Product Specification

Product Name: KTM035AM01

Product Code: T9010

Customer
Approved by Customer
Approved Date:

Designed By	Checked by	Approved By	
		R&D	QA

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CONTENT

REVISION RECORD

REV.	REVISION DESCRIPTION	REV. DATE	REMARK
Y01	Initial Release	2010-04-21	
Y02		2010-07-05	

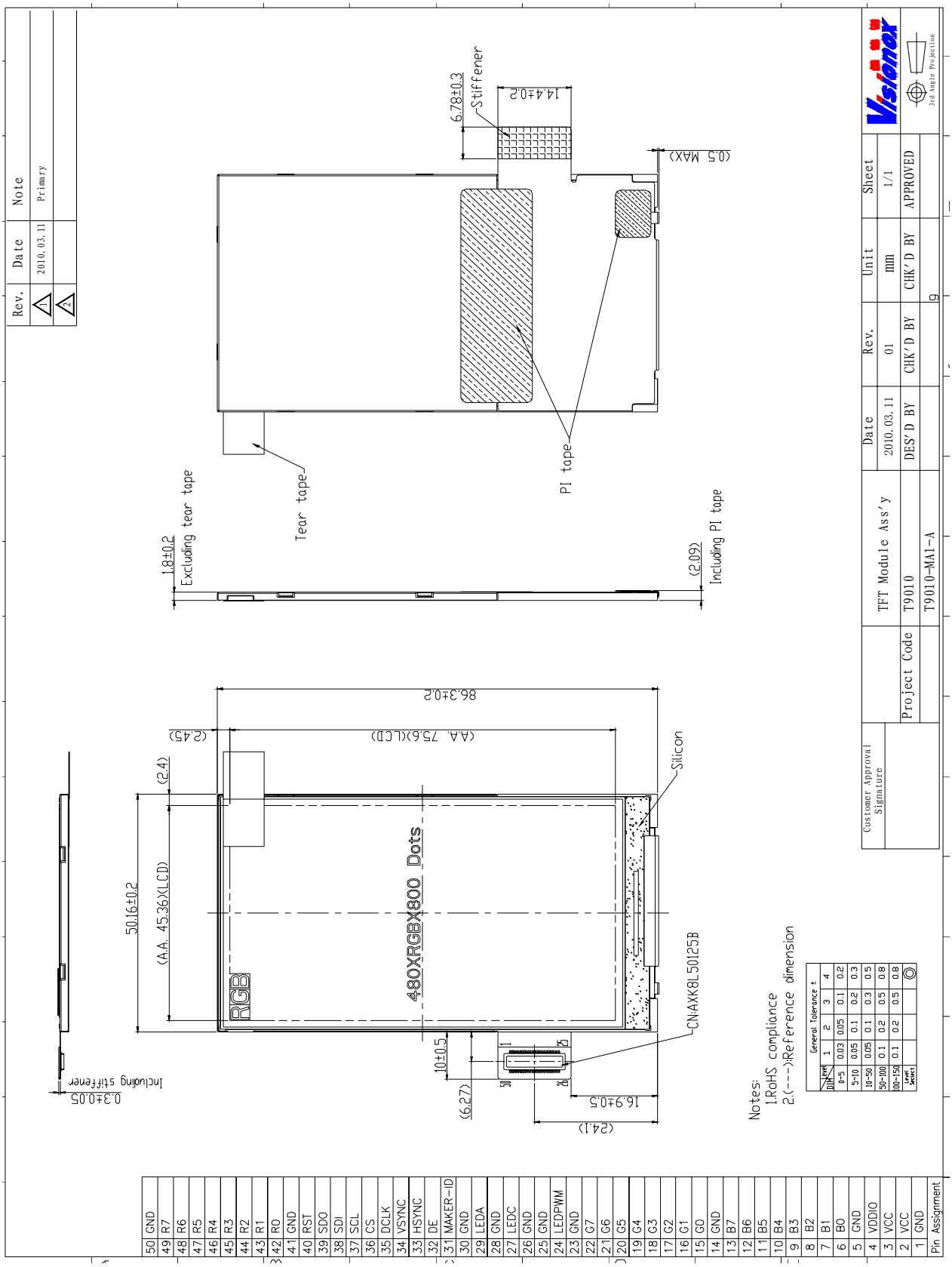
1 Overview

The specifications is a transmissive type color active matrix liquid crystal display (LCD) which uses amorphous thin film transistor (TFT) as switching devices. This product is composed of a TFT LCD panel, driver ICs, FPC, and a backlight unit. The following table described the features of KTM035AM01.

