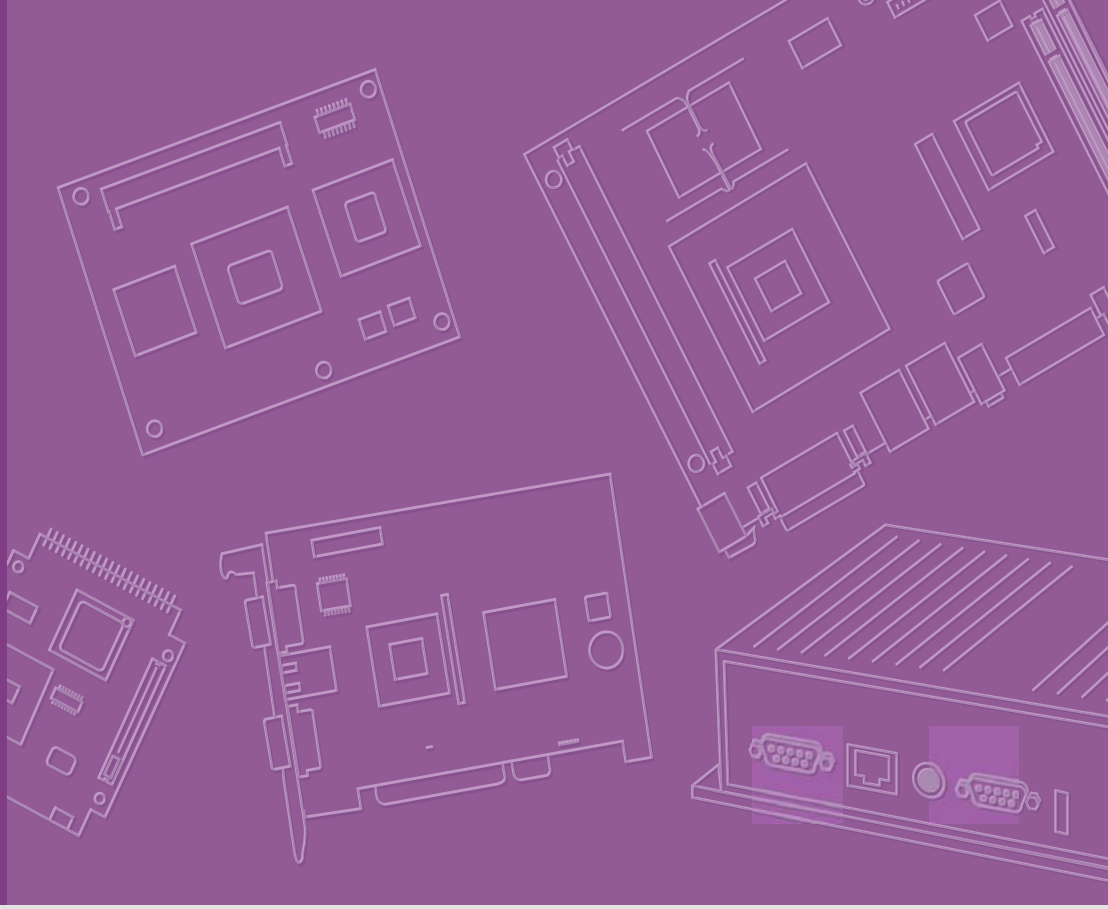

User Manual

IDK-1108R-45SVA1E

TFT-LCD 8.4" SVGA (LED Backlight)

ADVANTECH

Enabling an Intelligent Planet

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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.

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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

This document is for the 8.4 inch color TFT LCD module IDK-1108R-45SVA1E. IDK-1108R-45SVA1E is designed with wide viewing angle; wide operating temperature and long life LED backlight and is suited for display units for Industrial Applications. An LED driving board for backlight unit is included in this panel and the structure of the LED units is replaceable. IDK-1108R-45SVA1E has a built in timing controller and LVDS interface. The screen format is intended to support a 800 x 600 (H x W) SVGA screen and 16.2M (RGB 8-bits) or 262k colors (RGB 6-bits). IDK-1108R-45SVA1E is a RoHS product.

1.2 Display Characteristics

The following items are characteristics summary on the table under 25°C condition.

