BOELE CO.,LTD

LCD MODULE

SPECIFICATION

Customer: _____

Model Name: Q101IRE-LA1

Date: 2013/09/06

Version: 1.0

□Preliminary Specification

■Final Specification

For Customer's Acceptance

Approved by	Comment

Approved by	Reviewed by	Prepared by
鄭國偉	袁凌霄	夏彩梅

Record of Revision

Version	Revise Date	Page	Content
Pre-Spec.01	2012/11/16		Initial Release
Spec.02	2012/6/5		Update LCM and package drawing
Spec 1.0	2013/09/06		update Mechanical Drawing

Contents

1. General Specifications

No.	Item	Specification	Remark
1	LCD size	10.1 inch(Diagonal)	
2	Driver element	a-Si TFT active matrix	
3	Resolution	1280 × 3(RGB) × 800	
4	Display mode	Normally Black, Transmissive	
5	Dot pitch	0.0565(W) × 0.1695(H) mm	
6	Active area	216.96(W) × 135.60(H) mm	
7	Module size	228.6(W) ×149.2(H) ×2.6(MAX) mm	Note 1
8	Surface treatment	Hard-Coating	
9	Color arrangement	RGB-stripe	
10	Interface	Digital	
11	Backlight power consumption	3.1W (Max)	Note 2
12	Panel power consumption	1.15W (Max)	Note 3
13	Weight	160g(Max)	

Note 1: Refer to Mechanical Drawing.
Note 2: Including LED Driver power consumption.
Note 3: Including T-con Board power consumption

2. Pin Assignment

A 40pin connector MSAK24025P40 is used for the module electronics interface.

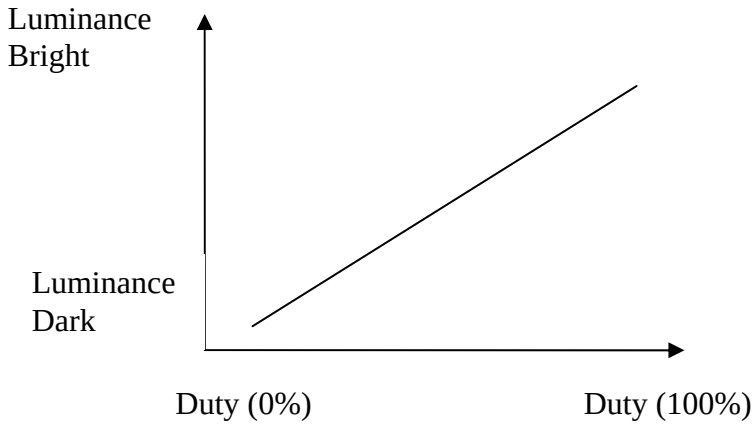
Pin No.	Symbol	I/O	Function	Remark
1	NC	---	No connection	
2	VDDIN	P	Power Supply, VDDIN=3.3V (Typ.)	
3	VDDIN	P	Power Supply, VDDIN=3.3V (Typ.)	
4	VDC	P	Power Supply, VDC =3.3V (Typ.)	
5	NC	---	No connection	
6	CLK EDID	I	CLK for EDID function use	
7	DATE EDID	I	CLK for EDID function use	
8	Rin0-	I	LVDS Negative data signal(-)	R0-R5, G0
9	Rin0+	I	LVDS Positive data signal(+)	
10	GND	P	Ground	
11	Rin1-	I	LVDS Negative data signal(-)	G1~G5, B0,B1
12	Rin1+	I	LVDS Positive data signal(+)	
13	GND	P	Ground	
14	Rin2-	I	LVDS Negative data signal(-)	B2-B5,HS,VS, DE
15	Rin2+	I	LVDS Positive data signal(+)	
16	GND	P	Ground	
17	LVDS_CLK-	I	LVDS Negative CLK signal(-)	LVDS CLK
18	LVDS_CLK+	I	LVDS Positive CLK signal(+)	
19	GND	P	Ground	
20	RIN3-	I	LVDS Negative data signal(-)	R6, R7, G6, G7, B6, B7
21	RIN3+	I	LVDS Positive data signal(+)	
22	CE_EN	I	Color engine enable	Note 1
23	NC	---	No connection	
24	NC	---	No connection	
25	GND	P	LED Ground	
26	NC	---	No connection	
27	NC	---	No connection	

28	GND	P	Ground	
29	NC	---	No connection	
30	NC	---	No connection	
31	LED_GND	P	LED Ground	
32	LED_GND	P	LED Ground	
33	LED_GND	P	LED Ground	
34	NC	---	No connection	
35	LED_PWM	I	PWM Signal for LED dimming control	Note 2
36	LED_EN	I	LED Enable Pin (+3V Input)	
37	CABC_EN	I	CABC Enable	Note 1
38	VLED	---	LED Power Supply VLED=3.7V	
39	VLED	---	LED Power Supply VLED=3.7V	
40	VLED	---	LED Power Supply VLED=3.7V	

I: input, O: output, P: Power
Note1: The setting of Color Enhance /CABC function are as follows.

Pin	Enable	Disable
Color_EN	High Voltage	Low Voltage or open
CABC_EN	High Voltage	Low Voltage or open

Note2: LED_PWM is used to adjust backlight brightness.