2 Mechanical Data

NO.	Item	Specification	Unit
1	Panel Size	3.5	Inch
2	Number of Pixels	480(H)×RGB×800(V)	Pixels
3	Active Area	45.36(H) × 75.6(V)	mm
4	Pixel Pitch	0.0945(H) × 0.0945(V)	mm
5	Outline Dimension	50.16(W) × 86.3(H) × 1.8 (D)	mm
6	Number of Colors	16.7M	-
7	Pixel Arrangement	RGB Vertical Stripe	-
8	Display Mode	Normally Black / Transmissive	-
9	Brightness	200(MIN)	cd/m^2
10	Contrast Ratio	500:1 (Typ)	-
11	Response time (Tr+Tf)	30 (Typ.)	ms
12	Viewing Direction	Free / MVA	-
13	Input Interface	RGB interface	-
14	Driver IC	HX8363A	-
15	Panel	CMO F03508-03V	-
16	Viewing Angle (H/V)	80/80(H);80/80(V)	degree
17	Backlight unit	LEDx7/Series	-
18	Surface Treatment	Hard Coating	-
19	Touch Panel	-	-
20	Weight	17.2	g

3 Mechanical Drawing



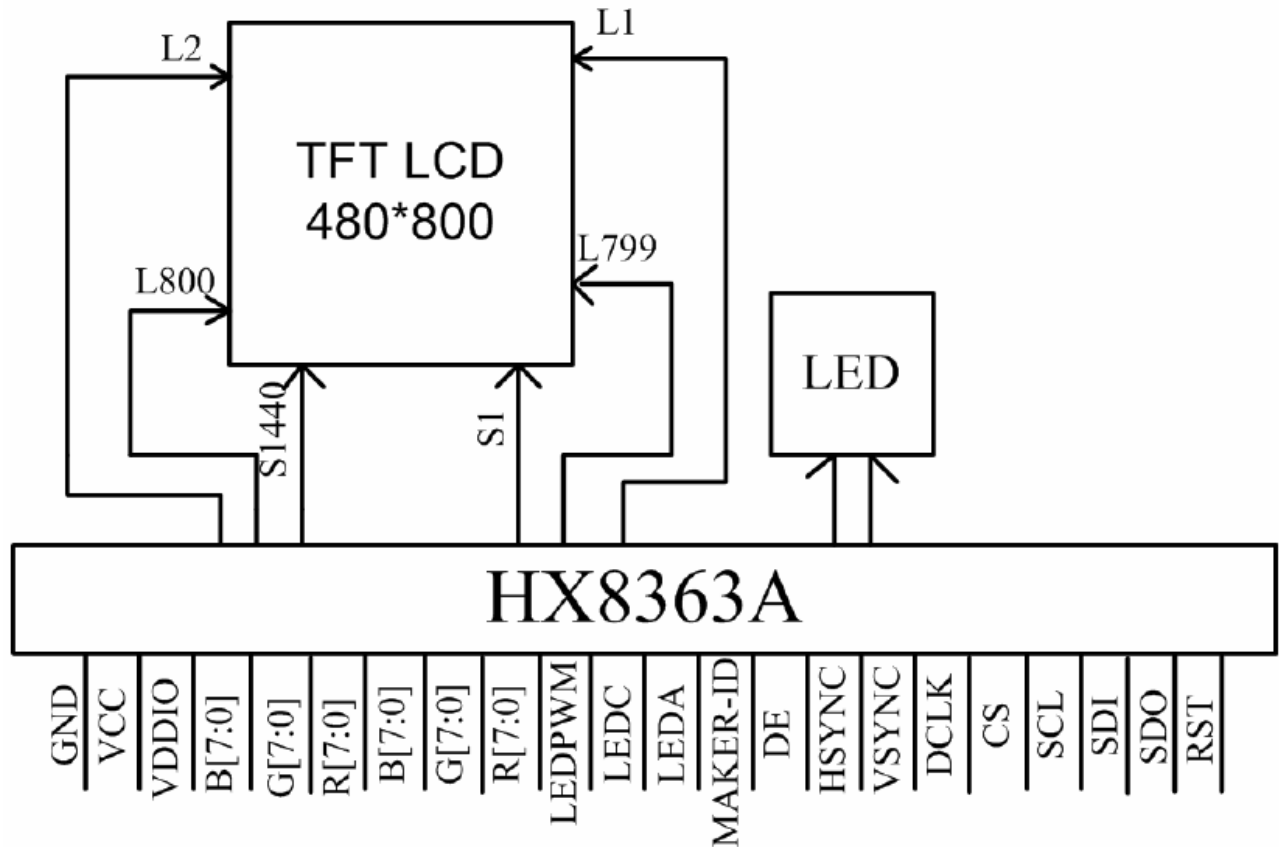
4 Module Interface

No.	Signal Name	I/O	Description	Remark
1	GND	P	System Ground	
2	VCC	P	Power supply for analog circuit	
3	VCC	P	Power supply for analog circuit	
4	VDDIO	P	Power supply for digital circuit	
5	GND	P	System Ground	
6	B0	I	Blue Bit 0	
7	B1	I	Blue Bit 1	
8	B2	I	Blue Bit 2	
9	B3	I	Blue Bit 3	
10	B4	I	Blue Bit 4	
11	B5	I	Blue Bit 5	
12	B6	I	Blue Bit 6	
13	B7	I	Blue Bit 7	
14	GND	P	System Ground	
15	G0	I	Green Bit 0	
16	G1	I	Green Bit 1	
