Reshine Display (HK) Technology Co., Limited

瑞翔顯示（香港）科技有限公司

产 品 规 格 书
Product Specification

产品名
Product　TFT -LCD Module

机种名
Model　RXL156070-A

Customer’ s Approve	
	Approved by Project Director : Name :　Date : Signature:
	Reviewed by Project manager: Name :　Date : Signature:
	Reviewed by Project Leader: Name :　Date : Signature:

※ 本基准书由封面、附件等全 20 页构成。如果对该规格书有异议，请在下订单前提出。

※ This Product Specification have20 pages including the coversheet and Appendices. Please negotiate the objection point before purchase order.

RECORDS OF REVISION

Model No. : RXL156070-A

DATE	NO.	REVISED No.	PAGE	SUMMARY	NOTE
2016/01/20	-	-	-	First Edition	Tentative
2016/03/18	1	1	14~17	Add EDID Table/Update optical characteristics	Version 01
2016/04/11	2	2	20~22	Update Packaging Condition and Reliability Test Items	Version 02
2016/09/12	3	3	14~17	Update EDID Product code/modify the chromaticity of R,G,B	Version 03

1. Application

This specification applies to a color TFT-LCD Module, RXL156070-A

2. Overview

This module is a color active matrix LCD module incorporating Oxide TFT (Thin Film Transistor).It is composed of a color TFT-LCD panel, driver ICs, a control circuit and power supply circuit. Graphics and texts can be displayed on a 1920×3×1080 dots panel with 262144 colors by using eDP (Embedded Display Port) Ver1.2 interface and supplying +3.3V DC supply voltage for TFT-LCD panel driving.

In this TFT-LCD panel, color filters for excellent color performance is incorporated to realize brighter and clearer pictures, making this Module optimum for use in multi-media applications.

Optimum viewings are in all directions.

9serial-4paralel LED structure.

Backlight-driving LED controller is built in this Module.

eDP transfer rate specification: 2.7Gbps/2 lane.

3. Generalspecifications.

Parameter	Specification	Unit	Note
Display size	394.38 (Diagonal)	mm	
	15.6 (Diagonal)	inch	
Active area	344.16(H) × 193.59(V)	mm	
Pixel Format	1920(H) × 1080(V) （1pixel = R + G + B dot）	pixel	
Pixel pitch	0.17925(H) x 0.17925 (V)	mm	
Pixel configuration	R, G, B vertical stripe	-	
Display mode	Normally black	-	
Driving scheme	FFS,IGZO TFT Active Matrix	-	
Power Consumption	3.1	W	[Note3-1]
Surface treatment of front polarizer	Anti-glarecoating: (3H)	-	

Outline dimensions

Parameter		Min.	Typ.	Max.	Unit	Remark
Unit outline dimensions	Width	359.2	359.5	359.8	mm	
	Height	223.25	223.75	224.25	mm	
	Depth	2.9	3.1	3.3	mm	[Note3-2]
Mass			TBD		g	

[Note 3-1] Typical

[Note 3-2]Including PWB

4. Input Terminals

4-1 Driving interfaceofPWB

CN1 (eDPsignals, +3.3V DC power supply and B/L power supply)

Pin No.	Symbol	I/O	Function	Remark
1	NC	-	Reserved for LCD	[Note4-1-1]
2	H_GND	P	High Speed Ground	[Note4-1-2]
3	Lane1_N	I	Complement Signal Link Lane 1	
4	Lane1_P	I	True Signal Link Lane 1	
5	H_GND	P	High Speed Ground	[Note4-1-2]
6	Lane0_N	I	Complement Signal Link Lane 0	
7	Lane0_P	I	True Signal Link Lane 0	
8	H_GND	P	High Speed Ground	[Note4-1-2]
9	AUX_CH_P	I	True Signal Auxiliary Channel	
10	AUX_CH_N	I	Complement Signal Auxiliary Channel	
11	H_GND	P	High Speed Ground	[Note4-1-2]
12	LCD_VCC	P	LCD logic and driver power(3.3V)	
13	LCD_VCC	P	LCD logic and driver power(3.3V)	
14	NC	I	Reserved for LCD manufacturer's use	[Note4-1-1]
15	LCD_GND	P	LCD logic and driver ground	
16	LCD_GND	P	LCD logic and driver ground	
17	HPD	O	HPD Signal	[Note4-1-3]
18	BL_GND	P	Backlight ground	
19	BL_GND	P	Backlight ground	
20	BL_GND	P	Backlight ground	
21	BL_GND	P	Backlight ground	
22	BL_ENABLE	I	Backlight on/off	[Note4-1-4]
23	BL_PWM_DIM	I	System PWM	[Note4-1-5]
24	NC	-	Reserved for LCD for manufacturer's use	[Note4-1-1]
25	NC	-	Reserved for LCD for manufacturer's use	[Note4-1-1]
26	BL_PWR	P	Backlight power	
27	BL_PWR	P	Backlight power	
28	BL_PWR	P	Backlight power	
29	BL_PWR	P	Backlight power	
30	NC	-	Reserved for LCD for manufacturer's use	[Note4-1-1]

*1 P: POWER I: Input O: Output

[Note 4-1-1] Don't input any signals or any powers into a NC pin. Keep the NC pin open.

[Note 4-1-2] The shielding case is connected with signal GND.

・Connector used :20455-030E-66 (I-PEX)

・Corresponding connector : 20453-030T (I-PEX)

(Panda is not responsible to its product quality, if the user applies a connector not corresponding to the above model.)

The equivalent circuit figure of the terminal.

[Note 4-1-3]

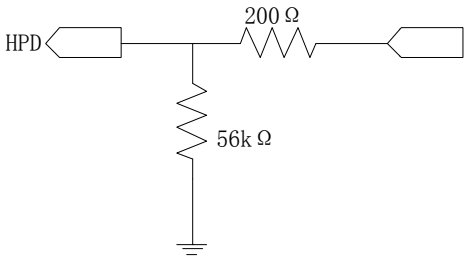


Fig.4-1-1 Equivalent circuit (Pin No.17)

[Note 4-1-4]

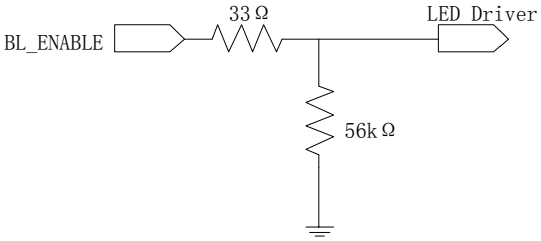


Fig.4-1-2Equivalent circuit (Pin No.22)

[Note 4-1-5]

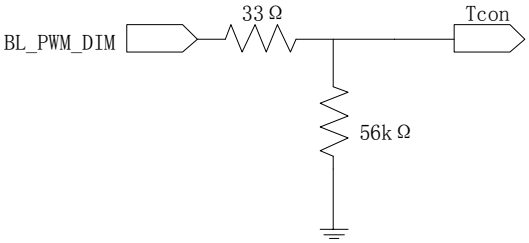
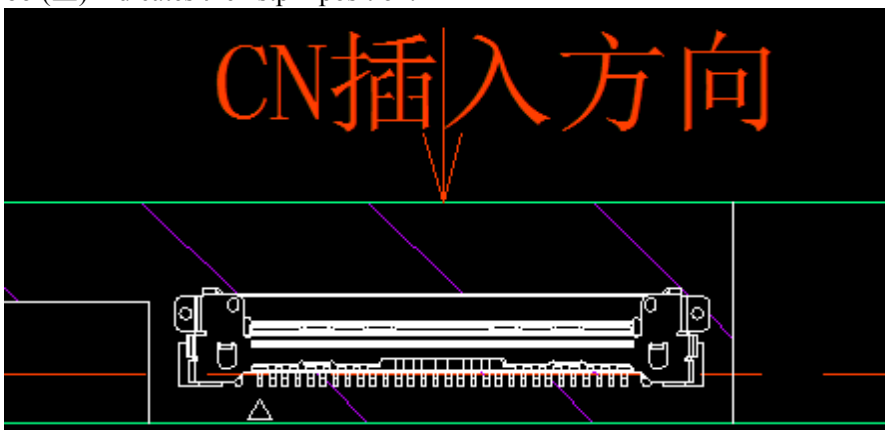


Fig.4-1-3 Equivalent circuit (Pin No.23)

4-2 CN1 pin 1 position

The triangle symbol(△) indicates the 1stpin position.



