

**SPECIFICATION
OF
LCD MODULE**

MODULE NO.: HL103T03-01

Customer Approval:

☐ **Accept**

☐ **Reject**

	SIGNATURE	DATE
PREPARED BY		
CHECKED BY		
APPROVED BY		

DOCUMENT REVISION HISTORY

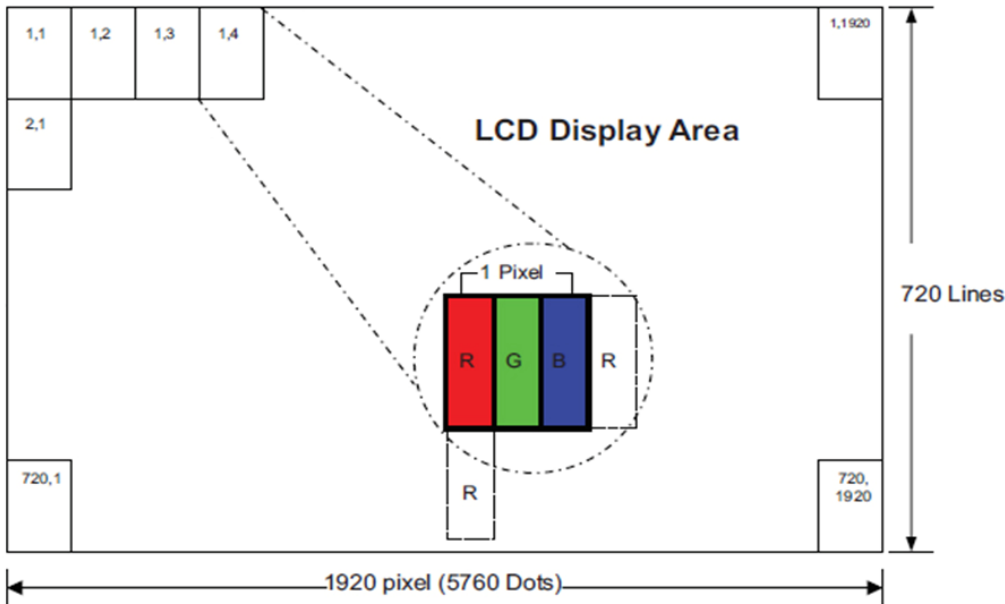
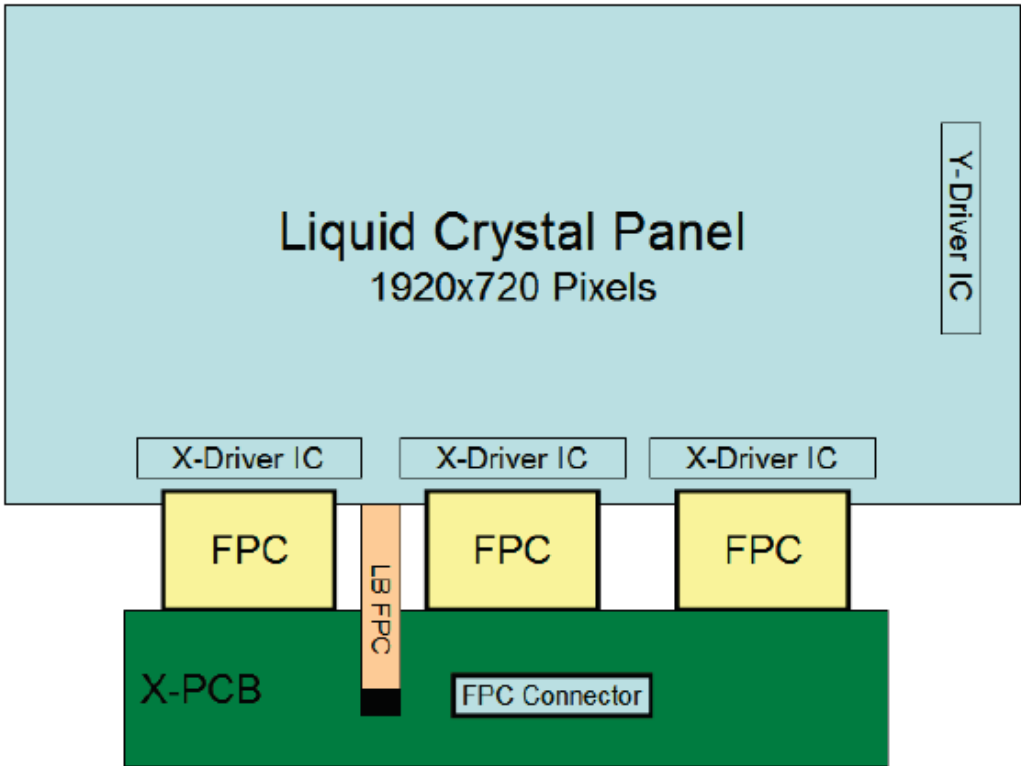
Sample Version	Doc. Version	DATE	DESCRIPTION	CHECKED BY
0001	A0	2023-09-21	First Release.	

1. MECHANICAL SPECIFICATIONS:

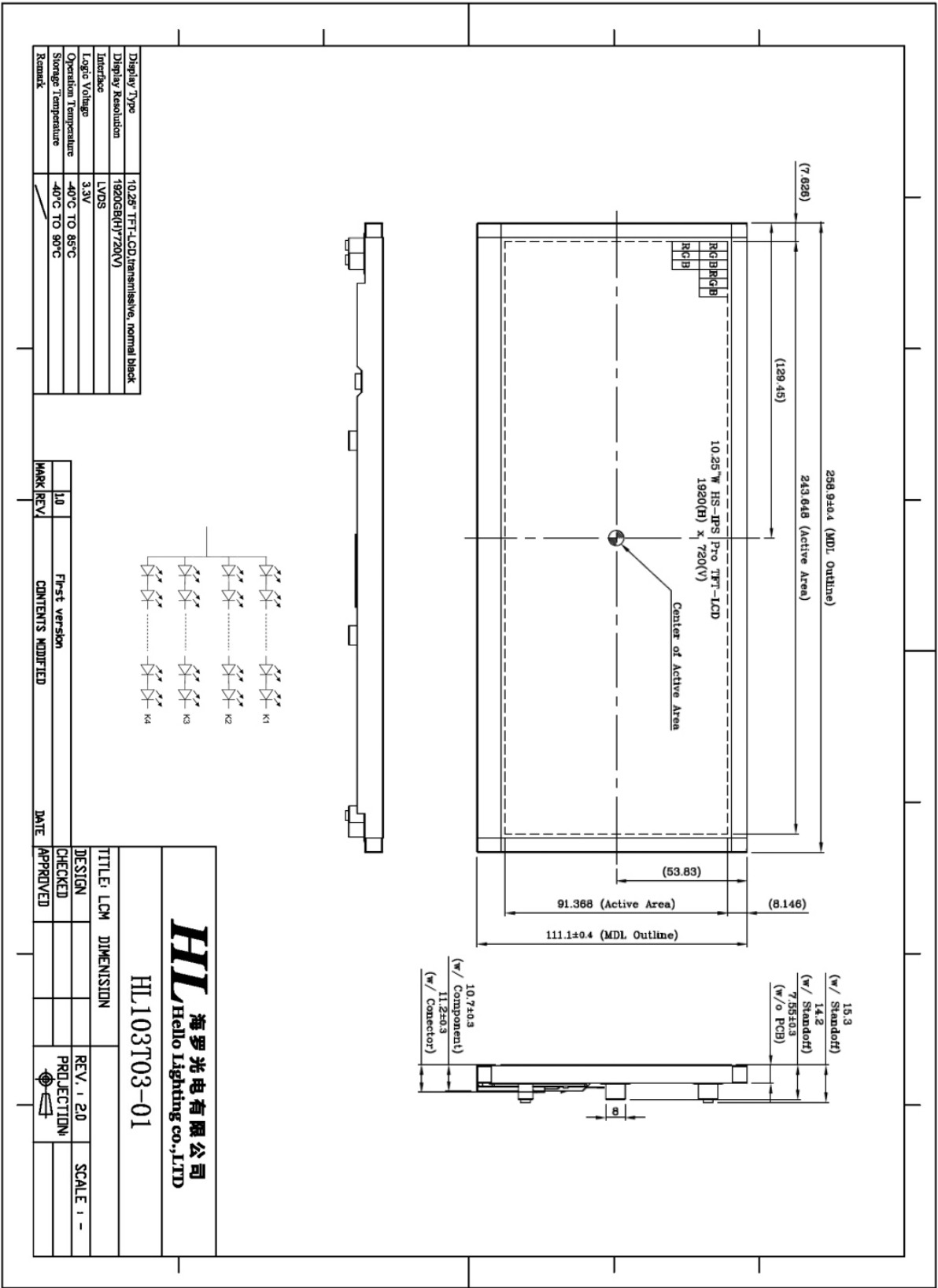
ITEM	SPECIFICATION	UNIT
OUTLINE DIMENSIONS	257.9 (W) X107.1(H) X5.55(D)	mm
Bezel opening	246.65(W) x 95.90(H)	mm
ACTIVE AREA	243.648(W) x 91.368(H)	mm
DISPLAY SIZE	10.25	inch
DOT PITCH	0.1269mmX0.1269mm	mm
NUMBER OF DOTS	1920* (RGB) *720	-
LCD TYPE	Normal black, TRANSMISSIVE	-
BACKLIGHT TYPE	LED White	-
VIEWING DIRECTION	Free	-

