



**User Manual**

# **IDK-2115 Series**

**15" High Brightness XGA (LED Backlight)**

**ADVANTECH**

*Enabling an Intelligent Planet*

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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

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## 1.1 General Description

The Advantech IDK-2115 series comes with a 15" 1200 cd/m<sup>2</sup> industrial grade LCD display, and an LED driving board. The series is also available with flexible options for touch screens and enhanced treatment such as AR surface treatment and optical bonding solution. IDK-2115 series supports 1200 cd/m<sup>2</sup> high brightness with low power consumption at the maximum consumption of 15.58 W. Equipped with high level of brightness and wide operating temperature, IDK-2115 provides superior sun-light 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):** 65°/60°/70°/70°
- **Brightness:** 1200 cd/m<sup>2</sup>
- **Contrast Ratio:** 1100:1
- **Response Time(ms):** 8ms
- **Colors:** 262K/16.2M
- **Voltage:** 3.3V
- **Power Consumption:** 15.58W
- **Signal Interface:** 1 channel LVDS
- **Weight:** 1350g(N series)
- **Dimensions(W x H x D):** N series: 326.5 x 253.5 x 13.0 mm  
R series: 326.5 x 253.5 x 14.61 mm

### 1.2.2 LED Driver Board

- **Efficiency:** 85%
- **Output Current & Voltage:** 900 mA / 18 V
- **Dimensions(W x H x D):** 90 x 50 x 7 mm

### 1.2.3 Touch Screen (R series)

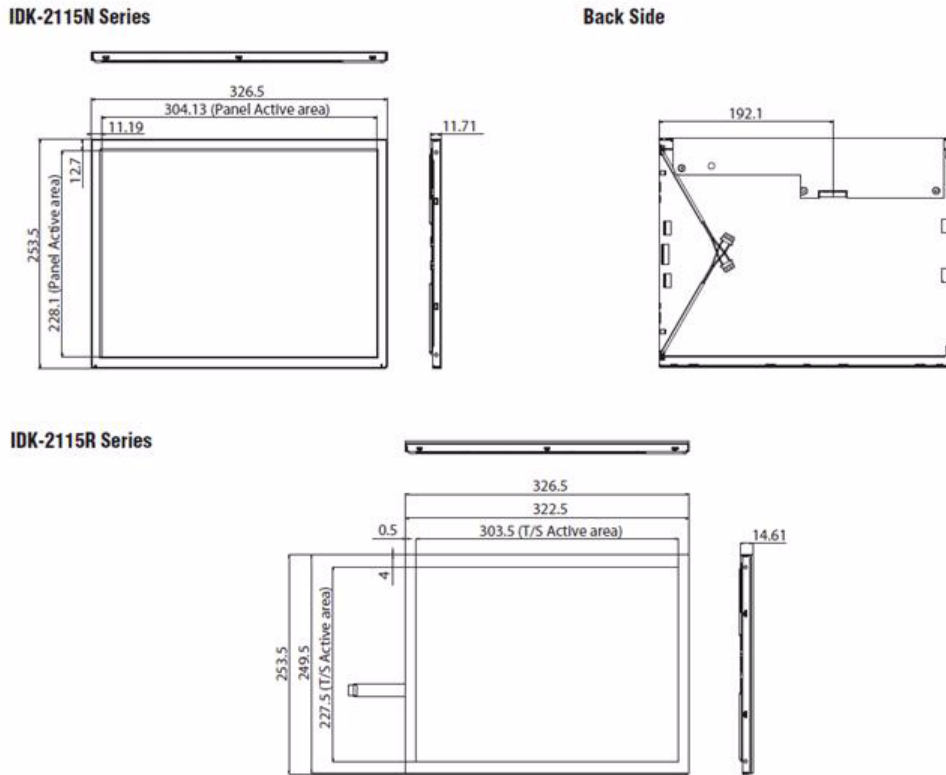
- **Touch Screen:** 5-Wire Resistive
- **Light Transmission:** 80 ± 2 %
- **Durability:** 1 million times

