Specification for Approval

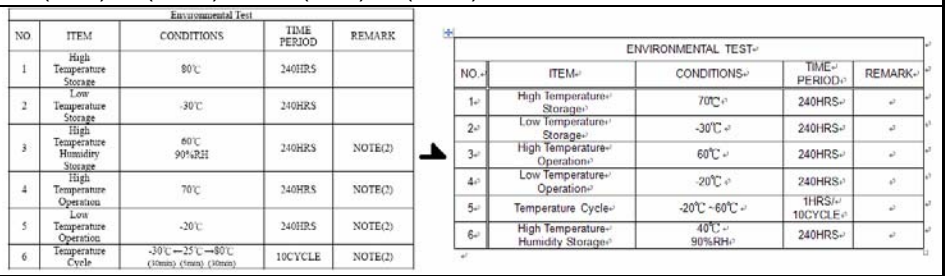
Customer:_____

Model Name:_____

Supplier Approval			Customer approval
R&D Designed	R&D Approved	QC Approved	
Peter	Peng Jun		

C O N T E N T S

1.RECORD OF REVISION

REV	DATE	PAGE	SUMMARY
A	2013.04.11	ALL	Preliminary specification was first issued.
B	2013.10.21	1	Modify 3.MECHANICAL SPECIFICATIONS (11) Module Weight(g) : T.B.D→135
		6	Modify:8.2 BACKLIGHT UNITS ,LED Driving Current TBD(TYP.),TBD(MAX.)→ 350(TYP.), 385(MAX.)
		8	Modify: OPTICAL CHARACTERISTICS Chromaticity:X: (0.249)MIN,(0.299)TYP,(0.349)MAX Y: (0.273)MIN,(0.323)TYP,(0.373)MAX → X: 0.27 MIN, 0.32 TYP, 0.37 MAX Y: 0.3 MIN, 0.35 TYP, 0.4 MAX Luminance L : (500)MIN, (550)TYP, → L : 900 MIN, 1000 TYP
C	2014.07.29	5	OPERATING -20(MIN),70(MAX) →-20(MIN),60(MAX). STORAGE -30(MIN),80(MAX) →-30(MIN),70(MAX)
		14	

Environmental Test

NO.	ITEM	CONDITIONS	TIME PERIOD	REMARK
1	High Temperature Storage	80℃	240HRS	
2	Low Temperature Storage	-30℃	240HRS	
3	High Temperature Humidity Storage	60℃ 90%RH	240HRS	NOTE(2)
4	High Temperature Operation	70℃	240HRS	NOTE(3)
5	Low Temperature Operation	-20℃	240HRS	NOTE(2)
6	Temperature Cycle	-30℃→25℃→80℃ (30min) (5min) (30min)	10CYCLE	NOTE(2)

ENVIRONMENTAL TEST

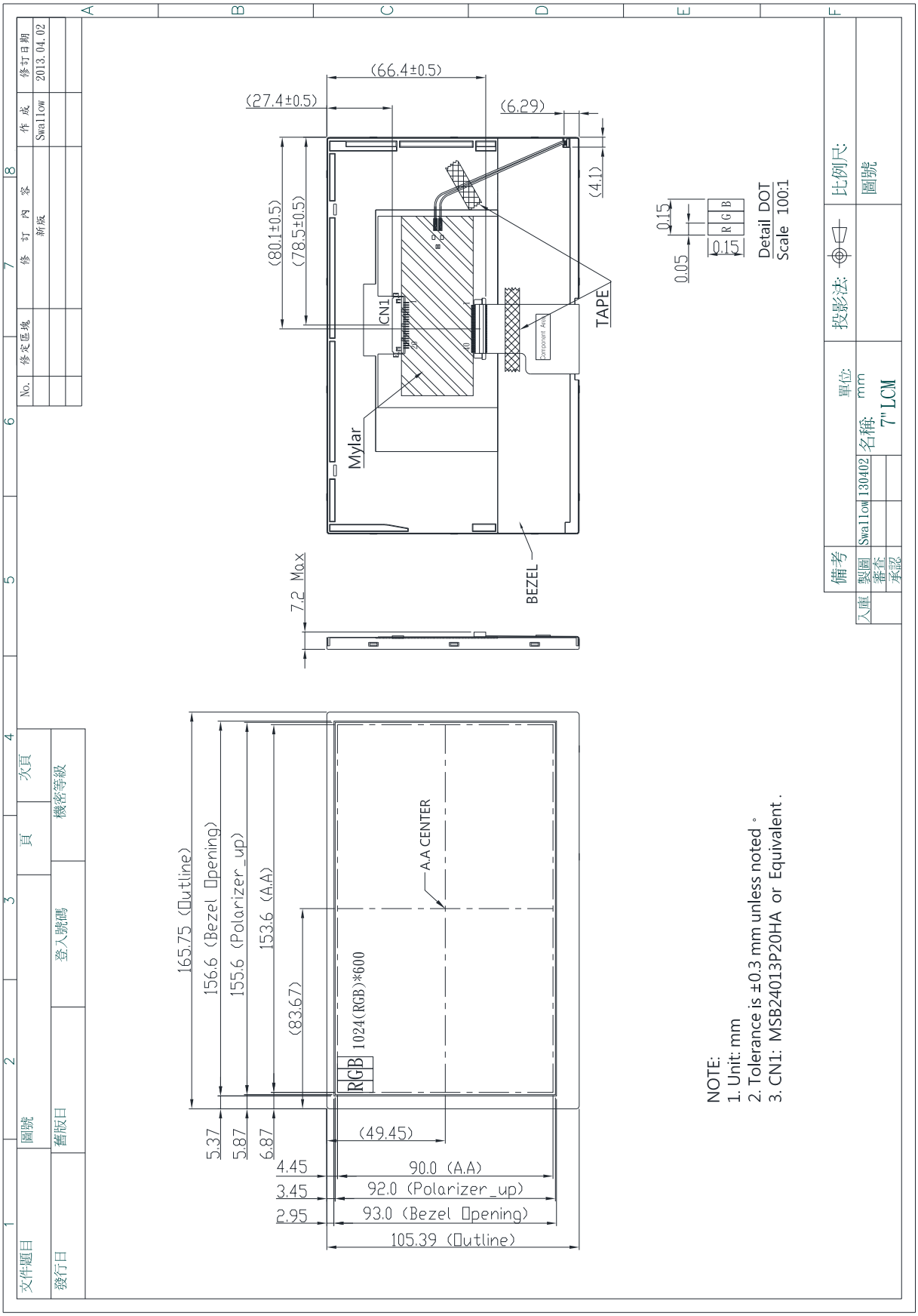
NO.	ITEM	CONDITIONS	TIME PERIOD	REMARK
1	High Temperature Storage	70℃	240HRS	
2	Low Temperature Storage	-30℃	240HRS	
3	High Temperature Operation	60℃	240HRS	
4	Low Temperature Operation	-20℃	240HRS	
5	Temperature Cycle	-20℃ ~60℃	1HRS/ 10CYCLE	
6	High Temperature Humidity Storage	40℃ 90%RH	240HRS	

