Shenzhen Leadtek Electronics Co.,Ltd

PRODUCT SPECIFICATION

TFT-LCD   MODULE

Module No：LTK123FHHLM11-V0

☑ Preliminary Specification

☐ Approval Specification

Designed by	Checked by	Approved by
jona	tom	lan

Final Approval by Customer

Approved by	Comment

※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
V0	Original	2022.12.28	

Contents

1. General Specifications

No.	Item	Specification	Remark
1	LCD size	12.3 inch	
2	Driver element	a-Si TFT active matrix	
3	Resolution	1920RGB (W) x 720(H)	
4	Display mode	Normally Black, Transmissive	
5	Dot pitch	0.0507*3 (w)x 0.1521(H)	
6	Active area	292.03(W) x 109.51(H) mm	
7	Module size	302.50W) ×125.40(H) ×13.70(D) mm	Note 1
8	View direction	ALL	
9	Color arrangement	RGB-stripe	
10	Interface	LVDS	
11	Lcm power consumption	（12.3W）TYP.	
12	Driver IC	HX8290，HX8695	
13	Weight	TBD	
14	Surface treatment	HC(Glare)	

Note 1: Refer to Mechanical Drawing.

2. Pin Assignment

LCM-PCB Connector is used for the module electronics interface. The recommended model is F31L-1A7H1-21050 manufactured by Aorara.

Pin No.	Symbol	I/O	Function	Remark
1	GND	P	Ground	
2	BIST/NC	---	No connect	
3	VCC	P	Main Power Supply	
4	VCC	P	Main Power Supply	
5	GND	P	Ground	
6	GND	P	Ground	
7	NC	---	No connect	
8	NC	---	No connect	
9	GND	P	Ground	
10	ORXIN0-	I	Odd pixel negative LVDS differential data input(O0-)	
11	ORXIN0+	I	Odd pixel positive LVDS differential data input(O0+)	
12	ORXIN1-	I	Odd pixel negative LVDS differential data input(O1-)	
13	ORXIN1+	I	Odd pixel positive LVDS differential data input(O1+)	
14	ORXIN2-	I	Odd pixel negative LVDS differential data input(O2-)	
15	ORXIN2+	I	Odd pixel positive LVDS differential data input(O2+)	
16	ORXCLKIN-	I	Odd pixel negative LVDS differential CLK input(OCLK-)	
17	ORXCLKIN+	I	Odd pixel positive LVDS differential CLK input(OCLK+)	
18	ORXIN3-	I	Odd pixel negative LVDS differential data input(O3-)	
19	ORXIN3+	I	Odd pixel positive LVDS differential data input(O3+)	
20	ERXIN0-	I	Even pixel negative LVDS differential data input(E0-)	
21	ERXIN0+	I	Even pixel positive LVDS differential data input(E0+)	
22	ERXIN1-	I	Even pixel negative LVDS differential data input(E1-)	
23	ERXIN1+	I	Even pixel positive LVDS differential data input(E1+)	
24	ERXIN2-	I	Even pixel negative LVDS differential data input(E2-)	

25	ERXIN2+	I	Even pixel positive LVDS differential data input(E2+)	
26	ERXCLKIN-	I	Even pixel negative LVDS differential CLK input(ECLK-)	
27	ERXCLKIN+	I	Even pixel positive LVDS differential CLK input(ECLK+)	
28	ERXIN3-	I	Even pixel negative LVDS differential data input(E3-)	
29	ERXIN3+	I	Even pixel positive LVDS differential data input(E3+)	
30	GND	P	Ground	
31	FAULT	---	No connect	
32	RESETB	I	Global reset pin, active low.	
33	STBYB	I	Standby mode setting pin, active low.	
34	NC	I	No connect	
35	NC	I	No connect	
36	NC	I	No connect	
37	NC	**I**	No connect	
38	GND	P	Ground	
39	GND	P	Ground	
40	NC	-I	No connect	
41	LEDA	P	LED ANODE（A）	
42	LEDA	P	LED ANODE（A）	
43	LEDA	P	LED ANODE（A）	
44	NC	I	No connect	
45	LEDK1	P	LED CATHODE(K1)	
46	LEDK2	P	LED CATHODE(K2)	
47	LEDK3	P	LED CATHODE(K3)	
48	LEDK4	P	LED CATHODE(K4)	
49	NTC_A	P	NTC ANODE	
50	NTC_K	P	NTC CATHODE	

I: input; O: output; P: Power or Ground(0V).

3. Operation Specifications

3.1. Absolute Maximum Ratings

(Note 1)

Item	Symbol	Values		Unit	Remark
		Min.	Max.		
Power voltage	VCC	-0.3	4.0	V	TA=25℃
Operation Temperature	T_{OP}	-30	85	℃	
Storage Temperature	T_{ST}	-40	90	℃	

Note1 : 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.

3.2. Typical Operation Conditions

Test condition: GND=0V, TA=25 ºC

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Digital Operating voltage	VCC	3.0	3.3	3.6	V	
High Level Input Voltage	V_{IH}	0.7 VCC	-	VCC	V	
Low Level Input Voltage	V_{IL}	0	-	0.3 VCC	V	

3.3. Current Consumption

3.3.1 Current for LCD Driver

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
	Ivcc	-	120	250	mA	VCC=3.3V
Total Power Consumption	LCD	-	0.396		W	

3.3.2 Current for LED Driver

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Voltage for LED Backlight	V_L	31.9	34.7	37.4	V	Note 1
Crrent for LED Backlight	I_L	-	320	-	mA	
BL Power Consumption	BL	-	11.904	-	W	
LED life time	-	30,000	-	-	Hrs	Note 2

Note1: V_L=34.7V, I_L=320mA (Backlight circuit:11series connection, 4 parallel connection), the ambient temperature is 25℃.

<div align="center">LED CIRCUIT DIAGRAM</div>
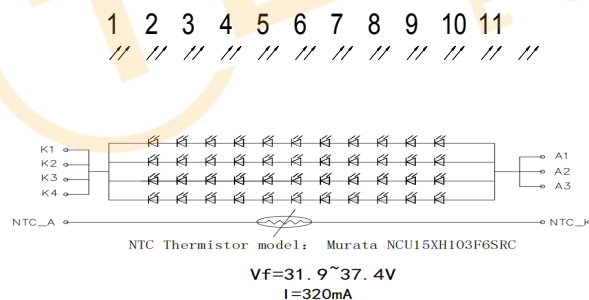
<div align="center">NTC CIRCUIT DIAGRAM</div>

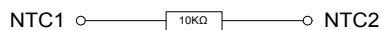<div align="center">Fig. 3-1 LED test circuit diagram</div>

Note 2: The "LED life time" is defined as the module brightness decrease to 50% original brightness at Ta=25℃ and 1/2 rated current. The LED lifetime could be decreased if operating I_L is larger than 320 mA.

