TV080WUM-NX2 Product Specification

BUYER	
SUPPLIER	HEFEI BOE Optoelectronics Technology CO., LTD
FG-Code	**TV080WUM-NX2**

ITEM	BUYER SIGNATURE	DATE

ITEM	SUPPLIER SIGNATURE	DATE
Prepared		
Reviewed		
Approved		

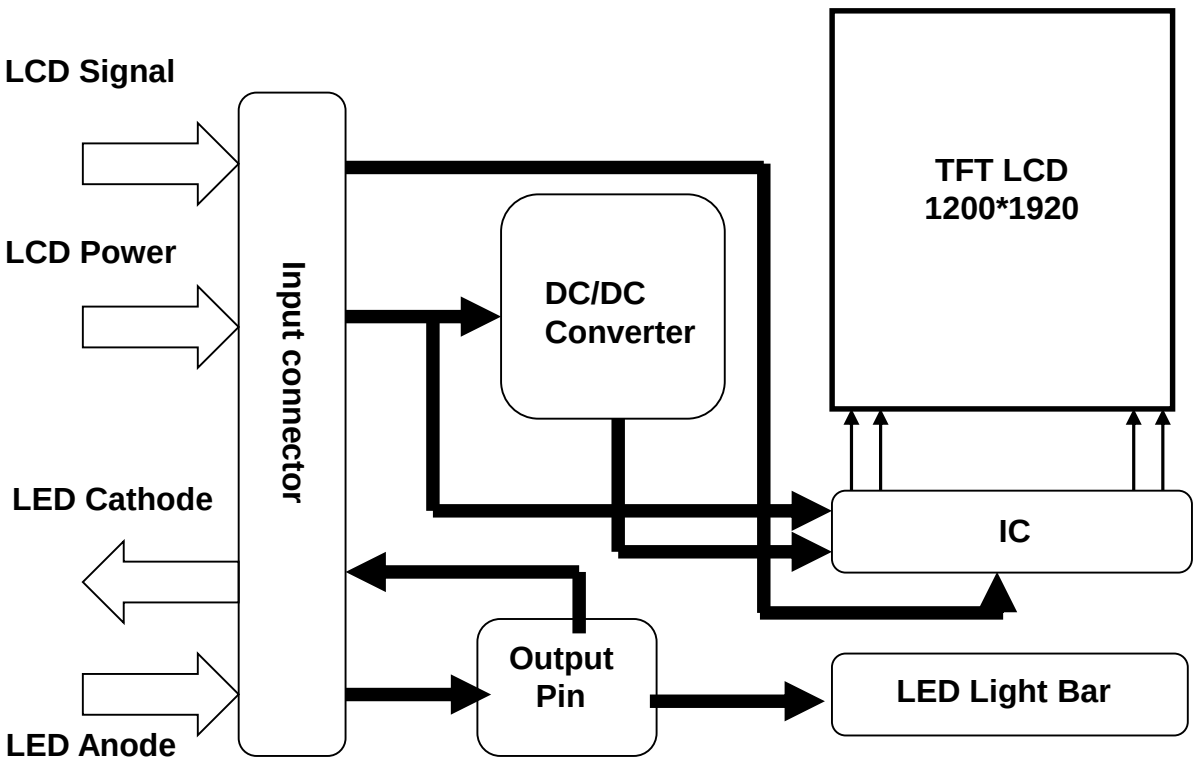
HEFEI BOE OPTOELECTRONICS TECHNOLOGY

REV.	ECN NO.	DESCRIPTION OF CHANGES	DATE	PREPARED
1.0	-	P0 Release	2018.03.15	Chen Jie
2.0	-	1.Update Key Part List @page 6 2.Update Pin Assignments @page 10 1.Update power sequence @page15 2.Update initial code @page 17	2018.03.15	Chen Jie
3.0	-	1. Update Led current 2. Update LCM Display Module Dra wing	2018.03.26	Chen Jie
4.0	-	1.Update initial code 2.Update BLU drawing 3.Update key part list	2018.05.25	Chen Jie

Contents

1.0. GENERAL DESCRIPTION

Block Diagram



Features

TV080WUM-NX2 is 8” color TFT-LCD (Thin Film Transistor Liquid Crystal Display) module composed of LCD panel, MIPI driver ICs, control circuit and backlight. By applying 8 bit digital data, 1200*RGB*1920,
16.7M-color images are displayed on the 8” diagonal screen

1.1 General Specifications

Parameter	Specification	Unit	Remarks
Screen Size	8	Inch	
Active Area	107.64*172.224	mm	
Panel Size	111.64*180.274	mm	
Outline Dimension	113.14*182.424	mm	±0.15
Display Resolution	1200*RGB*1920	pixel	
Pixel Pitch	29.9*89.7	um	
Display Method	a-Si	-	
Display Mode	Normal Black	-	
Display Color	16.7M	-	
Color Gamut	Typ. 70.8% , Min. 65%	%	NTSC
Luminance	Typ. 435 , Min. 370	nit	Center Value
Contrast Ratio	Typ. 1200:1 , Min. 800:1	-	
Viewing Angle	85/85/85/85(CR>10)	-	Single Center Point
Pol Surface Treatment	HC	-	
Weight	Max. 95	g	
D-IC	NT51021	-	2ea
Inversion Method	Colum	-	
LED Q'ty	24	ea	
Power Consumption	500+1757	mw	Logic + Back light

1.2 Key Part List

	item	Supplier	Spec/Size	Remark
Cell	TFT Glass	Corning	1850*1500*0.5T	mm
	C/F Glass	Corning	1850*1500*0.5T	mm
	Upper Pol	Sumitomo	109.64*174.72*0.097mm	HC
	Lower Pol	Sumitomo	109.64*174.07*0.108mm	APF
	Liquid Crystal	Merck	BOE-F029	
	Sealant	Sekisui	S-MA11	
Circuit	S-IC	NOVATEK	NT51021	
	FPC	T-more	30.4*19.13*0.07mm	
	PCB	Tripod	88.87*13mm, 4layer	
	POWER IC	新相微	NVP1137	
	MIPI CNT	IPEX	20655-045E-01	
	TP CNT	HRS	FH34S-6S-0.5SH(50)	
BLU	Curtain tape	综研	SK-7850BL	
	Up Dif Up Prism Lower Prism	Soulbrain	LF32-PTA185-D21	
	Down Diffuser	SKC	CH19NU	
	LGP	佳宏	PMMA注塑	
	Back Cover	永镫	SUS304	
	Reflector	三菱	Lumirex II R20-100	
	LED	聚飞	3006 silicate	

2.0 ABSOLUTE MAXIMUM RATINGS

The followings are maximum values which, if exceed, may cause faulty operation or damage the unit. The operational and non-operational maximum voltage and current values are listed in the following table .

Parameter	Symbol	Min.	Max.	Unit	Remarks
Logic Power Supply Voltage	VDD3V3	-0.3	5.5	V	Note1
LED Forward Current of every LED string	I_{LED}	-	25	mA	Note2
LED string Reverse Voltage	V_R	-	25.6	V	3.2V*8
Operating Temperature	T_{OP}	-20	+60	℃	Note3
Storage Temperature	T_{ST}	-30	+80	℃	

Notes : 1. Permanent damage to the device may occur if maximum values are exceeded functional operation should be restricted to the condition described under normal operating conditions.

2. the max value of LED forward current is relative to ambient temperature,the correlation is show in figure 1.

3. Temperature and relative humidity range are shown in the figure below.
95 % RH Max. (40 ℃ ≥ Ta)
Maximum wet - bulb temperature at 39 OC or less. (Ta > 40 OC) No condensation.