2.MECHANICAL SPECIFICATIONS

(1)	Number Of Dots (Dots)	1024(R.G.B) X 600
(2)	Module Size(mm)	165.75(H) X 105.39(V) X5.0(D)
(3)	Active Area(mm)	153.6(H) X 90.0(V)
(4)	Pixel Pitch(mm)	0.15(H) X 0.15(V)
(5)	LCD Model	TFT , Transmissive, Normally/White
(6)	Backlight Color	White, LED
(7)	Viewing Direction	12 O'clock Horizontal：Right side 75°(typ.), Left side 75°(typ.) Vertical：Up side 70°(typ.), Down side 75°(typ.)
(8)	Gray Scale Inversion Direction	6 O'clock
(9)	Electrical Interface	LVDS Interface
(10)	Color Configuration	R.G.B Stripe
(11)	Module Weight(g)	135±5%

**Viewing direction for best image quality is different from TFT definition, there is the 180 degrees shift

3. OUTLINE DIMENSIONS



4. INTERFACE PIN CONNECTION

4.1 LCM PANEL DRIVING SECTION

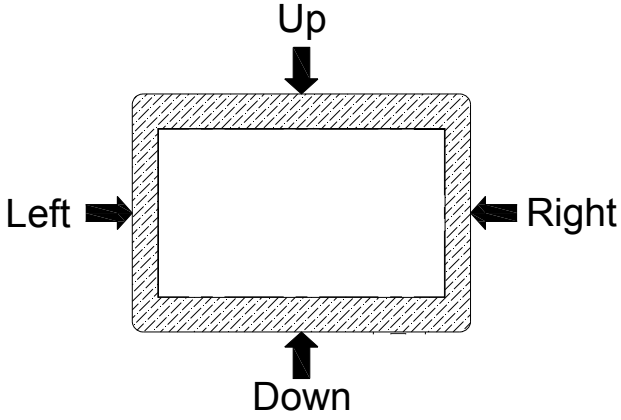
CN1 Connector：STM MSB24013P20HA or Equivalen

Mating Connector : STM P24013P20 or Equivalen

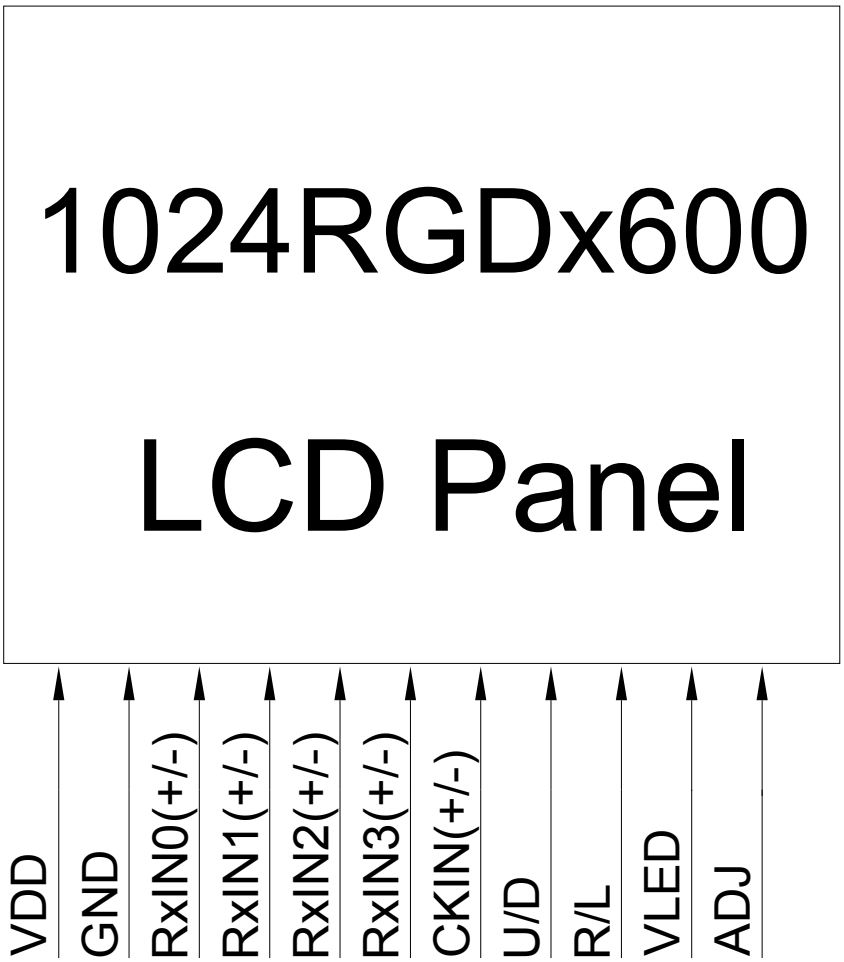
PIN NO.	SIGNAL	FUNCTION	REMARK
1	VDD	Power Supply For Digital Circuit	
2	VDD	Power Supply For Digital Circuit	
3	U/D	Up/Down Scan	Note1
4	L/R	Left/Right Scan	Note1
5	RxIN0-	Differential Data Input, CH0(Negative)	
6	RxIN0+	Differential Data Input, CH0(Positive)	
7	GND	Ground	
8	RxIN1-	Differential Data Input, CH1(Negative)	
9	RxIN1+	Differential Data Input, CH1(Positive)	
10	GND	Ground	
11	RxIN2-	Differential Data Input, CH2(Negative)	
12	RxIN2+	Differential Data Input, CH2(Positive)	
13	GND	Ground	
14	CLKIN-	Differential Clock Input(Negative)	
15	CLKIN+	Differential Clock Input(Positive)	
16	GND	Ground	
17	RXIN3-	Differential data Input,CH3(Negative)	
18	RXIN3+	Differential data Input,CH3(Positive)	
19	VLED	LED Driving Voltage	
20	ADJ	Adjust Brightness Control For LED B/L	

