ADVANTECH

Enabling an Intelligent Planet

Technical White Paper

Mar 5th, 2012 Version 1.0

IDK-101R-44WSI1

Author: Jerry.Huang

E-mail: jerry2.huang@advatech.com

1 General Description and Features

10 inch is Amorphous-TFT-LCD (Thin Film Transistor Liquid Crystal Display) module. This module is composed of a 10" TFT-LCD panel, a driving circuit and backlight system. This TFT LCD has a 10 (17:10) inch diagonally measured active display area with WSVGA (1024 horizontal by 600 vertical pixel) resolution.

2 Physical specifications

Item	Specifications	unit
LCD size	10 inch (Diagonal)	
Resolution	1024 x 3(RGB) x 600	dot
Pixel pitch	0.21525(W) x 0.21525(H)	mm
Active area	220.42(W) x 129.15(H)	mm
Module size	235.0(W) x 145.8(H) x 6.3(D)	mm
Surface treatment	Antiglare, Hard-Coating (3H) with EWV film	
Color arrangement	RGB-stripe	
interface	LVDS	
Brightness	550(Typ.)	cd/m^2
Weight	330(Typ)	g

3. ABSOLUTE MAX. RATINGS

(GND = AVSS = 0V)

Item	Symbol	Values		UNIT	Note
		Min.	Max.		
Power voltage	VLED	-0.3	6.0	V	
	VDD	-0.3	6.0		
Operation temperature	TOP	-20	70	℃	
Storage temperature	TST	-30	80	℃	

4. Mechanical Information

Item		Min.	Typ.	Max.	UNIT
Module size	Horizontal	234.5	235	235.5	mm
	Vertical	145.3	145.8	146.3	mm
	Depth	-	6.3	6.6	mm

5 ELECTRICAL CHARACTERISTICS

5-1 Typical Operation Conditions

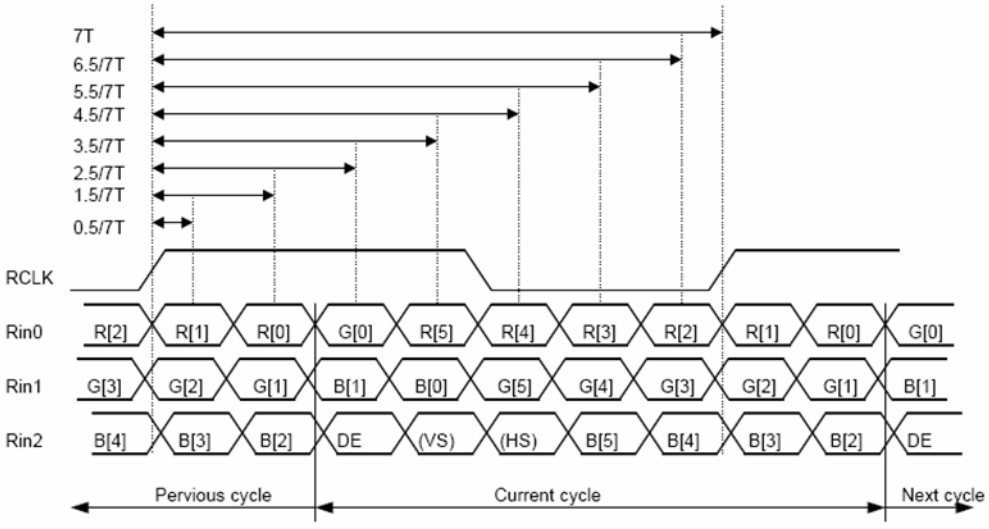
Item	Symbol	Values			UNIT	Note
		Min.	Typ.	Max.		
Power voltage	VDD	3.0	3.3	3.6	V	Note1
Current of power supply	IDD	-	0.3	-	A	VDD=3.3V Black pattern

Note 1: **VDD-dip condition:**
when 2.7V≦VDD<3.0V，td≦10ms.
VDD＞3.0V，VDD-dip condition should be same as VDD-turn-con Condition.

5-2 Switching Characteristics for LVDS Receiver

Item	Symbol	Min.	Typ.	Max.	Unit	Condition
Differential Input High Threshold	Vth	--	--	100	mV	VCM=1.2V
Differential Input Low Threshold	Vtl	-100	--	--	mV	
Input current	IIN	-10	--	+10	uA	
Differential input Voltage	|VID|	0.1	--	0.6	V	
Common Mode Voltage Offset	VCM	(|VID|/2)	1.25	1.8-0.4-(|VID|/2)	V	

5-3 Bit Mapping & Interface Definition



LVDS Receiver Input Timing Definition
for 6bits LVDS input

6. Optical Specifications

Item	Symbol	Condition	Values			Unit	Note
			Min.	Typ.	Max.		
Viewing angle	θL	(CR≧10)	60	70	--	degree	Note1 Note2
	θR		60	70	--		
	θU		40	50	--		
	θD		50	60	--		
Response time	TR	Normal θ=Φ=0°	--	5	7	msec	Note3
	TF		--	20	28	msec	
Contrast ratio	CR		400	500	--	--	Note2
Color chromaticity	WX		--	0.31	--	--	Note1 Note4
	WY		--	0.33	--	--	
Luminance	L		440	550	--	cd/m^2	Note4
Luminance uniformity	YU		70	--	--	%	Note5