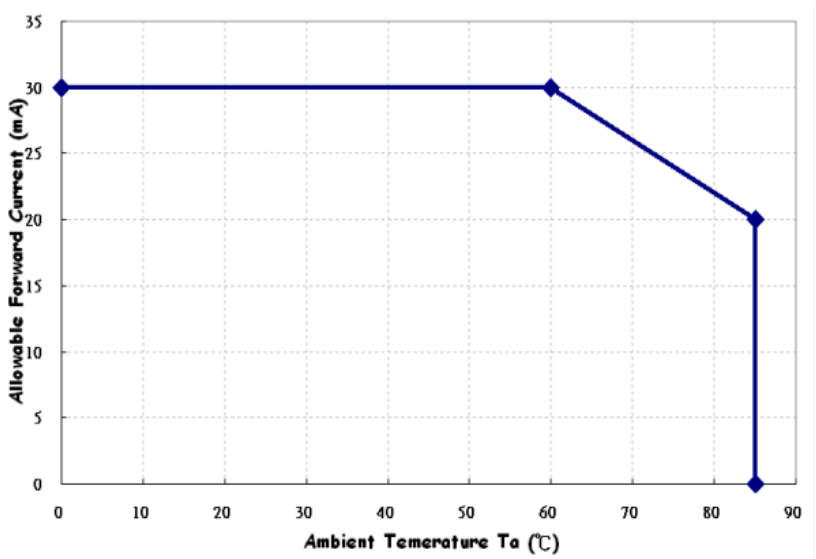


Figure 1. forward current vs ambient temperature

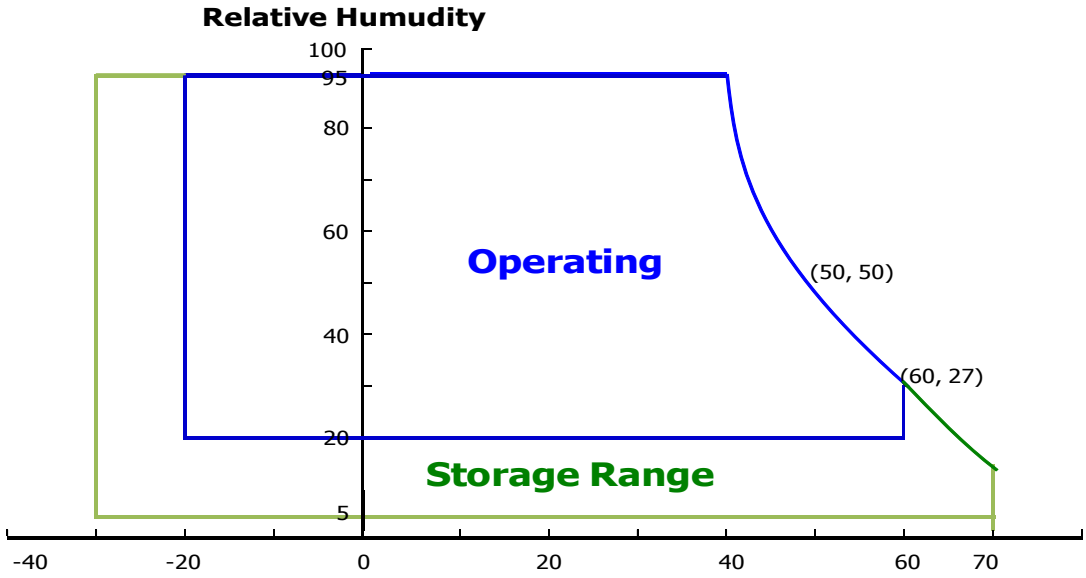


Figure 2. Operation temperature vs. Humidity

[Ta =25±2 ℃]

3.0 Electrical Specifications

3.1 TFT LCD Module

Parameter	Symbol	Values			Unit	Notes
		Min	Typ.	Max		
Power Supply Input Voltage	V_{DD}	3.0	3.3	3.6	V	@white (L255 pattern)
Power Supply Current	I_{DD}	-	151.5	166.7	mA	
LED Forward Voltage of every LED string	V_{LED}	-	24.4	25.6	V	8 series 3 parallels
LED Forward Current of every LED string	I_{LED}	-	24	25	mA	
Power Consumption	P_D	-	0.5	0.55	W	@white (L255 pattern)
	P_{BL}	-	1.757	1.920	W	
	P_{Total}	-	2.257	2.470	W	@white (L255 pattern)

3.2 BACK LIGHT UNIT

The edge-lighting type of back light unit consists of 24 LEDs which is connected in serial.

Table 3.1 Electrical Characteristics Of Back Light Unit

Parameter	Symbol	Values			Units	Notes
		Min	Typ.	Max		
LED Current	I_{LED}	-	24	25	mA	
LED Forward Voltage	V_{LED}	2.7	3.05	3.2	V	

3-2-1 LED Rank

Luminance Rank : typ. 9.5Lm

3.3. LCD INTERFACE CONNECTIONS

Interface Connector: IPEX 20655-045E-01 is used for the module electronics interface.

<Table 3.2. Pin Assignments for the Interface Connector>

Terminal	Symbol	Functions
1	GND	Ground
2	FB3	LED Current FB3
3	FB2	LED Current FB2
4	FB1	LED Current FB1
5	NC	NC
6	VLED	LED Power
7	VLED	LED Power
8	VLED	LED Power
9	NC	NC
10	CTP_VDD(3.0V)	TP Power supply
11	CTP_RST(1.8V)	Reset signal for TP
12	CTP_INT(1.8V)	Interrupt signal for TP
13	CTP_SDA(1.8V)	I2C date signal for TP
14	CTP_SCL(1.8V)	I2C Clk signal for TP
15	CTP_GND	Ground
16	NC/VPP	NC
17	NC	NC
18	VDD(3.3V)	LCD Power supply
19	VDD(3.3V)	LCD Power supply
20	VDD(3.3V)	LCD Power supply

<Table 3.2. Pin Assignments for the Interface Connector>

Terminal	Symbol	Functions
21	GND	Ground
22	D0_P	MIPI Positive data signal (+)
23	D0_N	MIPI Negative data signal (-)
24	GND	Ground
25	D1_P	MIPI Positive data signal (+)
26	D1_N	MIPI Negative data signal (-)
27	GND	Ground
28	CLK_P	MIPI Positive clock signal (+)
29	CLK_N	MIPI Negative clock signal (-)
30	GND	Ground
31	D2_P	MIPI Positive data signal (+)
32	D2_N	MIPI Negative data signal (-)
33	GND	Ground
34	D3_P	MIPI Positive data signal (+)
35	D3_N	MIPI Negative data signal (-)
36	GND	Ground
37	NC/BIST(3.3V)	NC
38	LCD_RESET(3.3V)	Reset signal for LCM
39	LCD_ID0	ID PIN
40	LCD_ID1	ID PIN
41	NC/TP_SYNC(3.3V)	NC
42	I2C_SDA(3.3V)	I2C date signal for LCM
43	I2C_SCL(3.3V)	I2C Clk signal for LCM
44	PWMOUT(3.3V)	PWM OUT
45	GND	Ground

