



# Specification for Approval

Customer: \_\_\_\_\_

Model Name: \_\_\_\_\_

Supplier Approval			Customer approval
R&D Designed	R&D Approved	QC Approved	
<i>Peter</i>	<i>Peng Jun</i>		

## REVISION STATUS

A	2016-10-26	NEW ISSUE	



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## 1. GENERAL DESCRIPTION

### 1.1 DESCRIPTION

20811330560001 is a color active matrix thin film transistor (TFT) IPS liquid crystal display (LCD) that uses amorphous silicon TFT as a switching device. It is composed of a TFT LCD panel, Driver IC, FPC and Backlight, This TFT LCD has a 13.3-inch diagonally measured active display area with WUXGA resolution (1920vertical by 1080 horizontal pixel array).

### 1.2 FEATURES:

No.	Item	Specification	Unit
1	Panel Size	13.3"	inch
2	Number of Pixels	1920×RGB (3)×1080	pixels
3	Active Area	293.76(H)x 165.24(V)	mm
4	Pixel Pitch	0.153(H)×0.153(V) x RGB	mm
5	Outline Dimension	305.35 (W)×187.82(H)×2.7(D)	mm
6	Number of Colors	16.7M	-
7	Display Mode	Transmission mode, normally black	-
8	Viewing Direction	Full viewing	-
9	Display Format	RGB vertical stripe	-
10	Luminance (cd/m <sup>2</sup> )	300(TYP.)	nit
11	Contrast Ratio	900(TYP.)	
12	Surface Treatment	Anti-Glare	-
13	Interface	eDP-2Line	-
14	Backlight	White LED	-
15	Operation Temperature	0-50	°C
16	Storage Temperature	-10-60	°C
17	Weight	257.5 (±10)	g



### 3. PIN DESCRIPTION

FPC Connector is used for the module electronics interface. The recommended model is: 20455-030E-76 (I-PEX)

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

## 4. ELECTRICAL CHARACTERISTICS

### 4.1 ABSOLUTE MAXIMUM RATINGS

Item	Symbol	Min.	Max.	Unit
Digital Supply Voltage	VCC	-0.3	4.0	V

### 4.2 TFT LCD MODULE

#### 4.2.1 OPERATING CONDITIONS

Parameter	Symbol	Min.	Typ.	Max.	Unit
Digital Power Supply Voltage	VCC	3.0	3.3	3.6	V

### 4.3 CURRENT CONSUMPTION

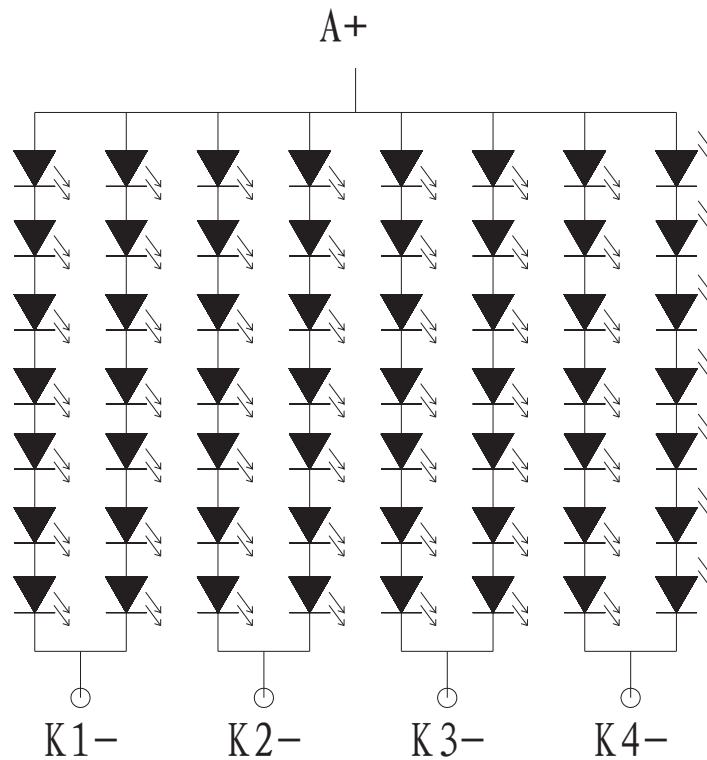
Item	Symbol	Condition	Values			Unit
			Min.	Typ.	Max.	
Digital Current	IVDD	VDD = 3.3V	-	180	260	mA