### 1.2.4 Environment

- **Operating Temperature:** 0~65 °C
- **Storage Temperature:** -20 ~ 65°C
- **Humidity:** 5~ 95% @ 40°C, non-condensing



### 1.3 Mechanical Characteristic



### 1.4 Functional Block Diagram

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

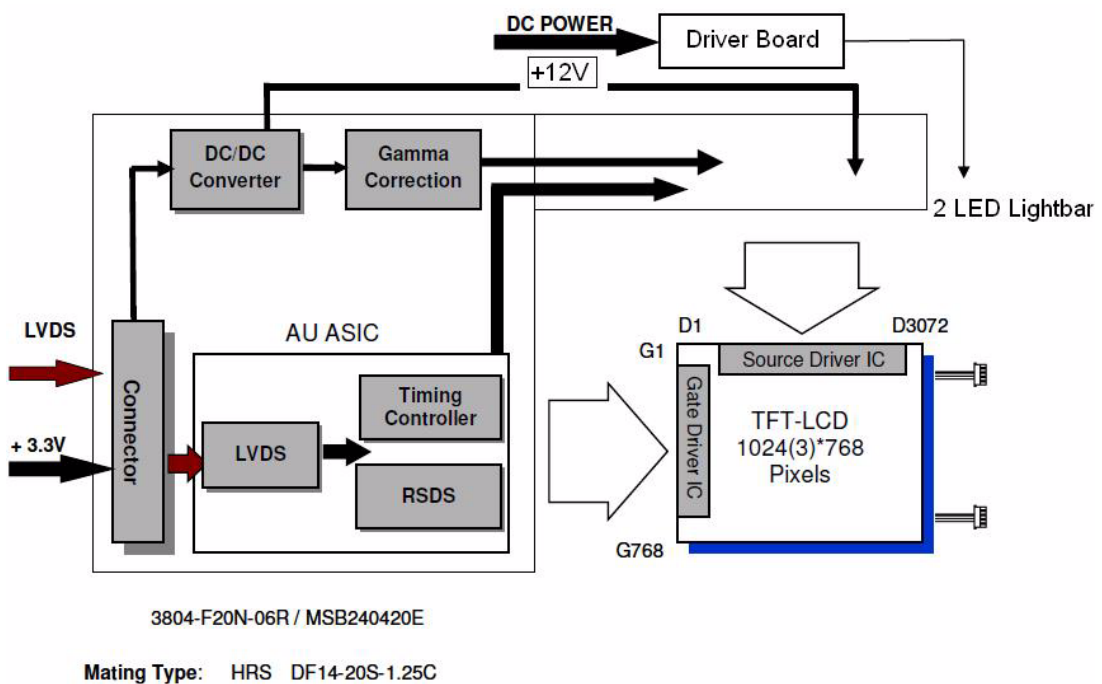


Figure 1.1 Function block diagram

## 1.5 Touch Screen driver

The T/S driver CD-ROM is in the accessory box and comes 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	Vin	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	ILed	390*2	400*2	[mA]	Note 1, 2

### 1.6.3 Absolute Ratings of Environment

Item	Symbol	Min.	Max.	Unit	Conditions
Operating Temperature	TOP	0	+65	[oC]	Note 3
Operation Humidity	HOP	8	90	[%RH]	
Storage Temperature	TST	-20	+65	[oC]	
Storage Humidity	HST	8	90	[%RH]	

