SHENZHEN GENYU OPTICAL CO.,LTD

SPECIFICATION FOR APPROVAL

产品规格书

客户名称 CUSTOMER:

客户型号 CLIENT TYPE:

模组型号 PRODUCTION NO.:GY12864-1489

出样日期 SHIPMENT DATE:

确认此规格书及样品，客户确认签字盖章： Confirm this specification and sample and confirm the signature of the customer

	签名 SIGNATURE	日期 DATE
拟制 PREPARED	冯楚君	2022.04.27
审核 CHECKED	袁道平	2022.04.27
批准 APPROVED	袁道平	2022.04.27

目录 CONTENTS

一、RECORDS OF REVISION

DATE	REVISED NO.	REVISED DESCRIPTIONS	PREPARED	CHECKED	APPROVED
2022.04.27	00	First Issue	FCJ	YDP	YDP

二、 GENERAL SPECIFICATIONS

1-1 SCOPE

This specification covers the delivery requirements for the liquid crystal display delivered by QUALITY to Customer

1-2 Certification

ROHS

1-3 Module Name

GY12864-1489

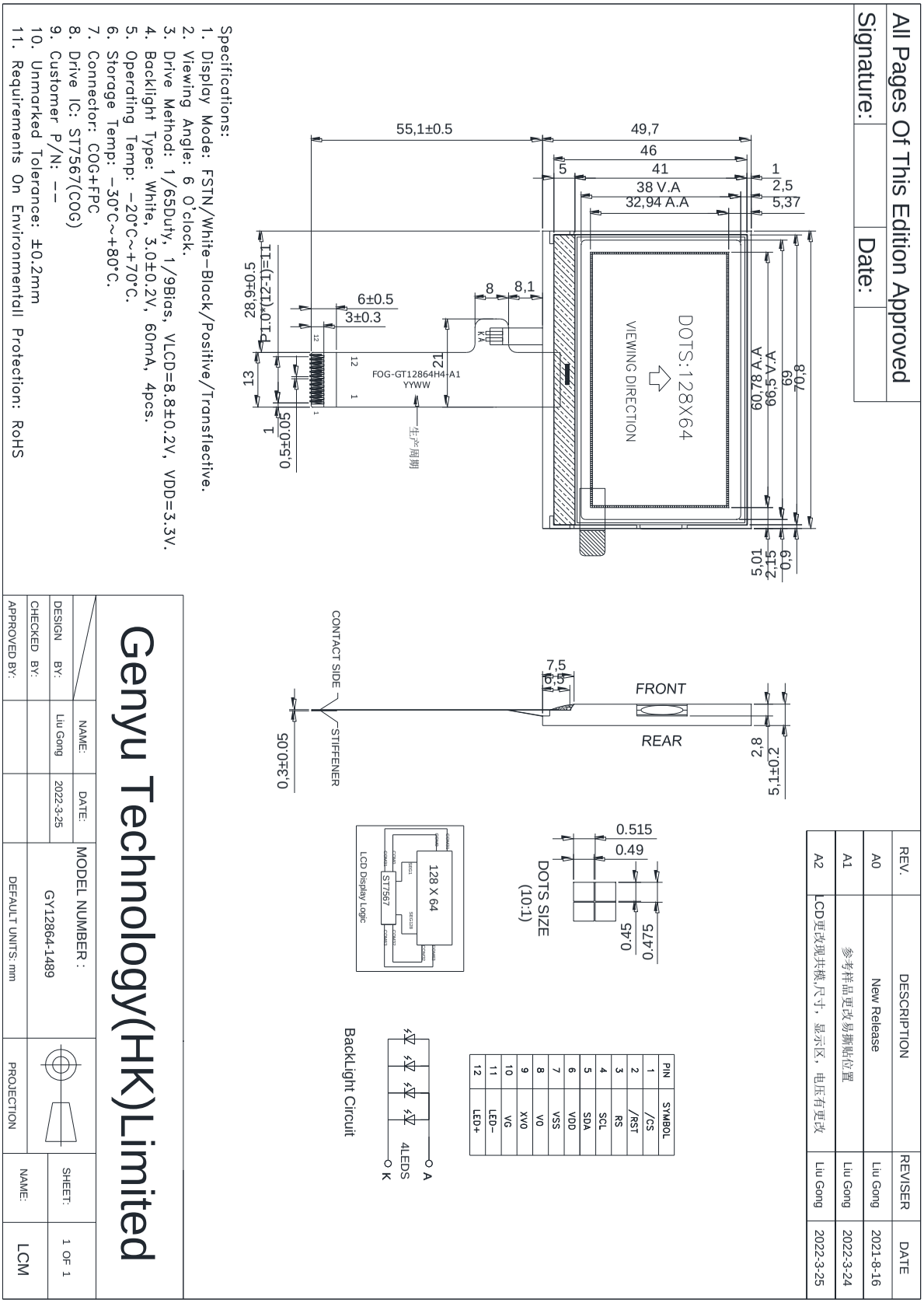
三、 FEATURES

2-1 Display Type: FSTN/POSITIVE/TRANSFLECTIVE
2-2 Driving Method:1/65DUTY,1/9BIAS
2-3 Viewing Direction:6 O' CLOCK
2-4 Drive IC:ST7567
2-5 LED Backlight: WHITE 3V 60MA,4PCS
2-6 VDD:3.3V VLCD:8.8V
2-7 Interface: 4SPI
2-8 Operating Temperature: -20~70℃, Storage Temperature: -30~80℃

四、 Mechanical SPECIFICATIONS:

ITEM	SPECIFICATIONS	UNIT
MODULE SIZE	70.80*49.70*5.1	MM
ASSY.TYPE	COG	--
WEIGHT	--	KG

五、 OUTLINE&PIN DESCRIPTION



六、PIN DESCRIPTION

PIN NO.	SYMBOL	DESCRIPTION
1	/CS	Chip Select input Pin.
2	/RST	Chip Hardware reset input Pin.
3	RS	It determines whether the access is related to data or command.
4	SCL	Serial Interface Clock Input Pin
5	SDA	Serial Interface Data Input Pin