Items	Unit	Specifications
Screen Diagonal	[inch]	8.4 (213.4mm)
Active Area	[mm]	170.4(H) x 127.8(V)
Pixels H x V		800x3(RGB) x 600
Pixel Pitch	[mm]	0.213x 0.213
Pixel Arrangement		R.G.B. Vertical Stripe
Display Mode		TN, Normally White
Nominal Input Voltage VDD	[Volt]	3.3 (typ)
Typical Power Consumption	[Watt]	2.94 (typ)
Weight	[Grams]	328.5 (typ)
Physical Size	[mm]	203.0(W) x 142.6(H) x 10.3(D) (typ.)
Electrical Interface		1 channel LVDS
Surface Treatment		Anti-glare, Hardness 3H
Support Color		262K(6-bit) / 16.2M(8-bit)
Temperature Range Operating Storage (Non-Operating)	 [°C] [°C]	 -10 to +60 (panel surface temperature) -30 to +70
RoHS Compliance		RoHS Compliance

1.3 Functional Block Diagram

The following diagram shows the functional block of the 12.1 inches Color TFT-LCD Module:

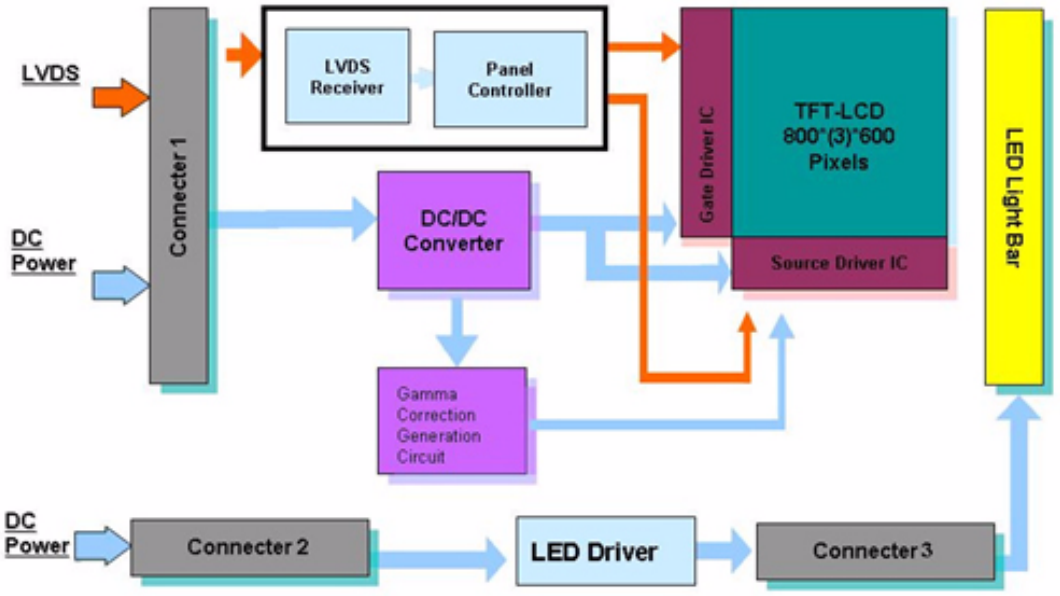


Figure 1.1 Function block diagram

1.4 Absolute Maximum Ratings

1.4.1 Absolute Ratings of TFT LCD Module

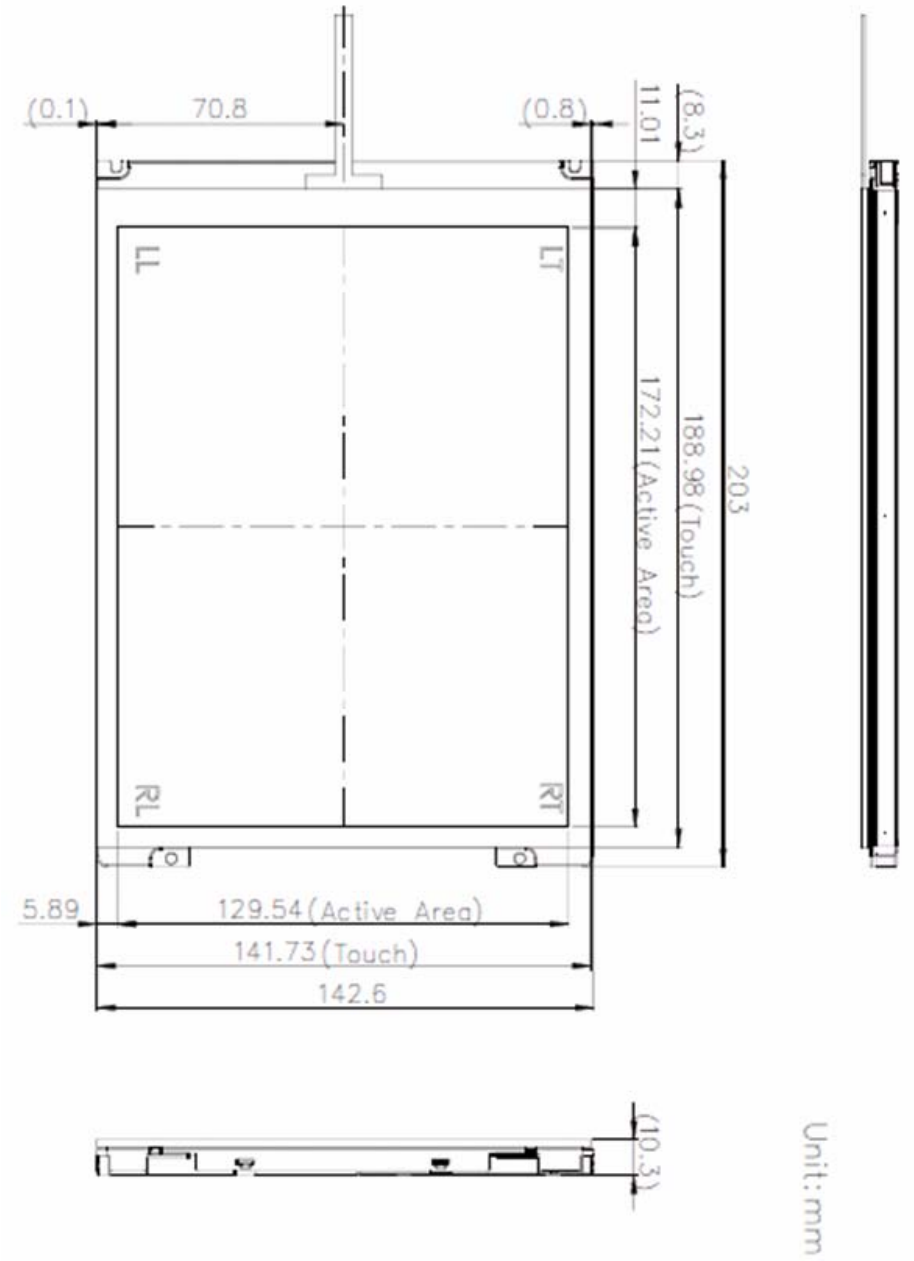
Item	Symbol	Min.	Max.	Unit
Logic/LCD Drive	VDD	-0.3	+3.6	[Volt]

1.4.2 Absolute Ratings of Environment

Item	Symbol	Min.	Max.	Unit
Operating Temperature	TOP	-10	+60	[oC]
Operation Humidity	HOP	10	90	[%RH]
Storage Temperature	TST	-30	+85	[oC]
Storage Humidity	HST	10	90	[%RH]

Note: Maximum Wet-Bulb should be 39°C and no condensation.