3. Operation Specifications

3.1. Absolute Maximum Ratings

(Note 1)

Item	Symbol	Values		Unit	Remark
		Min.	Max.		
Power voltage	VDD	-0.3	5.0	V	VSS=0V, TA=25℃
	VLED	-0.3	5.0	V	
Operation Temperature	T_{OP}	-10	50	℃	
Storage Temperature	T_{ST}	-20	60	℃	

Note 1: The absolute maximum rating values of this product are not allowed to be exceeded at any times. Should a module be used with any of the absolute maximum ratings exceeded, the characteristics of the module may not be recovered, or in an extreme case, the module may be permanently destroyed.

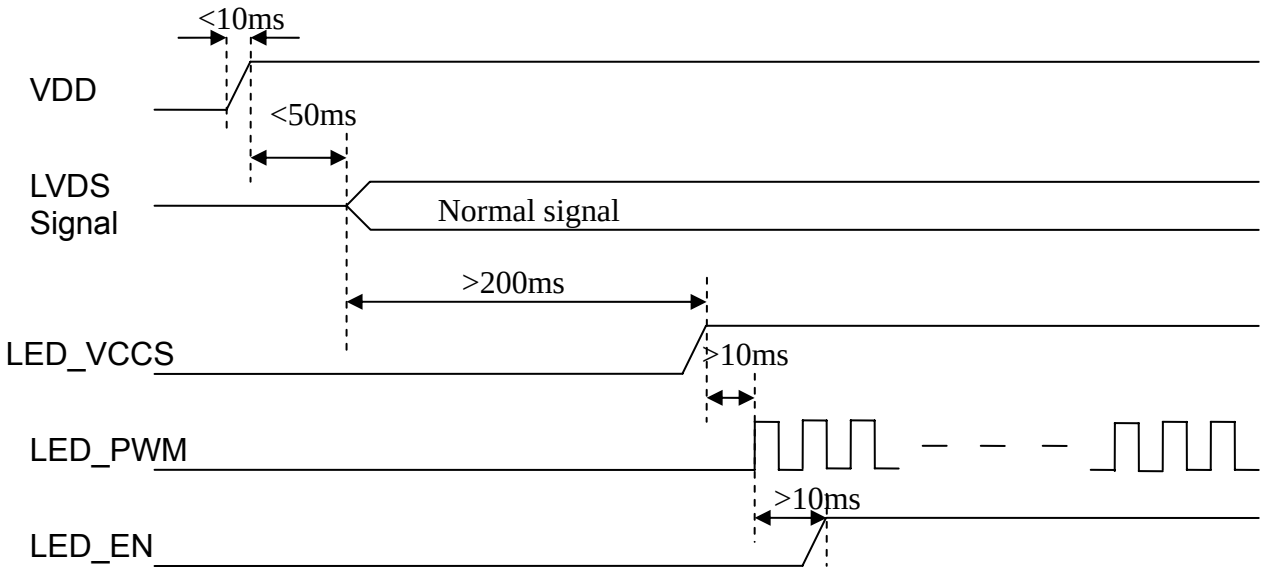
3.2. Typical Operation Conditions

(GND=0V, T_A=25 ^oC)

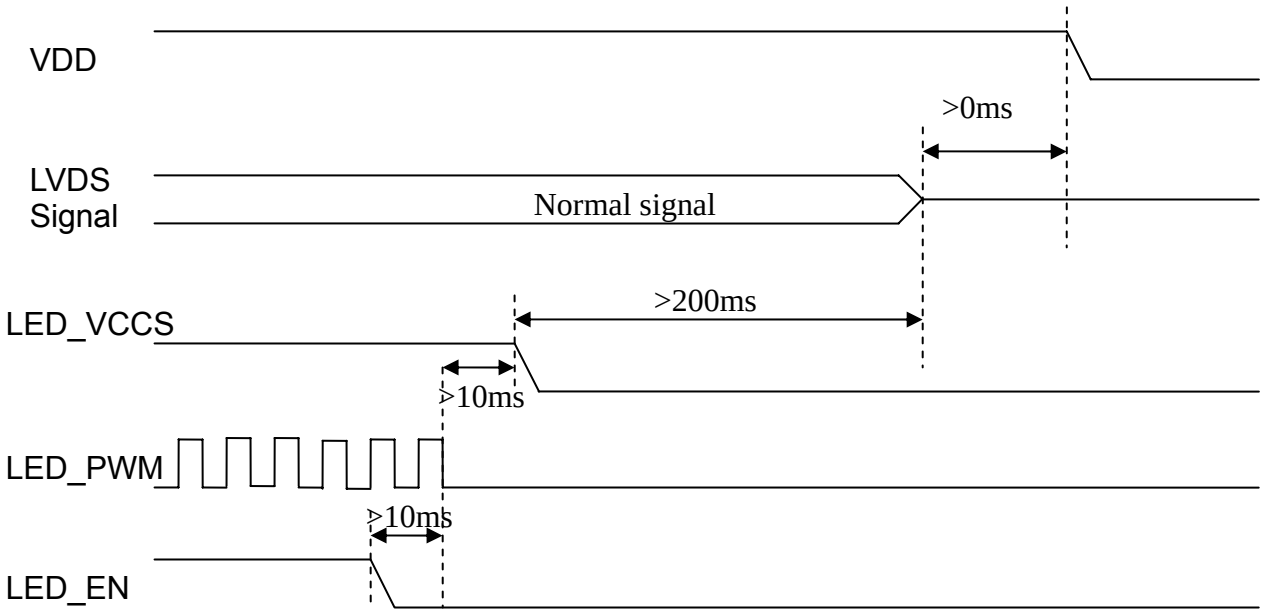
Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Power voltage	VDD	-	3.3	-	V	
	VLED	3.3	3.7	4.2	V	
Input logic high voltage	V_{IH}	3.0	3.3	3.6	V	
Input logic low voltage	V_{IL}	0	-	0.5	V	
Current for Driver	I_{VDD}	-	255	348	mA	VDD=3.3V
	I_{VLED}	-	830	837	mA	VLED=3.7V, Duty=100%
EN Control Level	Backlight On	3.0	-	3.6	V	
	Backlight Off	0	-	0.4	V	
PWM Control Level	PWM High Level	3.0	-	3.6	V	
	PWM Low Level	0	-	0.4	V	
PWM Control Frequency	f_{PWM}	1K	-	20K	Hz	