4.0. SIGNAL TIMING SPECIFICATIONS

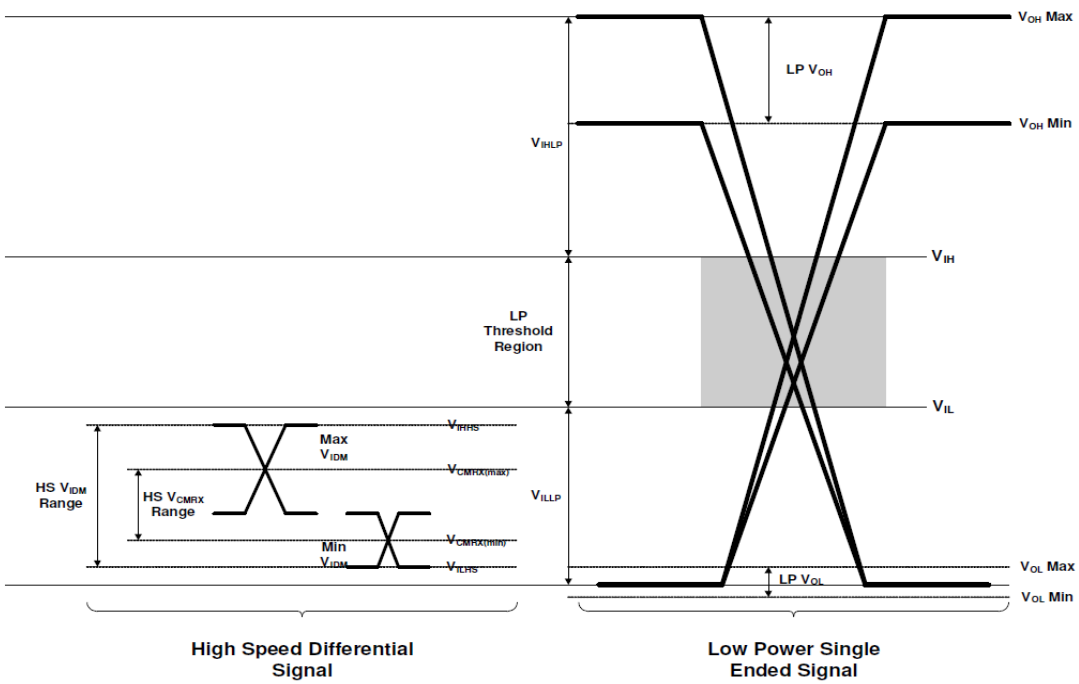
ITEM			SYNBOL	min	typ	max	UNIT
LCD	Frame Rate		-	-	60	-	Hz
	Pixels Rate		-	156.8	156.8	159.9	MHz
Timing	DCLK	Frequency	fCLK	490	490	498	MHz
		Period	Tclk	2.01	2.04	2.04	ns
	Horizontal	Horizontal total time	tHP	1343	1343	1366	t_{CLK}
		Horizontal Active time	tHadr		1200		t_{CLK}
		Horizontal Pulse Width	tHsync	1	1	1	t_{CLK}
		Horizontal Back Porch	tHBP	32	32	32	t_{CLK}
		Horizontal Front Porch	tHFP	110	110	133	t_{CLK}
	Vertical	Vertical total time	tvp	1946	1946	1951	t_H
		Vertical Active time	tVadr		1920		t_H
		Vertical Pulse Width	tVsync	1	1	1	t_H
		Vertical Back Porch	tVBP	14	14	14	t_H
		Vertical Front Porch	tVFP	11	11	16	t_H
Differential Swing			VDswing	400	500	-	mV
Bit Rate			TX SPD (MBPS)	980	980	995	Mbps
Pixel Fomat				-	24	-	Data bit/ pixel
Lane				-	4	-	Lane

4.1. MIPI Interface DC/AC Characteristic

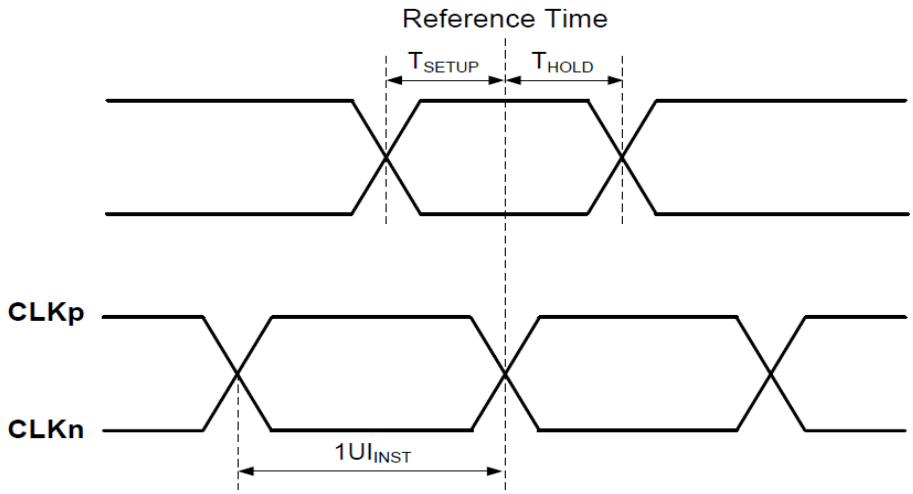
(1) DC Specification

< Table11. DC Specification >

Parameter	Symbol	Min	Typ	Max	Unit	Condition
MIPI digital operation current	I_{VCCIF}	-	-	24	mA	
MIPI digital stand-by current	$I_{VCCIFST}$	-	200	-	uA	
MIPI Characteristics for High Speed Receiver						
Single-ended input low voltage	V_{ILHS}	-40	-	-	mV	
Single-ended input high voltage	V_{IHHS}	-	-	460	mV	
Common-mode voltage	V_{CMRXDC}	155	-	330	mV	
Differential input impedance	Z_{ID}	80	100	125	Ω	
HS transmit differential voltage(V_{OD}=V_{DP}-V_{DN})	$\|V_{OD}\|$	85	200	250	mV	
MIPI Characteristics for Low Power Receiver						
Pad signal voltage range	V_I	-50	-	1350	mV	
Ground shift	V_{GNDSH}	-50	-	50	mV	
Output low level	V_{OL}	-150	-	150	mV	
Output high level	V_{OH}	1.1	1.2	1.3	V	



(2) AC Specification



1UI$_{INST}$ = 1 ns @ 1Gpbs (MIPI input data rate : 1 Gbps => Clock frequency : 500MHz => 1UI$_{INST}$: 1 ns

< Timing Diagram of MIPI Transmitter>

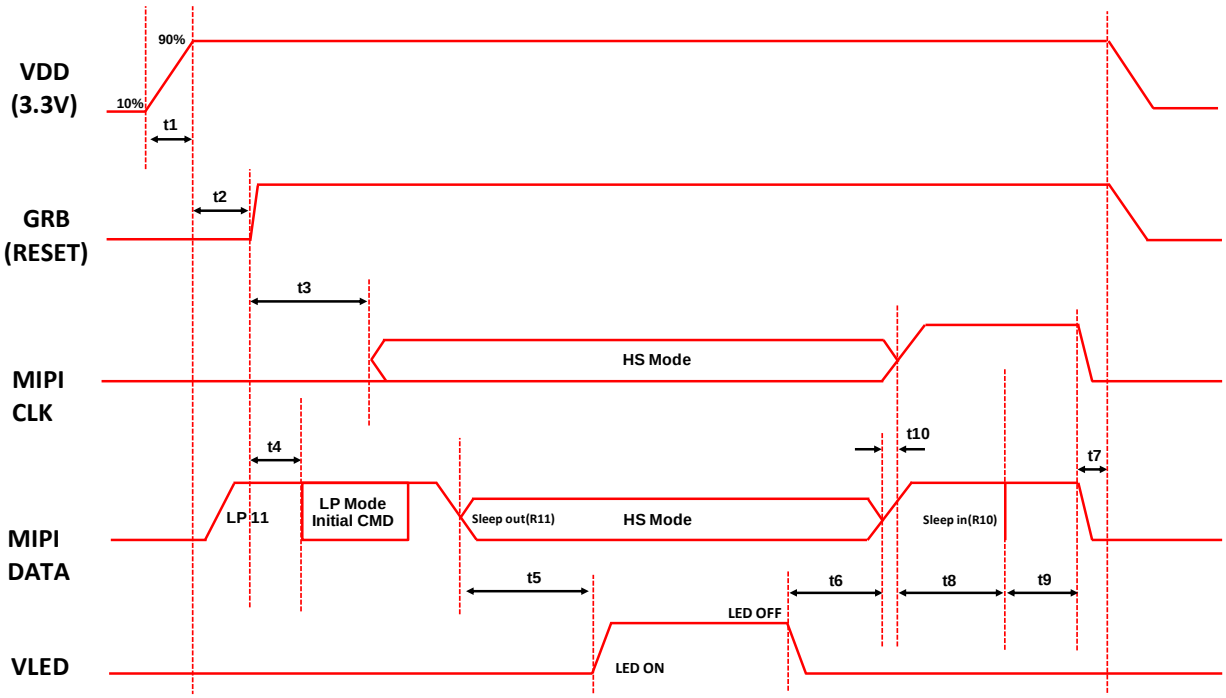
< Table12. AC Specification >

Description	Symbol	Condition	Min	Typ	Max	Unit
Data to Clock Setup Time	T_{SETUP}	-	0.25	-	-	UI_{INST}
Clock to Data Hold Time	T_{HOLD}	-	0.25	-	-	UI_{INST}