1.5 Outline Dimension



Chapter 2

Electrical Characteristics

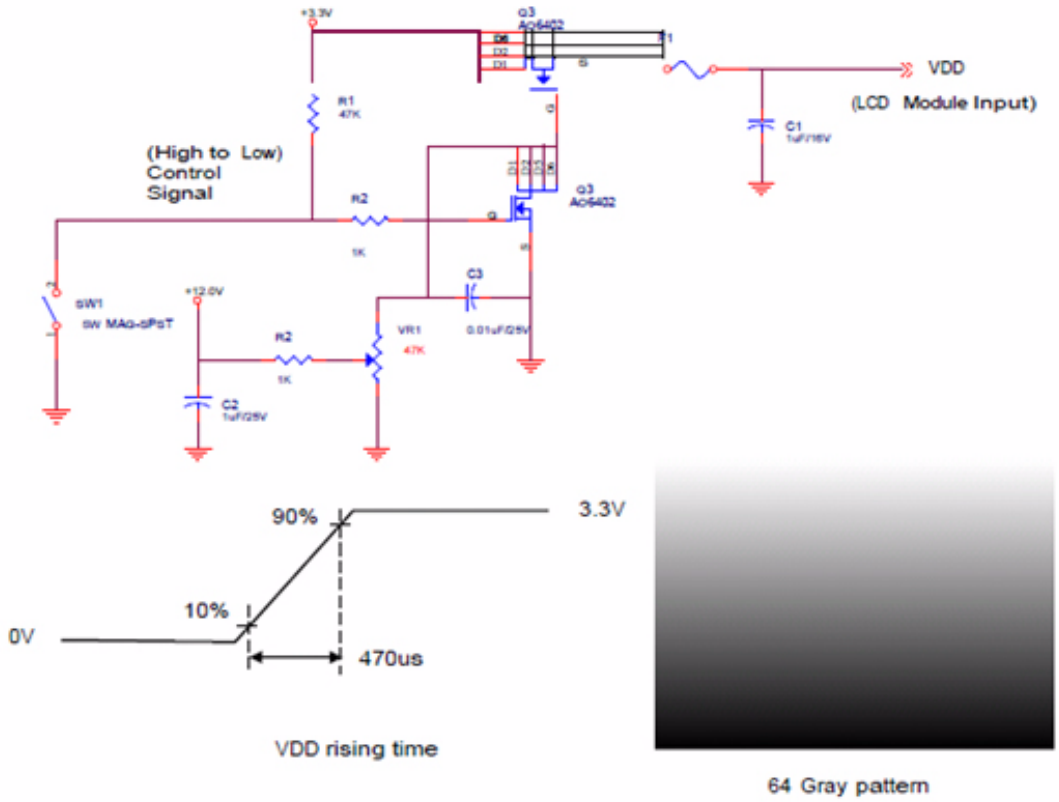
2.1 TFT LCD Module

2.1.1 Power Specification

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	-	200	220	[mA]	64 Gray Bar Pattern (VDD=3.3V, at 60Hz)
PDD	VDD Power	-	0.66	0.73	[Watt]	64 Gray Bar Pattern (VDD=3.3V, at 60Hz)

Note1 Measurement condition:



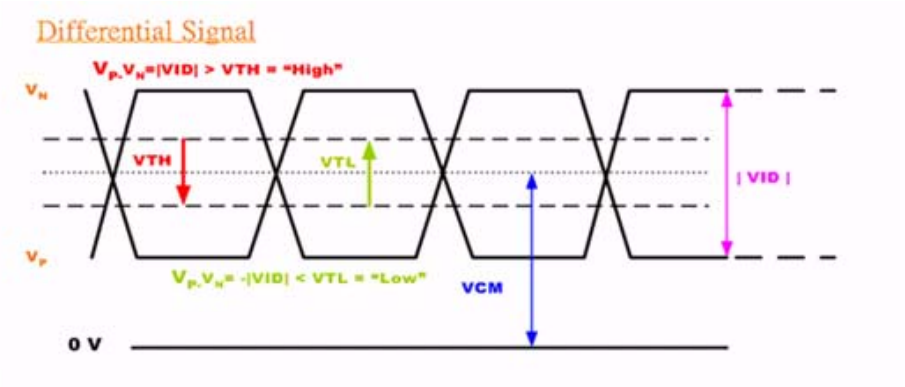
2.1.2 Signal Electrical Characteristics

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

Table 2.2: Signal Electrical Characteristics

Symbol	Item	Min.	Typ.	Max.	Unit	Remark
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	-	1.6	[V]	VTH / VTL = ±100mV

Note LVDS Signal Waveform.



2.2 Backlight Unit

2.2.1 Parameter Guideline for LED Backlight

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

Table 2.3: Backlight Driving Conditions

Symbol	Parameter	Min.	Typ.	Max.	Unit	Remark
VCC	Input Voltage	10.8	12	12.6	[Volt]	
I_{VCC}	Input Current	-	0.17	-	[A]	100% PWM Duty
P_{VCC}	Power Consumption	-	2.04	2.14	[Watt]	100% PWM Duty
P_{PWM}	Dimming Frequency	20	-	20K	[Hz]	
	Swing Voltage	3	3.3	5	V	
	Dimming Duty Cycle	5	-	100	%	
I_F	LED Forward Current	-	50	52.5	mA	Ta = 25°C
V_F	LED Forward Voltage	-	21		Volt	I_F = 50mA, Ta = -30°C
			19.2	21.9	Volt	I_F = 50mA, Ta = 25°C
			18.3			I = 50mA, Ta = 85°C
P_{LED}	LED Power Consumption	-	1.92	-	Watt	I_F = 50mA, Ta = 25°C (total power)
Operation Lifetime		50,000			Hrs	I_F = 50mA, Ta = 25°C

Note1 Ta means ambient temperature of TFT-LCD module.

Note2 VCC, Ivcc, PVCC , are defined for LED B/L.(100% duty of PWM dimming)

Note3 IF, VF are defined for each channel of LED Light Bar. There are two LED channels (AN1-CA1-CA2) in backlight unit.

Note4 If IDK-1108R-45SVA1E module is driven by high current or at high ambient temperature & humidity condition. The operating life will be reduced.

Note5 Operating life means brightness goes down to 50% initial brightness. Minimum operating life time is estimated data.

Chapter 3

Signal Characteristics

3.1 Signal Description

LVDS is a differential signal technology for LCD interface and high speed data transfer device. Connector pin definitions are below.

