联信光电子有限责任公司

LANSER DISPLAY TECH Inc.

REV 01A

SPECIFICATION FOR LCD MODULE

Customer :_____

Product Model: **LMG-128DI4-WUN1G**

Sample No. :

Designed by	Checked by	Production DEPT.	Approved by

Final Approval by Customer

☐ OK

☐ NG，Problem survey:

Approved By _____

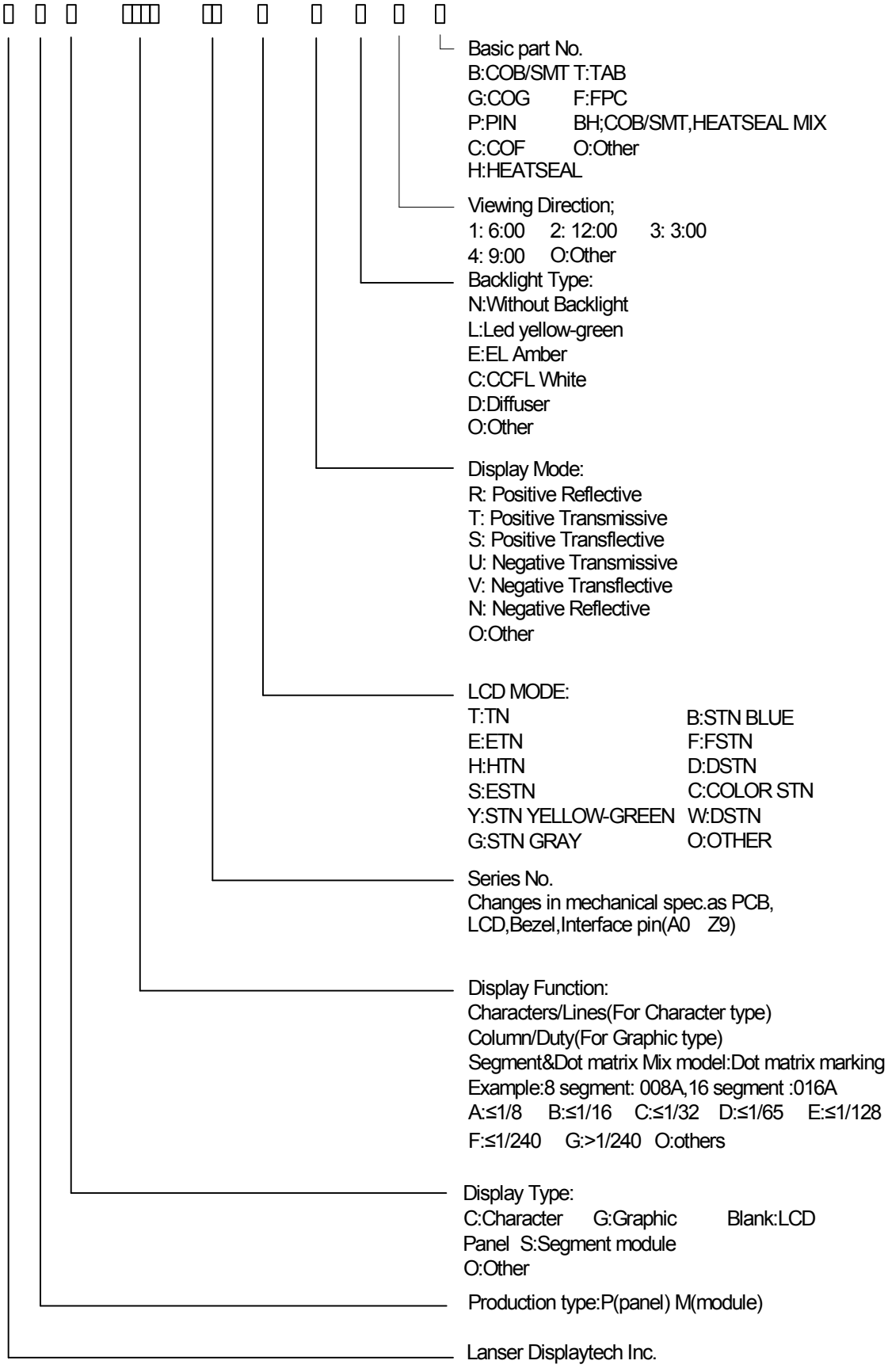
※The specification of “TBD” should refer to the measured value of sample . If there is difference between the design specification and measured value, we naturally shall negotiate and agree to solution with customer.

Revision History

Version	Contents	Date	Note
A	Original	August,2004	
01A	POLARIZER MODE:DSTN,	MAY,2005	

Contents

1 Numbering System



2 Scope

This specification applies to the STN LCD module which is designed and manufactured by Lanser Displaytech Inc.

It is capable of using 8bits data bus and operating with 8080-series or 6800-series MPU.