4.2. Power Sequence

(1) Power Sequence

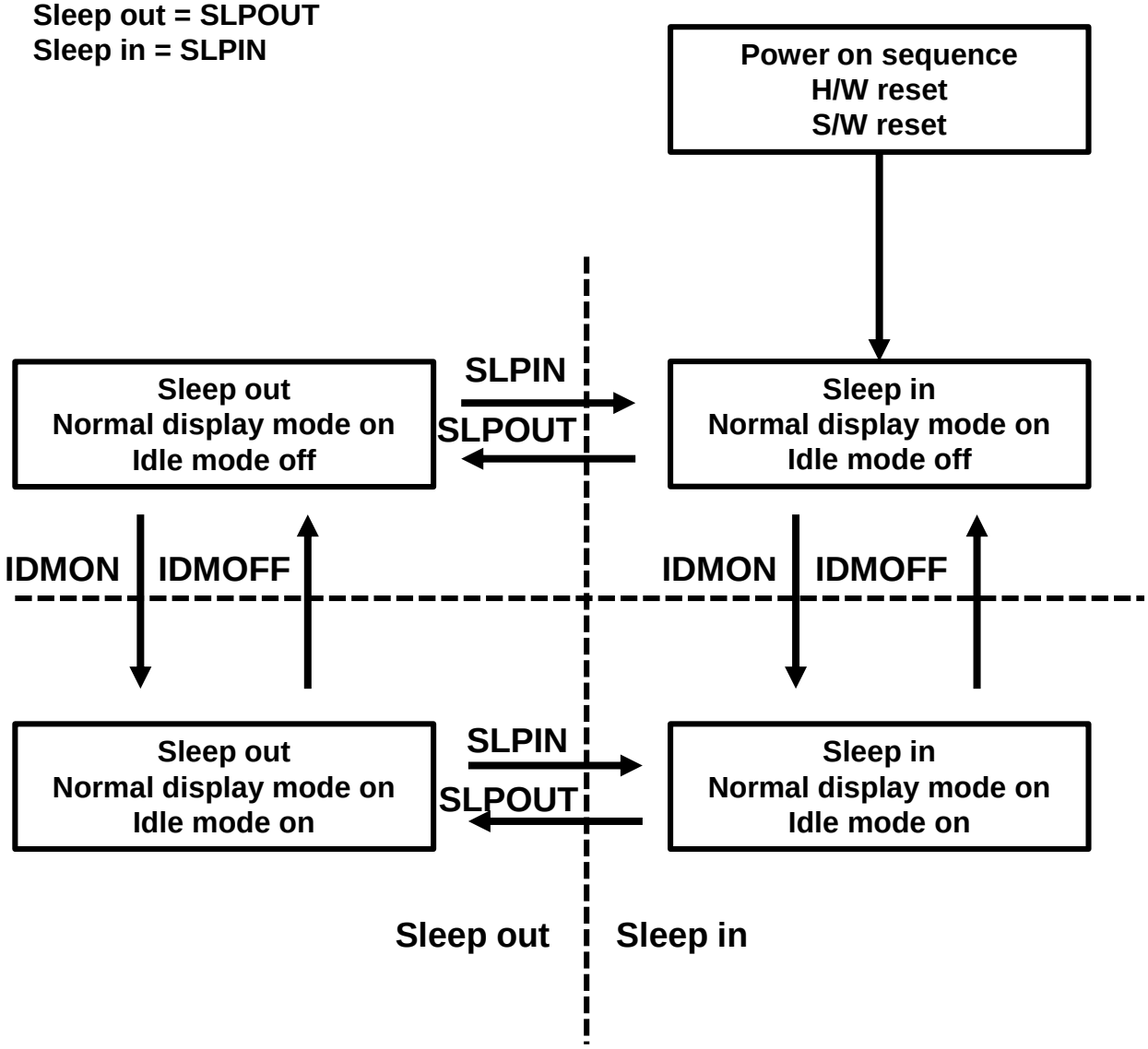
To prevent a latch-up or DC operation of the LCD module, the power on/off sequence shall be as shown in below



Item	Spec	Unit	Remark
t1	t1<20	ms	
t2	t2>3	ms	Souce IC SPEC要求t2大于1ms.且因t2须大于t1-1 (为确保VDD1V6早于GRB(Reset)上电)，故建议t2设置大于3ms.
t3	t3<50	ms	
t4	t4>0	ms	
t5	t5>=200	ms	
t6	t6>=50	ms	
t7	t7>=0	ms	
t8	t8>150	ms	Scan black(R10 后 IC固定跑4帧扫黑)， t8以MIPI CLK拉LP11为参考
t9	t9>70	ms	
t10	0≤t10<1	frame	MIPI CLK与MIPI Data 拉LP11 时间差异小于1frame。

(2). Software Flow

Commands:
Normal display mode on = NORON
Idle mode off = IDMOFF
Idle mode on = IDMON
Sleep out = SLPOUT
Sleep in = SLPIN



4.3. Initial Code

```
delay 100
R8F A5
delay 1
R01
delay 20
R8F A5
delay 1
R83 00
R84 00
R8C 80
RCD 6C
RC0 8B
RC8 F0
R8B 10
RA9 20
R97 00
R83 AA
R84 11
RA9 4B
R85 04 // Touch Noise improve,test mode1
R86 08 // Touch Noise improve,test mode2
R98 C1 // Touch Noise improve,change source charge sharing frequency
R83 BB // CABC function setting
R84 22
R94 BA // CABC freq 27-35KHZ
R90 40
RA1 FF
RA2 FE
RA3 FA
RA4 F7
RA5 F3
RA6 F1
RA7 ED
RA8 EB
RA9 E9
RAA E6
RAF 00
RB0 35
RB1 89
RB2 99
RB3 99
RB4 0D
RB5 1A
RB6 16
R9A 10
R9B 00
R96 E6
R99 06 // CABC function setting
R11
R8F 00
```

5.0 Optical Specifications

The test of Optical specifications shall be measured in a dark room (ambient luminance ≤ 1 lux and temperature = 25±2℃) with the equipment of Luminance meter system (CA-310、BM-5A) and test unit shall be located at an approximate distance 50cm from the LCD surface at a viewing angle of θ and Φ equal to 0°.

Parameter		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Viewing Angle range	Horizontal	Θ_3	CR > 10	80	85	-	Deg.	Note 1
		Θ_9		80	85	-	Deg.	
	Vertical	Θ_{12}		80	85	-	Deg.	
		Θ_6		80	85	-	Deg.	
Color Gamut				65	70.8	-	%	-
Luminance Contrast ratio		CR	Θ = 0°	800:1	1200:1		-	Note 2
Luminance of White	Center Point	Y_w	Θ = 0°	370	435	-	cd/m²	Note 3
White Luminance uniformity	9 Points	ΔY9		80	-	-	%	Note 4
White balance		Wx	Θ = 0°	0.272	0.302	0.332	-	Note 5
		Wy		0.289	0.319	0.349	-	
Reproduction of color	Red	R_x	Θ = 0°	0.611	0.641	0.671	-	Note6
		R_y		0.31	0.34	0.37		
	Green	G_x		0.277	0.307	0.337		
		G_y		0.581	0.611	0.641		
	Blue	B_x		0.121	0.151	0.181		
		B_y		0.023	0.053	0.083		
Response Time (Rising + Falling)		T_{RT}	Ta= 25° C Θ = 0°	-	-	35	ms	Note 7
Flicker		-	-	-	-	-27	dB	-
Crosstalk		-	-	-	-	2	%	-

Cell & BLU Optical Characteristics

Parameter	Typ	Unit	Remarks
Aperture Ratio	52	%	
Upper Pol Trans.	42.5	%	
Lower Pol Trans.	42.5	%	
Panel Trans.	-	%	w/o APF
Panel Trans.	4.3(LCM)	%	with APF

Note :

1. Viewing angle is the angle at which the contrast ratio is greater than 10. The viewing angles are determined for the horizontal or 3, 9 o'clock direction and the vertical or 6, 12 o'clock direction with respect to the optical axis which is normal to the LCD surface (see FIGURE 1).

