PRODUCT   :   LCD MODULE
MODEL NO   :   LCD700RLBJ-03-100C
SUPPLIER   :   LCD Mikroelektronik GmbH
DATE   :   Feb.26.2020

SPECIFICATION

Prepared by	Checked	Approved

CUSTOMER:
MODEL NO.:   DATE:

Approved	Checked	Department

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Revision Record

Rev No.	Rev Date	Contents	Page
1.0	Oct.26.2018	New creation	All
1.1	Jul.01.2019	Add AVDD,VCOM,VGH,VGL	P8
1.2	Aug.16.2019	Modify CTP IC	P4
1.3	Feb.26.2020	Add min/max value of AVDD,VCOM,VGH,VGL	P8

1. General Specifications

No	Item	Contents	Unit
1	Size	7.0	inch
2	Resolution	800RGB*480	
3	Interface	24 BIT RGB	
4	Color Depth	16.7	Million
5	Technology Type	a-Si TFT	
6	Sub pixel size	0.0642*0.179	mm
7	Pixel Arrangement	RGB-stripe	
8	Display Mode	Transmissive,TN,NW	
9	Viewing Direction	12:00	o'clock
10	LCM (W x H x D)	181.08*112.92*5.825	mm
11	Active Area (W x H)	154.08*85.92	mm
12	With/Without TSP	With CTP	

Touch panel parameter

No	Features	Details	Note
1	CTP Technology	Mutual capacitor	
2	Input Method	Finger	
3	Touch point	5Point	
4	Positional Accuracy	2.5mm at 4 edges and 1.5mm at center	Unit: mm
5	Cover glass	Sodalime glass，chemically hardened	
6	Hardness	6H	
7	Surface treatment	NO	
8	Optical transmittance	87%	
9	Touch controller	GT911	
10	Interface to Host	I^2C	
11	I^2C Address	0X28/0XBA	
12	Connection Type	ZIF Connector	

LCD MODULE　　LCD700RLBJ-03-100C

2. Mechanical Drawing

TOP VIEW

Viewing Direction:
12:00

800(RGB)*480

*181.08±0.2 LENS OD
155.08 LENS VA
154.08(Active Area)

*112.92±0.2 LENS OD
86.92 LENS VA
85.92(Active Area)

保护膜撕手
pull tab for
the protective film

BLACK PRINTING ON BACK GALSS

high-temperature
tape 15*15mm

P0.5*(50-1)24.5±0.1
77.79±0.5
142.85±0.5
25.5±0.1
3.5±0.1

BOTTOM VIEW

*5.425±0.5
*1.925±0.2
0.7 LENS
0.175 LOCA
0.55 SENSOR
0.5 GASKET
*3.5±0.5(TFT)

*181.08±0.2 LENS OD
164.9(LED)

*112.92±0.2 LENS OD
100(LED)

Steel Stiffener
CONTACT　STIFFENER
PI Stiffener
0.3±0.05 Contact
0.3±0.05

3M93020LE T=0.2mm

P 0.5X5=2.5

If: 140mA(TYP) Vf:8.7V(MIN)9.6 V (TYP) 10.5V (MAX)

Backlight 21LED Circuit

CTP

No	1.	2.	3.	4.	5.	6.
	RST	VDD	GND	INT	SDA	SCL

PIN NO.	PIN NAME	PIN NO.	PIN NAME
1	V_{LED+}	26	G1
2	V_{LED+}	27	G0
3	V_{LED-}	28	R7
4	V_{LED-}	29	R6
5	GND	30	R5
6	V_{COM}	31	R4
7	DVDD	32	R3
8	MODE	33	R2
9	DE	34	R1
10	VS	35	R0
11	HS	36	GND
12	B7	37	DCLK
13	B6	38	GND
14	B5	39	L/R
15	B4	40	U/D
16	B3	41	V_{GH}
17	B2	42	V_{GL}
18	B1	43	AV_{DD}
19	B0	44	RESET
20	G7	45	NC
21	G6	46	V_{COM}
22	G5	47	DITHB
23	G4	48	GND
24	G3	49	NC
25	G2	50	NC

1	Operating Voltage:	VDD=3.3V typ.
2	Resolution:	800RGB*480
3	Color:	16./M
4	Interface:	24 BIT RGB
5	Display type:	Transmissive
6	Viewing Direction:	12:00
7	Operating Temp:	-20°C～/0°C
8	Storage Temp:	-30°C～70°C
9	Driver IC:	EK9/13CA,EK/3002AB
10	CTP Driver IC:	GT911 (5 Points)
11	CM uminance(cd/m2):270(MIN),350(TYP)	
12	Unspecified tolerance:　±0.3	

NO.	DESCRIPTION	NAME	DATE
	Initial Version	lijing	18.10.25
1	Modify the CTP	lijing	18.10.29
2			
3			

Unit:mm
Chk
APV

3. PIN Assignment

Pin No	Symbol	I/O	Function	Remark
1-2	VLED+	P	LED anode	
3-4	VLED-	P	LED cathode	
5	GND	P	Ground	
6	VCOM	P	Common voltage	
7	DVDD	P	Power supply for digital circuits	
8	MODE	I	DE / SYNC mode select. Normally pull high H: DE mode. L: HSD/VSD mode.	
9	DE	I	Data Input Enable. Active High to enable the data input bus under "DE Mode". Normally pull low.	
10	VS	I	Vertical Sync input. Negative polarity. Normally pull high.	
11	HS	I	Horizontal Sync input. Negative polarity. Normally pull high.	
12-19	B7-B0	I	Data bit.	
20-27	G7-G0	I	Data bit.	
28-35	R7-R0	I	Data bit.	
36	GND	P	Ground	
37	DCLK	I	Clock for Input Data. Data latched at rising/falling edge of this signal. Default falling edge	
38	GND	P	Ground	
39	L/R	I	Source Right or Left sequence control. Normally pull high. SHLR = "L", shift left: last data =S1←S2←S3......... ←S1200 = first data. SHLR = "H", shift right: first data =S1→S→S3. ...... →S1200 = last data.	
40	U/D	I	Gate Up or Down scan control. Normally pull low. UPDN = "L", STV2 output vertical start pulse and UD pin output logical"0" to Gate driver. UPDN = "H", STV1 output vertical start pulse and UD pin output logical	
41	VGH	P	Gate ON Voltage	
42	VGL	P	Gate OFF Voltage	
43	AVDD	P	Power supply for analog circuits	
44	RESET	I	Global reset pin. Active Low to enter Reset State. Suggest to connecting with an RC reset circuit for stability. Normally pull high.	
45	NC	-	No connection	
46	VCOM	P	Common voltage	

Pin No	Symbol	I/O	Function	Remark
47	DITHB		Dithering function enable control. Normally pull high	
48	GND	P	Ground	
49-50	NC	-	No connection	

PS: For further details, please refer to EK73002AB&E17913CA data sheet.

4. Absolute Maximum Rating

AGND = GND = 0V , Ta = 25°C

Item	Symbol	Min	Max	Unit	Remark
Power Voltage	DVDD	-0.5	5	V	
Operating Temperature	T_{OPR}	-20	70	°C	
Storage Temperature	T_{STG}	-30	70	°C	

The absolute maximum rating values of this product are not allowed to be exceeded at any times. Should a module be used with any of the absolute maximum ratings exceeded, the characteristics of the module may not be recovered, or in an extreme case, the module may be permanently destroyed.