Table 3.1: Symbol Description

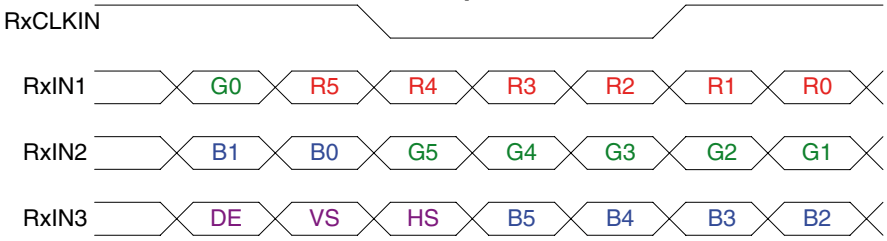
Pin No.	Symbol	Description
1	VDD	Power Supply, 3.3V(typical)
2	VDD	Power Supply, 3.3V(typical)
3	UD	Vertical Reverse Scan Control, When UD=Low or NC -> Normal Mode. When UD=High -> Vertical Reverse Scan. Note
4	LR	Horizontal Reverse Scan Control, When LR=Low or NC -> Normal Mode. When LR=High -> Horizontal Reverse Scan. Note
5	RxIN1-	LVDS differential data input Pair 0
6	RxIN1+	
7	GND	Ground
8	RxIN2-	LVDS differential data input Pair 1
9	RxIN2+	
10	GND	Ground
11	RxIN3-	LVDS differential data input Pair 2
12	RxIN3+	
13	GND	Ground
14	RxCLKIN-	LVDS differential Clock input Pair
15	RxCLKIN+	
16	GND	Ground
17	SEL 68	LVDS 6/8 bit select function control, Low or NC -> 6 Bit Input Mode. High -> 8 Bit Input Mode. Note
18	NC	NC
19	RxIN4-	LVDS differential data input Pair 3. Must be set to NC in 6 bit input mode.
20	RxIN4+	

Note1 “Low” stands for 0V. “High” stands for 3.3V. “NC” stands for “No Connected.”

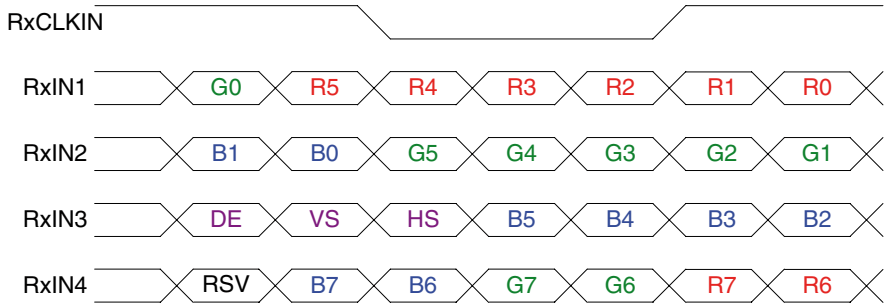
3.2 The Input Data Format

3.2.1 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 (MSB)	Red-pixel Data Each red pixel’s brightness data consists of these 8 bits pixel data.
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 (LSB)	
G7	Green Data 7 (MSB)	Green-pixel Data Each green pixel’s brightness data consists of these 8 bits pixel data.
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 (LSB)	

B7	Blue Data 7 (MSB)	Blue-pixel Data Each blue pixel's brightness data consists of these 8 bits pixel data.
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 (LSB)	
RxCLKIN+ RxCLKIN-	LVDS Clock Input	
DE	Display Enable	
VS	Vertical Sync	
HS	Horizontal Sync	

