



User Manual

IDK-1110P-series

**TFT-LCD 10.4" XGA (LED
Backlight)**

ADVANTECH

Enabling an Intelligent Planet

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Note! *Notes provide optional additional information.*



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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

1.1 General Description

This specification applies to the 10.4 inch color TFT LCD module IDK-1110P-series. IDK-1110P is designed with wide viewing angle; wide operating temperature and long life LED backlight which is well suited for Industrial Applications. LED driving board for backlight unit is included in this panel and the structure of the LED units is replaceable. Also, IDK-1110P-series has an LVDS interface and projected capacitive touch solution. The screen format is intended to support XGA (1024 (H) x 768 (V)) screen and 16.2M + FRC. IDK-1110P is a RoHS product.

1.2 Display Characteristics

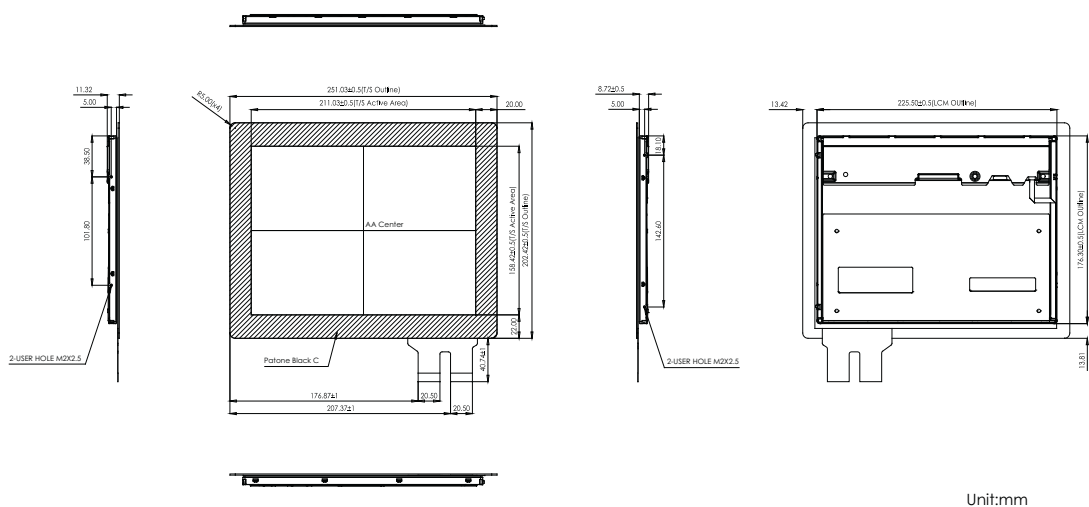
The following items are product characteristics under 25°C conditions.

Items	Specifications	Unit
Screen Diagonal	10.4	inch
Active Area	210.4 (H) x 157.8 (V)	mm
Pixels H x V	1024x3(RGB) x 768	-
Pixel Pitch	0.0685 (H) x 0.2055 (V)	mm
Pixel Arrangement	R.G.B. Vertical Stripe	-
Display Mode	Transmissive mode / Normally black	-
Nominal Input Voltage VDD	3.3 (typ)	Volt
Typical Power Consumption	10 W (typ)	Watt

1.3 Mechanical Specification

Item		Min.	Typ.	Max.	Unit	Note
Module Size	Horizontal(H)	-	251.03	-	mm	
	Vertical(V)	-	202.42	-	mm	
	Depth(D)	-	11.32	-	mm	
Weight		-	500	-	g	-

1.4 Mechanical Dimension



1.5 Absolute Maximum Ratings

1.5.1 Absolute Ratings of the TFT LCD Module

Item	Symbol	Value		Unit
		Min.	Max.	
Logic/LCD Drive Voltage	VCC	-0.3	+7	[Volt]

1.5.2 Absolute Environment Ratings

Item	Symbol	Value		Unit
		Min.	Max.	
Operating Temperature	TOP	-20	+70	°C
Operation Humidity	HOP		90	[%RH]
Storage Temperature	TST	-30	+80	°C
Storage Humidity	HST		90	[%RH]

Note! Maximum Wet-Bulb should be 39°C with no condensation.