***See attached drawing for details.**

2.BLOCK DIAGRAM:



3.DIMENSIONAL



4. PIN DESCRIPTION:

Pin define for LCD

Connector: Hirose FH28K-60S-0.5SH, 60PIN

NO.	PIN NAME	I/O	Description
1	GND	P	Ground
2	VCOM	O	Connect to Pin-59(VCOM) and set the capacitor (4.7uF) to ground.
3	GND	G	Ground
4	VGL	P	Power for gate drvier and set the capacitor (1.0uF and 0.1uF) to ground. Pin-4 and Pin-5 are connected together.
5	VGL	P	Power for gate drvier and set the capacitor (1.0uF and 0.1uF) to ground. Pin-4 and Pin-5 are connected together.
6	NC	-	No connection
7	VDD	P	Power input for Gate IC (3.3±0.3V). Set the capacitor (4.7uF and 0.1uF) to ground. Pin-7 and Pin-8 are connected together.
8	VDD	P	Power input for Gate IC (3.3±0.3V). Set the capacitor (4.7uF and 0.1uF) to ground. Pin-7 and Pin-8 are connected together.
9	NC	-	No connection
10	VGH	P	Power for gate drvier and set the capacitor (1.0uF and 0.1uF) to ground. Pin-10 and Pin-11 are connected together.
11	VGH	P	Power for gate drvier and set the capacitor (1.0uF and 0.1uF) to ground. Pin-10 and Pin-11 are connected together.
12	NC	-	No connection
13	VDD_OTP	P	Power for trim process. Designed for manufacturers. Keep N/C for customers
14	NC	-	No connection
15	VDPA	P	Power input for source driver. Set the capacitor (10uF) to ground. Pin-15 and Pin-16 are connected together.
16	VDPA	P	Power input for source driver. Set the capacitor (10uF) to ground. Pin-15 and Pin-16 are connected together.
17	NC	-	No connection
18	VDNA	P	Power input for source driver. Set the capacitor (10uF) to ground. Pin-18 and Pin-19 are connected together.
19	VDNA	P	Power input for source driver. Set the capacitor (10uF) to ground. Pin-18 and Pin-19 are connected together.

20	VDDN1	O	Internal regulator out for negative level shifter(-3.6v). Set the capacitor (4.7uF) to ground.
21	NC	-	No connection
22	I2C_SCL	I	Serial interface clock input for I2C interface. Pull high with 4.7KΩ resistance.
23	I2C_SDA	I/O	Serial Interface address and data input / output for I2C interface. Pull high with 4.7KΩ resistance.
24	GND	G	Ground
25	VDD	P	Power input for Source IC (3.3±0.3V). Set the capacitor (4.7uF and 0.1uF) to ground. Pin-25 and Pin-26 are connected together.
26	VDD	P	Power input for Source IC (3.3±0.3V). Set the capacitor (4.7uF and 0.1uF) to ground. Pin-25 and Pin-26 are connected together.
27	DVDD	P	logic power supply (1.6~1.65V). Set the capacitor (2.2uF) to ground. Pin-27 and Pin-28 are connected together.
28	DVDD	P	logic power supply (1.6~1.65V). Set the capacitor (2.2uF) to ground. Pin-27 and Pin-28 are connected together.
29	NC	-	No connection
30	DVDD	P	Interface power supply (1.6~1.65V) . Set the capacitor (2.2uF) to ground. Pin-30 and Pin-31 are connected together.
31	DVDD	P	Interface power supply (1.6~1.65V) . Set the capacitor (2.2uF) to ground. Pin-30 and Pin-31 are connected together.
32	GND	G	Ground
33	OLV3P	I	LVDS data lane 3 Positive
34	OLV3N	I	LVDS data lane 3 Negative
35	GND	G	Ground
36	OLV2P	I	LVDS data lane 2 Positive
37	OLV2N	I	LVDS data lane 2 Negative
38	GND	G	Ground
39	OLVCLKP	I	LVDS Clock Lane Positive
40	OLVCLKN	I	LVDS Clock Lane Negative
41	GND	G	Ground
42	OLV1P	I	LVDS data lane 1 Positive
43	OLV1N	I	LVDS data lane 1 Negative
44	GND	G	Ground
45	OLV0P	I	LVDS data lane 0 Positive
46	OLV0N	I	LVDS data lane 0 Negative

47	GND	G	Ground
48	VGMPH	O	Internal regulator output for positive gamma reference voltage. Set the capacitor (2.2uF) to ground.
49	VGMPH	O	Internal regulator output for positive gamma reference voltage. Set the capacitor (2.2uF) to ground.
50	VGMNH	O	Internal regulator output for positive gamma reference voltage. Set the capacitor (2.2uF) to ground.
51	VGMNL	O	Internal regulator output for positive gamma reference voltage. Set the capacitor (2.2uF) to ground.
52	FAIL_DET	O	Fail detection signal output.
53	STBYB	I	Standby mode setting pin.
54	RESETB	I	Global Reset pin.
55	UPDN	I	Vertical display direction control
56	SHLR	I	Horizontal display direction control
57	GND	G	Ground
58	BIST	I	Normal Operation/BIST pattern select.
59	VCOM	O	Connect to Pin-2(VCOM) and set the capacitor (4.7uF) to ground.
60	GND	G	Ground