5. Electrical Characteristics

5.1. Recommended Operating Condition

AGND = GND = 0V , Ta = 25°C

Item	Symbol	Min	Typ.	Max	Unit	Remark
Power Voltage	DVDD	1.8	3.3	3.6	V	
	VCOM	2.8	3.8	4.8	V	
	VGH	15.3	16	16.7	V	
	VGL	-7.7	-7	-6.3	V	
	AVDD	10.2	10.4	10.6	V	
Input logic high voltage	V_{IH}	0.7 VDD	-	VDD	V	
Input logic low voltage	V_{IL}	0	-	0.3VDD	V	

5. 2.Recommended Driving Condition for Backlight

Ta = 25°C

Item	Symbol	Min	Typ.	Max	Unit	Remark
Forward Voltage	Vf	8.7	9.6	10.5	V	
Forward Current	If		140		mA	
Operating Life Time	-	20000			Hours	

Note 1:The LED supply voltage is defined by the number of LED at Ta=25℃ and If=140mA.

Note 2:The "Operating Life Time" is defined as the module brightness decrease to 50% original brightness at Ta=25℃ and If = 140 mA. The LED lifetime could be decreased if operating If is larger than140 mA.

6. Timing Characteristics

6.1. AC Electrical Characteristics

AC Characteristics

(TA = -20 to 85°C, VDD = 1.8 to 3.6V, AVDD = 6.5 to 13.5V, GND = AVSS = 0V)

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
VDD Power On Slew rate	TPOR	From 0V to 90% VDD	-	-	20	ms
RSTB pulse width	TRST	CLKIN = 40MHz	1	-	-	ms
CLKIN cycle time	Tcph	-	20	-	-	ns
CLKIN pulse duty	Tcwh	-	40	50	60	%
VSD setup time	Tvst	-	8	-	-	ns
VSD hold time	Tvhd	-	8	-	-	ns
HSD setup time	Thst	-	8	-	-	ns
HSD hold time	Thhd	-	8	-	-	ns
Data set-up time	Tdsu	D0[7:0], D1[7:0], D2[7:0] to CLKIN	8	-	-	ns
Data hold time	Tdhd	D0[7:0], D1[7:0], D2[7:0] to CLKIN	8	-	-	ns
DEN setup time	Tesu	-	8	-	-	ns
DEN hold time	Tehd	-	8	-	-	ns
Output stable time	Tsst	10% to 90% target voltage. CL=120pF, R=10K ohm	-	-	6	us

6. 2.DC Electrical Characteristics

DC Characteristics

(TA = -20 to 85°C, VDD = 1.8 to 3.6V, AVDD = 6.5 to 13.5V, GND = AVSS = 0V)

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Low level input voltage	Vil	For the digital circuit	0	-	0.3×VDD	V
High level input voltage	Vih	For the digital circuit	0.7×VDD	-	VDD	V
Input leakage current	Ii	For the digital circuit	-	-	±1	μA
High level output voltage	Voh	Ioh= -400 μA	VDD-0.4	-	-	V
Low level output voltage	Vol	Iol= +400 μA	-	-	GND+0.4	V
Pull low/high resistor	Ri	For the digital input pin @ VDD=3.3V	150K	250K	350K	ohm
Digital Operation current	Idd	Fclk=40 MHz, FLD=37.88KHz, VDD=3.3V	-	8	10	mA
Digital Stand-by current	Ist1	Clock and all functions are stopped	-	10	50	μA
Analog Operating Current	Idda	No load, Fclk=40MHz, FLD=37.88KHz @ AVDD=10V,V1=8V, V14=0.4V	-	10	12	mA
Analog Stand-by current	Ist2	No load, Clock and all functions are stopped	-	10	50	μA
Input level of V1 ~ V7	Vref1	Gamma correction voltage input	0.4*AVDD	-	AVDD-0.1	V
Input level of V8 ~ V14	Vref2	Gamma correction voltage input	0.1	-	0.6*AVDD	V
Output Voltage deviation	Vod1	Vo = AVSS+0.1V ~ AVSS+0.5V and Vo = AVDD-0.5V ~ AVDD-0.1V	-	±20	±35	mV
Output Voltage deviation	Vod2	Vo = AVSS+0.5V ~ AVDD-0.5V	-	±15	±20	mV
Output Voltage Offset between Chips	Voc	Vo = AVSS+0.5V ~ AVDD-0.5V	-	-	±20	mV
Dynamic Range of Output	Vdr	SO1 ~ SO1200	0.1	-	AVDD-0.1	V
Sinking Current of Outputs	IOLy	SO1 ~ SO1200; Vo=0.1V v.s 1.0V , AVDD=13.5V	80	-	-	uA
Driving Current of Outputs	IOHy	SO1 ~ SO1200; Vo=13.4V v.s 12.5V , AVDD=13.5V	80	-	-	uA
Resistance of Gamma Table	Rg	Rn: Internal gamma resistor	0.7*Rn	1.0*Rn	1.3*Rn	ohm

6. 3.Timing

For 800 × 480 panel

Horizontal input timing

Parameter		Symbol	Value			Unit
Horizontal display area		thd	800			DCLK
DCLK frequency		fclk	Min.	Typ.	Max	
			-	33.3	50	MHz
1 Horizontal Line		th	862	1056	1200	
HSD pulse width	Min.	thpw		1		DCLK
	Typ.			-		
	Max.			40		
HSD Back Porch (Blanking)		thb	46	46	46	
HSD Front Porch		thfp	16	210	354	

Vertical input timing

Parameter	Symbol	Min.	Typ.	Max.	Unit
Vertical display area	tvd		480		H
VSD period time	tv	510	525	650	H
VSD pulse width	tvpw	1	-	20	H
VSD Back Porch (Blanking)	tvb	23	23	23	H
VSD Front Porch	tvfp	7	22	147	H

Parallel 24-bit RGB Mode

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
CLKIN Frequency	Fclk	VDD = 1.8V ~3.6V	-	33.3	50	MHz
CLKIN Cycle Time	Tclk	-	20	30	-	ns
CLKIN Pulse Duty	Tcwh	Tclk= Tcwh + cwl	40	50	60	%
	Tcwl		40	50	-60	%
VSD to STV	Tstv	HV mode	-	24	-	H
DEN to STV	Tstv	DE mode	-	4	-	CLKIN
STV pulse width	Twstv	-	-	0.5	-	H
STV to CKV	Tckv	-	-	18	-	CLKIN
STV to OEV	Toev	-	-	2	-	CLKIN
CKV Pulse Width	Twckv	-	-	66	-	CLKIN
OEV Pulse Width	Twoev	-	-	50	-	CLKIN