1.6 Block Diagram

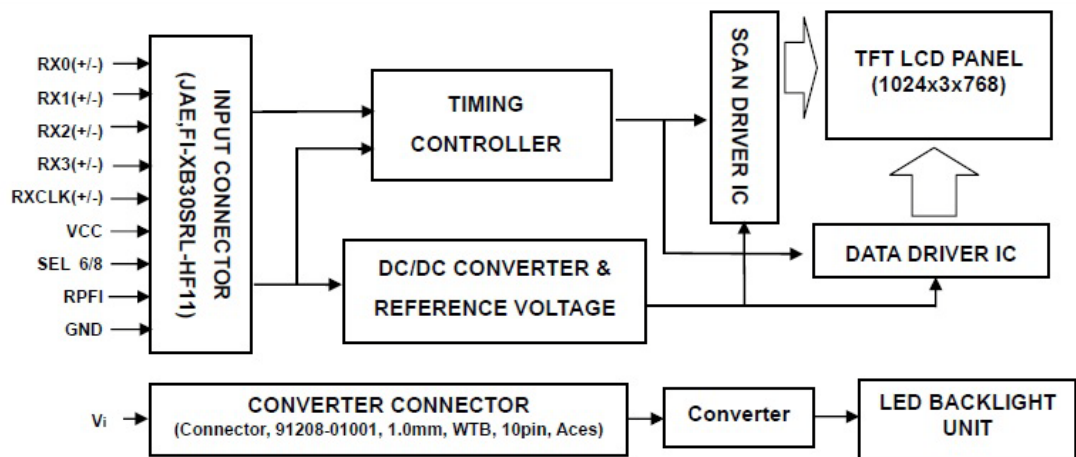


Figure 1.1 TFT LCD module

Chapter 2

Electrical
Characteristics

2.1 TFT LCD Module

2.1.1 Electrical Characteristics

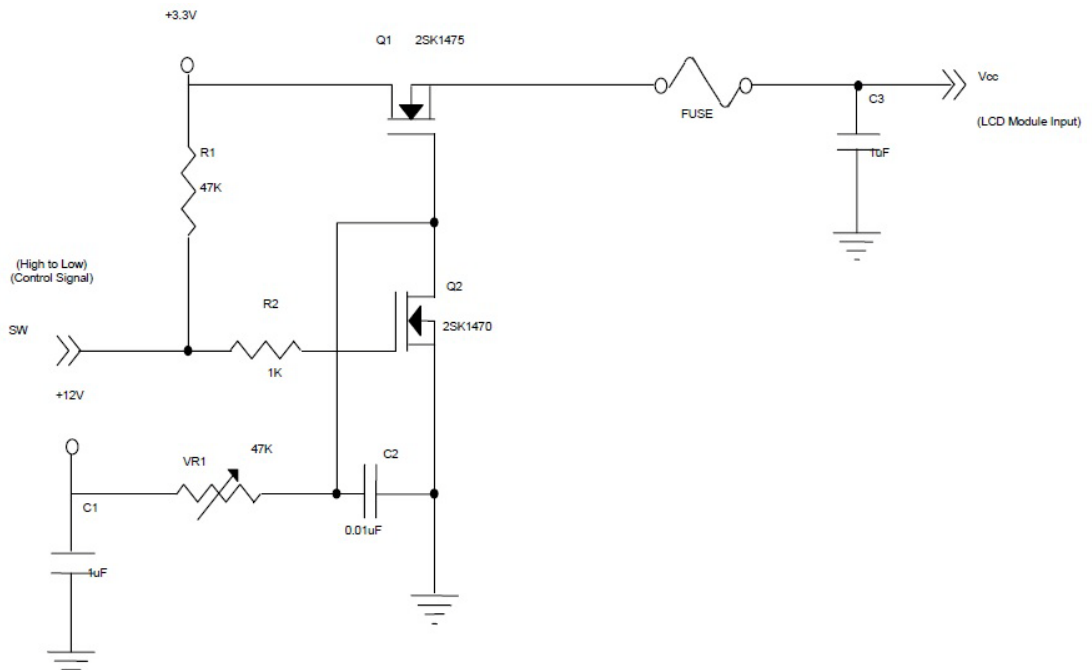
Ta=25 ± 2° C

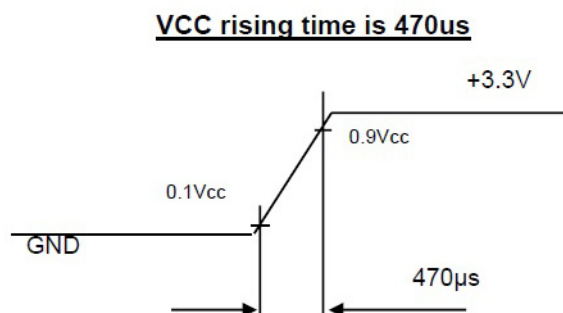
Parameter	Symbol	Value			Unit	Note
		Min.	Typ.	Max.		
Power Supply Voltage	V _{CC}	3.0	3.3	3.6	V	(1)
Rush Current	I _{RUSH}	-	-	4.0	A	(2)
Power Supply Current	White	530	570	620	mA	(3)
	Black	380	420	460	mA	
Power Consumption	P _L	---	1.9	---	W	
LVDS differential input voltage	IV _{IDI}	100.0	-	600.0	mV	-
LVDS common input voltage	V _{ICM}	0.7	-	1.6	V	-


Note! The assembly should be always operated within above ranges.



Measurement Conditions:






Note!  The specified power supply current is under the conditions at $V_{cc}=3.3\text{ V}$, $T_a=25\pm 2^\circ\text{ C}$, $f_v=60\text{ Hz}$, whereas a power dissipation check pattern is displayed.