Pin defines for BL:

Connector: IRISO 12001S-10Y901

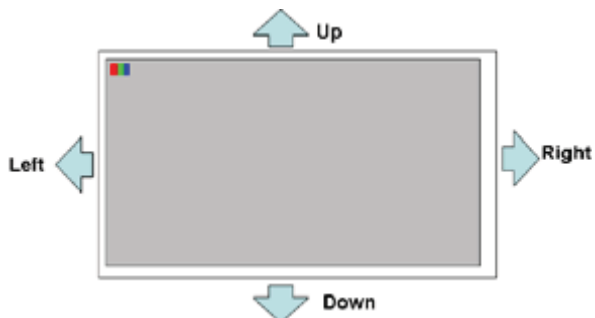
NTC: NCP18XH103F03RB

NO.	PIN NAME	Description
1	PLED	Power LED anode power supply
2	PLED	Power LED anode power supply
3	PLED	Power LED anode power supply
4	NC	Keep floating
5	NTC1	Heat sensor
6	NTC2(GND)	Heat sensor
7	NC	Keep floating
8	NLED	Power LED cathode power supply
9	NLED	Power LED cathode power supply
10	NLED	Power LED cathode power supply

Remarks: “I” is Input; “O” is Output; “P” is Power; “C” is passive component.

Note 1: RL and TB defines:

RL	TB	Function
VDD	GND	Left -> right Down->up
GND	GND	Right -> left Down->up
VDD	VDD	Left->right Up->down(default)
GND	VDD	Right->left Up->down



5. MAXIMUM ABSOLUTE LIMIT:

Item	Symbol	Value	Unit
Power supply voltage	VCC	-0.3 - 4	V
Input voltage	V _{in}	V _{DD} +0.3	V
Operating temperature	T _{opr}	-40 to 85	°C
Storage temperature	T _{stg}	-40 to 90	°C

Note 1: If the absolute maximum rating of even is one of the above parameters is exceeded even momentarily, the quality of the product may be degraded. Absolute maximum ratings, therefore, specify the values exceeding which the product may be physically damaged. Be sure to use the product within the range of the absolute maximum ratings.

Note 2: Optical deviation under -30°

Note 3: Panel surface temperature should not exceed 95°C. No performance guarantee below -30°C.

Note 4: No condensation allowed under any condition

6.ELECTRICAL CHARACTERISTICS

6-1 DC Characteristics (V_{DD}=3.3V,Ta=25°C)

Item	Symbol	Min	Type	Max	Unit	Test condition
Operating voltage	VDDA	3.0	3.3	3.6	V	-
Supply current	I _{DD}	-	-	600	mA	V _{DD} =3.3V,Ta=25°C
Input voltage	V _{IH}	0.7V _{DD}	-	V _{DD}	V	-
	V _{IL}	0	-	0.3V _{DD}	V	
Input leakage current	I _{IL}	-1.0	-	1.0	μA	V _{IN} =V _{DD} or V _{SS}

Note: Voltage greater than above may damage the module.

All voltages are specified relative to V_{SS}=0V.

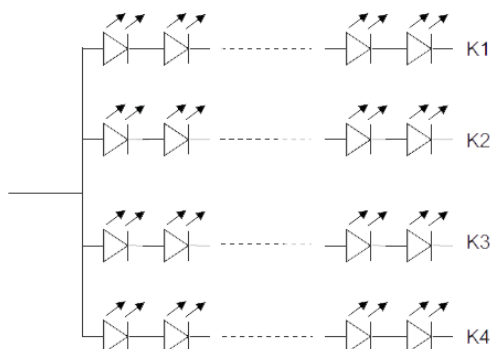
6-3 Backlight Electrical-optical Characteristics

Item	Symbol	MIN	TYP	MAX	UNIT	Test Condition	Note
Supply Voltage	Vf	-	27.9	29.7	V	If=300 mA	-
Supply Current	If	-	300	-	mA	-	-
Reverse Voltage	Vr	-	-	5	V	10uA	
Power dissipation	Pd	-	6.48	-	W	-	
Uniformity for LCM	-	80	-	-	%	If=300mA	3
Life Time	-	30000	-	-	Hr	If=300 mA	-
Backlight Color	White						

Note (1) LED life time (Hr) can be defined as the time in which it continues to operate under the condition: Ta=25±3 °C, typical IL value indicated in the above table until the brightness becomes less than 50%.

Note (2) The “LED life time” is defined as the module brightness decrease to 50% original brightness at Ta=25°C and IL=300mA. The LED lifetime could be decreased if operating IL is larger than 300mA. The constant current driving method is suggested.

Note (3) LED Light Bar Circuit 9S4P =36pcs LED

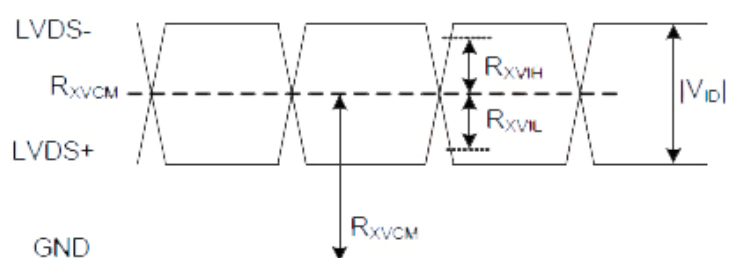


7.AC TIMING

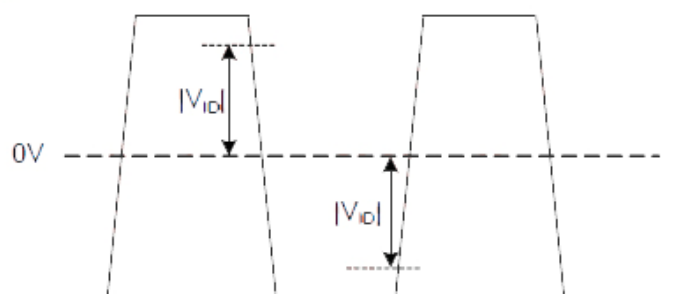
7.1 LVDS DC Characteristics ($V_{DD}=3.3V, T_a=25^{\circ}C$)

Item	Symbol	Min.	Typ.	Max.	Unit	Conditions
Differential Input High Threshold	R_{xVTH}	+100		+300	mV	
Differential Input Low Threshold	R_{xVTL}	-300		-100	mV	
Differential input common mode voltage	R_{xVCM}	1.0	1.2	1.7- $I_{VID}/2$	V	
Input leakage Current	I_{IN}	-10		10	μA	$RX+/-, RXC+/-$
Differential input Voltage	I_{VID}	200		600	mV	

