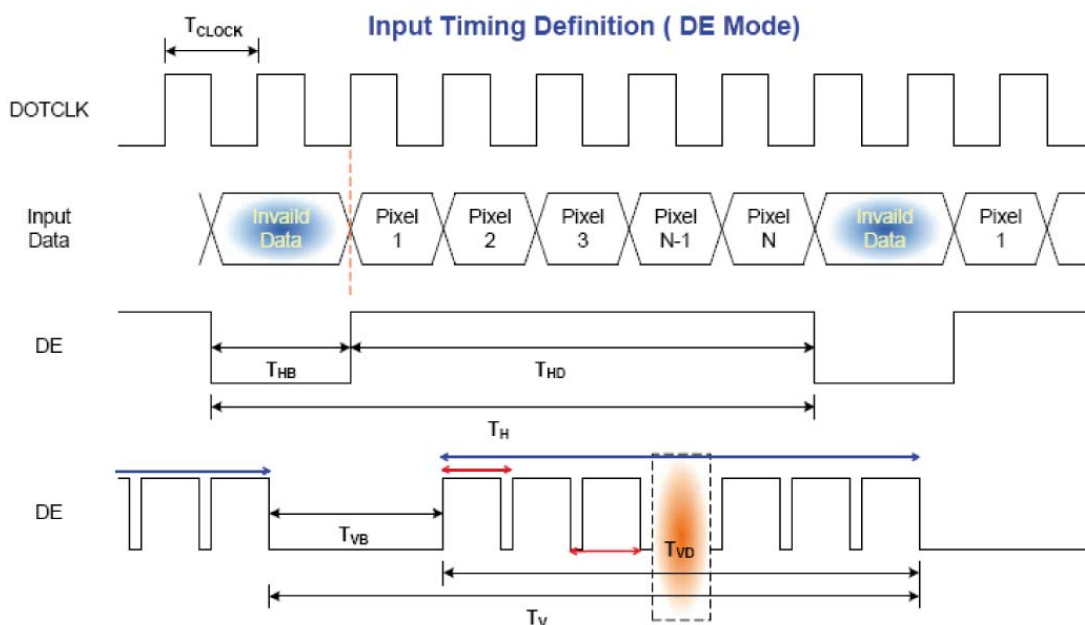
Table 3.2: Timing Characteristics							
Signal	Parameter	Symbol	Min.	Typ.	Max.	Unit	
Clock Timing	Clock frequency	$1/T_{\text{Clock}}$	50	65	81	MHz	
	Vsync Timing	Vertical Section					T_{Line}
Period		T_V	776	806	1024		
Active		T_{VD}	768	768	768		
Hsync Timing	Horizontal Section	Blanking	T_{VB}	8	38	256	T_{Clock}
		Period	T_H	1054	1344	2048	
		Active	T_{HD}	1024	1024	1024	
		Blanking	T_{HB}	30	320	1024	

Note: Frame rate is 60 Hz.

Note: DE mode.

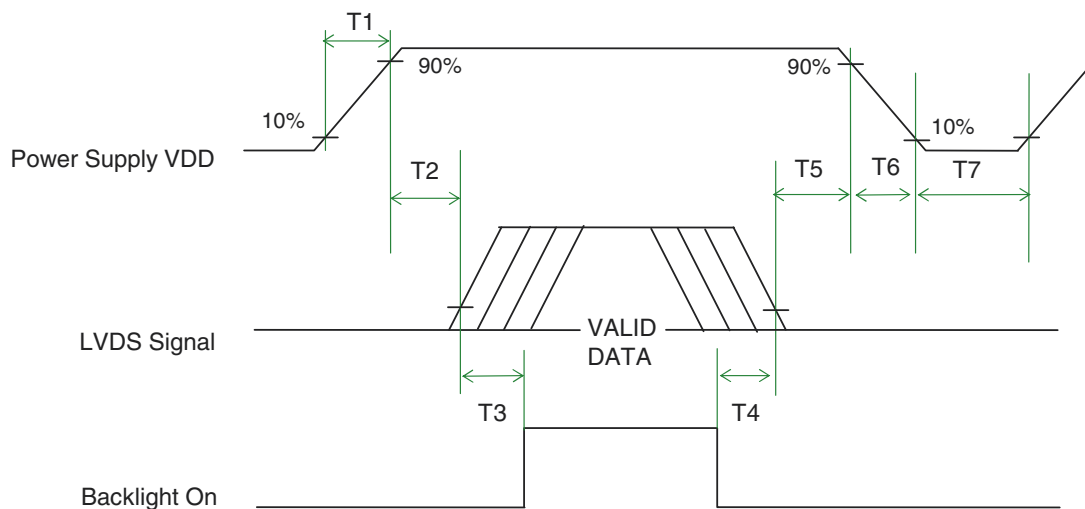
Note: Typical values refer to VESA standard

