LCD MODULE
SPECIFICATION

Customer:

Model Name: HC080IY28026-D60V.C

Date: 2022/01/20

Version: 01

■**Preliminary Specification**

☐**Final Specification**

For Customer's Acceptance

Approved by	Comment

Approved by	Reviewed by	Prepared by

Record of Revision

Version	Revise Date	Page	Content
Pre-Spec.01	2022/01/20	All	Initial Release

<u>CONTENTS</u>

1. __Features & Mechanical Specifications__

Item	Contents	Unit
	LCD	
LCD Type	TFT / Transmissive / Normally Black	--
Viewing direction	Full view	--
Backlight	White LED x 21	--
Interface	4 Lanes MIPI Interface	--
Outline Dimension	130.24(W)× 198.82(H)×4.55(D)	mm
Active area (W×H)	107.64× 172.22	mm
Number of Dots	800(RGB) ×1280	--
TP Interface	IIC	--
Dot pitch (W×H)	0.0449 × 0.1346	mm
Pixel pitch (W×H)	0.1346 × 0.1346	mm
Operating Temperature	-10 ～ +50	℃
Storage temperature	-20 ～ +60	℃
Polarizer	Top: IPS film	--
	Bottom: IPS film	

2. <u>Dimensional Outline</u>

NOTES:
1.Display size:8"IPS 800*1280
2.Viewing direction:Full View
3.Display mode:Transmissive/Normal black/Anti-glare
4.Operation temperature:-10°C~+50°C
5.Storage temperature:-20°C~+60°C
6.Unspecification tolerance are ±0.2mm

Front

198.82±0.1 COVER OD
184.12±0.2 LCM OD
172.82 CTP VA
172.22 LCM AA

9.89
13.00
13.30

BLACK INK

800RGBx1280
8.0"
Viewing Direction:ALL

130.24±0.1 COVER OD
114.62±0.2 LCM OD
108.24 CTP VA
107.64 LCM AA

7.81
11.00
11.30
A-1.00

Side

CONN:5.0 MAX

CTP+LCM=4.55±0.2
1.10 COVER
0.20 OCA
0.55 SENSOR
0.20 OCA
2.50±0.2 LCM

Back

40.41
20.12
FPC24PIN0P0.5

REV	DESCRIPTIONS	DATE
01	NEW	2022.01.20

VERSION	DATE
01	2022.01.20

NO.	UNIT
	mm

SCALE 1:1

APPROVED William
CHECKED Bonnbi
DRAWN Zane

TITLE:HC080IY28026-D60V.C
FILE NAME:

LCM	
PIN	Assignment
1	VDD 5V
2	VDD 5V
3	VDD 3.3V
4	IOVCC 1.8V
5	DSI_PWM
6	DSI_EN
7	TP_INT
8	TP_SDA
9	TP_SCL
10	TP_RST
11	GND
12	DSI_DP0
13	DSI_DN0
14	GND
15	DSI_DP1
16	DSI_DN1
17	GND
18	DSI_CLKP
19	DSI_CLKN
20	GND
21	DSI_DP2
22	DSI_DN2
23	GND
24	DSI_DP3
	DSI_DN3

Figure 1. Dimensional outline

Pin Description

PIN No.	SYMBOL	Function
1	VDD	5V input
2	VDD3.3V	LCM Analog supply voltage (2.8-3.3V)
3	IOVCC1.8V	LCM I/O circuit supply voltage. (1.8V)
4	DSI_PWM	No connection
5	DSI_EN	Ground
6	TP_INT	TP_INT
7	TP_SDA	TP SDA
8	TP_SCL	TP clock
9	TP_RST	TP Reset signal
10	GND	Ground
11	DSI_DN0	MIPI differential data1 input(Negative)
12	DSI_DP0	MIPI differential data1 input(Positive)
13	GND	Ground
14	DSI_DN1	MIPI differentiald ata 1input(Negative)
15	DSI_DP1	MIPI differential data1 input(Positive)
16	GND	Ground
17	DSI_CLKN	MIPI differential clock input(Negative)
18	DSI_CLKP	MIPI differential clock input(Positive)
19	GND	Ground
20	DSI_DN2	MIPI differential data2input(Negative)
21	DSI_DP2	MIPI differential data2 input(Positive)
22	GND	Ground
23	DSI_DN3	MIPI differential data3 input(Negative)
24	DSI_DP3	MIPI differential data3 input(Positive)