3 Normative Reference

GB/T4619-1996

《 Liquid Crystal Display Test Method》

GB/T2424

《Basic environmental Testing Procedures for Electric and Electronic Products.》

GB/T2423

《Basic Testing Procedures for Electric and Electronic Products》

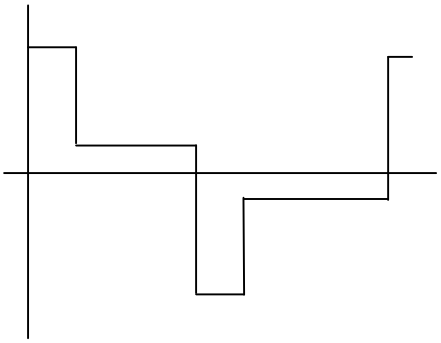
IEC61747-1

《SIXTH PARTGB2828`2829-87 National Standard of PRC》

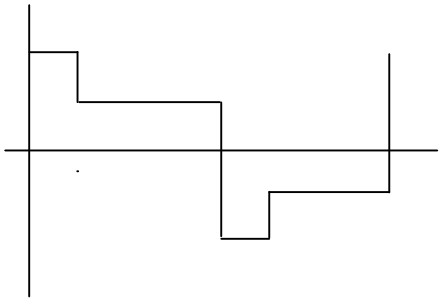
4 Definitions

4.1 Definitions of Vop

The definitions of threshold voltage Vth1, Vth2 the following typical waveforms are applied on liquid crystal by the method of equalized voltage for each duty and bias



【 selected waveform 】



【 non-selected waveform 】

① Vth1: The voltage which the brightness of segment indicates 50% of saturated value on the conditions of selected waveform (f_f=80Hz, Φ=10° θ=270 at 25℃)

② Vth2: The voltage which the brightness of segment indicates 50% of saturated value on the conditions of non-selected waveform (f_f=80Hz, Φ=10° θ=270 at 25℃)

③ Vop: (Vth1(50%)+Vth2(50%))/2 (f_f=80Hz, Φ=10° θ=270 at 25℃)

4.2 Definition of Response Time Tr, Td

①Tr: The time required which the brightness of segment becomes 10% from 100% when waveform is switched to selected one from non-selected one. (f_f=80Hz, Φ=10° θ=270 at 25℃)

②Td: The time required which the brightness of segment becomes 90% from 10% when waveform is switched to selected one from selected one. (f_f=80Hz, Φ=10° θ=270 at 25℃)