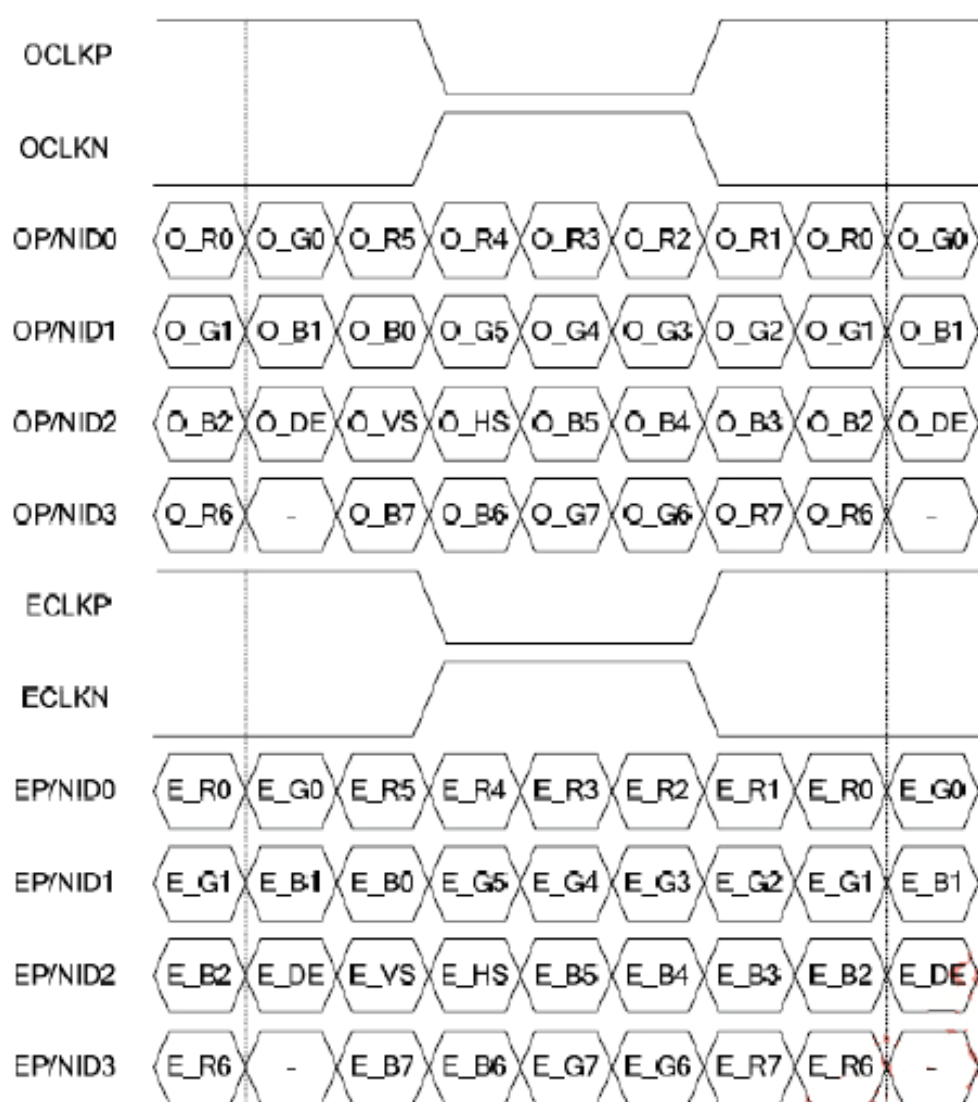
Single-end Signal



Differential Signal



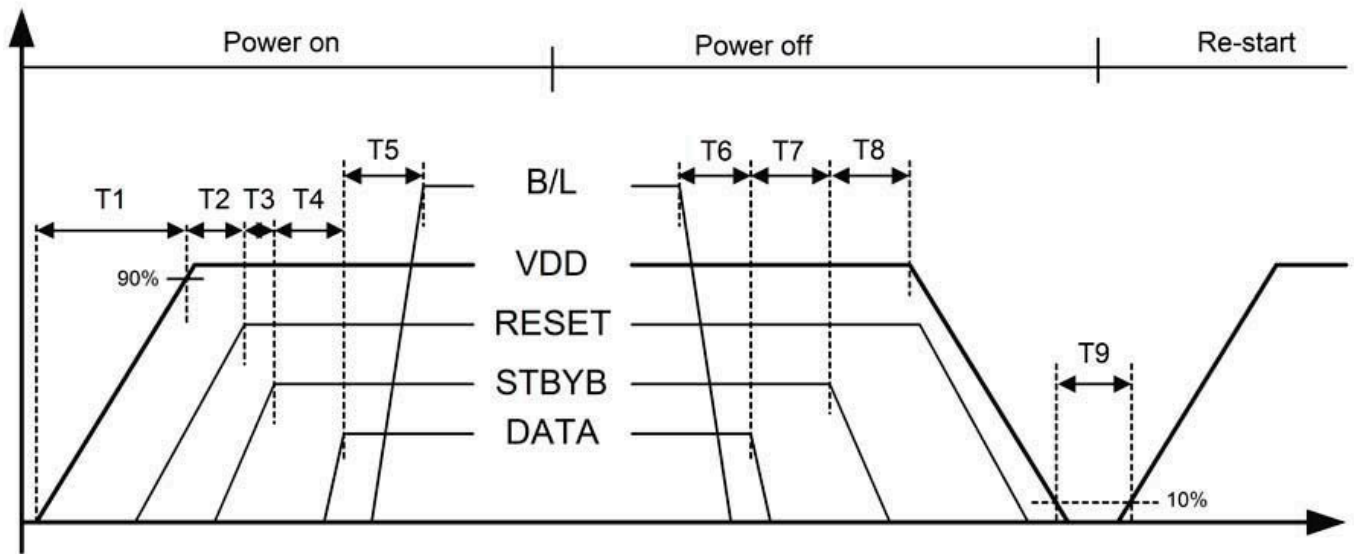
7.2 8bit LVDS input



7.3 interface time(DE mode)

Item	Symbol	Min.	Typ.	Max.	Unit
Frame Rate	--	55	60	65	Hz
Vertical Total Time	T _v	730	732	764	line
Vertical Display Time	T _{vd}	720			
Vertical Blanking Time	T _{vb}	10	12	44	line
Horizontal Total Time	T _h	1022	1045	1080	clock
Horizontal Display Time	T _{hd}	960			
Horizontal Blanking Time	T _{hb}	62	85	120	clock
Clock Rate	1/ T _{clock}	45.4	45.9	48.5	MHz

7.4 power sequence



Item	Min.	Typ.	Max.	Unit
T1	0.5	--	20	ms
T2	1	--	--	ms
T3	1	--	--	ms
T4	200	--	--	ms
T5	50	--	--	ms
T6	50	--	--	ms
T7	16	--	--	ms
T8	16	--	--	ms
T9	1000	--	--	ms

8. OPTICAL CHARACTERISTICS:

Driving the backlight

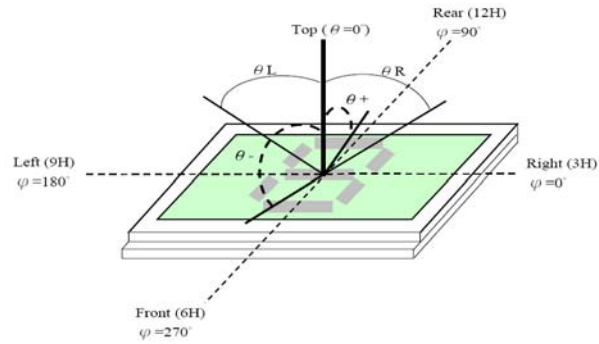
No.	ITEM		Symbol	Conditions	Specification			Unit	Note
					Min	Typ	Max		
1	Response Time		Tr+Tf	25℃	-	-	30	Ms	(1)(2)
				-20℃	-	-	250	Ms	
				-30℃	-	-	500	Ms	
2	Contrast Rate		Cr	$\theta=0$, Normal viewing angle	1100	1300	-	-	(1)(3)
3	Viewing Angle	Hor.	θ_L	CR>10	-	85	-	Deg	-
			θ_R		-	85	-		
		Ver.	$\Theta+$		-	85	-		
			$\Theta-$		-	85	-		
4	Chromaticiry	White	x	Brightness is ON	$\pm$ 0.04	0.313	$\pm$ 0.04		
			y			0.329			
		Red	x			0.642			
			y			0.332			
		Green	x			0.288			
			y			0.600			
		Blue	x			0.148			
			y			0.065			
5	luminance		L		750	1000		cd/m2	
6	Uniformity		U		75	80		%	