4-3 eDP interface

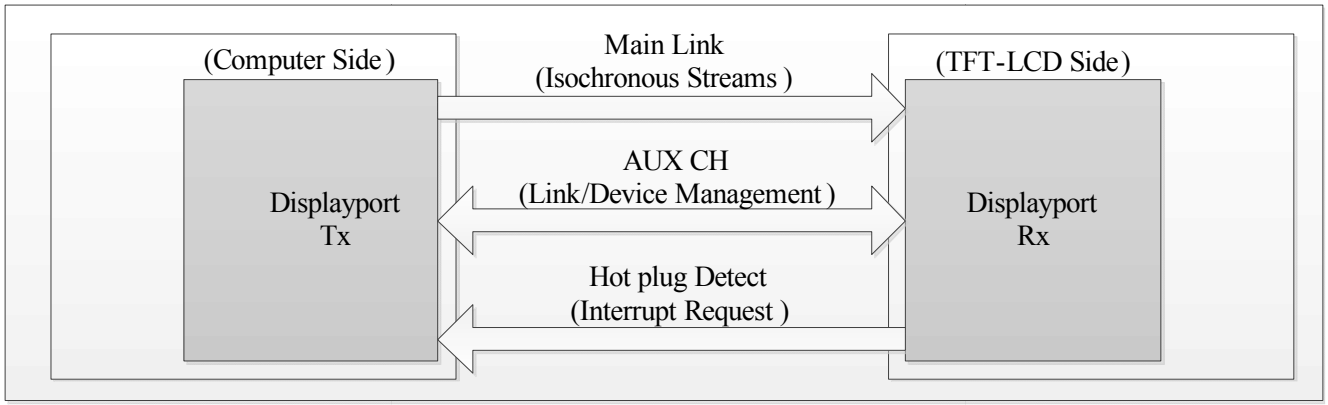


Fig.4-3-1 DP architect

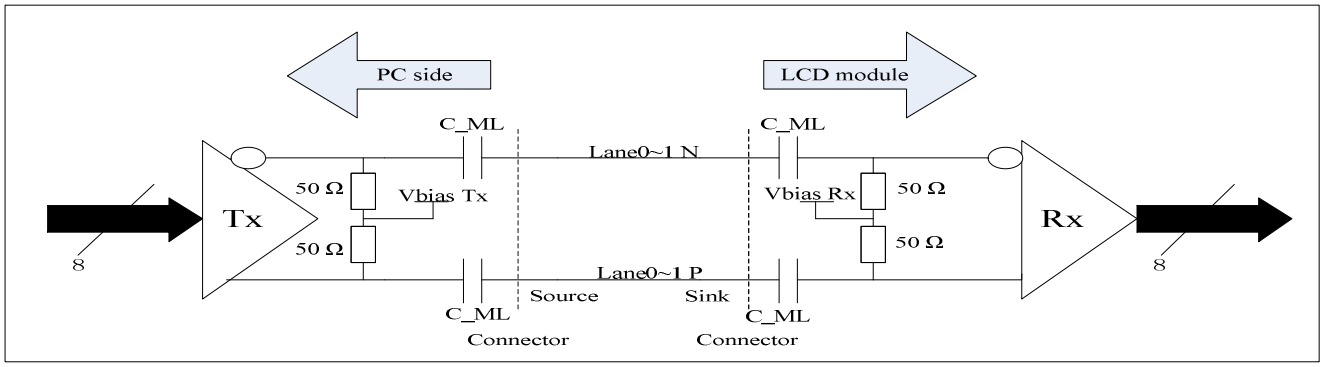


Fig.4-3-2 Main Link differential pair

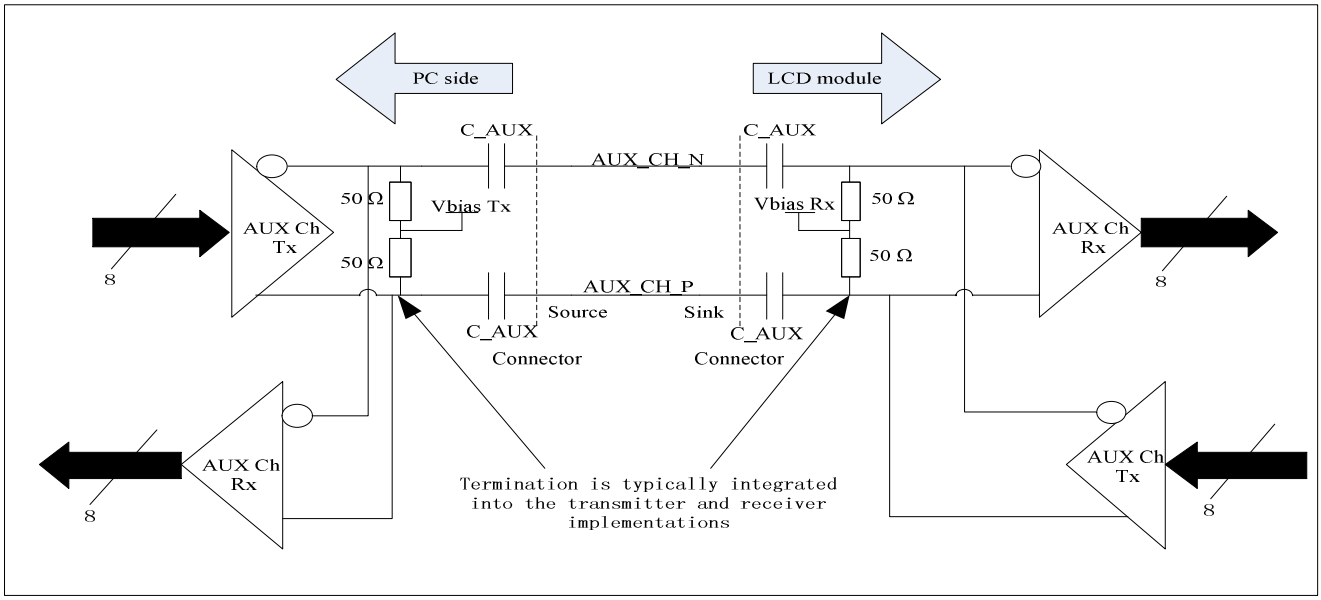


Fig.4-3-3 AUX Link differential pair

Lane0	Lane1
R0-5:0	R1-5:0
G0-5:0	G1-5:0
B0-5:0	B1-5:0
R2-5:0	R3-5:0
G2-5:0	G3-5:0
B2-5:0	B3-5:0
R4-5:0	R5-5:0
G4-5:0	G5-5:0
B4-5:0	B5-5:0

Fig.4-3-4 eDP 2lane 6bit input data mapping.

5. Electrical Characteristics

5-1. Absolute Maximum Ratings

Parameter	Symbol	Condition	Ratings		Unit	Remark
			Min.	Max.		
+3.3V supply voltage	VDD	Ta=25°C	-0.3	+4.0	V	
Back Light supply voltage	VBL	Ta=25°C	-0.3	+26.5	V	
Input voltage(eDP)	VI	Ta=25°C	-0.3	+1.5	V	[Note 5-1]
Input voltage(BL)	VBL_I	Ta=25°C	-0.3	VDD+0.3	V	[Note 5-2]
Operation temperature	TOPR	-	0	+50	°C	[Note 5-3]
Storage temperature	TSTG	-	-20	+60	°C	

(*) "*Absolute Maximum Ratings*" is regulations that do not exceed it even momentarily.