**Note1:** With in Ta= 25°C

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

# Chapter 2

Electrical  
Characteristics

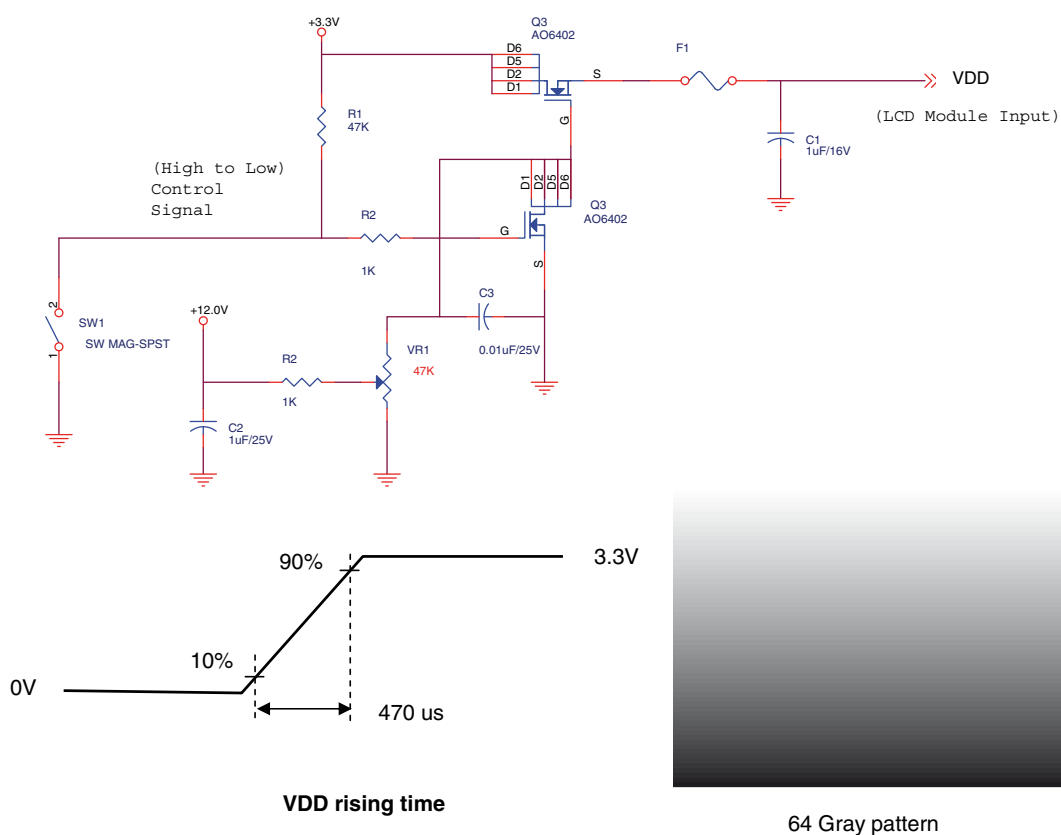
## 2.1 Power Specification

Input power specifications are as follows:

**Table 2.1: Power specification**

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:



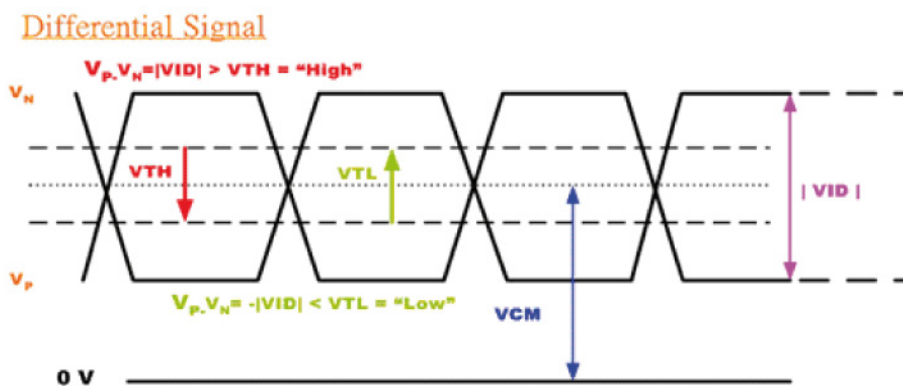
### 2.1.1 Signal Electrical Characteristics

Input signals shall be 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 Driving Conditions