17	G2	I	Green Bit 2	
18	G3	I	Green Bit 3	
19	G4	I	Green Bit 4	
20	G5	I	Green Bit 5	
21	G6	I	Green Bit 6	
22	G7	I	Green Bit 7	
23	GND	P	System Ground	
24	LEDPWM	O	Backlight On/Off control pin.	
25	GND	P	System Ground	
26	GND	P	System Ground	
27	LEDC	P	LED-	
28	GND	P	System Ground	
29	LEDA	P	LED+	
30	GND	P	System Ground	
31	MAKER-ID	-	Inside pull high(VDDIO)	

32	DE	I	Enable signal	
33	HSYNC	I	Horizontal synv signal	
34	VSYNC	I	Vertical sync signal	
35	DCLK	I	Pixel clock signal	
36	CS	I	Chip select pin	
37	SCL	I	Serial clock	
38	SDI	I	Serial data input pin	
39	SDO	O	Serial data output pin	
40	RST	I	Reset signal	
41	GND	P	System ground	
42	R0	I	Red Bit 0	
43	R1	I	Red Bit 1	
44	R2	I	Red Bit 2	
45	R3	I	Red Bit 3	
46	R4	I	Red Bit 4	
47	R5	I	Red Bit 5	
48	R6	I	Red Bit 6	
49	R7	I	Red Bit 7	
50	GND	P	System ground	

Note: All input signals shall be low or Hi-Z state when VDD is off.

5 Function Block Diagram



6 Absolute Maximum Rating

Item	Symbol	Values		Unit	Remark
		Min	Max.		
Power Supply Voltages	VCC	-0.3	4.6	V	GND=0
	VDDIO	-0.3	4.6	V	
LED Forward Voltage	V_F	3.2		V	
LED Forward Current	I_F	30		mA	One LED
LED Power Dissipation	Pd	96		mW	One LED
Storage Temperature	T_{STG}	-30	80	℃	
Operating Temperature (Ambient Temperture)	T_{OPR}	-20	70	℃	