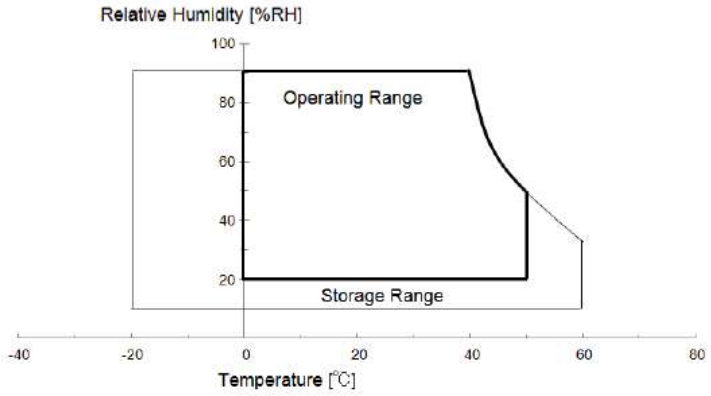
(*) Stress beyond those listed under "*Absolute Maximum Ratings*" may cause permanent damage to the device.

[Note 5-1] eDP signal

[Note 5-2]Backlight control signals(BL_ENABLE,BL_PWM_DIM)

[Note 5-3] Humidity: 90%RH Max.（Ta≦+40°C）.

Maximum wet-bulb temperature at +39°C or less at Ta>+40°C, No condensation.



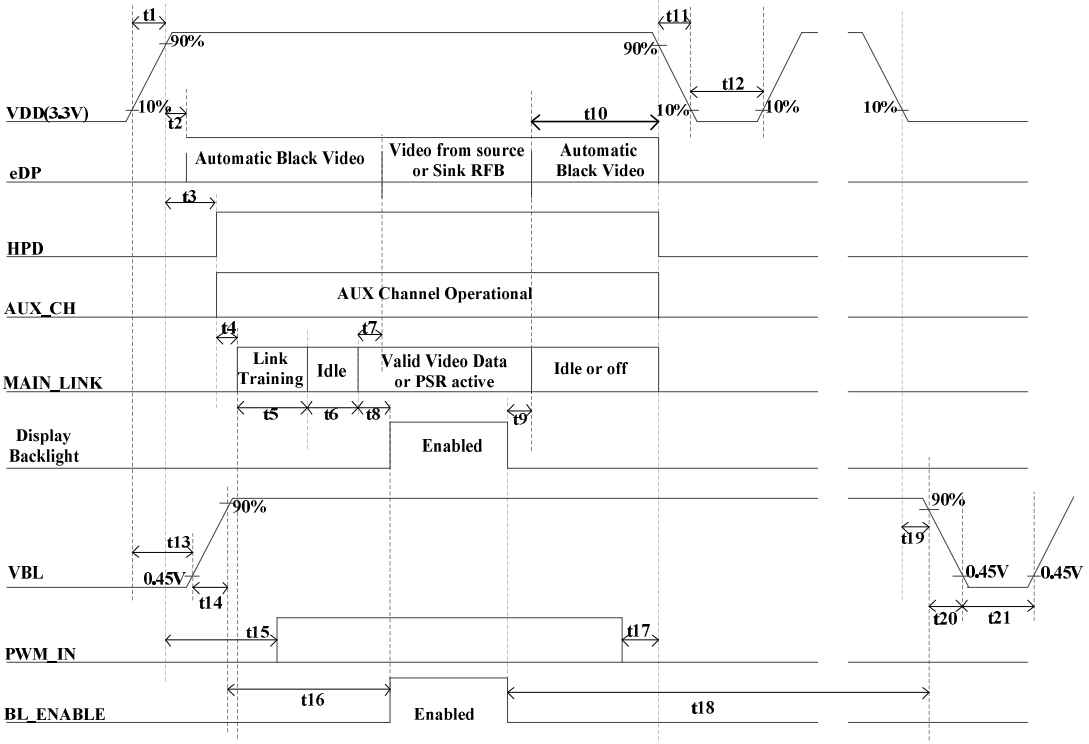
5-2. DC Characteristics

5-2-1. TFT-LCD panel driving

Ta＝+25±2℃

DC Electrical Characteristics						
Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
+3.3V supply voltage	VDD	+3.0	+3.3	+3.6	V	[Note 5-2-1]
Current dissipation	IDD	-	180	290	mA	[Note 5-2-2]
Permissible input ripple voltage	V_{RP}	-	-	100	mVp-p	VDD=+3.3V
eDP AUX Channel Characteristics						
Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
Unit Interval for AUX channel	UI_{AUX}	0.4	0.5	0.6	μS	
Peak-to-peak voltage at TP1	$V_{AUX-DIFF-pp}$	0.32	-	1.36	V	
AUX DC Common mode Voltage	$V_{AUX-DC-CM}$	0	-	2.0	V	
AUX Short current limit	I_{AUX_SHORT}	-	-	90	mA	
AUX CH terminationDCresistor	R_{AUX_TERM}	-	100	-	Ω	Differential input
AUX AC coupling capacitor	C_{AUX}	75	-	200	nF	
Number of pre-charge pulses	Pre-charge pulses	10	-	16		
eDP Main Link Receiver Characteristics						
Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
Link clock down spreading	Down_Spread_Amplitude	0		0.5	%	
Differential Peak-to-peak Input Voltage at Rx package pins	$V_{RX-DIFFp-p}$	90	-	1200	mV	
Differential Return Loss at 1.35GHz at Rx package pins	$RL_{RX-DIFF}$	9	-	-	dB	
Differential termination resistance	$R_{RX-TERM}$	-	100	-	Ω	
RX short circuit Current Limit	$I_{RX-SHORT}$	-	-	50	mA	
Lane Intra-pair Skew at RX package pins	$T_{RX-SKEW-INTRA-PAIR-High-Bit-Rate}$	-	-	50	ps	

[Note 5-2-1] ON-OFF conditions for supply voltage



[Note5-2-1] Do not keep the interface signal high-impedance or unusual signal when power is on.

Symbol	Min	Max	Unit	Note
t1	0.5	10	ms	
t2	0	200	ms	
t3	0	200	ms	
t4	-	-	ms	
t5	-	-	ms	
t6	-	-	ms	
t7	0	50	ms	
t8	-	-	ms	
t9	-	-	ms	
t10	0	500	ms	
t11	1	50	ms	[Note 5-2-3]
t12	500	-	ms	
t13	-	-	ms	
t14	0.5	10	ms	
t15	100	-	ms	
t16	0	-	ms	
t17	0	-	ms	
t18	-	-	ms	
t19	-	-	ms	
t20	0.1	-	ms	
t21	100	-	ms	

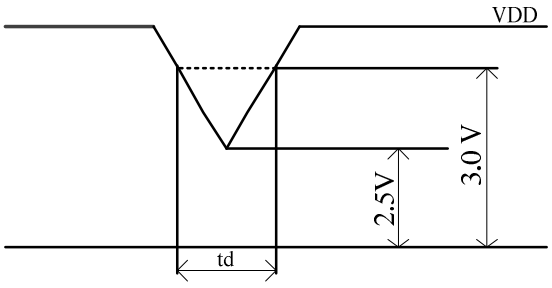
[Note 5-2-3]As for the power off sequence for VDD (t11), be sure to keep above mentioned timing.
If the VDD power off sequence timing is other than shown above, LCD may cause permanent damage.
As for the power sequence for backlight, it is recommended to apply above mentioned input timing.
If the backlight is light on and off at a timing other than shown above displaying image maybe getdisturbed.

VDD-dip-conditions

1) 2.5 V≦VDD＜3.0 V
td≦10 ms

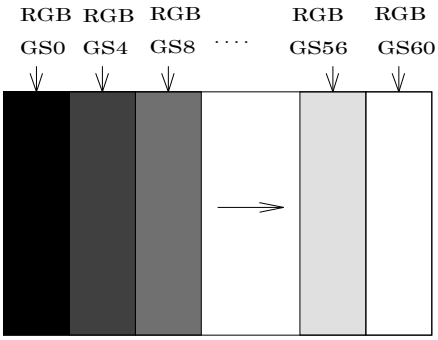
Under above condition, the display image should return to Anappropriate figure after VDD voltage recovers.