2. Contrast measurements shall be made at viewing angle of Θ= 0 and at the center of the LCD surface. Luminance shall be measured with all pixels in the view field set first to white, then to the dark (black) state . (see FIGURE 1) Luminance Contrast Ratio (CR) is defined mathematically.

$$CR = \frac{\text{Luminance when displaying a white raster}}{\text{Luminance when displaying a black raster}}$$

3. Center Luminance of white is defined as luminance values of 1point average across the LCD surface. Luminance shall be measured with all pixels in the view field set first to white. This measurement shall be taken at the locations shown in FIGURE 1 for a total of the measurements per display. The luminance is measured by CA310 when the LED current is set at 20mA.

.

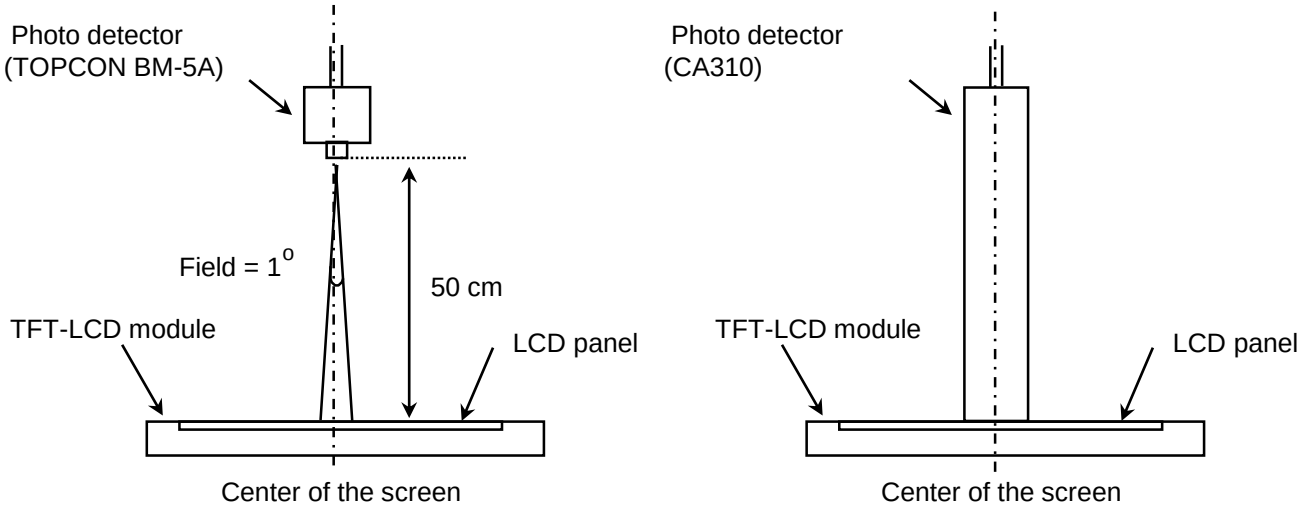
4. The White luminance uniformity on LCD surface is then expressed as : ΔY = Minimum Luminance of 9points / Maximum Luminance of 9points (see FIGURE 2).

5. The color chromaticity coordinates specified shall be calculated from the spectral data measured with all pixels first in red, green, blue and white. Measurements shall be made at the center of the panel.

6. The color chromaticity coordinates specified shall be calculated from the spectral data measured with all pixels first in red, green, blue and white. Measurements shall be made at the center of the panel.

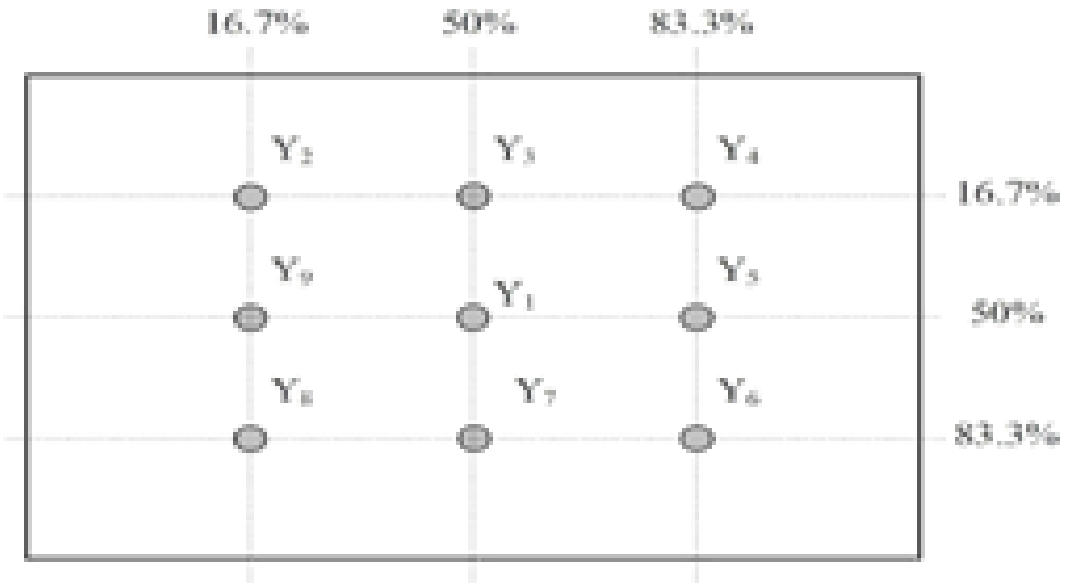
7. The electro-optical response time measurements shall be made as FIGURE 3 by switching the "data" input signal ON and OFF. The times needed for the luminance to change from 10% to 90% is Tr, and 90% to 10% is Td.

Figure 1. Measurement Set Up



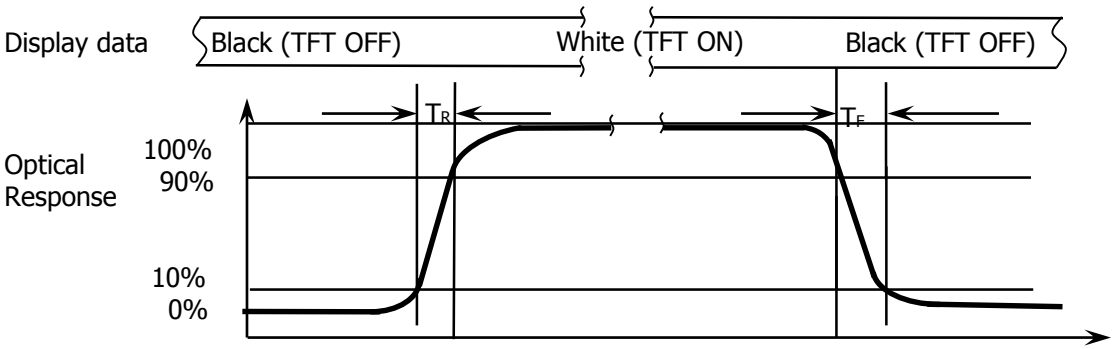
View angel range measurement setup Luminance , uniformity and color measurement setup

Figure 2. White Luminance and Uniformity Measurement Locations (9 points)



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

Figure 3. Response Time Testing



The electro-optical response time measurements shall be made as shown in FIGURE 4 by switching the “data” input signal ON and OFF. The times needed for the luminance to change from 10% to 90% is Tr and 90% to 10% is Td.