## 4.4 BACK LIGHT UNIT

Ta=25°C

Item	Symbol	Min.	Typ.	Max.	Unit	Remark
LED current	I <sub>LED</sub>		160		mA	Total LED
Forward voltage	V <sub>F</sub>	18.9	19.6	20.3	V	I <sub>F</sub> =160mA
Reverse current	I <sub>R</sub>			50	μA	V <sub>R</sub> =5V, 1LED
Power dissipation	P <sub>d</sub>	3360			mW	Total LED
Peak forward current	I <sub>FP</sub>	100			mA	1LED
Reverse Voltage	V <sub>R</sub>	5			V	1LED

### ※1. Internal Circuit Diagram

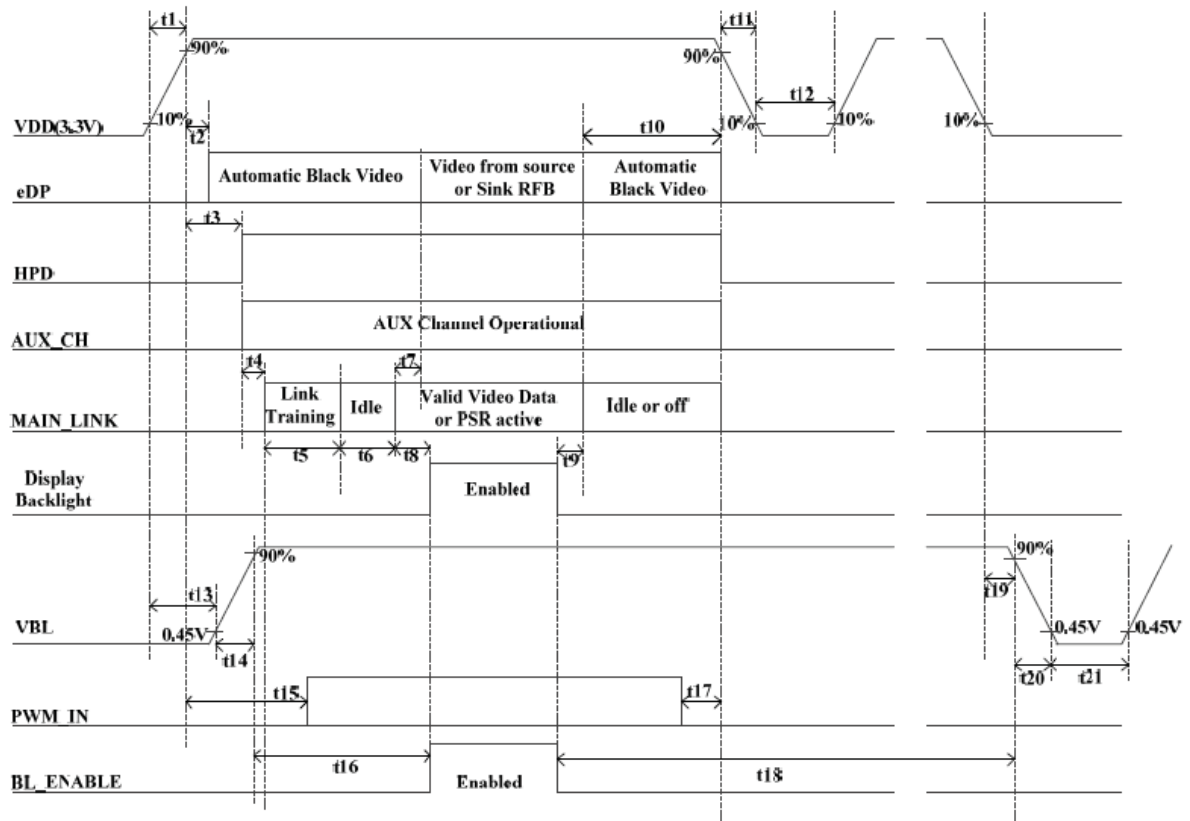


7\*8=56EA    I<sub>f</sub>=160mA



Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
Supply voltage	$V_{BL}$	7.0	12.0	21.0	V	
Current dissipation	$I_{BL}$	-	TBD		mA	$V_{BL}=12.0V$ Duty Ratio =100%
Modulated light signal voltage	$V_{PWMH}$	1.85	-	VDD	V	
	$V_{PWL}$	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	$V_{CNTH}$	1.3	-	VDD	V	[Note5-3-3]
LED-BL ON/OFF Low voltage	$V_{CNTL}$	0	-	0.5	V	
Input signal (H level) pin current	$I_{IN}$	-	-	$V_{IN}/56K\Omega$	$\mu A$	BL_ENABLE, BL_PWM_DIM
LED lifetime	-	-	10000	-	h	LED

## 4.5 POWER ON/OFF SEQUENCE



Symbol	Min	Max	Unit	Note
t1	0.5	10	ms	
t2	0	200	ms	
t3	0	100	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.

## 5.1 MODE DC ELECTRICAL CHARACTERISTIC

eDP AUX Channel Characteristics						
Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
Unit Interval for AUX channel	UI <sub>AUX</sub>	0.4	0.5	0.6	μS	
Peak-to-peak voltage at TP1	V <sub>AUX-DIFF-PP</sub>	0.32	-	1.36	V	
AUX DC Common mode Voltage	V <sub>AUX-DC-CM</sub>	0	-	2.0	V	
AUX Short current limit	I <sub>AUX_SHORT</sub>	-	-	90	mA	
AUX CH terminationDCresistor	R <sub>AUX_TERM</sub>	-	100	-	Ω	Differential input
AUX AC coupling capacitor	C <sub>AUX</sub>	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 <sub>RX-DIFFP-P</sub>	90	-	1200	mV	
Differential Return Loss at 1.35GHz at Rx package pins	RL <sub>RX-DIFF</sub>	9	-	-	dB	
Differential termination resistance	R <sub>RX-TERM</sub>	-	100	-	Ω	
RX short circuit Current Limit	I <sub>RX-SHORT</sub>	-	-	50	mA	
Lane Intra-pair Skew at RX package pins	T <sub>RX-SKEW-INTRA-PAIR-High-Bit-Rate</sub>	-	-	50	ps	

## 5.2 EDID

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 (LC133LF4L01 : TBD)	00	00000000