2) VDD＜2.5 V
VDD-dip conditions should also follow the ON-OFF conditions for supply voltage.

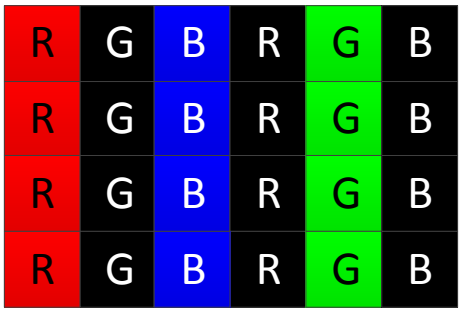


[Note 5-2-2]

Typical current condition: 16-gray-bar pattern.
VDD＝+3.3V



Maximum current condition: Vertical stripe pattern.
VDD＝+3.3V



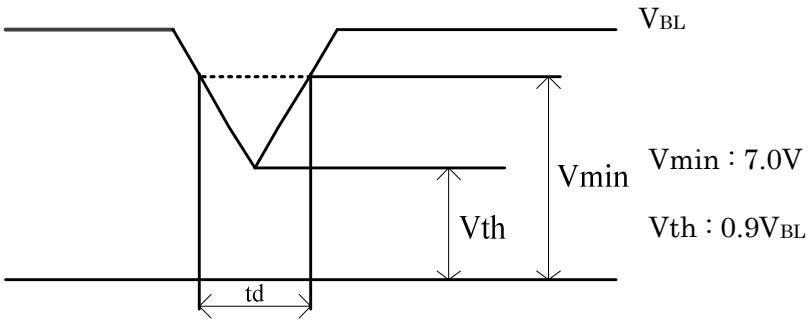
5-3. Backlight driving

The backlight system is an edge-lighting type with white-LED.
(It is usually required to measure under the following condition: Ta=25℃±2℃)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
Supply voltage	V_{BL}	7.0	12.0	21.0	V	
Current dissipation	I_{BL}	-	202	-	mA	V_{BL}=12.0V Duty Ratio =100%
Modulated light signal voltage	$V_{PWM}H$	1.85	-	VDD	V	
	$V_{PWM}L$	0	-	0.7	V	
Brightness Control Duty Ratio	Duty	1	-	100	%	[Note5-3-1]
Brightness Control pulse width	T_{PWM}	5	-	-	us	[Note5-3-2]
Brightness Control frequency	f_{PWM}	200	-	2000	Hz	
LED-BL ON/OFF High voltage	$V_{CNT}H$	1.3	-	VDD	V	[Note5-3-3]
LED-BL ON/OFF Low voltage	$V_{CNT}L$	0	-	0.5	V	
Input signal (H level) pin current	I_{IN}	-	-	V_{IN}/56KΩ	μA	BL_ENABLE, BL_PWM_DIM
LED lifetime	-	-	10000	-	h	LED

[Note5-3-1]V_{PWM} Input : 100%= Max luminance 1%= Min luminance
[Note5-3-2]The minimum value of the dimming signal pulse width is assumed regulations of the width of high and the width of low.
[Note5-3-3]V_{CNT} Input : High = BL turn on, Low or OPEN =BL turn off

VBL-dip conditions



Vmin：7.0V

Vth：0.9V_{BL}

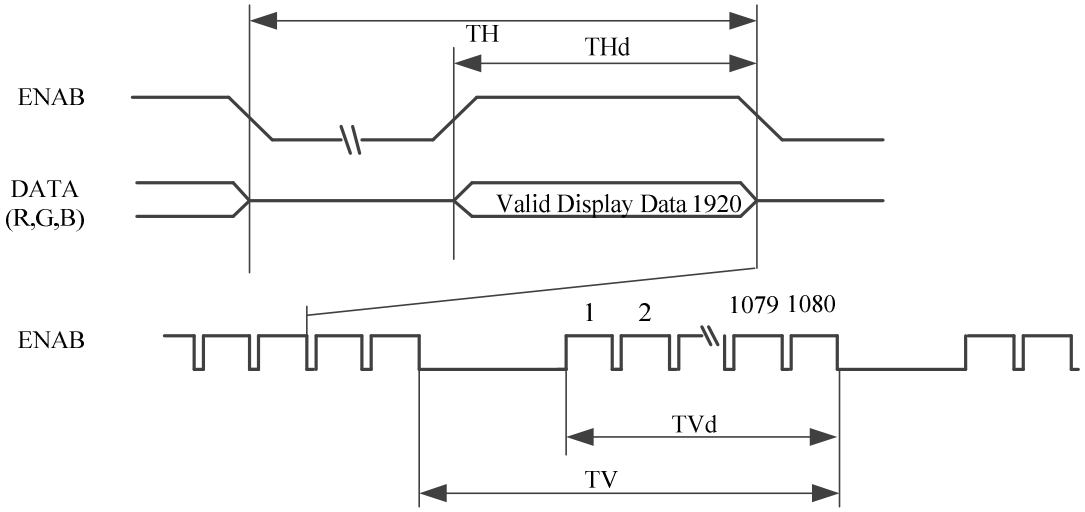
1) Vth≦V_{BL} ＜Vmin : td ≦20ms
2) V_{BL} ＜Vth : The condition of instantaneous voltage drop is apply to input voltage sequences

6. Timing characteristics of input signals

6-1.Timing Characteristics

Parameter		Symbol	Min.	Typ.	Max.	Unit	Remark
Clock	Frequency	$1/T_C$	142.0	148.5	150.0	MHz	[Note 6-1-1]
Data enable signal	Horizontal period	TH	2080	2200	2400	clock	
			-	14.815	-	μs	
	Horizontal period (High)	THd	-	1920	-	clock	
	Vertical period	TV	1090	1125	1200	line	
			-	16.667	-	ms	
	Vertical period (High)	TVd	–	1080	–	line	

[Note 6-1-1] In case of using the long vertical period, the deterioration of display quality, flicker, etc, may occur.



6-2. Input data signals and display position on the screen



Display position of input data(V·H)

7. Input signal, basic display colors and gray scale of each color

	Colors	Gray Scale	Data signal																	
			R0	R1	R2	R3	R4	R5	G0	G1	G2	G3	G4	G5	B0	B1	B2	B3	B4	B5
			LSB					MSB	LSB					MSB	LSB					MSB
Basic Color	Black	–	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Blue	–	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1
	Green	–	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
	Cyan	–	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1
	Red	–	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	Magenta	–	1	1	1	1	1	1	0	0	0	0	0	0	1	1	1	1	1	1
	Yellow	–	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0
	White	–	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Gray Scale of Red	Black	GS0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	⇧	GS1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Darker	GS2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	⇧	↓				↓					↓						↓			
	⇩	↓				↓					↓						↓			
	Brighter	GS61	1	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	⇩	GS62	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	Red	GS63	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
Gray Scale of Green	Black	GS0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	⇧	GS1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
	Darker	GS2	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
	⇧	↓				↓					↓						↓			
	⇩	↓				↓					↓						↓			
	Brighter	GS61	0	0	0	0	0	0	1	0	1	1	1	1	0	0	0	0	0	0
	⇩	GS62	0	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0
	Green	GS63	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
Gray Scale of Blue	Black	GS0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	⇧	GS1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
	Darker	GS2	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
	⇧	↓				↓					↓						↓			
	⇩	↓				↓					↓						↓			
	Brighter	GS61	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	1	1
	⇩	GS62	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
	Blue	GS63	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1

0: Low level voltage, 1: High level voltage.

Each basic color can be displayed in 64 gray scales from 6 bit data signals.
According to the combination of 18 bit data signals, the 262144color display can be achieved on the screen.

8 EDID Specifications

This is the EDID(Extended Display Identification Data) data formats to support displays as defined in the VESA Plug & Display.