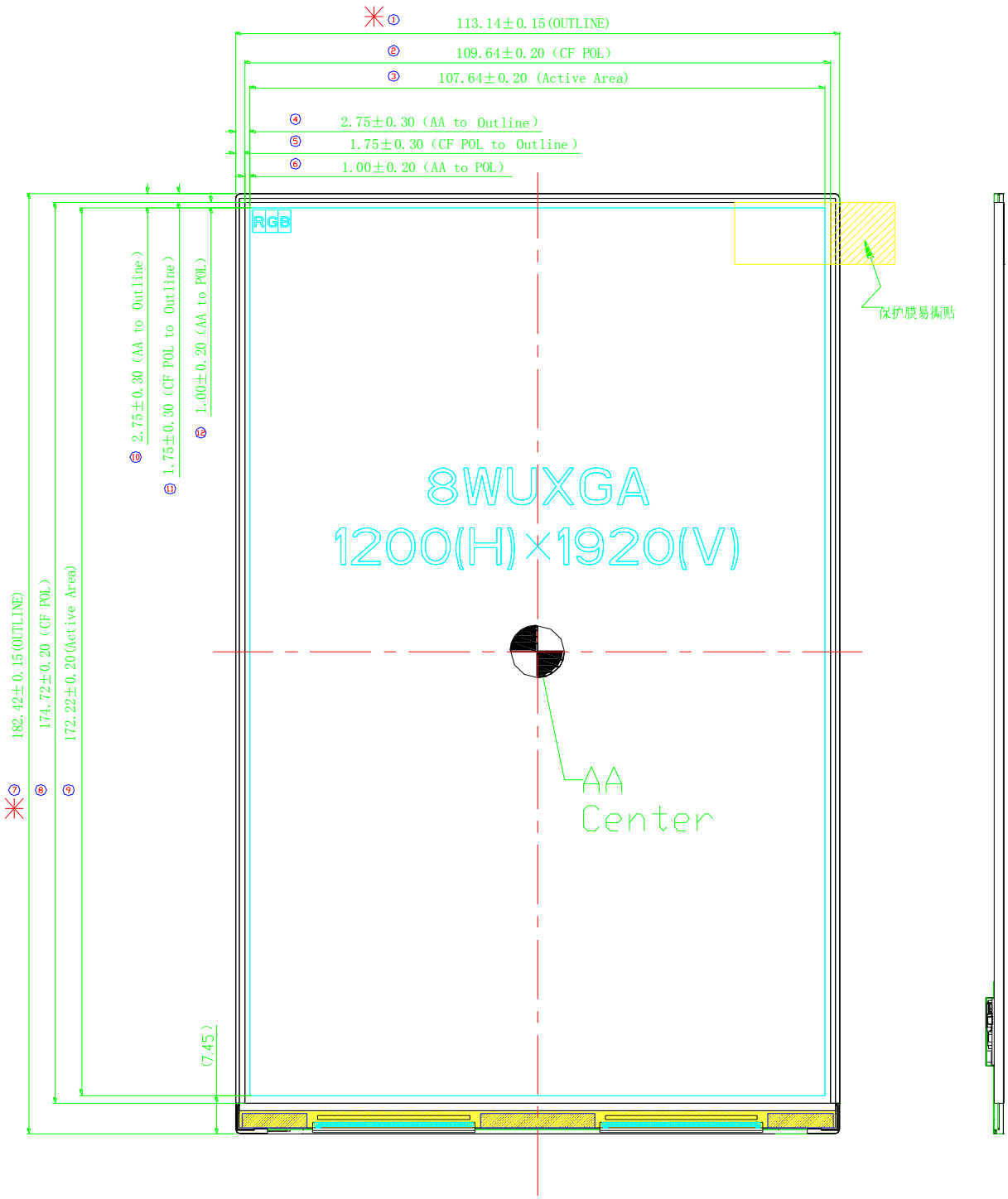
6.0 MECHANICAL CHRACTERISTICS

The contents provide general mechanical characteristics for the model.
In addition the figures in the next page are detailed mechanical drawing of the LCD.

item		Description	Typ.	Tolerance	Unit
Mother glass		Size	1850*1500	-	mm
CF and TFT thickness after slimming		thickness	0.2/ 0.2		mm
Panel	AA	A/A	107.64*172.224	-	mm
	CF	C/F	111.64*176.974	±0.2	mm
	TFT	TFT	111.64*180.274	±0.2	mm
	IC Bonding area	IC Bonding Area	3.3	-	mm
	Pol size	Pol Size	CF: 109.64* 174.72	±0.2	mm
	Gap between pol~glass (U/D/L/R)	Gap Between Pol~C/F border (U/D/L/R)	CF: 0.8/1.45/1.0 /1.0	±0.25	mm
Module	Horizontal	Horizontal	113.14	±0.15	mm
	Vertical	Vertical	182.424	±0.15	mm
	Thickness	Thickness	1.85	±0.15	mm
	Uv glue thickness	UV Glue Thick ness	-	-	mm