Measure Conditions:

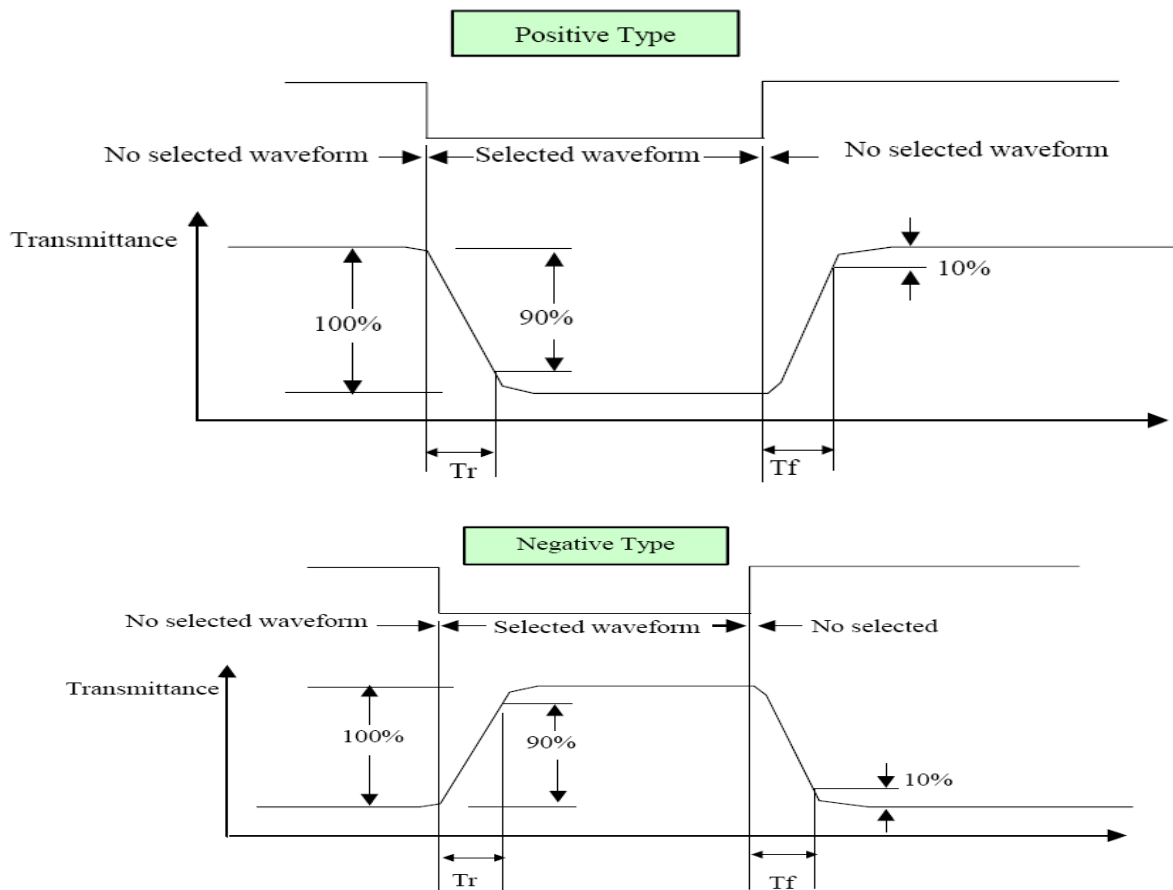
1. Measure surrounding : dark room;
2. Ambient temperature: 25±2℃;
3. 30min.warm-up time.

Note Definition:

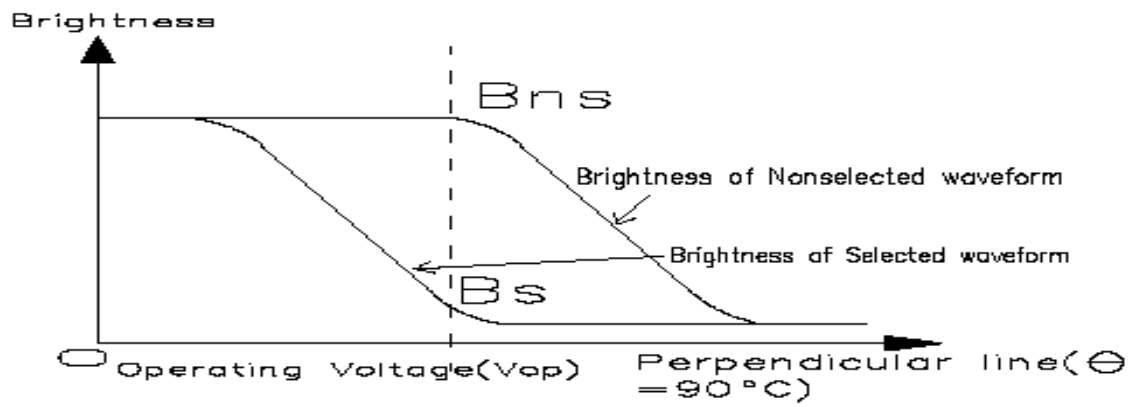
Note(1)Viewing angle range:



Note(2) Response Time:



Note(3) Contrast Ratio Definition:

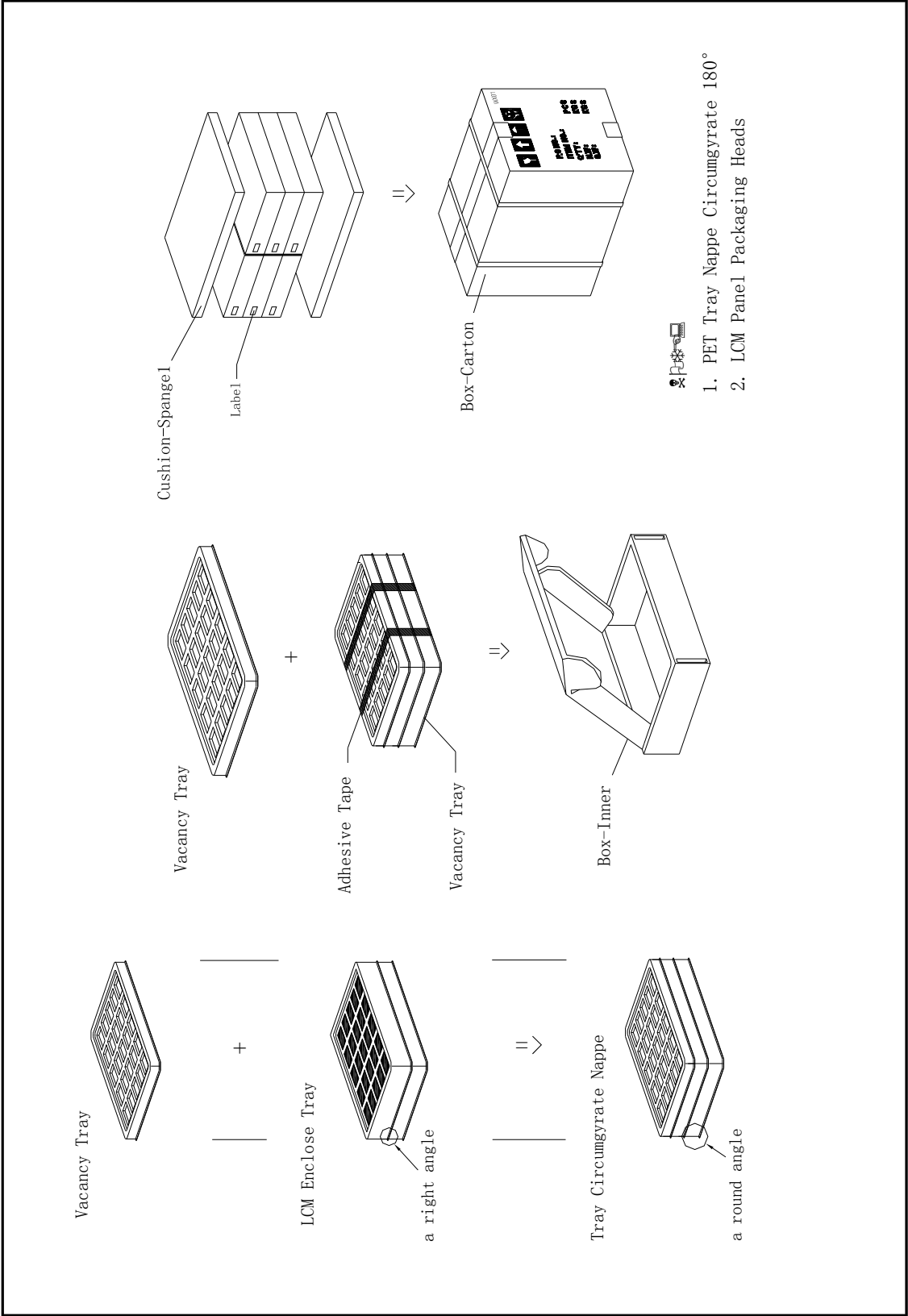


Luminance with all pixel white

Contrast Ratio (Cr)= _____

Luminance with all pixel black

9.PACKAGE.



10. STANDARD SPECIFICATION FOR RELIABILITY:

Item	Condition	Time (hrs)	Reference	Quantity
High temp. Storage	95°C	500	IEC 60068-2-2 Bb	4pcs
High temp. Operating	85°C	500	IEC 60068-2-1 Ab	4pcs
Low temp. Storage	-40°C	500	IEC 60068-2-1 Ab	4pcs
Low temp. Operating	-40°C	500	IEC 60068-2-1 Ab	4pcs
Accelerated Humidity	60°C/ 90%RH	500	IEC60068-2-78 Cab	4pcs
Thermal Shock Temp. Cycle	-40°C ← →85°C (0.5hour ←5min → 0.5 hour) Non-operating	100cycles	IEC 60068-2-14Na	4pcs
UV exposure resistance	1KW Xenon/ 100 hrs Power off.		IEC 60068-2-5 Sa	2pcs
Mechanical Shock	3 directions: X,Y,Z axes Repeats:6 Peak acc.:100 G Pulse duration: 6 ms (half sine wave)		IEC 60068-2-27Ea	2pcs
Mechanical Vibration	3 directions: X,Y,Z axes Sweep time:10 (1Oct/ min) Frequency:10 -> 150->10 Hz 10-58 Hz: constant amplitude		IEC 60068-2-6Fc	1box

Note 1: Panel surface temperature should not exceed 95°C.

Note 2: No optical performance guarantee below -30°C.

Note 3: For module internal structure robustness test purpose only. Customer application design should take care of overall mounting robustness with module

Item	Condition	Method	Remark	Quantity
Human body model	R = 330ohm, C = 150pF, · Air discharge: ±15 KV to display surface · Contact discharge: ±8 KV to metal frame	IEC61000-4-2	Not operating	2pcs

Note 1: The TFT-LCD panel and IC on module are sensitive to electrostatic discharge; please make sure equipments and operators are properly ground before and during handling.

Note 2: As different customer application have different interfacing designs and assembly processes, the display module has no ESD protection circuitry. Customer is required to take special care on ESD level control in the assembly and test processes

11.SPECIFICATION OF QUALITY ASSURANCE:

11.1 Purpose

This standard for Quality Assurance should affirm the quality of LCD Module products to supply.

11.2 Standard for Quality Test

a. Inspection:

Before delivering, the supplier should take the following tests, and affirm the quality of product.

b. Electro-Optical Characteristics:

According to the individual specification to test the product.

c. Test of Appearance Characteristics:

According to the individual specification to test the product.

d. Test of Reliability Characteristics:

According to the definition of reliability on the specification for testing products.

e. Delivery Test:

Before delivering, the supplier should take the delivery test.

(i) Test method: According to MIL-STD105E.General Inspection Level II take a single time.

(ii) The defects classify of AQL as following:

Major defect: AQL = 0.65

Minor defect: AQL = 2.5

Total defects: AQL = 2.5

11.3. Nonconforming Analysis & Deal With Manners

a. Nonconforming Analysis:

(i) Purchaser should supply the detail data of non- conforming sample and the non- conforming.

(ii) After accepting the detail data from purchaser, the analysis of nonconforming should be finished in two weeks.

(iii) If supplier can not finish analysis on time, must announce purchaser before two weeks.

b. Disposition of nonconforming:

(i) If find any product defect of supplier during assembly time, supplier must change the good product for every defect after recognition.

(ii) Both supplier and customer should analyze the reason and discuss the disposition of nonconforming when the reason of nonconforming is not sure.

11.4. Agreement items

Both sides should discuss together when the following problems happen.

a. There is any problem of standard of quality assurance, and both sides think that it must be modified.

b. There is any argument item which does not record in the standard of quality assurance.

c. Any other special problem.

11.5 Standard of The Product Appearance Test

a. Manner of appearance test: This specification should be applied for both light on and off situation.

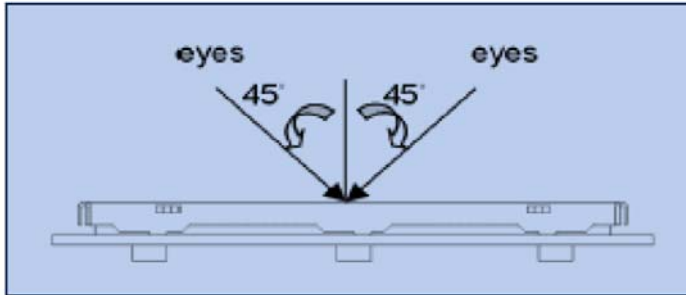
(i) The test must be under 20W × 2 or 40W fluorescent light, and the distance of view must

be at 30 ± 5 cm.