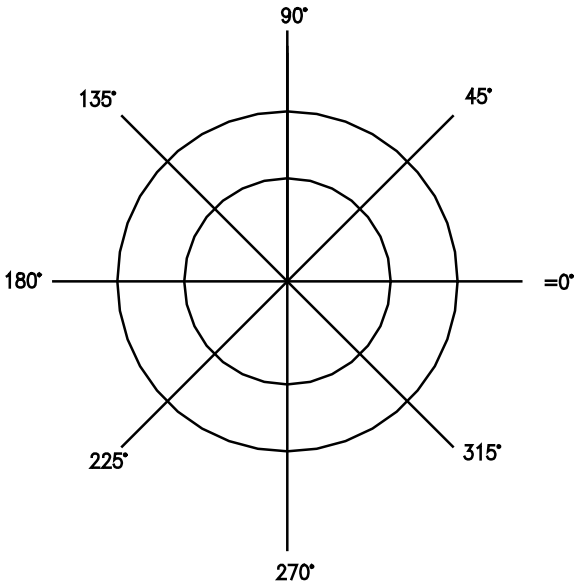
4.3 Definition of Contrast Ratio Cr

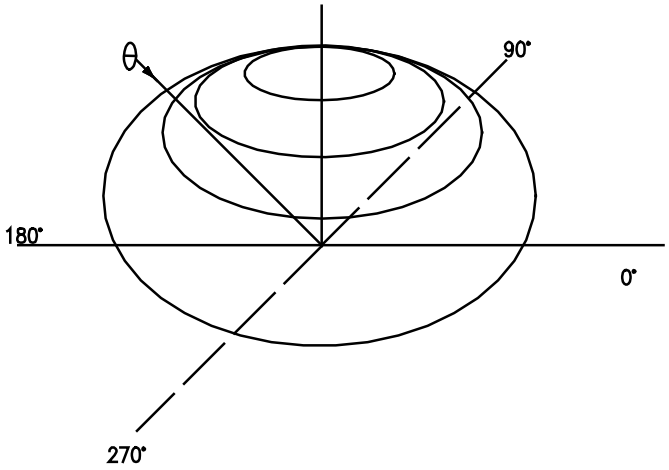
Cr=A/B

① A: Segments brightness in case of non-selected waveform

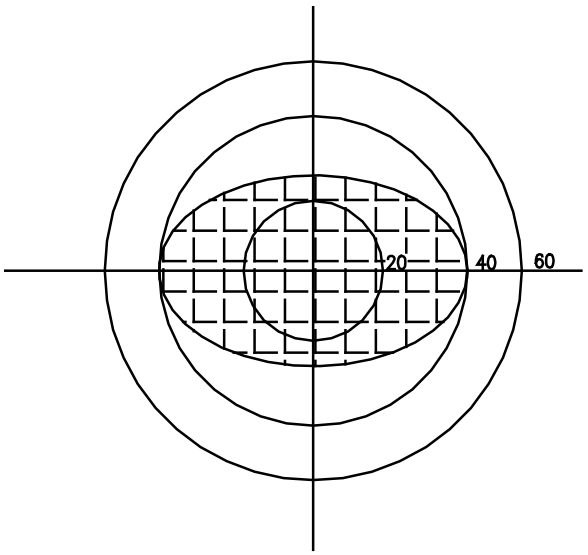
② ②Segments brightness in case of selected waveform

4.4 Definition of Angle and Viewing Range





Angular Graph: Constrast Ratio



Such as:
Viewing Angle Range:
86(Cr>2) Horizontal
88(Cr>2) Vertical

5 Technology Specifications

5.1 Feature

Display Mode : DSTN , Transmissive/ Negative type

Display Dots : 128(W)×64(H)

Input data : 8-bit parallel data interface from a MPU

Multiplexing Ratio : 1/65 Duty 1/9Bias

Viewing Direction : 6 o'clock

LCD Drive : ST7565V-G (COG)

Display RAM capacity : 132 X 65=8580 bits

5.2 Mechanical Specifications

Item	Specifications	Unit
Dimensional outline	76.1(W) ×98.6(H)×2.1(T)	mm
Viewing area	70.7 (W) ×38.8 (H)	mm
Active area	66.52 (W) ×33.24 (H)	mm
Pixel pitch	0.52(W)X0.52(H)	mm
Dots size	0.48(W)X0.48(H)	mm

5.3 Absolute Max. Rating

Item	Symbol	Value			Unit	Remark
		Min	typ	Max		
Supply voltage	Vdd	-0.3	+3.3	+5.0	V	
Input voltage	Vin	-0.3		VDD+0.3	V	
Operating temperature	Top	-20		+85	℃	
Storage temperature	Tstg	-30		+95	℃	
Humidity	-	-		70	%RH	

5.4 Electrical Characteristics (VSS=0V,,Ta=-20 to 70°C)

Item		Symbol	Condition	Value			Unit
				Min	Typ	Max	
Supply voltage (Logic)		Vdd	-	1.8	-	3.3	V
Input voltage	"H" level	VIH	-	0.8VDD	-	VDD	V
	"L" level	VIL		VSS	-	0.2VDD	V
Output voltage	"H" level	VOH	IOH=-0.5 mA	0.8VDD	-	VDD	V
	"L" level	VOL	IOL=0.5 mA	VSS	-	0.2VDD	V
I/O leakage current		IIL	VIN=VDD or Vss	-1.0	-	+1.0	µA
		IOZ		-3.0	-	+3.0	
Current consumption		Idd1	Full Display	-	65	110	µA
		Idd2	Stand mode	-	5	10	µA
LCD driving voltage (recommended voltage)		Vop	Ta = -20°C	TBD	TBD	TBD	V
			ϕ = 0°, θ=0°				
			Ta = 25°C	9.34	9.84	10.34	V
			ϕ = 0°, θ=0°				
			Ta =70°C	TBD	TBD	TBD	V
			ϕ = 0°, θ=0°				

5.5 Optical Characteristics

Item	Symbol	Temp	Condition	Value			Unit
				Min	Typ	Max	
Response time	tr	-20℃	Φ=0 Θ=0	TBD	TBD	TBD	ms
		25℃		-	120	220	
	tf	-20℃		TBD	TBD	TBD	
		25℃		-	172	272	
Viewing angle	Φ	25℃	Θ=0	65 CR>2 Horizontal			Deg
			Θ=90	71CR>2 Vertical			
Contrast ratio	Cr	25℃	Φ=0 Θ=0	3	3	-	

