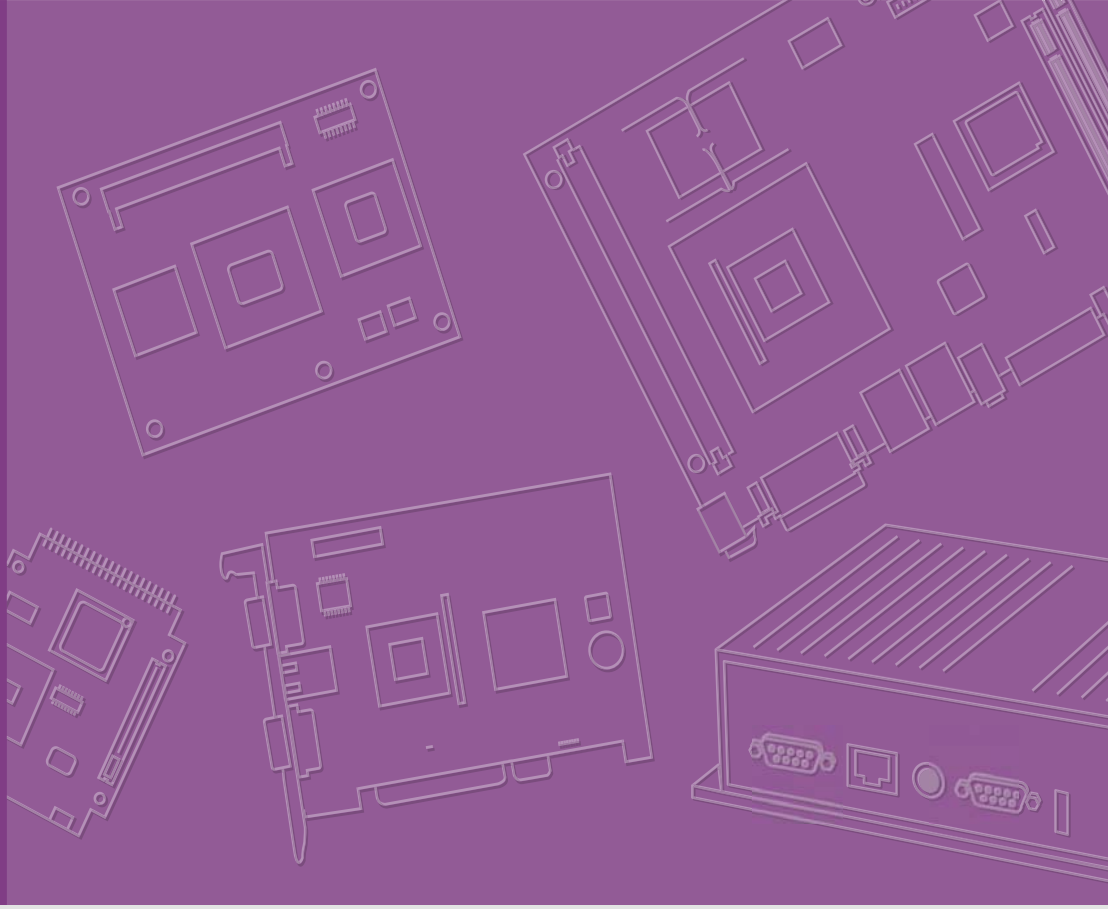


User Manual

IDK-2119 Series

19" High Brightness SXGA (LED Backlight)

ADVANTECH

Enabling an Intelligent Planet

Copyright

Acknowledgements

Part No. 2006211910 Edition 2

Printed in China Jan 2013

A Message to the Customer

Advantech Customer Services

Each and every Advantech product is built to the most exacting specifications to ensure reliable performance in the harsh and demanding conditions typical of industrial environments. Whether your new Advantech equipment is destined for the laboratory or the factory floor, you can be assured that your product will provide the reliability and ease of operation for which the name Advantech has come to be known.

Your satisfaction is our primary concern. Here is a guide to Advantech's customer services. To ensure you get the full benefit of our services, please follow the instructions below carefully.

Technical Support

We want you to get the maximum performance from your products. So if you run into technical difficulties, we are here to help. For the most frequently asked questions, you can easily find answers in your product documentation. These answers are normally a lot more detailed than the ones we can give over the phone.

So please consult this manual first. If you still cannot find the answer, gather all the information or questions that apply to your problem, and with the product close at hand, call your dealer. Our dealers are well trained and ready to give you the support you need to get the most from your Advantech products. In fact, most problems reported are minor and are able to be easily solved over the phone.

In addition, free technical support is available from Advantech engineers every business day. We are always ready to give advice on application requirements or specific information on the installation and operation of any of our products.

Product Warranty (2 years)

Advantech warrants to you, the original purchaser, that each of its products will be free from defects in materials and workmanship for two years from the date of purchase.

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.

Because of Advantech's high quality-control standards and rigorous testing, most of our customers never need to use our repair service. If an Advantech product is defective, it will be repaired or replaced at no charge during the warranty period. For out-of-warranty repairs, you will be billed according to the cost of replacement materials, service time and freight. Please consult your dealer for more details.

If you think you have a defective product, follow these steps:

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.

Contents

Chapter 1

Overview

1.1 General Description

The Advantech IDK-2119 series comes with a 19" 1200 cd/m2 industrial grade LCD display, and an LED driver 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-2119 series supports 1200 cd/m2 high brightness with low power consumption at the maximum consumption of 29.61 W. Equipped with high level of brightness and wide operating temperature, IDK-2119 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:** 19" LED backlight panel
- **Resolution:** 1280 x 1024
- **Viewing Angle (U/D/L/R):** 80°/80°/85°/85°
- **Brightness:** 1200 cd/m^2
- **Contrast Ratio:** 1100:1
- **Response Time (ms):** 5ms
- **Colors:** 16.7 M
- **Voltage:** 5V
- **Power Consumption:** 41.14W
- **Signal Interface:** 2 channel LVDS
- **Weight:** R series: 2800(Typ)
  N series: 1700(Typ)
- **Dimensions (W x H x D):** R series: 396(H) x 324 (V) x 20.7 (D) (Typ)
  N series: 396(H) x 324 (V) x 17.8 (D) (Typ)

1.2.2 LED Driver Board

- **Efficiency:** 85%
- **Output Current & Voltage:** 800 mA / 19.2 V (Max.)
- **Dimensions (W x H x D):** 80 x 42 x 6.5 mm

1.2.3 Touch Screen (R series)

- **Touch Screen:** 5-Wire Resistive
- **Light Transmission:** 80 ± 3%
- **Durability:** 10 million times