6	VDD	LCM Power Supply 3.3v
7	VSS	Ground.
8	V0	Connect a capacitor(1uf/25v)between V0 and XV0
9	XV0	
10	VG	Connect a capacitor(1uf/25v)between VG and VSS
11	LED-	Backlight Negative Power Supply
12	LED+	Backlight Positive Power Supply

七、 ABSOLUTE MAXIMUM RATING

ITEM	SYMBOL				UNIT
		MIN.	TYP.	MAX.	
Power Supply Voltage(1)	VDD	0.3	-	3.6	V
Power Supply Voltage(2)	VLCD	8.6	8.8	9	V
Operating Temperature	TOPR	-20	25	+70	℃
Storage Temperature	TSTR	-30	25	+80	℃
Input Voltage	VIN	-0.4	-	VDD+0.3	V

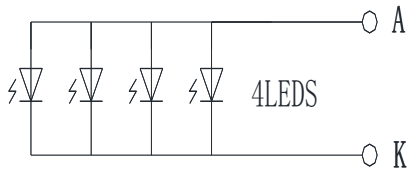
八、 ELECTRICAL CHARACTERISTICS

VSS=0V; Tamb = -30°C to +85°C; unless otherwise specified.

Item	Symbol	Condition		Rating			Unit	Applicable Pin
				Min.	Typ.	Max.		
Operating Voltage (1)	VDD1			1.7	—	3.3	V	VDD1
Operating Voltage (2)	VDD2			2.4	—	3.3	V	VDD2
Operating Voltage (3)	VDD3			2.4	—	3.3	V	VDD3
Input High-level Voltage	V_{IHC}			0.7 x VDD1	—	VDD1	V	MPU Interface
Input Low-level Voltage	V_{ILC}			VSS1	—	0.3 x VDD1	V	MPU Interface
Output High-level Voltage	V_{OHC}	I_{OUT}=1mA, VDD1=1.8V		0.8 x VDD1	—	VDD1	V	D[7:0]
Output Low-level Voltage	V_{OLC}	I_{OUT}=-1mA, VDD1=1.8V		VSS1	—	0.2 x VDD1	V	D[7:0]
Input Leakage Current	I_{LI}			-1.0	—	1.0	μA	MPU Interface
Output Leakage Current	I_{LO}			-3.0	—	3.0	μA	MPU Interface
Liquid Crystal Driver ON Resistance	R_{ON}	Ta=25°C	Vop=8.5V, ΔV=0.85V	—	0.6	0.8	KΩ	COMx
			VG=1.9V, ΔV=0.19V	—	1.3	1.5	KΩ	SEGx
Frame Frequency	FR	Duty=1/65, Vop=8.5V Ta = 25℃		70	75	80	Hz	