Note1:

U/D	L/R	FUNCTION
0	1	Normal display
0	0	Inverse Left and Right
1	1	Inverse Up and Down
1	0	Inverse Left and Right Inverse Up and Down



5. BLOCK DIAGRAM



6. ABSOLUTE MAXIMUM RATINGS

6.1 ELECTRICAL ABSOLUTE MAXIMUM RATINGS

ITEM	SYMBOL	MIN.	MAX.	UNIT	REMARK
Power Voltage For LCD	VDD	-0.3	5.0	V	
Logic Output Voltage	VI	-0.5	5.0	V	

6.2 ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS

ITEM	OPERATING		STORAGE		REMARK
	MIN.	MAX.	MIN.	MAX.	
Ambient Temperature(℃)	-20	60	-30	70	Note 1,2
Humidity(% RH)	Note 3		Note 3		Without condensation

Note 1 : The response time will become lower when operated at low temperature.
Note 2 : Background color changes slightly depending on ambient temperature.
Note 3 : Storage Ta=40℃ & RH=90%≦240Hrs

7. ELECTRICAL CHARACTERISTICS

7.1 LCM ELECTRICAL CHARACTERISTICS

Ta=25℃

ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT	REMARK
Power Voltage For LCD	VDD	3.0	3.3	3.6	V	
	IDD	-	150	180	mA	Note1
Differential Input Threshold Voltage	VTH	-	-	+100	mV	Note2
	VTL	-100	-	-	mV	Note2

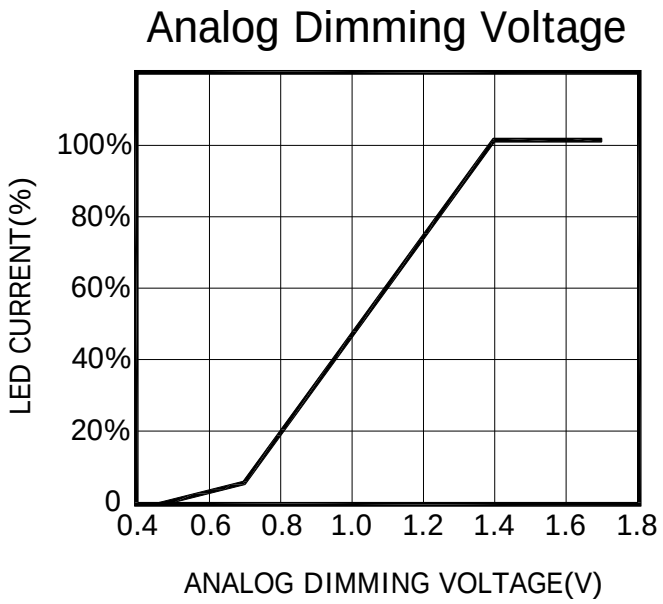
Note 1 : Test Condition: VDD=3.3V ; Test Pattern: Black.
Note 2 : VTH and VTL is defined in RxIN0+/-、RxIN1+/-、RxIN2+/-、CLKIN+/- signal voltage level.