2.2 Backlight Unit

2.2.1 Parameter guideline for LED backlight

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

Parameter	Symbol	Value			Unit	Remark
		Min.	Typ.	Max.		
Input Voltage	V_i	10.8	12	13.2	[Volt]	(Duty 100%)
Input Current	I_i	-	0.7	-	[A]	@ $V_i=12\text{ V}$ (Duty 100%)
Power Consumption	P_{LED}	-	8	-	[Watt]	@ $V_i=12\text{ V}$ (Duty 100%)
PWM Control	F_{PWM}	190	200	20k	[Hz]	
EN Control Level	Backlight on	2.0	-	5	[Volt]	
	Backlight off	0	-	0.8	[Volt]	
PWM Control Level	PWM High Level	2.0	-	5	[Volt]	
	PWM Low Level	0	-	0.15	[Volt]	
PWM Control Duty Ratio		2	-	100	%	
Operation Lifetime		50,000	-	-	Hrs	Note (2) below

Note!  LED current is measured by utilizing a high frequency current meter as shown below:

Note!  The lifetime LED is defined as the time when it continues to operate under the conditions: $T_a=25\pm 2^\circ\text{ C}$ and $I_{LED}=80\text{ mADC}$ (LED forward current) until the brightness becomes $\leq 50\%$ of its original value. Minimum LED lifetime is estimated and provided by Nichia in Japan.

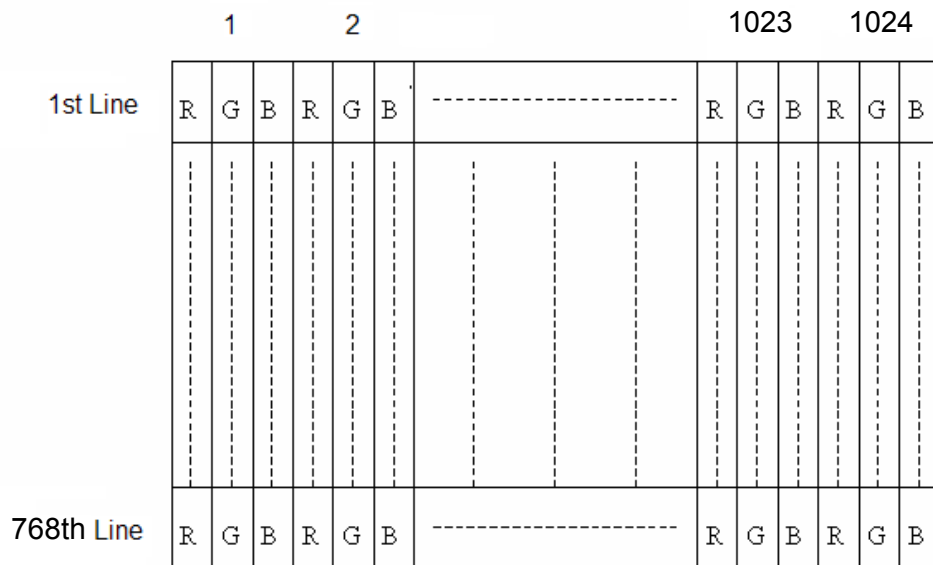
Pin	Symbol	Description	Remark
1	V_i	Converter input voltage	12 V
2	V_i	Converter input voltage	12 V
3	V_i	Converter input voltage	12 V
4	V_i	Converter input voltage	12 V
5	V_{GND}	Converter ground	Ground
6	V_{GND}	Converter ground	Ground
7	V_{GND}	Converter ground	Ground
8	V_{GND}	Converter ground	Ground
9	EN	Enable pin	3.3 V
10	ADJ	Backlight Adjust	PWM Dimming

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

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

Table 3.1: Pin Description

Pin No.	Symbol	Description	Note
1	VCC	Power supply: +3.3 V	
2	VCC	Power supply: +3.3 V	
3	VCC	Power supply: +3.3 V	
4	GND	Ground	
5	GND	Ground	
6	GND	Ground	
7	RPFI	Reverse Panel Function (Display Rotation)	
8	NC	No Connection	
9	NC	No Connection	
10	NC	No Connection	
11	SEL 6/8	LVDS 6/8 bit select function control, Low or NC -> 8bit Input Mode High -> 6bit Input Mode	
12	GND	Ground	
13	NC	No Connection	
14	GND	Ground	
15	RX0-	Negative transmission data of pixel 0	
16	RX0+	Positive transmission data of pixel 0	
17	GND	Ground	
18	RX1-	Negative transmission data of pixel 1	

Table 3.1: Pin Description

19	RX1+	Positive transmission data of pixel 1
20	GND	Ground
21	RX2-	Negative transmission data of pixel 2
22	RX2+	Positive transmission data of pixel 2
23	GND	Ground
24	RXCLK-	Negative of clock
25	RXCLK+	Positive of clock
26	GND	Ground
27	RX3-	Negative transmission data of pixel 3
28	RX3+	Positive transmission data of pixel 3
29	GND	Ground
30	NC	No Connection

Note! Connector Part No.: JAE, FI-XB30SRL-HF11 or compatible.



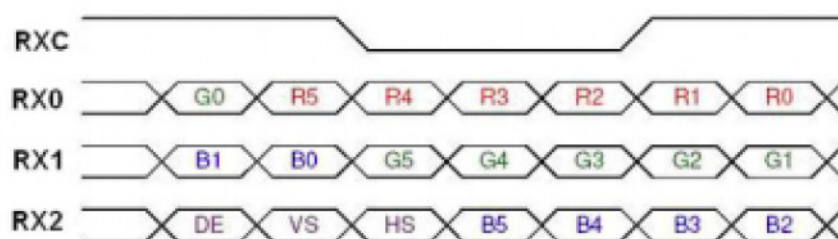
Note! “Low” stands for 0 V. “High” stands for 3.3 V. “NC” stands for “Not Connected.”