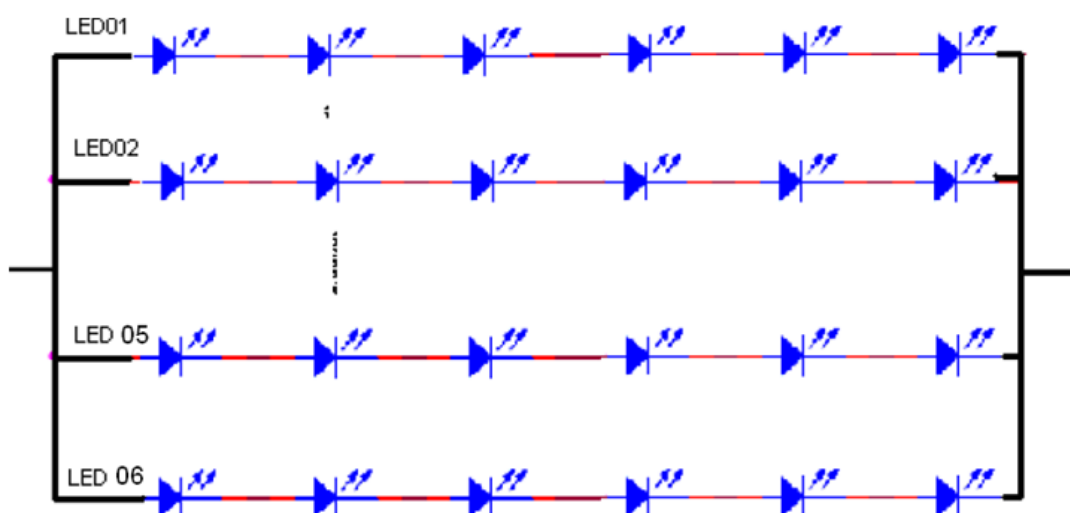
Parameter guideline for LED Light Bar Driver is under stable conditions at 25°C (Room Temperature):

**Table 2.3: Backlight driving 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** The "LED lift time" is defined as the module brightness decrease to 50% original brightness that the ambient temperature is 25°C and typical LED Current at 400mA.

**Note2** The LED driving condition is defined for each LED module.(6 LED Serial, a LED includes 1 Chip).



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

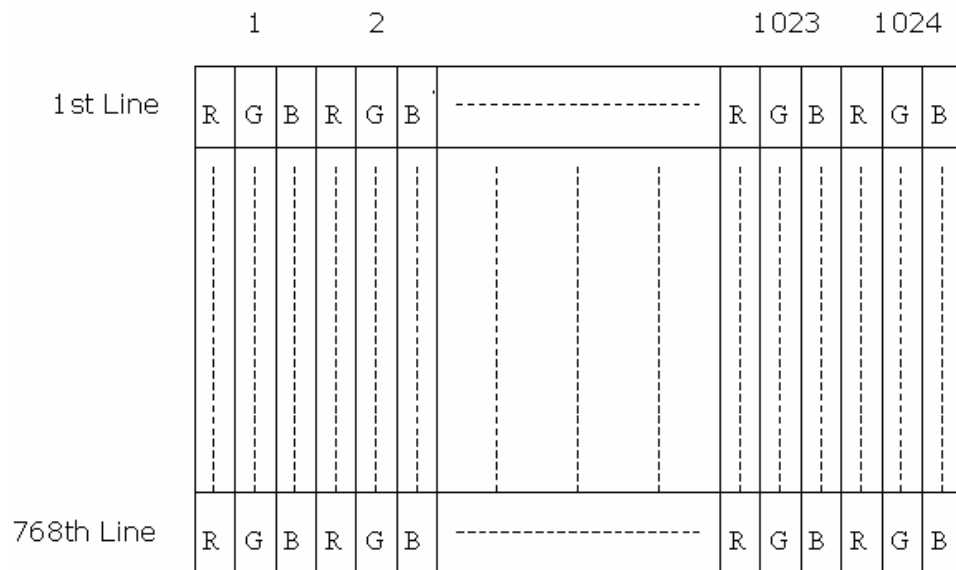


# Chapter 3

## 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 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	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, RSV)
19	VSS	Ground
20	SEL68	6/ 8bits LVDS data input selection [H: 8bits L/NC: 6bit]

