User Manual

IDK-1105 Series

TFT-LCD 5.7" VGA (LED Backlight)

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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

General Description and Features

This specification applies to the 5.7" inch color TFT LCD module IDK-1105R.

IDK-1105R is designed to operate in a wide range of operating temperatures and has long life LED backlights that are well-suited to display units for industrial applications.

An LED driving board for backlight unit is included in this panel and the structure of the LED unit is replaceable.

IDK-1105R has a built-in, 4-wire resistive touchscreen, timing controller and LVDS interface.

The screen format is intended to support the VGA 640(H) x 480(V) screen and 262k colors (RGB 6-bits). IDK-1105 is a RoHS 2.0 compliant product.

1.1 Display Characteristics

1.1.1 IDK-1105R-50VGA1E

The following table items are display characteristics under 25°C conditions.

Items	Unit	Specifications
Active Area (H x V)	[mm]	116.2 x 87.3
Pixels (H x V)		640x3(RGB) x 480
Pixel Pitch (H x V)	[mm]	0.18 x 0.18
Pixel Arrangement		R.G.B. Vertical Stripe
Display Mode		TN, Normally White
Nominal Input Voltage VDD	[Volt]	3.3 typ (Min.:3.0 ; Max.:3.6)
Typical Power Consumption	[Watt]	1.8 typ.
Weight	[Grams]	230 ± 10
Physical Size (W x H x D)	[mm]	127.0 x 99.30 x 9.26
Electrical Interface		1 channel LVDS
Surface Treatment		Anti-glare, Hardness 3H
Color Support		262K(6-bit)
Temperature Range		
Operating	[°C]	-20 ~ 70
Storage (Non-Operating)	[°C]	-30 ~ 80
RoHS Compliance		RoHS Compliance 2.0

1.2 Optical Characteristics

Optical characteristics are measured under stable conditions at 25°C (room temperature):

1.2.1 IDK-1105R-50VGA1E

Item	Unit	Conditions	Min.	Typ.	Max.	Note
White Luminance	[cd/m2]		400	500	-	1,4
Uniformity	%	9 Points	70	75	-	1,4
Contrast Ratio			200	250	-	1,3,4
Response Time	[msec]	Rising + Falling	-	50	-	1,2,4

Viewing Angle	[degree]	Horizontal CR ≥ 10	Point - 5	120	140	-	1,4,6
	[degree]	Vertical CR ≥ 10	Point - 5	80	100	-	
Color/Chromaticity Coordinates (CIE 1931)		Red x		0.566	0.616	0.666	1,4
		Red y		0.302	0.352	0.402	
		Green x		0.308	0.358	0.408	
		Green y		0.518	0.568	0.618	
		Blue x		0.096	0.146	0.196	
		Blue y		0.086	0.136	0.186	
		White x		0.296	0.346	0.396	
		White y		0.328	0.378	0.428	