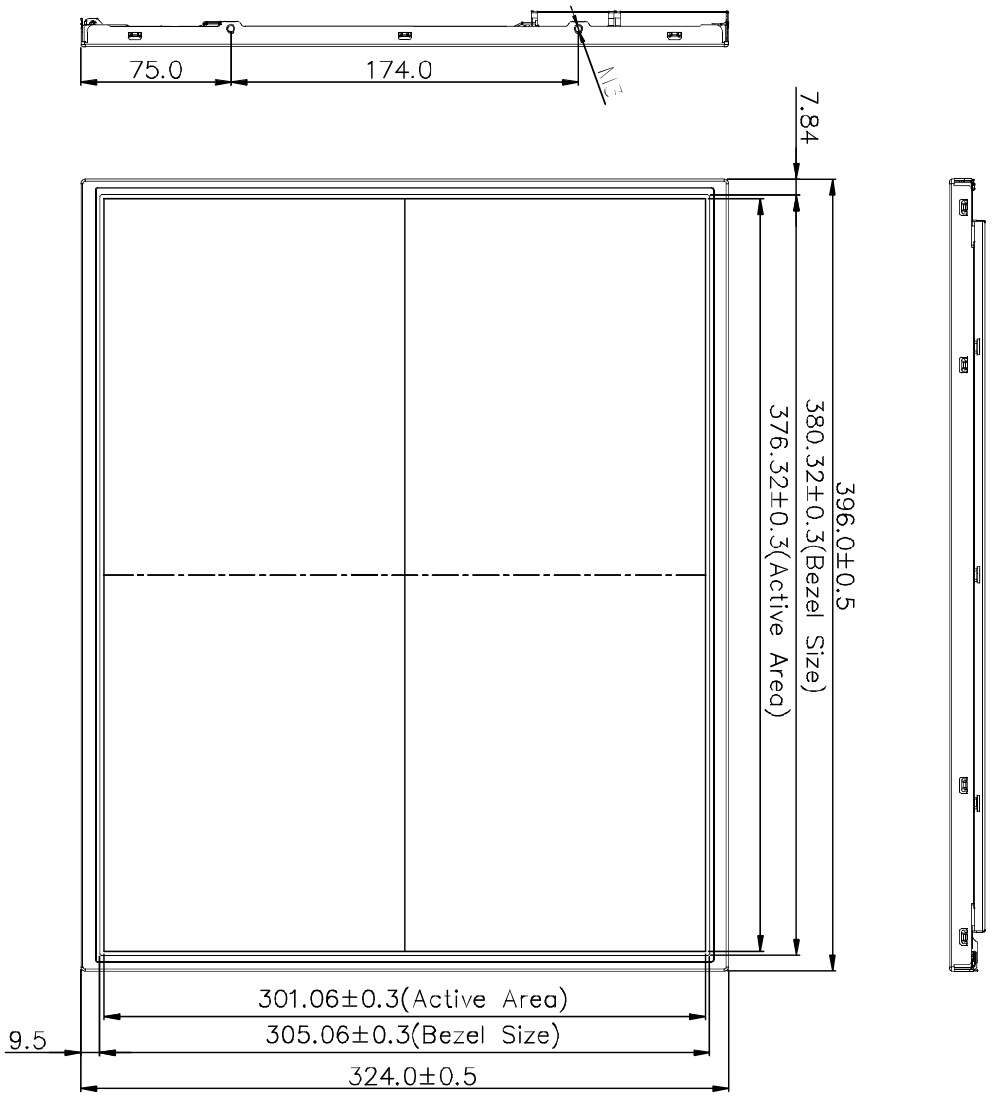
1.2.4 Environment

- **Operating Temperature:** 0 ~ 50°C
- **Storage Temperature:** -20 ~ 60° C
- **Humidity:** 8 ~ 90% @ 25° C, non-condensing