CLKIN

Tcph

Tcwl   Tcwh

70%

1   30%   2   30%   30%   Last

30%

Data

Tdsu   Tdhd

70%   70%

First data   2nd data   Last data

30%   30%

DEN

70%

Tesu

CLKIN

30%

VSD

Tvst   Tvhd

30%   30%

HDS

Thhd

30%   30%   30%

Thst   Th
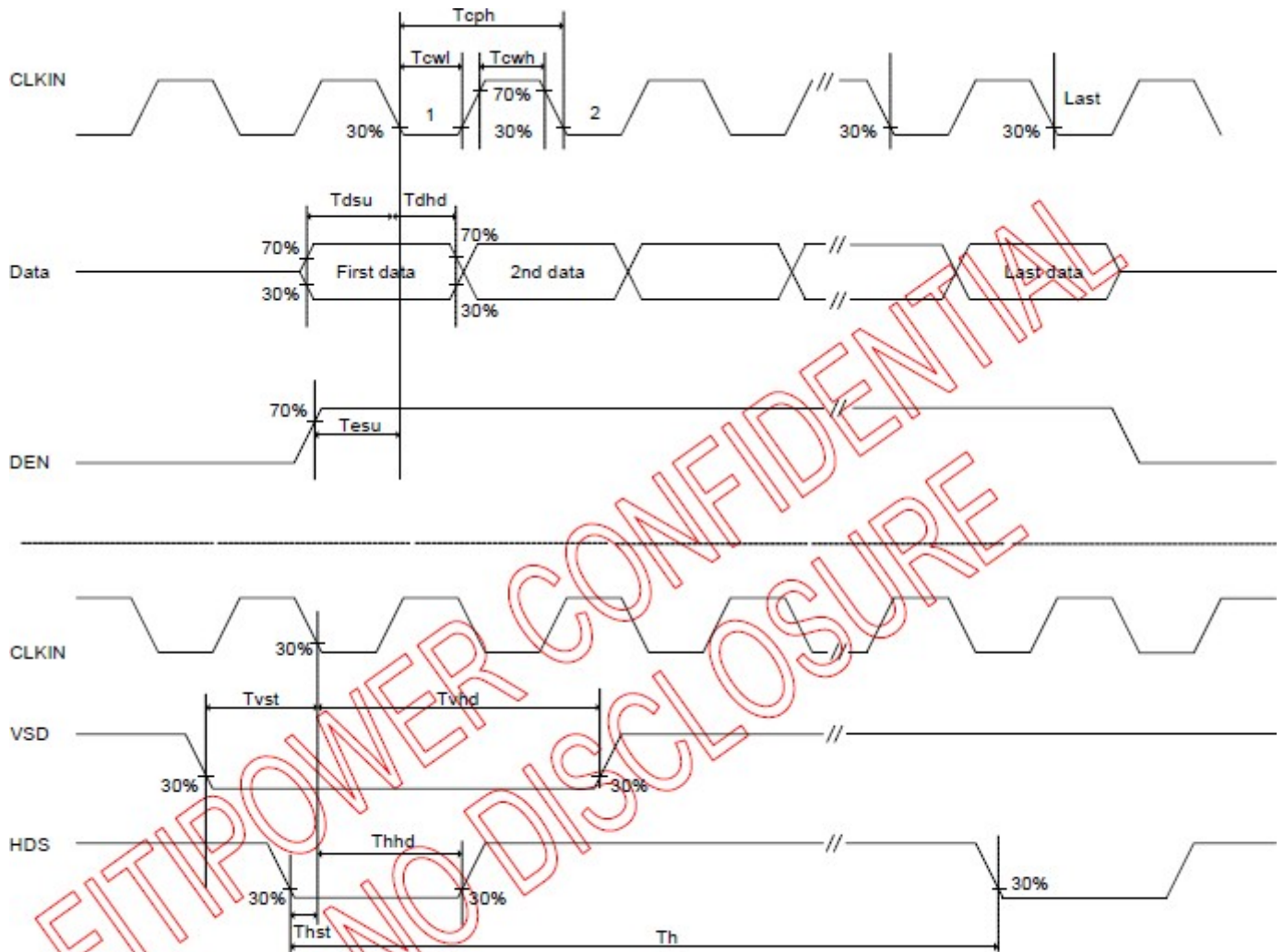
Input Clock and Data Timing Diagram

Measure point

Output

5K   5K

60P   60P

Vcom
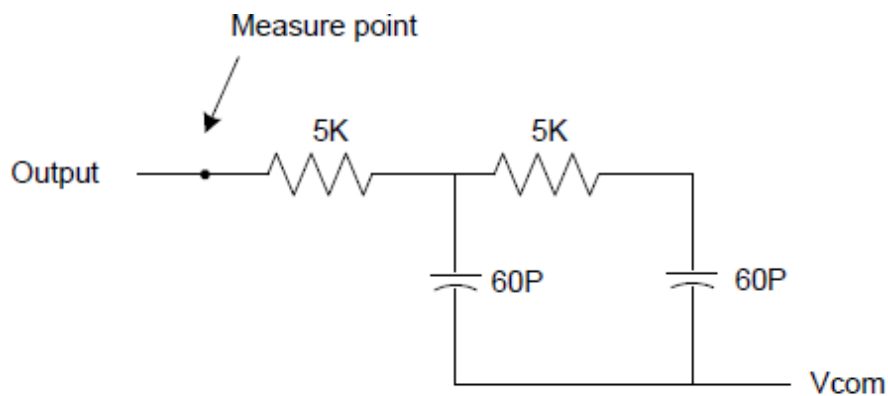
Output load condition
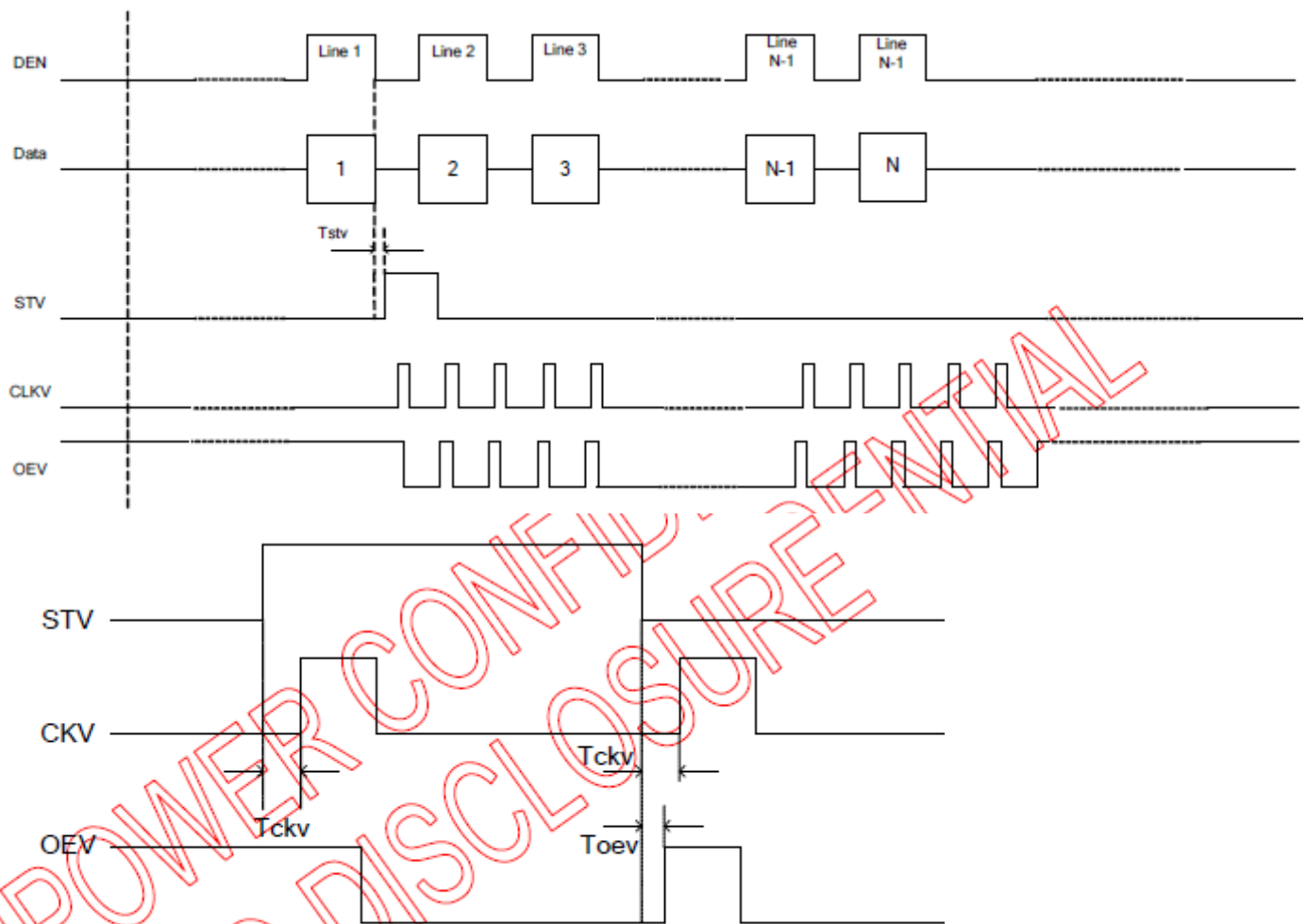
Vertical Timing Diagram DE
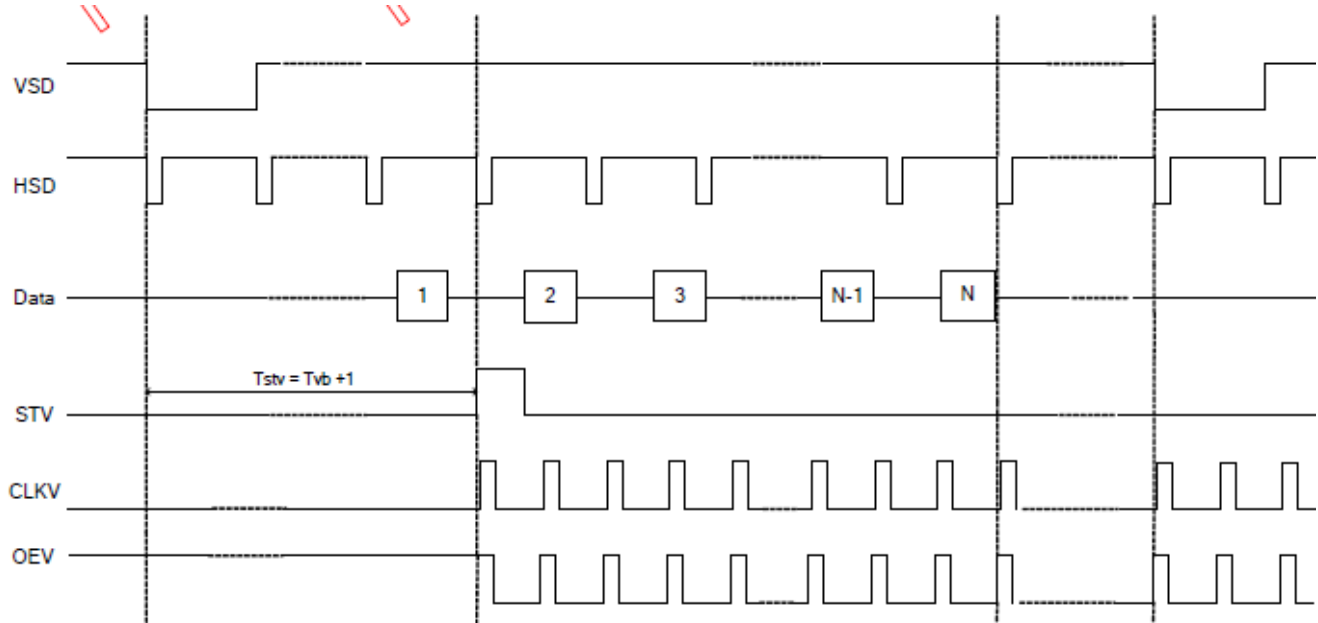
Vertical Timing Diagram HV