7.2 BACKLIGHT UNITS

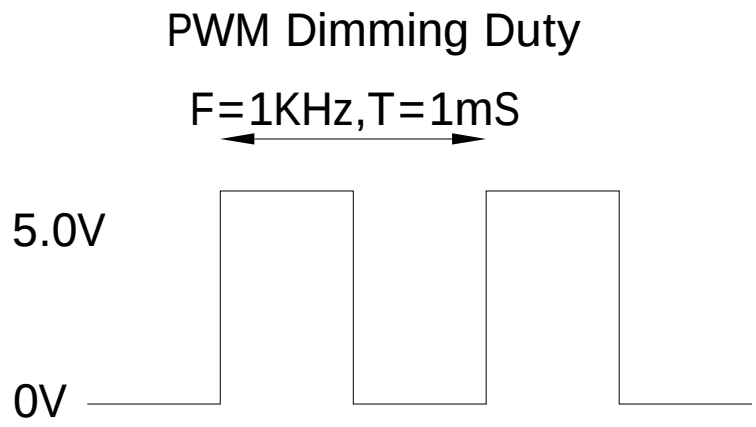
Ta=25℃

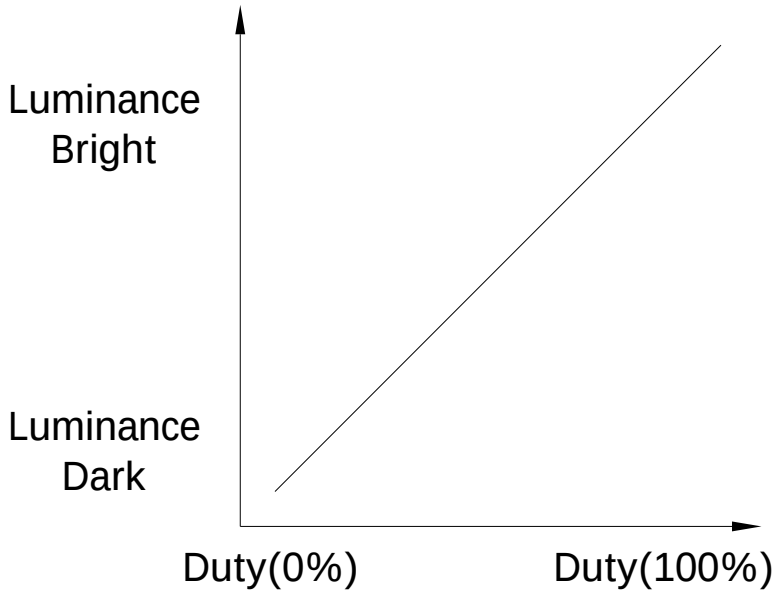
ITEM		SYMBOL	MIN.	TYP.	MAX.	UNIT	REMARK
LED Driving Voltage		VLED	11.7	12	12.3	V	
LED Driving Current		ILED	-	350	385	mA	
LED Life Time		-	50,000	-	-	Hr	Note1
Brightness Control	Analog Dimming	ADJ	0.7	-	1.4	V_{DC}	Note4
	PWM Dimming		1.4	-	5.0	V_{P-P}	Note5
ADJ Frequency		-	100	-	1000	Hz	

Note1 : The LED life time define as the estimated time to 50% degradation of initial luminous.
Note2 : Operating temperature 25℃,humidity 55%RH.
Note3 : A higher LED power supply voltage will result in better power efficiency. Keep the VLED between 12V and 12.3V is strongly recommended.
Note4: When the ADJ pin voltage rises from 0.7VDC to 1.4VDC,the LED current will change from 0% to 100% of the maximum LED current.



Note5: ADJ signal V_{P-P}=1.4~5.0V,operation frequency :100Hz~1kHz





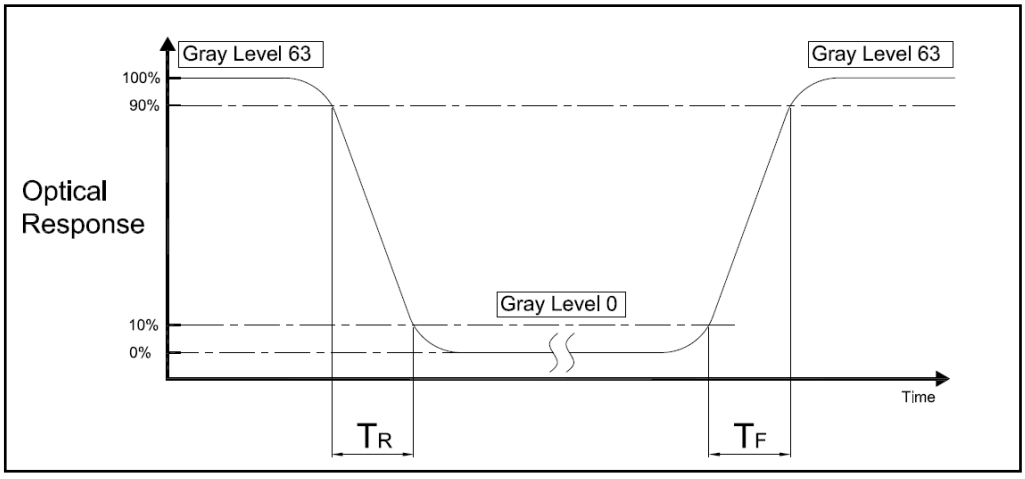
8. OPTICAL CHARACTERISTICS

Ta=25℃

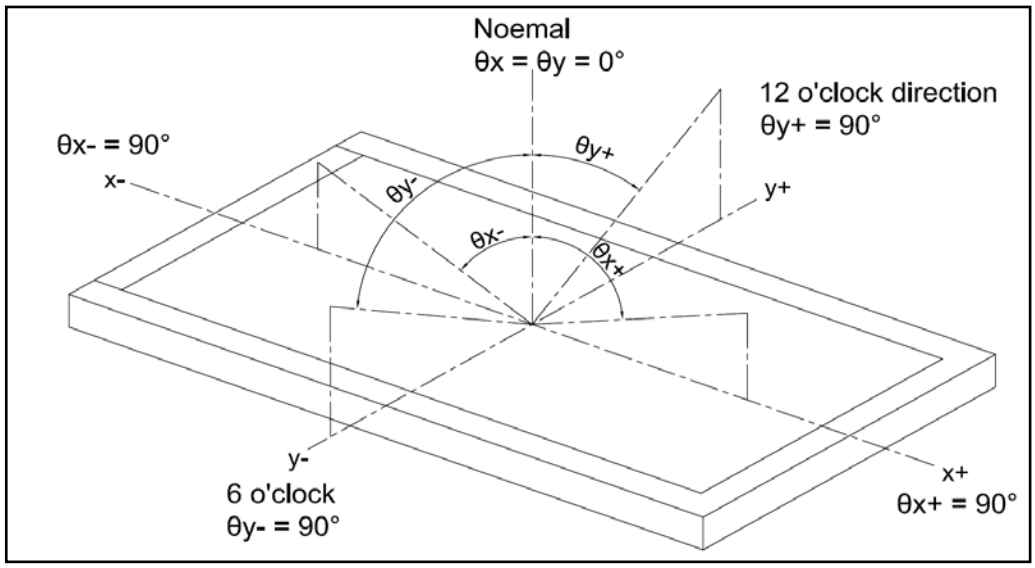
ITEM		SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNIT	REMARK
Contrast Ratio		CR	Viewing Normal Angle Θx=Θy=0°	500	700	-	-	Note 1
Response Time		TR+TF		-	25	50	ms	Note 2
Chromaticity	White	x		0.27	0.32	0.37	-	Note 4
		y		0.30	0.35	0.40	-	
Viewing Angle	Hor.	θx+	Viewing Angle Θx=Θy=0° CR≧10	65	75	-	Deg.	Note 3
		θx -		65	75	-		
	Ver.	θy+		60	70	-		
		θy -		65	75	-		
Luminance		L	PWM=100%	900	1000	-	cd/m2	Center
Luminance Uniformity		YU		70	-	-	%	Note 5