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) 2015-1990 = 25	19	00011001
18	12	EDID structure version # = 1	01	00000001
19	13	EDID revision # = 4	04	00000100
20	14	Video i/p definition = Digital 8bit DP support	A5	10100101
21	15	Max H image size(cm) = 29cm	1D	00011101
22	16	Max V image size(cm) = 17cm	11	00010001
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)	DE	11011110
26	1A	Blue/White Low bit(BxBy/WxWy)	50	01010000
27	1B	Red X(Rx) (written value 0.64 )	A3	10100011
28	1C	Red Y(Ry) (written value 0.33 )	54	01010100
29	1D	Green X(Gx) (written value 0.3 )	4C	01001100
30	1E	Green Y(Gy) (written value 0.6 )	99	10011001
31	1F	Blue X(Bx) (written value 0.15 )	26	00100110
32	20	Blue Y(By) (written value 0.06 )	0F	00001111
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 (=138.5MHz/10000=13850=361Ah)	1A	00011010
55	37	#1 fck	36	00110110
56	38	#1 Horizontal active 1920=780h 80h	80	10000000
57	39	#1 Horizontal blanking 160=0A0h A0h	A0	10100000
58	3A	#1 Horizontal active/Horizontal blanking 70h	70	01110000
59	3B	#1 Vertical active 1080=438h 38h	38	00111000
60	3C	#1 Vertical blanking 31=01Fh 1Fh	1F	00011111
61	3D	#1 Vertical active/Vertical blanking 40h	40	01000000
62	3E	#1 Horizontal sync , offset(Thfp) 48=030h 30h	30	00110000
63	3F	#1 Horizontal sync , width 32=020h 20h	20	00100000
64	40	#1 Vertical sync,offset / Vertical sync,width (offset=3h/width=5h)	35	00110101
65	41	#1 Horizontal sync offset/width/Vertical sync offset/width	00	00000000
66	42	#1 Horizontal image size 293.76mm=126h 26h	26	00100110
67	43	#1 Vertical image size 165mm=0A5h A5h	A5	10100101
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 160=0A0h A0h	A0	10100000
76	4C	#2 Horizontal active/Horizontal blanking 70h	70	01110000
77	4D	#2 Vertical active 1080=438h 38h	38	00111000
78	4E	#2 Vertical blanking 31=01Fh 1Fh	1F	00011111
79	4F	#2 Vertical active/Vertical blanking 40h	40	01000000
80	50	#2 Horizontal sync , offset(Thfp) 48=030h 30h	30	00110000
81	51	#2 Horizontal sync , width 32=020h 20h	20	00100000
82	52	#2 Vertical sync, offset / Vertical sync, width (offset=3h/width=5h)	35	00110101
83	53	#2 Horizontal sync offset/width/Vertical sync offset/width	00	00000000