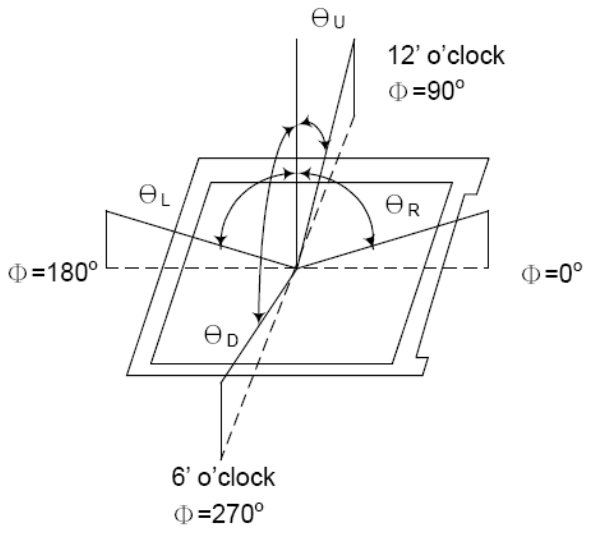
6.1 Measuring surrounding

- dark room
- LED current : IL=160mA
- Ambient temperature：25±2oC
- 15min. Warm-up time.

6.2 Measuring Equipment

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. (Response time is measured by Photo detector TOPCON BM-7 of view : 1° / Height : 120mm.)

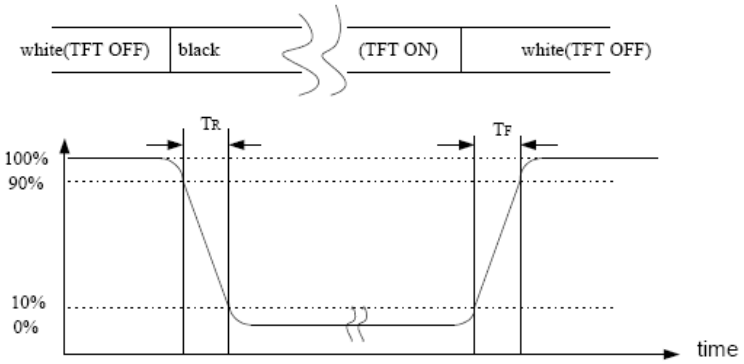
Note 1 : Definition of viewing angle range



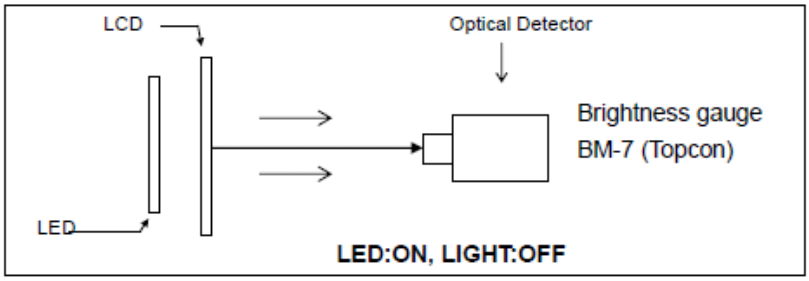
Note 2 : Definition of Contrast Ratio (CR) :
measured at the center point of panel

$$CR = \frac{\text{Luminance with all pixels white}}{\text{Luminance with all pixels black}}$$

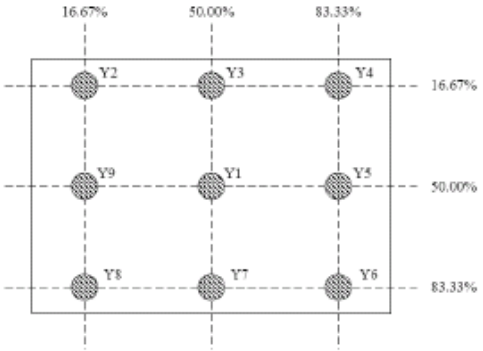
Note 3 : Definition of Response time : Sum of TR and T



Note 4 : Definition of optical measurement setup



Note 5 : Definition of brightness uniformity



$$\text{Luminance uniformity} = \frac{\text{(Min Luminance of 9 points)}}{\text{(Max Luminance of 9 points)}} \times 100\%$$

7. INTERFACE

7.1 TFT LCD Module

CN1 (Input signal): FI-XB30SL-HF10 (JAE or equivalent)

Pin No.	Symbol	Description	Note
1	GND	Ground	
2	VDD	3.3V Power	
3	VDD	3.3V Power	
4	V_EDID	3.3V Power for EDID	
5	NC	No connection	
6	CLK_EDID	EDID Clock Input	
7	DATA_EDID	EDID Data Input	
8	RXIN0-	LVDS Signal - channel0-	
9	RXIN0+	LVDS Signal+ channel0+	
10	GND	Ground	
11	RXIN1-	Data Input channel1-	
12	RXIN1+	Data Input channel1+	
13	GND	Ground	
14	RXIN2-	Data Input channel2-	
15	RXIN2+	Data Input channel2+	
16	GND	Ground	
17	RXCLKIN-	Data Input CLK-	
18	RXCLKIN+	Data Input CLK+	
19	GND	Ground	
20	NC	No connection	
21	NC	No connection	
22	GND	Ground	
23	GND	Ground	
24	NC	No connection	
25	NC	No connection	
26	NC	No connection	
27	NC	No connection	
28	NC	No connection	
29	NC	No connection	
30	NC	No connection	