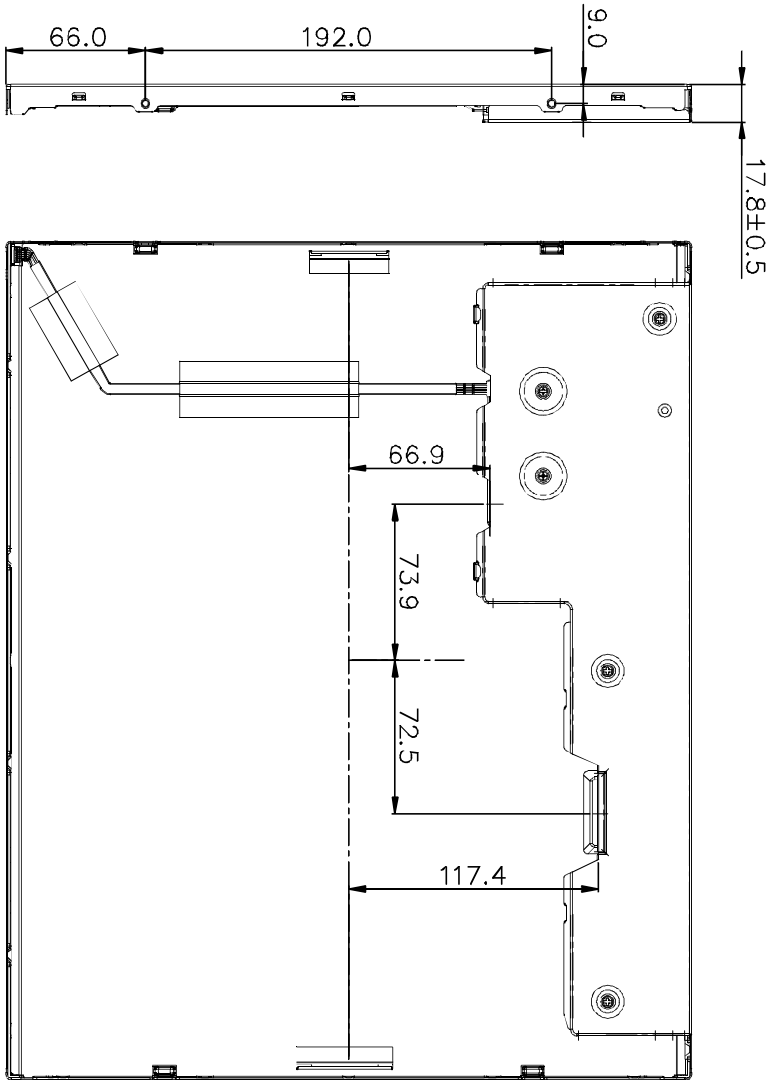
1.3 Mechanical Characteristics

1.3.1 IDK-2119N-K2SXA2E

Front View

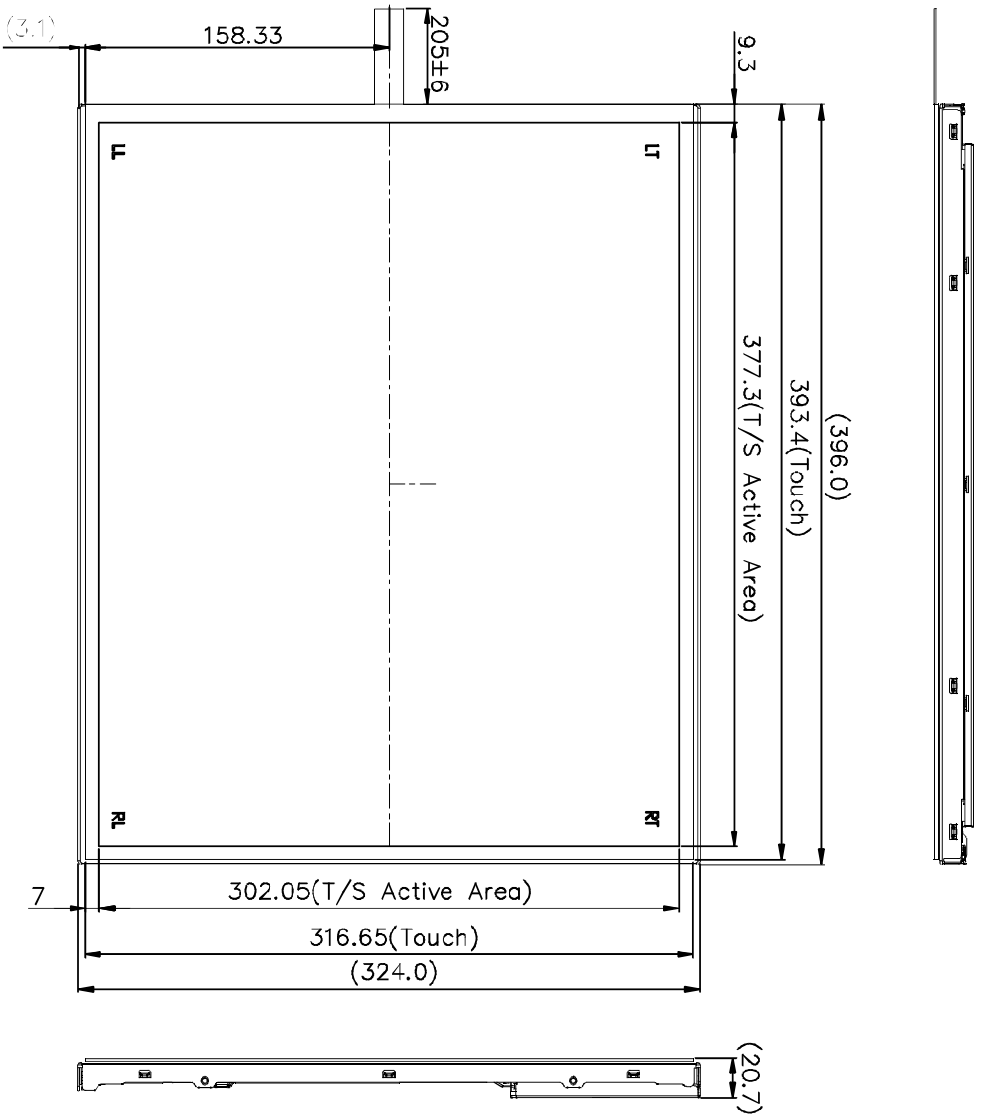


Rear View

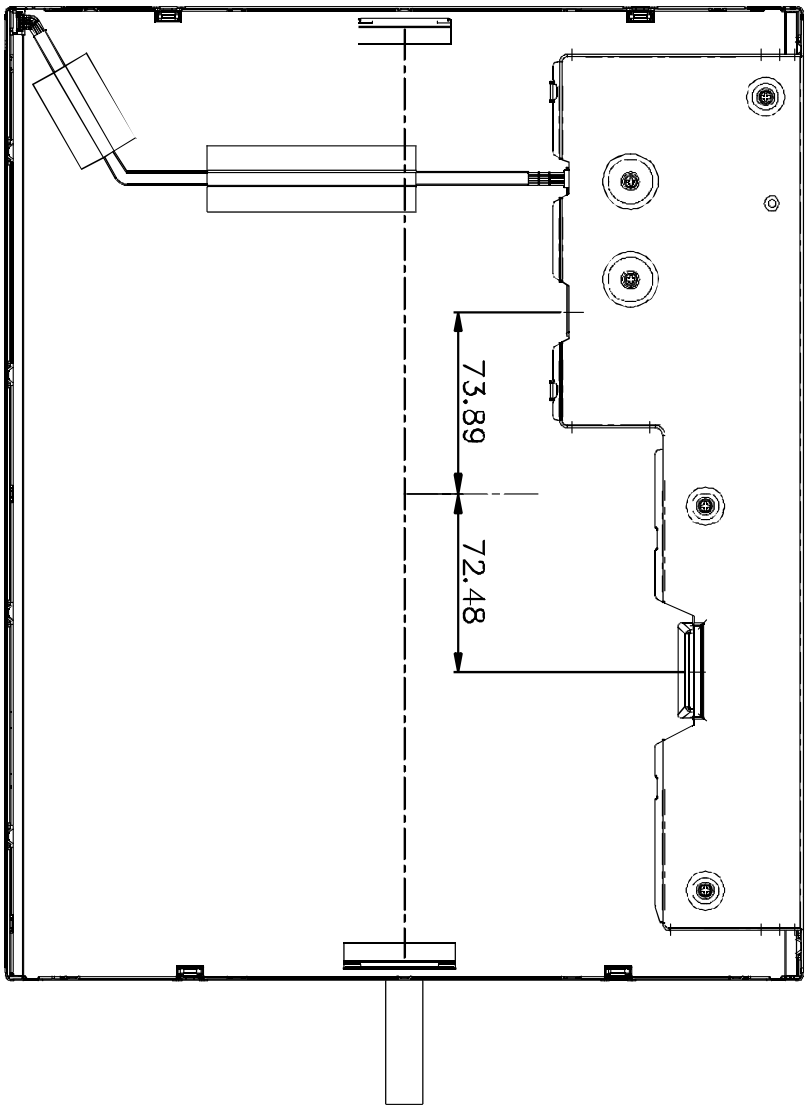


1.3.2 IDK-2119R-K2SXA2E

Front View



Rear View



1.4 Functional Block Diagram

The following diagram shows the functional block of the 19-inch color TFT-LCD module:

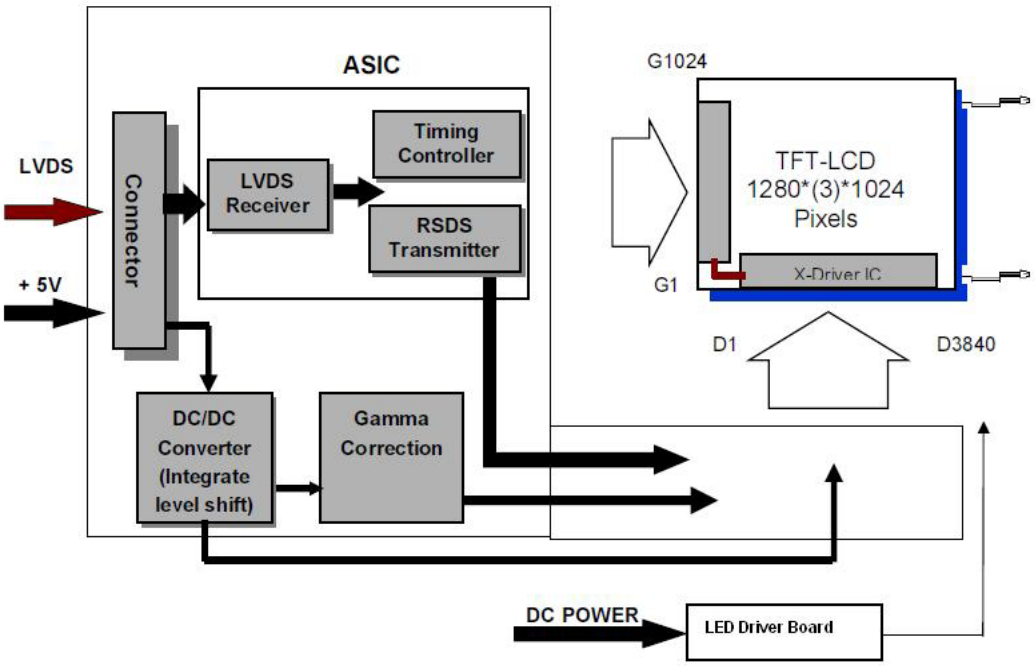


Figure 1.1 Function block diagram

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 allowable ratings for this module are as follows:

1.6.1 Absolute Ratings for TFT LCD Module

Item	Symbol	Min.	Max.	Unit	Conditions
Logic/LCD Drive Voltage	Vin	0.5	+5.5	[Volt]	Note 1, 2

1.6.2 Absolute Ratings for Backlight Unit

Item	Symbol	Min.	Max.	Unit	Conditions
LED Light Bar Current	ILed	-	800*2	[mA]	Note 1, 2

1.6.3 Absolute Environmental Ratings

Item	Symbol	Min.	Max.	Unit	Conditions
Operating Temperature	TOP	0	+50	[oC]	
Operation Humidity	HOP	8	90	[%RH]	
Storage Temperature	TST	-20	+60	[oC]	
Storage Humidity	HST	8	90	[%RH]	

Note1: Ta must not exceed 25°C

Note2: Permanent damage to the device may occur if maximum values are exceeded.