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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) 2015-1990 = 25	19	00011001
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35	23	Established timings 1	00	00000000
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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

## 5.1 MODE DC ELECTRICAL CHARACTERISTIC

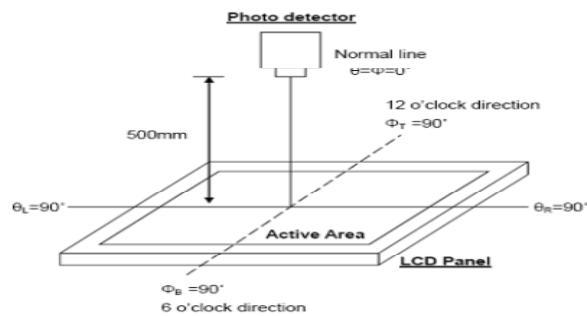
eDP AUX Channel Characteristics						
Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
Unit Interval for AUX channel	UI <sub>AUX</sub>	0.4	0.5	0.6	μS	
Peak-to-peak voltage at TP1	V <sub>AUX-DIFF-PP</sub>	0.32	-	1.36	V	
AUX DC Common mode Voltage	V <sub>AUX-DC-CM</sub>	0	-	2.0	V	
AUX Short current limit	I <sub>AUX_SHORT</sub>	-	-	90	mA	
AUX CH terminationDCresistor	R <sub>AUX_TERM</sub>	-	100	-	Ω	Differential input
AUX AC coupling capacitor	C <sub>AUX</sub>	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 <sub>RX-DIFFP-P</sub>	90	-	1200	mV	
Differential Return Loss at 1.35GHz at Rx package pins	RL <sub>RX-DIFF</sub>	9	-	-	dB	
Differential termination resistance	R <sub>RX-TERM</sub>	-	100	-	Ω	
RX short circuit Current Limit	I <sub>RX-SHORT</sub>	-	-	50	mA	
Lane Intra-pair Skew at RX package pins	T <sub>RX-SKEW-INTRA-PAIR-High-Bit-Rate</sub>	-	-	50	ps	