Note 1: *Measurement conditions: 25°C±2°C, 60±10%RH under 10Lux, in a dark room by BM-7TOPCON), viewing 2°, VCC=3.3V, VDD=3.3V.*
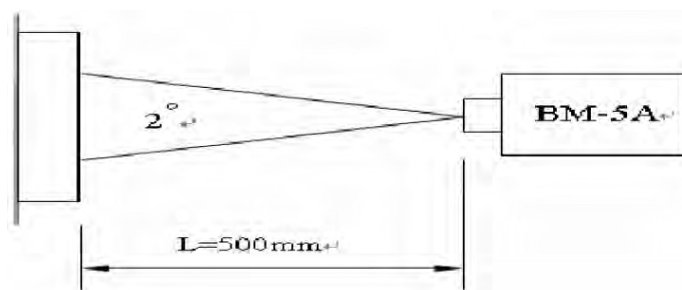
Note 2: *Definition of Response Time (White-Black)*
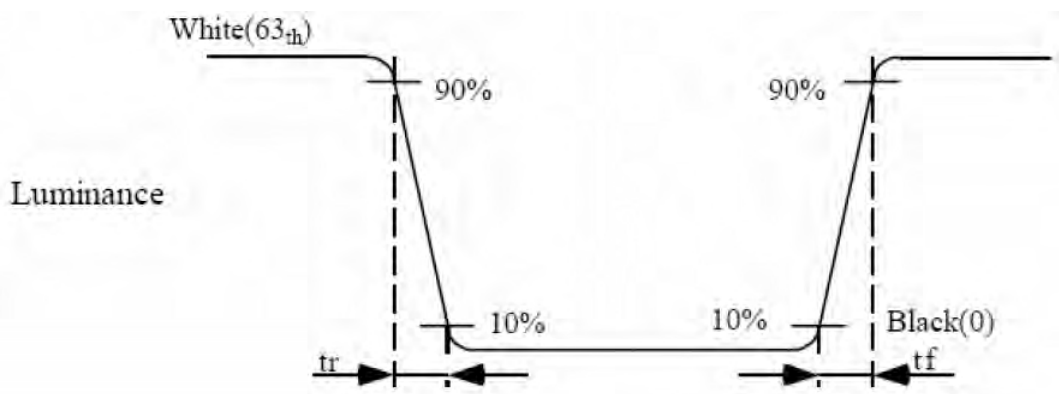
Note 3: *Definition of Contrast Ratio*

Contrast ratio is calculated with the following formula:

Contrast Ratio (CR)=(White) Luminance of ON ÷ (Black) Luminance of OFF

Note 4: *Definition of Luminance*

Measurement of luminance of white state at center point (Point 5)
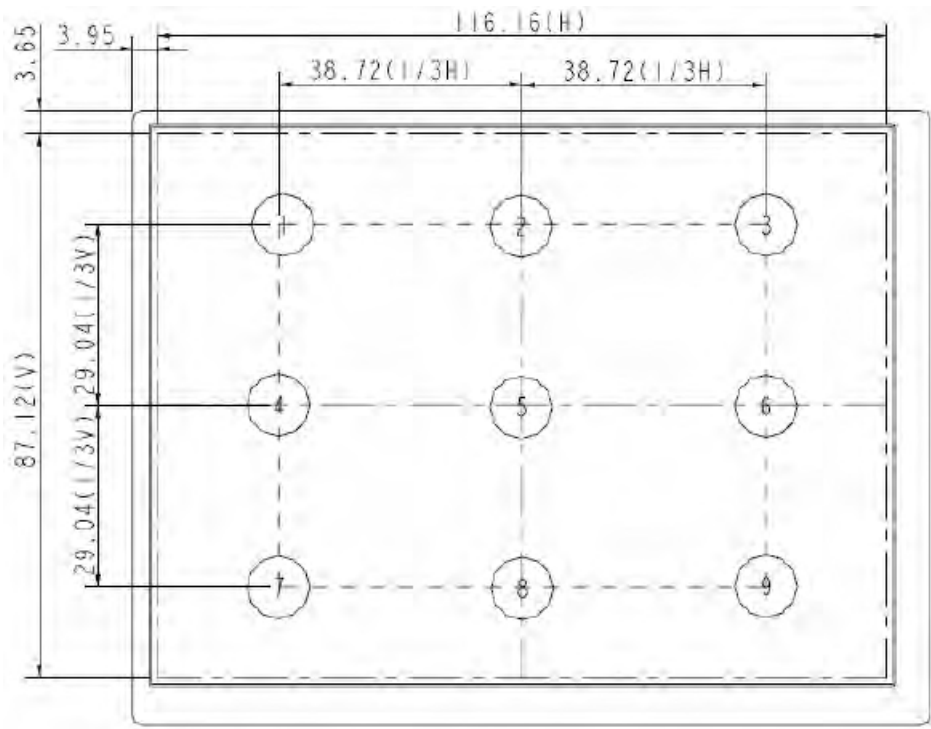
Note 5: *Definition of Luminance Uniformity*