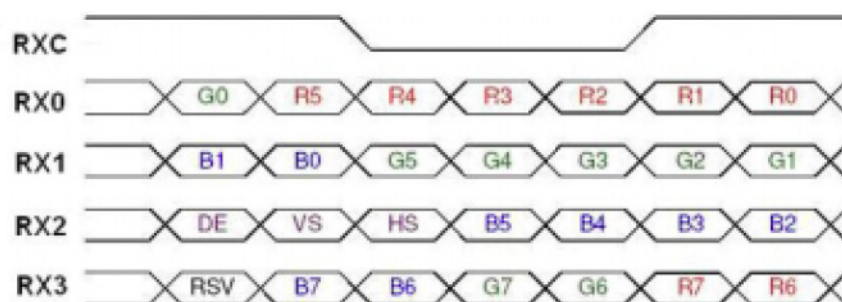
3.3 Input Data Format

3.3.1 SEL68

SEL68 = “Low” or “NC” for 6 bits LVDS Input



SEL68 = “High” for 8 bits LVDS Input



Note! Please follow PSWG.



Note! R/G/B data 7: MSB, R/G/B data 0: LSB.



Table 3.2: Input Data Format

Signal Name	Description	Remark
R7	Red Data 7	
R6	Red Data 6	Red-pixel Data
R5	Red Data 5	
R4	Red Data 4	For 8 bits LVDS input, MSB: R7; LSB:R0
R3	Red Data 3	
R2	Red Data 2	For 6 bits LVDS input, MSB: R5; LSB:R0
R1	Red Data 1	
R0	Red Data 0	
G7	Green Data 7	
G6	Green Data 6	Green-pixel Data,
G5	Green Data 5	
G4	Green Data 4	For 8 bits LVDS input, MSB: G7; LSB:G0
G3	Green Data 3	
G2	Green Data 2	For 6 bits LVDS input, MSB: G5; LSB:G0
G1	Green Data 1	
G0	Green Data 0	
B7	Blue Data 7	
B6	Blue Data 6	Blue-pixel Data
B5	Blue Data 5	
B4	Blue Data 4	For 8 bits LVDS input, MSB: B7; LSB:B0
B3	Blue Data 3	
B2	Blue Data 2	For 6 bits LVDS input, MSB: B5; LSB:B0
B1	Blue Data 1	
B0	Blue Data 0	
RXCLKIN+ RXCLKIN-	LVDS Clock Input	
DE	Display Sync	
VS	Vertical Sync	
HS	Horizontal Sync	

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

DE mode only (For IDK-1110P-40SVA1E)

Table 3.3: Timing Characteristics (For IDK-1110P-40SVA1E)							
Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition	
Clock frequency	F_c	55	65	75	MHz		
Vertical Section	Period	T_V	770	806	950	T_H	$T_V = T_{Vd} + T_{Vb}$
	Active	T_{Vd}	-	768	-		
	Blanking	T_{Vb}	2	38	182		
Horizontal Section	Period	T_h	1104	1344	1800	T_{Clock}	$T_h = T_{hd} + T_{hb}$
	Active	T_{hd}	-	1024	-		
	Blanking	T_{hb}	76	320	776		

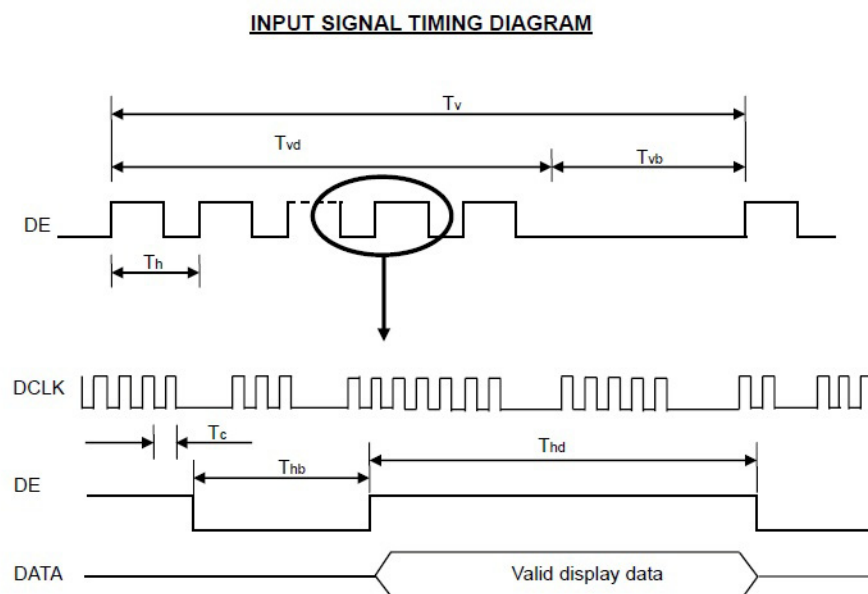
Note! Frame rate is 60 Hz.



Note! DE mode. Hsync and Vsync input signals should be set to low logic level otherwise this assembly would operate abnormally.