3.3.3   Backlight NTC Resistor

Murata NTC Specification NCP15XH103F03RC			
R25 10k ohm +/- 1%			
B(25/50) 3380K +/-1%			
TEMP.	R-low	R-center	R-high
(deg.C)	(k ohm)	(k ohm)	(k ohm)
-40	188.0202	195.652	203.5731
-35	142.7877	148.171	153.7418
-30	109.5221	113.3471	117.294
-25	84.8227	87.5588	90.3741
-20	66.2694	68.2367	70.2554
-15	52.2283	53.6496	55.104
-10	41.4765	42.5062	43.557
-5	33.1462	33.8922	34.6515
0	26.678	27.2186	27.7675
5	21.6294	22.0211	22.4175
10	17.643	17.9255	18.2107
15	14.4712	14.6735	14.8772
20	11.9371	12.0805	12.2244
25	9.9	10	10.1
30	8.2162	8.3145	8.4132
35	6.8534	6.9479	7.043
40	5.7443	5.8336	5.9238
45	4.8333	4.9169	5.0015
50	4.0833	4.1609	4.2395
55	3.4634	3.535	3.6076
60	2.9486	3.0143	3.0812
65	2.5259	2.5861	2.6476
70	2.1724	2.2275	2.2839
75	1.8741	1.9245	1.9761
80	1.6225	1.6685	1.7157
85	1.4101	1.4521	1.4952
90	1.2296	1.268	1.3074
95	1.0746	1.1096	1.1456
100	0.9419	0.9738	1.0067
105	0.8288	0.858	0.8881
110	0.7313	0.758	0.7856
115	0.6471	0.6715	0.6968
120	0.574	0.5964	0.6196
125	0.5106	0.5311	0.5524

3.4. Power Sequence

a. Power on:
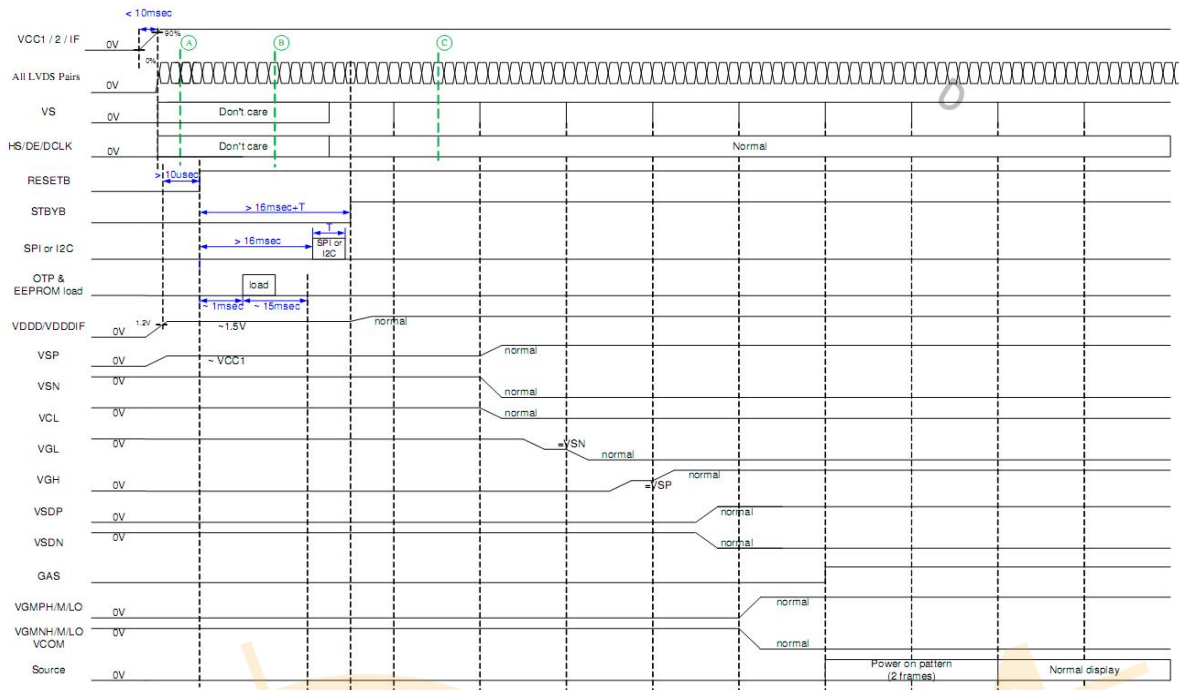
b. Power off
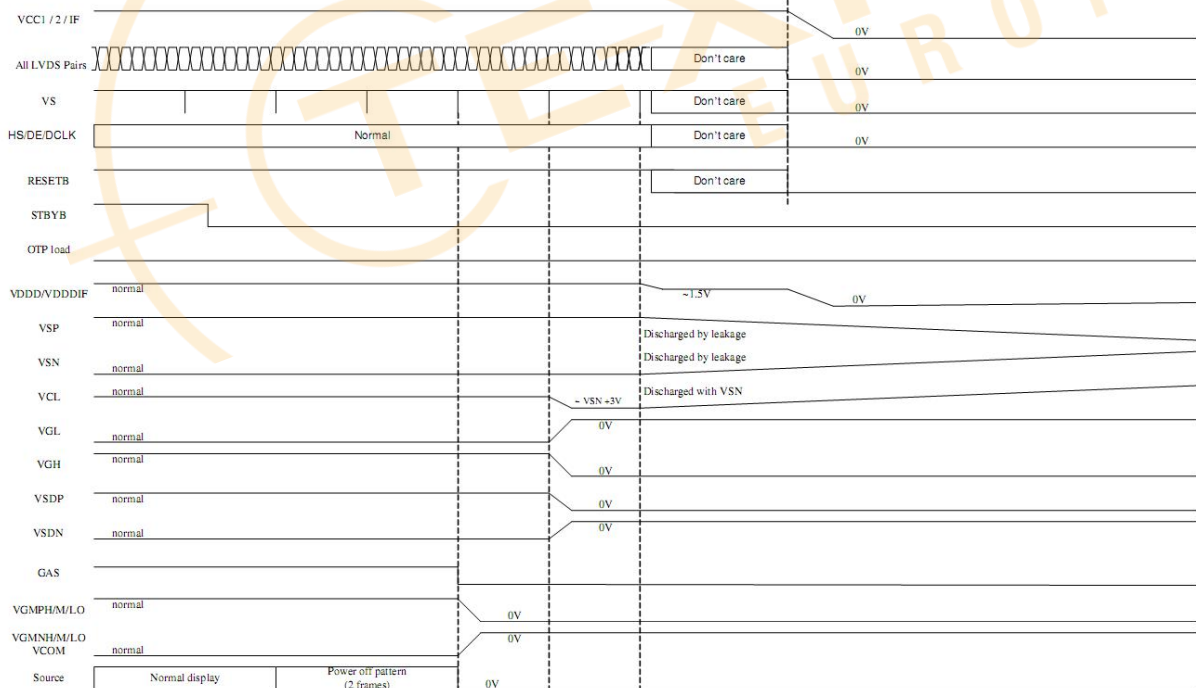
3.5. LVDS Signal Timing Characteristics