Byte (decimal)	Byte (hex)	Field Name and Comments	Value (hex)	Value (binary)
0	00	Header	00	00000000
1	01	Header	FF	11111111
2	02	Header	FF	11111111
3	03	Header	FF	11111111
4	04	Header	FF	11111111
5	05	Header	FF	11111111
6	06	Header	FF	11111111
7	07	Header	00	00000000
8	08	EISA manufacture code =NCP	38	00111000
9	09	EISA manufacture code (Compressed ASCII)	70	01110000
10	0A	Product code (LM156LF1L02: 11)	0B	00001011
11	0B	Product code (hex,LSB first)	00	00000000
12	0C	LCD Serial No (fixed “0”)	00	00000000
13	0D	LCD No (fixed “0”)	00	00000000
14	0E	LCD No (fixed “0”)	00	00000000
15	0F	LCD No (fixed “0”)	00	00000000
16	10	Week of manufacture	00	00000000
17	11	Year of manufacture - 1990 (ex 2000 – 1990 = 10) 2016-1990 = 26	1A	00011010
18	12	EDID structure version # = 1	01	00000001
19	13	EDID revision # = 4	04	00000100
20	14	Video i/p definition = Digital 6bit DP support	95	10010101
21	15	Max H image size(cm) = 34cm	22	00100010
22	16	Max V image size(cm) = 19cm	13	00010011
23	17	Display gamma (2.2×100) – 100 = 120	78	01111000
24	18	Feature support(stanby,suspend,RGB color/Prefer Time)	06	00000110
25	19	Red/Green Low bit(RxRy/GxGy)	9A	10011010
26	1A	Blue/White Low bit(BxBy/WxWy)	85	10000101
27	1B	Red X(Rx) (written value 0.592)	97	10010111
28	1C	Red Y(Ry) (written value 0.360)	5C	01011100
29	1D	Green X(Gx) (written value 0.342)	57	01010111
30	1E	Green Y(Gy) (written value 0.557)	8E	10001110
31	1F	Blue X(Bx) (written value 0.158)	28	00101000
32	20	Blue Y(By) (written value 0.109)	1C	00011100
33	21	White X(Wx) (written value 0.313)	50	01010000
34	22	White Y(Wy) (written value 0.329)	54	01010100
35	23	Established timings 1	00	00000000
36	24	Established timings 2	00	00000000
37	25	Established timings 3(Manufacture’s reserved timing)	00	00000000
38	26	Standard timing ID1	01	00000001
39	27	Standard timing ID1	01	00000001
40	28	Standard timing ID2	01	00000001

41	29	Standard timing ID2	01	00000001
42	2A	Standard timing ID3	01	00000001
43	2B	Standard timing ID3	01	00000001
44	2C	Standard timing ID4	01	00000001
45	2D	Standard timing ID4	01	00000001
46	2E	Standard timing ID5	01	00000001
47	2F	Standard timing ID5	01	00000001
48	30	Standard timing ID6	01	00000001
49	31	Standard timing ID6	01	00000001
50	32	Standard timing ID7	01	00000001
51	33	Standard timing ID7	01	00000001
52	34	Standard timing ID8	01	00000001
53	35	Standard timing ID8	01	00000001
54	36	Detailed timing descriptor#1 fck/10000 (=148.5MHz/10000=14850=3A02h)	02	00000010
55	37	#1 fck	3A	00111010
56	38	#1 Horizontal active 1920=780h 80h	80	10000000
57	39	#1 Horizontal blanking 280=118h 18h	18	00011000
58	3A	#1 Horizontal active/Horizontal blanking 71h	71	01110001
59	3B	#1 Vertical active 1080=438h 38h	38	00111000
60	3C	#1 Vertical blanking 45=02DFh 2Dh	2D	00101101
61	3D	#1 Vertical active/Vertical blanking 40h	40	01000000
62	3E	#1 Horizontal sync , offset(Thfp) 88=058h 58h	58	01011000
63	3F	#1 Horizontal sync , width 44=02Ch 2Ch	2C	00101100
64	40	#1 Vertical sync,offset / Vertical sync,width (offset=4h/width=5h)	45	01000101
65	41	#1 Horizontal sync offset/width/Vertical sync offset/width	00	00000000
66	42	#1 Horizontal image size 344.16mm=158h 58h	58	01011000
67	43	#1 Vertical image size 193.59mm=0C2h C2h	C2	11000010
68	44	#1 Horizontal image size / Vertical image size 10h	10	00010000
69	45	Horizontal boader	00	00000000
70	46	Vertical boader	00	00000000
71	47	Flags(Non-interlaced=0/non 3D=00/Degital separate=11/Horizontal polarity/Vertical polarity=00)	18	00011000
72	48	Detailed timing descriptor#1 fck/10000 (=110.92224MHz/10000=11092.224=2B54h)	54	01010100
73	49	#2fck	2B	00101011
74	4A	#2 Horizontal active 1920=780h 80h	80	10000000
75	4B	#2 Horizontal blanking 280=118h 18h	18	00011000
76	4C	#2 Horizontal active/Horizontal blanking 71h	71	01110001
77	4D	#2 Vertical active 1080=438h 38h	38	00111000
78	4E	#2 Vertical blanking 45=02DFh 2Dh	2D	00101101
79	4F	#2 Vertical active/Vertical blanking 40h	40	01000000
80	50	#2 Horizontal sync , offset(Thfp) 88=058h 58h	58	01011000
81	51	#2 Horizontal sync , width 44=02Ch 2Ch	2C	00101100
82	52	#2 Vertical sync, offset / Vertical sync, width (offset=4h/width=5h)	45	01000101
83	53	#2 Horizontal sync offset/width/Vertical sync offset/width	00	00000000

84	54	#2 Horizontal image size 344.16mm=158h 58h	58	01011000
85	55	#2 Vertical image size 193.59mm=0C2h C2h	C2	11000010
86	56	#2 Horizontal image size / Vertical image size 10h	10	00010000
87	57	Horizontal boader	00	00000000
88	58	Vertical boader	00	00000000
89	59	Flags(Non-interlaced=0/non 3D=00/Degital separate=11/Horizontal polarity/Vertical polarity=00)	18	00011000
90	5A	Detailed timing descriptor #3	00	00000000
91	5B	Flag	00	00000000
92	5C	Reserved	00	00000000
93	5D	Dummy Descriptor	10	00010000
94	5E	Flag	00	00000000
95	5F	1st Dummy	00	00000000
96	60	2nd Dummy	00	00000000
97	61	3rd Dummy	00	00000000
98	62	4th Dummy	00	00000000
99	63	5th Dummy	00	00000000
100	64	6th Dummy	00	00000000
101	65	7th Dummy	00	00000000
102	66	8th Dummy	00	00000000
103	67	9th Dummy	00	00000000
104	68	10th Dummy	00	00000000
105	69	11th Dummy	00	00000000
106	6A	New line character #3 indicates end	00	00000000
107	6B	Padding with “blank” character	00	00000000
108	6C	Detailed timing descriptor #4	00	00000000
109	6D	Flag	00	00000000
110	6E	Reserved	00	00000000
111	6F	Display Product name	FC	11111100
112	70	Flag	00	00000000
113	71	Supplier P/N#1 (L)	4C	01001100
114	72	Supplier P/N#2 (M)	4D	01001101
115	73	Supplier P/N#3 (1)	31	00110001
116	74	Supplier P/N#4 (5)	35	00110101
117	75	Supplier P/N#5 (6)	36	00110110
118	76	Supplier P/N#6 (L)	4C	01001100
119	77	Supplier P/N#7 (F)	46	01000110
120	78	Supplier P/N#8 (1)	31	00110001
121	79	Supplier P/N#9 (L)	4C	01001100
122	7A	Supplier P/N#10 (0)	30	00110000
123	7B	Supplier P/N#11 (2)	32	00110010
124	7C	Supplier P/N#12 ("space")	0A	00001010
125	7D	(If<13 char, then terminate with ASCII code 0Ah,set remaining char 20h)	20	00100000
126	7E	Extension flag	00	00000000
127	7F	Checksum	F4	11110100