6.4. Data input format
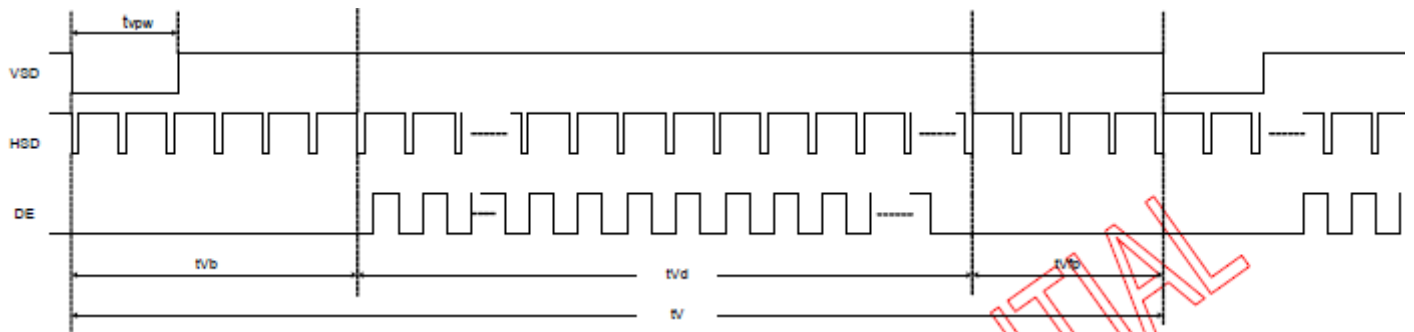
Vertical input timing
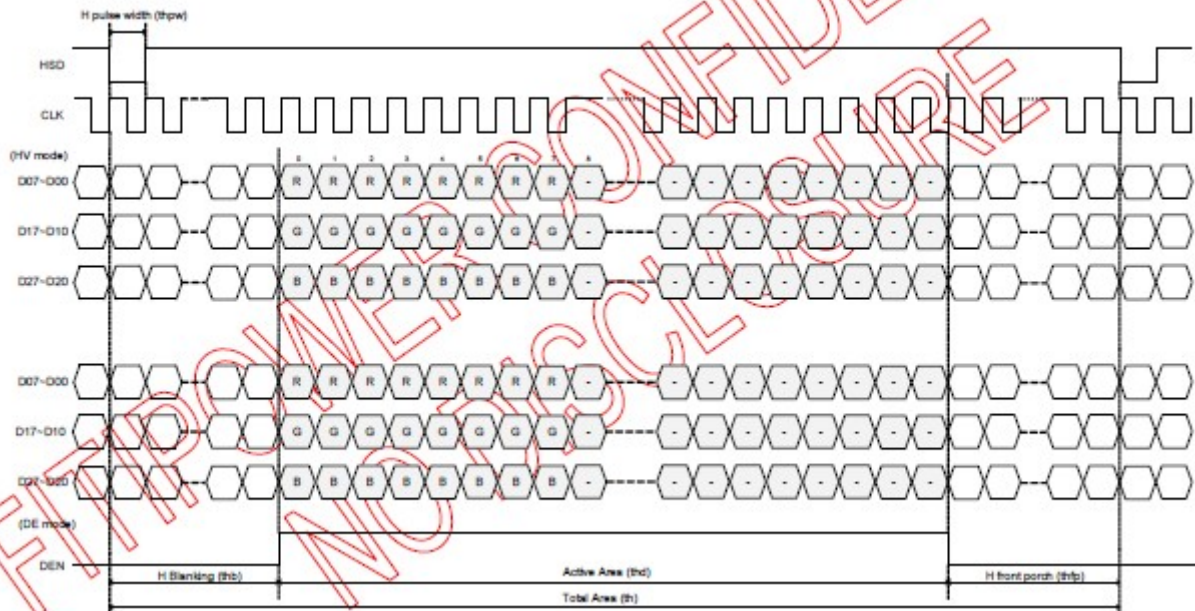
Horizontal input timing

6.5. Power on/off sequence

In order to prevent IC from power on reset fail, the rising time (TPOR) of the digital power supply VDD should be maintained within the given specifications. Refer to "AC Characteristics" for more detail on timing.