Chapter 2

Electrical Characteristics

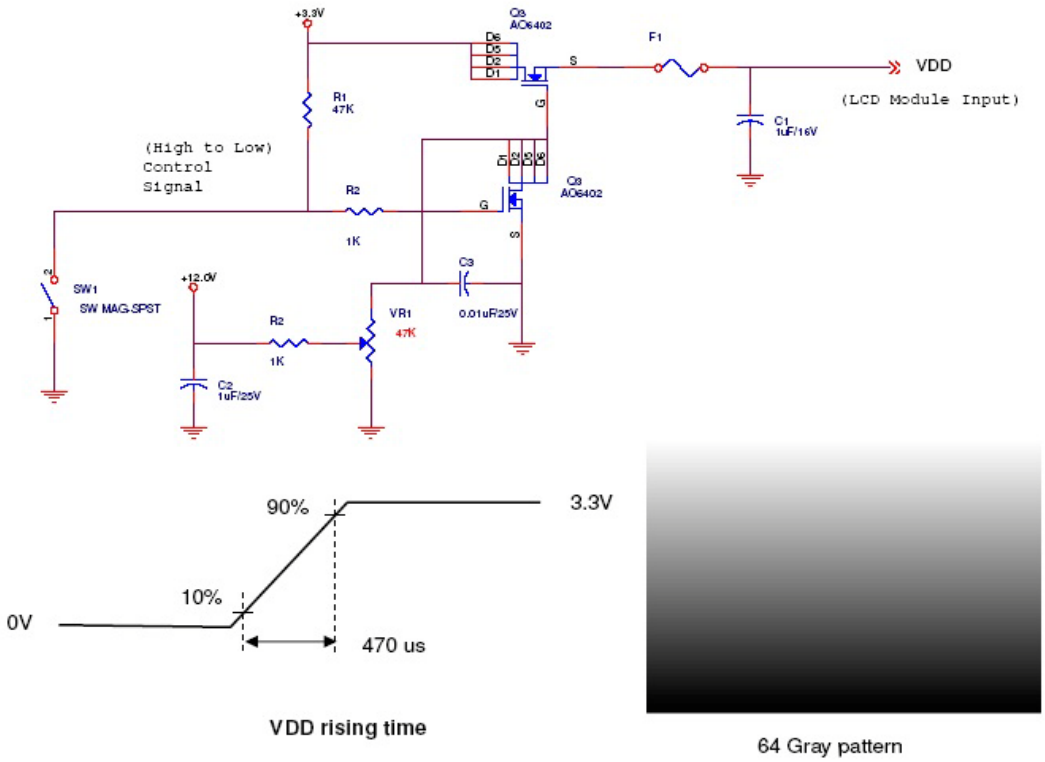
2.1 Power Specification

Input power specifications are as follows:

Table 2.1: Power specification

Symbol	Parameter	Min.	Typ.	Max.	Unit	Condition
VCC	Logic/LCD Drive Voltage	4.5	5.0	5.5	[Volt]	±10%
IDD	Input Current	-	0.94	1.1	[A]	Vin= 5.0V,All white pattern, At 60Hz
PCC	VCC Power	-	4.7	5.5	[Watt]	Vin= 5.0V,All white pattern, At 60Hz
IRush	Inrush Current	-	2.1	2.5	[A]	Note 2
VCCrp	Allowable Logic/ LCD Drive Ripple Voltage	-	-	300	[mV] p-p	with panel loading

Note1 Measurement condition:



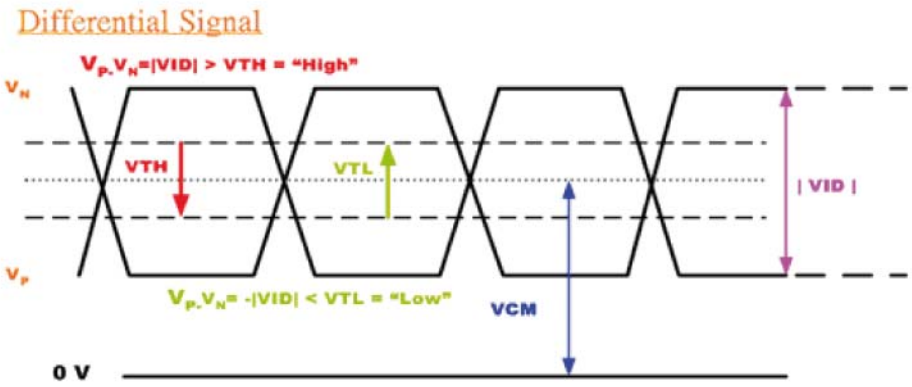
2.1.1 Signal Electrical Characteristics

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	1.0	-	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):

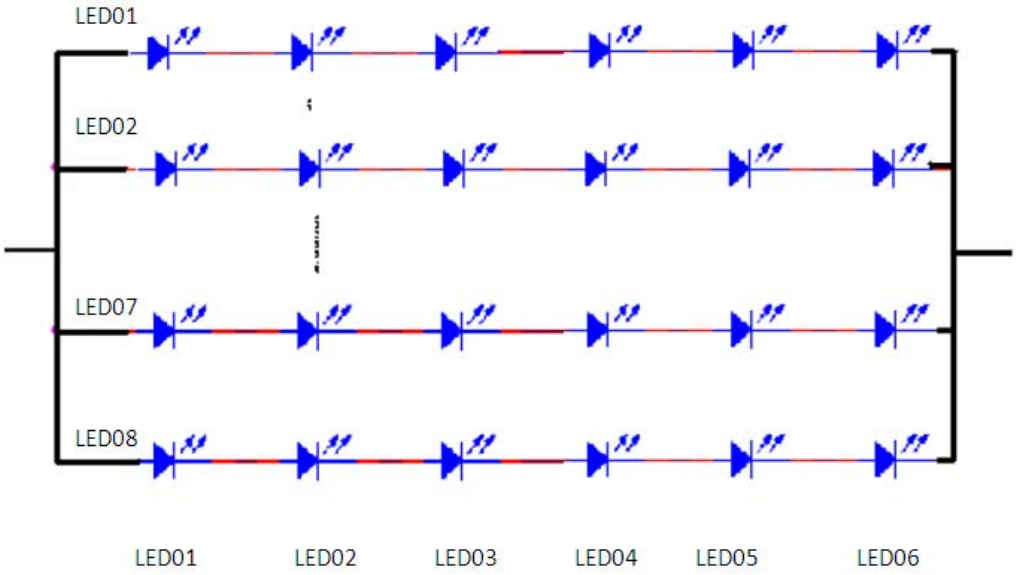
Table 2.3: Backlight driving conditions

Item	Symbol	Values			Unit	Condition
		Min.	Typ.	Max.		
LED Voltage	VL	-		19.2	V	Note 2,3
LED Current	IL	-		800*2	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 800 mA.

Note2 The LED driving condition is defined for each LED module.(6 LED Serial).

Note3 The variance of LED Light Bar power consumption is 10%. Calculator value for reference (IL x VL x 2 = PLED)