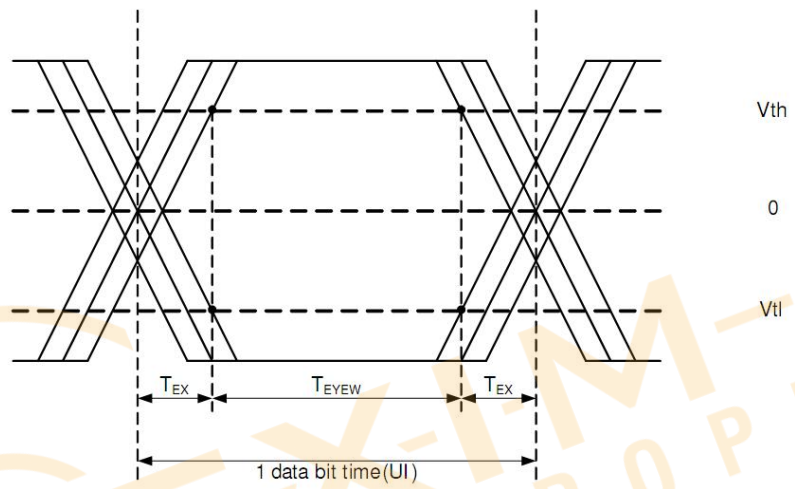### 3.5.1. AC Electrical Characteristics

Parameter	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
Clock frequency	F_{LVCYC}	20	-	85	MHz
Clock period	T_{LVCYC}	11.76	-	-	ns
1 data bit time	UI	-	1/7	-	T_{LVCYC}
Clock hight time	T_{LVCH}	3.9	4	4.1	UI
Clock low time	T_{LVCL}	2.9	3	3.1	UI
Position 1	T_{POS1}	-0.2	0	0.2	UI
Position 0	T_{POS0}	0.8	1	1.2	UI
Position 6	T_{POS6}	1.8	2	2.2	UI
Position 5	T_{POS5}	2.8	3	3.2	UI
Position 4	T_{POS4}	3.8	4	4.2	UI
Position 3	T_{POS3}	4.8	5	5.2	UI
Position 2	T_{POS2}	5.8	6	6.2	UI
Input eye width	T_{EYEW}	0.6	-	-	UI
Input eye border	T_{EX}	-	-	0.2	UI
LVDS wake up time	T_{ENLVDS}	-	-	150	us
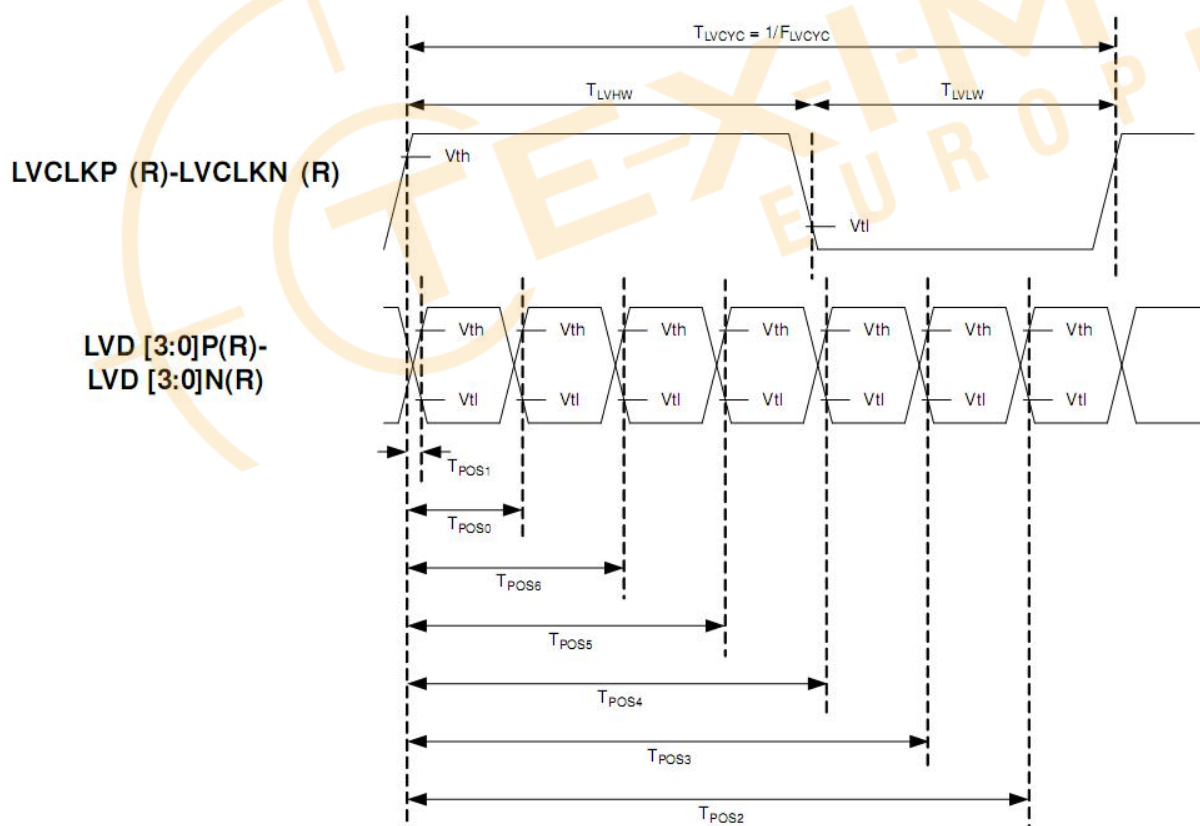
Single-ended:
LVD[3:0]P,
LVD[3:0]N

Vcm+0.5*Vth
Vcm-0.5*Vtl

Vcm

Vcm-0.5*Vth
Vcm+0.5*Vtl

T_{EX} T_{EYEW} T_{EX}

1 data bit time(UI)
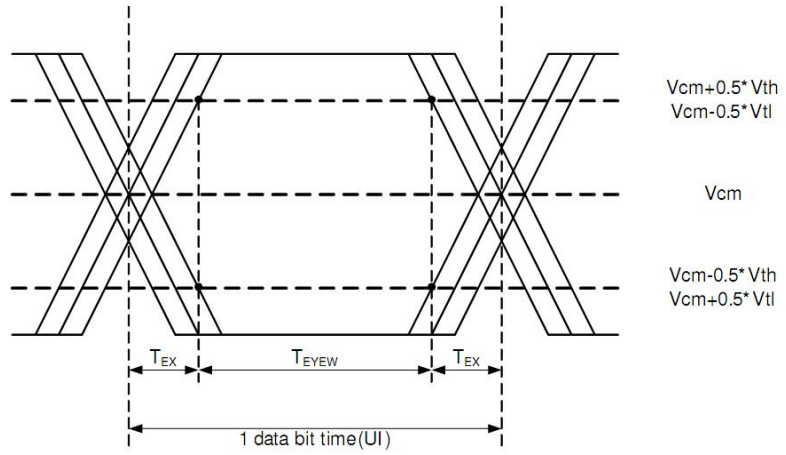
Differential:
LVD[3:0]P-LVD[3:0]N