(ii) When test the model of transmissive product must add the reflective plate.

(iii) The test direction is base on about around 10° of vertical line (Left graph)

(iii) Temperature: $25 \pm 5^\circ\text{C}$ Humidity: $65 \pm 10\%\text{RH}$



(iv) Definition of area (Right graph)

A. Area: Viewing area. B. Area: Out of viewing area.(Outside viewing area)

b. Basic principle:

(i) It will accord to the AQL when the standard can not be described.

(ii) The sample of the lowest acceptable quality level must be discussed by both supplier and customer when any dispute happened.

(iii) Must add new item on time when it is necessary.

c. Standard of inspection: (Unit: mm)

Allowable limits defined in follow Dot defect Table should be met for each white, black , R, G, B raster. The limits apply to the entire area. Missing white in 60% or more of typical (one color, R or G or B) pixel aperture is defined as a bright defect, less than 60% is acceptable .Black spot in 60% or more of typical pixel aperture is defined as a dark defect, less than 60% is acceptable.

Dot defect table:

Item		White dot defect	Black dot defect	Total
1	Defect counts	3	3	3
2	Combined defect Counts	No combined dot defect allowed. Two Single dot defect that within 5mm during each dot defect should becounted as combined dot defect.		

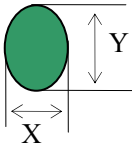
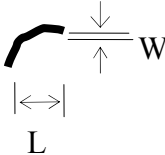
11.6 Inspection specification

AQL inspection standard

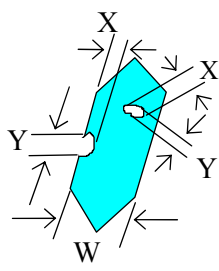
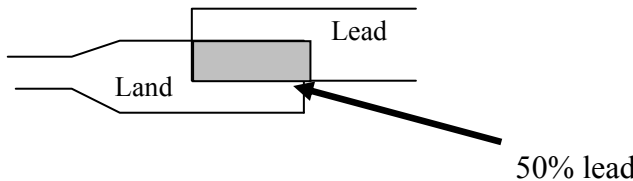
Sampling method: MIL-STD-105E, Level II, single sampling

Classify	Item		Note	AQL
Major	Display state	Short or open circuit	1	0.65
		Contrast defect (dim, ghost)		
		LC leakage		
		Flickering		
		No display		
		Wrong viewing direction	2	
		Wrong Back-light	7	
	Non-display	Flat cable or pin reverse	9	
		Wrong or missing component	10	
Minor	Display state	Background color deviation	2	2.5
		Black spot and dust	3	
		Line defect	4	
		Scratch		
		Rainbow	5	
		Pin hole	6	
	Polarizer	Bubble and foreign material	3	
		Scratch	4	
	PCB,FPC	Scratch	4	
	Soldering	Poor connection	8	
	Wire	Poor connection	9	
	LCD	CHIP OUT	11	

Note on defect classification:

No.	Item	Criterion																				
1	Short or open circuit	Not allow																				
	LC leakage																					
	Flickering																					
	No display																					
	Wrong viewing direction																					
	Wrong Back-light																					
2	Contrast defect	Refer to approval sample																				
	Background color deviation																					
3	Point defect, Black spot, dust (incl. Polarizer) ex.: dirt under polarizer, Pinhole of reflector ,glass scratch, dirt under glass,scratch on polarizer $\phi = (X+Y)/2$	 <table><tr><td>Point</td><td>Acceptable Qty.</td></tr><tr><td>Size</td><td></td></tr><tr><td>$\phi \leq 0.20$</td><td>Disregard</td></tr><tr><td>$0.20 < \phi \leq 0.25$</td><td>3</td></tr><tr><td>$0.25 < \phi \leq 0.30$</td><td>2</td></tr><tr><td>$\phi > 0.30$</td><td>0</td></tr></table> Unit: mm	Point	Acceptable Qty.	Size		$\phi \leq 0.20$	Disregard	$0.20 < \phi \leq 0.25$	3	$0.25 < \phi \leq 0.30$	2	$\phi > 0.30$	0								
	Point	Acceptable Qty.																				
Size																						
$\phi \leq 0.20$	Disregard																					
$0.20 < \phi \leq 0.25$	3																					
$0.25 < \phi \leq 0.30$	2																					
$\phi > 0.30$	0																					
4	Line defect	 <table><tr><td></td><td>Line</td><td>Acceptable Qty.</td></tr><tr><td>L</td><td>W</td><td></td></tr><tr><td>---</td><td>$0.015 \geq W$</td><td>Disregard</td></tr><tr><td>$3.0 \geq L$</td><td>$0.03 \geq W$</td><td rowspan="2">2</td></tr><tr><td>$2.0 \geq L$</td><td>$0.05 \geq W$</td></tr><tr><td>$1.0 \geq L$</td><td>$0.1 > W$</td><td>1</td></tr><tr><td>---</td><td>$0.05 < W$</td><td>Applied as point defect</td></tr></table> Unit: mm		Line	Acceptable Qty.	L	W		---	$0.015 \geq W$	Disregard	$3.0 \geq L$	$0.03 \geq W$	2	$2.0 \geq L$	$0.05 \geq W$	$1.0 \geq L$	$0.1 > W$	1	---	$0.05 < W$	Applied as point defect
		Line	Acceptable Qty.																			
L	W																					
---	$0.015 \geq W$	Disregard																				
$3.0 \geq L$	$0.03 \geq W$	2																				
$2.0 \geq L$	$0.05 \geq W$																					
$1.0 \geq L$	$0.1 > W$	1																				
---	$0.05 < W$	Applied as point defect																				
5	Rainbow	Not more than two color changes across the viewing area																				

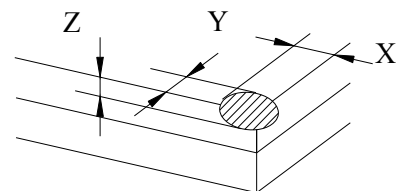
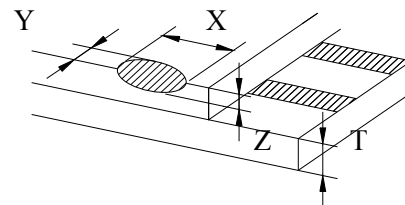
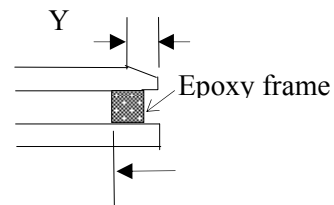
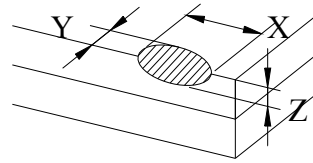
No.	Item	Criterion
-----	------	-----------

6	Segment pattern W = Segment width $\phi = (X+Y)/2$	(1) Pin hole $\phi < 0.10\text{mm}$ is acceptable.  <table border="1" data-bbox="968 358 1428 548"> <tr> <th>Point Size</th> <th>Acceptable Qty</th> </tr> <tr> <td>$\phi \leq 1/4W$</td> <td>Disregard</td> </tr> <tr> <td>$1/4W < \phi \leq 1/2W$</td> <td>1</td> </tr> <tr> <td>$\phi > 1/2W$</td> <td>0</td> </tr> </table> Unit: mm	Point Size	Acceptable Qty	$\phi \leq 1/4W$	Disregard	$1/4W < \phi \leq 1/2W$	1	$\phi > 1/2W$	0
Point Size	Acceptable Qty									
$\phi \leq 1/4W$	Disregard									
$1/4W < \phi \leq 1/2W$	1									
$\phi > 1/2W$	0									
7	Back-light	(1) The color of backlight should correspond its specification. (2) Not allow flickering								
8	Soldering	(1) Not allow heavy dirty and solder ball on PCB or FPC. (The size of dirty refer to point and dust defect) (2) Over 50% of lead should be soldered on Land. 								
9	Wire	(1) Copper wire should not be rusted (2) Not allow crack on copper wire connection. (3) Not allow reversing the position of the flat cable. (4) Not allow exposed copper wire inside the flat cable.								
10	PCB,FPC	(1) Not allow screw rust or damage. (2) Not allow missing or wrong putting of component.								