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

3.3 Interface Timing

3.3.1 Timing Characteristics

DE mode only

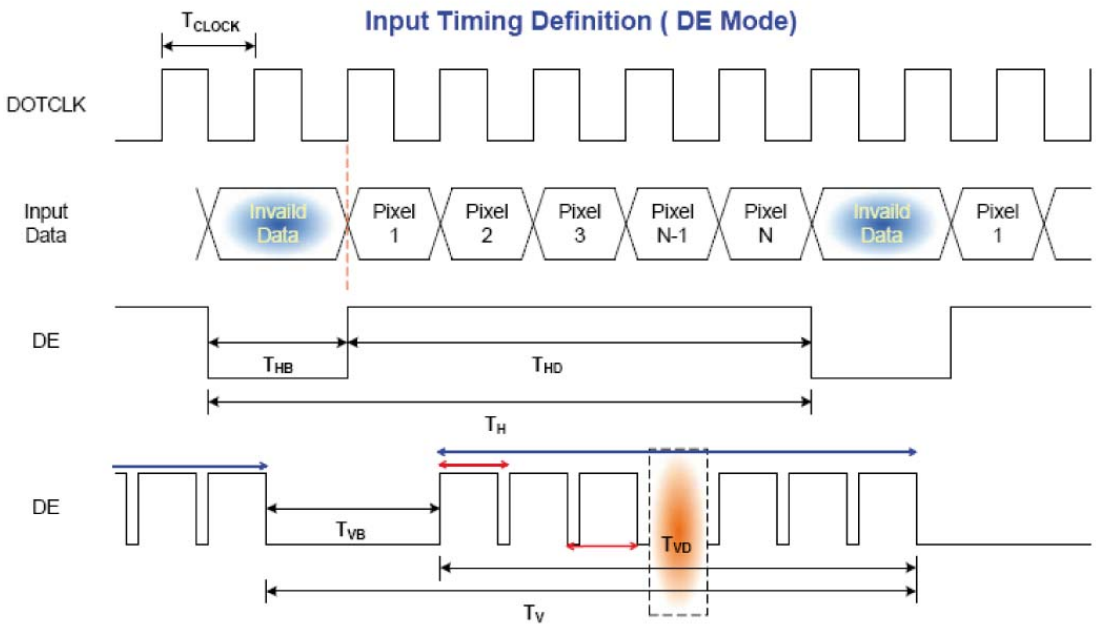
Table 3.2: Timing Characteristics

Parameter		Symbol	Min.	Typ.	Max.	Unit
Clock frequency		1/ T_{Clock}	33.6	39.8	48.3	MHz
Vertical Section	Period	T_V	608	628	650	T_H
	Active	T_{VD}	600	600	600	
	Blanking	T_{VB}	8	28	50	
Horizontal Section	Period	T_H	920	1056	1240	T_{Clock}
	Active	T_{HD}	800	800	800	
	Blanking	T_{HB}				

Note Frame rate is 60 Hz.

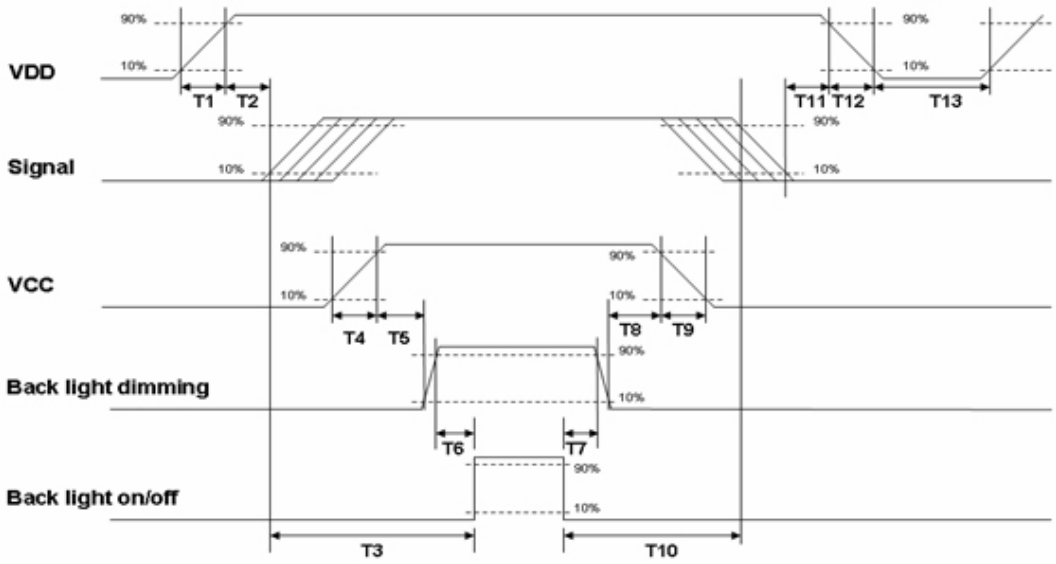
Note DE mode.

3.3.2 Input Timing Diagram



3.4 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 ON/OFF Sequence Timing

Parameter	Value			Unit
	Min.	Typ.	Max.	
T1	0.5	-	10	[ms]
T2	30	40	50	[ms]
T3	200	-	-	[ms]
T4	0.5	-	10	[ms]

T5	10	-	-	[ms]
T6	10	-	-	[ms]
T7	0	-	-	[ms]
T8	10	-	-	[ms]
T9	-	-	10	[ms]
T10	110	-	-	[ms]
T11	0	16	50	[ms]
T12	-	-	10	[ms]
T13	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

Display Connector Definition

4.1 TFT LCD Signal (CN1): LVDS Connector

Table 4.1: TFT LCD Signal (CN1): LVDS Connector	
Connector Name / Description	**Signal Connector**
Manufacturer	STM, Hirose or compatible
Connector Model Number	STM -MSB24013P20HA, Hirose- DF19LA-20P-1H or compatible
Mating Model Number	STM-P24013P20, Hirose-DF19-20S-1C or compatible

Table 4.2: Pin Assignment			
Pin No.	**Signal Name**	**Pin No.**	**Signal Name**
1	VDD	2	VDD
3	UD	4	LR
5	RxIN1	6	RxIN1
7	GND	8	RxIN2
9	RxIN2	10	GND
11	RxIN3	12	RxIN3
13	GND	14	RxCKIN
15	RxCKIN+	16	GND
17	SEL	18	NC
19	RxIN4	20	RxIN4

4.2 LED Backlight Unit (CN2): LED Driver Connector

Connector Name / Designation	**LED Connector**
Manufacturer	ENTERY
Connector Model Number	ENTERY 3808K-F04N-02R or compatible
Mating Model Number	ENTERY H208K-P04N-02B or compatible.