九、 LED BACKLIGHT

9-1 POWER SUPPLY FOR LED BACKLIGHT



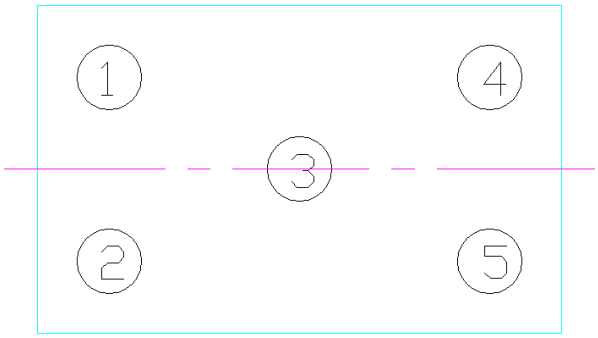
BackLight Circuit

9-2 ELECTRICAL –OPTICAL CHARACTERISTICS

(Ta=25℃.Unless specified,The Ambient temperature Ta=25℃)

Item	Symbol	Conditions	Standard Value			Unit
			Min.	Typ.	Max.	
Forward Voltage	Vf	IF=60MA	2.8	3	3.2	V
Reverse Current	Ir					uA
Spectral Line Half Width	Δλ					nM
Peak wave length	λ p					nM
Chromaticity Coordinates	X					
	Y					
Luminance	Lv					Cd/m²
Uniformity	Avg					%

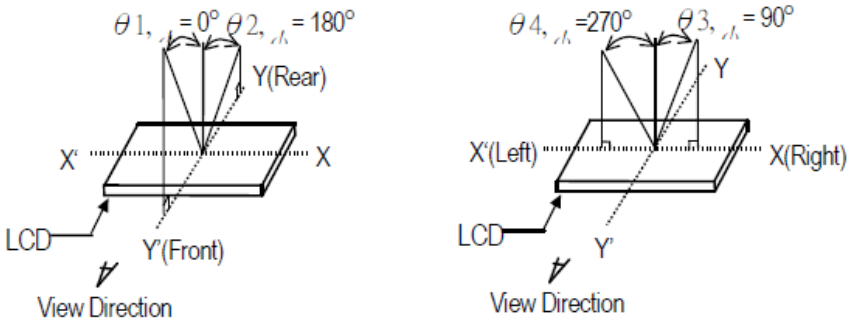
9-3 TEST POINT

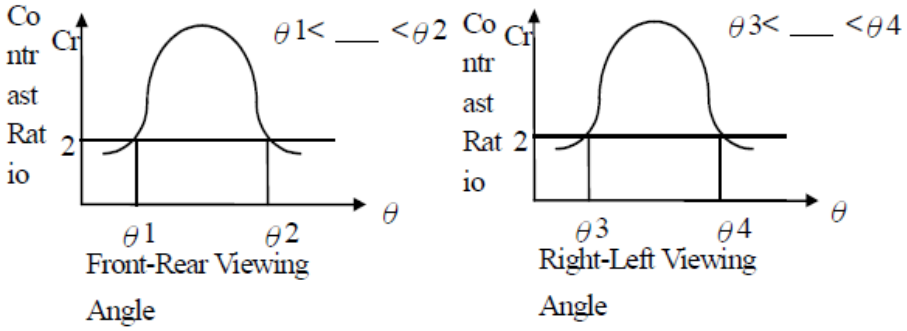


The luminance is the average value of 5 points,and the LVmin./LVmax. Is more than 75% Typical .The measurement instrument is BM-7 luminance Colorimeter.The aperature is φ 5mm.