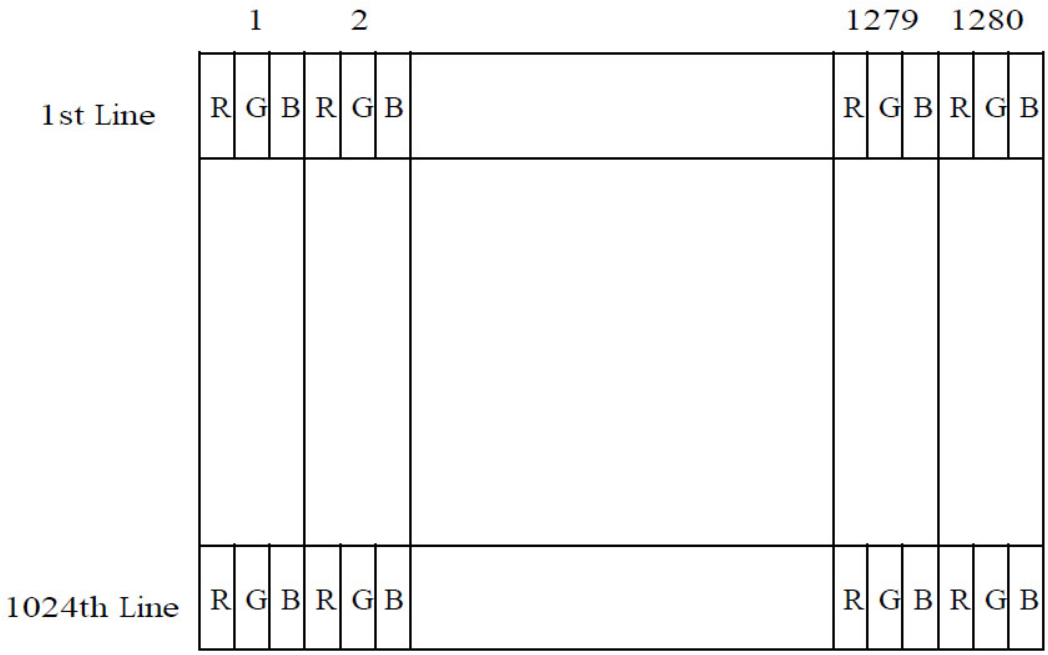

LED01
LED02
LED07
LED08
LED01
LED02
LED03
LED04
LED05
LED06

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

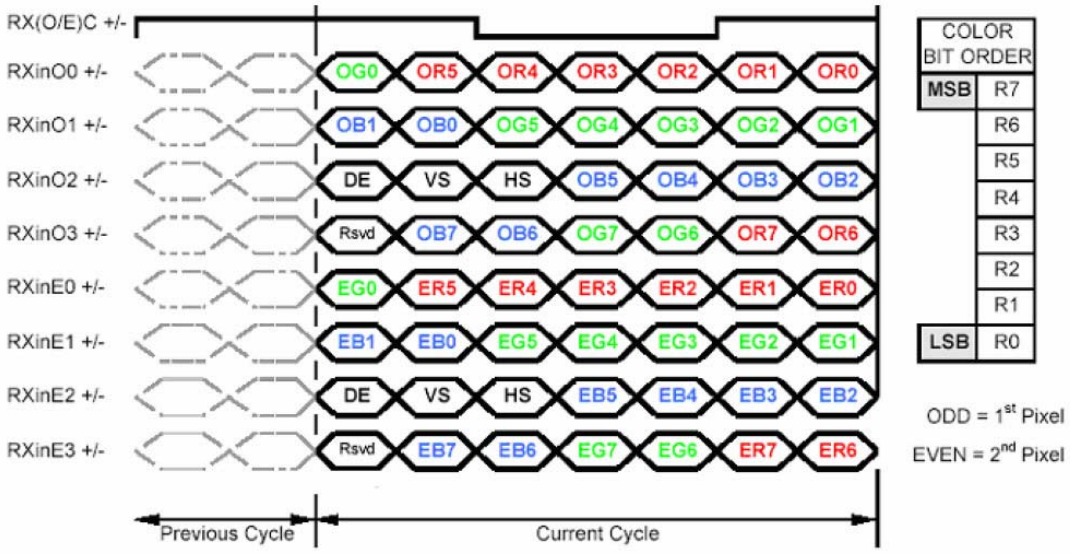
The module uses a pair of LVDS receiver SN75LVDS82 (Texas Instruments) or compatible. LVDS is a differential signal technology for LCD interface and high speed data transfer device. Transmitter shall be SN75LVDS83 (negative edge sampling) or compatible. The first LVDS port (RxOxxx) transmits odd pixels while the second LVDS port (RxExxx) transmits even pixels.

Table 3.1: Pin Description

Pin No.	Symbol	Description
1	RxO0-	Negative LVDS differential data input (Odd data)
2	RxO0+	Positive LVDS differential data input (Odd data)
3	RxO1-	Negative LVDS differential data input (Odd data)
4	RxO1+	Positive LVDS differential data input (Odd data)
5	RxO2-	Negative LVDS differential data input (Odd data, H-Sync,V-Sync,DSPTMG)
6	RxO2+	Positive LVDS differential data input (Odd data, H-Sync,V-Sync,DSPTMG)
7	VSS	Power Ground
8	RxOC-	Negative LVDS differential clock input (Odd clock)
9	RxOC+	Positive LVDS differential clock input (Odd clock)
10	RxO3-	Negative LVDS differential data input (Odd data)
11	RxO3+	Positive LVDS differential data input (Odd data)
12	RxE0-	Negative LVDS differential data input (Even data)
13	RxE0+	Positive LVDS differential data input (Even data)
14	VSS	Power Ground

Table 3.1: Pin Description		
15	RxE1-	Negative LVDS differential data input (Even data)
16	RxE1+	Positive LVDS differential data input (Even data)
17	VSS	Power Ground
18	RxE2-	Negative LVDS differential data input (Even data)
19	RxE2+	Positive LVDS differential data input (Even data)
20	RxEC-	Negative LVDS differential clock input (Even clock)
21	RxEC+	Positive LVDS differential clock input (Even clock)
22	RxE3-	Negative LVDS differential data input (Even data)
23	RxE3+	Positive LVDS differential data input (Even data)
24	VSS	Power Ground
25	VSS	Power Ground
26	NC	No contact
27	VSS	Power Ground
28	VCC	+5.0V Power Supply
29	VCC	+5.0V Power Supply
30	VCC	+5.0V Power Supply

3.3 The Input Data Format



Signal Name	Description	Remark
R7	Red Data 7	Red-pixel Data, For 8 bits LVDS input, MSB: R5; LSB:R0
R6	Red Data 6	
R5	Red Data 5	
R4	Red Data 4	
R3	Red Data 3	
R2	Red Data 2	
R1	Red Data 1	
R0	Red Data 0	
G7	Green Data 7	Green-pixel Data, For 8 bits LVDS input, MSB: G7; LSB:G0
G6	Green Data 6	
G5	Green Data 5	
G4	Green Data 4	
G3	Green Data 3	
G2	Green Data 2	
G1	Green Data 1	
G0	Green Data 0	
B7	Blue Data 7	Blue-pixel Data, For 8 bits LVDS input, MSB: B7; LSB:B0
B6	Blue Data 6	
B5	Blue Data 5	
B4	Blue Data 4	
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	Horizontal Synchro- nous Signal