3.3. Power Sequence

a. Power on:



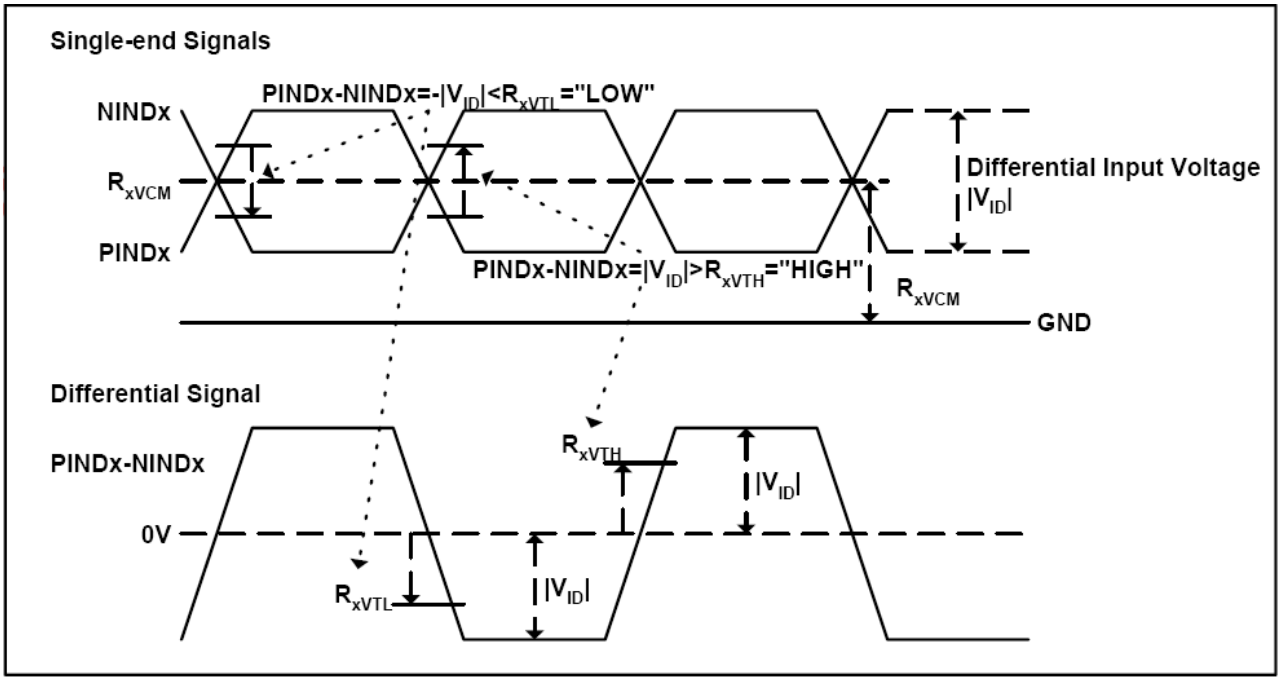
b. Power off:



3.4. LVDS Signal Timing Characteristics

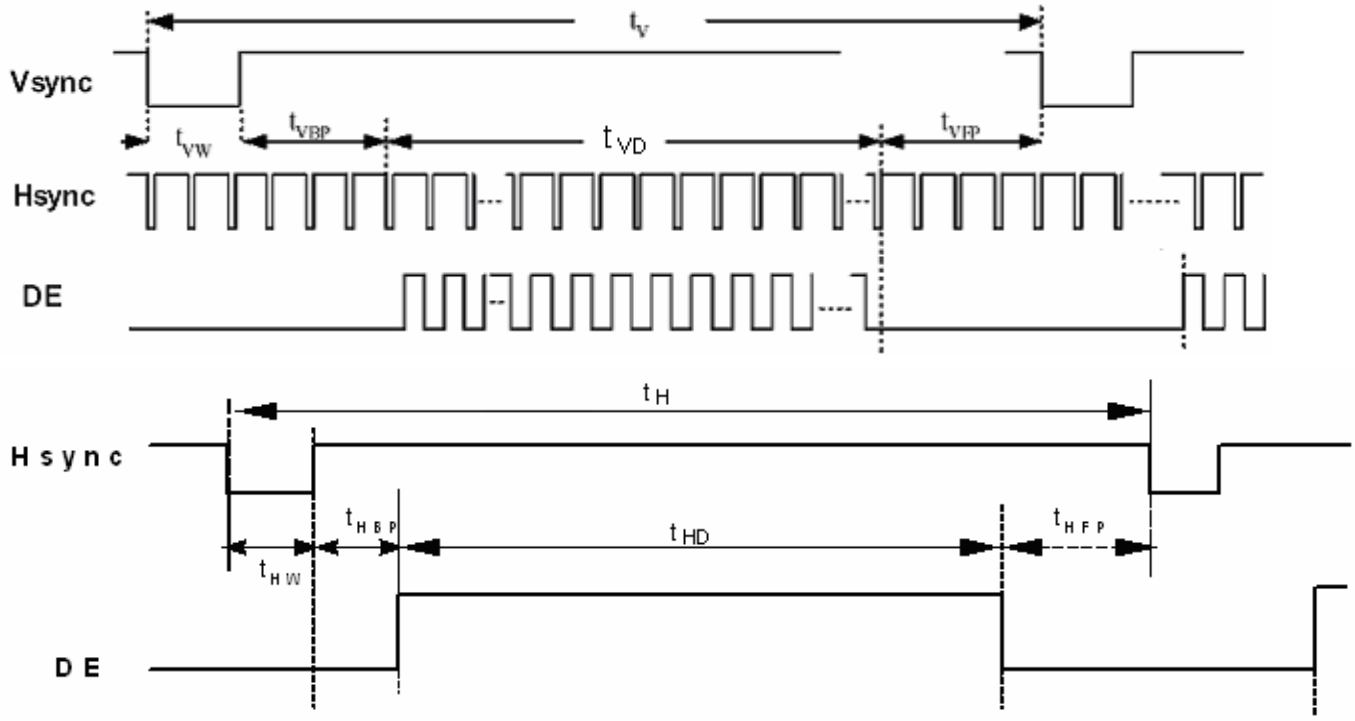
3.4.1. AC Electrical Characteristics

Parameter	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
LVDS Differential input high Threshold voltage	R_{xVTH}	-	-	+100	mV	R_{XVCM}=1.2V
LVDS Differential input low Threshold voltage	R_{xVTL}	-100	-	-	mV	
LVDS Differential input common mode voltage	R_{xVCM}	0.7	-	1.6	V	
LVDS Differential voltage	$\|V_{ID}\|$	250	-	600	mV	

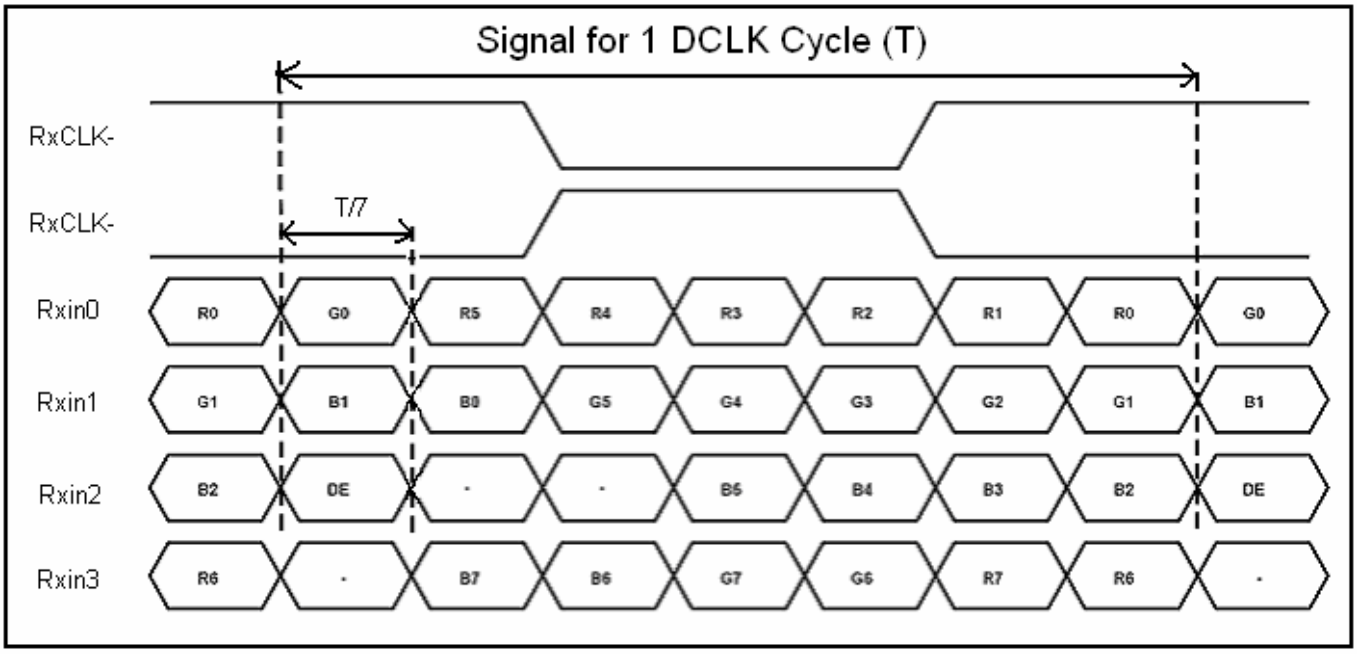


3.4.2. Timing Table

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Clock Frequency	1/Tc	68.9	71.1	85	MHz	Frame rate =60Hz
Horizontal display area	tHD		1280		Tc	
HS period time	tH	1410	1440	2000	Tc	
HS Width +Back Porch +Front Porch	tHW+ tHBP +tHFP	60	160	720	Tc	
Vertical display area	tVD		800		tH	
VS period time	tv	815	823	1024	tH	
VS Width +Back Porch +Front Porch	tvW+ tvBP +tvFP	15	23	224	tH	