Note 1：Definition of Contrast Ratio (CR)：
The contrast ratio can be calculated by the following expression.
Contrast Ratio (CR) = L63/L0
L63：Luminance of gray level 63
L0：Luminance of gray level 0
CR = CR(5)
CR(X) is corresponding to the Contrast Ratio of the point X at Figure in Note 5

Note 2：Definition of Response Time (TR.TF)

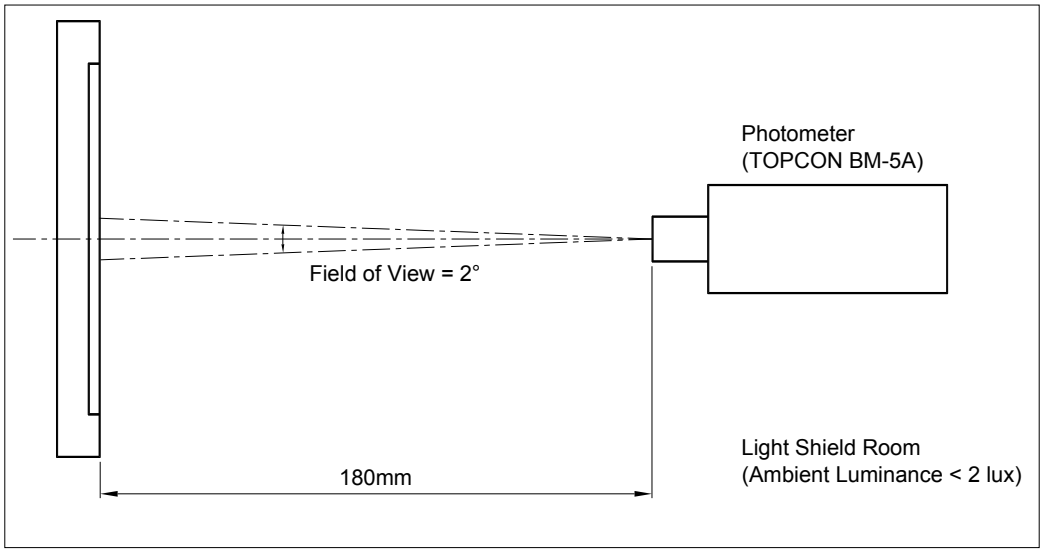


Note 3：Definition of Viewing Angle

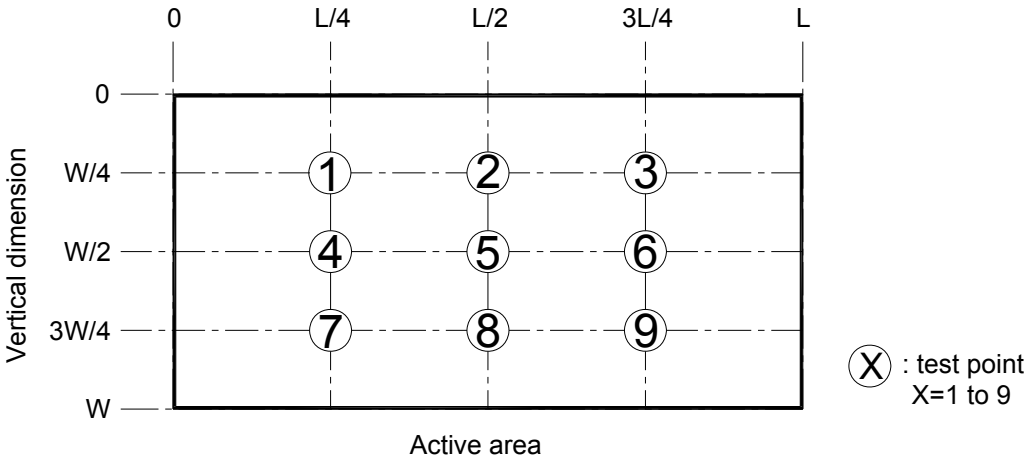


Note 4：Measurement Set-Up:

The LCD module should be stabilized at a given temperature for 20 minutes to avoid abrupt temperature change during measuring. In order stabilize the luminance, the measurement should be executed after lighting Backlight for 20 minutes in a windless room.



Note 5：

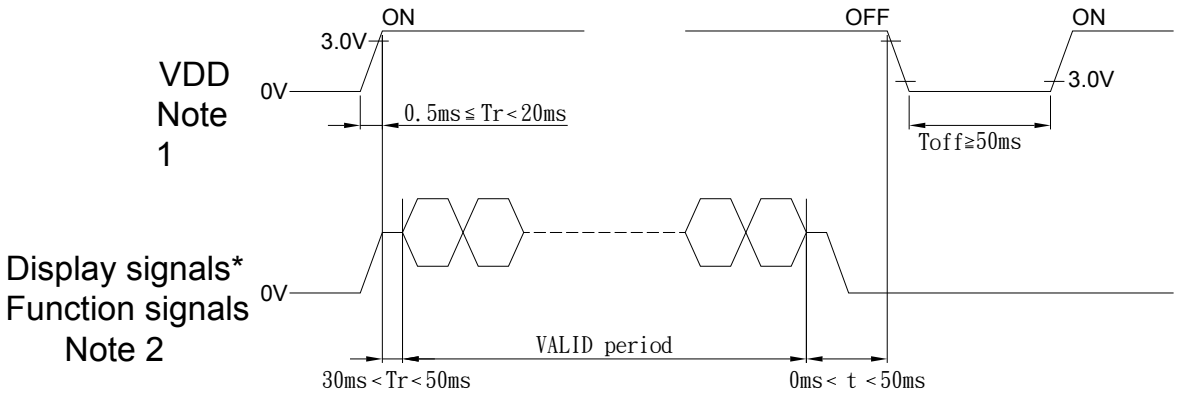


$$\left(1 - \frac{\text{MAX Luminance - Average Luminance}}{\text{Average Luminance}}\right) \text{X100\%} \geqq 70\%$$