3. **Absolute Maximum Ratings**

Item	Symbol	Rating	Unit
Digital Supply Voltage	VDD/VDDIO	-0.3 to +4.0	V
Operating Temperature range	T_{OP}	-10 to +50	℃
Storage Temperature range	T_{ST}	-20 to +60	℃

4. Electrical Characteristics

DC Characteristics

Item	Symbol	Min.	Type.	Max.	Unit
Digital Power Supply Voltage	VDD	3.0	3.3	3.6	V
	VDDIO	1.7	1.8	1.9	V

5. Backlight Characteristics

(White LED × 3 in series) × 7 in Parallel   (Ta = 25°C)

Item	Symbol	Condition	Min	Typ	Max	Unit
Forward Voltage	VF	IF=140mA	9.0	9.6	10.8	V
Uniformity	$\triangle$Bp	-	80	-	-	%
LCM Luminance	Lv	IF=140mA	260	280	-	cd/m^2

6. Electro-Optical Characteristics

The test of Optical specifications shall be measured in a dark room (ambient luminance ≤1lux and temperature = 25±2℃) with the equipment of Luminance meter system (Goniometer system and TOPCON BM-5) and test unit shall be located at an approximate distance 50cm from the LCD surface at a viewing angle of θ and Φ equal to 0°. We refer to θØ=0 (=θ3) as the 3 o"clock direction (the "right"), θØ=90 (= θ12) as the 12 o"clock direction ("upward"), θØ=180 (= θ9) as the 9 o"clock direction ("left") and θØ=270(= θ6) as the 6 o"clock direction ("bottom"). While scanning θand/or Ø, the center of the measuring spot on the Display surface shall stay fixed.
Optimum viewing angle direction is 6 "clock.

Item		Symbol	Condition	Value			Unit	N
				Min	yp	Max		
Uniformity		$\triangle$Bp		70	80		%	Note 4
Luminance		L		230	280		cd/m2	Note 4
Viewing Angle	Left	θ L	Cr≥10		85		deg	ote 1
	Right	θ R			85			
	Top	ψ T			85			
	Bottom	ψ B			85			
Contrast Ratio		Cr	θ =0 =0	700	900			Note 2
Response Time		Tr+Tf		--	25	--	ms	
		Tgray					ms	
Color Coordinate of CIE1931	Red	X	θ =0 =0	TBD	TBD	TBD		Note 5
		y		TBD	TBD	TBD		
	Green	X		TBD	TBD	TBD		
		y		TBD	TBD	TBD		
	Blue	X		TBD	TBD	TBD		
		y		TBD	TBD	TBD		
	White	X		TBD	TBD	TBD		
		y		TBD	T	TBD		

Note :

1. Viewing angle is the angle at which the contrast ratio is greater than 10. The viewing angles are determined for the horizontal or 3, 9 o'clock direction and the vertical or 6, 12 o'clock direction with respect to the optical axis which is normal to the LCD surface (see FIGURE 1).

2. Contrast measurements shall be made at viewing angle of $\Theta= 0$ and at the center of the LCD surface. Luminance shall be measured with all pixels in the view field set first to white, then to the dark (black) state . (see FIGURE 1) Luminance Contrast Ratio (CR) is defined mathematically.

$$CR = \frac{\text{Luminance when displaying a white raster}}{\text{Luminance when displaying a black raster}}$$

3. Transmittance is the Value with Polarizer

4. The color chromaticity coordinates specified in Table 5 shall be calculated from the spectral data measured with all pixels first in red, green, blue and white. Measurements shall be made at the center of the panel.