This is another paragraph of sub-function description.
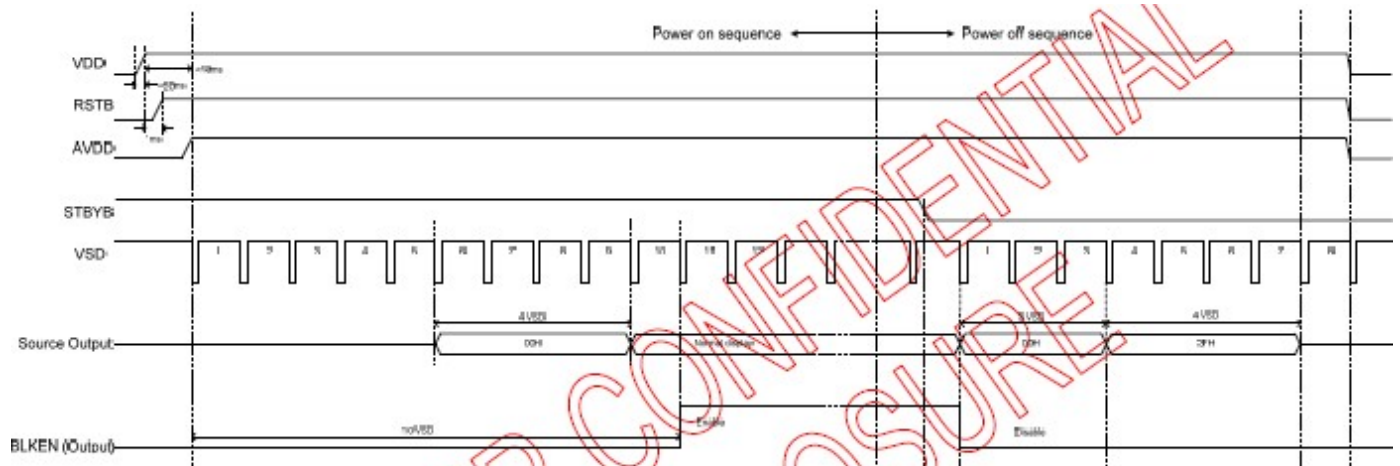
Power-On/Off Timing Sequence
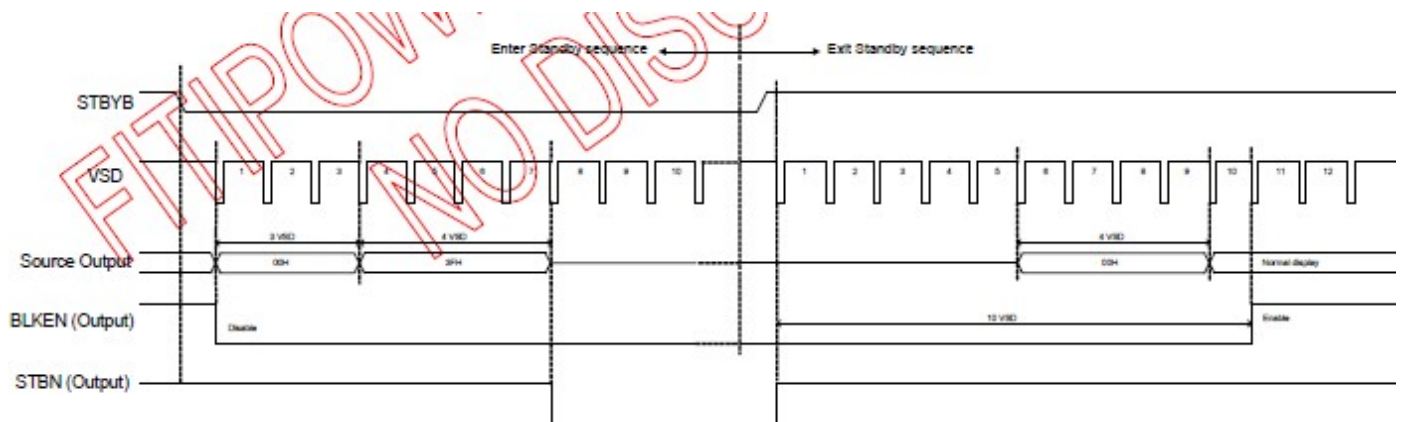
Enter and Exit Standby Mode Sequence

7. Optical Characteristics

Item		Symbol	Condition	Min	Typ	Max	Unit	Remark
View Angles		θ T	CR≥10	40	50		Degree	Note 2
		θ B		60	70			
		θ L		60	70			
		θ R		60	70			
Contrast Ratio		CR	$\theta = 0°$	（400）	（500）			Note 1 Note 3
Response Time		T_{ON}	25°C	-	10	20	ms	Note 1 Note 4
		T_{OFF}			15	30		
Chromaticity	W_x	x		0.278	0.308	0.338		Note 1 Note 5
	W_y	y		0.297	0.327	0.357		
Uniformity		U		75			%	Note 5
Luminance		L		270	350		cd/m^2	Note 1 Note 5

Test Conditions:

1. I_f =140mA(Backlight current), DVDD=3.3V, the ambient temperature is 25°C.

2. The test systems refer to Note 2.

Note1: Definition of optical measurement system.

The optical characteristics should be measured in dark room. After 5Minutes operation, the optical properties are measured at the center point of the LCD screen. ALL input terminals LCD panel must be ground when measuring the center area of the panel.
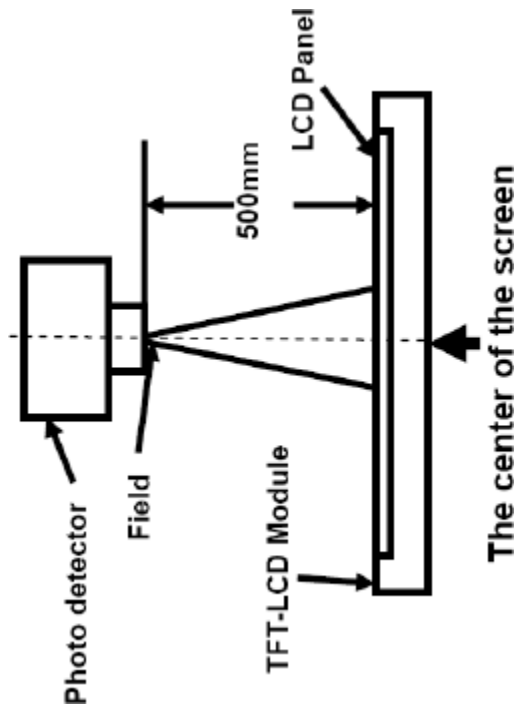
Item	Photo detector	Field
Contrast Ratio	CS1000	1º
Luminance		
Lum Uniformity		
Chromaticity	CS1000	
Response Time	DMS703	-

Note2: Definition of viewing angle range and measurement system.
Viewing angle is measured at the center point of the LCD by CONOSCOPE (DMS703)
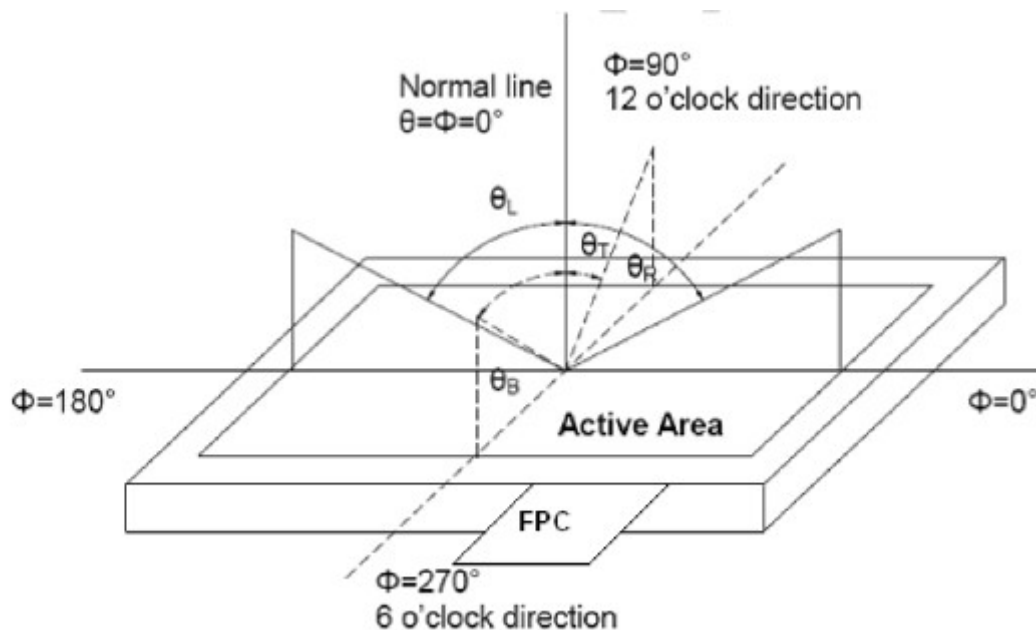
Note3: Definition of contrast ratio

$$\text{Contrast ratio (CR)} = \frac{\text{Luminance measured when LCD is on the "White" state}}{\text{Luminance measured when LCD is on the "Black" state}}$$

"White state ":The state is that the LCD should drive by Vwhite.