9. TIMING SPECIFICATIONS

9.1 LCM POWER SUPPLY VOLTAGE SEQUENCE

9.1.1 LCD panel signal processing board

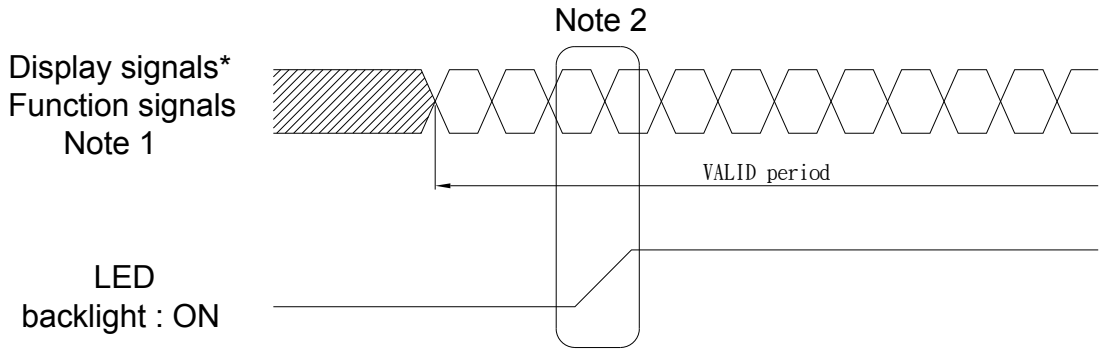


*These signals should be measured at the terminal of 100Ω resistance

Note1: If there is a voltage variation (voltage drop) at the rising edge of VDD below 3.0V, there is a possibility that a product does not work due to a protection circuit.

Note2: Display signals (RxIN0+/-, RxIN1+/-, RxIN2+/-, and CLKIN+/-), except the VALID period (See above sequence diagram), in order to avoid the circuitry damage. If some of display and function signals of this product are cut while this product is working, even if the signal input to it once again, it might not work normally. If a customer stops the display and function signals, VDD also must be shut down.

9.1.2 LCD driver board



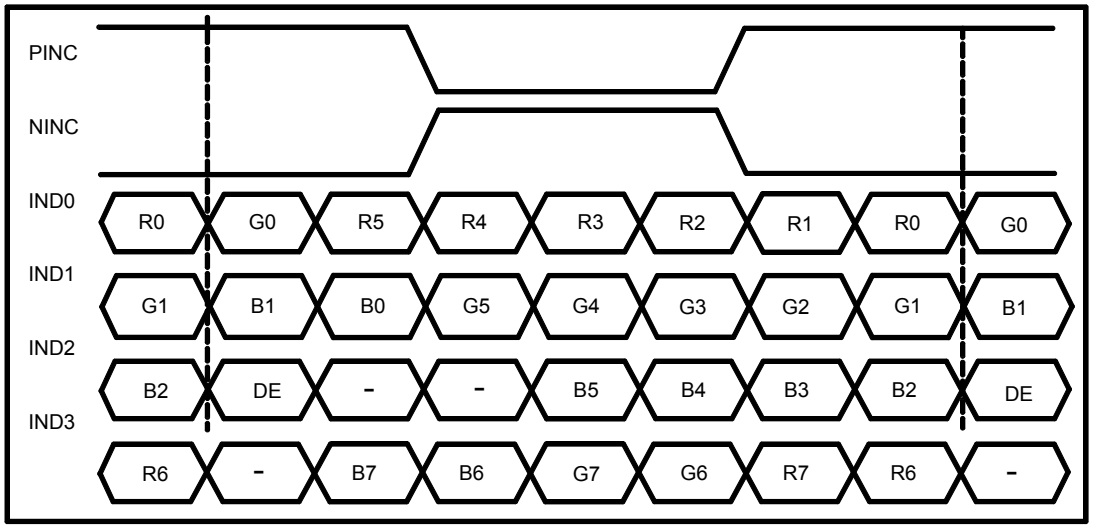
Note1: These are the display and function signals for LCD panel signal processing board.

Note2: The backlight should be turned on within the valid period of display and function signals, in order to avoid unstable data display.