5. The electro-optical response time measurements shall be made as FIGURE 3 by switching the "data" input signal ON and OFF. The times needed for the luminance to change from 10% to 90% is Tr, and 90% to 10% is Td.

7. MIPI ELECTRICAL CHARACTERISTICS

7.1. DC Characteristics for DSI LP Mode

DC levels of the LP-00, LP-01, LP-10 and LP-11 are defined in the table below: DC Characteristics for the DSI LP mode when LP-RX, LP-CD or LP-TX is mentioned in the condition column. Other logical levels in the table are for MCU interface.

Parameter	Symbol	Condition	Specification			Unit
			Min.	Typ.	Max.	
Logic 1 output voltage	V_{OH}	I_{OUT}=-1mA, Note 2	TBD	-	TBD	V
Logic 0 output voltage	V_{OL}	I_{OUT}=1mA, Note 2	TBD	-	TBD	V
Logic 1 input voltage	V_{IHLPCD}	LP-CD, Note 3	TBD	-	TBD	mV
Logic 0 input voltage	V_{ILLPCD}	LP-CD, Note 3	TBD	-	TBD	mV
Logic 1 input voltage	V_{IHLPRX}	LP-RX (CLK, D0 ,D1, D2, D3), Note 3	TBD	-	TBD	mV
Logic 0 input voltage	V_{ILLPRX}	LP-RX (CLK, D0 ,D1, D2, D3), Note 3	TBD	-	TBD	mV
Logic 0 input voltage	$V_{ILLPRXULP}$	LP-RX (CLK ULP mode), Note 3	TBD	-	TBD	mV
Logic 1 output voltage	V_{OHLPTX}	LP-TX (D0), Note 3	TBD	TBD	TBD	V
Logic 0 output voltage	V_{OLLPTX}	LP-TX (D0), Note 3	TBD	-	TBD	mV
Logic 1 input current	I_{IH}	LP-CD, LP-RX, Note 3	-	-	TBD	uA
Logic 0 input current	I_{IL}	LP-CD, LP-RX, Note 3	TBD	-	-	uA

Notes:

1. Ta = -30℃ to 70℃ (to +85℃ no damage)

2. BC, TE, PANEL_TE

3. DSI High Speed mode is off.

7.2. DC Characteristics for DSI HS Mode

Parameter	Symbol	Condition	Specification			Unit
Input Common Mode Voltage for Clock	V$_{CMCLK}$	CLKP/N Note 2, Note 3	TBD	-	TBD	mV
Input Common Mode Voltage for Data	V$_{CMDATA}$	DnP/N Note 2, Note 3, Note 5	TBD	-	TBD	mV
Common Mode Ripple for Clock Equal or Less than 450MHz	V$_{CMRCLKL450}$	CLKP/N Note 4	TBD	-	TBD	mV
Common Mode Ripple for Data Equal or Less than 450MHz	V$_{CMRDATAL450}$	DnP/N Note 4, Note 5	TBD	-	TBD	mV
Common Mode Ripple for Clock More than 450MHz (peak sine wave)	V$_{CMRCLKM450}$	CLKP/N	-	-	TBD	mV
Common Mode Ripple for Data More than 450MHz (peak sine wave)	V$_{CMRDATAM450}$	DnP/N Note 5	-	-	TBD	mV
Differential Input Low Level Threshold Voltage for Clock	V$_{THLCLK-}$	CLKP/N	TBD	-	-	mV
Differential Input Low Level Threshold Voltage for Data	V$_{THLDATA-}$	DnP/N Note 5	TBD	-	-	mV
Differential Input High Level Threshold Voltage for Clock	V$_{THHCLK+}$	CLKP/N	-	-	TBD	mV
Differential Input High Level Threshold Voltage for Data	V$_{THHDATA+}$	DnP/N Note 5	-	-	TBD	mV
Single-ended Input Low Voltage	V$_{ILHS}$	CLKP/N, DnP/N Note 3, Note 5	TBD	-	-	mV
Single-ended Input High Voltage	V$_{IHHS}$	CLKP/N, DnP/N Note 3, Note 5	-	-	TBD	mV
Differential Termination Resistor	R$_{TERM}$	CLKP/N, DnP/N Note 5	TBD	TBD	TBD	Ω
Single-ended Threshold Voltage for Termination Enable	V$_{TERMEN}$	CLKP/N, DnP/N Note 5	-	-	TBD	mV
Termination Capacitor	C$_{TERM}$	CLKP/N, DnP/N Note 5, Note 6	-	-	TBD	pF