## 6.OPTICAL CHARACTERISTICS

Ta=25±2℃

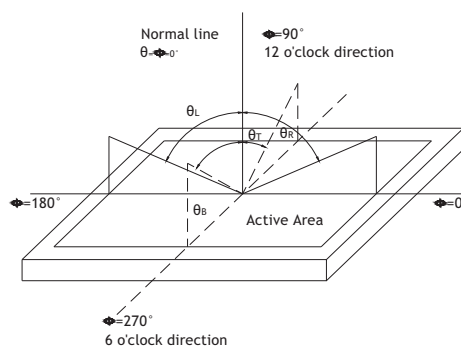
Item	Symbol	Min.	Typ.	Max.	Unit	Note	
Contrast Ratio	CR	-	800	-		Note1 Note3	
Luminance(center)	L	250	300	-	cd/m2	Note1 Note5 Note7	
Luminous tolerance	LU	70	75		%	Note7	
Response Time	Rising + Falling	-	30	35	ms	Note1 Note4	
Viewing Angle K=Contrast Ratio>10	Horizontal	$\theta x^+$	80	89	-	degree	Note2
		$\theta x^-$	80	89	-		
	Vertical	$\theta y^+$	80	89	-		
		$\theta y^-$	80	89	-		
Color Chromaticity (CIE1931)	Red	x	535	585	635	Note1 Note5 Note7	
		y	285	335	385		
	Green	x	242	292	342		
		y	578	628	678		
	Blue	x	092	142	192		
		y	033	083	133		
White	x	236	286	336			
	y	284	334	384			
Color gamut (NTSC ratio)			68		%		

Note1: Definition of optical measurement system (BM-7)



Note2: Definition of viewing angle range and measurement system

Viewing angle is measured at the center point of the LCD by CONOSCOPE (ergo-80).





**Note3: Definition of Response time**

The response time is defined as the LCD optical switching time interval between “White” state and “Black” state. Rise time (TON) is the time between photo detector output intensity changed from 90% to 10%. And fall time (TOFF) is the time between photo detector output intensity changed from 10% to 90%.

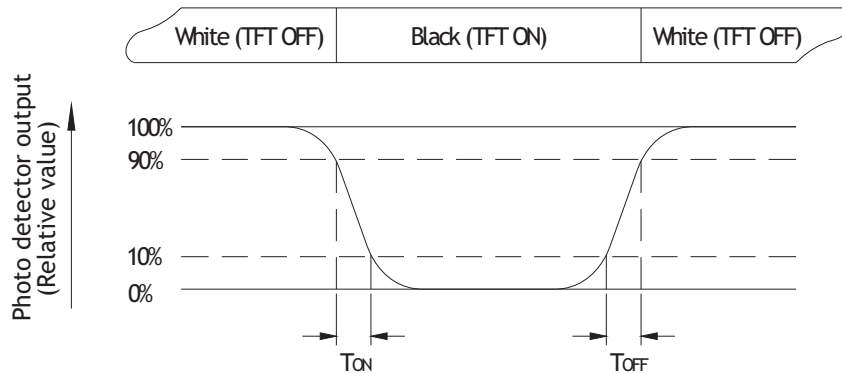


Fig. 6-3 Definition of response time

**Note4: Definition of contrast ratio**

$$\text{Contrast ratio(CR)} = \frac{\text{Luminance measured when LCD on the Whitestate}}{\text{Luminance measured when LCD on the Blackstate}}$$

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

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

Vwhite: To be determined Vblack: To be determined.

**Note5: Definition of color chromaticity (CIE1931)**

Color coordinates measured at center point of LCD.

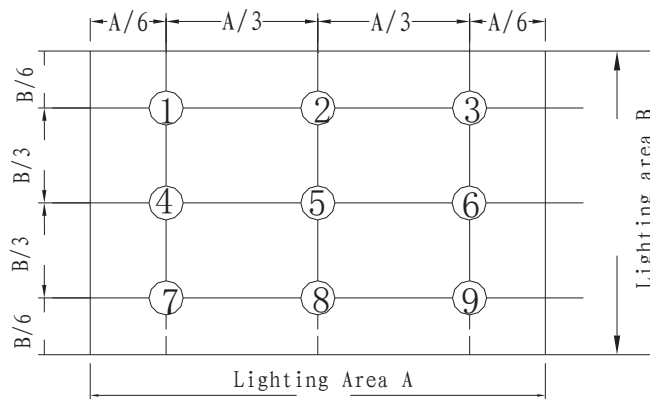
**Note6:** All input terminals LCD panel must be ground while measuring the center area of the panel. The LED driving condition is IL=180mA

**Note7: Definition of Luminance Uniformity**

Active area is divided into 9 measuring areas. Every measuring point is placed at the center of each measuring area.

$$\text{Luminance Uniformity (U)} = \text{Lmin} / \text{Lmax}$$

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



Bmax: The measured maximum luminance of all measurement position.