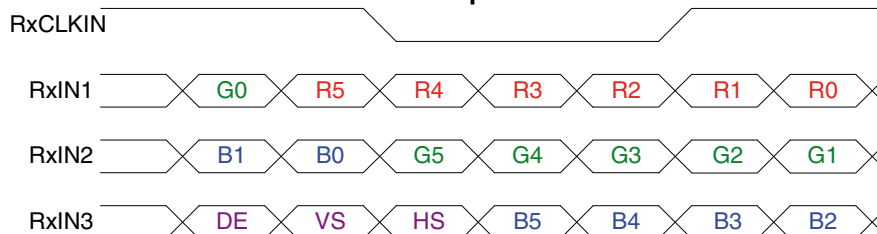
**Note1:** Input signals shall be in low status when VDD is off.

**Note2:** For 6 bits mode, please keep the Pin 17& Pin 18 NC or make sure that the voltage of Pin 18 is always higher than the voltage of Pin 17.

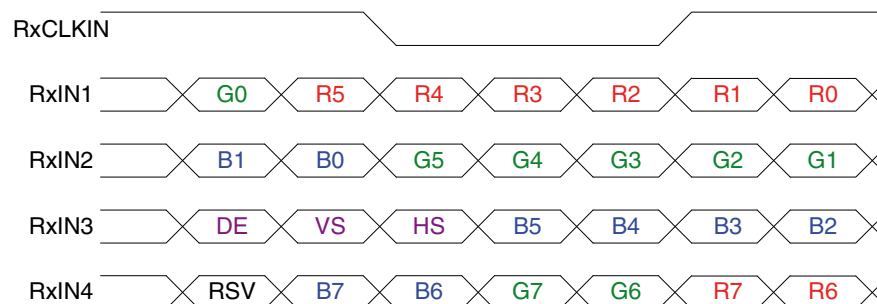
## 3.3 The Input Data Format

### 3.3.1 SEL68

#### SEL68 = "Low" or "NC" for 6 bits LVDS Input



#### SEL68 = "High" for 8 bits 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: R5;
R3	Red Data 3	LSB:R0
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 shall be valid to be displayed.
VS	Vertical Synchronous Signal	
HS	Horizotal 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

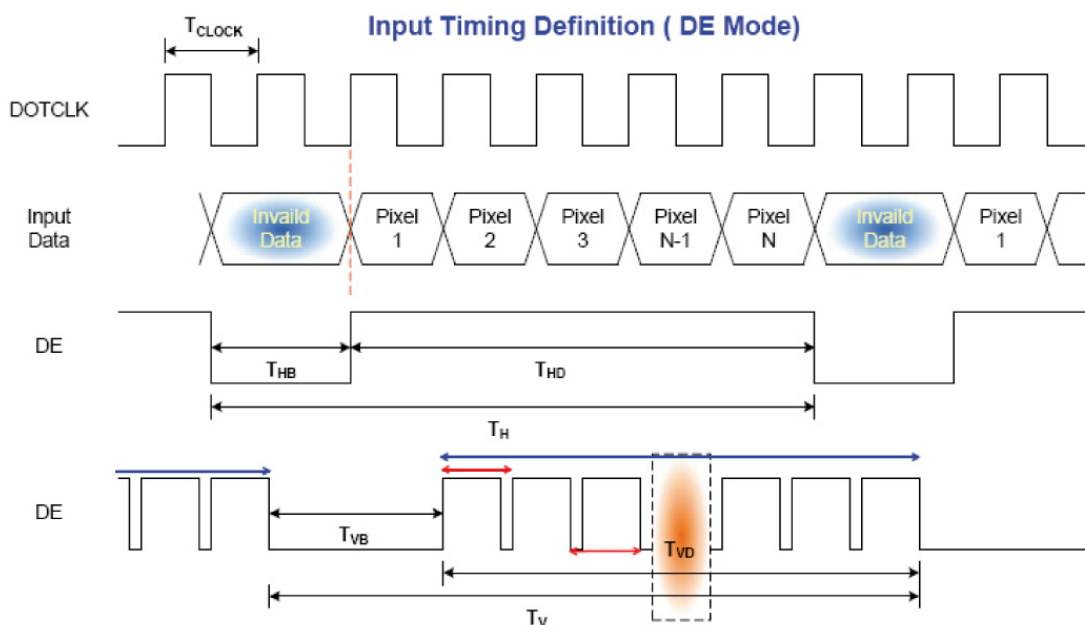
Table 3.2: Timing Characteristics							
Signal	Parameter	Symbol	Min.	Typ.	Max.	Unit	
Clock Timing	Clock frequency	$1/T_{\text{Clock}}$	50	65	81	MHz	
	Vsync Timing	Vertical Section					$T_{\text{Line}}$
Period		$T_V$	776	806	1024		
Active		$T_{VD}$	768	768	768		
Hsync Timing	Horizontal Section	Blanking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