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

3.4 Interface Timing

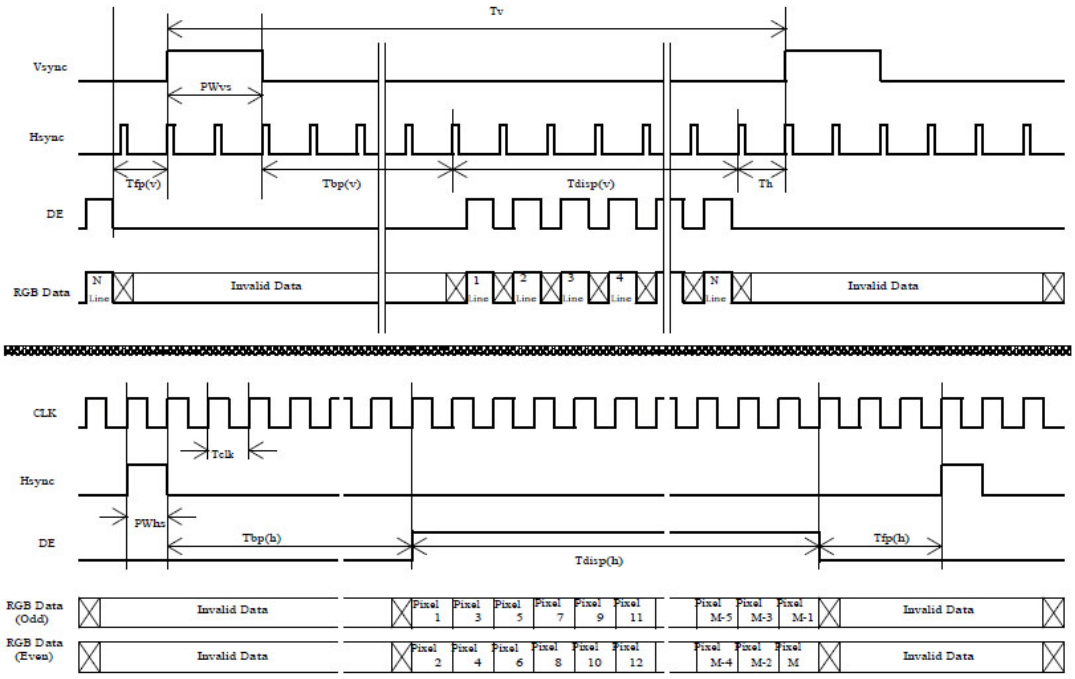
3.4.1 Timing Characteristics

Table 3.2: Timing Characteristics

Signal	Item	Symbol	Min.	Typ.	Max.	Unit
Vertical Section	Period	T_V	1032	1066	1150	T_H
	Active	$Tdisp_{(V)}$	1024	1024	1024	T_H
	Blanking	$Tbp_{(V)}+Tfp_{(V)}+PW_{VS}$	8	42	126	T_H
Horizontal Section	Period	T_H	780	844	2047	T_{Clock}
	Active	$Tdisp_{(H)}$	640	640	640	T_{Clock}
	Blanking	$Tbp_{(H)}+Tfp_{(H)}+PW_{HS}$	140	204	-	T_{Clock}
Clock	Period	T_{Clock}	22.2	18.52	14.81	ns
	Frequency	Freq	45	54	67.5	MHz
Frame Rate	Frequency	$1/T_V$	50	60	75	Hz

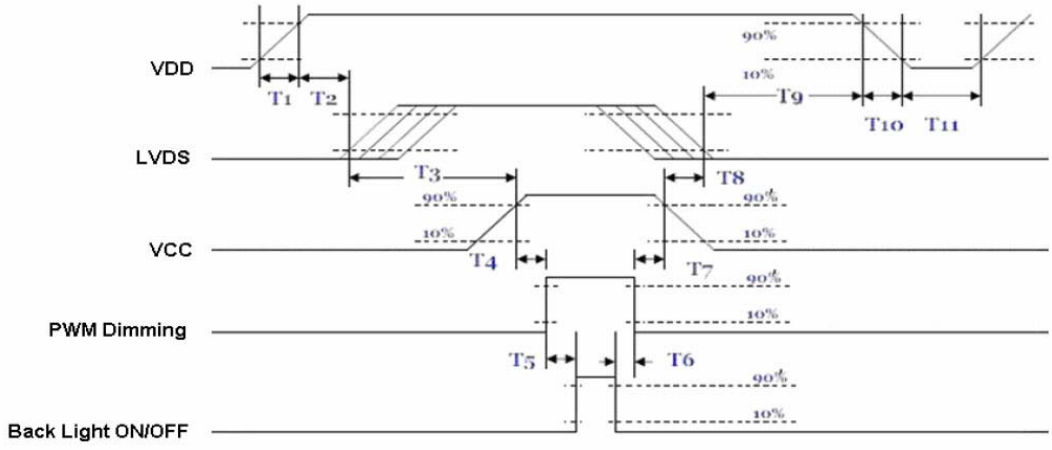
Note DE mode.

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	30	40	50	[ms]
T3	175	-	-	[ms]
T4	10	-	-	[ms]
T5	10	-	-	[ms]
T6	0	-	-	[ms]
T7	10	-	-	[ms]
T8	100	-	-	[ms]
T9	0	16	50	[ms]
T10				[ms]
T11	1000			[ms]

Chapter 4

Connector & Pin Assignment

4.1 TFT LCD Module

Physical interface is described for the connector on the 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	Interface Connector / Interface card
Manufacture	JAE / P-TWO
Type Part Number	FI-XB30SSLA-HF15 / 187034-30091
Mating Housing Part Number	FI-X30HL FI-X30H (Unlocked Type)

4.1.2 Pin Assignment

Table 4.2: Pin Assignment

Pin No.	Signal Name	Pin No.	Signal Name
1	RxOIN0-	2	RxOIN0+
3	RxOIN1-	4	RxOIN1+
5	RxOIN2-	6	RxOIN2+
7	VSS	8	RxOCLKIN-
9	RxOCLKIN+	10	RxOIN3-
11	RxOIN3+	12	RxEIN0-
13	RxEIN0+	14	VSS
15	RxEIN1-	16	RxEIN1+
17	VSS	18	RxEIN2-
19	RxEIN2+	20	RxECLKIN-
21	RxECLKIN+	22	RxEIN3-
23	RxEIN3+	24	VSS
25	VSS	26	NC
27	VSS	28	VCC
29	VCC	30	VCC

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
Manufacturer	STM
Type Part Number	MS24019R
Mating Type Part Number	P24019

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

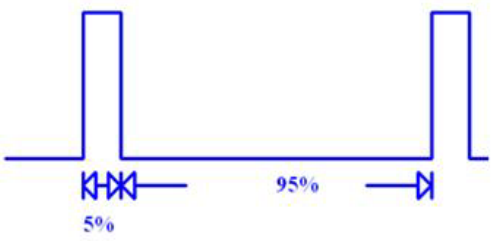
Cable Length : 250mm+/-10mm

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=800mA, Vout=19.2V		85		%
	Power		3		30	W
Output	Voltage			19.2		V
	Current		150		800	mA
	Current Accurancy	150mA≤Iout≤1000 mA		±5	±10	%
	Protection		Thermal/OVP			
Environment	Thermal Shutdown			165		°C
	Operating Junction Temperature				125	°C
	Operating Tempera-ture		-20		+70	°C
	Storage Temperature		-40		+ 85	°C
PWM Dim-mer	Dimmer range(Note. 1)		5		100	V
	Dimmer VH		3		5	V
	Dimmer VL		0		1.5	V
	Dimmer Frequency		0.25	0.5	1	KHz
ON/OFF	Von		3		5.5	V
	off		0		2	V



Note1: When the input ≤ 1KHz, 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)
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 definition**
1	VLED-
2	VLED+