9.2 LCM INTERFACE TIMING

9.2.1 INPUT DATA SIGNAL

8bit LVDS input

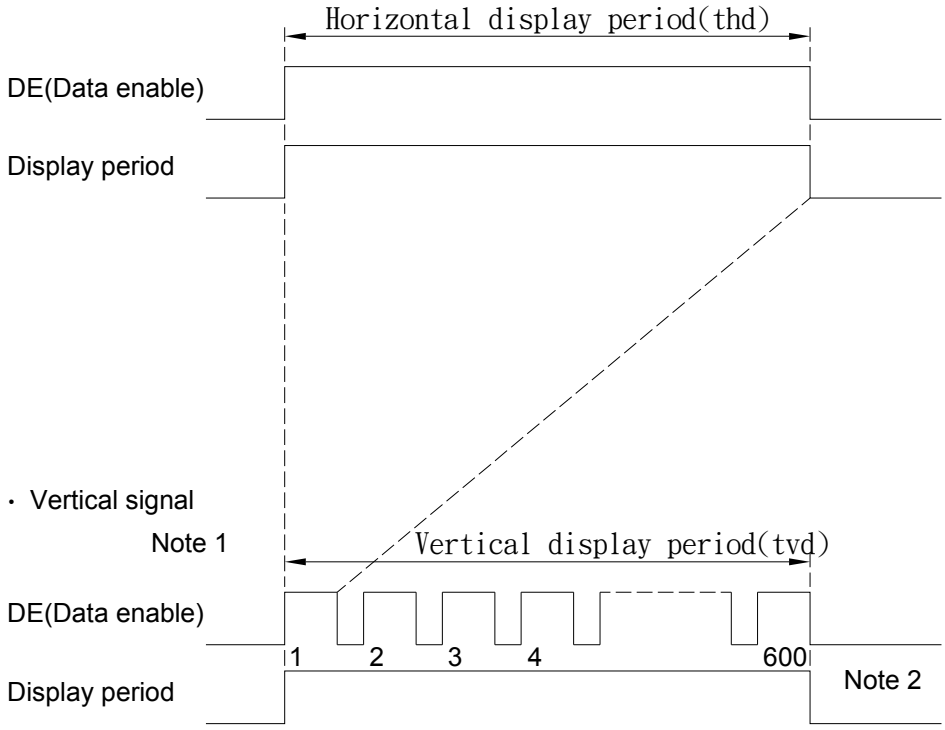


Note:Support DE timing mode only.SYNC mode not supported

9.2.2 OUTLINE OF INPUT SIGNAL TIMINGS

- Horizontal signal

Note 1



- Vertical signal

Note 1

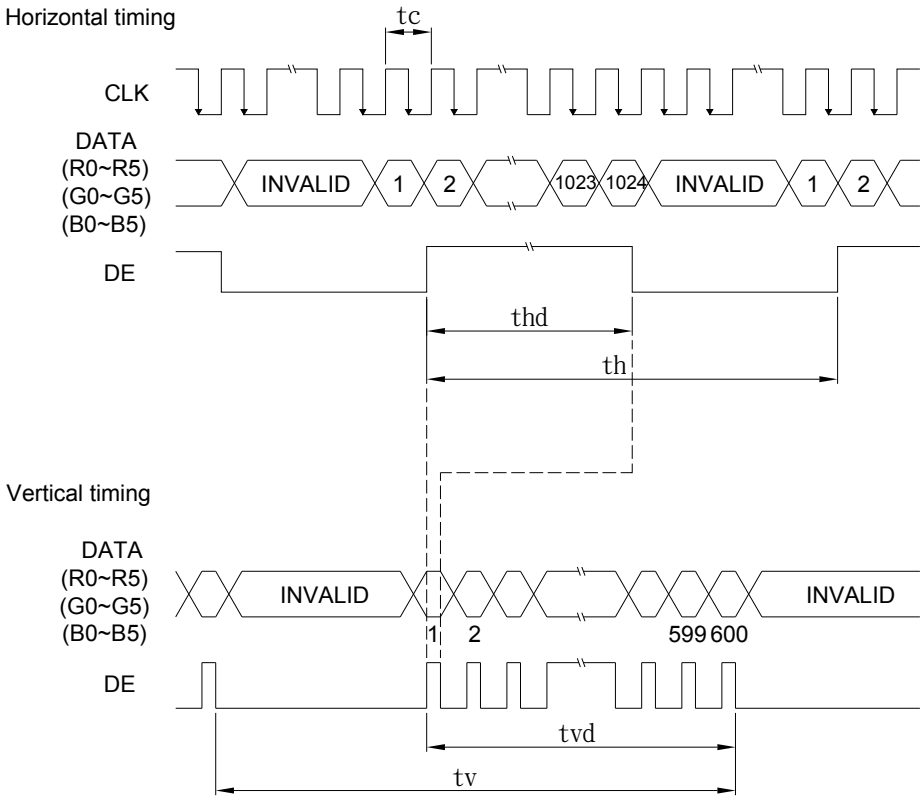
Note 1:This diagram indicates virtual signal for set up to timing.
Note 2:See "**9.2.4 INPUT SIGNAL TIMING CHART**" for the pulse number.

9.2.3 TIMING CHARACTERISTICS

ITEM			SYMBOL	MIN.	TYP.	MAX.	UNIT	REMARKS
CLK	Frequency		1/tc	40.8	51.2	67.2	MHz	19.53ns (typ.)
	Duty		-	-			-	-
	Rise time, Fall time		-				ns	
DATA	CLK-DATA	Setup time	-	-			ns	-
		Hold time	-				ns	
	Rise time, Fall time		-				ns	
DE	Horizontal	Cycle	th	20.83	26.24	27.3	μs	38.1Hz (typ.)
				1114	1344	1400	CLK	
		Display period	thd	1024			CLK	
	Vertical (One frame)	Cycle	tv	12.7	16.666	20.92	ms	60.0Hz (typ.)
				610	635	800	H	
		Display period	tvd	600			H	
	CLK-DE	Setup time	-	-			ns	-
		Hold time	-				ns	
	Rise time, Fall time		-				ns	

Note1: Definition of parameters is as follows.
tc=1CLK, th=1H
Note2: See the data sheet of LVDS transmitter.
Note3: Vertical cycle(tv) should be specified in integral multiple of Horizontal cycle(th).

9.2.4 INPUT SIGNAL TIMING CHART



10 RELIABILITY TEST

ENVIRONMENTAL TEST				
NO.	ITEM	CONDITIONS	TIME PERIOD	REMARK
1	High Temperature Storage	70℃	240HRS	
2	Low Temperature Storage	-30℃	240HRS	
3	High Temperature Operation	60℃	240HRS	
4	Low Temperature Operation	-20℃	240HRS	
5	Temperature Cycle	-20℃~60℃	1HRS/ 10CYCLE	
6	High Temperature Humidity Storage	40℃ 90%RH	240HRS	

NOTE 1：a. The module should word properly.
b. Before and after function test, The difference of consumptive current. Should be within 10%.
NOTE 2：a. The module should work properly.
b. The module won't be deformative, Color changeable or broken.
c. The modules can't be apart.
NOTE 3：a. Before cosmetic and function test, The product must have enough recovery time, At least 2 hours at room temperature.