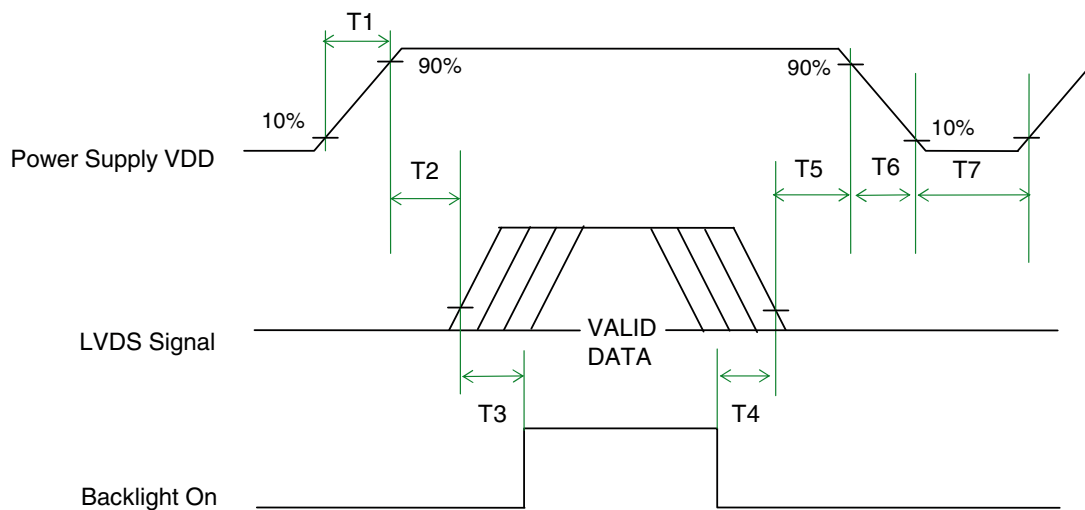
**Note** Typical value refer to VESA STANDARD

### 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	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

Physical interface is described as for the connector on module. These connectors are capable of accommodating the following signals and will be 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
Adapable 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

Physical interface is described as for the connector on module. These connectors are capable of accommodating the following signals and will be 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

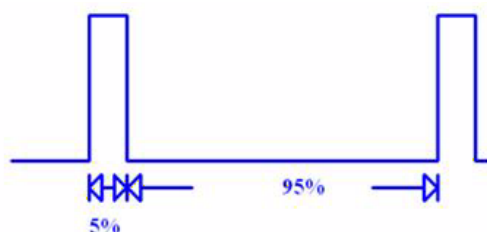
Lower	CN2	1	HI 2	Red	Power supply for backlight unit
		2	GND 2	Black	Ground for backlight unit

Cable Length : 250mm+/-10mm

## 4.2.2 LED Driver Board

### 4.2.2.1 Specification:

Table 4.3: Specification						
Symbol	Characteristics	Condition	Min.	Typ.	Max.	Unit
Input	Voltage		10	12	15	V
	Efficiency	Vin=12V, Iout=1.5A, Vout=18V		90		%
	Power		3		30	W
Output	Voltage		18		24	V
	Current		150		1500	mA
	Current Accuracy	150mA≤Iout≤1000mA		±5	±10	%
Environment	Protection		Thermal/OVP			
	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  $\leq 1$ KHz, the high-level digital output must be greater than the total output level of only 5%.