十、 OPTICAL CHARACTERISTICS

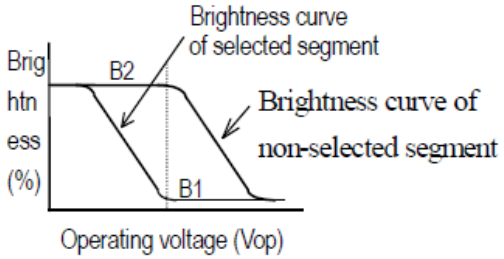
(1) DEFINITION OF VIEWING ANGLE



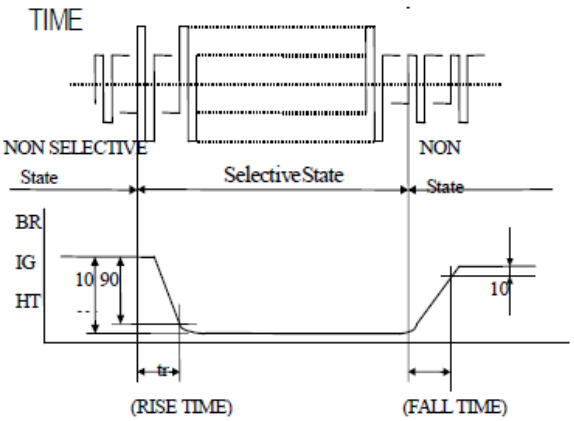


(2) DEFINITION OF CONTRAST RATIO

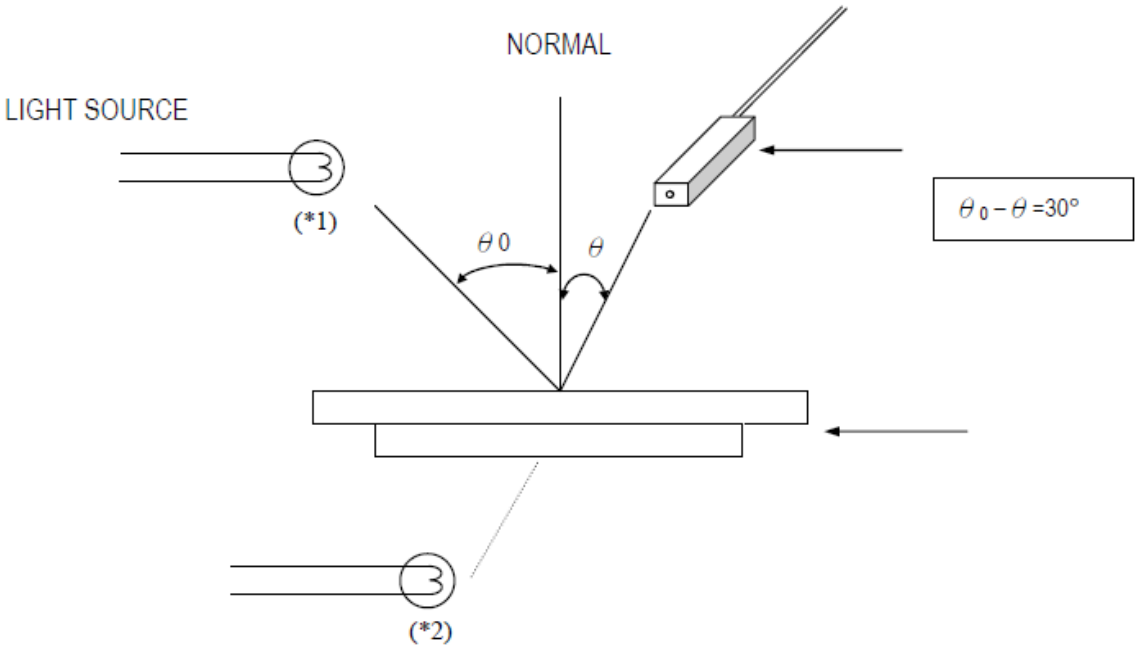
$$C.R = \frac{\text{Brightness of non-selected segment (B2)}}{\text{Brightness of selected segment}}$$



(3) DEFINITION OF RESPONSE TIME



(3) Measuring Instruments For Electro-optical Characteristics



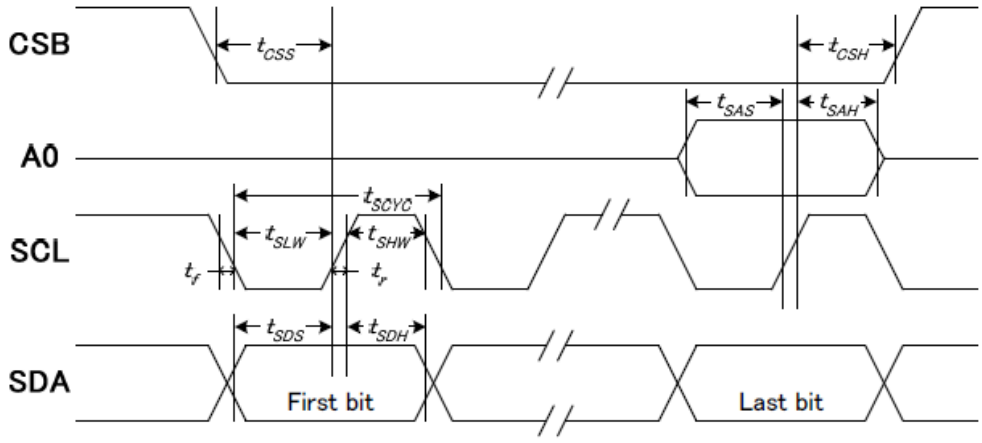
*1.Light source position for measuring the reflective type of LCD panel