5.6 Interface Pin Connections

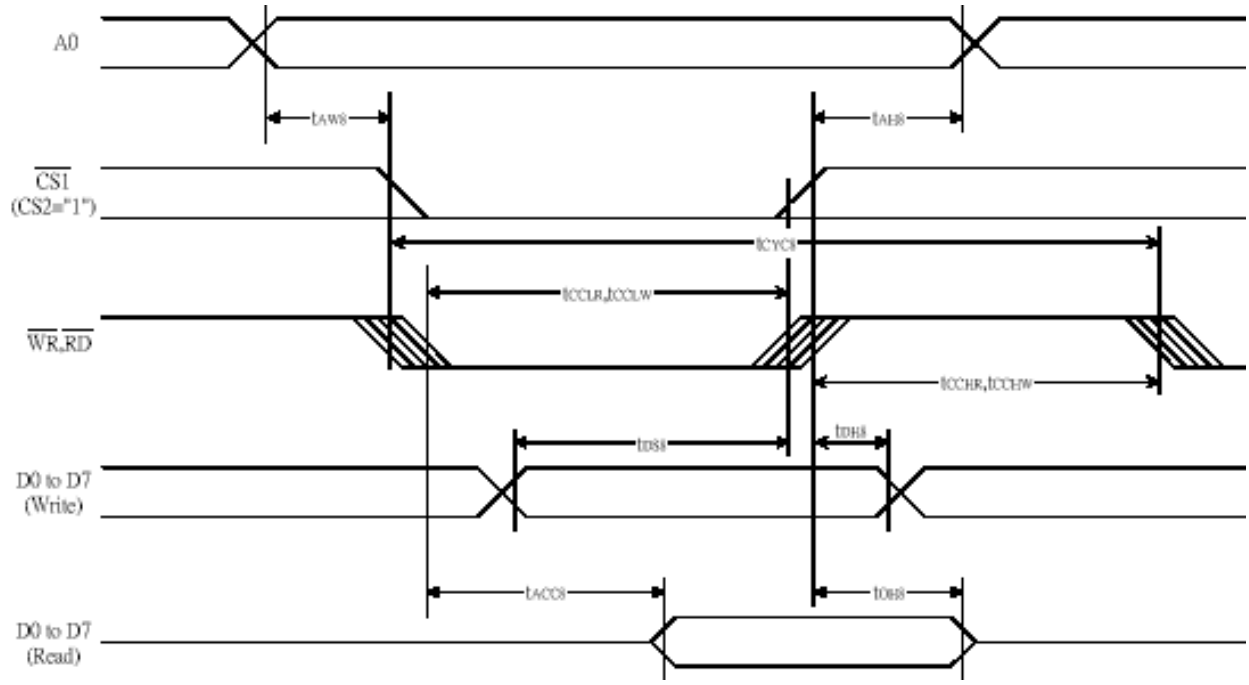
No.	Symbol	Description
1	/CS1	This is the chip select signal
2	/RST	RESET PIN
3	A0	Register select input pin
4	WR(R/W)	Read / Write execution control pin
5	RD(E)	Read / Write execution control pin
6	D0	8-bit bi-directional data bus
7	D1	
8	D2	
9	D3	
10	D4	
11	D5	
12	D6	
13	D7	
14	VDD	Power supply
15	VSS	Ground
16	VOUT	DC/DC voltage converter connect a capacitor between this Terminal and vss
17	CAP5-	DC/DC voltage converter connect a capacitor between this Terminal and the CAP1+terminal;not used when 4x step-up
18	CAP3-	DC/DC voltage converter connect a capacitor between this Terminal and the CAP1+terminal
19	CAP1+	DC/DC voltage converter connect a capacitor between this Terminal and the CAP1-terminal
20	CAP1-	DC/DC voltage converter connect a capacitor between this Terminal and the CAP1+terminal
21	CAP2-	DC/DC voltage converter connect a capacitor between this Terminal and the CAP2+terminal
22	CAP2+	DC/DC voltage converter connect a capacitor between this Terminal and the CAP2-terminal
23	CAP4-	DC/DC voltage converter connect a capacitor between this Terminal and the CAP2+terminal;not used when 4x step-up
24	VRS	This is the internal-output VREG power supply for the LCD Power supply voltage regulator

25	V1	Multi-level power supply for the LCD
26	V2	
27	V3	
28	V4	
29	V5	
30	VR	Output voltage regulator terminal ,Provides the voltage between VDD and V5 through a resistive voltage divider.
31	C86	This is the MPU interface switch terminal
32	P/S	This is the parallel date input/serial data input switch terminal
33	HPM	This is the power control terminal for the power supply circuit for liquid crystal drive
34	IRS	This terminal selects the resistors for the V5 voltage level adjustment