Measure Maximum luminance [L(MAX)] and Minimum luminance [L(MIN)] on 9 points

Luminance Uniformity is calculated with the following formula:

$$\Delta L = [\ L(MIN)\ /\ L\ (MAX)\ ]\ X\ 100\%$$

Note 6: *Definition of Viewing Angle*

1.3 Absolute Maximum Ratings

1.3.1 Absolute Ratings of TFT LCD Module

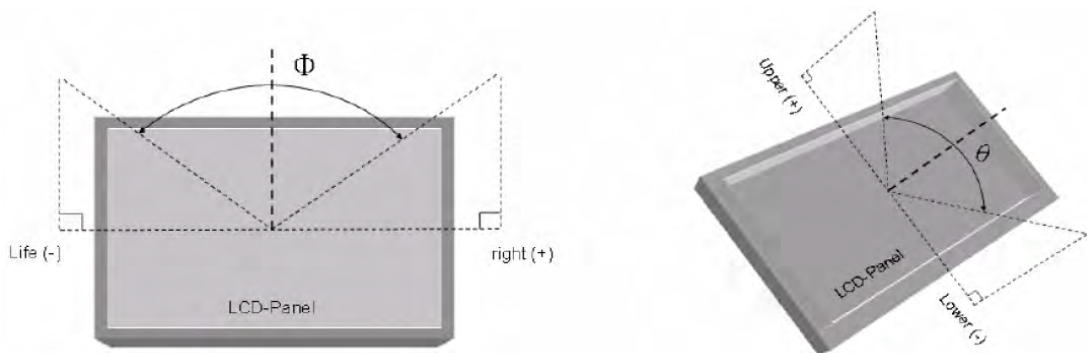| Item	Symbol	Min.	Max.	Unit
LCD Voltage	Vcc	-0.5	+5	[Volt]
LED B/L Voltage	V_{LED}	+4.5	+5.5	[Volt]
Signal Input Voltage	DCLK, DE R0~R5 G0~G5	-0.5	VCC + 0.5	[Volt]

1.3.2 Absolute Ratings of Environment

Item	Symbol	Min.	Max.	Unit
Operating Temperature	T_{OP}	-20	+70	[°C]
Operation Humidity	H_{OP}	5	90	[%RH]
Storage Temperature	T_{ST}	-30	+80	[°C]

Note: After 24 hour room temperature and test.

1.4 Outline Dimensions

1.4.1 Front View

[Unit: mm]