Notes:

1. Ta = -30°C to 70°C (to +85°C no damage), VCI = 2.5V to 3.3V, VDD3 = VDD3_M = 1.65V to 3.3V

2. Includes 50mV (-50mV to 50mV) ground difference

3. Without VCMRCLKM450/VCMRDATAM450

4. Without 50mV (-50mV to 50mV) ground difference

5. n = 0 and 1

6. For higher bit rates, a 14pF capacitor will be needed to meet the common-mode return loss specification.

7.3. High Speed Mode － Data Clock Channel Timing

DSI Data to Clock Channel Timings
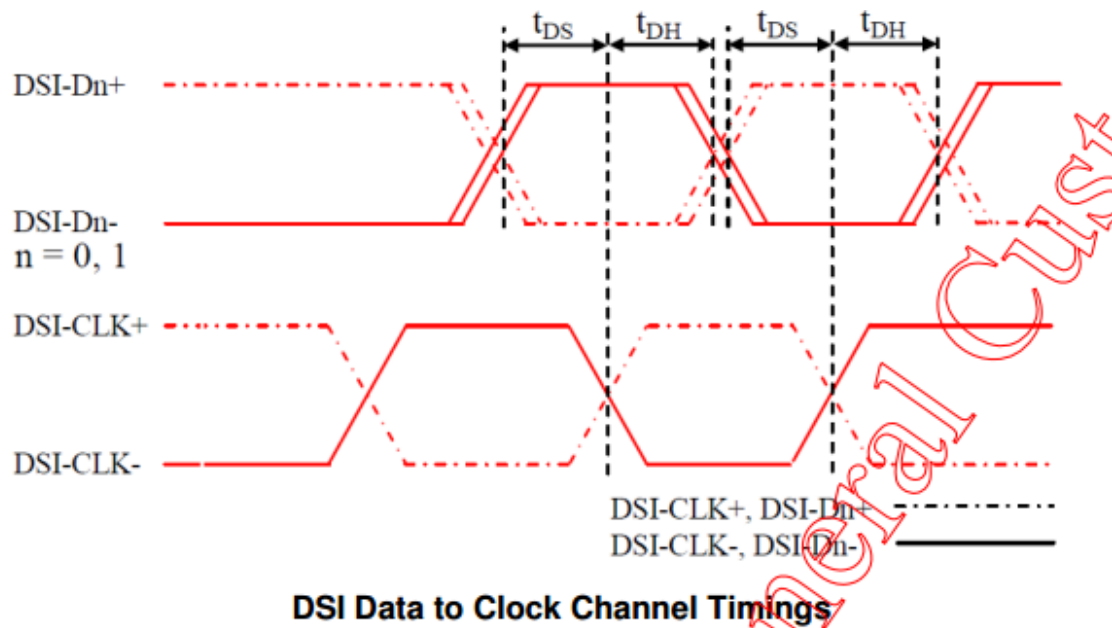
DSI Data to Clock Channel Timings

Signal	Symbol	Parameter	Min	Max
DnP/N , n=0 and 1	t_{DS}	Data to Clock Setup time	TBD	-
	t_{DH}	Clock to Data Hold Time	TBD	-