4.2.2.4 Dimension

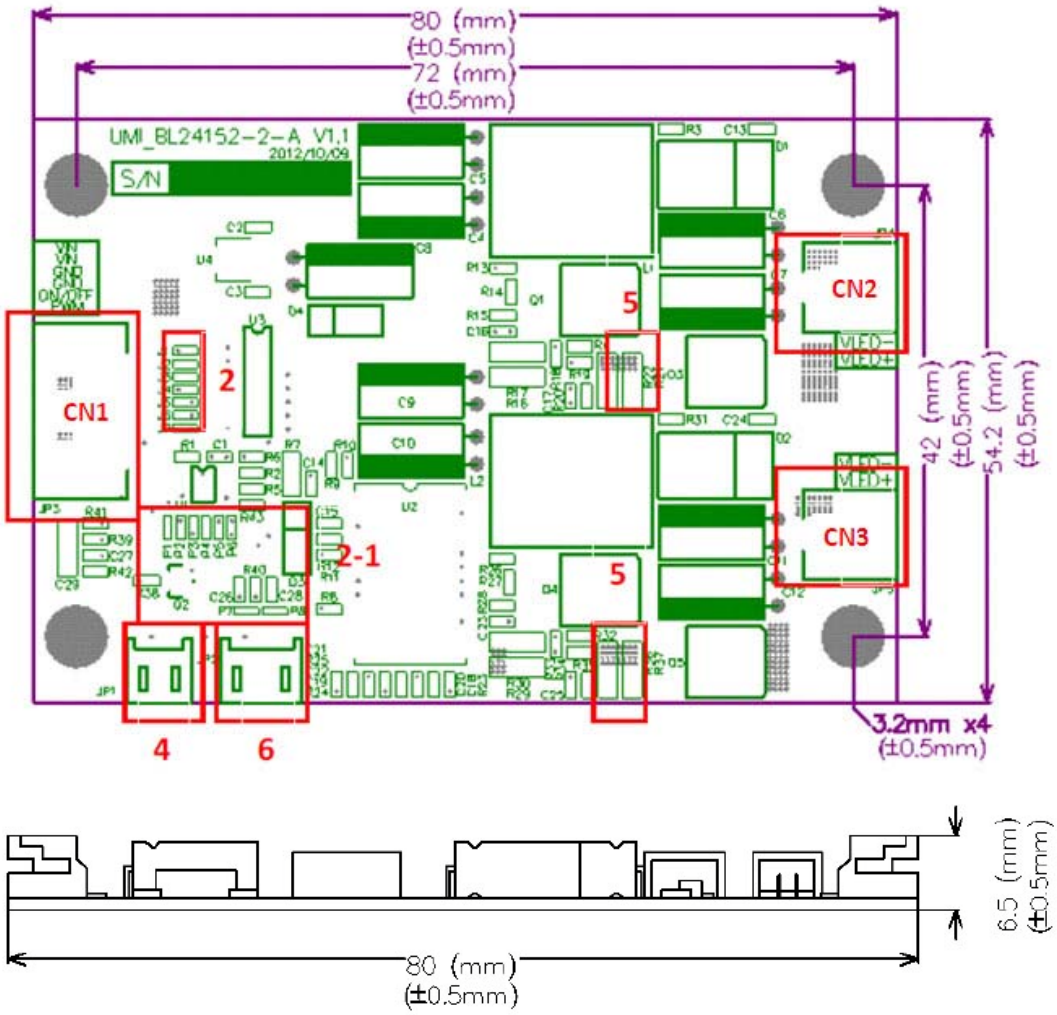


Figure 4.1 Dimension

Chapter 5

Touch Screen & Touch Controller

5.1 Touch Screen (Optional: for IDK-2119R only)

5.1.1 Touch Characteristics

TOUCH PANEL is resistance type that customer uses with flat display like LCD. Once operator touches it, either with round-ended resin PEN or FINGER, the circuit for TOUCH PANEL sends coordinate point to PC from voltage at contact point.

5.1.2 Optical Characteristics

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

5.1.3 Environment Characteristics

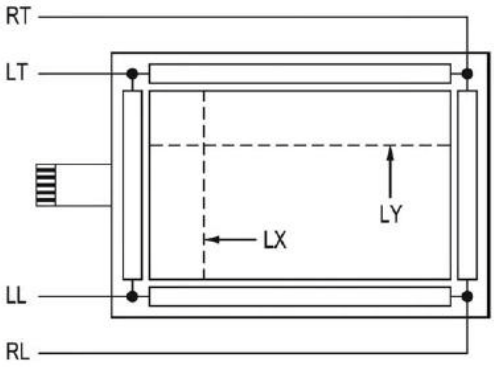
	Item	Specification	Remarks
1	Operation temperature	-20°C ~ 70°C	Note: All terms under 1 atmosphere
2	Storage temperature	-40°C ~ 80°C	
3	Operation Humidity	20% ~ 80%RH	
4	Storage temperature	20% ~ 90%RH	

5.1.4 Mechanical Characteristics

	Item	Specification		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 Finger	0.05N~1.96N (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 ~ 500Ω(Figure as bellow)	FPC connector
		Y axis: 200Ω ~ 800Ω(Figure as bellow)	
3	Linearity	X ≤1.5% (Figure as bellow) Y ≤1.5% (Figure as bellow)	Reference: 250gf
4	Chattering	≤ 15ms Max	
5	Insulation Resistance	≥ 20MΩ min (DC 25V)	

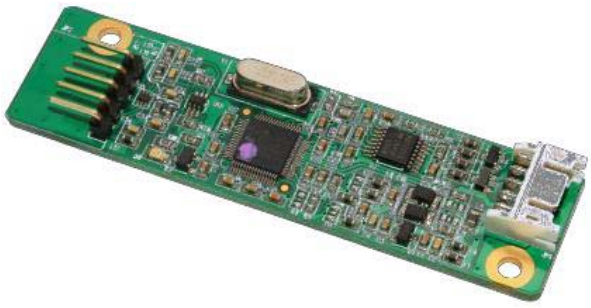


5.1.6 General specification

	Item	Specification
1	Frame size	393.40±0.50 X 316.65±0.50 mm
2	View Area	380.90±0.20 X 305.65±0.20 mm
3	Active Area	377.30±0.20 X 302.05±0.20 mm
4	Total Thickness	3.20±0.20 mm
5	Tail length	305.00±6.00 mm

5.2 Touch controller (Optional: for IDK-2119R only)

Advantech ETM-RES04C Touch Control Board is the ultimate combo board. This touch panel controller provides optimum performance for analog resistive touch panels for 5 wire models. It communicates with PC system directly through USB and RS-232 connector. You can see how superior the design is in sensitivity, accuracy and friendly operation. The touch panel driver emulates mouse left and right button functions and provides the following features:



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 Features

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

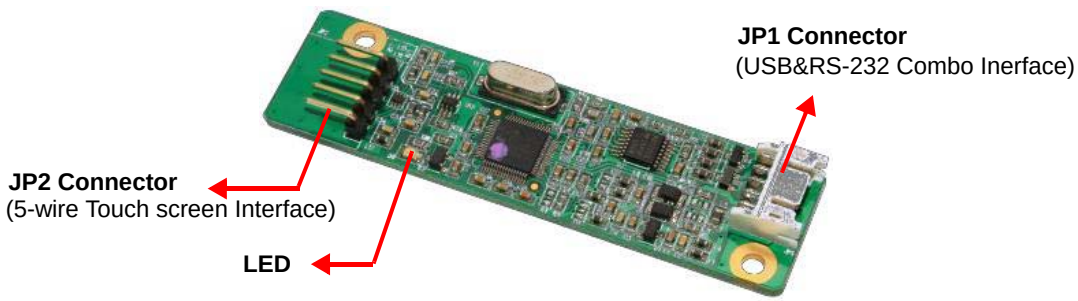
RoHS certificate complete

Requlatory FCC-B, CE approvals complete

Dimensions: 75 mm x 20 mm x 10 mm

5.2.2 Pin Assignment and Description

5.2.2.1 Connector and LED Locations



5.2.2.2 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
1	G	Ground
2	V	USB Power
3	G	Ground
4	D+	USB D+
5	D-	USB D-

RS-232 Pin #	Signal Name	Signal Function
1	G	Ground
2	V	Power
3	G	Ground
4	TxD	Serial Port
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

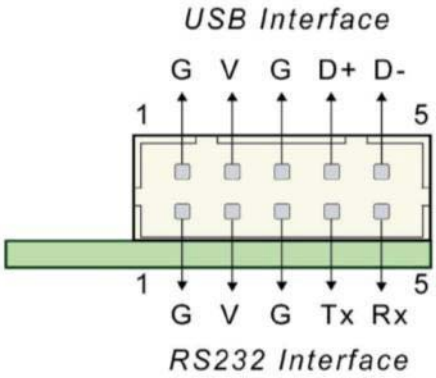
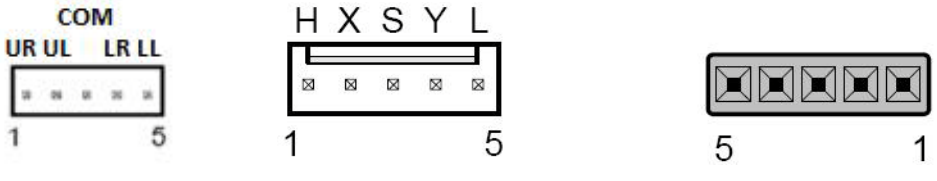