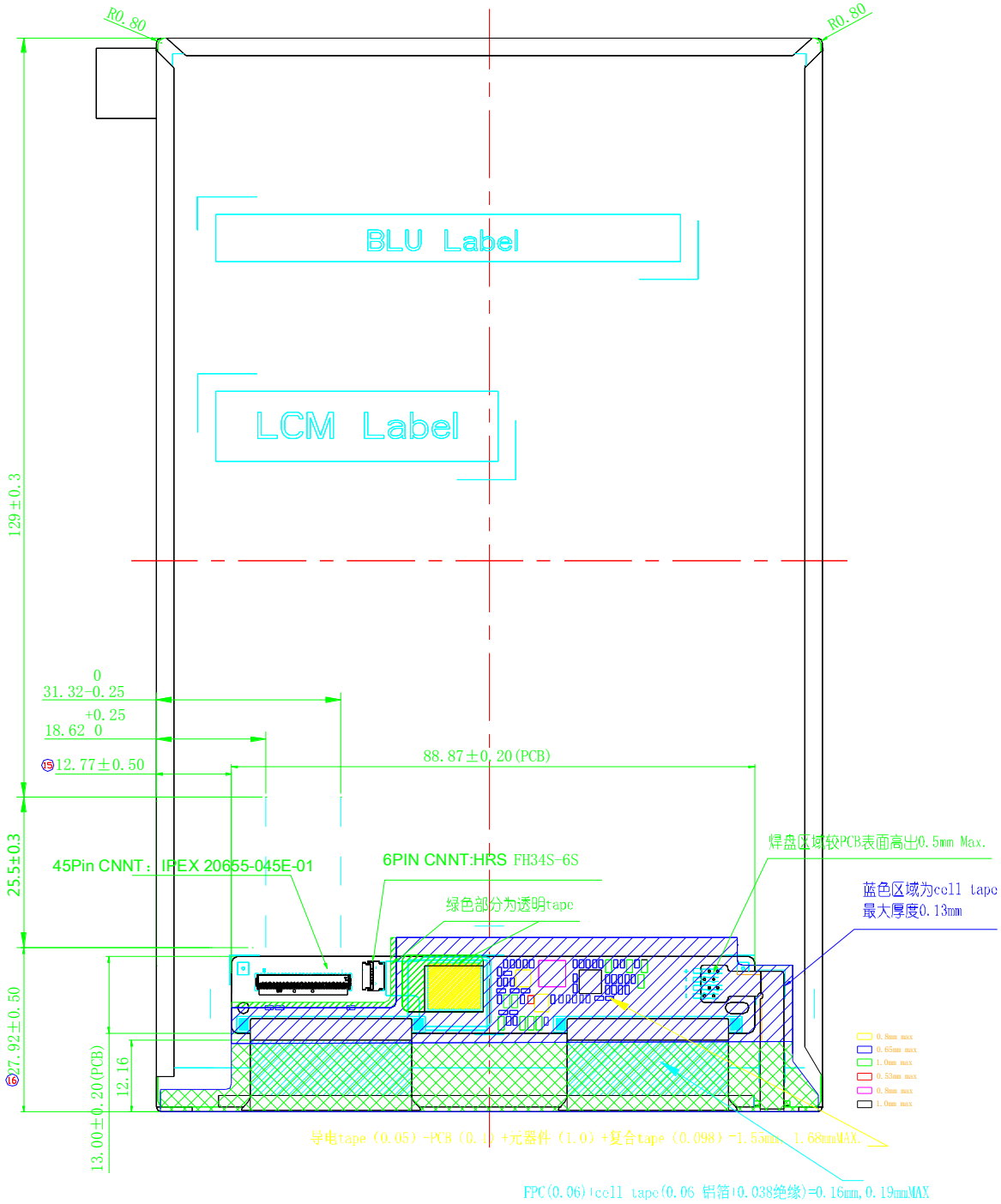
6.1 LCM Display Module Drawing

(1) Front side

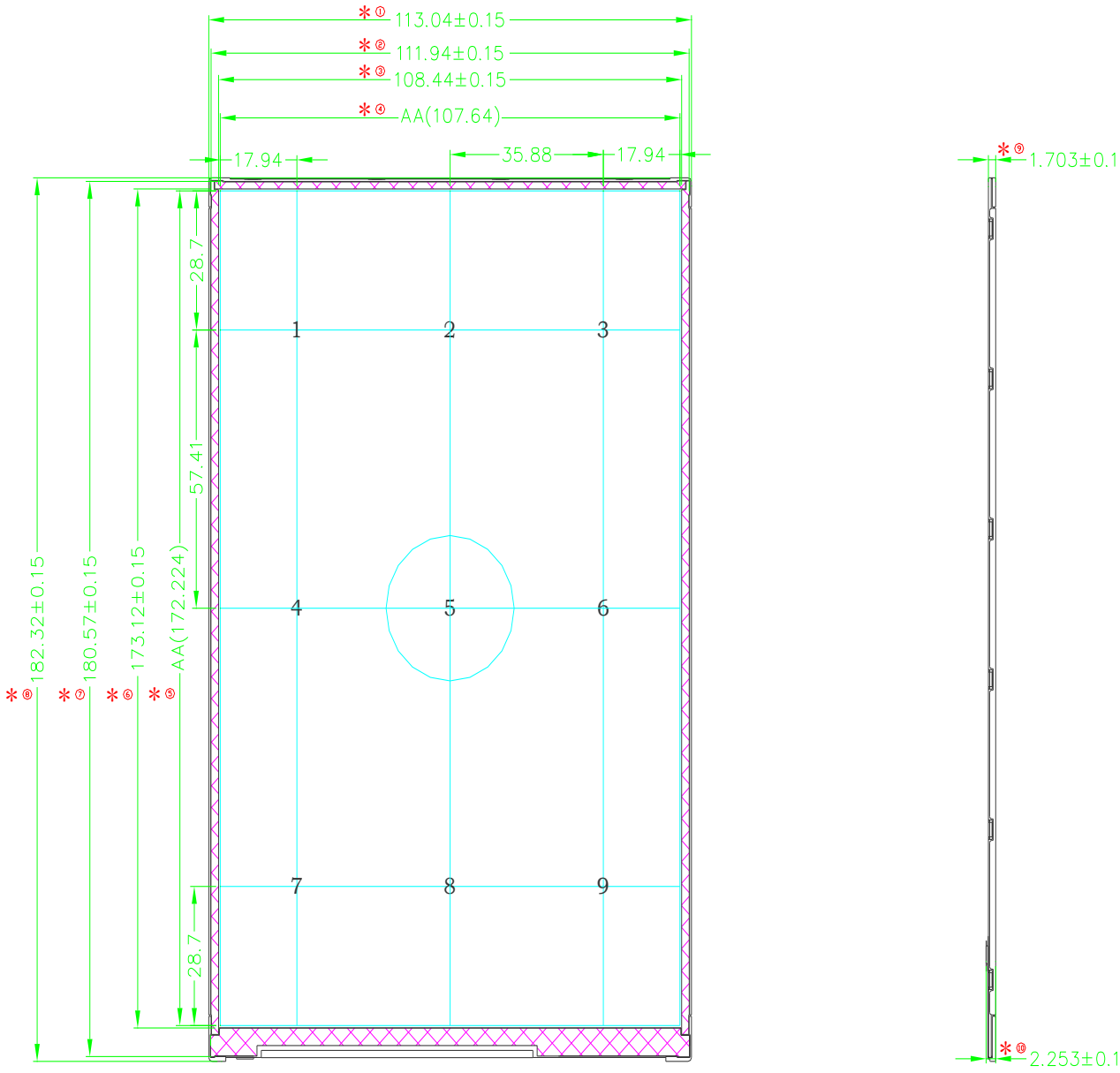


6.1 LCM Display Module Drawing

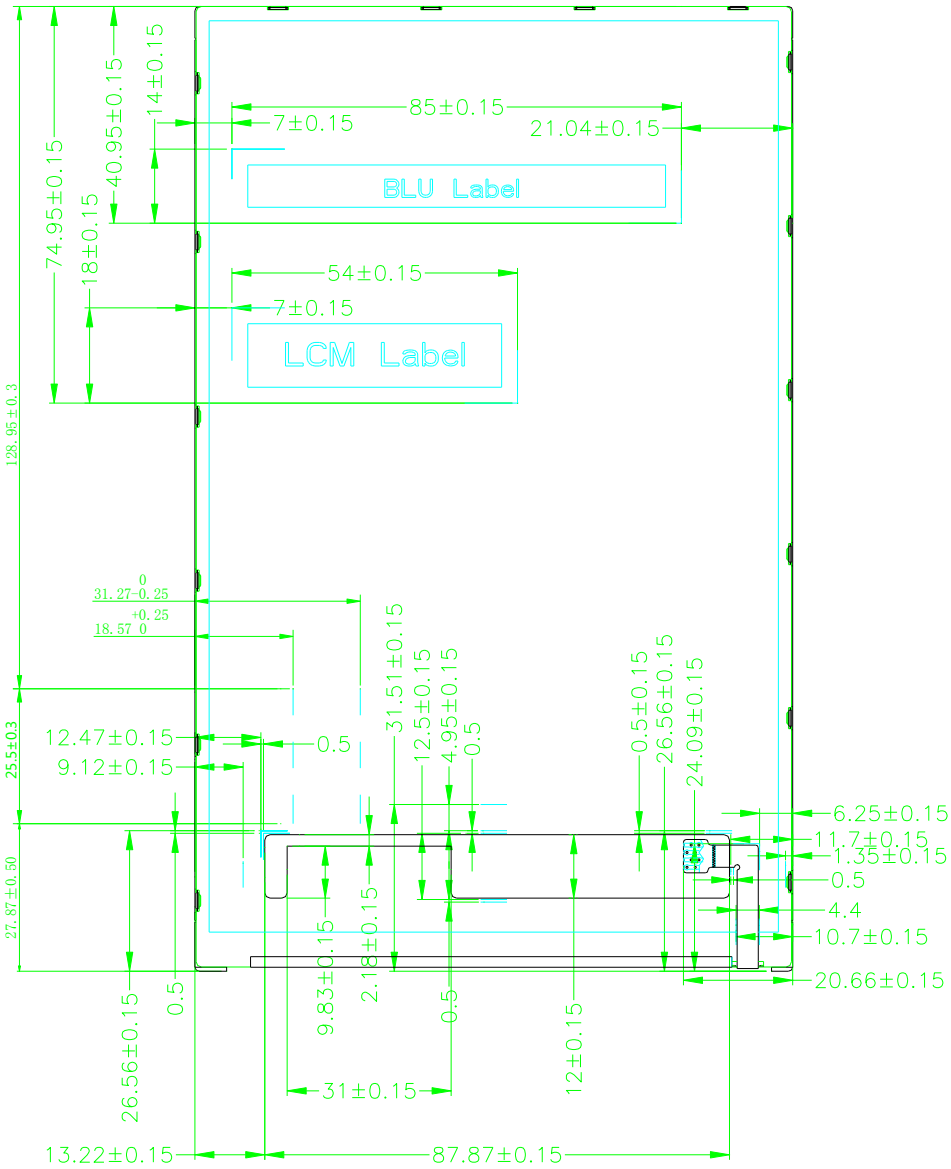
(2) Rear side



6.2 BLU Outline Dimension



6.2 BLU Outline Dimension



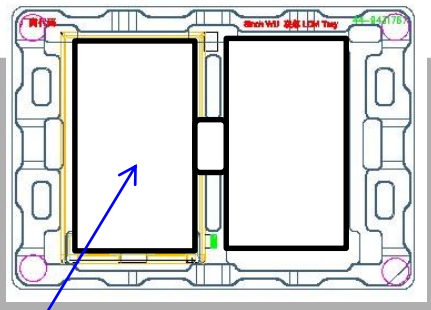
7.0 Reliability Test

测试分类	测试项目	条件
信赖性测试	THO	60℃ 90%RH 120hr operation
	HTO	70℃ 120hr operation
	LTO	-20℃ 120hr operation
	HTS	80℃ 120hr storage
	LTS	-30℃ 120hr storage
	TST	[(-30℃ 60min) →(70℃ 60min)]/cycle, 32cycles storage
	ESD	Power on Contact ±6KV/Air±8KV Judgement B