CN2(LED backlight): BHSR-02VS-1 (JST or equivalent)

Pin No.	Symbol	Description	Note
1	A	Anode for LED backlight (+18.9V, 160mA)	
2	K	Cathode for LED backlight	

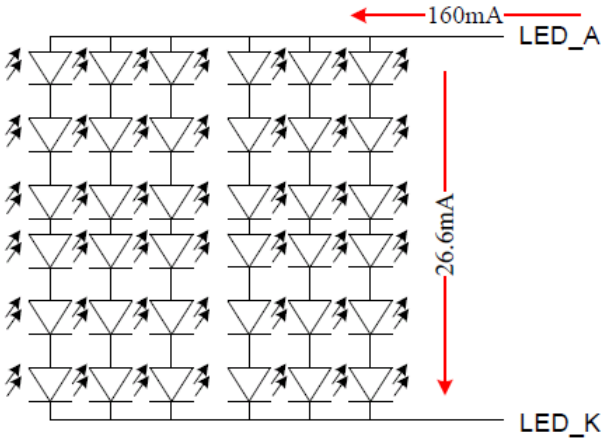
CN3(LED backlight Driver): FPHTI-104TTW000(Kingfont or equivalent)

Pin No.	Symbol	Description	Note
1	+12V	Voltage for LED circuit (+12V)	
2	LED_EN	LED BLU ON/OFF	
3	GND	Power ground	
4	PWM	Adjust the LED brightness by PWM	

8. Backlight Driving Conditions

ITEM	SYMBOL	MIN	TYP	MAX	UNIT	NOTE
LED Driver Power Voltage	V_{LED}	9	12	13	V	
LED Current	I_{LED}	--	160	--	mA	Note1
LED Life Time(MTBF)		--	50K	--	Hr	Note2
LED Driver Power Current	I_{+12V} (+12V)	-	360	--	mA	Ta=25℃

Note 1: There are 3 Groups LED shown as below , VLEDA-LEDK=18.9V ,Ta=25℃

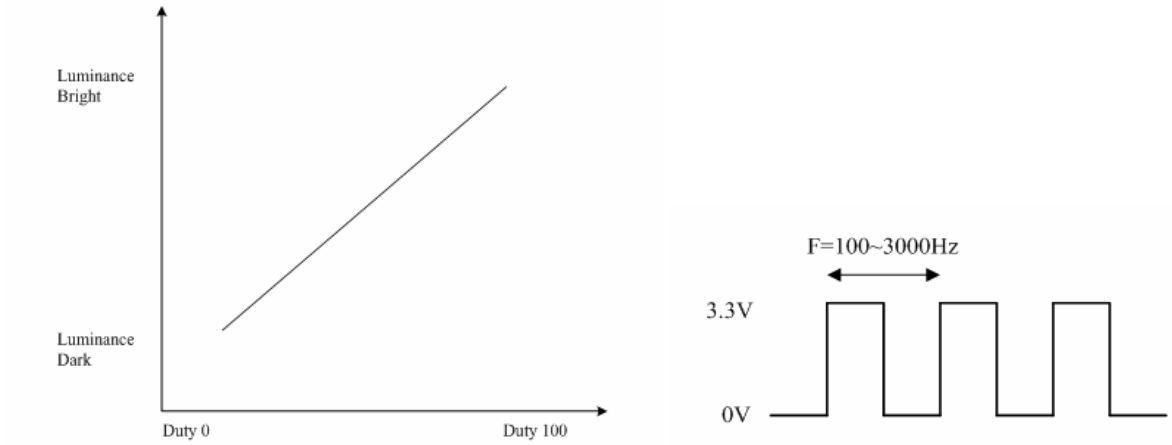


Note2: Condition: Ta=25℃, continuous lighting

Life time is estimated data. Definitions of failure:

1. LCM brightness becomes half of the minimum value.
2. LED doesn't light normally.

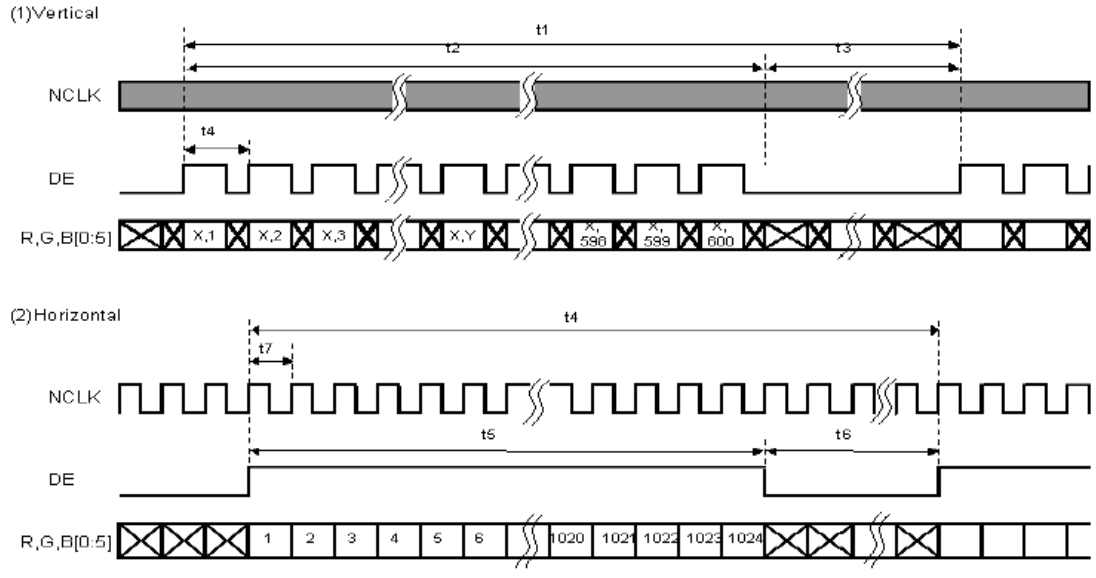
PWM Dimming Control



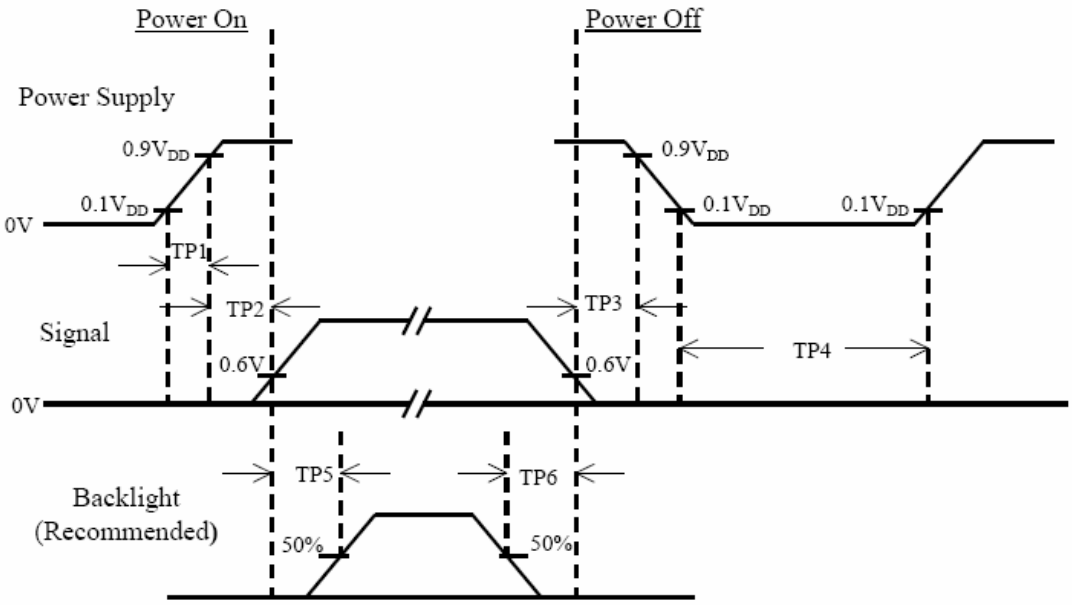
9. Interface Timing (DE mode)

Item	Symbol	Min.	Typ.	Max.	Unit
Frame Rate	--	55	60	65	Hz
Frame Period	t1	612	625	638	line
Vertical Display Time	t2	600	600	600	line
Vertical Blanking Time	t3	12	25	38	line
1 Line Scanning Time	t4	1160	1200	1240	clock
Horizontal Display Time	t5	1024	1024	1024	clock
Horizontal Blanking Time	t6	136	176	216	clock
Clock Rate	t7	39	45	51.42 €	MHz

Timing Diagram of Interface Signal (DE mode)



10. Power On/Off Sequence



Item	Min.	Typ.	Max.	Unit	Remark
TP1	0.5	--	10	msec	
TP2	0	--	50	msec	
TP3	0	--	50	msec	
TP4	500	--	--	msec	
TP5	200	--	--	msec	
TP6	200	--	--	msec	

Note：

(1) The supply voltage of the external system for the module input should be the same as the definition of VDD.

(2) Apply the lamp voltage within the LCD operation range. When the back-light turns on before the LCD operation or the LCD turns off before the back-light turns off, the display may momentarily become white.

(3) In case of VDD = off level, please keep the level of input signal on the low or keep a high impedance.