### 4.2.2.2 Input connector pin define

Table 4.4: Input connector pin define	
Pin No.	Pin Define
1	Vin(+12V)

**Table 4.4: Input connector pin define**

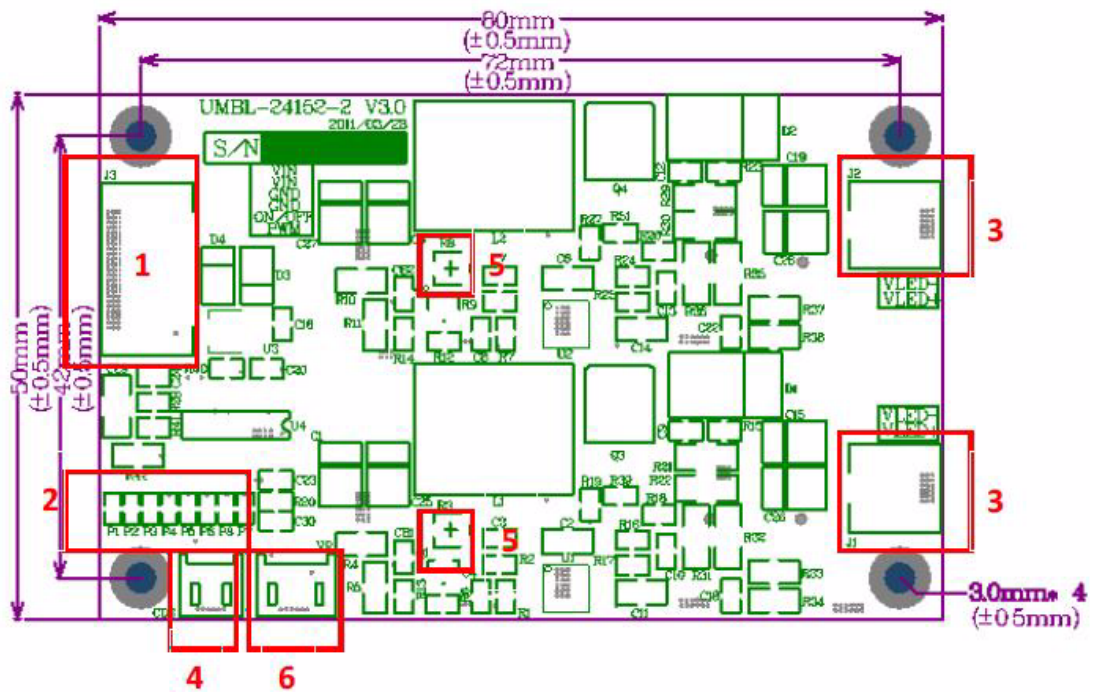
2	Vin(+12V)
3	GND
4	GND
5	ON/OFF(0V: Off ; +5V: On)
6	Dimming(PWM)