3.4.2 Input Timing Diagram



3.5 Power ON/OFF Sequence

VDD power and lamp on/off sequence is shown below. 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	0	40	50	[ms]
T3	200	-	-	[ms]
T4	200	-	-	[ms]

T5	0	16	50	[ms]
T6	0	-	10	[ms]
T7	1000	-	-	[ms]

The above on/off sequence should be applied to avoid abnormal function in the display. Please make sure to turn off the power when you plug the cable into the input connector or pull the cable out of the connector.

Chapter 4

Connector & Pin
Assignment

4.1 TFT LCD Module

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

4.1.1 Connector

Table 4.1: Connector

Connector Name / Description	Signal Connector
Manufacture	E&T or compatible
Connector Model Number	3804-F20N-06R / MSB240420E
Adaptable Plug	HRS DF14-20S-1.25C

Mating LVDS transmitter: THC63LVDM83A or equivalent device

4.1.2 Pin Assignment

Table 4.2: Pin Assignment

Pin No.	Signal Name	Pin No.	Signal Name
1	VDD	2	VDD
3	VSS	4	GND
5	RxIN1-	6	RxIN1+
7	VSS	8	RxIN2-
9	RxIN2+	10	VSS
11	RxIN3-	12	RxIN3+
13	VSS	14	CLKIN-
15	CLKIN+	16	GND
17	RxIN4-	18	RxIN4+
19	VSS	20	SEL68

4.2 Backlight Unit

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

Connector Name / Designation	LED Light Bar Connector / Backlight Lamp
Manufacturer	TKP TERMINAL/ TKP HOVSING
Type Part Number	TKP TERMINAL 8820T/ TKP HOVSING 8821-03
Mating Type Part Number	Wire VL 1007 24 AWG

4.2.1 Signal for LED Light Bar Connector

Connector No.	Pin No.	Input	Color	Function
Upper CN1	1	HI 1	Red	Power supply for backlight unit
	2	GND 1	Black	Ground for backlight unit

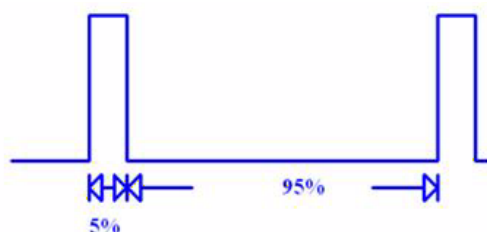
Lower	CN2	1	HI 2	Red	Power supply for backlight unit
		2	GND 2	Black	Ground for backlight unit

Cable Length : 250mm+/-10mm

4.2.2 LED Driver Board

4.2.2.1 Specifications:

Table 4.3: Specifications						
Symbol	Characteristics	Condition	Min.	Typ.	Max.	Unit
Input	Voltage		10	12	15	V
	Efficiency	Vin=12V, Iout=800mA, Vout=17.7V		85		%
	Power		3		30	W
Output	Voltage		17.7	18	24	V
	Current		150		800	mA
	Current Accuracy	150mA≤Iout≤800mA		±5	±10	%
Protection			OVP			
Environment	Thermal Shutdown			165		°C
	Operating Junction Temperature				125	°C
	Operating Temperature		-20		+70	°C
	Storage Temperature		-40		+85	°C
PWM Dimmer	Dimmer Range (Note. 1)		5		100	V
	Dimmer VH		2		5	V
	Dimmer VL		0		1.5	V
	Dimmer Frequency		0.25	0.5	1	KHz
ON/OFF	Von		3.5		5.5	V
	off		0		2	V



Note1: When the input $\leq 1\text{KHz}$, the high-level digital output must be greater than the total output level of only 5%.