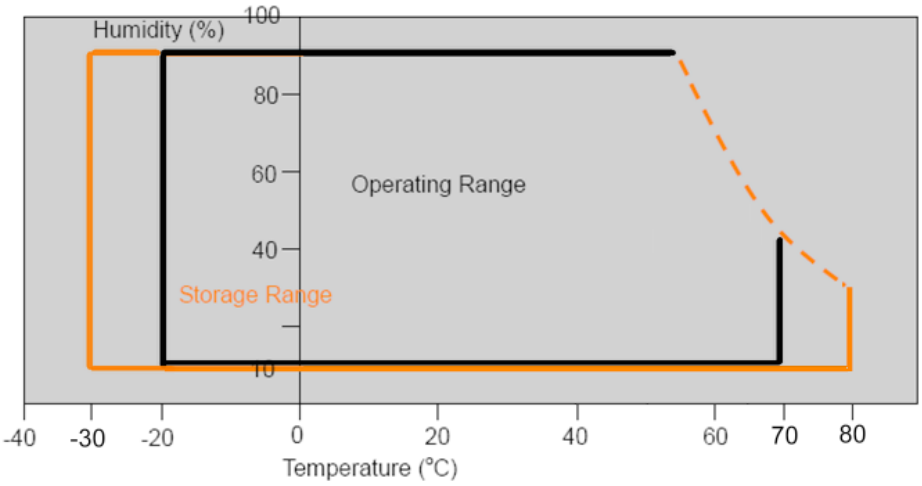
(4) TP4 should be measured after the module has been fully discharged between power off and on period.

(5) Interface signal shall not be kept at high impedance when the power is on.

11. RELIABILITY TEST CONDITIONS

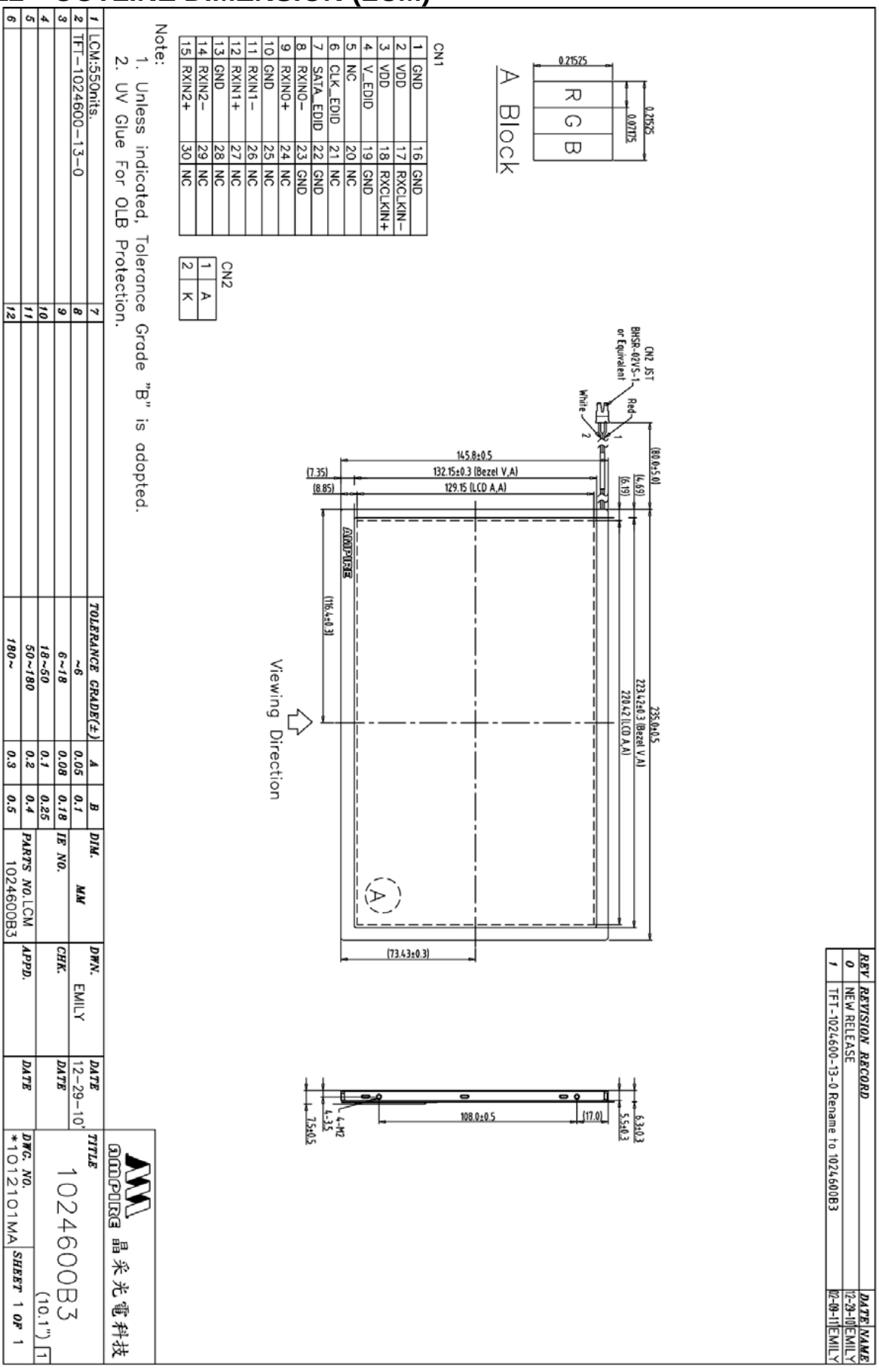
Item	Test Conditions	Note
High Temperature Storage	Ta = 80℃ 240 hrs	
Low Temperature Storage	Ta = -30℃ 240 hrs	
High Temperature Operation	Ts = 70℃ 240 hrs	
Low Temperature Operation	Ta = -20℃ 240 hrs	
Thermal Shock	-30℃ /30 min ~ +80℃ /30 min 100 cycles	