1.4.2 Rear View

[Unit: mm]
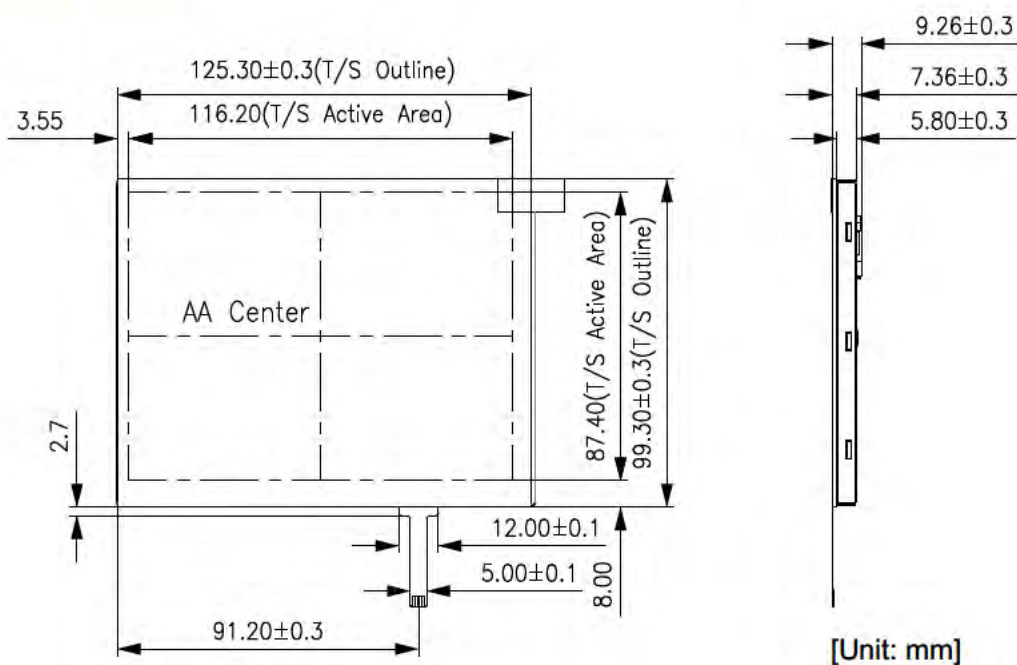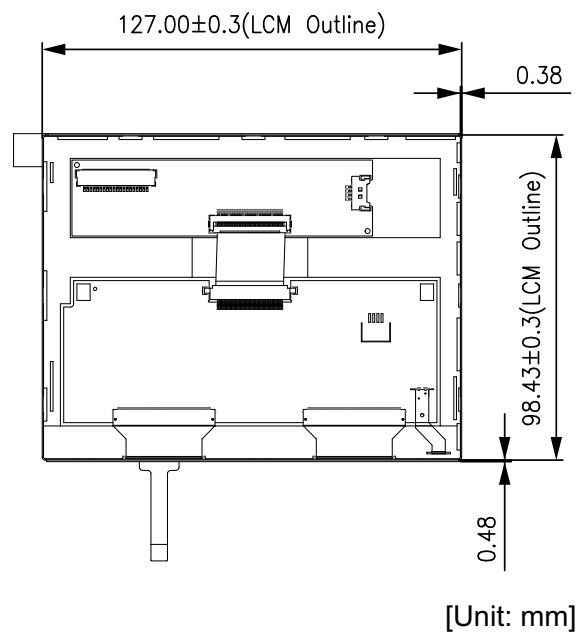
Chapter 2

Electrical Characteristics

2.1 TFT LCD Module

2.1.1 Power Specifications

Table 2.1: Power Specifications						
Item	**Symbol**	**Values**			**Unit**	**Remarks**
		Min.	**Typ.**	**Max.**		
Power Voltage For LCD	Vcc	3.0	3.3	3.6	V	
Power Voltage For Backlight LED	V_{LED}	4.5	5.0	5.5	V	V_{LED} = 5V
LCD Power Current	I_{CC}	-	106	-	mA	Note 1
LED Backlight Power Current	I_{LED}	-	290	-	mA	
Logic Input Voltage — Input Voltage	V_{IN}	-0.5	-	V_{CC}+0.5	V	
Logic Input Voltage — Logic Input High Voltage	V_{INH}	$0.7V_{CC}$	-	V_{CC}	V	LVDS
Logic Input Voltage — Logic Input Low Voltage	V_{INL}	GND	-	$0.3V_{CC}$	V	LVDS

Note 1: Typical: Under 64 gray pattern.
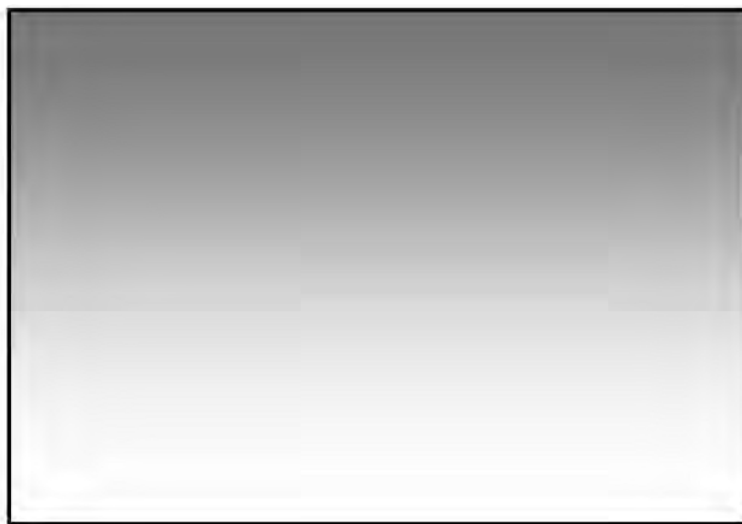
2.1.2 Signal Electrical Characteristics