6 Signal timing diagram and Circuit block diagram

6.1 Signal Timing Diagram For LCD Driver ST7565V

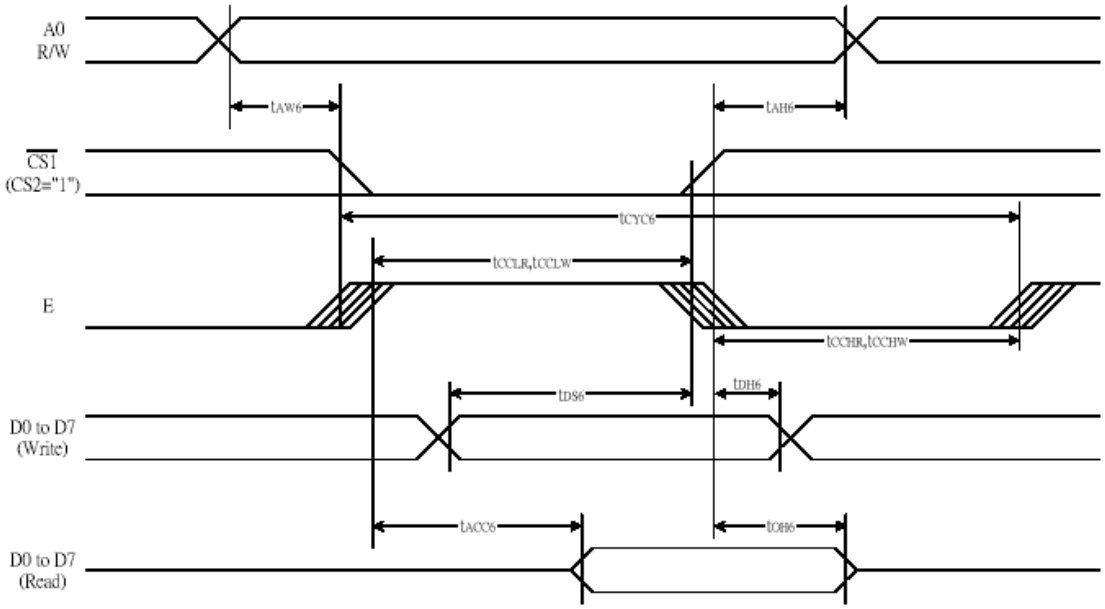
- System Bus Read/Write Characteristics 1 (For the 8080 Series MPU)



(VDD = 3.3V , Ta =25°C)

Item	Signal	Symbol	Condition	Rating		Units
				Min.	Max.	
Address hold time	A0	t_{AH8}		0	—	Ns
Address setup time		t_{AW8}		0	—	
System cycle time		t_{CYC8}		240	—	
Enable L pulse width (WRITE)	WR	t_{CCLW}		80	—	
Enable H pulse width (WRITE)		t_{CCHW}		80	—	
Enable L pulse width (READ)	RD	t_{CCLR}		140	—	
Enable H pulse width (READ)		t_{CCHR}		80		
WRITE Data setup time	D0 to D7	t_{DS8}		40	—	
WRITE Address hold time		t_{DH8}		0	—	
READ access time		t_{ACC8}	C_L = 100 pF	—	70	
READ Output disable time		t_{OH8}	C_L = 100 pF	5	50	

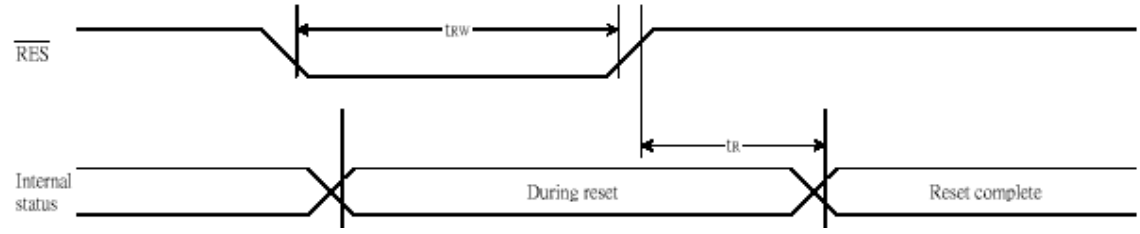
- System Bus Read/Write Characteristics 2 (For the6800 Series MPU)



(VDD = 3.3 V , Ta = 25°C)

Item	Signal	Symbol	Condition	Rating		Units
				Min.	Max.	
Address hold time	A0	tAH6		0	—	ns
Address setup time		tAW6		0	—	
System cycle time		tCYC6		240	—	
Enable L pulse width (WRITE)	WR	tEWLW		80	—	
Enable H pulse width (WRITE)		tEWHW		80	—	
Enable L pulse width (READ)	RD	tEWLR		80	—	
Enable H pulse width (READ)		tEWHR		140		
WRITE Data setup time	D0 to D7	tDS6		40	—	
WRITE Address hold time		tDH6		0	—	
READ access time		tACC6	CL = 100 pF	—	70	
READ Output disable time		tOH6	CL = 100 pF	5	50	

- Reset Input Timing



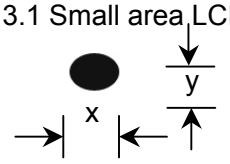
(VDD = 3.3V , Ta = –40 to 85°C)

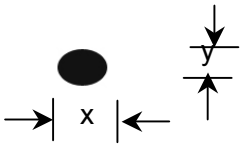
Item	Signal	Symbol	Condition	Rating			Units
				Min.	Typ.	Max.	
Reset time		tR		—	—	0.5	us
Reset "L" pulse width	/RES	tRW		0.5	—	—	us