9 Optical characteristics

Ta=25°C

Parameter		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Viewing angle range	Horizontal	θ21	CR＞10	80	85	-	Deg.	[Note9-1,9-3,9-4,9-6]
		θ22		80	85	-		
	Vertical	θ11		80	85	-	Deg.	
		θ12		80	85	-	Deg.	
Contrast ratio		CR	θ=0 deg.	700	1000	-	-	[Note9-2,9-4,9-6]
Response time		$\tau_r+\tau_d$		-	25	35	ms	[Note9-1,9-5,9-6]
Chromaticity of white		x		0.283	0.313	0.343	-	[Note 9-2, 9-6] Normal operation (PWM Duty=100%)
		y		0.299	0.329	0.359	-	
Chromaticity of red		x		Typ. -0.03	0.592	Typ. +0.03	-	
		y			0.360		-	
Chromaticity of green		x			0.342		-	
		y			0.557		-	
Chromaticity of blue		x			0.158		-	
		y			0.109		-	
NTSC ratio		%		-	45	-	%	
Luminance of White		Y_{LI}		200	250	-	cd/m^2	[Note 9-7]
White uniformity 5pt				-	-	1.25		[Note 9-8]
White uniformity 13pt		δ_W	θ=0 deg.	-	-	1.5	-	[Note 9-2, 9-8]

※The optical characteristics shall be measured in a dark room or equivalent.
※Condition: PWM Duty = 100%
※

[Note 9-1] Measurement of viewing angle range
[Note 9-2] Measurement of luminance and
and Response time. Chromaticity and Contrast.

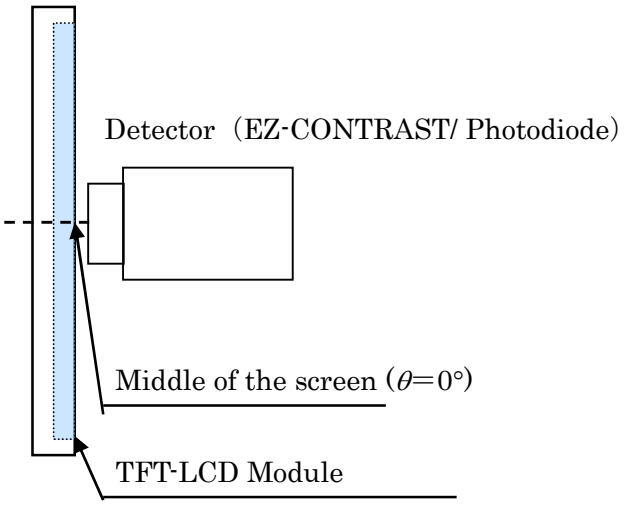


Fig.9-1 Measurement of Viewing angle range and Response time.
(Viewing angle range: EZ-CONTRAST, Response time: Photodiode)

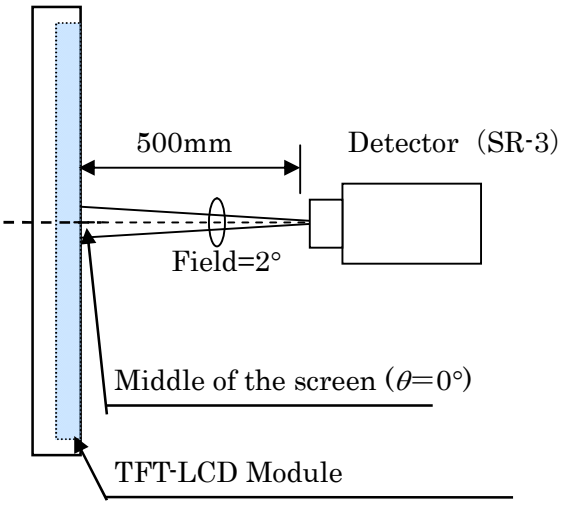


Fig.9-2 Measurement of Contrast, Luminance, Chromaticity, White variation, Crosstalk AndColor temperature variation.

[Note 9-3]Definitions of viewing angle range:

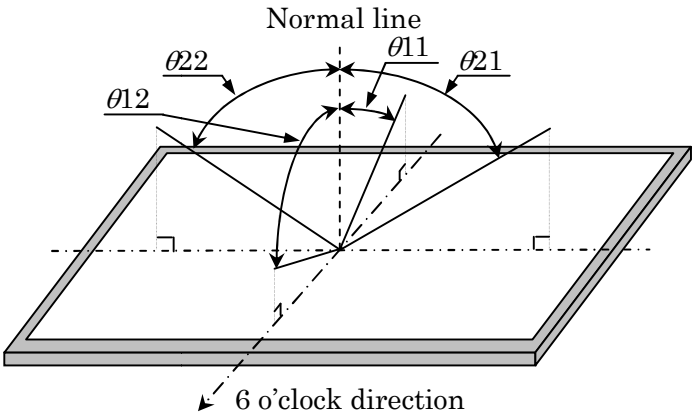


Fig.9-3 Viewing angle

[Note 9-4]Definition of contrast ratio:

The contrast ratio is defined as the following.

$$\text{Contrast Ratio} = \frac{\text{Luminance(Brightness) with all pixels white}}{\text{Luminance(Brightness) with all pixels Black}}$$

[Note 9-5]Definition of response time:

The response time is defined as the following figure and shall be measured by switching the input signal for "black" and "white" .

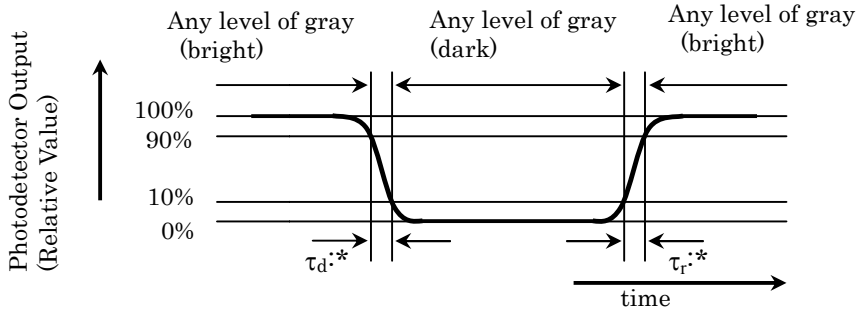


Fig.9-4 Response time

[Note 9-6] This shall be measured at center of the screen.

[Note 9-7] The Luminance of White is the average of 5 measurements(4,5,7,9,10) showing in the Fig.9-5.

[Note 9-8]Definition of white uniformity:

White uniformityof 5 points is defined as the following with 5 measurements(4,5,7,9,10).

$$\delta_{W1} = \frac{\text{Maximum Luminance of 5 Points(Brightness)}}{\text{Minimum Luminance of 5 Points(Brightness)}}$$

White uniformityof 13 points is defined as the following with 13measurements(1~13).

$$\delta_{W2} = \frac{\text{Maximum Luminance of 13 Points(Brightness)}}{\text{Minimum Luminance of 13 Points(Brightness)}}$$

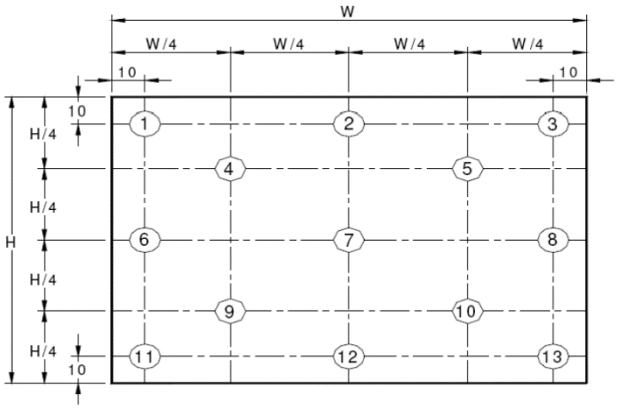


Fig.9-5

10 Display Quality

The display quality of the color TFT-LCD Module shall be in compliance with the Incoming Inspection Standard.