4.2.2.2 Input Connector Pin Definition

Table 4.4: Input Connector Pin Definition	
Pin No.	Pin Definition
1	Vin(+12V)

Table 4.4: Input Connector Pin Definition

2	Vin(+12V)
3	GND
4	GND
5	ON/OFF(0V: Off ; +5V: On)
6	Dimming(PWM)

4.2.2.3 Output Connector Pin Definition

Table 4.5: Output Connector Pin Definition

Pin No.	Pin Define
1	VLED-
2	VLED+

4.2.2.4 Dimensions

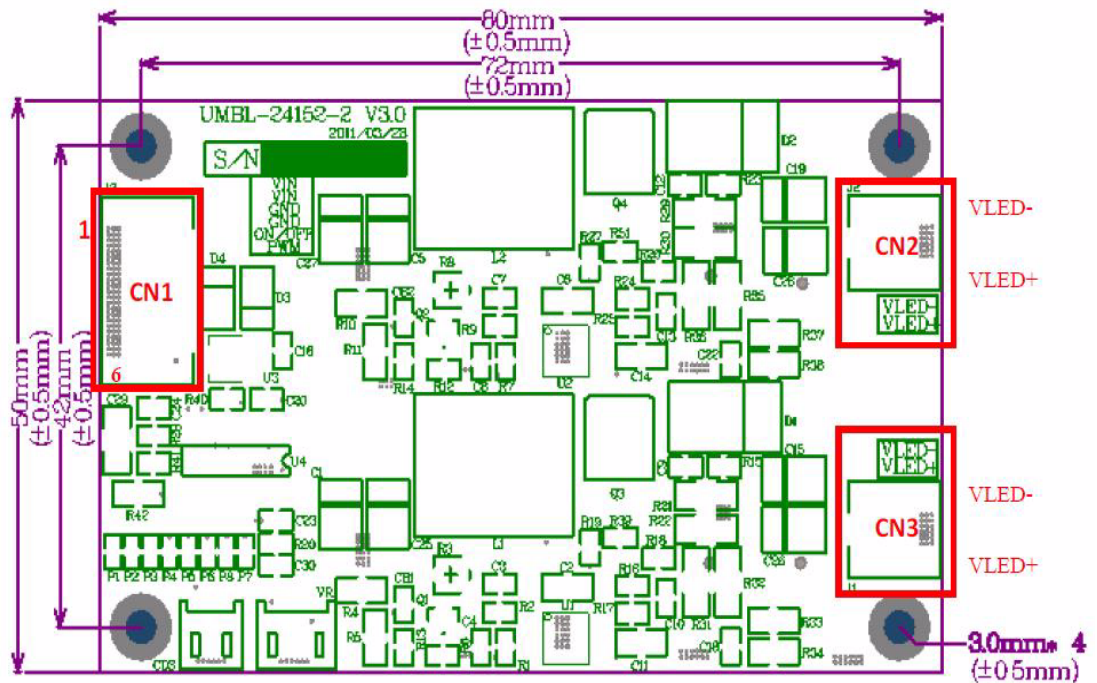


Figure 4.1 Dimensions

Chapter 5

Touchscreen & Touch
Controller

5.1 Touchscreen (Optional: for IDK-2115R Only)

5.1.1 Touch Characteristics

The touch panel is a resistance type that a customer uses with flat display like an LCD. Once the operator touches it with the round end of a resin pen or a finger, the circuit for the touch panel sends coordinate points to a PC from the voltage at the contact points.