*2.Light source position for measuring the transflective / transmissive types of LCD panel

十一、 TIMING CHARACTERISTICS

11.1 从 CPU 写到 IC 时序参数说明

System Bus Timing for 4-Line Serial Interface

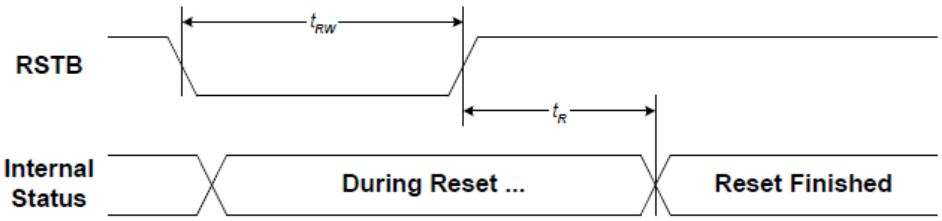


(VDD1 = 3.3V , Ta =25°C)

Item	Signal	Symbol	Condition	Min.	Max.	Unit
Serial clock period	SCLK	tSCYC		50	—	ns
SCLK “H” pulse width		tSHW		25	—	
SCLK “L” pulse width		tSLW		25	—	
Address setup time	A0	tSAS		20	—	
Address hold time		tSAH		10	—	
Data setup time	SDA	tSDS		20	—	
Data hold time		tSDH		10	—	
CSB-SCLK time	CSB	tCSS		20	—	
CSB-SCLK time		tCSH		40	—	

11.2 电源启动复位时序参数说明

Hardware Reset Timing



(VDD1 = 3.3V , Ta =25°C)

Item	Symbol	Condition	Min.	Max.	Unit
Reset time	tR		—	1.0	us
Reset "L" pulse width	tRW		1.0	—	

十二、 COMMAND TABLE

12.1 初始化指令 Initialization instructions

INSTRUCTION	A0	R/W (RWR)	COMMAND BYTE D7	D6	D5	D4	D3	D2	D1	D0	DESCRIPTION
(1) Display ON/OFF	0	0	1	0	1	0	1	1	1	D	D=1, display ON D=0, display OFF
(2) Set Start Line	0	0	0	1	S5	S4	S3	S2	S1	S0	Set display start line
(3) Set Page Address	0	0	1	0	1	1	Y3	Y2	Y1	Y0	Set page address
(4) Set Column Address	0	0	0	0	0	1	X7	X6	X5	X4	Set column address (MSB)
	0	0	0	0	0	0	X3	X2	X1	X0	Set column address (LSB)
(5) Read Status	0	1	0	MX	D	RST	0	0	0	0	Read IC Status
(6) Write Data	1	0	D7	D6	D5	D4	D3	D2	D1	D0	Write display data to RAM
(7) Read Data	1	1	D7	D6	D5	D4	D3	D2	D1	D0	Read display data from RAM
(8) SEG Direction	0	0	1	0	1	0	0	0	0	MX	Set scan direction of SEG MX=1, reverse direction MX=0, normal direction
(9) Inverse Display	0	0	1	0	1	0	0	1	1	INV	INV =1, inverse display INV =0, normal display
(10) All Pixel ON	0	0	1	0	1	0	0	1	0	AP	AP=1, set all pixel ON AP=0, normal display
(11) Bias Select	0	0	1	0	1	0	0	0	1	BS	Select bias setting 0=1/9; 1=1/7 (at 1/65 duty)
(12) Read-modify-Write	0	0	1	1	1	0	0	0	0	0	Column address increment: Read:+0 , Write:+1
(13) END	0	0	1	1	1	0	1	1	1	0	Exit Read-modify-Write mode
(14) RESET	0	0	1	1	1	0	0	0	1	0	Software reset
(15) COM Direction	0	0	1	1	0	0	MY	-	-	-	Set output direction of COM MY=1, reverse direction MY=0, normal direction
(16) Power Control	0	0	0	0	1	0	1	VB	VR	VF	Control built-in power circuit ON/OFF
(17) Regulation Ratio	0	0	0	0	1	0	0	RR2	RR1	RR0	Select regulation resistor ratio
(18) Set EV	0	0	1	0	0	0	0	0	0	1	Double command!! Set electronic volume (EV) level
	0	0	0	0	EV5	EV4	EV3	EV2	EV1	EV0	
(19) Set Booster	0	0	1	1	1	1	1	0	0	0	Double command!!
	0	0	0	0	0	0	0	0	0	BL	Set booster level: BL=0: 4X BL=1: 5X
(20) Power Save	0	0	Compound Command								Display OFF + All Pixel ON
(21) NOP	0	0	1	1	1	0	0	0	1	1	No operation
(22) Test	0	0	1	1	1	1	1	1	1	-	Do NOT use. Reserved for testing.