7.4. High Speed Mode － Rising and Falling Timings

Rising and Falling Timings on Clock and Data Channels
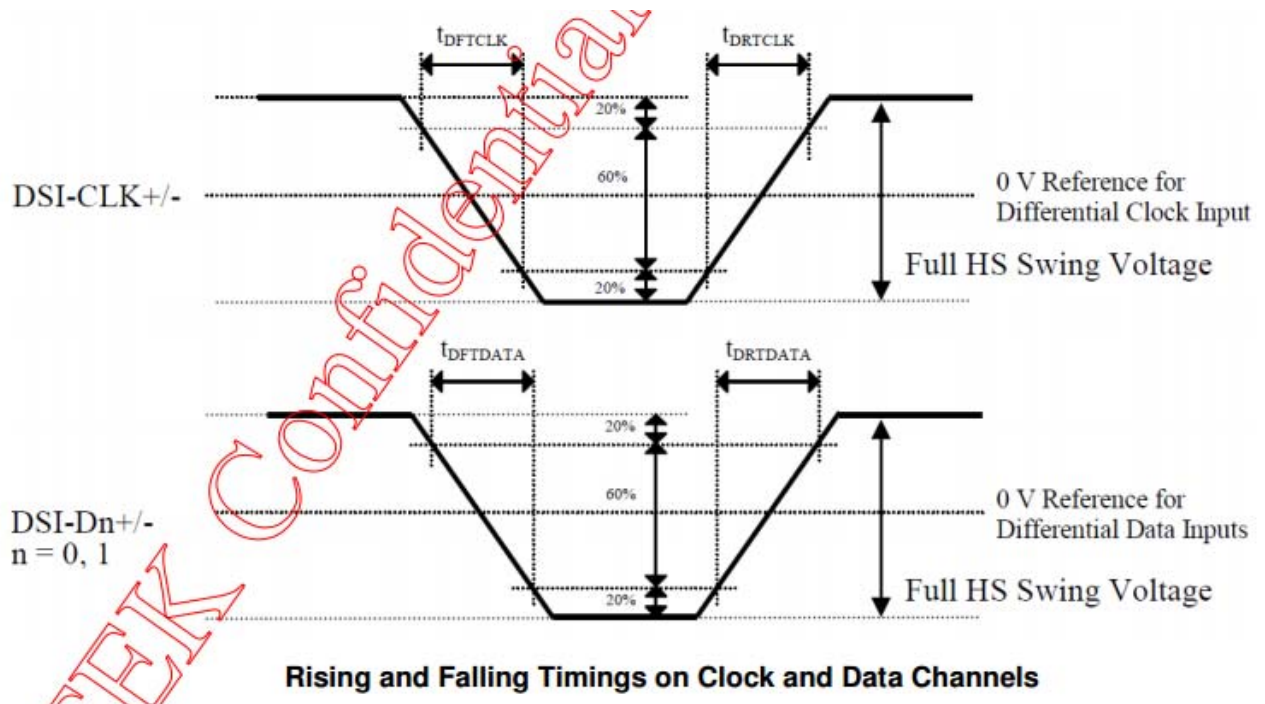
8. Quality Specifications

All The raw material are Rohs complicant.

8.1. Standard of the product appearance test

Manner of appearance test: The inspection should be performed in using 20W x 2 fluorescent lamps.   Distance between LCM and fluorescent lamps should be 100 cm or more. Distance between LCM and   inspector eyes should be 30 cm or more.

Viewing direction for inspection is 45° from vertical against LCM.
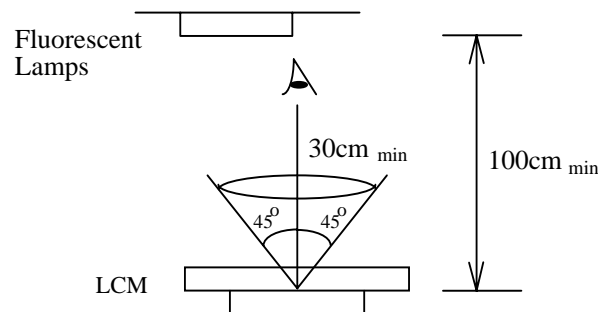
Definition of zone:
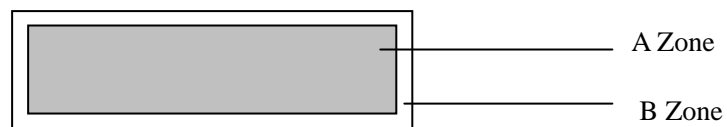
A Zone: viewing area