5.1.2 Optical Characteristics

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

5.1.3 Environment Characteristics

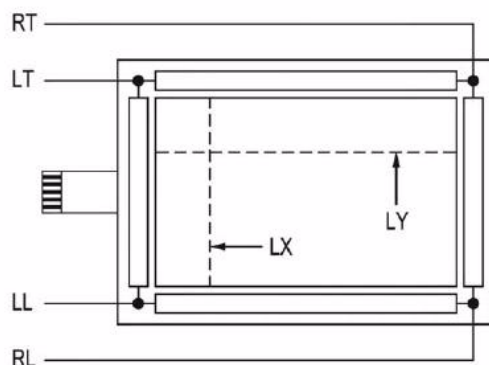
	Item	Specifications	Remarks
1	Operation temperature	-20°C ~ 70°C	Note: All terms under 1 atmosphere
2	Storage temperature	-40°C ~ 80°C	
3	Operation Humidity	20% ~ 80%RH	
4	Storage temperature	20% ~ 90%RH	

5.1.4 Mechanical Characteristics

	Item	Specifications	Remarks
1	Hardness of surface	Pencil hardness 3H.	JIS K-5600-5-4 150gf, 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	Resistance	X axis: 200Ω ~ 1000Ω(Figure as bellow) Y axis: 200Ω ~ 800Ω(Figure as bellow)	FPC connector
3	Linearity	X ≤1.5% (Figure as bellow) Y ≤1.5% (Figure as bellow)	Reference: 250gf
4	Chattering	≤ 20ms Max	
5	Insulation Resistance	≥ 20MΩ min (DC 25V)	



5.1.6 General Specifications

Item	Specifications
1	Frame size 322.00±0.30 X 245.50±0.30 mm
2	View Area 309.00±0.30 X 233.50±0.20 mm
3	Active Area 303.00±0.30 X 227.50±0.20 mm
4	Total Thickness 2.20±0.20 mm
5	Tail length 205.00±6.00 mm

5.2 Touch Controller (Optional: - for IDK-2115R Only)

Advantech's ETM-RES04C Touch Control Board is the ultimate combo board. This touch panel controller provides optimal performance for 5-wire analog resistive touch panels. It communicates with a PC system directly through USB and RS-232 connectors. The superior design is sensitive, accurate and is friendly to operate. The touch panel driver emulates mouse left and right button functions and supports the following operating systems.



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)
- 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

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

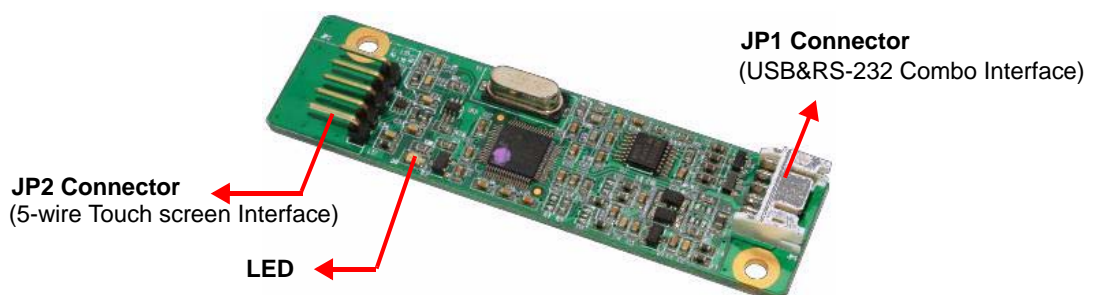
Acquired RoHS Certificate

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 for USB and RS-232 is a 2.0mm, 10-pin, 90 degree box; male type with lock connector. It is 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	ctlr	serial data from controller to host
TxD	3	4	host	serial data from host to controller

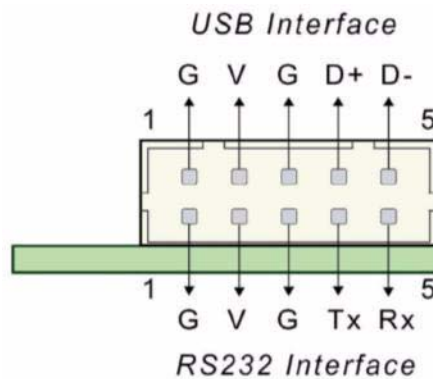
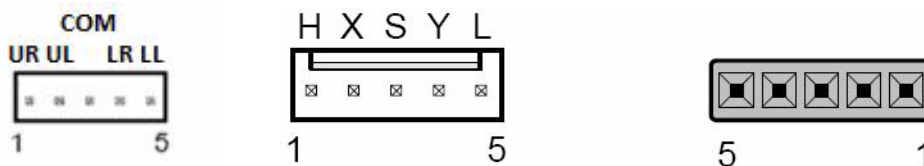