Vth

0

Vtl

T_{EX} T_{EYEW} T_{EX}

1 data bit time(UI)

LVDS input eye diagram

STBYB

LVxN/P

T_{ENLVDS}

Internal data
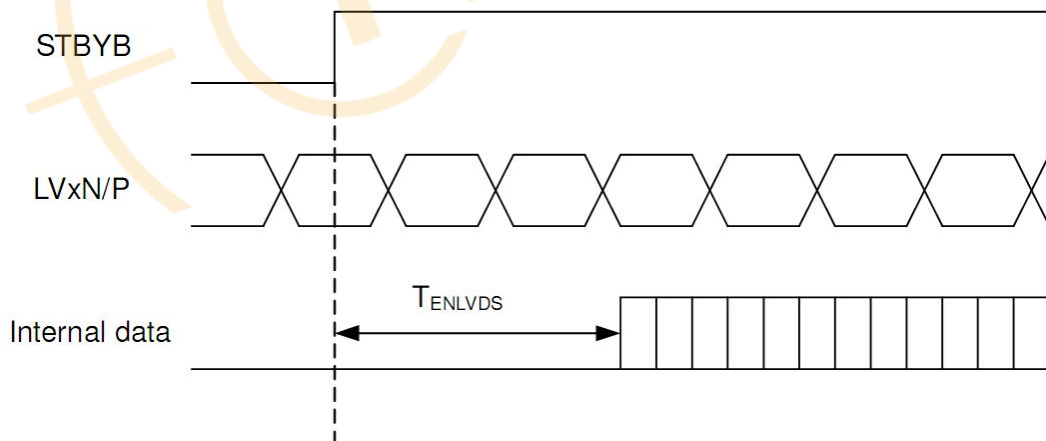
The LVDS receiver can support spread spectrum clock (SSC) .Limitation is listed as below.

| Parameter	Symbol	Condition	Spec.			Unit
			Min.	Typ.	Max	
Modulation Frequency	SSC_MF	LVDS clock frequency center at 80MHz	-	-	200	KHz
		LVDS clock frequency center at 60MHz	-	-	150	KHz
		LVDS clock frequency center at 40MHz	-	-	100	KHz
		LVDS clock frequency center at 20MHz	-	-	50	KHz
Modulation Rate	SSC_MR	LVDS clock frequency + SSCMR in the range of 20MHZ~85Mhz	-	-	±3	%

3.5.2. DC Electrical Characteristics

Parameter	Symbol	Condition	Spec.			Unit
			Min.	Typ.	Max.	
Differential input high Threshold voltage	Vth	Vcm=1.2V	-	-	+0.1	V
Differential input low threshold voltage	Vtl	-	-0.1	-	-	V
Differential input common Mode voltage	V_{CM}	-	1	1.2	$1.7-|V_{id}|/2$	V
LVDS input voltage	V_{INLV}	-	0.7		1.7	V
Differential input voltage	$|Vid|$	-	0.1	-	0.6	V
Differential input leakage Current	Ilvleak	-	-10	-	+10	µA

Single-ended:
LVCLKP(R),
LVCLKN(R),
LVD[3:0]P(R),
LVD[3:0]N(R)
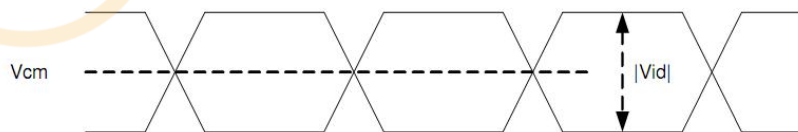
Differential:
LVCLKP(R)-LVCLKN(R),
LVD[3:0]P(R)-
LVD[3:0]N(R)
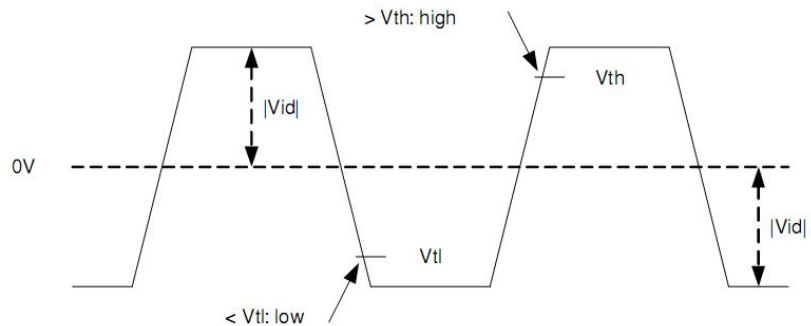
3.5.3. Timing Controller

Item	Symbol	1920xRGBx720 (Two Port)			Unit	Remark
		Min.	Typ.	Max.		
DCLK frequency	Fclk	43.1	44.1	70.1	MHz	Frame rate =60Hz
Hsync period time	Th		1002		DCLK	
Horizontal valid data	thd		1920		DCLK	
Hsync pulse Width	thpw	10	12	255	DCLK	
Hsync back porch	thbp	5	16	255	DCLK	
Hsync front porch	thfp	24	26	260	DCLK	
Vsync period time	Tv		733		H	
Vertical valid data	tvd		720		H	
Vsync pulse width	tvpw	1	3	20	H	
Vsync back porch	tvbp	2	5	255	H	
Vsync front porch	tvfp	5	8	260	H	