Table 2.2: Signal Electrical Characteristics						
Item	**Symbol**	**Values**			**Unit**	**Note**
		Min.	**Typ.**	**Max.**		
Differential Input High Threshold Voltage	RxVTH	-	-	+0.1	V	RXVCM=1.2V
Differential Input Low Threshold Voltage	RxVTH	-0.1	-	-	V	
Input Voltage Range (Single-end)	RxVIN	0	-	2.4	V	
Differential Input Common Mode Voltage	RxVCM	$|VID|/2$	-	$2.4-|VID|/2$	V	
Differential Voltage	$|VID|$	0.2	-	0.6	V	

Table 2.2: Signal Electrical Characteristics					
Differential Input Leakage Current	RVxliz	-10	-	+10	uA
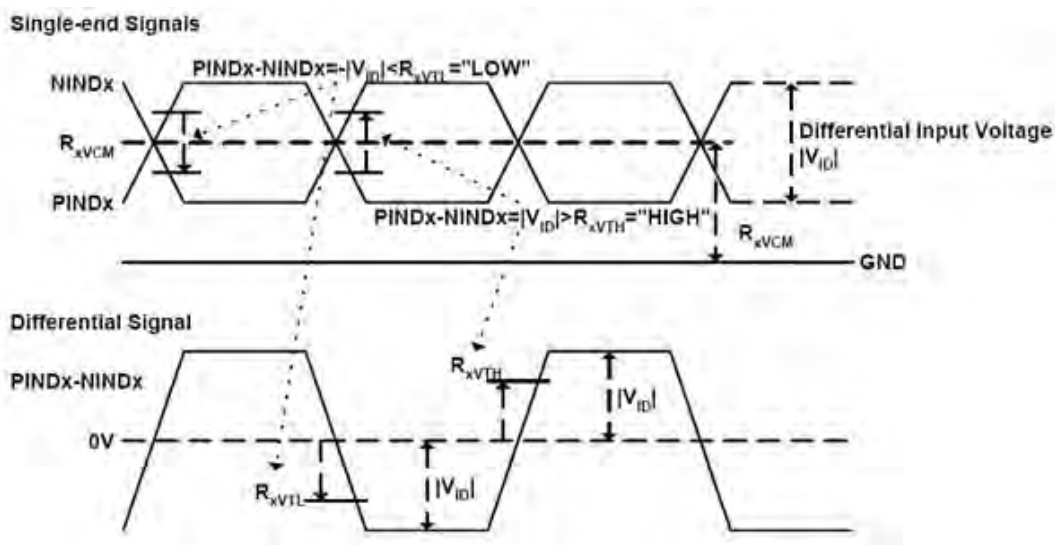
2.2 Backlight Unit

2.2.1 Parameter Guidelines for LED backlight

Following characteristics are measured under a stable condition using an inverter at 25°C (Room Temperature):

Table 2.3: For IDK-1105						
Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
LED Driver Power Voltage	V_{LED}	4.5	5	5.5	V	
LED Driver Current Consumption	I_{LED}	-	290	-	mA	
ADJ (Dimming) Input Voltage	V_{ADJH}	3	-	5	V	
	V_{ADJL}	GND	-	0.3	V	duty=100% Note2
LED life time	-	-	50,000	-	Hr	Note1

Note 1: *Operating life means brightness goes down to 50% initial brightness. Minimum operating life time is estimated data.*

Note 2: *V_{ADJ} is PWM signal input. It is for brightness control.*

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Chapter 3

Signal Characteristics

3.1 Signal Description

LVDS is a differential signal technology for LCD interface and high speed data transfer device. The connector pin definition is as below.

Note: "Low" stands for 0V. "High" stands for 3.3V. "NC" stands for "Not Connected."