11

LCD

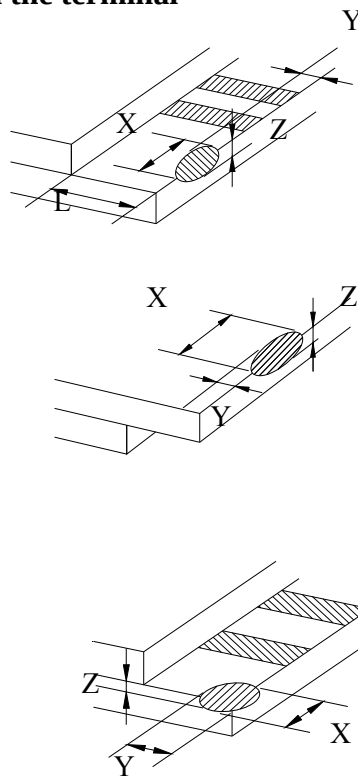
2.1.1 chip on the surface



Note: A: LCD Length

X	Y	Z
$>1/8A$	$\leq 0.3\text{mm}$	$\leq 1/2T$
$\leq 1/8A$	Not enter into epoxy frame	$\leq T$
	Not enter into the inner edge of epoxy	$\leq 1/2T$

2.1.2 Chip on the terminal

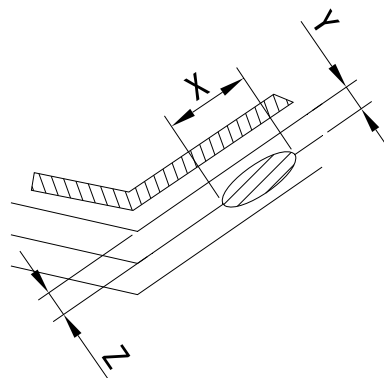


X	Y	Z
$>1/8A$	$\leq 0.3\text{mm}$	$\leq 1/2T$
$\leq 1/8A$	$\leq 1/2L$	$\leq T$
$\leq 1/8A \& \leq 1\text{mm}$	$\leq L$	$\leq T$
$\leq 1/8A \& \leq 2\text{mm}$	$\leq L$	$\leq 1/2T$

Note: A: LCD Length.

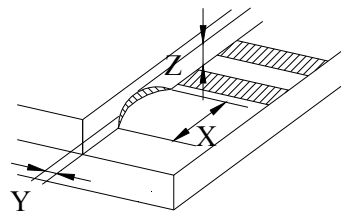
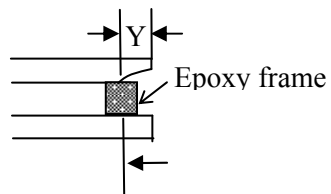
the distance between crack and contact pad must be greater than the width of 1st contact pad.

2.1.3 Chip out on between side



11

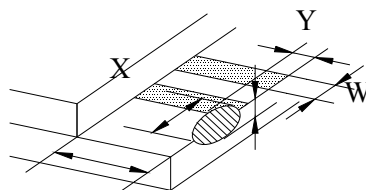
LCD



X	Y	Z
$\leq 1/8A$	Not enter into epoxy frame	$Z \leq 2T$
	Not enter into 1/2 epoxy frame	$Z \leq 1/2T$

Note: A : LCD Length

2.1.4 including corner chip and side chip

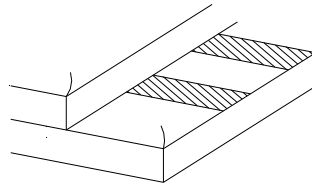


L

Note: A:LCD Length

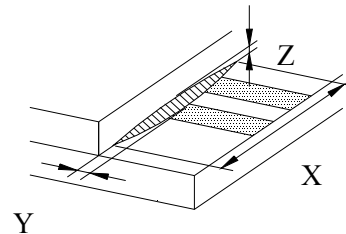
X	Y	Z
$> 1/8A$	$\leq 1/6L$	$\leq 1/2T$
$\leq 1/8A$	$\leq 1/3L$	
$\leq 1/4W$	$\leq 2/3L$	

2.2 Chip out



- 1) Chip out is that crackles extend to inner edge.
- 2) Crackles round epoxy frame will be rejected.
- 3) Chip out on the terminal will be rejected: $Z=T$ length $>1\text{mm}$ or $Z<T$ length $>2\text{mm}$
- 4) The chip out at ITO will be rejected.

2.3 Poor cutting



X	Y	Z
$>1/8$ A	≤ 0.3	$\leq 1/2T$
$\leq 1/8$ A	According to drawing	$1/2T \leq Z \leq T$

Note : A: LCD Length.

11

LCD

12

SMT

According to the <Acceptable of electronic assemblies>
IPC-A-610C class 2 stander. Component missing or function defect
are Major defect ,the others are Minor defect.

Any one out of the specification will be rejected.

12. GENERAL PRECAUTIONS

(1) Mounting Method

The panel of the LCD Module consists of two thin glass plates with polarizers which easily get damaged since the Module is fixed by utilizing fitting holes in the printed circuit board. Extreme care should be taken when handling the LCD Modules.

(2) Caution of LCD handling & cleaning

When cleaning the display surface, use soft cloth with solvent (recommended below) and wipe lightly.

- Isopropyl alcohol
- Ethyl alcohol
- Trichlorotrifluoroethane

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

- Water
- Ketone
- Aromatics

(3) Caution against static charge

The LCD Module use C-MOS LSI drivers, so we recommend 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 table. And assembly equipment to protect against static electricity.

(4) Packaging

Modules use 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 directly to sunshine or high temperature/humidity.

(5) Caution for operation

- It is indispensable to drive LCD's within the specified voltage limit since the higher voltage than the limit shorten LCD life. An electrochemical reaction due to direct current causes LCD deterioration, Avoid the use of direct current drive.
- Response time will be extremely delayed at lower temperature than the operating temperature range and on the other hand at higher temperature LCD's show 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 operating temperature range.

- If the display area is pushed hard during operation, some font will be abnormally displayed but it resumes normal condition after turning off once.
- As light dew depositing on terminals is a cause for electro-chemical reaction resulting in terminal

open circuit.

Usage under the relative condition of 40°C, 50%RH or less is required.

(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 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 is.

Keeping temperature in the specified 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)

(7) Safety

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

Hello Lighting co., ltd reserves the right to change this specification.
www.hello-lighting.com
- END -