3.5.4. LVDS Data Input Format
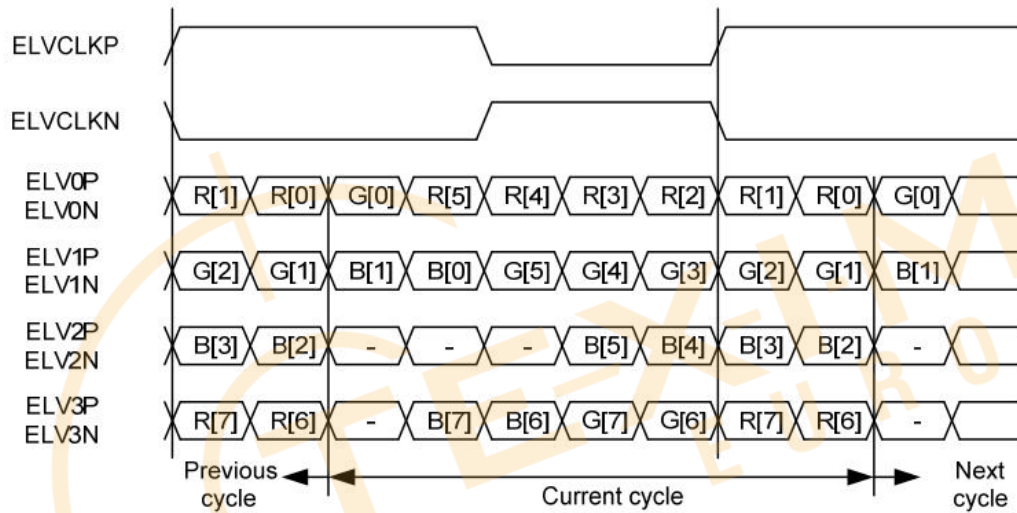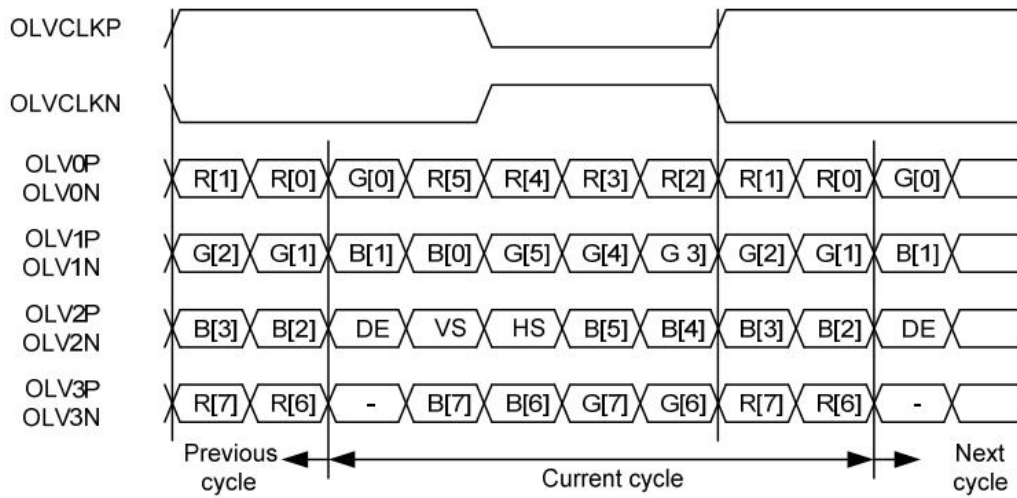
2-port LVDS signals, VESA format, 8-bit mode

4. Optical Specifications

Item	Symbol	Condition	Values Min.	Values Typ.	Values Max.	Unit	Remark
Viewing angle (CR≥ 10)	θ_L	Φ=180° (9 o'clock)	-	85	-	degree	Note 1
	θ_R	Φ=0°(3 o'clock)	-	85	-		
	θ_T	Φ=90° (12 o'clock)	-	85	-		
	θ_B	Φ=270° (6 o'clock)	-	85	-		
Response time	T_{ON+} T_{OFF}		-	20	-	msec	Note 3
Contrast ratio	CR		-	1000	-	-	Note 4
Color chromaticity	W_X	Normal θ=Φ=0°	0.26	0.31	0.36	-	Note 2 Note 5 Note 6
	W_Y		0.28	0.33	0.38	-	
NTSC (CIE 1931)			-	76	-	%	Note 2 Note 5
Luminance	L			800	-	cd/m²	Note 6
Luminance uniformity	Y_U		75	-	-	%	Note 7

The test systems refer to Note 2.

Note 1: Definition of viewing angle range

Normal line
θ=Φ=0°

Φ=90°
12 o'clock direction

θL

θT   θR

θB

Φ=180°

Φ=0°

Active Area
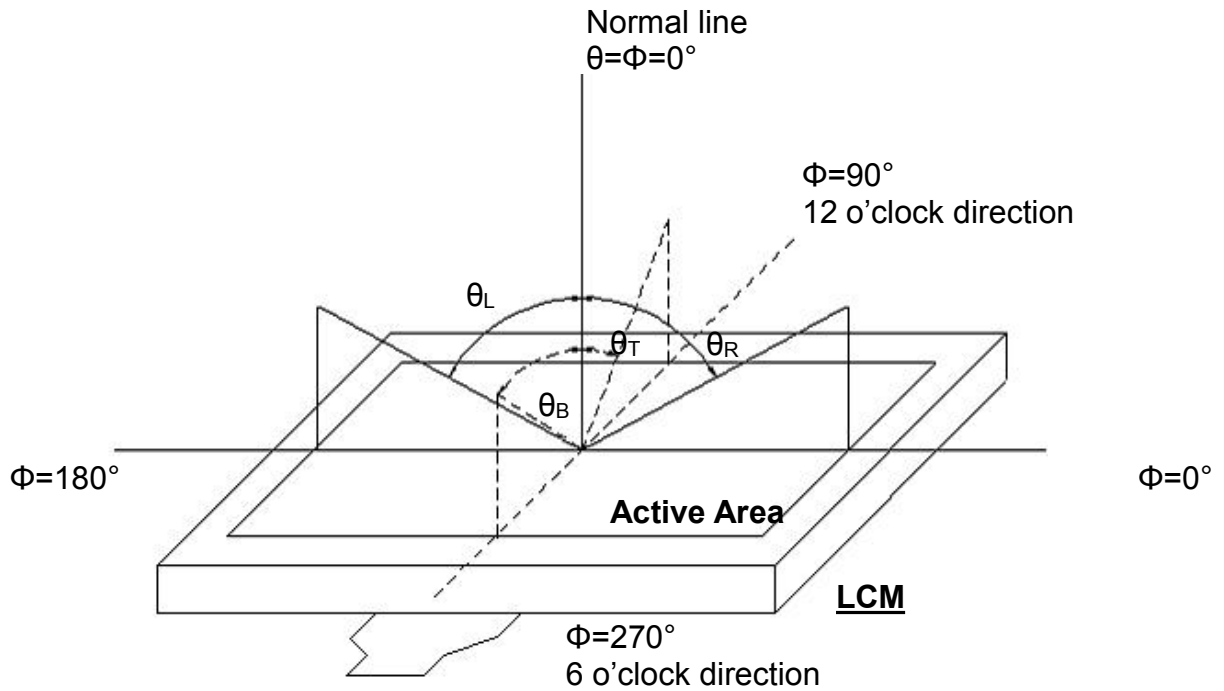
LCM

Φ=270°
6 o'clock direction

Fig. 4-2 Definition of viewing angle

Note 2: Definition of optical measurement system.
The optical characteristics should be measured in dark room. After 30 minutes operation, the optical properties are measured at the center point of the LCD screen. (Viewing angle is measured by ELDIM-EZ contrast/Height :1.2mm, Response time is measured by Photo detector TOPCON BM-7, other items are measured by BM-5A/ Field of view: 1° /Height: 500mm.) or CA-210.