7 Electrical Characteristics

7.1 LCD DC Electrical Characteristics

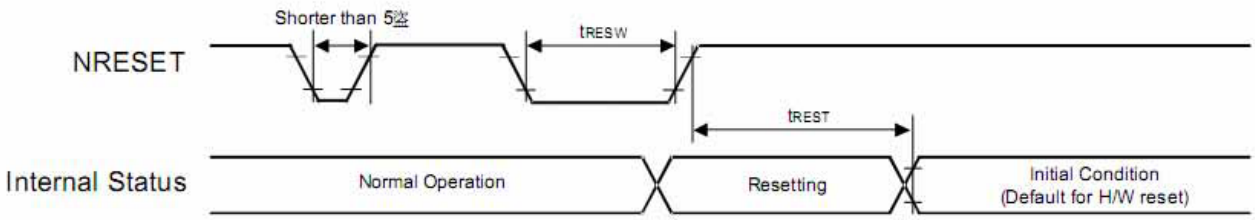
Item	Symbol	Values			Unit	Remark
		Min	Typ	Max.		
Operating voltage	VDDIO	1.65	2.8	3.3	V	
	VCC	2.3	2.8	3.3	V	
Input high voltage	V_{IH}	0.7×VDDIO	-	VDDIO	V	
Input low voltage	V_{IL}	0	-	0.3×VDDIO	V	
Output high voltage	V_{OH}	0.8×VDDIO		VDDIO	V	
Output low voltage	V_{OL}	0	-	0.2×VDDIO	V	
Current Consumption	I_{VCC}	-	7.6	-	mA	VCC =2.8V VDDIO =2.8V
Power Consumption	P_{LCD}	-	22.3	-	mW	

7.2 Backlight Unit (GND=0V)

Item	Symbol	Values			Unit	Remark
		Min	Typ	Max		
LED Voltage	V_L	-	22.4	-	V	
LED Current	IF	-	20	-	mA	
Power Consumption	P_{LED}	-	452	-	mW	

7.3 Reset Timing Characteristics (VCC=2.3 ~3.3V, VDDIO=1.65 ~3.3V)

Item	Symbol	Values			Unit	Remark
		Min	Typ	Max		
Reset low pulse width	T_{RESW}	10	-	-	us	
Reset complete width	T_{REST}	-	-	5	ms	Sleep mode
		-	-	120	ms	Normal mode

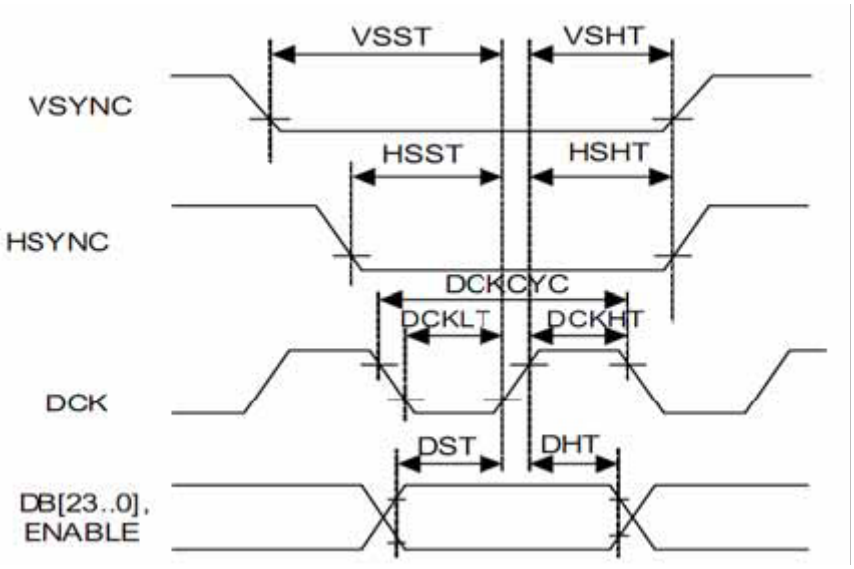


8 AC Electrical Characteristics

8.1 AC Timing Diagrams

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Vertical sync. Setup time	VSST	-	5	-	-	ns
Vertical sync. Hold time	VSHT	-	5	-	-	ns
Horizontal sync. Setup time	HSST	-	5	-	-	ns
Horizontal sync. Hold time	HSHT	-	5	-	-	ns
Pixel clock cycle When RGB I/F is running	DCKCYC	VRR = Min . 50 Hz Max. 70 Hz	31 (Note 3)	-	49.2 (Note 4)	ns
Pixel clock low time	DCKLT	-	5	-	-	ns
Pixel clock high time	DCKHT	-	5	-	-	ns
Data setup time DB[23:0]	DST	-	5	-	-	ns
Data Hold time DB[23:0]	DHT	-	5	-	-	ns