B Zone: outside viewing area

8.2. Specification of quality assurance

AQL inspection standard

Sampling method: MIL-STD-105E, Level II, single sampling
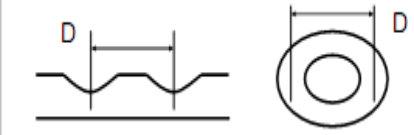
Defect classification (Note: * is not including)

NO.	项目	标准		备注
1	电测部分	无显示	主缺	（D）mm：平均直径=（长径+短径）/2
		缺行、缺列	主缺	
		显示异常（花屏、白屏、蓝屏、少画面、乱码）	主缺	
		背光不亮	主缺	
		亮暗点判定标准： <table><tr><td>屏幕规格（英寸）</td><td>项目</td><td>判定标准</td></tr><tr><td rowspan="3">规格≤5</td><td>亮点</td><td>N≤1</td></tr><tr><td>暗点</td><td>N≤4</td></tr><tr><td>总数</td><td>N≤4</td></tr><tr><td rowspan="3">5＜规格≤10.2</td><td>亮点</td><td>A区：N=1　B区：N≤2</td></tr><tr><td>暗点</td><td>A区：N≤2　B区：N≤4</td></tr><tr><td>总数</td><td>N≤5</td></tr><tr><td rowspan="3">规格＞10.2</td><td>亮点</td><td>A区：N=1　B区：N≤2</td></tr><tr><td>暗点</td><td>A区：N≤2　B区：N≤4</td></tr><tr><td>总数</td><td>N≤6</td></tr></table>备注： 1，缺陷大小＞0.5dot 定义为点缺陷 2，缺陷大小≤0.5dot 不计 3，微弱亮点透过 6%ND Fillter 仍可视计为点缺陷 背光点状异物不良规格： <table><tr><td>大小（D）mm</td><td>允许数量</td></tr><tr><td>D≤0.2</td><td>不计（密集不可）</td></tr><tr><td>0.2＜D≤0.3</td><td>3</td></tr><tr><td>0.3＜D≤0.45</td><td>1</td></tr><tr><td>D＞0.45</td><td>0</td></tr></table>背光线状异物不良规格： <table><tr><td>长L（mm）</td><td>宽W（mm）</td><td>允许数量</td></tr><tr><td>不计</td><td>W＜0.05</td><td>不计（密集不可）</td></tr><tr><td>L≤2.0</td><td>0.05≤W≤0.1</td><td>3</td></tr><tr><td>不计</td><td>W＞0.1</td><td>不允许</td></tr></table>偏光片点状异物不良规格： <table><tr><td>大小（D）mm</td><td>允许数量</td></tr><tr><td>D≤0.3</td><td>不计（密集不可）</td></tr><tr><td>0.3＜D≤0.5</td><td>3</td></tr><tr><td>D＞0.5</td><td>0</td></tr></table>偏光片线状异物不良规格： <table><tr><td>长L（mm）</td><td>宽W（mm）</td><td>允许数量</td></tr><tr><td>L≤2.5</td><td>0.1＜W≤0.2</td><td>4</td></tr></table>	次缺	

		L >2.5	W>0.2	不允许	

偏光片凹、凸点不良规格：

大小（D）mm	允许数量
D≤0.3	不计（密集不可）
0.3≤ D ≤0.5	4
0.5≤ D ≤0.7	2
D >0.7	0

MURA 规格：

不允许任何透过 6%ND Fillter 可视之 MURA

2	外观部分	偏光片裂痕 A. B区域内不论大小不可存在	次缺		目视
		点状不良（如：凹、凸点等）	次缺		同电性规格
		线状不良（如：脏污、毛线等）	次缺		同电性规格
		偏光片偏移超出要求（依客户要求而定）	次缺		
		贴反	次缺		
		无保护膜、保护膜上无易撕贴	次缺		
		面板 缺角	在不影响外观、线路性能的情况下视为OK品		次缺