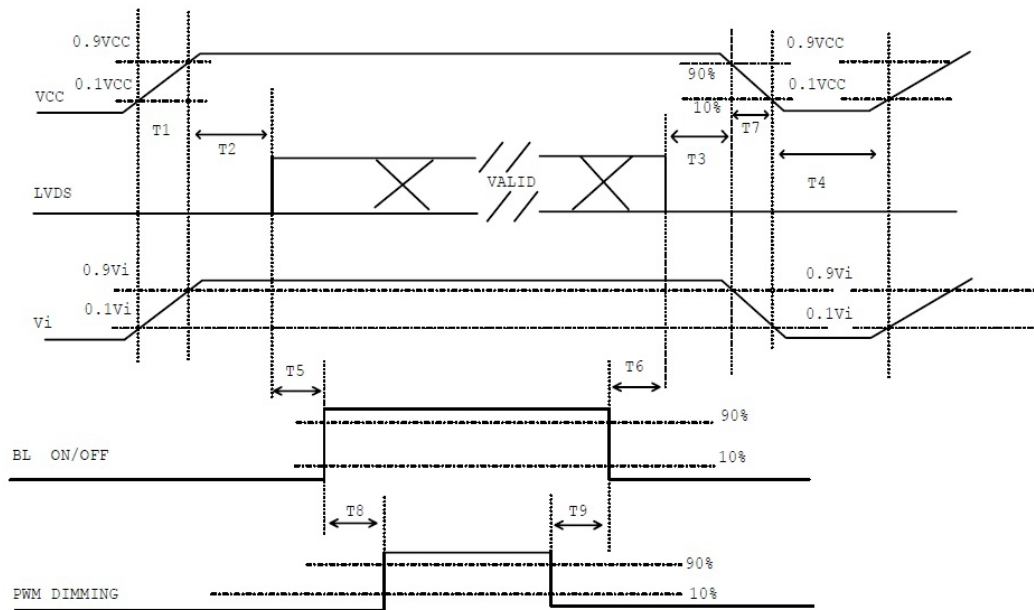


3.4.2 Input Timing Diagram



3.5 Power ON/OFF Sequence

To prevent a latch-up or DC operation of LCD assembly, the power on/off sequence should be as the diagram below.



Power Sequence Timing

Parameter	Value			Unit
	Min.	Typ.	Max.	
T1	0.5	-	10	[ms]
T2	0	-	50	[ms]
T3	0	-	50	[ms]
T4	500	-	-	[ms]
T5	200	-	-	[ms]
T6	20	-	-	[ms]
T7	5	-	300	[ms]
T8	10	-	-	[ms]
T9	10	-	-	[ms]

Chapter 4

Display Connector Definition

4.1 TFT LCD Signal(CN1): LVDS Connector

Table 4.1: Connector

Connector Name / Description	Signal Connector
Manufacturer	JAE or compatible
Connector Model Number	FI-XB30SRL-HF11 or compatible
Adaptable Plug	FI-X30C2L or compatible

Table 4.2: Pin Assignments

Pin No.	Signal Name	Pin No.	Signal Name
1	VCC	2	VCC
3	VCC	4	GND
5	GND	6	GND
7	RPFI	8	NC
9	NC	10	NC
11	SEL6/8	12	GND
13	NC	14	GND
15	RX0-	16	RX0+
17	GND	18	RX1-
19	RX1+	20	GND
21	RX2-	22	RX2+
23	GND	24	RXCLK-
25	RXCLK+	26	GND
27	RX3-	28	RX3+
29	GND	30	NC

4.2 LED Backlight Unit (CN2): LED Driver Connector

Connector Name / Designation	LED Light Bar Connector / Backlight lamp
Manufacturer	ACES or compatible
Connector Model Number	91208-01001 or compatible
Mating Model Number	91209-01011 or compatible

Table 4.3: LED Backlight Pin

Pin	Symbol	Description	Remark
1	V_i	Converter input voltage	12 V
2	V_i	Converter input voltage	12 V
3	V_i	Converter input voltage	12 V
4	V_i	Converter input voltage	12 V
5	V_{GND}	Converter ground	Ground
6	V_{GND}	Converter ground	Ground
7	V_{GND}	Converter ground	Ground
8	V_{GND}	Converter ground	Ground
9	EN	Enable pin	3.3 V
10	ADJ	Backlight adjust	PWM dimming

Chapter 5

Touch Screen

5.1 Touch Characteristics

This touch panel is a Projected Capacitive type used with flat displays like LCDs. Once an operator touches it, this is measurable as a change in capacitance and the change sensed as a 'touch' by the controller.

5.2 Optical Characteristics

Item	Specification	Remarks
1 TRANSPARENCY	90 ± 3%	
2 HAZE	7 ± 3%	

5.3 Environment Characteristics

General:

Projected capacitive touch panel is designed by Cover Lens-Film-Film construction.