Note: (1) Signal rise and fall times are equal to or less than 20 ns.
(2) Input signals are measured by 0.30 x VDD1 for low state and 0.70 x VDD1 for high state.
(3) 32.2 MHz
(4) 20.3 MHz



9 Optical characteristics

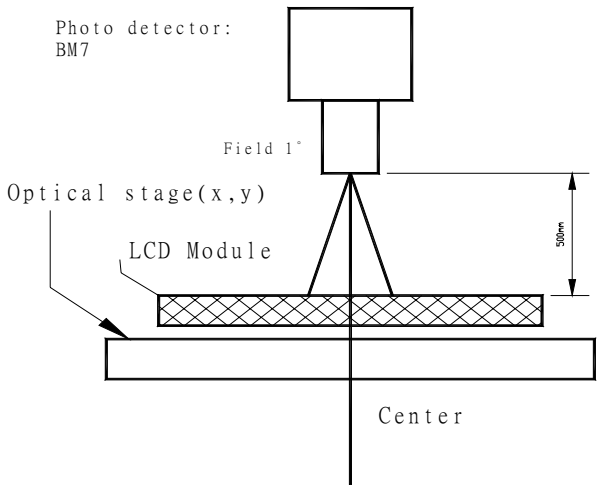
The following items are measured under stable conditions. The optical characteristics should be measured in a dark room or equivalent state with the methods shown in Note.

9.1 Main LCD Optical Characteristics

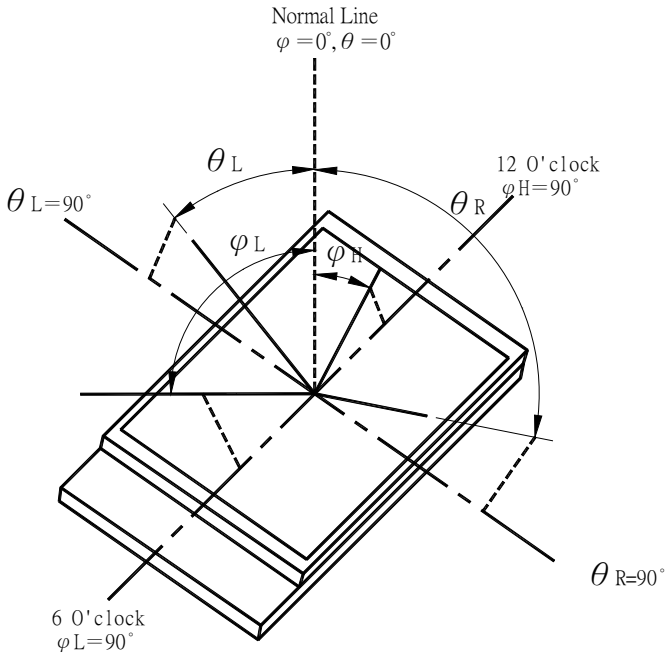
Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Viewing Angle	Top	ΦU	CR≧10	-	80	-	degree	Note.2
	Bottom	ΦD		-	80	-		
	Left	ΘL		-	80	-		
	Right	ΘR		-	80	-		
Response time(Tr+Tf)			T=0	-	30	-	ms	Note.3
Uniformity		ΔB	IF=20mA	80	85		%	Note.0
Brightness			Center	200	230		cd/m^2	
Contrast Ratio		CR	At optimized viewing angle	450	500	-	-	Note.4
Color Chromaticity	White	Xw	Viewing normal angle Φ,Θ=0	0.247	0.297	0.347	-	Note.5
		Yw		0.291	0.341	0.391		
	Red	X_R		0.603	0.653	0.703	-	-
		Y_R		0.285	0.335	0.385		
	Green	X_G		0.257	0.307	0.357	-	-
		Y_G		0.586	0.636	0.686		
	Blue	X_B		0.094	0.144	0.194	-	-
		Y_B		0.007	0.057	0.107		