Photo detector

Normal line
θ=Φ=0°

Φ=90°
12 o'clock direction

500mm

Φ=180°

Φ=0°

Active Area

LCM

Φ=270°
6 o'clock direction
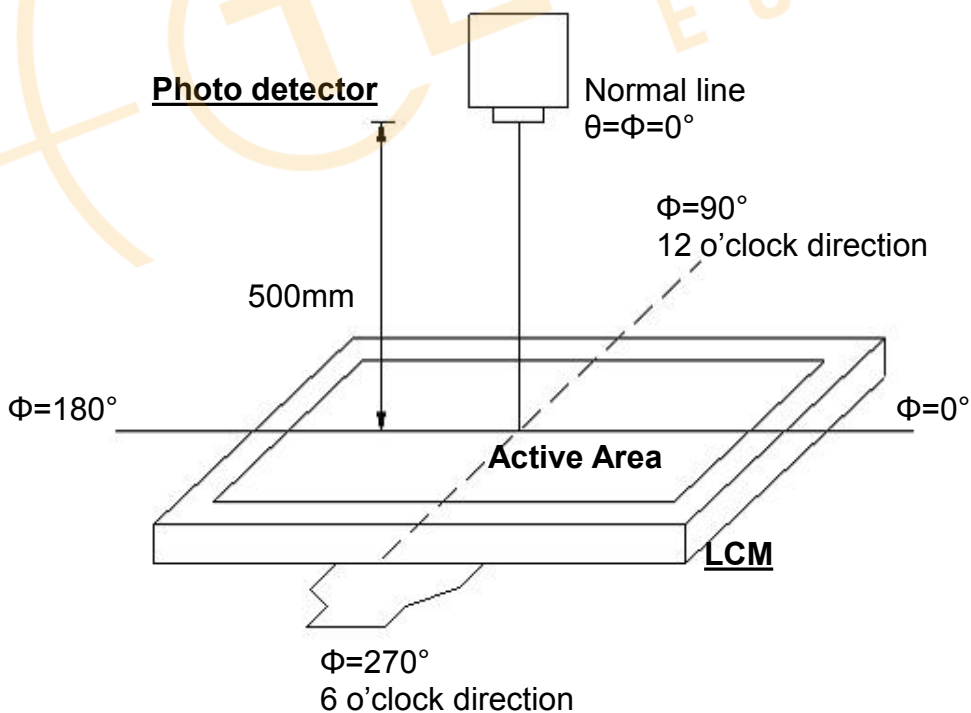
Fig. 4-3 Optical measurement system setup

Note 3: 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% to 90%.
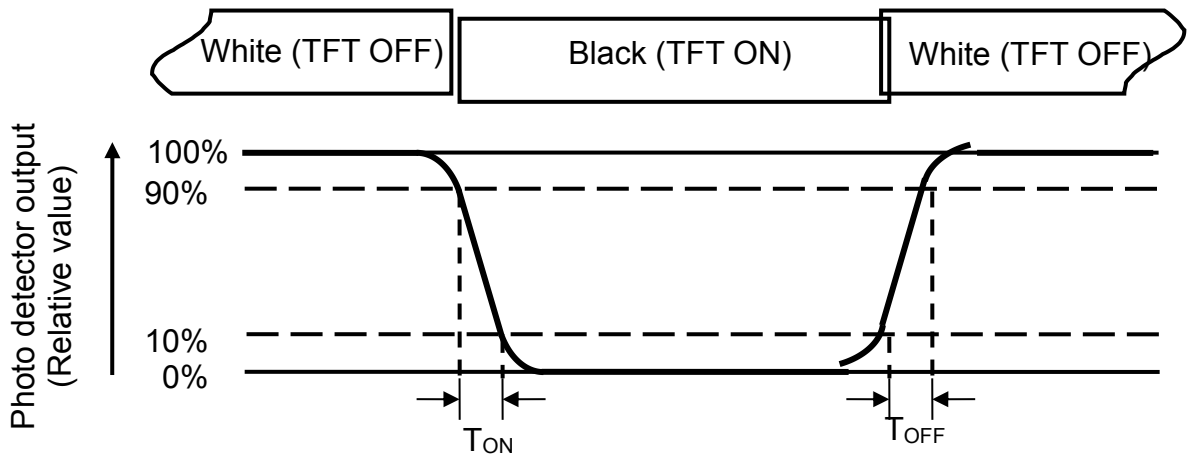

Fig. 4- 4 Definition of response time

Note 4: Definition of contrast ratio

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

Note 5: Definition of color chromaticity (CIE1931)
    Color coordinates measured at center point of LCD.

Note 6: All input terminals LCD panel must be ground while measuring the center area of the panel. The LED driving condition is I_L=320mA .

Note 7: Definition of Luminance Uniformity
    Active area is divided into 9 measuring areas(Refer to Fig. 4-4).
    Every measuring point is placed at the center of each measuring area.

$$\text{Luminance Uniformity } (Yu) = \frac{B_{min}}{B_{max}}$$

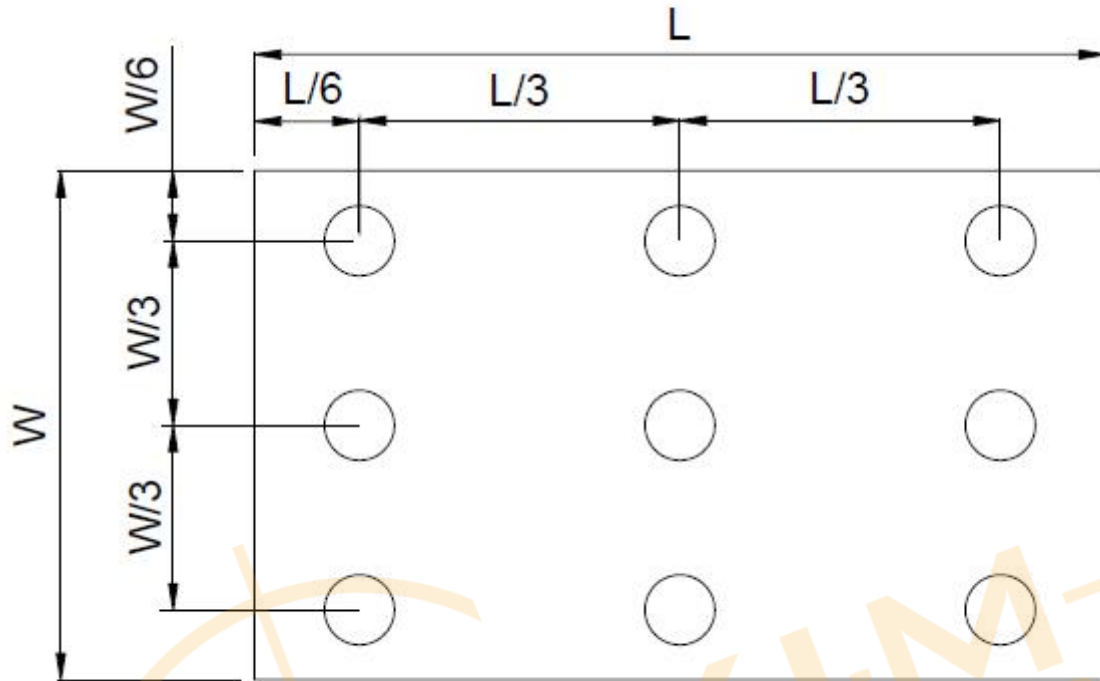L-------Active area length   W----- Active area width

Fig. 4-4 Definition of measuring points

B_{MAX}: The measured maximum luminance of all measurement position.
B_{MIN}: The measured minimum luminance of all measurement position.