11 Handling Precautions

a) Be sure to turn off the power supply when inserting or disconnecting the cable.
Please insert for too much stress not to join a connector in the case of insertion of a connector.

b) Be sure to design the cabinet so that the Module can be installed without any extra stress such as warp or twist.

c) Since the front polarizer is easily damaged, pay attention not to scratch it.

d) Wipe off water drop immediately. Long contact with water may cause discoloration or spots.

e) When the panel surface is soiled, wipe it with absorbent cotton or other soft cloth.

f) Since the panel is made of glass, it may break or crack if dropped or bumped on hard surface. Handle with care.

g) Since CMOS LSI is used in this Module, take care of static electricity and injure the human earth when handling. Observe all other precautionary requirements in handling components.

h) This Open-cell has its circuitry PCBs on the side and should be handled carefully in order not to be stressed.

i) Laminate film is attached to the Module surface to prevent it from being scratched. Peel the laminate film off slowly just before the use with strict attention to electrostatic charges. Ionized air shall be blown over during the action. Blow off the 'dust' on the polarizer by using an ionized nitrogen gun, etc. Working under the following environments is desirable.

・All workers wear conductive shoes, conductive clothes, conductive fingerstalls and grounding belts without fail.

・Use Ionized blower for electrostatic removal, and peel of the laminate film with a constant speed. (Peeling of it at over 2 seconds)

j) The polarizer surface on the panel is treated with Anti Glare . In case of attaching protective board over the LCD, be careful about the optical interface fringe etc. which degrades display quality.

k) Do not expose the LCD Module to a direct sunlight, for a long period of time to protect the Module from the ultra violet ray.

l) When handling LCD Modules and assembling them into cabinets, please be noted that long-term storage in the environment of oxidization or deoxidization gas and the use of such materials as reagent, solvent, adhesive, resin, etc. which generate these gasses, may cause corrosion and discoloration of the Modules.

m) Liquid crystal contained in the panel may leak if the LCD is broken. Rinse it as soon as possible if it gets inside your eye or mouth by mistake.

n) Disassembling the Module can cause permanent damage and should be strictly avoided.
(Except for protection film of the panel.)

o) Be careful when using it for long time with fixed pattern display as it may cause afterimage.
(Please use a screen saver etc., in order to avoid an afterimage.)

p) If a minute particle enters in the Module and adheres to an optical material, it may cause display non-uniformity issue, etc. Therefore, fine-pitch filters have to be installed to cooling and inhalation hole if you intend to install a fan.

q) Epoxy resin (amine series curing agent), silicone adhesive material (dealcoholization series and oxime series),
tray forming agent (azo compound) etc, in the cabinet or the packing materials may induce abnormal display with polarizer film deterioration regardless of contact or noncontact to polarizer film.
Be sure to confirm the component of them.

r) Do not use polychloroprene. If you use it, there is some possibility of generating Cl_2 gas that influences the reliability of the connection between LCD panel and driver IC.

s) Do not put a laminate film on LCD Module, after peeling of the original one. If you put on it, it may cause discoloration or spots because of the occurrence of air gaps between the polarizer and the film.

t) Ground module bezel to stabilize against EMI and external noise.

12 Packaging Condition(TBD)

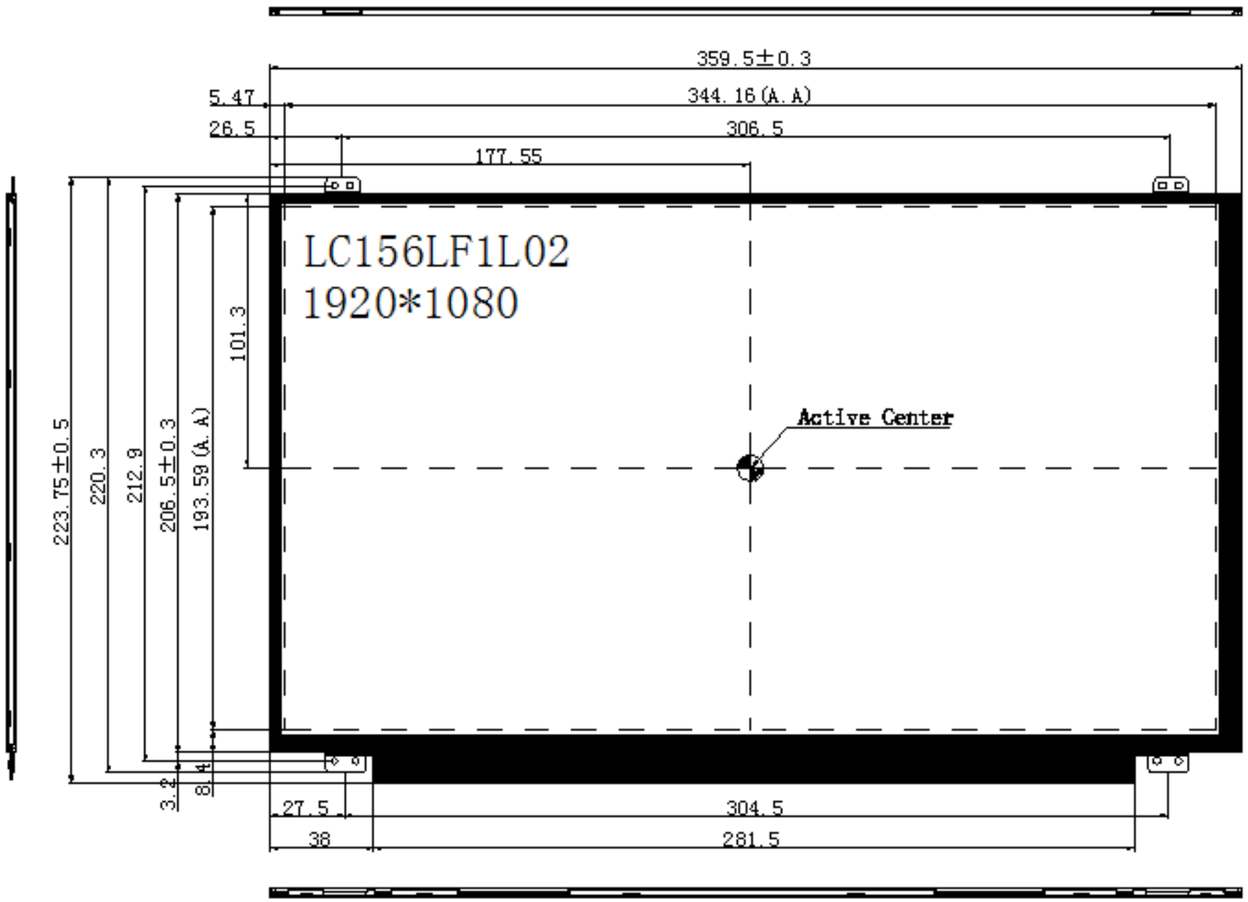
13 Label (TBD)
1) Module Bar code label:
TBD
2) Packing bar code label
TBD