Note: Symbol "-" means this bit can be "H" or "L".

12.2 显示存储器映射关系 RAM MAPPING

Display Data RAM (DDRAM)

ST7567 is built-in a RAM with 65X132 bit capacity which stores the display data. The display data RAM (DDRAM) store the dot data of the LCD. It is an addressable array with 132 columns by 65 rows (8-page with 8-bit and 1-page with 1-bit). The X-address is directly related to the column output number. Each pixel can be selected when the page and column addresses are specified (please refer to Fig 7 for detailed illustration). The rows are divided into: 8 pages (Page-0 ~ Page-7) each with 8 lines (for COM0~63) and Page-8 with only 1 line (COMS, for icon). The display data (D7~D0) corresponds to the LCD common-line direction and D0 is on top. All pages can be accessed through D[7:0] directly except icon page. Icon RAM uses only 1-bit of data bus (D0). Refer to Fig 8 for detailed illustration. The microprocessor can write to and read from (only Parallel interfaces) DDRAM by the I/O buffer. Since the LCD controller operates independently, data can be written into DDRAM at the same time as data is being displayed without causing the LCD flicker or data-conflict.

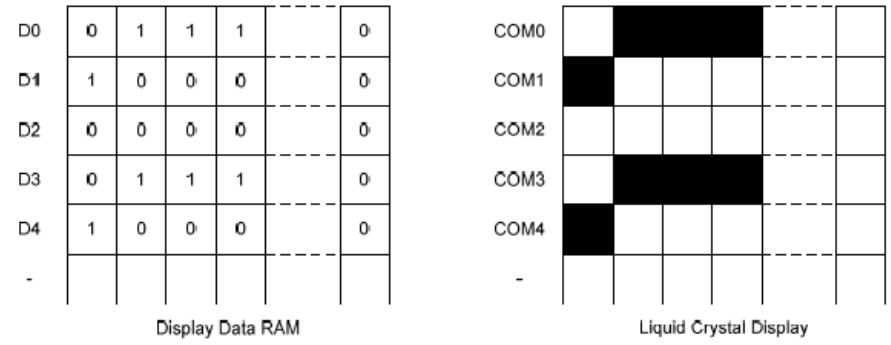


Fig 7. DDRAM Mapping Mode (Default Setting)

Fig 8. DDRAM Format

十三、 RELIABILITY

ITEM	CONDITIONS	CRITERION
OPERATING TEMPERATURE	HIGH TEMPERATURE +70℃ 240HRS	NO DEFECT IN DISPLAYING AND OPERATIONAL FUNCTION
	LOW TEMPERATURE -20℃ 240HRS	
STORAGE TEMPERATURE	HIGH TEMPERATURE +80℃ 240HRS	NO DEFECT IN DISPLAYING AND OPERATIONAL FUNCTION
	LOW TEMPERATURE -30℃ 240HRS	
HUMIDITY	50℃ 90%RH 120HRS	NO DEFECT IN DISPLAYING AND OPERATIONAL FUNCTION
VIBRATION	• Operating Time:thirty minutes exposure for each direction(X,Y,Z) • Sweep Frequency:10~55Hz(1min) • Amplitude:1.5mm	NO DEFECT IN DISPLAYING AND OPERATIONAL FUNCTION
THERMAL SHOCK	-10℃(60mins) ←→+60℃(60mins),24 cycles	NO DEFECT IN DISPLAYING AND OPERATIONAL FUNCTION