3.4.3. LVDS Data Input Format



4. Optical Specifications

Item	Symbol	Condition	Values			Unit	Remark
			Min.	Typ.	Max.		
Viewing angle (CR≥ 10)	θ_L	Φ=180°(9 o'clock)	75	80	-	degree	Note 1
	θ_R	Φ=0°(3 o'clock)	75	80	-		
	θ_T	Φ=90°(12 o'clock)	75	80	-		
	θ_B	Φ=270°(6 o'clock)	75	80	-		
Response time	T_{ON}	Normal =Φ=0°	-	10	20	msec	Note 3
	T_{OFF}		-	15	30	msec	Note 3
Contrast ratio	CR		600	800	-	-	Note 2 Note 4
Color chromaticity	W_X		0.28	0.31	0.34	-	Note 2 Note 5 Note 6
	W_Y		0.30	0.33	0.36	-	
Luminance	L		300	350	-	cd/m²	Note 6
Luminance uniformity	Y_U		70	75	-	%	Note 7

Test Conditions:

1. VDD=3.3V, VLED=3.7V, the ambient temperature is 25℃.
2. The test systems refer to Note 2.

Note 1: Definition of viewing angle range

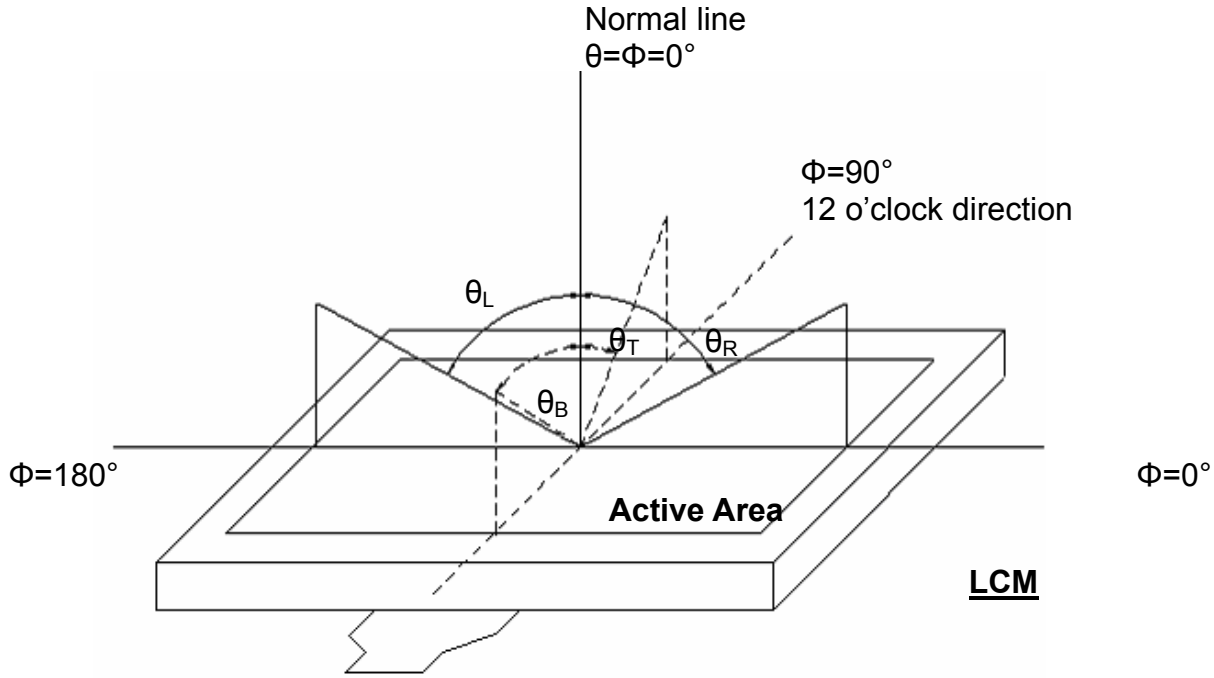


Fig. 4-1 Definition of viewing angle

Note 2: Definition of optical measurement system.

The optical characteristics should be measured in dark room. After 30 minutes operation, the optical properties are measured at the center point of the LCD screen. (Viewing angle is measured by ELDIM-EZ contrast/Height :1.2mm, Response time is measured by Photo detector TOPCON BM-7, other items are measured by BM-5A/ Field of view: 1° /Height: 500mm.)