Pin #	**Symbol**	**Pin Description**
1	VCC	12V input
2	GND	GND
3	Display ON/OFF	+5.0V or +3.3 V:ON, 0V:OFF
4	Dimming	PWM

4.3 LED Light Bar Input Connector (CN3)

Table 4.3: LED Light Bar Input Connector (CN3)	
Connector Name / Description	**Signal Connector**
Manufacturer	ENTERY 3800K-F03N-03 or compatible
Mating Connector Model Number	ENTERY H203K-D03N-04B or compatible

Pin #	Symbol	Pin Description
1	AN	LED
2	CA	LED
3	CA	LED

Pin #	Symbol	Pin Description
1	AN1	Red
2	CA1	Black
3	CA2	Black

Chapter 5

Touch Screen

5.1 Touch Characteristics

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

5.2 Optical Characteristics

	Item	Specification	Remarks
1	TRANSPARENCY	82.5% Typ. 80% Min. (Active area) (Inside of guaranteed active area)	JIS K-7105
2	HAZE	8.0% Typ. (Anti-glare)	JIS K-7105

5.3 Environmental Characteristics

	Item	Specification	Remarks
1	Operation temperature	-10°C ~ 60°C	Max. wet Temp is 38°C(No dew)
2	Storage temperature	-30°C ~ 70°C	
3	Operation Humidity	20% ~ 90%RH	
4	Storage temperature	10% ~ 90%RH	

5.4 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	0.05N~1.96 N (5~200gf)	Dot-Spacer Within "guaranteed active area", but not on the age and Dot-Spacer.
		Finger		

5.5 Electronic Characteristics

	Item	Specification	Remarks
1	Rated Voltage	DC 7V max.	
2	Resistance	X axis: 200Ω ~ 1000Ω(Glass side) Y axis: 100Ω ~ 800Ω(Film side)	FPC connector
3	Linearity	±1.5%max initial value ±2.0%max "after environmental & life test"	Reference: 250gf
4	Chattering	20ms Max At connector pin	
5	Insulation Resistance	10MΩ min(DC 25V)	

Chapter 6

Touch Controller

6.1 Touch Controller Characteristics

Advantech ETM-RES05C Touch Control Board, the ultimate combo board. This touch panel controller provides the optimistic performance of your analog resistive touch panels for 4 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 function and supports operation systems as following.

6.2 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.
- 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

6.3 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

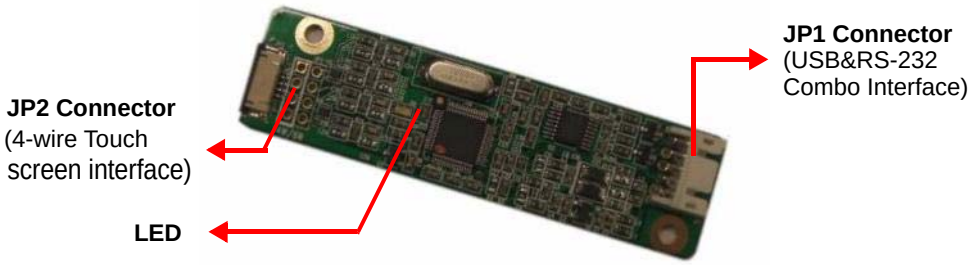
Acquired RoHS certificate

Regulatory FCC-B, CE approvals

Dimension: 75 mm x 20 mm x 10 mm

6.4 Pin Assignment and Description

6.4.1 Connector and LED Location



6.4.2 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

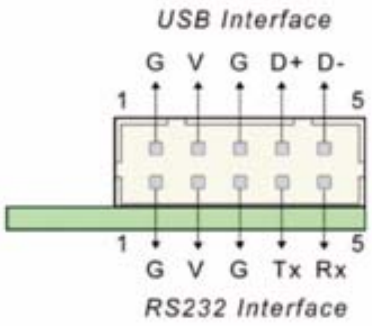
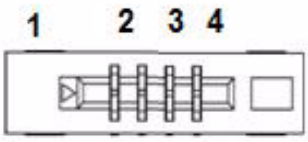


Figure 6.1 Board mounted header

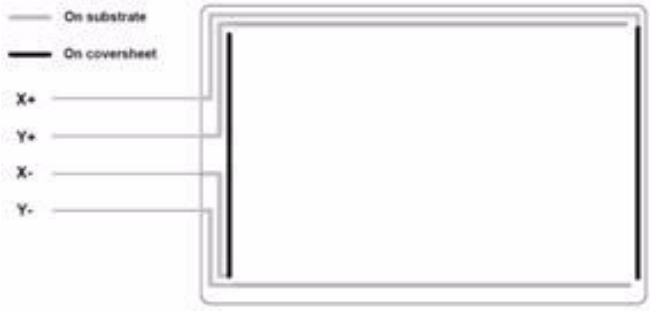
6.4.3 Touch Screen Connector, JP2, Pins and Signal Descriptions