5. Reliability Test Items

Item	Test Conditions	Criterion
High Temperature Storage	Ta = 90℃ 120hrs	A,B,C,D,E
Low Temperature Storage	Ta = -40℃ 120hrs	A,B,C,D,E
High Temperature Operation	Ts = 85℃ 120hrs	A,B,C,D,E
Low Temperature Operation	Ta =-30℃ 120hrs	A,B,C,D,E
Operate at High Temperature and Humidity	+60℃, 90%RH 120hrs	A,B,C,D,E
Thermal Shock （Non operation）	-20℃/30 min ~ +70℃/30 min for a total 100 cycles, Start with cold temperature and end with high temperature.	A,B,C,D,E
Vibration Test	Sweep:10Hz~55Hz~10Hz 2G 2 hours for each direction of X. Y. Z. (6 hours for total)	A,B,C,D,E
Package Vibration Test	Random Vibration : 0.015G*G/Hz from 5-200HZ, -6dB/Octave from 200-500HZ 2 hours for each direction of X. Y. Z. (6 hours for total)	A,B,C,D,E
Package Drop Test	Height:60 cm 1 corner, 3 edges, 6 surfaces	A,B,C,D,E
Electro Static Discharge	Contact=+/-8KV, Air=+/-15KV,(R=330R,C=150pF), 1 sec,9point,10times/point;	A,B,C,D,E

※Criterion:

A.LCM each function is OK,.

B.LCM appearance inspection without abnormalities (Including scratch, damage, corrosion and serious deformation)
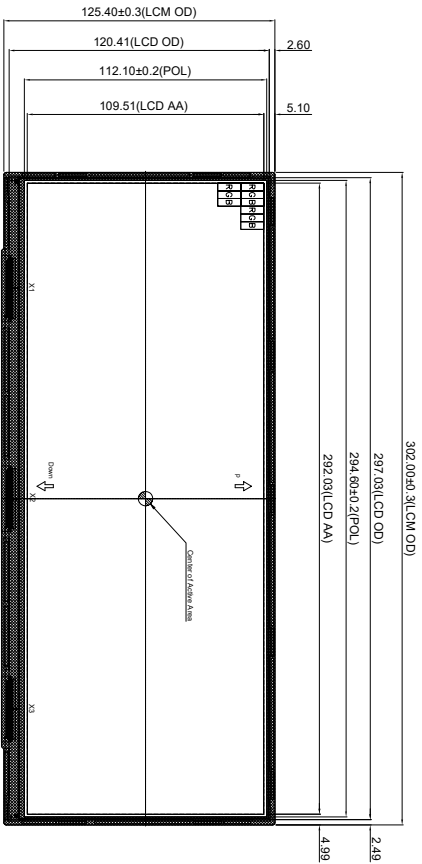
C.LCM brightness above the Min. value of Spec.

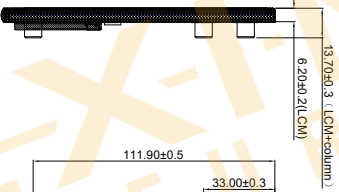D. Luminance uniformity above the Min. value of Spec.

E. Color chromaticity within tolerance range
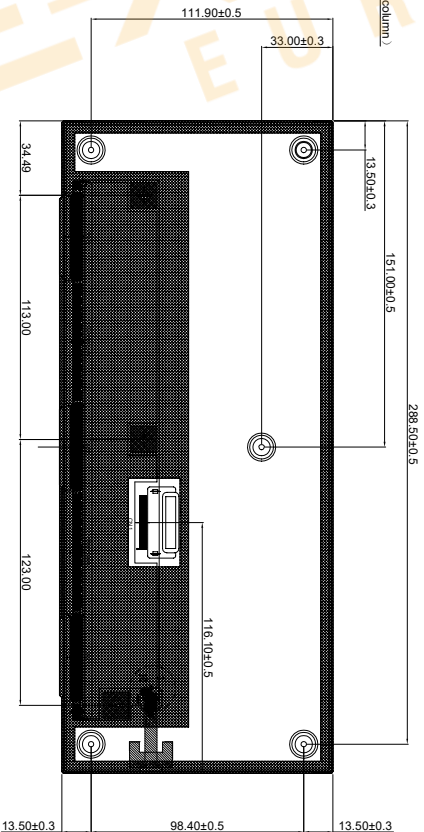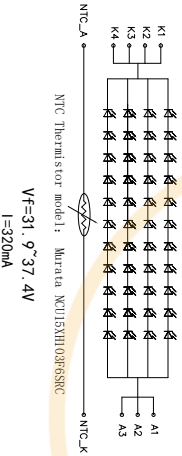
6．Mechanical Drawing

Front View

Dimensions:
- 302.00±0.3(LCM OD)
- 297.03(LCD OD)
- 294.60±0.2(LCD OD)
- 292.03(LCD AA)
- 125.40±0.3(LCM OD)
- 120.41(LCD OD)
- 112.10±0.2(POL)
- 109.51(LCD AA)
- 2.60
- 5.10
- 4.99
- 2.49

Center of Active Area
Down

Side View

- 13.70±0.3 (LCM+column)
- 6.20±0.2(LCM)

Back View

- 111.90±0.5
- 33.00±0.3
- 34.49
- 13.50±0.3
- 151.00±0.5
- 113.00
- 288.50±0.5
- 123.00
- 116.10±0.5
- 13.50±0.3
- 98.40±0.5
- 13.50±0.3

Notes:
1. Display : 12.3", TFT
2. Resolution: 1920xRGBx720
3. LCD Viewing Direction: ALL,
4. Display Mode: Normally Black
5. LCM Brightness: 800 cd/m² (TYP)
6. unmark Tolerance:±0.2
7. OPERATING TEMP: -30° C~ +85° C
8. STORAGE TEMP: -40° C~ +90° C
9. Requirements on Environmental Protection: ROHS

NTC_A
NTC Thermistor model: Murata NCU15XH103F6SRC
Vf=31.9~37.4V
I=320mA
NTC_K

K1
K2
K3
K4
A1
A2
A3

REV	DESCRIPTION	DATE	NAME
0	NEW	2022.12.19	IAN
1			
2			
3			

LEADTEK DISPLAY
LEADTEK COMPANY LIMITED

SCALE:1/1	UNIT:mm
Part No:	LTK123FHHLM11
Customer No:	
PAGE:1/1	VER:V0
Approve	JONA
Check	IAN
Drawn	IAN