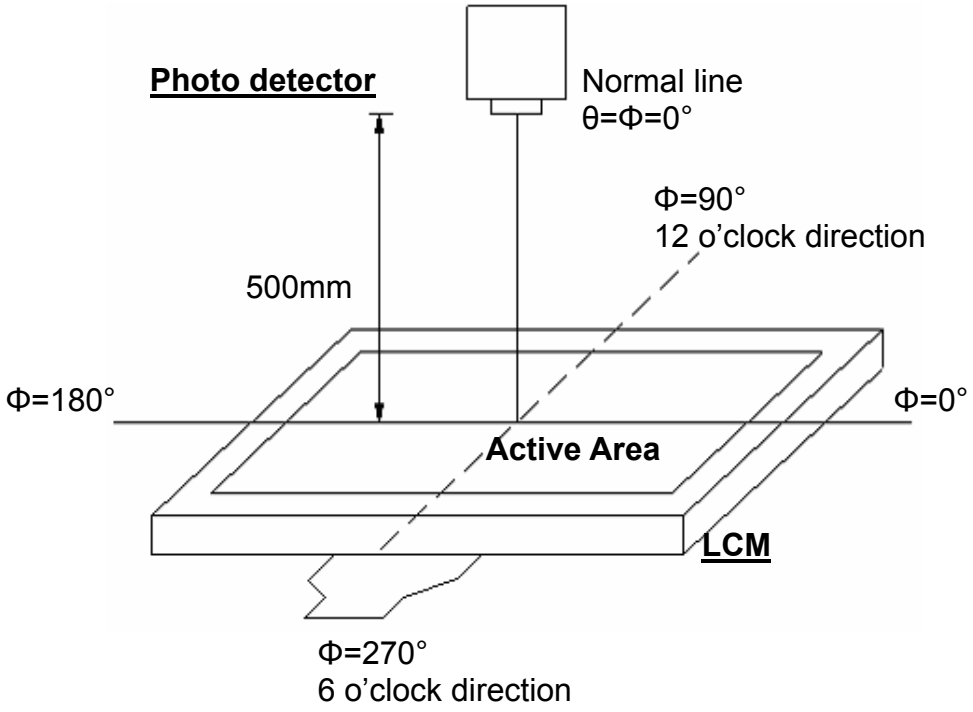


Fig. 4-2 Optical measurement system setup

Note 3: Definition of Response time

The response time is defined as the LCD optical switching time interval between “White” state and “Black” state. Rise time (T_{ON}) is the time between photo detector output intensity changed from 90% to 10%. And fall time (T_{OFF}) is the time between photo detector output intensity changed from 10% to 90%.

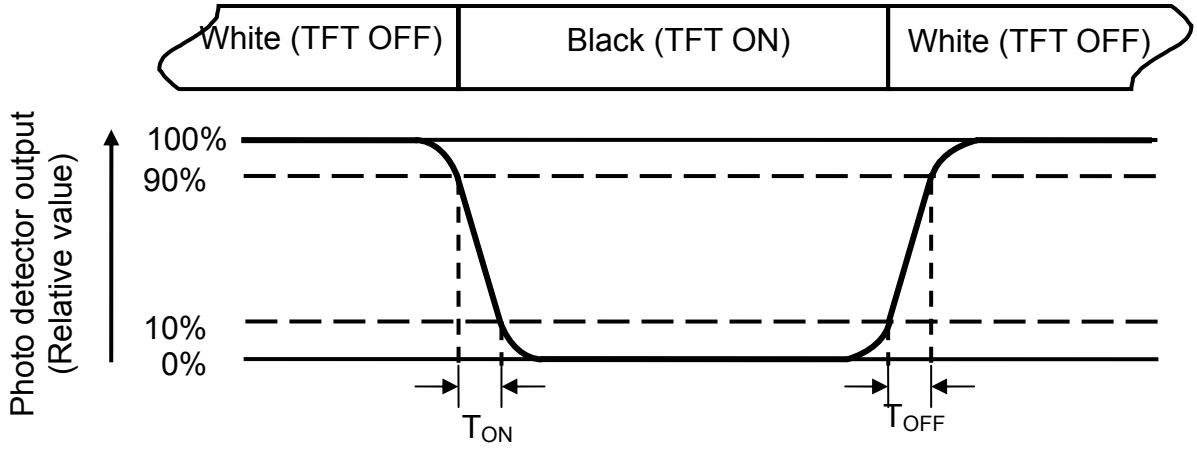


Fig. 4-3 Definition of response time

Note 4: Definition of contrast ratio

$$\text{Contrast ratio (CR)} = \frac{\text{Luminance measured when LCD on the "White" state}}{\text{Luminance measured when LCD on the "Black" state}}$$

The Luminance in the formula measured at center point of LCD.

Note 5: Definition of color chromaticity (CIE1931)

Color coordinates measured at center point of LCD.

Note 6: All input terminals LCD panel must be grounded while measuring the Average of 5 points of the panel. The LED driving condition is I_L=240mA.

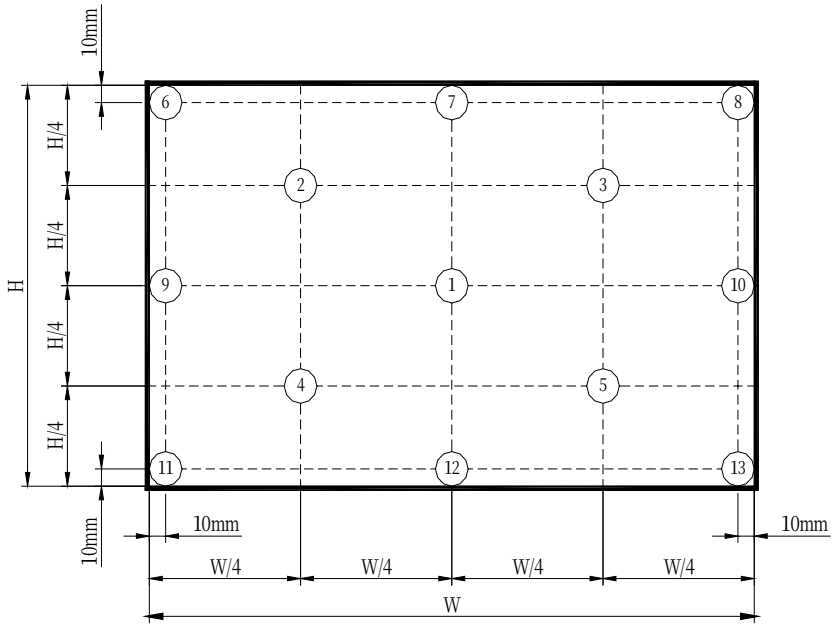
The average of 5 points luminance = (L (1)+ L (2)+ L (3)+ L (4)+ L (5)) / 5