7 Reliability Test Conditions And Methods

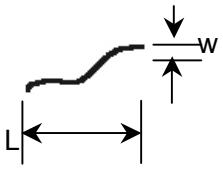
NO	Item	Condition	Method
1	High / Low Temperature Storage	60℃/-20℃ 500hrs	Check and record every 96Hrs
2	High / Low Temperature Life	50℃/-10℃ 500hrs (operating mode)	Check and record every 96Hrs
3	High Temperature、High Humidity Operating	40℃ 90% RH, 120Hrs	Check and record every 48hrs
4	Thermal Shock	-30℃(30Min) ⟶ 25℃(5Min) ⟶ 80℃(30Min) (conversion time, : 5 sec) 20 cycles	Each 10 cycles end , check
5	Vibration	10Hz~55Hz~10Hz Amplitude: 1.5mm 2hrs for each direction(X,Y,Z)	Each direction end, Check the Appearance and Electrical Characteristics
6	Static Electricity	Gap mood: ±1KV~±8KV (10 times air discharge with positive/negative voltage voltage gap : 1kv) Touch mood: ±1KV~±4KV	Each discharge end, Check the Electrical Characteristics
7	Slump	Free faller movement for each side、cording、angle (75cm High、 6 sides、2 angle、2 cording)	End

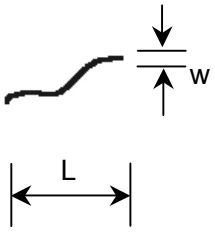
8.Inspection standard

<table>
<tr><th>No</th><th>Item</th><th>Criterion</th><th></th></tr>
<tr><td>01</td><td>Outline Dimension</td><td>In accord with drawing</td><td></td></tr>
<tr><td>02</td><td>Position-finding Dimension Assemble Dimension</td><td>In accord with drawing</td><td></td></tr>
<tr><td rowspan="2">03</td><td rowspan="2">LCD black spots, white spots (Round type)</td><td>Round type: non display
3.1 Small area LCD
 

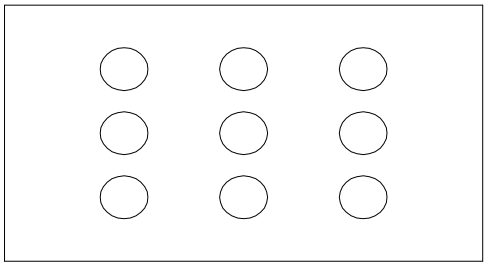
Unit : mm
<table><tr><th>Dimension</th><th>Qualified Quantity</th></tr><tr><td>D≤0.15</td><td>Ignore</td></tr><tr><td>0.15＜D≤0.2</td><td>4</td></tr><tr><td>D＞0.2</td><td>0</td></tr></table></td><td></td></tr>
<tr><td>3.2Large area LCD
 

<table><tr><th>Dimension</th><th>Qualified Quantity</th></tr><tr><td>D≤0.15</td><td>Ignore</td></tr><tr><td>0.15＜D≤0.2</td><td>4</td></tr><tr><td>0.2＜D≤0.25</td><td>2</td></tr><tr><td>D＞0.25</td><td>0</td></tr></table>STN : if D＞0.1 , unqualified</td><td></td></tr>
</table>

<table>
<tr><td rowspan="2">04</td><td rowspan="2">LCD black spots, white spots (Line Style)</td><td>
4.1 Small area LCD Unit : mm


<table>
<tr><th>Length</th><th>Width</th><th>Qualified Quantity</th></tr>
<tr><td>-</td><td>≤0.015</td><td>Ignore</td></tr>
<tr><td>≤1.0</td><td rowspan="2">0.015＜W≤ 0.025</td><td>2</td></tr>
<tr><td>≤2.0</td><td>1</td></tr>
<tr><td>≤1.0</td><td>0.025＜W≤0.05</td><td>1</td></tr>
<tr><td>-</td><td>D＞0.05</td><td>According to circle</td></tr>
</table>
</td><td></td></tr>
<tr><td>
4.2Large area LCD


<table>
<tr><th>Length</th><th>Width</th><th>Qualified Quantity</th></tr>
<tr><td>-</td><td>≤0.015</td><td>Ignore</td></tr>
<tr><td>≤2.0</td><td>0.015＜W≤ 0.025</td><td>2</td></tr>
<tr><td>≤1.0</td><td>0.025＜W≤0.05</td><td>1</td></tr>
<tr><td>-</td><td>D＞0.05</td><td>According to circle</td></tr>
</table>
CSTN : If W ≥ 0.015 , unqualified
Ignore beyond viewing area
</td><td></td></tr>
<tr><td>05</td><td>LCD Scratch 、 Threadlike Fiber</td><td colspan="2">Same to NO.3 circle
sightline and surface of LCD is vertical
(2)Same to NO.3 line style</td><td></td></tr>
<tr><td>06</td><td>POL</td><td colspan="2">It is not admissible that POL is beyond the edge of glass, else, unqualified.
It is essential that POL is over the 50 percent of width of frame , else ,unqualified.
According to the drawing in case of special definition.</td><td></td></tr>
<tr><td rowspan="3">07</td><td rowspan="3">IC/FPC Bonding</td><td>Scratch</td><td>Reject</td><td></td></tr>
<tr><td>Intensity Of Adhesion</td><td>If lower than specification, reject</td><td></td></tr>
<tr><td>Gold Fold Twist</td><td>Reject</td><td></td></tr>
</table>