Figure 5.1 Board mounted header

5.2.2.3 Touch Screen Connector, JP2, Pins and Signal Descriptions

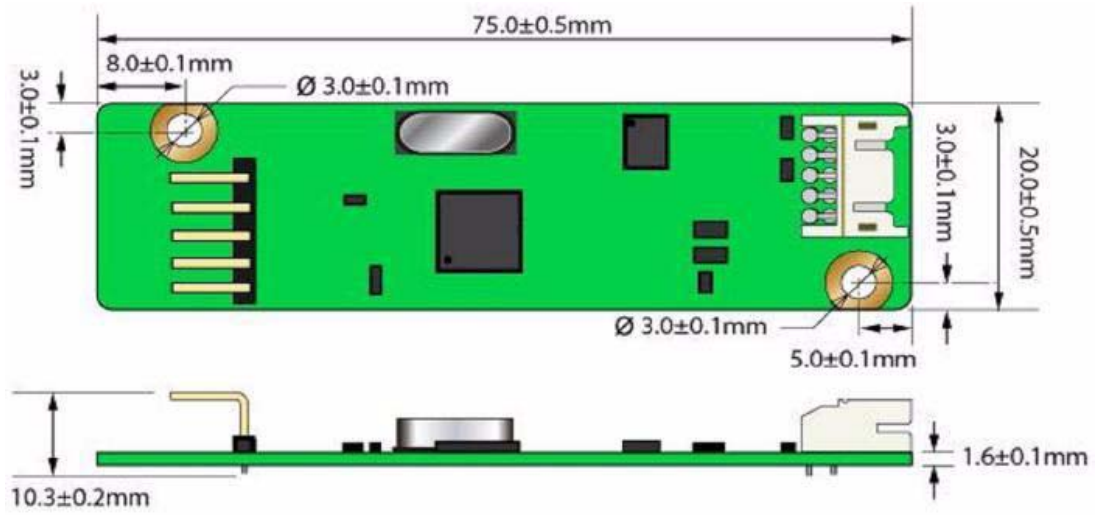
The touchscreen connector, JP2, is a single row, 2.54mm, 5-pins, 90 degrees; male type connector. The pins are numbered as shown in the table below.

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 Dimensions

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



Appendix **A**

Optical Characteristics

A.1 Optical Characteristics

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

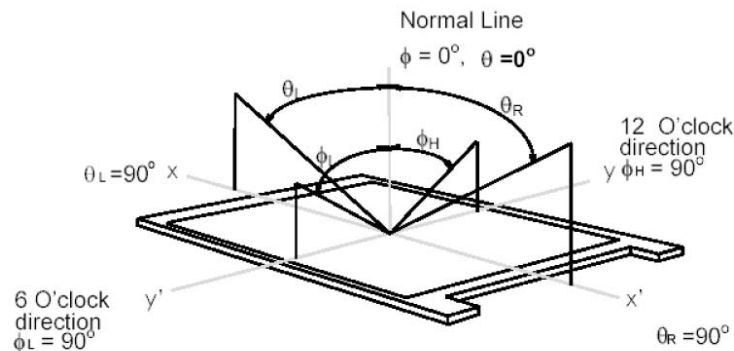
Table A.1: Optical Characteristics

Item	Unit	Conditions	Min.	Typ.	Max.	Note
Viewing Angle	[degree]	Horizontal (Right)		80	-	1
		CR = 10 (Left)		80	-	
	Vertical (Upper)		70	-		
		CR = 10 (Lower)		60		-
Luminance Uniformity	[%]	9 Points	75	80	-	2, 3
Optical Response Time	[msec]	Rising	-	5.7	-	5
		Falling	-	2.3	-	
		Rising + Falling	-	8	-	
Color/Chromaticity Coordinates (CIE 1931)		White x	-	0.313	-	4
		White y	-	0.322	-	
Color Temp.	K		-	7500		
White Luminance	[cd/m ²]		1100	1200	-	4
Contrast Ratio			-	700	-	4