The points measured refers to Notes 7

Note 7: Definition of Luminance Uniformity

Measure the luminance of gray level 63 at 9 points

δW_{9p} = {Minimum [L (1)+ L (6)+ L (7)+ L (8)+ L (9)+ L (10)+ L (11) +L (12) +L (13)] / Maximum [L (1)+ L (6)+ L (7)+ L (8)+ L (9)+ L (10)+ L (11) +L (12) +L (13)]}*100%



5. Reliability Test Items

(Note3)

Item	Test Conditions	Remark
High Temperature Storage	Ta = 60℃ 240hrs	Note 1，Note 4
Low Temperature Storage	Ta = -20℃ 240hrs	Note 1，Note 4
High Temperature Operation	Ts = 50℃ 240hrs	Note 2，Note 4
Low Temperature Operation	Ta = -10℃ 240hrs	Note 1，Note 4
Operate at High Temperature and Humidity	+40℃, 90%RH 240hrs	Note 4
Thermal Shock	-20℃/30 min ~ +60℃/30 min for a total 100 cycles, Start with cold temperature and end with high temperature.	Note 4
Vibration Test	ISTA-3A 1Hz~200Hz,Grms=0.53 Half hours for direction of Z.	
Mechanical Shock	100G 6ms,±X, ±Y, ±Z 3 times for each direction	
Electro Static Discharge	C=150pF,R=300Ω,8point/Panel Contact:± 4KV, 5times, Human Body Mode Air : ± 8KV, 5times, Human Body Mode (Environment :15°C~35°C,30%~60%)	

Note 1: Ta is the ambient temperature of samples.
Note 2: Ts is the temperature of panel's surface.
Note 3: In the standard condition, there shall be no practical problem that may affect the display function. After the reliability test, the product only guarantees operation, but don't guarantee all of the cosmetic specification.
Note 4: Before cosmetic and function test, the product must have enough recovery time, at least 2 hours at room temperature.

6. General Precautions

6.1. Safety

Liquid crystal is poisonous. Do not put it in your mouth. If liquid crystal touches your skin or clothes, wash it off immediately by using soap and water.

6.2. Handling

1. The LCD panel is plate glass. Do not subject the panel to mechanical shock or to excessive force on its surface.
2. The polarizer attached to the display is easily damaged. Please handle it carefully to avoid scratch or other damages.
3. To avoid contamination on the display surface, do not touch the module surface with bare hands.
4. Keep a space so that the LCD panels do not touch other components.
5. Put cover board such as acrylic board on the surface of LCD panel to protect panel from damages.
6. Transparent electrodes may be disconnected if you use the LCD panel under environmental conditions where the condensation of dew occurs.
7. Do not leave module in direct sunlight to avoid malfunction of the ICs.

6.3. Static Electricity

1. Be sure to ground module before turning on power or operating module.
2. Do not apply voltage which exceeds the absolute maximum rating value.