**4.2.2.3 Output connector pin define**

**Table 4.5: Output connector pin define**

Pin No.	Pin Define
1	VLED-
2	VLED+

**4.2.2.4 Dimension**



**Figure 4.1 Dimension**



# Appendix **A**

## Optical Characteristics

# A.1 Optical Characteristics

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

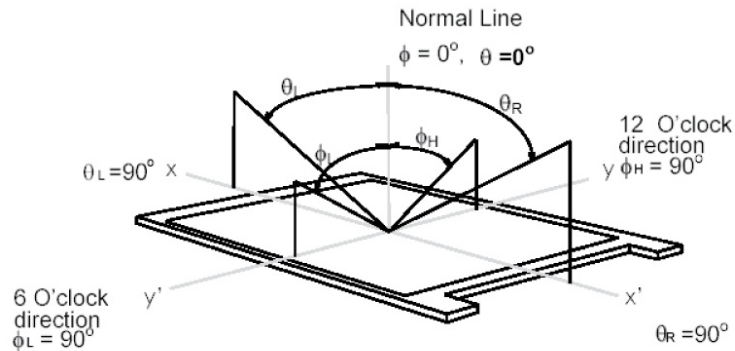
**Table A.1: Optical Characteristics**

Item	Unit	Conditions	Min.	Typ.	Max.	Note
Viewing Angle	[degree]	Horizontal (Right)		70		1
		CR = 10 (Left)		70	-	
	Vertical (Upper)		55		-	
		CR = 10 (Lower)		65		
Luminance Uniformity	[%]	9 Points	75	85	-	2, 3
Optical Response Time	[msec]	Rising	-	10	20	
		Falling	-	20	30	5
		Rising + Falling	-	30	50	
Color/Chromaticity Coordinates (CIE 1931)		White x	-	0.313	-	4
		White y	-	0.322	-	
Color Temp.	K		-	6500		
White Luminance	[cd/m <sup>2</sup> ]		1100	1200	-	4
Contrast Ratio			-	550	-	4

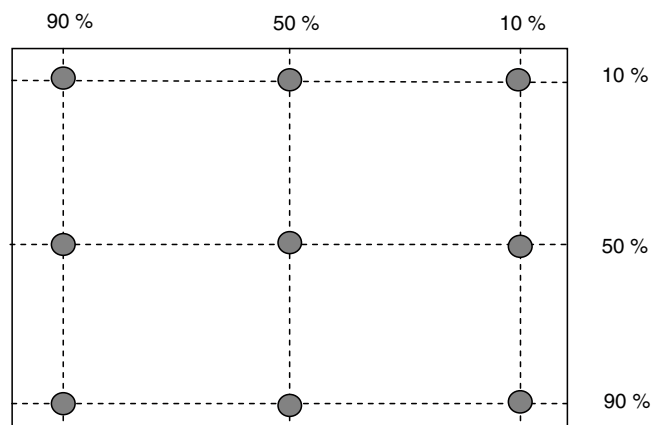
**Note** Optical Equipment: BM-7, DT-101, or equivalent

**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 below: 90° ( $\theta$ ) horizontal left and right, and 90° ( $\Phi$ ) 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

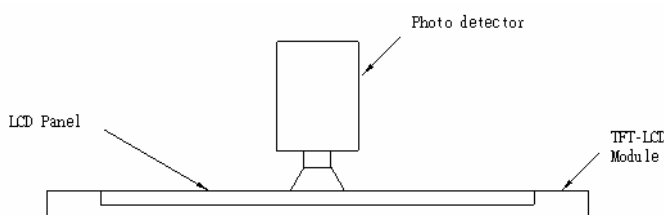


**Note3** The luminance uniformity of 9 points is defined by dividing the maximum luminance values by the minimum test point luminance

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

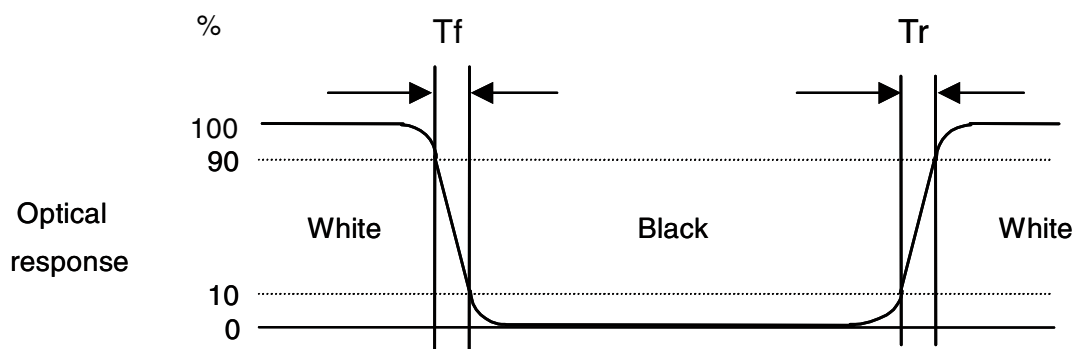
**Note4** Measurement method

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 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 interval between the 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 drop 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 if a Module has to be put back into the packing container slot after once it was taken out from the container, please press at 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. At 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 is 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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