"Black state ":The state is that the LCD should drive by Vblack.

Vwhite: To be determined   Vblack: To be determined

Note4:Definition of Response time

The response time is defined as the LCD optical switching time interval between "White"state and "Black" state. Rise time (T_{ON})is the time between photo detector output intensity changed from 90% to 10%.And fall time (T_{OFF})is the time between photo detector output intensity changed from 10% to90%.
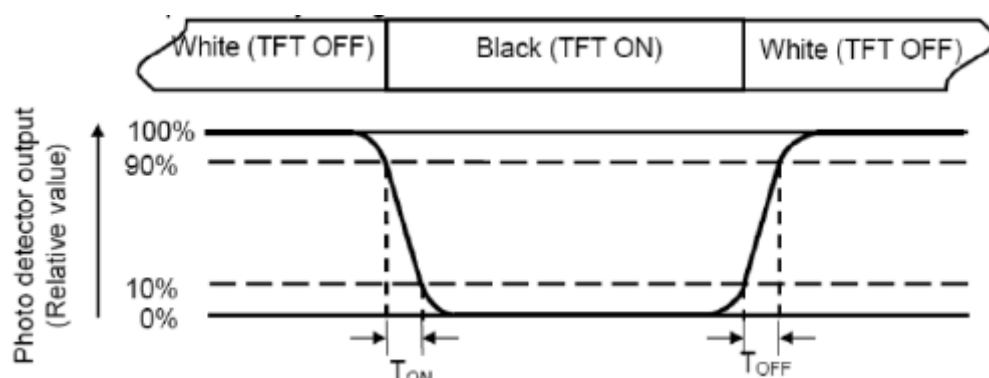
Note5:Definition of color chromaticity（CIE1931）

Color coordinates measured at center point of LCD.

Note6: Definition of Luminance Uniformity

Active area is divided into 9 measuring areas(Refer Fig.2).Every measuring point is placed at the center of each measuring area.

　　Luminance Uniformity (U)=Lmin/Lmax

　　L--------Active area length   W------- Active area width
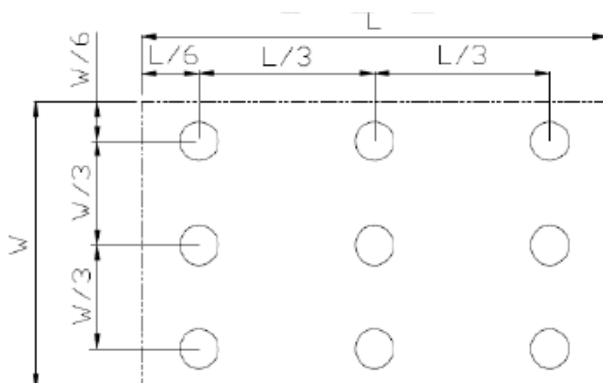
　　L max: The measured Maximum luminance of all measurement position.

　　L min: The measured Minimum luminance of all measurement position.

　　Note7: Definition of luminance: Measure the luminance of white state at center point.

8. Environmental/Reliability Test

No.	Test Item	Test Condition	Inspection after test
1	High Temperature Storage	70±2℃/240 hours	Inspection after 2~4hours storage at room temperature,the sample shall be free from defects: 1.Air bubble in the LCD; 2.Sealleak; 3.Non-display; 4.missing segments; 5.Glass crack; 6.Current Idd is twice higher than initial value.
2	Low Temperature Storage	-30±2℃/240 hours	
3	High Temperature Operating	70±2℃/240 hours	
4	Low Temperature Operating	-20±2℃/240 hours	
5	Temperature Cycle	-30℃~25℃~70℃ × 10cycles (30min.) (5min.) (30min.)	
6	Damp Proof Test	60℃±5℃×90%RH/120 hours	
7	Vibration Test	Frequency：10Hz~55Hz~10Hz Amplitude：1.5mm, X，Y，Z direction for total 3hours (Packing condition)	
8	Dropping test	Drop to the ground from 1m height, one time,　every side of carton. (Packing condition)	
9	ESD test	Voltage:±8KV R: 330Ω C: 150pF Air discharge, 10time Voltage:±6KV R: 330Ω C: 150pF Contact discharge, 10time	

Remark:

1.The test samples should be applied to only one test item.

2.Sample size for each test item is 5~10pcs.

3.For Damp Proof Test, Pure water(Resistance＞10MΩ) should be used.

4.In case of malfunction defect caused by ESD damage, if it would be recovered to normal state after resetting, it would be judge as a good part.

5.Failure Judgment   Criterion: Basic Specification, Electrical Characteristic, Mechanical Characteristic, Optical Characteristic.

6.Please use automatic switch menu(or roll menu) testing mode when test operating mode.

9. Packing Drawing(TBD)

10. Standard Specifications For Product Quality

10.1. Manner of test:

10.1.1 The test must be under 40W fluorescent light, and the distance of view must be at 30±10cm.

10.1.2 Room temperature 25±5℃   Humidity: (60±10)％RH.

10.2. Quality specification

It shall be based on GB2828-87, inspection level Ⅱ .

	IETM	CHECK LEVEL	AQL
MAJOR (MA)	1.Liquid crystal leakage 2.Wrong polarizer 3.Outside dimension 4. Bright dot、Dark dot 5. Display abnormal 6. Class crack	Ⅱ	0.25
MINOR (MI)	1. Spot Defect (Including black spot、white spot、pinhole、foreign particle、bubbles、hurt） 2. fragment 3. Line Defect (Including black line、white line、cratch) 4. Incision defect 5. Newton's ring 6. Other visual defects	Ⅱ	1.0

10.3. Definition of area:

10.3.1 Ⅰ area: viewing area
     ″ area: outside viewing area
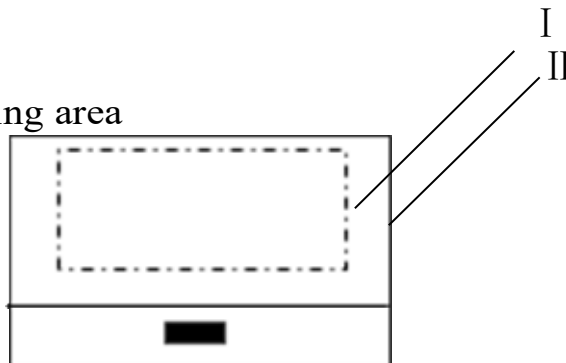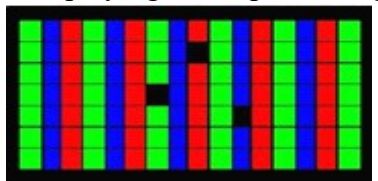
10.4.Standard of appearance test for Ⅰ area: (unit: mm)
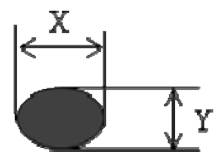
NOTE：Defect ignore for Ⅱ area .
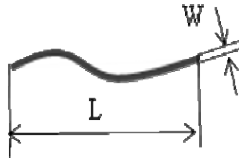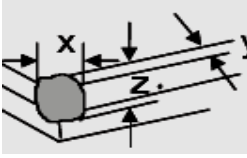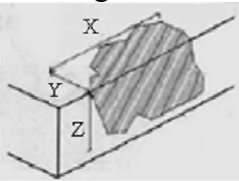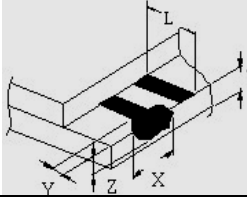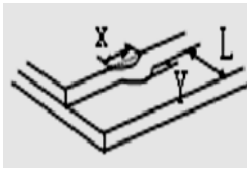
10.4.1 Bright/Dark Dots explain