3	FPC	不可"V"字形折痕，折痕处发白	次缺	目视、显微镜
		引角断	次缺	
		断路/短路	次缺	
		产品上有分层	次缺	
		引脚/线路；凹、凸偏斜超过30%	次缺	
		双面胶掉、歪斜且影响使用	次缺	
		引脚非导电异物不可跨越两条线，导电依凹/凸判定	次缺	
		PAD翘起、变形、脱落	次缺	
		刮伤，以不露铜为OK	次缺	
		气泡不能横跨2条线路，且不可超过2个	次缺	

4	Film 上 的 鱼眼、凹痕、气泡		D≤0.3mm	不计（密集不可）
			0.3mm< D ≤0.5mm	N≤3(距离在5mm以上)
			0.5≤ D ≤0.7	2
			D >0.7	0

5	牛顿环	满屏的六分之一以内	N≤3
		超过满屏的六分之一	NG

A、B 区域图表说明
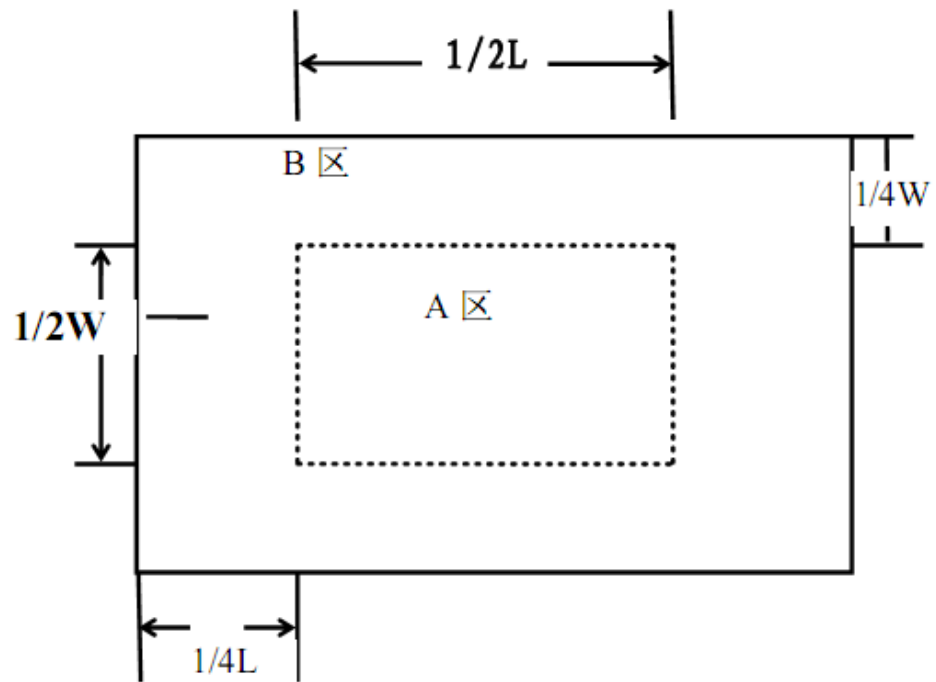
判定

允许水准 AQL,严重缺点 CR=0、主要缺点 MA=0.4、次要缺点 MI=1.0

8.3.   Reliability of LCM

Reliability test condition:

Item	Condition	Time (hrs)	Assessment
High temp. Storage	60°C	48	
High temp. Operating	50°C	48	
Low temp. Storage	-20°C	48	No abnormalities
Low temp. Operating	-10°C	48	in functions
Humidity	50°C/ 90%RH	48	and appearance
Temp. Cycle	-10°C ← 25°C →50°C (60 min ← 5 min → 60min)	10cycles	

Recovery time should be 24 hours minimum. Moreover, functions, performance and appearance shall be free from remarkable deterioration within 50,000 hours under ordinary operating and storage conditions room temperature (20+8°C), normal humidity (below 65% RH), and in the area not exposed to direct sun light.