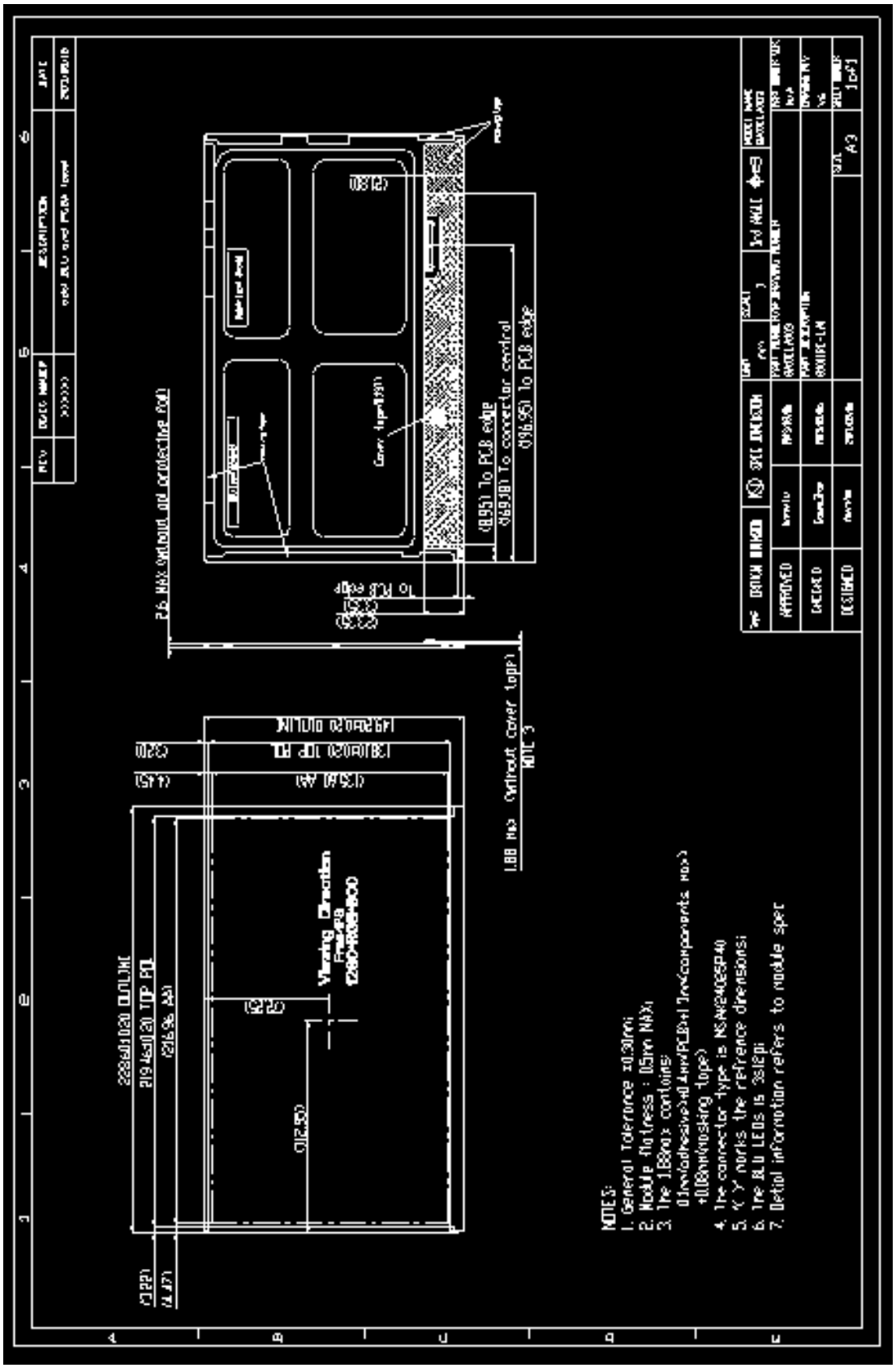
6.4. Storage

1. Store the module in a dark room where must keep at 25±10℃ and 65%RH or less.
2. Do not store the module in surroundings containing organic solvent or corrosive gas.
3. Store the module in an anti-electrostatic container or bag.

6.5. Cleaning

1. Do not wipe the polarizer with dry cloth. It might cause scratch.
2. Only use a soft sloth with IPA to wipe the polarizer, other chemicals might permanent damage to the polarizer.

7. Mechanical Drawing



8. Package Drawing

8.1 Packaging Material Table

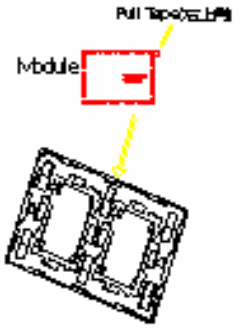
No.	Item	Model (Material)	Dimensions(mm)	Unit Weight (kg)	Quantity	Remark
1	LCM Module	Q101IRE-LA1	228.6 X149.2X 2.6	0.1445	40pcs	
2	Partition	BC Corrugated paper	512 X 349 X 226	1.25	1set	
3	PET Tray	PET	511 X 342X14.6	0.21	21pcs	
4	Dust-Proof Bag	PE	700 X 530	0.060	1pcs	
5	Carton	Corrugated paper	530 X 355 X 255	1.10	1pcs	
6	Total weight	12.6 Kg±5%				

8.2 Packaging Quantity

Total LCM quantity in Carton: 2pcs/Tray X 20 Trays/Carton = 40pcs

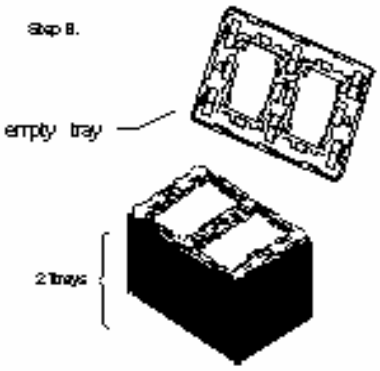
8. Packaging Drawing

Step A.



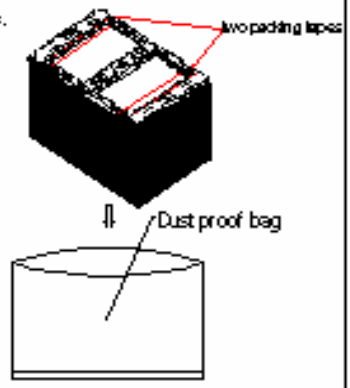
NOTES:
Put products into the trays.
The top surface of products face to us.
There are 2 pcs modules/ one tray.

Step B.



Notes:
There are total 40modules in 21 trays.
Every second tray turn 180 degrees to stack up.
The top tray is empty.

Step C.

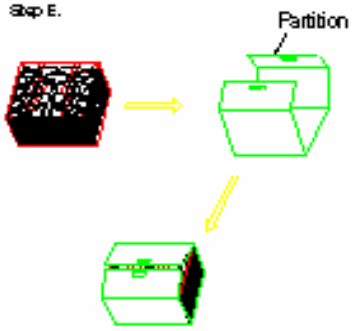


1.Wind around two packing-tapes as above picture
2.Put trays into Dust-Proof Bag.

Step D.

1.Seal the Dust-Proof Bag.
2.Wind around two packing-tapes as above picture

Step E.



Put it into the Partition

Step F.

Put it into the Carton.

Step G.

Seal the Carton.

Step H.

Paste the label on Caton

Step I.

Put the 30 loaded packages on a pallet.
There are 6 packages on a storey, 5 stores on a pallet.