*NOTE:TEST CONDITON

(1)TEMPERATURE AND HUMIDITY:IF NO SPECIFICATION,TEMPERATURE SET AT 25±2℃, HUMIDITY SET AT 60±5%RH

(2)OPERATING STATE:SAMPLES SUBJECT TO THE TESTS SHALL BE IN”OPERATING”CONDITON

十四、 Outgoing Quality Control Specifications

14-1 Environment Required

Customer’s test&measurement are required to be conducted under the following Conditons:

Temperature: 23±5℃

Humidity: 55±15%RH

Fluorescent Lamp: 30W

Distance between the Panel&Lamp: ≥50cm

Distance between the Panel&Eyes of the Inspector: ≥30cm

Finger glove(or finger cover)must be worn by theinspector.

Inspection table or jig must be anti-electrostatic.

14-2 Sampling Plan

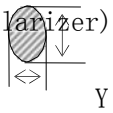
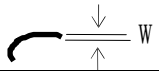
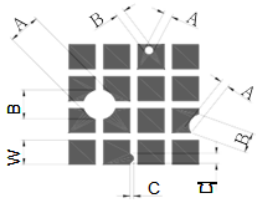
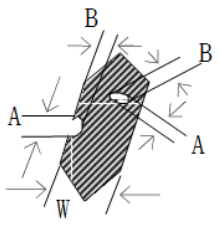
LevelⅡ, Normal inspection,Single Sampling,MIL-STD-105E

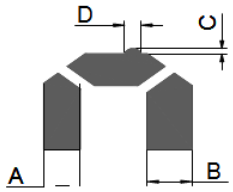
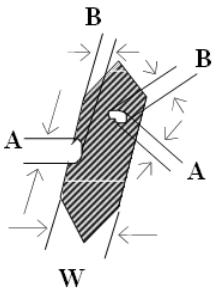
14-3 Criteria&Acceptable Quality Level

Partition	AQL	Definition
Major	0.65	Defects in Pattern Check(Display On)
Minor	1.0	Defects in Cosmetic Check(Display off)

14-4 Cosmetic Check Note on defect classification

Classify	Item		Note	AQL
Major	Display state	Short or open circuit	1	0.4
		Flickering		
		No display		
		Wrong viewing direction		
	No-display	Flat cable or pin reverse	10	
		Wrong or missing component	11	
		LC leakage	1	
Minor	Display state	Background color deviation	2	1.0
		Black spot and dust	3	1.0
		Line defect	4	1.0
		Rainbow	5	1.0
		Pin hole	6	1.0
		Segment defect	7	1.0
		Back-light	1,8	1.0
		Contrast defect (dim, ghost)	2	1.0
	Polarizer	Scratch	4	1.0
		Bubble and foreign material	3	1.0
	Soldering	Poor connection	9	1.0
	Wire	Poor connection	10	1.0

<table>
<tr><td>No</td><td>Item</td><td colspan="4">Criterion</td></tr>
<tr><td rowspan="6">1</td><td>Short or open circuit</td><td colspan="4" rowspan="6">Not allow</td></tr>
<tr><td>Lc Leakage</td></tr>
<tr><td>Flickering</td></tr>
<tr><td>No display</td></tr>
<tr><td>Wrong viewing direction</td></tr>
<tr><td>Wrong Back-light</td></tr>
<tr><td>2</td><td>Contrast defect
Background color deviation</td><td colspan="4">refer to approval sample</td></tr>
<tr><td>3</td><td>Point defect Back spot, dust (includingpolarizer)
Φ=(X+Y)/2
 
Y</td><td colspan="2">Point Size (Unit: mm)</td><td colspan="2">Acceptable Qty</td></tr>
<tr><td></td><td colspan="2">Φ≤0.10</td><td colspan="2">Disregarded</td></tr>
<tr><td></td><td colspan="2">0.10<Φ≤0.20</td><td colspan="2">3</td></tr>
<tr><td></td><td colspan="2">0.20<Φ≤0.25</td><td colspan="2">2</td></tr>
<tr><td></td><td colspan="2">0.25<Φ≤0.30</td><td colspan="2">1</td></tr>
<tr><td></td><td colspan="2">Φ>0.30</td><td colspan="2">0</td></tr>
<tr><td rowspan="6">4</td><td rowspan="6">Line defect scratch (includingpolarizer)
 