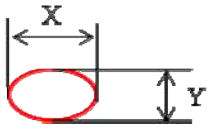| Name	Explain	Definition
Bright dot	Dots appear bright and unchanged in size in which LCD panel isdisplaying under black pattern 	The definition of dot: The size of a defective dot over 1/2 of single pixel dot is regarded as one defective dot . NOTE: One pixel consists of 3 sub-pixels, including R,G, and B dot.(Sub-pixel = Dot)
Dark dot	Dots appear dark and unchanged in size in which LCD panel isdisplaying under pure red, green, blue pattern. 	
ADJACENT DOT	Adjacent two sub-pixel are defect（define two dot defect）	

10.4.2 Inspection standard

№	Items	Criterion		Checking Manner	Defect Classes
1	Bright/dark dot	Under 6" (contain 6")	Bright dot：2 Dark dot：N≤4 **Note:** be more than 5mm apart	Checking with eyes	MAJ
		6"-12"	Bright dot：N≤4 Dark dot：N≤5 Total Bright and Dark Dots：N≤8 **Note ：** 1. Two bright dot defects (red, green, blue, and white) should be larger than 15mm； 2. The distance between black dot defects or black and bright dot defects should be more than 5mm apart.		
2	Spot Defect (Including black spot.white spot. Pinhole.foreign particle.bubbles.hurt） D=(X+Y)/2	Under 6" （contain 6"）	D≤0.1 Ignore 0.1 ＜D≤0.35 N≤3 0.35＜D N=0	Checking with eyes	MIN
		6"-12"	D≤0.3 Ignore 0.3 ＜D≤0.6 N≤4 0.6＜D N=0		

№	Items	Criterion			Checking manner	Defect classes
3	Line Defect (Including black Line.white line. scratch)	Under 6" （contain 6"）	W≤0.02 Ignore 0.02＜W≤0.04 L≤5 N≤2 0.04＜W≤0.06 L≤5 N≤1 W＞0.06 N=0		Checking with eyes	MIN
		6"-12"	W≤0.07 Ignore 0.07＜W≤0.1 L≤10 N≤4 W＞0.1 N=0			
4	Display abnormal	Not allowed			Checking with eyes	MAJ
5	Outside dimension	Accord with drawing			Callipers	MAJ
6	Class crack	Not allowed			Checking with eyes	MAJ
7	Leak	Not allowed			Checking with eyes	MAJ
8	Comer fragment	X≤3 Y≤3 Z≤T Ignore Note： 1.No hurt identifying .wire.seal 2.T：Glass thickness X: Length Y: Width Z: thickness			Checking with eyes	MIN
9	Side fragment	Y≤1 Z≤T Ignore Note： 1.No hurt identifying .wire.seal 2.T：Glass thickness X: Length Y: Width Z: thickness			Checking with eyes	MIN
	Step fragment	Y≤1 and Y≤1/4 L			Checking with eyes	MIN
	Incision defect	Y≤1 and accord with outside dimension			Checking with eyes	MIN

№	Items	Criterion			Checking manner	Defect classes
10	Newton's ring （CTP or Cover board） D=(X+Y)/2	Under 6" (contain 6")	$D{\leq}25$ $N{\leq}3$ $D{>}25$ $N=0$		Checking with eyes	MIN
		6"-12"	$D{\leq}70$ $N{\leq}5$ $D{>}70$ $N=0$			

11. Precautions for Use of LCD Modules

11.1 Handing Precautions

(1) The display panel is made of glass and polarizer. As glass is fragile. It tends to become or chipped during handling especially on the edges. Please avoid dropping or jarring. Do not subject it to a mechanical shock by dropping it or impact.

(2) If the display panel is damaged and the liquid crystal substance leaks out, be sure not to get any in your mouth. If the substance contacts your skin or clothes, wash it off using soap and water.

(3) Do not apply excessive force to the display surface or the adjoining areas since this may cause the color tone to vary. Do not touch the display with bare hands. This will stain the display area and degraded insulation between terminals (some cosmetics are determined to the polarizer).

(4) The polarizer covering the display surface of the LCD module is soft and easily scratched. Handle this polarizer carefully. Do not touch, push or rub the exposed polarizers with anything harder than an HB pencil lead (glass,tweezers, etc.). Do not put or attach anything on the display area to avoid leaving marks on. Condensation on the surface and contact with terminals due to cold will damage, stain or dirty the polarizer. After products are tested at low temperature they must be warmed up in a container before coming is contacting with room temperature air.

(5) If the display surface becomes contaminated, breathe on the surface and gently wipe it with a soft dry cloth. If it is heavily contaminated, moisten cloth with one of the following solvents

    - Isopropyl alcohol

    - Ethyl alcohol

Do not scrub hard to avoid damaging the display surface.

(6) Solvents other than those above-mentioned may damage the polarizer. Especially, do not use the following.

    - Water

    - Ketone

    - Aromatic solvents

Wipe off saliva or water drops immediately, contact with water over a long period of time may cause deformation or color fading. Avoid contacting oil and fats.

(7) Exercise care to minimize corrosion of the electrode. Corrosion of the electrodes is accelerated by water droplets, moisture condensation or a current flow in a high-humidity environment.

(8) Install the LCD Module by using the mounting holes. When mounting the LCD module make sure it is free of twisting, warping and distortion. In particular, do not forcibly pull or bend the I　O cable
or the backlight cable.

(9) Do not attempt to disassemble or process the LCD module.

(10) NC terminal should be open. Do not connect anything.

(11) If the logic circuit power is off, do not apply the input signals.

(12) Electro-Static Discharge Control,Since this module uses a CMOS LSI, the same careful attention should be paid to electrostatic discharge as for an ordinary CMOS IC. To prevent destruction of the elements by static electricity, be careful to maintain an optimum work environment.

- Before remove LCM from its packing case or incorporating it into a set, be sure the module and your body have the same electric potential.Be sure to ground the body when handling the LCD modules.

- Tools required for assembling, such as soldering irons, must be properly grounded. make certain the AC power source for the soldering iron does not leak. When using an electric screwdriver to attach LCM, the screwdriver should be of ground potentiality to minimize as much as possible any transmission of electromagnetic waves produced sparks coming from the commutator of the motor.

- To reduce the amount of static electricity generated, do not conduct assembling and other work under dry conditions. To reduce the generation of static electricity be careful that the air in the work is not too dried. A relative humidity of 50%-60% is recommended.As far as possible make the electric potential of your work clothes and that of the work bench the ground potential.

The LCD module is coated with a film to protect the display surface. Exercise care when peeling off this protective film since static electricity may be generated.

(13)Since LCM has been assembled and adjusted with a high degree of precision, avoid applying excessive shocks to the module or making any alterations or modifications to it.
- Do not alter, modify or change the shape of the tab on the metal frame.
- Do not make extra holes on the printed circuit board, modify its shape or change the positions of components to be attached.
- Do not damage or modify the pattern writing on the printed circuit board.
- Absolutely do not modify the zebra rubber strip (conductive rubber) or heat seal connector.
- Except for soldering the interface, do not make any alterations or modifications with a soldering iron.
- Do not drop, bend or twist LCM.