Storage / Operating temperature



Note . Max wet bulb temp.=39oC

12 OUTLINE DIMENSION (LCM)



CN1			
1	GND	16	GND
2	VDD	17	RXCLKIN−
3	VDD	18	RXCLKIN+
4	V_EDID	19	GND
5	NC	20	NC
6	CLK_EDID	21	NC
7	SATA_EDID	22	GND
8	RXIN0−	23	GND
9	RXIN0+	24	NC
10	GND	25	NC
11	RXIN1−	26	NC
12	RXIN1+	27	NC
13	GND	28	NC
14	RXIN2−	29	NC
15	RXIN2+	30	NC

CN2	
1	A
2	K

REV	REVISION RECORD	DATE	NAME
0	NEW RELEASE	12-29-10	EMILY
1	TFT-1024600-13-0 Rename to 1024600B3	02-08-11	EMILY

				TOLERANCE GRADE(±)	A	B	DIM.	DWN.	DATE
LCM:550nits.				~6	0.05	0.1	MM	EMILY	12-29-10
TFT-1024600-13-0				6~18	0.08	0.18	IE NO.	CHK.	DATE
				18~50	0.1	0.25			
				50~180	0.2	0.4	PARTS NO.LCM	APPD.	DATE
				180~	0.3	0.5	1024600B3		

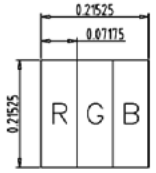
晶采光電科技 CMO

TITLE: 1024600B3 (10.1") T

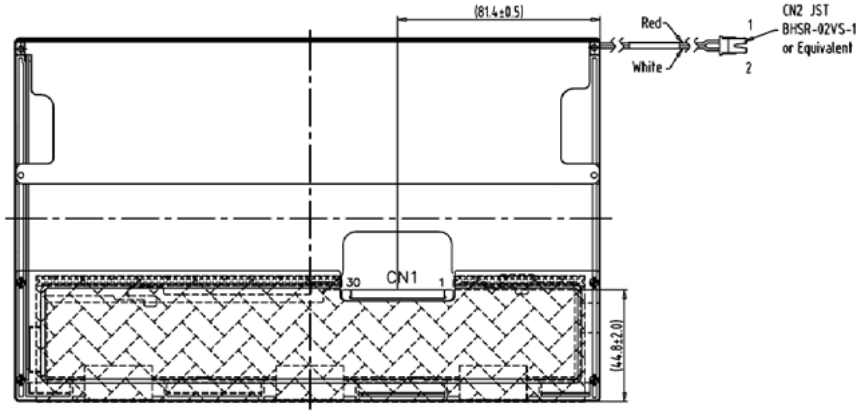
DWG. NO. *1012101MA

SHEET 1 OF 1

REV	REVISION RECORD	DATE	NAME
0	NEW RELEASE	12-29-10	EMILY
1	TFT-1024600-13-0 Rename to 1024600B3	02-09-11	EMILY



A Block



Back View

CN1

1	GND	16	GND
2	VDD	17	RXCLKIN−
3	VDD	18	RXCLKIN+
4	V_EDID	19	GND
5	NC	20	NC
6	CLK_EDID	21	NC
7	SATA_EDID	22	GND
8	RXIN0−	23	GND
9	RXIN0+	24	NC
10	GND	25	NC
11	RXIN1−	26	NC
12	RXIN1+	27	NC
13	GND	28	NC
14	RXIN2−	29	NC
15	RXIN2+	30	NC

CN2

1	A
2	K

Note:
1. Unless indicated, Tolerance Grade "B" is adopted.
2. UV Glue For OLB Protection.

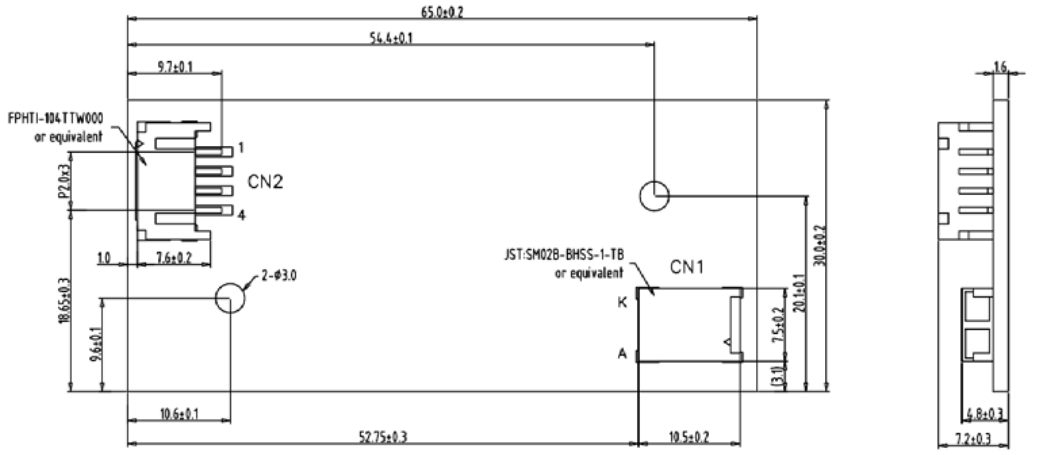
				TOLERANCE GRADE(±)	A	B
1	LCM:550nits.	7		~6	0.05	0.1
2	TFT-1024600-13-0	8		6~18	0.08	0.18
3		9		18~50	0.1	0.25
4		10		50~180	0.2	0.4
5		11		180~	0.3	0.5
6		12				