W</td><td colspan="2">Line (Unit: mm)</td><td colspan="2">Acceptable Qty</td></tr>
<tr><td>L</td><td>W</td><td colspan="2"></td></tr>
<tr><td>---</td><td>0.015≥W></td><td colspan="2">Disregard</td></tr>
<tr><td>≤2.5</td><td>0.03≥W>0.015</td><td colspan="2">2</td></tr>
<tr><td>≤1.5</td><td>0.05≥W>0.03</td><td colspan="2">2</td></tr>
<tr><td>≤1.5</td><td>0.1≥W>0.05</td><td colspan="2">1</td></tr>
<tr><td></td><td>W >0.1</td><td colspan="2">Applied as point defect</td></tr>
<tr><td>5</td><td>Rainbow</td><td colspan="4">According to the limit sample</td></tr>
<tr><td>6</td><td>Pin hole
 
Matrix type: pin hole
 
Segment type: pin hole</td><td rowspan="2">Size</td><td>Area≤60cm²</td><td>Area>60cm²</td></tr>
<tr><td>Allowed number</td><td colspan="2"></td></tr>
<tr><td></td><td>φ≤0.1</td><td colspan="3">Disregarded</td></tr>
<tr><td></td><td>0.10<φ≤0.15</td><td>2</td><td>3</td></tr>
<tr><td></td><td>0.15<φ≤0.2</td><td>1</td><td>2</td></tr>
<tr><td></td><td>φ >0.2</td><td>0</td><td>0</td></tr>
<tr><td></td><td colspan="4">Remark
W: width of dot or segment A: in the horizontal direction B: in the vertical direction</td></tr>
<tr><td>7</td><td></td><td colspan="2">Size (mm)</td><td colspan="2">Allowed number</td></tr>
</table>

		(C+D)/2≤ 0.10	2
	Segment defect: 1. Segment width defect  2.Segment pattern  	0.10＜(C+D)/2≤ 0.2	1
		(C+D)/2＞0.20	Not Allowed
		Remark A: in the horizontal direction B: in the vertical direction Segment width defect allowed standard A - B <0.2mm Does not touch other segment or matrix spot D≤W/3 (W: width of dot or segment)	
		POINT SIZE （Unit: mm）	Acceptable Qty
		Φ < 0.10mm	Disregarded
		Φ≤1/4W	Disregarded
		1/4W<Φ≤1/2W	1
		Φ＞1/2W	0
		Remark：W=SEGMENTWIDTH；Φ=（A+B）/2	
8	Back-light	1) the color of backlight should correspond its specification	
		2) not allow flickering	
9	Soldering	(1) not allow heavy dirty and solder ball on PCB(the size of dirty refer to point and dust defect)	
		(2) over 50% of lead should be soldered on land	
10	Wire	(1) copper wire should not be rusted	
		(2) not allow crack on copper wire connection	
11	PCB	(1) not allow screw rusted or damaged (2) not allow missing or wrong putting of component	

十五、 Precaution for Use

The following precautions should be followed, since this module contains precise parts.

(1) Do not store module for an extended periods of time under the conditions of high temperature and high humidity.

(2) Avoid using or storing the module in areas that expose it to direct sunlight or ultraviolet rays.

(3) Use protective finger covers when handling the module to avoid scratching or staining the module.

(4) Care should be taken not to expose the module to static electricity, because the module contains C-MOS LSI's.

(5) The LSI is sensitive to light.
The user's product should be designed so that LSI is not exposed to any light during operation.

(6) During installation, cover the display area with acrylic protection plates to protect the polarizer plate and LCD cells.

(7) Do not apply any excessive shocks to the module because the module contains sensitive LCD cells. Do not use a module, which has experienced strong mechanical shock.

(8) Care should be taken when the power supply turns on as following.
(a) Do not apply any input signals before the supplying voltage is applied.
(b) Do not turn off the power supply while any input signals are applied.

Caution

(1) Dangerous. Do not shock glass because glass can break.

(2) If module breaks, do not touch it directly.
(Glass could stick or cut skin.)

(3) Do not swallow Liquid Crystal.
(In case of broken LCD panel, do not swallow liquid crystal even if there is no proof that liquid crystal is poisonous.)

(4) If liquid crystal is exposed to skin, wash the area thoroughly with alcohol or soap.

(5) When disposing of the product, please observe industrial waste disposal laws in each country and district.

(6) In case of injury, give immediate treatment and consult with a doctor.

(7) This product is constructed precisely. Don't disassemble or modify.

※ Neglecting this mark can cause injury to humans and damage to materials