Bmin: The measured minimum luminance of all measurement position.

## 7. RELIABILITY TEST ITEMS

### 7.1 TEMPERATURE AND HUMIDITY

Test Item	Test Condition	Remark
High Temperature Storage	Ta=60°C ; 120hrs	IEC60068-2-1 : 2007 GB2423.2-2008
Low Temperature Storage	Ta=-10°C ;120hrs	IEC60068-2-1 : 2007 GB2423.1-2008
High Temperature Operation	Ta=50°C , 120Hrs	IEC60068-2-1 : 2007 GB2423.2-2008
Low Temperature Operation	Ta=0°C ; 120hrs	IEC60068-2-1 : 2007 GB2423.1-2008
High Temperature High Humidity Operation	Ta=40°C , 80%RH , 96Hrs(no condensation)	IEC60068-2-78 : 2001 GB/T2423.3-2006
Thermal Shock	-10°C (0.5h) ~ 60°C (0.5h) / 50 cycles	Start with cold temperature , End with high temperature , IEC60068-2-14:1984,GB2423.22-2002
Image Sticking	25°C ; 4hrs	Note1

Note1:Condition of image sticking test :25°C±2°C

## 7.2 VIBRATION&SHOCK

Test item	Conditions	Remark
Packing Shock (non-operation)	980m/s <sup>2</sup> ,6ms, ±x,y,z 3times for direction	IEC60068-2-27 : 1987 GB/T2423.5-1995
Packing Vibration (non-operation)	Frequency range:10 HZ~50HZ Stroke:1.0mm,sweep:10 HZ ~50HZ x,y,z 2 hours for each direction	IEC60068-2-32 : 1990 GB/T2423.8-1995

## 7.3ESD

Test item	Conditions	Remark	
Electro Static Discharge Test (non-operation)	150pF , 330Ω , Contact:±4KV,Air:±8KV	1	Class C
	200pF , 0Ω , ±200V contact test	2	

Note: Measure point :

1. LCD glass and metal bezel
2. IF connector pins
3. ESD class B:some performance degradation allowed. Self-recoverable.  
No data lost,no hardware failures.

## 8. GENERAL PRECAUTION

### 8.1 SAFETY

1. Do not swallow any liquid crystal, even if there is no proof that liquid crystal is poisonous.
2. If the LCD panel breaks, be careful not to get liquid crystal to touch your skin.
3. If skin is exposed to liquid crystal, wash the area thoroughly with alcohol or soap.

### 8.2 STORAGE CONDITIONS

1. Store the panel or module in a dark place where the temperature is 23±5°C and The humidity is below 50±20%RH.
2. Store in anti-static electricity container.
3. Store in clean environment, free from dust, active gas, and solvent.
4. Do not place the module near organics solvents or corrosive gases.
5. Do not crush, shake, or jolt the module.

### 8.3 HANDLING PRECAUTIONS

1. Avoid static electricity which can damage the CMOS LSI.
2. The polarizing plate of the display is very fragile. So, please handle it very carefully.
3. Do not give external shock.
4. Do not apply excessive force on the surface.
5. Do not wipe the polarizing plate with a dry cloth, as it may easily scratch the Surface of plate.
6. Do not use ketonics solvent & Aromatic solvent, use with a soft cloth soaked with a cleaning naphtha solvent.
7. Do not operate it above the absolute maximum rating.
8. Do not remove the panel or frame from the module.
9. When the module is assembled, it should be attached to the system firmly, Be careful not to twist and bend the module.
10. Wipe off water droplets or oil immediately. If you leave the droplets for a long time, staining and discoloration may occur.



11. If the liquid crystal material leaks from the panel, it should be kept away from the eyes or mouth in case of contact with hands, legs or clothes, it must be washed away thoroughly with soap.

#### **8.4 WARRANTY**

1. The period is within twelve months since the date of shipping out under normal using and storage conditions.
2. Do not repaired or modified the LCM. It may cause function to lose efficacy,AMSON does not warrant the LCM.
3. All process and material comply ROHS.