3.1.1 Signal Description

J2 LVDS connector: CSTAR CP100-S20G-H16

Table 3.1: Symbol Description			
Pin No.	**Symbol**	**Description**	**Note**
1	VCC	Power Voltage for Logic: 3.3V	
2	VCC	Power Voltage for Logic: 3.3V	
3	GND	Ground	
4	GND	Ground	
5	IN0-	- LVDS differential data input 1	
6	IN0+	+ LVDS differential data input 1	
7	GND	Ground	
8	IN1-	- LVDS differential data input 2	
9	IN1+	+ LVDS differential data input 2	
10	GND	Ground	
11	IN2-	- LVDS differential data input	
12	IN2+	+ LVDS differential data input	
13	GND	Ground	
14	CLK-	-Sampling Clock	
15	CLK+	+Sampling Clock	
16	GND	Ground	
17	NC	No Connect	
18	NC	No Connect	
19	GND	Ground	
20	GND	Ground	

J3 LED connector: ENTERY 3808K-F05N-03L (Mating connector: ENTERY H2808K-P04N-02B)

Pin No.	Symbol	Description	Note
1	V_{LED}	Power Voltage for Backlight: 5V	
2	GND	Power Ground	
3	LED_ON/OFF	Backlight ON/OFF, "H" LED ON, "L" LED OFF.	
4	PWM	PWM input for LED brightness adjustment	

ITEM	SYMBOL	MIN	TYP	MAX	UNIT
ADJ (Dimming) signal frequency	fPWM	0.1	--	200	KHz
ADJ signal logic level High	V_{ADJL}	3	--	5	V
ADJ signal logic level Low	V_{ADJL}	GND	--	0.3	V

Note:

1. PWM adjusts brightness to control Pin, Pulse duty the bigger the brighter.
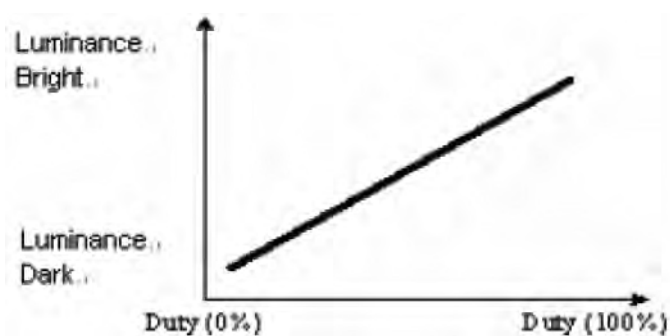
2. PWM signal = 0 ~ 5.0V, operation frequency: 100Hz~200 KHz
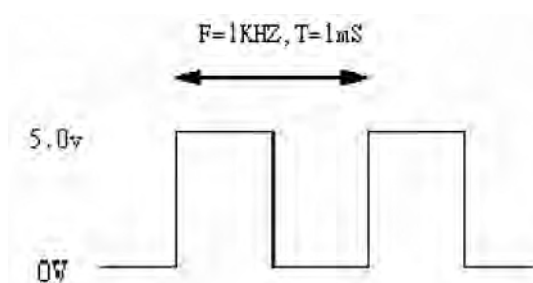
3.2 Interface Timing

3.2.1 Timing Characteristics

DE mode only

Table 3.2: Timing Characteristics					
Parameter	**Symbol**	**Values**			**Unit**
		Min.	**Typ.**	**Max.**	
Clock frequency	F_{CLK}	22.66	25.175	27.69	MHz
Clock period time	T_{CLOCK}	36.11	39.7	44.13	ns
Input data skew margin	T_{RSKM}	550	700	-	ps
Clock duty	T_{CWH}	40	50	60	%
Horizontal active time	T_{HD}	-	640	-	T_{CLOCK}
HS period time	T_H	750	800	850	T_{CLOCK}
HS pulse width	T_{WH}	5	30	-	T_{CLOCK}
HS blanking	T_{HB}	112	144	175	T_{CLOCK}
Vertical active time	T_{VD}	-	480	-	T_H
VS period time	T_V	515	525	535	T_H
VS pulse width	T_{WV}	1	3	5	T_H
VS blanking	T_{VB}	-	35	-	T_H

*Note: When SYNC mode is used, 1st data starts from 144th CLK after HS falls (when STHD[5:0]=00000)