11.2 Storage Precautions
When storing the LCD modules, the following precaution is necessary.
(1) Store them in a sealed polyethylene bag. If properly sealed, there is no need for the dessicant.
(2) Store them in a dark place. Do not expose to sunlight or fluorescent light, keep the temperature between 0°C and 35°C.
(3) The polarizer surface should not come in contact with any other objects. (We advise you to store them in the container in which they were shipped).

11.3 Others
Liquid crystals solidify under low temperature (below the storage temperature range) leading to defective orientation or the generation of air bubbles (black or white). Air bubbles may also be generated if the module is subject to a low temperature.

If the LCD modules have been operating for a long time showing the same display patterns, the display patterns may remain on the screen as ghost images and a slight contrast irregularity may also appear.A normal operating status can be regained by suspending use for some time. It should be noted that this phenomenon does not adversely affect performance reliability.

To minimize the performance degradation of the LCD modules resulting from destruction caused by static electricity etc., exercise care to avoid holding the following

sections when handling the modules.
- Exposed area of the printed circuit board.
-Terminal electrode sections.

11.4 USING LCD MODULES
Installing LCD Modules
The hole in the printed circuit board is used to fix LCM as shown in the picture below. Attend to the following items when installing the LCM.
(1) Cover the surface with a transparent protective plate to protect the polarizer and LC cell.
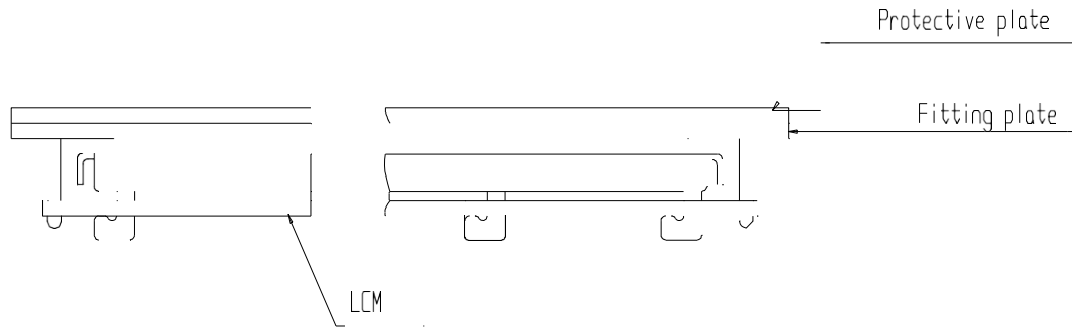
(2) When assembling the LCM into other equipment, the spacer to the bit between the LCM and the fitting plate should have enough height to avoid causing stress to the module surface, refer to the individual specifications for measurements. The measurement tolerance should be ±0.1mm.
Precaution for assemble the module with BTB connector:
Please note the position of the male and female connector position,don't assemble or assemble like the method which the following picture shows
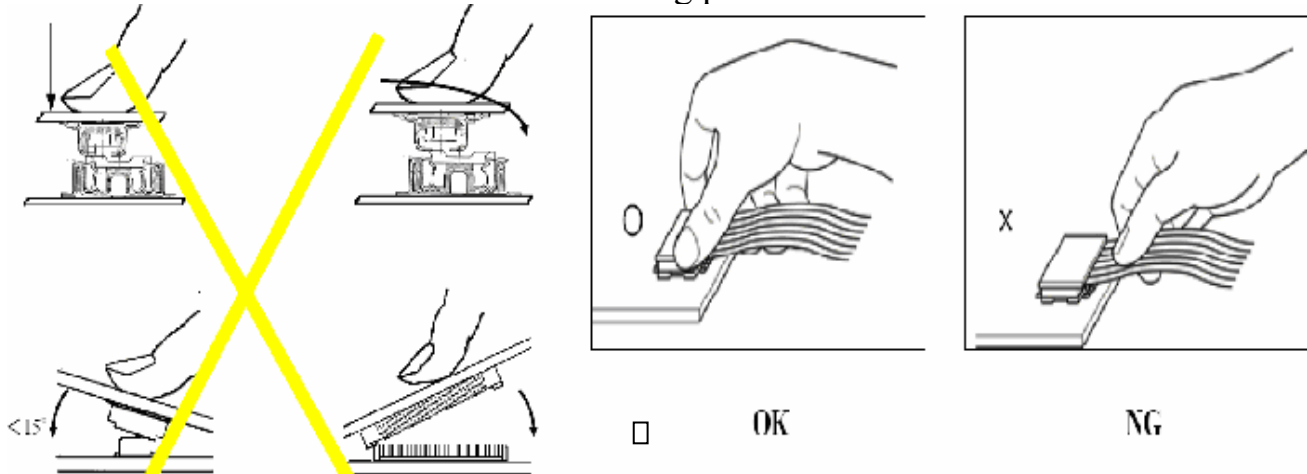
Precaution for soldering to the LCM

	Hand soldering	Machine drag	Machine press soldering
No ROHS Product	290°C~350°C. Time : 3-5S.	330°C ~350°C. Speed : 4-8mm/s.	300°C~330C. Time : 3-6S. Press: 0.8~1.2Mpa
ROHS Product	340°C~370°C. Time : 3-5S.	350°C ~370°C. Time : 4-8 mm/s.	330°C~360C. Time : 3-6S. Press: 0.8~1.2Mpa

(1) If soldering flux is used, be sure to remove any remaining flux after finishing to

soldering operation. (This does not apply in the case of a non-halogen type of flux.) It is recommended that you protect the LCD surface with a cover during soldering to prevent any damage due to flux spatters.

(2) When soldering the electroluminescent panel and PC board, the panel and board should not be detached more than three times. This maximum number is determined by the temperature and time conditions mentioned above, though there may be some variance depending on the temperature of the soldering iron.

(3) When remove the electroluminescent panel from the PC board, be sure the solder has completely melted, the soldered pad on the PC board could be damaged.

Precautions for Operation

(1) 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.

(2) 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.

(3 If the display area is pushed hard during operation, the display will become abnormal. However, it will return to normal if it is turned off and then back on.

(4) 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.

(5) Input each signal after the positive/negative voltage becomes stable.

(6) Please keep the temperature within specified range for use and storage. Polarization degradation, bubble generation or polarizer peel-off may occur with high temperature and high humidity.

Safety

(1) It is recommended to crush damaged or unnecessary LCDs into pieces and wash them off with solvents such as acetone and ethanol, which should later be burned.

(2) If any liquid leaks out of a damaged glass cell and comes in contact with the hands, wash off thoroughly with soap and water.

(3) WEEE order must be executed in product scrap.

11.5The disposal of waste

For waste disposal, our recommendations are as follows, please refer to your company and the relevant provisions of the state laws and regulations of the act accordingly

1. Packing materials disposal for our packaging (carton/PS tray/EPE tray/PET tray)

1)Our company used to recycle and reuse materials, packing materials can be you just need to transfer to material recycling companies

2. Our scrap module can't be recycled for reuse, so please dispose of,

1) Our scrap module can't be recycled for reuse, products and components are "served" can lead to accidents

2) Our scrap can be transfer to material recycling companies, dismantling, to ensure that scrap in relatively advanced technology products, environmental protection measures of relatively perfect environment for processing.

3. WEEE order must be executed in product scrap.

12. Prior Consult Matter

1.①For standard products, we keep the right to change material, process ... for improving the product property without notice on our customer.

②For OEM products, if any change needed which may affect the product property, we will consult with our customer in advance.

2.If you have special requirement about reliability condition, please let us know before you start the test on our samples.

13. Factory

FACTORY NAME: LCD Mikroelektronik GmbH

FACTORY ADDRESS: Otto-Lilienthal-Str. 13, D-76275 Ettlingen