The Touch Screen connector, JP2, is a FFC/FPC SMD 1.0mm 4-pins 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 Touch Screen ZIF connector



4-Wire Screen viewed from coversheet side

Appendix A

Optical Characteristics

A.1 Optical Characteristics

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

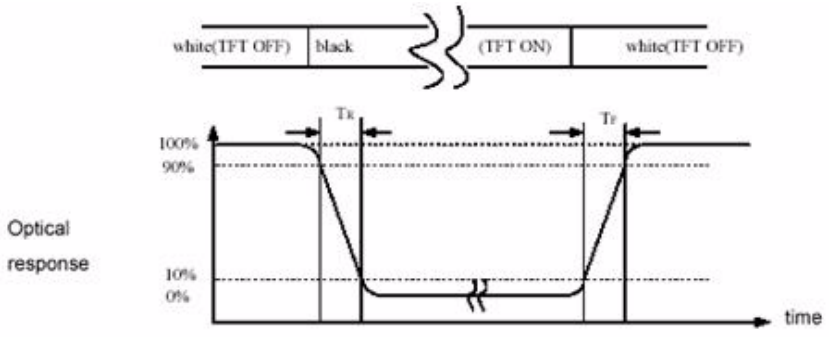
Table A.1: Optical Characteristics

Item	Unit	Conditions	Min.	Typ.	Max.	Note
White Luminance	[cd/m2]	IF= 50mA (center point)	350	450	-	1
Uniformity	%	9 Points	70	75	-	1,2,3
Contrast Ratio			400	600	-	4
Response Time	[msec]	Rising	-	20	30	5
	[msec]	Falling	-	10	20	
	[msec]	Rising + Falling	-	30	50	
Viewing Angle	[degree]	Horizontal (Right)	70	80	-	6
	[degree]	CR = 10 (Left)	70	80	-	
	[degree]	Vertical (Upper)	70	80	-	
	[degree]	CR = 10 (Lower)	70	80	-	
Color/Chromaticity Coordinates (CIE 1931)		Red x	0.559	0.609	0.659	4
		Red y	0.283	0.333	0.383	
		Green x	0.315	0.365	0.415	
		Green y	0.520	0.570	0.620	
		Blue x	0.101	0.151	0.201	
		Blue y	0.056	0.106	0.156	
		White x	0.26	0.31	0.36	
		White y	0.28	0.33	0.38	
Contrast Ratio				45	-	1

Note

These items are measured by BM-5A(TOPCON) or CA-1000(MINOLTA) in the dark room (no ambient light) After 5 minutes operation, the optical properties are measured at the center point of the LCD screen.

Note1 Definition of Response Time (White-Black)



Note2 Definition of Contrast Ratio

Contrast ratio is calculated with the following formula :

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

Note3 Definition of Luminance

Measure the luminance of white state at center point.

Note4 Definition of Luminance Uniformity

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

Luminance Uniformity is calculated with the following formula:

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

Note5 Definition of Viewing Angle

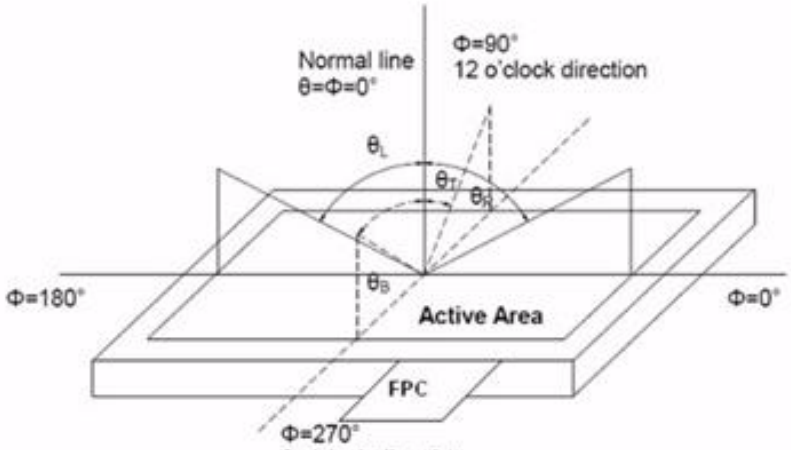


Fig. 1 Definition of viewing angle

Appendix B

Handling Precautions

B.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 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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All product specifications are subject to change without notice.