DIM. MM	DWN. EMILY	DATE 12-29-10'	TITLE 1024600B3 (10.1") 1
IE NO.	CHK.	DATE	
PARTS NO. LCM-1024600B3	APPD.	DATE	DWG. NO. *1012102MA SHEET 1 OF 1

晶采光電科技

OUTLINE DIMENSION (LED driver)

REV	REVISION RECORD	DATE	NAME
0	NEW RELEASE	01-07-11	EMILY
1	TFT-1024600-13-0 Rename to 1024600B3	02-09-11	EMILY



LED Driver Board

1	+12V
2	+12V
3	GND
4	DIMM

Note:

1. Unless indicated, Tolerance Grade "B" is adopted.
2. UV Glue For OLB Protection.

				TOLERANCE GRADE(±)	A	B	DIM.	DWN.	DATE	TITLE
1	TFT-1024600-13-0	7					MM	EMILY	01-07-11	1024600B3 (10.1") 1
2		8		~6	0.05	0.1	IE NO.	CHK.	DATE	
3		9		6~18	0.08	0.18				
4		10		18~50	0.1	0.25				
5		11		50~180	0.2	0.4	PARTS NO. LCM-2 1024600B3	APPD.	DATE	DWG. NO. *110117SA SHEET 1 OF 1
6		12		180~	0.3	0.5				

ampire 晶采光電科技

14. EDID TABLE

Byte# (Decimal)	Byte# (HEX)	Field Name & Comments	Value (HEX)	Value (BIN)	Value (DEC)
0	0	Header	00	00000000	0
1	1	Header	FF	11111111	255
2	2	Header	FF	11111111	255
3	3	Header	FF	11111111	255
4	4	Header	FF	11111111	255
5	5	Header	FF	11111111	255
6	6	Header	FF	11111111	255
7	7	Header	00	00000000	0
8	8	EISA Manufacture Code LSB (3 character ID = HSD)	22	00100010	34
9	9	Compressed ASCII	64	01100100	100
10	0A	Product Code "1001"	E9	11101001	233
11	0B	Hex, LSB first	03	00000011	3
12	0C	LCD module Serial No - Preferred but Optional	00	00000000	0
13	0D	LCD module Serial No - Preferred but Optional	00	00000000	0
14	0E	LCD module Serial No – Preferred but Optional	00	00000000	0
15	0F	LCD module Serial No – Preferred but Optional	00	00000000	0
16	10	Week of manufacture=18	12	00010010	18
17	11	Year of manufacture = 2008	12	00010010	18
18	12	EDID Structure Version # = 1	01	00000001	1
19	13	EDID revision # = 3	03	00000011	3
20	14	Video input definition = Digital input, CRGB	80	10000000	128
21	15	Max H image size = 22cm	16	00010110	22
22	16	Max V image size = 13cm	0D	00001101	13
23	17	Display Gamma = 2.2	78	01111000	120
24	18	Feature support (DPMS) = Active off, RGB color	0A	00001010	10
25	19	Red/green low bits (10000110)	86	10000110	134
26	1A	Blue/white low bits (00100110)	26	00100110	38
27	1B	Red x , Red x = 0.58	94	10010100	148
28	1C	Red y , Red y = 0.34	57	01010111	87
29	1D	Green x , Green x = 0.317	51	01010001	81
30	1E	Green y , Green y = 0.564	90	10010000	144
31	1F	Blue x , Blue x = 0.152	27	00100111	39

Byte# (Decimal)	Byte# (HEX)	Field Name & Comments	Value (HEX)	Value (BIN)	Value (DEC)
32	20	Blue y , Blue y = 0.131	21	00100001	33
33	21	White x , White x = 0.31	4F	01001111	79
34	22	White y , White y = 0.33	54	01010100	84
35	23	Established timing 1	00	00000000	0
36	24	Established timing 2	00	00000000	0
37	25	Manufacturer's timings	00	00000000	0
38	26	Standard timing #1 was not used	01	00000001	1
39	27		01	00000001	1
40	28	Standard timing #2 was not used	01	00000001	1
41	29		01	00000001	1
42	2A	Standard timing #3 was not used	01	00000001	1
43	2B		01	00000001	1
44	2C	Standard timing #4 was not used	01	00000001	1
45	2D		01	00000001	1
46	2E	Standard timing #5 was not used	01	00000001	1
47	2F		01	00000001	1
48	30	Standard timing #6 was not used	01	00000001	1
49	31		01	00000001	1
50	32	Standard timing #7 was not used	01	00000001	1
51	33		01	00000001	1
52	34	Standard timing #8 was not used	01	00000001	1
53	35		01	00000001	1
54	36	Detailed timing/monitor (descriptor #1)	94	10010100	148
55	37	1024x600 @60Hz: Pixel Clock = 45 MHz	11	00010001	17
56	38	Horizontal active=1024 pixels (L8b)	00	00000000	0
57	39	Horizontal blanking= 176 pixels (L8b)	B0	10110000	176
58	3A	HA (U4b): HB (U4b)	40	01010000	64
59	3B	Vertical active=600 lines (L8b)	58	01011000	88
60	3C	Vertical blanking= 25 lines (L8b)	19	00011001	25
61	3D	HA (U4b): HB (U4b)	20	00100000	32
62	3E	H sync. Offset= 53 pixels	35	00110101	53
63	3F	H sync. Width= 35 pixels	23	00100011	35