		Silicon	According to outline, no gold outside, seal can not be higher than LCD	
		FPC Gold Sever	Reject	
08	Brightness	In accord with product specification	Drive condition is according to specification Measure location is in Follow Picture 3、Adjust brightness instrument tozero , burrow against the surface of LCD , press “measure” , record when the display is steady. (YOKOGAWA-3298)	
			 Measure location	
09	CR (Max)	According to specification	According to product specification Measure instrument (DMS-501)	
10	Response time	According to specification	According to product specification Measure instrument (DMS-501)	
11	Viewing angle	According to specification	According to product specification Measure instrument (DMS-501)	
12	Vibration、Ring	Compare with the sample customer supply	Compare with the sample customer supply when assemble	

9 Handling Precautions

9.1 Mounting method

The LCD panel of Lanser LCD module consists of two thin glass plates with polarizes which easily be damaged. And since the module in so constructed as to be fixed by utilizing fitting holes in the printed circuit board.

Extreme care should be needed when handling the LCD modules.

9.2 Caution of LCD handling and cleaning

When cleaning the display surface, Use soft cloth with solvent [recommended below] and wipe lightly

- Isopropyl alcohol
- Ethyl alcohol

Do not wipe the display surface with dry or hard materials that will damage the polarizer surface.

Do not use the following solvent:

- Water
- Aromatics

Do not wipe ITO pad area with the dry or hard materials that will damage the ITO patterns

Do not use the following solvent on the pad or prevent it from being contaminated:

- Soldering flux
- Chlorine (Cl) , Salfur (S)

If goods were sent without being sili8con coated on the pad, ITO patterns could be damaged due to the corrosion as time goes on.

If ITO corrosion happen by miss-handling or using some materials such as Chlorine (Cl), Salfur (S) from customer, Responsibility is on customer.

9.3 Caution against static charge

The LCD module use C-MOS LSI drivers, so we recommended that you:

Connect any unused input terminal to Vdd or Vss, do not input any signals before power is turned on, and ground your body, work/assembly areas, assembly equipment to protect against static electricity.

9.4 packing

- Module employ LCD elements and must be treated as such.
- Avoid intense shock and falls from a height.
- To prevent modules from degradation, do not operate or store them exposed direct to sunshine or high temperature/humidity

9.5 Caution for operation

- It is an indispensable condition to drive LCD's within the specified voltage limit since the higher voltage then the limit cause the shorter LCD life.
- An electrochemical reaction due to direct current causes LCD's undesirable deterioration, so that the use of direct current drive should be avoided.
- Response time will be extremely delayed at lower temperature then the operating temperature range and on the other hand at higher temperature LCD's how dark color in them. However those phenomena do not mean malfunction or out of order with LCD's, which will come back in the specified operation temperature.
- If the display area is pushed hard during operation, some font will be abnormally displayed but it resumes normal condition after turning off once.
- A slight dew depositing on terminals is a cause for electro-chemical reaction resulting in terminal open circuit.

Usage under the maximum operating temperature, 50%Rh or less is required.

9.6 storage

In the case of storing for a long period of time for instance, for years for the purpose or replacement use, the following ways are recommended.

- Storage in a polyethylene bag with the opening sealed so as not to enter fresh air outside in it . And with no desiccant.
- Placing in a dark place where neither exposure to direct sunlight nor light's keeping the storage temperature range.
- Storing with no touch on polarizer surface by the anything else.
  [It is recommended to store them as they have been contained in the inner container at the time of delivery from us

9.7 Safety

- It is recommendable to crash damaged or unnecessary LCD's into pieces and wash off liquid crystal by either of solvents such as acetone and ethanol, which should be burned up later.
- When any liquid leaked out of a damaged glass cell comes in contact with your hands, please wash it off well with soap and water

10 Precaution for use

10.1

A limit sample should be provided by the both parties on an occasion when the both parties agreed its necessity. Judgment by a limit sample shall take effect after the limit sample has been established and confirmed by the both parties.