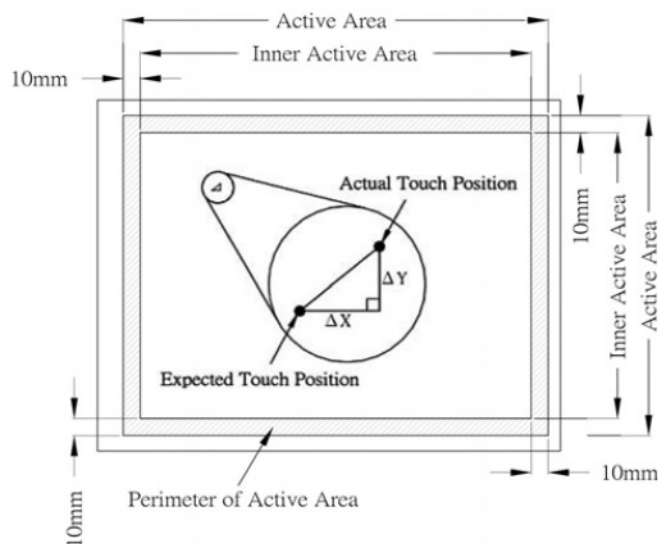
Mechanical Performance:

- **Surface Hardness:** Mohs 5
- **Cover Lens Thickness:** 1.10mm (Glass)
- **Overall Thickness:** 1.50 ±0.20mm
- **Static Force Requires Breaking the Glass:** >20kgf
- **Tail Type:** Gold Plated FPC, ZIF
 - FPC tail bending Radius: R1.0mm
 - Holding force for tail, peeling upward 90deg with 500gw without impact to electric performance.
 - Tail Terminator: Two ZIF connectors, 40-pins and 40-pins
- **Top Surface Finish Type:** Clear

5.4 Mechanical Characteristics

■ Positional Accuracy:

Perimeter of Active Area: it is in the 10mm area inside from active area, the accuracy specifications are based on touch panel controllers and drivers to define, the percentage of positional inaccuracy is less than 2.5% as defined below. **Inner Active Area:** it is the area of 10mm inside of the active area, the accuracy specifications are based on PenMount touch panel controllers and drivers to define, the percentage of positional inaccuracy is less than 1.5% as defined below.



X direction of linearity: $\Delta x/X * 100\%$.

Y direction of linearity: $\Delta y/Y * 100\%$.

- **Operating Voltage:** 5 V
- **Measurement Resolution:** 2048 based on PenMount PM1300 series control board.
- **Activation Force:** Zero force

Chapter 6

Touch Controller

6.1 Touch Controller Characteristics

The PenMount PM1310 control board is a high specification (Projected Capacitive Input, PCI) touch panel controller product introduced by PenMount. The PenMount PM1310 can be applied in the consumer, commercial and the industrial fields.

The PenMount PM1310 provides two types of interface, USB, I2C and UART interface, and also supports a wide range of operating systems such as Windows and Linux. There are four connectors on this board: two 40 Pins ZIF connectors for PCI touch screen FPC cable, one USB connector for 4-pin USB cable, and one I2C/UART connector for 7-pin I2C cable (optional).

6.2 Specifications

Electrical Features

- **Max Touch Line:** 35 Driving lines, 23 sensing line
- **Sampling rate:** > 160sps (Single)
- **Operation Voltage Vcc:** +5V, $\pm 5\%$
- **Power Consumption: (Typ.)**
- **Working Mode:** 33.2 mA/5 V_{DC}
- **Idle Mode:** 23.2 mA/5 V_{DC}
- **Sleep Mode:** 1.0 mA/5 V_{DC}
- **RS specification:** IEC61000-4-3 Level 3, Criteria A (For 1.8 mm Top Glass, Dual touch)
- **CS specification:** IEC61000-4-6 Level 3, Criteria A (For 1.8 mm Top Glass, Dual touch)

Interface

- **Support:** USB, UART, I2C
- **USB:** Full-speed, 12Mbps
- UART interface 38400 baud rate / 8 bit data / non parity / one stop bit / non-PnP I2C, Slave, support 400kHz specifications
- **Touch Resolution:** 2,048 x 2,048 resolution
- **Response Time:** 30 ~ 50 ms
- **Dimension:** 70 mm x 30mm x 1 mm

6.3 Environmental Feature

Reliability

- MTBF is 1,920,000 hours

Temperature Ranges

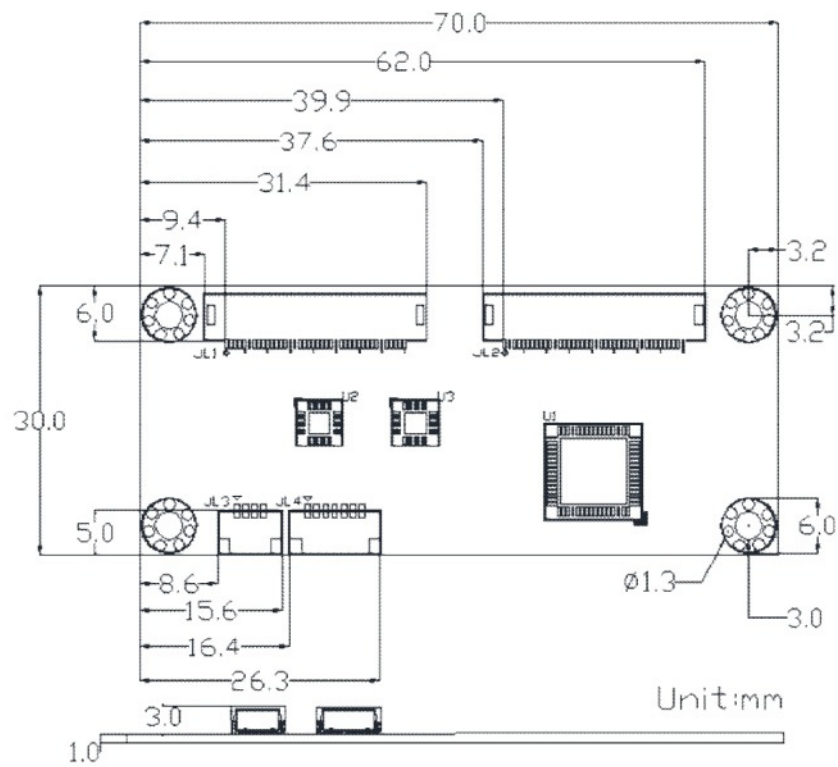
- Operating: -30° C ~ 70° C
- Storage: -40° C ~ 85° C