PIN	Definition	PIN	Definition
1	GND	26	ERXCLKIN-
2	NC/BIST	27	ERXCLKIN+
3	VCC	28	NC
4	VCC	29	ERXIN3-
5	GND	30	GND
6	GND	31	FA_LT
7	NC	32	VCC
8	NC	33	RESET
9	GND	34	STBYB
10	GND	35	NC
11	ORXIN0-	36	NC
12	ORXIN1-	37	NC
13	ORXIN1+	38	NC
14	ORXIN2+	39	GND
15	ORXIN2-	40	GND
16	GND	41	NC
17	ORXCLKIN-	42	LEDA
18	ORXCLKIN+	43	LEDA
19	ORXIN3-	44	NC
20	ORXIN3+	45	NC
21	ERXIN0-	46	LEDK
22	ERXIN0+	47	LEDK
23	ERXIN1+	48	LEDK
24	ERXIN2-	49	NTC_A
25	ERXIN2+	50	NTC_K

7. Package Drawing

TBD

8. General Precautions

8.1. Safety

Liquid crystal is poisonous. Do not put it in your mouth. If liquid crystal touches your skin or clothes, wash it off immediately by using soap and water.

8.2. Handling

1. The LCD panel is plate glass. Do not subject the panel to mechanical shock or to excessive force on its surface.

2. The polarizer attached to the display is easily damaged. Please handle it carefully to avoid scratch or other damages.

3. To avoid contamination on the display surface, do not touch the module surface with bare hands.

4. Keep a space so that the LCD panels do not touch other components.

5. Put cover board such as acrylic board on the surface of LCD panel to protect panel from damages.

6. Transparent electrodes may be disconnected if you use the LCD panel under environmental conditions where the condensation of dew occurs.

7. Do not leave module in direct sunlight to avoid malfunction of the ICs.

8.3. Static Electricity

1. Be sure to ground module before turning on power or operating module.

2. Do not apply voltage which exceeds the absolute maximum rating value.

8.4. Storage

1. Store the module in a dark room where must keep at 25±10℃ and 65%RH or less.

2. Do not store the module in surroundings containing organic solvent or corrosive gas.

3. Store the module in an anti-electrostatic container or bag.

8.5. Cleaning

1. Do not wipe the polarizer with dry cloth. It might cause scratch.

2. Only use a soft sloth with IPA to wipe the polarizer, other chemicals might permanent damage to the polarizer.

Disclaimer

ALL PRODUCTS, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

Texim Europe B.V. its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "Texim"), disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product.

Texim makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product.

It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application.

Parameters provided in datasheets and / or specifications may vary in different applications and performance may vary over time.

All operating parameters, including typical parameters, must be validated for each customer application by the customer's technical experts.

Please contact us if you have any questions about the contents of the datasheet.

This may not be the latest version of the datasheet. Please check with us if a later version is available.

Texim Europe - contact details
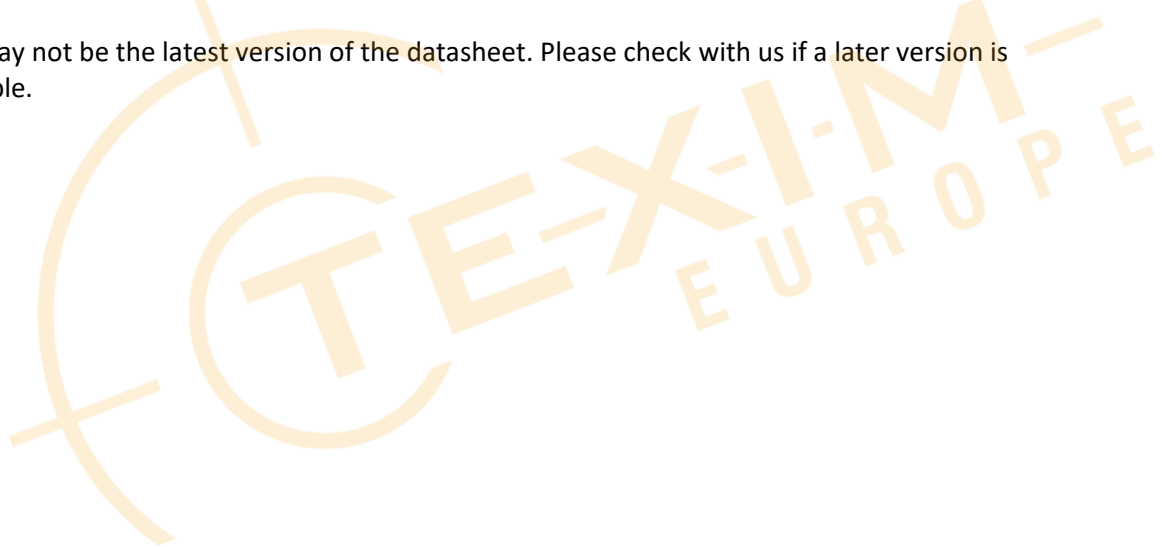
Headquarters & Warehouse

Elektrostraat 17
NL-7483 PG Haaksbergen
The Netherlands

T: +31 (0)53 573 33 33
E: info@texim-europe.com
Homepage: www.texim-europe.com

The Netherlands

Elektrostraat 17
NL-7483 PG Haaksbergen

T: +31 (0)53 573 33 33
E: nl@texim-europe.com
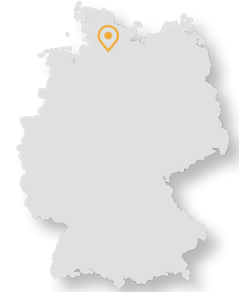
Belgium

Zuiderlaan 14, box 10
B-1731 Zellik

T: +32 (0)2 462 01 00
E: belgium@texim-europe.com

UK & Ireland

St Mary's House, Church Lane
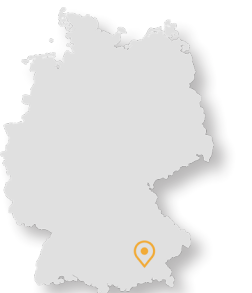Carlton Le Moorland
Lincoln LN5 9HS

T: +44 (0)1522 789 555
E: uk@texim-europe.com

Germany - North

Bahnhofstrasse 92
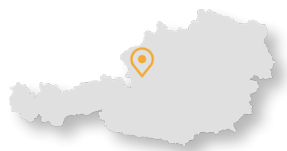D-25451 Quickborn

T: +49 (0)4106 627 07-0
E: germany@texim-europe.com

Germany - South

Martin-Kollar-Strasse 9
D-81829 München

T: +49 (0)89 436 086-0
E: muenchen@texim-europe.com

Austria

Warwitzstrasse 9
A-5020 Salzburg

T: +43 (0)662 216 026
E: austria@texim-europe.com

Nordic

Søndre Jagtvej 12
DK-2970 Hørsholm

T: +45 88 20 26 30
E: nordic@texim-europe.com

Italy

Martin-Kollar-Strasse 9
D-81829 München

T: +49 (0)89 436 086-0
E: italy@texim-europe.com