3.2.2 Input Timing Diagram
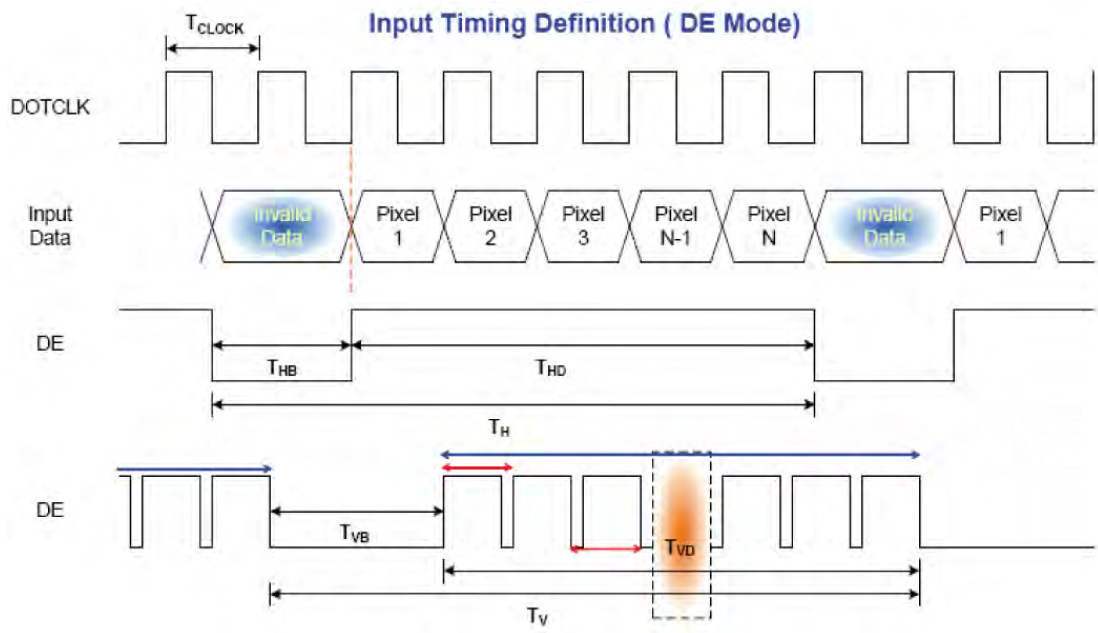
Chapter   4

Touchscreen

4.1 Touch Characteristics

This touch panel is a resistance type that customers use with flat displays like LCDs. Once an operator touches it, the circuit sends coordinate points to the PC from the voltage at contact points.

	Item	Specification	Remarks
1	Operating temperature	-20°C ~ 70°C	
2	Storage temperature	-30°C ~ 80°C	
3	Resistance	Film (Top) side: 300Ω ~ 1000Ω	FPC At connector
		Glass (Bottom) side: 100Ω ~ 800Ω	
4	Linearity	±1.5%max initial value ±3.0%max "after environmental & life test"	
5	Insulation resistance	20MΩ min(DC 25V)	
6	Life time	> 1,000,000 times	

Chapter   5

Touch Controller

5.1 Touch Controller Characteristics

Advantech ETM-RES05C touch control board is the ultimate combo board. This touch panel controller provides optimum performance of your analog resistive touch panels for 4-wire models. It communicates with the 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.

5.2 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 4-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.
- Supports 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

5.3 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

Acquired RoHS certificate
Requlatory FCC-B, CE approvals
Dimension: 75 mm x 20 mm x 10 mm

5.4 Pin Assignment and Description

5.4.1 Connector and LED Location

JP2 Connector
(4-wire Touch
screen interface)
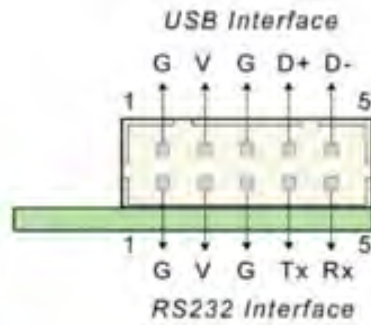
JP1 Connector
(USB&RS-232
Combo Interface)