Relative Humidity

- 10~90% RH at 60° C, RH Non-condensing

6.4 Mechanical Drawing

6.4.1 Mechanical size



6.5 Pin Assignment and Description

6.5.1 Touch Line Pin Definition

JL1 40Pin ZIF , PH 0.5mm ; HRS FH52-40S-05SH							
PIN	Description	PIN	Description	PIN	Description	PIN	Description
1	Ground	11	Cap Drive X6	21	Cap Drive X16	31	Cap Drive X26
2	Ground	12	Cap Drive X7	22	Cap Drive X17	32	Cap Drive X27
3	NC	13	Cap Drive X8	23	Cap Drive X18	33	Cap Drive X28
4	Ground	14	Cap Drive X9	24	Cap Drive X19	34	Cap Drive X29
5	Cap Drive X0	15	Cap Drive X10	25	Cap Drive X20	35	Cap Drive X30
6	Cap Drive X1	16	Cap Drive X11	26	Cap Drive X21	36	Cap Drive X31
7	Cap Drive X2	17	Cap Drive X12	27	Cap Drive X22	37	Cap Drive X32
8	Cap Drive X3	18	Cap Drive X13	28	Cap Drive X23	38	Cap Drive X33
9	Cap Drive X4	19	Cap Drive X14	29	Cap Drive X24	39	Cap Drive X34
10	Cap Drive X5	20	Cap Drive X15	30	Cap Drive X25	40	Ground
JL2 40Pin ZIF , PH 0.5mm ; HRS FH52-40S-05SH							
PIN	Description	PIN	Description	PIN	Description	PIN	Description
1	NC	11	NC	21	Cap Sense Y15	31	Cap Sense Y5
2	NC	12	Ground	22	Cap Sense Y14	32	Cap Sense Y4
3	NC	13	NC	23	Cap Sense Y13	33	Cap Sense Y3
4	NC	14	Cap Sense Y22	24	Cap Sense Y12	34	Cap Sense Y2
5	NC	15	Cap Sense Y21	25	Cap Sense Y11	35	Cap Sense Y1
6	NC	16	Cap Sense Y20	26	Cap Sense Y10	36	Cap Sense Y0
7	NC	17	Cap Sense Y19	27	Cap Sense Y9	37	NC
8	NC	18	Cap Sense Y18	28	Cap Sense Y8	38	Ground
9	NC	19	Cap Sense Y17	29	Cap Sense Y7	39	NC
10	NC	20	Cap Sense Y16	30	Cap Sense Y6	40	Ground