Figure 5.1 Board mounted header

5.2.2.3 Touch Screen Connector, JP2, Pins and signal descriptions

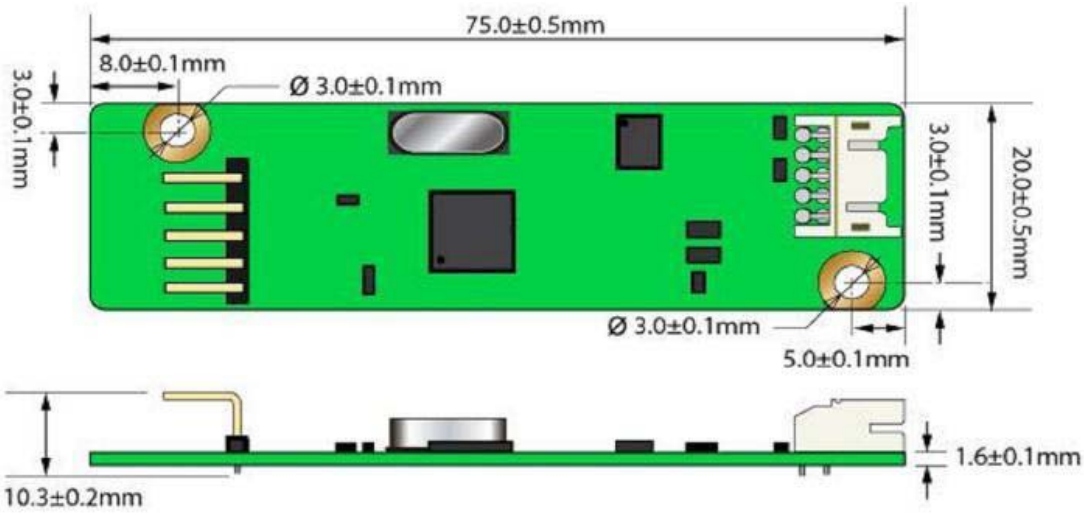
The Touch Screen connector, JP2, is a single row by 2.54mm 5-pins 90 degree, Male type connector. The pins are numbered as shown in the table below.

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 Characterisctics

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

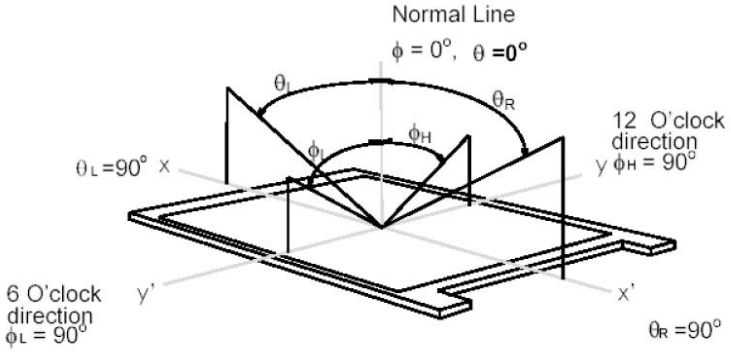
Table A.1: Optical Characteristics

Item	Unit	Conditions	Min.	Typ.	Max.	Note
Viewing Angle	[degree]	Horizontal (Right)	75	85	-	1
		CR = 10 (Left)	75	85	-	
		Vertical (Up)	70	80	-	
		CR = 10 (Down)	70	80	-	
		Horizontal (Right)	75	85	-	
		CR = 5 (Left)	75	85	-	
		Vertical (Up)	70	80	-	
		CR = 5 (Down)	70	80	-	
Luminance Uniformity	[%]	9 Points	80	85	-	2, 3
Optical Response Time	[msec]	Rising	-	3.6	5.7	4, 6
		Falling	-	1.4	2.3	
		Rising + Falling	-	5	8	
Color / Chromaticity Coordinates (CIE)		Red x	0.594	0.644	0.694	4
		Red y	0.292	0.342	0.392	
		Green x	0.273	0.323	0.373	
		Green y	0.571	0.621	0.671	
		Blue x	0.098	0.148	0.198	
		Blue y	0.011	0.061	0.111	
		White x	0.263	0.313	0.363	
		White y	0.279	0.329	0.379	
White Luminance (At LED= 80mA)	[cd/m^2]			1200	-	4
Contrast Ratio			-	1100	-	4
Cross Talk (At 60Hz)	[%]		-	-	1.5	5
Flicker	[dB]		-	-	-20	7

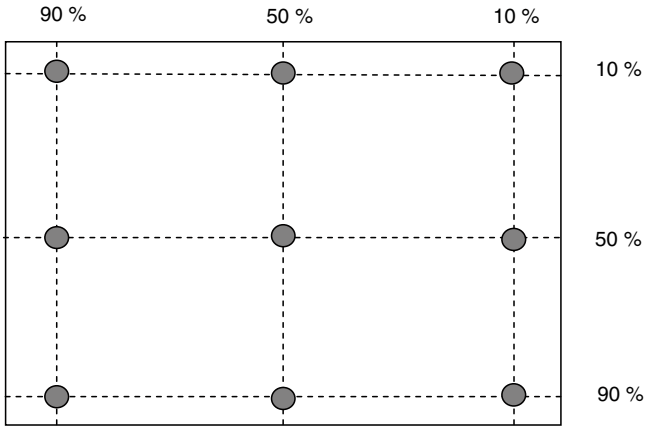
Note Optical Equipment: BM-7, DT-101, or equivalent

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° (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

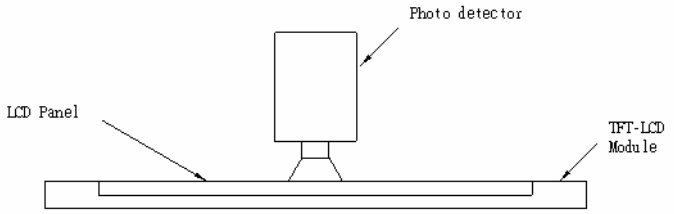


Note3 The luminance uniformity of 9 points is defined by dividing the maximum luminance values by the minimum test point luminance

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

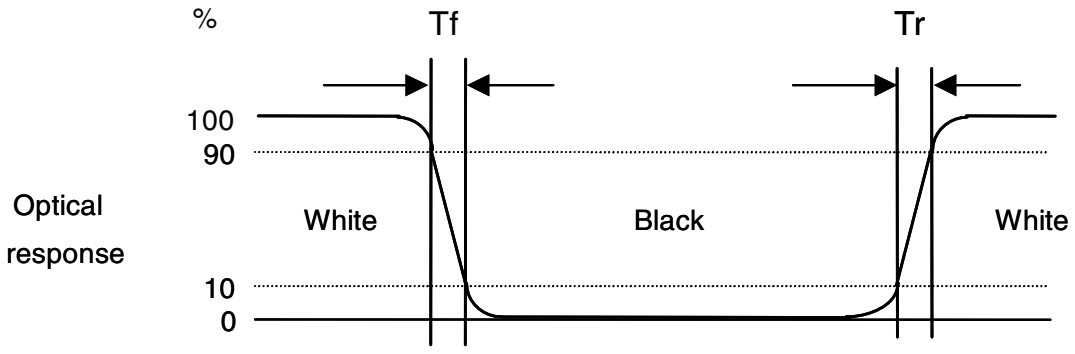
Note4 Measurement method

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 Characterisctics

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

1. Since front polarizer is easily damaged, be careful not to scratch it.
2. Be sure to turn off power supply when inserting or disconnecting from input connector.
3. Wipe off water droplets 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 if it collides with a hard object.
6. Since CMOS LSI is used in this module, take care of static electricity and insure human earthing 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 direction.
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 at the far ends of the LED light bar reflector edge lightly. Otherwise the TFT Module may be damaged.
10. When inserting or removing 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 momentarily. When designing the enclosure, it should be taken into consideration that no bending/twisting forces are applied to the TFT Module, otherwise the TFT Module may be damaged.
12. A small amount of material having no flammability grade is used in the LCD module. The LCD module should be supplied by power complying with requirements of Limited Power Source (IEC60950 or UL1950), or an exemption applied for.

ADVANTECH

Enabling an Intelligent Planet

www.advantech.com

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

All product specifications are subject to change without notice.