LED

5.4.2 Combo Interface Connector, JP1, Pins and Signal Descriptions

The combo interface connector: USB and RS-232, is a 2.0 mm 10-pin 90° degree male type with lock connector, intended to be used with single wired pins in a 5+5 pin 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

USB Interface

RS232 Interface
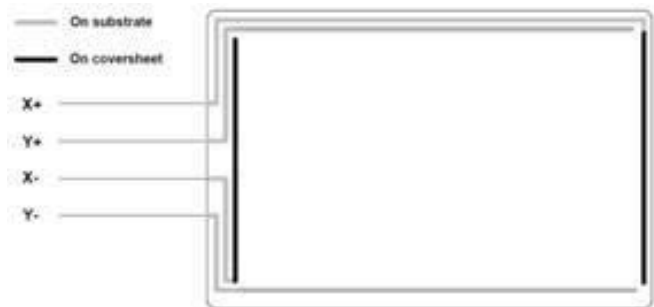
Figure 5.1 Board mounted header

5.4.3 Touchscreen Connector, JP2, Pins and Signal Descriptions

The Touchscreen connector, JP2, is a FFC/FPC SMD 1.0 mm 4-pin 90° degree, female type connector. The pins are numbered as shown in the table below.

TS4 Pin #	Signal Name	Signal Description
1	YB	Bottom
2	XL	Left
3	YT	Top
4	XR	Right

4-Wire Touchscreen ZIF connector   4-Wire Screen viewed from cover sheet side
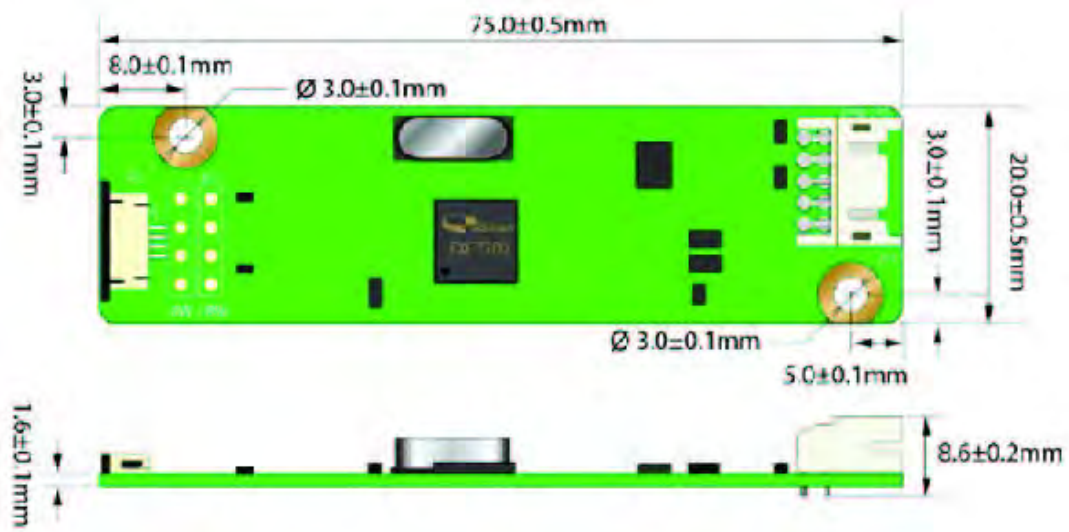
5.4.4 Physical Dimensions

Figure 5.2 Physical Dimensions

Appendix A

Handling Precautions

A.1 Handling Precautions

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 ensure a proper earth ground 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 momentarily. During enclosure design, it should be taken into consideration that no bending/twisting forces be applied to the TFT Module from outside. Otherwise the TFT Module may be damaged.
12. Small amounts of materials having no flammability grade are used in the LCD module. The LCD module should be supplied by power compliant with requirements of Limited Power Source (IEC60950 or UL1950), or be applied for exemption.

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