6.5.2 Interface Detection and Pin Definition

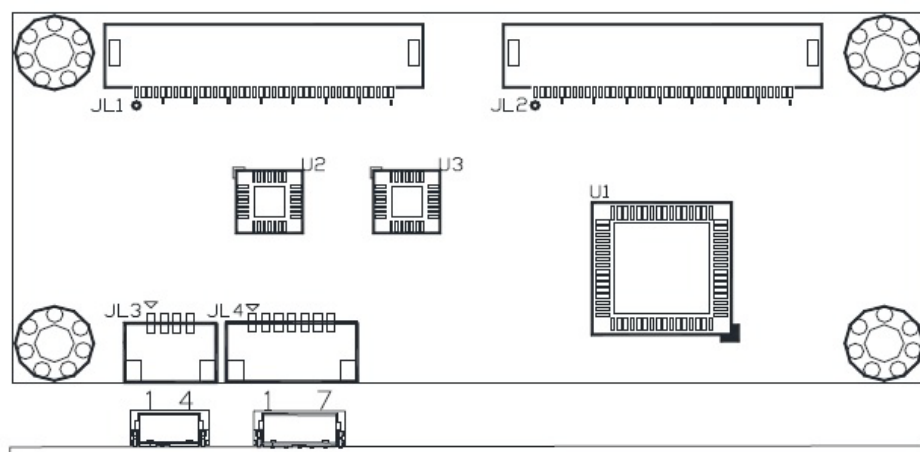


Table 6.1: JL3 / 4PIN / USB

PIN No.	Signal Function
1	Vcc (USB 5 V)
2	D-
3	D+
4	Ground

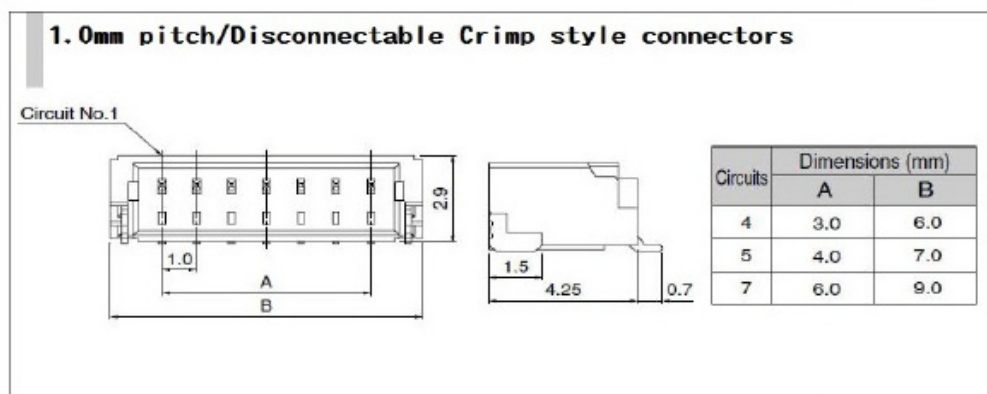
Table 6.2: JL4 / 7 PIN / I²C/ UART

PIN No.	Signal Function	I ² C	UART	Remark
1	Vcc	V	V	
2	Ground	V	V	
3	SCL,RXD	V	V	
4	SDA,TXD	V	V	
5	Reset	Float	Float	Pull low at least 2 μ s to reset the P2-08 device
6	DETECT	N.C	Low	
7	INTHM	V	N.C	

Note! If you use I2C interface, please add pull-up resistor 2.2K at SCL /SDA / INTHM Host side.



6.6 Connector Specification



6.7 Driver Utilities

6.7.1 Drivers

For I²C

- **Windows CE:** Provide binary driver for freescale iMX platform. Other platform by request.
- **Linux / Android:** Provid source code for integration.

For USB / UART

- **Windows 2000, XP, 2003:** Single touch, mouse driver.
- **Windows Vista:** Single touch, inbox driver.
- **Windows 7, 8: 5** touches support, Inbox driver.
- **Linux:** Ubuntu, Android, other Linux distributors under development.

6.7.2 Utility

Firmware adjustment utility is ready for user to fine tune the touch panel sensitivity.

Appendix **A**

Optical Characteristics

A.1 Optical Characteristics

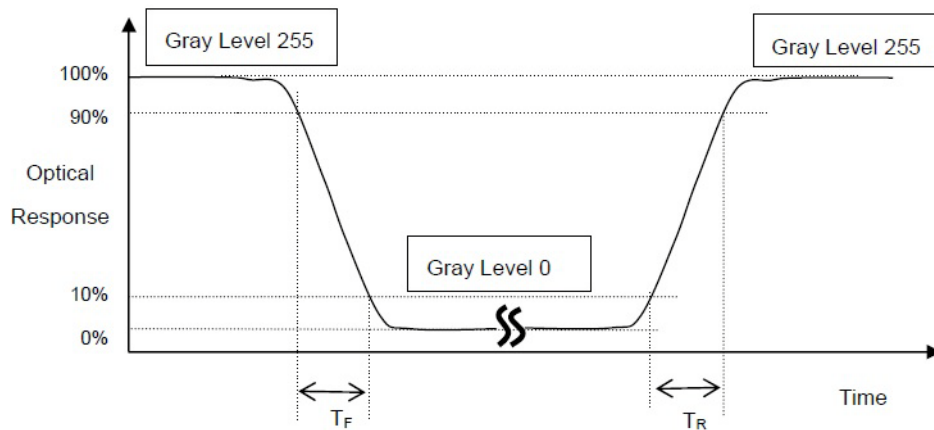
The optical characteristics are measured under stable conditions at 25°C (Room Temperature):

Item	Conditions	Min.	Typ.	Max.	Unit	Note
White Luminance	IF= 50mA (center point)	400	500	-	[cd/m2]	1
Uniformity	5 Points	-	75	-	%	1, 2, 3
Contrast Ratio		700	1000	-		4
Response Time	Rising	-	14	19	[msec]	5
	Falling	-	11	16	[msec]	
	Raising + Falling	-	25	35	[msec]	
Viewing Angle	Horizontal (Right)	80	88	-	[degree]	6
	CR ≥ 10 Left)	70	88	-	[degree]	
	Vertical (Upper)	80	88	-	[degree]	
	CR ≥ 10 (Lower)	80	88	-	[degree]	
Color / Chromaticity Coordinates (CIE 1931)	Red x		0.617			1
	Red y		0.357			
	Green x		0.336			
	Green y	Typ-0.05	0.567	Typ.+0.05		
	Blue x		0.147			
	Blue y		0.087			
	White x		0.313			
White y		0.329				
Color Gamut			57	-	%	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.



Note! Definition of Response Time (TR, TF).



Note! Definition of Contrast Ratio

Contrast ratio is calculated with the following formula :

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

Note! Definition of Luminance:

Measure the luminance of white state at center point.

Note! 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:

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

Note! 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, take extra care not to scratch it.
2. Be sure to turn off power supply when inserting or disconnecting from input connector.
3. Wipe off water drops immediately. 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 are 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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