Byte# (Decimal)	Byte# (HEX)	Field Name & Comments	Value (HEX)	Value (BIN)	Value (DEC)
64	40	V sync. Offset= 4 lines	45	01000101	69
65	41	V sync. Width= 5 lines	00	00000000	0
66	42	H image size = 220 mm (L8b)	DC	11011100	220
67	43	V image size = 129 mm (L8b)	81	10000001	129
68	44	Horizontal Image (U4b): Vertical Image (U4b)	00	00000000	0
69	45	No Horizontal Border=0	00	00000000	0
70	46	No Vertical Border=0	00	00000000	0
71	47	Non-interlaced, Normal display, No stereo, Digital separate sync, H/V pol Negatives	19	00011000	25
72	48	Detailed timing/monitor (descriptor #2)	16	00010110	22
73	49	1024x600 @65Hz: Pixel Clock = 51.42 MHz	14	00010100	20
74	4A	Horizontal active=1024 pixels (L8b)	00	00000000	0
75	4B	Horizontal blanking=216pixels (L8b)	D8	11011000	216
76	4C	HA (U4b): HB (U4b)	40	01000000	64
77	4D	Vertical active=600 lines (L8b)	58	01011000	88
78	4E	Vertical blanking= 38 lines (L8b)	26	00100110	38
79	4F	HA (U4b): HB (U4b)	20	00100000	32
80	50	H sync. Offset= 93 pixels	5D	01011101	93
81	51	H sync. Width= 35 pixels	23	00100011	35
82	52	V sync. Offset= 17lines	15	00010101	21
83	53	V sync. Width=5 lines	04	00000100	4
84	54	H image size = 220 mm (L8b)	DC	11011100	220
85	55	V image size = 129 mm (L8b)	81	10000001	129
86	56	Horizontal Image (U4b): Vertical Image (U4b)	00	00000000	0
87	57	No Horizontal Border=0	00	00000000	0
88	58	No Vertical Border=0	00	00000000	0
89	59	EDID Module revision	00	00000000	0
90	5A	Flag	00	00000000	0
91	5B	Flag	00	00000000	0
92	5C	Flag	00	00000000	0
93	5D	Dummy Descriptor	FE	11111110	254
94	5E	Flag	00	00000000	0
95	5F	PC Maker P/N 1st Character =M	00	00000000	0

Byte# (Decimal)	Byte# (HEX)	Field Name & Comments	Value (HEX)	Value (BIN)	Value (DEC)
96	60	PC Maker P/N 2nd Character =3	00	00000000	0
97	61	PC Maker P/N 3rd Character =4	00	00000000	0
98	62	PC Maker P/N 4th Character =9	00	00000000	0
99	63	PC Maker P/N 5th Character =5	00	00000000	0
100	64	LCD Supplier EEDID Revision # =1.0	00	0000000	0
101	65	Manufacturer P/N = 1	00	00000000	0
102	66	Manufacturer P/N = 5	00	00000000	0
103	67	Manufacturer P/N = P	00	00000000	0
104	68	Manufacturer P/N = X	00	00000000	0
105	69	Manufacturer P/N = 1	00	00000000	0
106	6A	Manufacturer P/N = 4	00	00000000	0
107	6B	Manufacturer P/N(If <13char, then terminate with ASCII code, set remaining=20h)	00	00000000	0
108	6C	Flag	00	00000000	0
109	6D	Flag	00	00000000	0
110	6E	Flag	00	00000000	0
111	6F	Data Type Tag	FE	11111110	254
112	70	Flag	00	00000000	0
113	71	SMBUS Value = 20 nit	00	00000000	0
114	72	SMBUS Value = 28 nit	00	00000000	0
115	73	SMBUS Value = 40 nit	00	00000000	0
116	74	SMBUS Value = 56 nit	00	00000000	0
117	75	SMBUS Value = 79 nit	00	00000000	0
118	76	SMBUS Value = 111 nit	00	00000000	0
119	77	SMBUS Value = 156 nit	00	00000000	0
120	78	SMBUS Value = max nit	00	00000000	0
121	79	Number of LVDS channels=1	01	00000001	1
122	7A	Panel Self Test (00-Not Present, 01-Present)	00	00000000	0
123	7B	(If<13 char, then terminate with ASCII code 0Ah,set remaining char=20h)	00	00000000	0
124	7C	(If<13 char, then terminate with ASCII code 0Ah,set remaining char=20h)	00	00000000	0
125	7D	(If<13 char, then terminate with ASCII code 0Ah,set remaining char=20h)	00	00000000	0
126	7E	Extension Flag = 00	00	00000000	0
127	7F	Checksum	C8	11001000	200