10.2

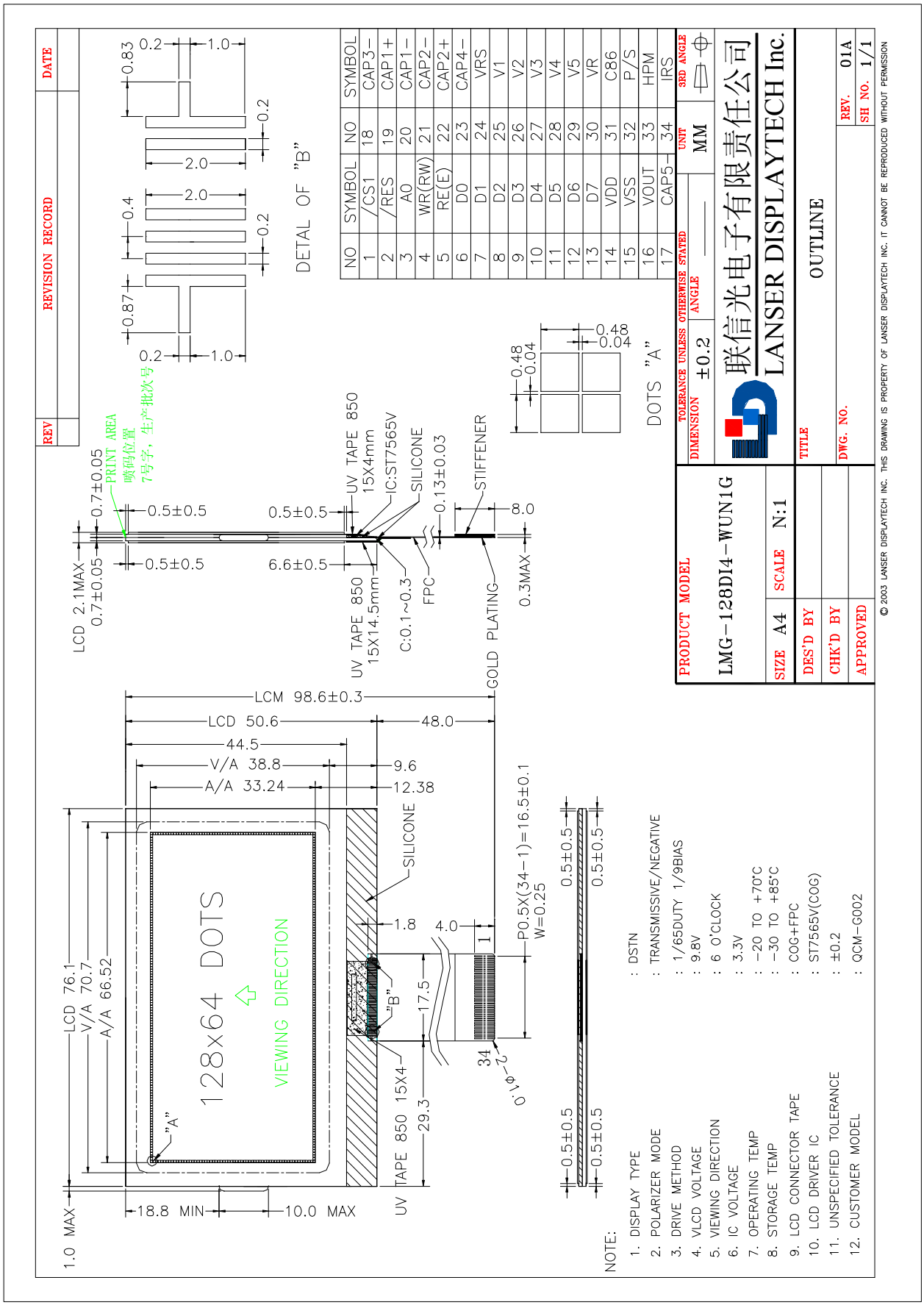
On the following occasions, the handing of problem should be decided through discussion and agreement between responsible of the both parties.

- When a question is arisen in this specification
- When a new problem is arisen which is not specified in this specifications
- When an inspection specifications change or operating condition change in customer is reported to Lanser , and some problem is arisen in this specification due to the change
- When a new problem is arisen at the customer's operating set for sample evaluation in the customer site.

11 Parts list

NO	Description	MAKER	LOCATION	APPROVED	REMARK
1	ITO GLASS	LAIBAO	CHINA		
2	IC	Sitronix	CHINA		
3	FPC	FLEX	CHINA		

12.**Dimensional Outline**



NO	SYMBOL	NO	SYMBOL
1	DUMMY	21	CAP1+
2	DUMMY	22	CAP1−
3	/CS1	23	CAP2−
4	/RES	24	CAP2+
5	A0	25	CAP4−
6	WR(RW)	26	VRS
7	RE(E)	27	V1
8	D0	28	V2
9	D1	29	V3
10	D2	30	V4
11	D3	31	V5
12	D4	32	VR
13	D5	33	C86
14	D6	34	P/S
15	D7	35	HPM
16	VDD	36	IRS
17	VSS	37	DUMMY
18	VOUT	38	DUMMY
19	CAP5−	39	DUMMY
20	CAP3−	40	DUMMY

PIN TABLE

聯信光电子有限责任公司 LANSER DISPLAYTECH Inc.			
UNIT	mm	REV	A
SCALE	N:1	TITLE	LAYOUT
PAGE	2/3	MODEL	LPG-128DI4-WUN1G