8.0. Package

2pcs Panel per Tray

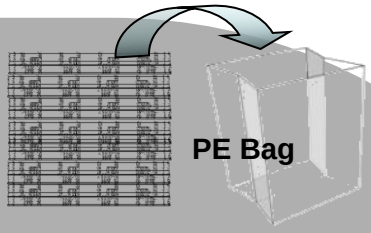
1pcs EPE Spacer UP and Down



EPE Spacer

21pcs PET Tray in PE Bag

-. 1pcs empty Tray top

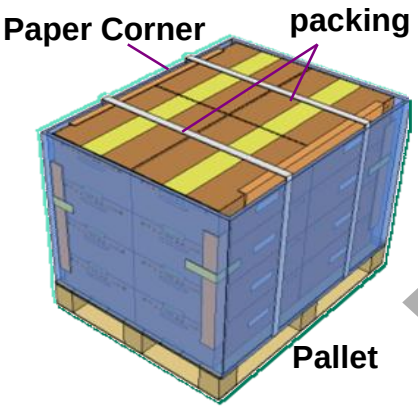


PE Bag

-. 3layers per Pallet, 24inner boxes per layer

Pallet outer package : Protective film & Paper Corner

960pcs Panels per Pallet



Paper Corner

packing Belt

Pallet

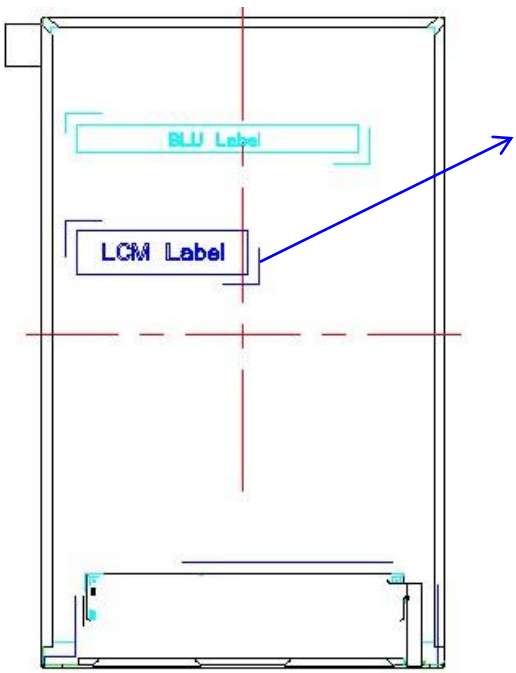
2EA Cushion -EPE Board per Inner Box

40pcs MDL per Inner Box

EPE Cover

Inner Box

8.1 MDL label



3 TV080WUM-NX2-39P0 1
XXXXXXXXXXXXXXXXXXX 2

Remark:
1.FG-CODE: TV080WUM-NX2-39P0
TV080WUM-NX1-39P0

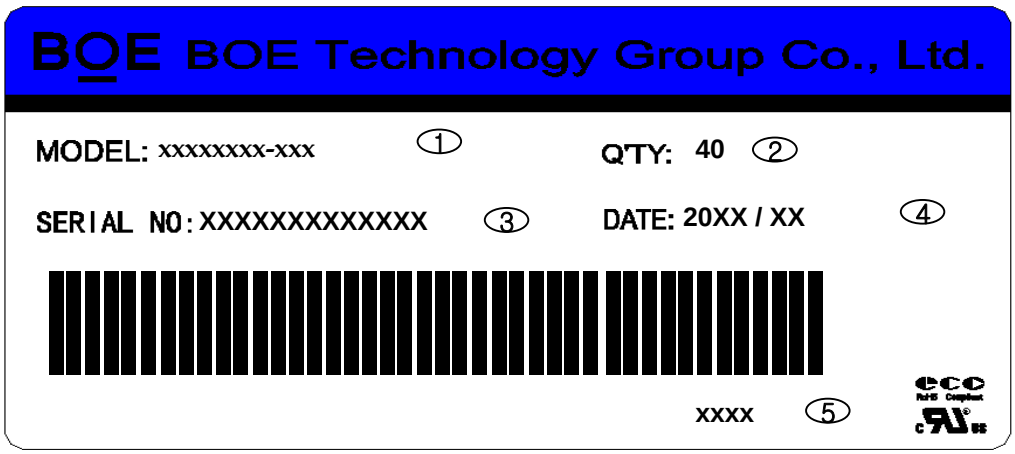
2.MDL ID
3.MDL ID QR CODE

MDL ID RULES

序列号	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
代码	X	X	P	3	X	X	X	3	9	4	1	X	X	X	X	X	X
描述	GBN CODE		GRADE	B3	Y	M	D	Last 4 digit of FG Code				(36 hexadecimal without “I” and ”O”)					

8.2 BOX label

(1)



Label Size: 110 mm (L) × 55 mm (W)
Contents
1.Model：
2.Q`ty: Module Q`ty in one box
3.Serial No.: Box Serial No. See next figure for detail description.
4.Date: Packing Date
5. Last 4 digit of FG Code

No.	1	2	3	4	5	6	7	8	9	10	11	12	13
code	X	X	X	X	X	X	X	X	X	X	X	X	X
Describe	GBN code		Grade	B3	Year		Month	Rev	Serial number(36hexadecimal without “I” and ”O”)				

(2)

“RoHS” Label Size::70mm*35mm
“HF” Label Size::70mm*35mm

9.0 Handing & Cautions

(1) Cautions when taking out the module
- Pick the pouch only, when taking out module from a shipping package.

(2) Cautions for handling the module
- As the electrostatic discharges may break the LCD module, handle the LCD module with care. Peel a protection sheet off from the LCD panel surface as slowly as possible.
- As the LCD panel and back - light element are made from fragile glass material, impulse and pressure to the LCD module should be avoided.
- As the surface of the polarizer is very soft and easily scratched, use a soft dry cloth without chemicals for cleaning.
- Do not pull the interface connector in or out while the LCD module is operating.
- Put the module display side down on a flat horizontal plane.
- Handle connectors and cables with care.

(3) Cautions for the operation
- When the module is operating, do not lose CLK, ENAB signals. If any one of these signals is lost, the LCD panel would be damaged.
- Obey the supply voltage sequence. If wrong sequence is applied, the module would be damaged.

(4) Cautions for the atmosphere
- Dew drop atmosphere should be avoided.
- Do not store and/or operate the LCD module in a high temperature and/or humidity atmosphere. Storage in an electro-conductive polymer packing pouch and under relatively low temperature atmosphere is recommended.

(5) Cautions for the module characteristics
- Do not apply fixed pattern data signal to the LCD module at product aging.
- Applying fixed pattern for a long time may cause image sticking.

(6) Other cautions
- Do not disassemble and/or re-assemble LCD module.
- Do not re-adjust variable resistor or switch etc.
- When returning the module for repair or etc., Please pack the module not to be broken. We recommend to use the original shipping packages.