10.1 VIBRATION TEST：

10.1.1 STATE LABORATORY ENVIRONMENT：

Room temperature： 25±3℃
Relative humidity：55±20％RH

10.1.2 TEST METHOD / SPECIFICATION：

Sample Status： Non-packaged single state
Waveform： Sine
Frequency：10~55~10Hz
Full amplitude：1.5mm
Vibration direction：X,Y,Z Axis (3 Axial)
Test time： Each 2Hour / X,Y,Z Axis， Altogether 6 Hour

10.2 MECHANICAL SHOCK TEST：

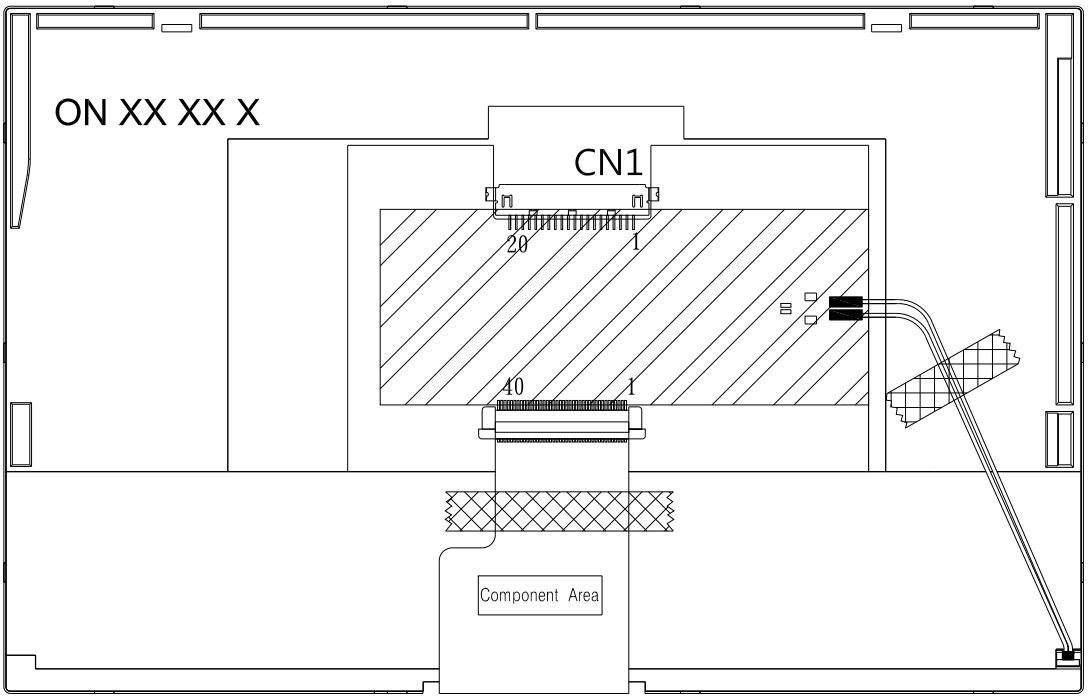
10.2.1 STATE LABORATORY ENVIRONMENT：

Room temperature： 25±3℃
Relative humidity：55±20％RH

10.2.2 TEST METHOD / SPECIFICATION：

Sample Status： Non-packaged single state
Waveform： Half-sine
Acceleration：1.5G
Shock Time：6ms
Impact direction：6 Directions (±X, ±Y, ±Z axes)
Number of shocks： Each direction 3 Secondary， Altogether 18 Secondary

11.MODEL NUMBER SYSTEM



(a) MODEL NAME：AM-1024600-070N
(b) LOT NO：XX XX X

CODE	MEANING	DESCRIPTION
XX	Year	2014=14, 2015=15, ….
XX	Month	01,02,03,04,05,06,07,08,09,10,11,12
X	Week	1,2,3,4,5,6

12. LCM INSPECTION STANDARD

Inspection specifications refer AMSON LCM INSPECTION STANDARD Document.

13 PACKAGE INFORMATION

LCM Model	LCM Qty. in the box	Inner Box Size (mm)	Weight	REMARK
AM-1024600-070N	TBD	TBD	TBD	

14.PRECAUTIONS FOR USE

14.1 SAFETY

(1) Do not swallow any liquid crystal, even if there is no proof that liquid crystal is poisonous.
(2) If the LCD panel breaks, be careful not to get liquid crystal to touch your skin.
(3) If skin is exposed to liquid crystal, wash the area thoroughly with alcohol or soap.

14.2 STORAGE CONDITIONS

(1) Store the panel or module in a dark place where the temperature is 23±5°C and the humidity is below 50±20%RH.
(2) Store in anti-static electricity container.
(3) Store in clean environment, free from dust, active gas, and solvent.
(4) Do not place the module near organics solvents or corrosive gases.
(5) Do not crush, shake, or jolt the module.

14.3 HANDLING PRECAUTIONS

(1) Avoid static electricity which can damage the CMOS LSI.
(2) The polarizing plate of the display is very fragile. So, please handle it very carefully.
(3) Do not give external shock.
(4) Do not apply excessive force on the surface.
(5) Do not wipe the polarizing plate with a dry cloth, as it may easily scratch the Surface of plate.
(6) Do not use ketonics solvent & Aromatic solvent, use with a soft cloth soaked with a cleaning naphtha solvent.
(7) Do not operate it above the absolute maximum rating.
(8) Do not remove the panel or frame from the module.
(9) When the module is assembled, it should be attached to the system firmly, Be careful not to twist and bend the module.
(10) Wipe off water droplets or oil immediately . If you leave the droplets for a long time, staining and discoloration may occur.
(11) If the liquid crystal material leaks from the panel, it should be kept away from the eyes or mouth. In case of contact with hands, legs or clothes, it must be washed away thoroughly with soap.

14.4 WARRANTY

(1) Acceptance inspection period
The period is within one month after the arrival of contracted commodity at the buyer's factory site.
(2) Applicable warrant period
The period is within 12 months since the date of shipping out under normal using and storage conditions.