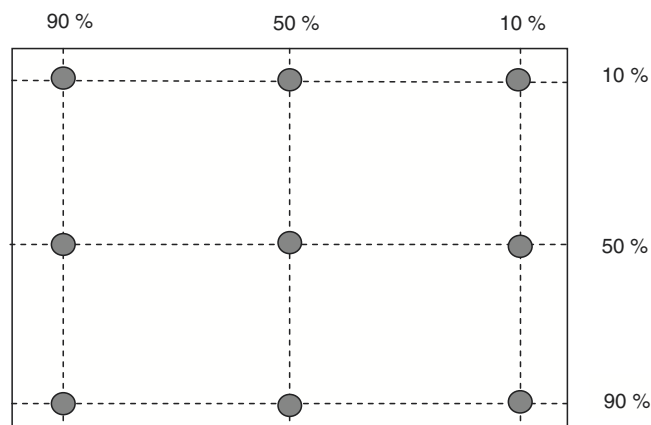
Note: Optical Equipment: BM-7, DT-101, or equivalent

Note1: Definition of viewing angle

Viewing angle is the measurement of contrast ratio R10, 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-point position

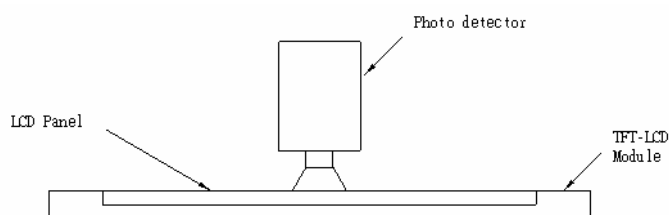


Note3: 9-point luminance uniformity is defined by dividing the maximum luminance values by the minimum test point luminance

$$\delta_{w9} = \frac{\text{Minimum Brightness of nine points}}{\text{Maximum Brightness of nine points}}$$

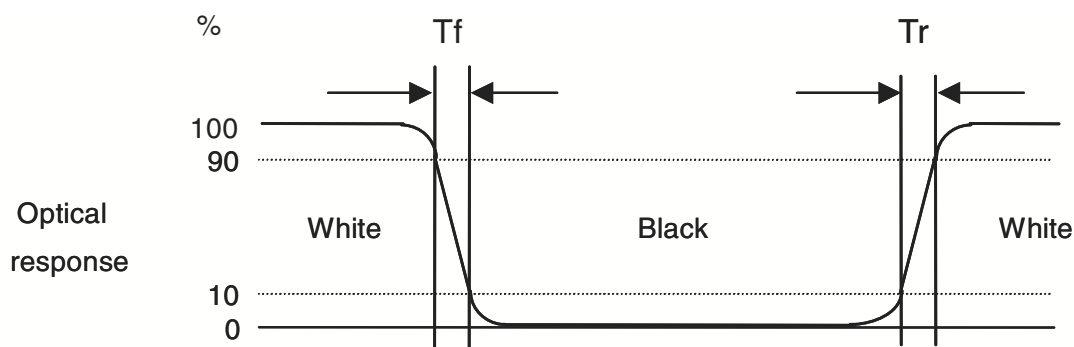
Note4: Measurement method

The LCD module should be stabilized at given temperature for 30 minutes to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting Backlight for 30 minutes in a stable, windless and dark room. Optical Equipment: DT-100, or equivalent



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 as below.



Appendix **B**

Handling Precautions

B.1 Optical Characteristics

The optical characteristics are measured under stable conditions at 25°C (room temperature).

1. Since front polarizer is easily damaged, pay attention not to scratch it.
2. Be sure to turn off power supply when inserting or disconnecting from input connector.
3. Wipe off water drops immediately. Lengthy 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 a CMOS LSI is used in this module, be aware of static electricity and insure equipment and personnel are properly grounded when 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. If a module has to be put back into the packing container slot after having been taken out, please press the far ends of the LED light bar reflector edge softly. Otherwise the TFT Module may be damaged.
10. During insertion or removal of the Signal Interface Connector, be sure not to rotate or 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 momentarily. When designing the enclosure, care should be taken not to bend/twist the TFT Module from outside. Otherwise the module may be damaged.
12. Small amounts of inflammable materials are used in the LCD module. The LCD module should be supplied by power that complies to requirements for a Limited Power Source (IEC60950 or UL1950) or an exemption should be applied for.

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