8.4.   Precaution for using LCD/LCM

LCD/LCM is assembled and adjusted with a high degree of precision. Do not attempt to make any alteration or modification. The followings should be noted.

General Precautions:

1. LCD panel is made of glass. Avoid excessive mechanical shock or applying strong pressure onto the surface of display area.
2. The polarizer used on the display surface is easily scratched and damaged. Extreme care should be taken when handling. To clean dust or dirt off the display surface, wipe gently with cotton, or other soft material soaked with isoproply alcohol, ethyl alcohol or trichlorotriflorothane, do not use water, ketone or aromatics and never scrub hard.
3. Do not tamper in any way with the tabs on the metal frame.
4. Do not made any modification on the PCB without consulting Hetech.
5. When mounting a LCM, make sure that the PCB is not under any stress such as bending or twisting. Elastomer contacts are very delicate and missing pixels could result from slight dislocation of any of the elements.
6. Avoid pressing on the metal bezel, otherwise the elastomer connector could be deformed and lose contact, resulting in missing pixels and also cause rainbow on the display.
7. Be careful not to touch or swallow liquid crystal that might leak from a damaged cell. Any liquid crystal adheres to skin or clothes, wash it off immediately with soap and water.

Static Electricity Precautions:

1. CMOS-LSI is used for the module circuit; therefore operators should be grounded whenever he/she comes into contact with the module.
2. Do not touch any of the conductive parts such as the LSI pads; the copper leads on the PCB and the interface terminals with any parts of the human body.
3. Do not touch the connection terminals of the display with bare hand; it will cause disconnection or defective insulation of terminals.
4. The modules should be kept in anti-static bags or other containers resistant to static for storage.
5. Only properly grounded soldering irons should be used.
6. If an electric screwdriver is used, it should be grounded and shielded to prevent sparks.
7. The normal static prevention measures should be observed for work clothes and working benches.
8. Since dry air is inductive to static, a relative humidity of 50-60% is recommended.

Soldering Precautions:

1. Soldering should be performed only on the I/O terminals.
2. Use soldering irons with proper grounding and no leakage.
3. Soldering temperature: 280°C$\pm$10°C
4. Soldering time: 3 to 4 second.
5. Use eutectic solder with resin flux filling.
6. If flux is used, the LCD surface should be protected to avoid spattering flux.
7. Flux residue should be removed.

Operation Precautions:

1. The viewing angle can be adjusted by varying the LCD driving voltage Vo.
2. Since applied DC voltage causes electro-chemical reactions, which deteriorate the display, the applied pulse waveform should be a symmetric waveform such that no DC component remains. Be sure to use the specified operating voltage.
3. Driving voltage should be kept within specified range; excess voltage will shorten display life.
4. Response time increases with decrease in temperature.
5. Display color may be affected at temperatures above its operational range.
6. Keep the temperature within the specified range usage and storage. Excessive temperature
7. and humidity could cause polarization degradation, polarizer peel-off or generate bubbles.
8. For long-term storage over 40°C is required, the relative humidity should be kept below 60%,
9. and avoid direct sunlight.

Limited Warranty

Hetech LCDs and modules are not consumer products, but may be incorporated by Hetech s customers into consumer products or components thereof, Hetech does not warrant that its LCDs and components are fit for any such particular purpose.

1. The liability of Hetech is limited to repair or replacement on the terms set forth below. Hetech will not be responsible for any subsequent or consequential events or injury or

damage to any personnel or user including third party personnel and/or user. Unless otherwise agreed in writing between Hetech and the customer, Hetech will only replace or repair any of its LCD which is found defective electrically or visually when inspected in accordance with Hetech general LCD inspection standard. (Copies available on request)

2. No warranty can be granted if any of the precautions state in handling liquid crystal display above has been disregarded. Broken glass, scratches on polarizer mechanical damages as well as defects that are caused accelerated environment tests are excluded from warranty.

3. In returning the LCD/LCM, they must be properly packaged; there should be detailed description of the failures or defect.