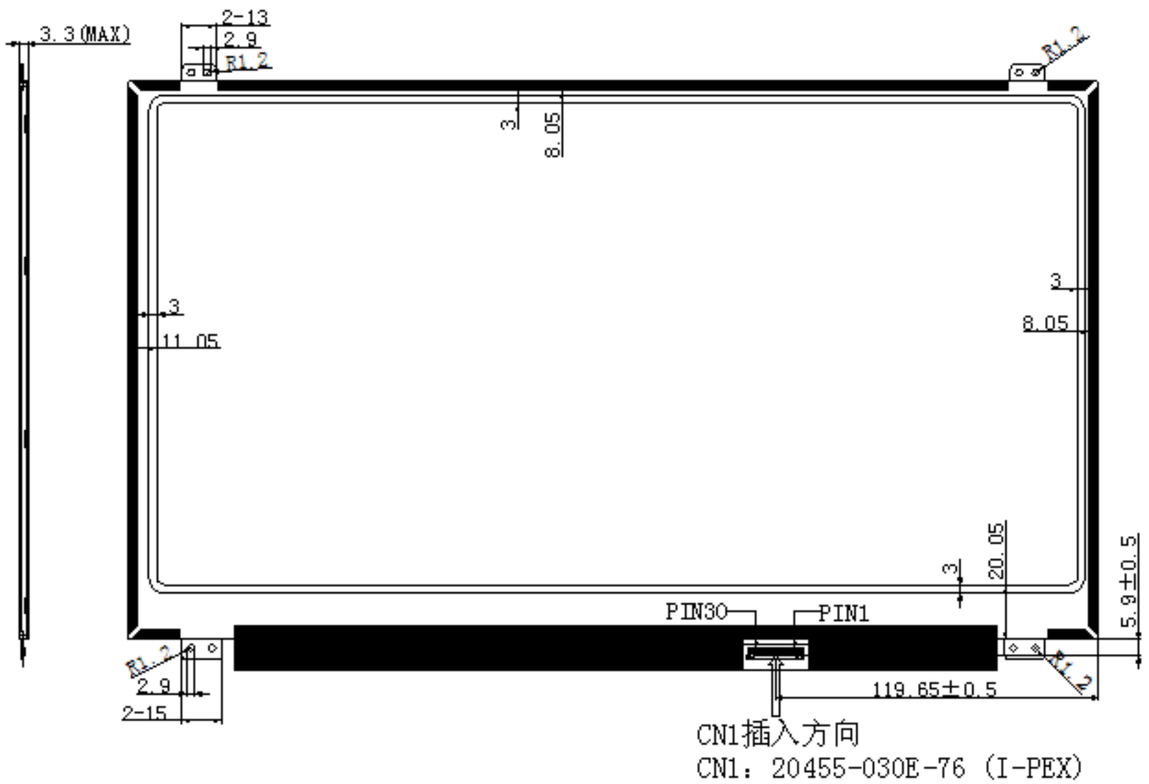
14 RoHS Directive
This LCD Module is compliant with RoHS Directive.

15 Reliability Test Items

No.	Test Item	Conditions
1	High temperature storage test	Ta=+60℃ 240h
2	Low temperature storage test Δ 3	Ta=-20℃ 240h
3	High temperature & high humidity operation test	Ta=+40℃95%RH 240h (No condensation)
4	High temperature operation test	Ta=+50℃ 240h
5	Low temperature operation test	Ta=0℃ 240h
6	Vibration test Δ 3 (non-operating)	Frequency:5~50Hz/ Vibration width：1.54mm :22~500Hz/ Acceleration: 12.25m/s^2 Sweep time:3minutes Test period:15 minutes for the direction of X 15 minutes for the direction of Y 1 hour for the direction ofZ (Total 1.5 hours)
7	Shock test Δ 3 (non- operating)	Max acceleration: 686m/s^2,Pulse width:11ms Max acceleration: 2352 m/s^2,Pulse width:2ms Half sine wave direction:±X，±Y，±Z Once for each direction
8	ESD Δ 3	150pF[330Ω] Panel center，Around the module:One time for each position <Contact: non-operation>±10KV <Contact: operation>±8KV <Air : non-operation>±20KV <Air : operation>±15KV

[Result Evaluation Criteria] Under the display quality test condition with normal operation state.
Do not change these condition as such changes may affect practical display function.
[Normal operation state] temperature：+ 15℃~ + 35℃，Humidity：45~75%，Atmospheric pressure：86~106kPa

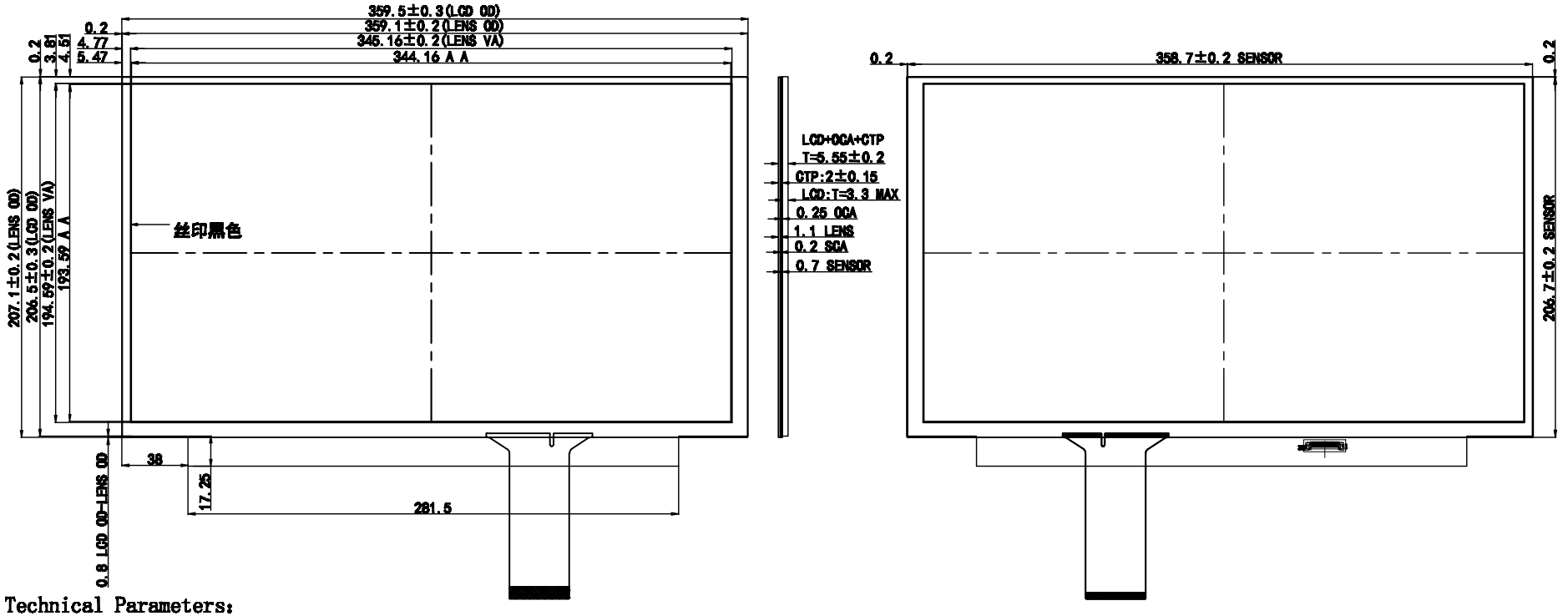

359.5±0.3
344.16(A.A)
306.5
177.55
5.47
26.5
LC156LF1L02
1920*1080
Active Center
101.3
223.75±0.5
220.3
212.9
206.5±0.3
193.59(A.A)
3.2
8.4
27.5
304.5
38
281.5


3.3(MAX)
2-13
2.9
R1.2
3
8.05
3
11.05
3
8.05
3
20.05
5.9±0.5
PIN30
PIN1
R1.2
2.9
2-15
R1.2
119.65±0.5
CN1插入方向
CN1：20455-030E-76（I-PEX）

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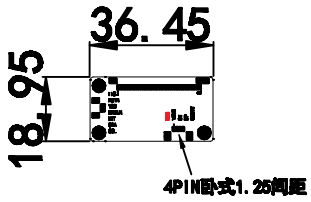
Rev	Nature of Madification	DATE
01	原始版本	2022-1-19

Front view　　Side view　　Back view



Technical Parameters:

1. Driver IC: ILI2511
2. Structure:Glass+Glass
3. Operating voltage: 2.8V-3.3 V;
   I2C communication voltage: 2.8V-3.3 V
4. Transparent rate: ≥80%
5. Surface hardness: ≥6H
6. Operating temperature: -20℃~+70℃, ≤90%RH
7. Storage temperature: -30℃~+80℃, ≤90%RH
8. Unmarked tolerance: ±0.3mm
9. Meet ROHS environmental requirements



SCALE: 1 : 1 NOT TO SCALE			Reshine Display (HK) Technology Co., Limited
PAGE: 1 OF 1			Tel:0755-29190292　Fax:0755-29190291
GENERAL TOL. 0.50mm		UNITS MM	
APPROVALS		DATE	MODEL NUMBER : RXG-GG156545A-1.0
APP:			CUSTOMER NO.:
CHK:	YANHAI	2022-1-19	DATE:
DWN:	LY	2022-1-19	

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