Note.0: ΔB=B(min)/B(max)

Note.1: After stabilizing and leaving the panel alone at a given temperature for 30 minutes, the measurement should be executed. Measurement should be executed in a stable, windless, and dark room. Optical specifications are measured by Topcon K-10 Series Colorimeter with a viewing angle of 1° at a distance of 50cm and normal direction.

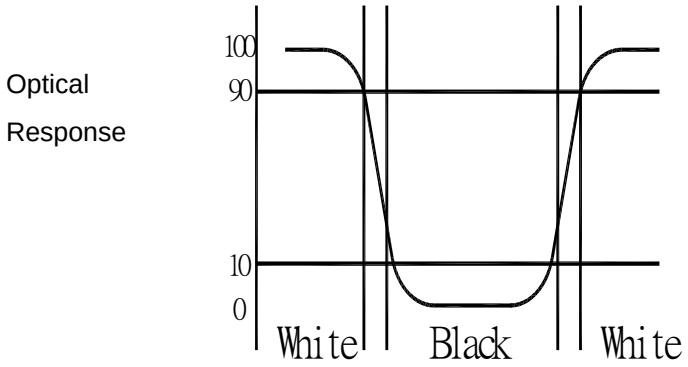


Note.2: Definition of Viewing Angle: Refer to figure as below:



Note.3: Definition of Response Time: TR and TF

The figure below is the output signal of the photo detector.



Note.4: Definition of Contrast Ratio (CR)

Ratio of gray max (G max)& gray min(G min)
Contrast ratio (CR) =(G max) / (G min)
(G max)=luminance with all pixel white
(G min)=luminance with all pixel black

Note.5: Measured at the center area of the panel when all the input terminals of LCD panel are electrically opened.

10 Package Specification

TBD

11 Precautions for operation and Storage

11.1 Precautions for Operation

(1) Since the display panel is made of glass, do not apply any mechanical shock or impact or excessive force to it when installing the module. Any strong mechanical impact due to falling dropping etc. may cause damage (breakage or cracking).

(2) If the display panel is damaged and the liquid crystal substance inside it leaks out, be sure not to get any in your mouth, if the substance comes into contact with your skin or clothes, promptly wash it off using soap and water.

(3) The polarizer on the display surface is made of soft material and is easily scratched. Please take most care when handing. When the display surface is contaminated, please wipe it off gently by using moisten soft cloth with isopropyl alcohol, do not use water, ketone or aromatics.If still not completely clear, moisten cloth with isopropyl alcohol or ethyl alcohol solvents.

(4) When handling the LCD module, please be sure that the body and the tools are properly grounded. And do not touch I/O pins with bare hands or contaminate I/O pins, it will cause disconnection or defective insulation of terminals.

(5) Do not attempt to disassemble or process the LCD module.

(6) The LCD Module is coated with a film to protect the display surface. Be care when peeling off this protective film since static electricity may be generated. To reduce the amount of static electricity generated, do not conduct assembly and other work under dry conditions.

(7) Do not put one product on the other .Otherwise, it may cause the product to be scratched and/or change on cosmetic occur (ex. Newton ring).

11.2 Soldering

(1) Soldering should be performed only on the I/O terminals.

(2) Use soldering irons with proper grounding and no leakage.

(3) Iron: no higher than 300℃ and 3~4 sec during soldering.

11.3 Precautions for Storage

(1) Please store LCD module in a dark place. Avoid exposure to sunlight, the light of fluorescent lamp or any ultraviolet ray.

(2) Keep the environment temperature between 0℃ and 40℃ and the relative humidity less than 80%. Avoid high temperature and high humidity.

(3) Keep the LCD modules stored in the room without acid ,alkali and harmful gas.

11.4 Warranty period

Visionox Display Co., Ltd. warrants for a period of 12 months from the shipping date when stored or used under normal condition.