

## LCD MODULE

# SPECIFICATION

<b>Model:</b>	UE035HV-RN50-L010
<b>Version:</b>	V1.0
<b>Date:</b>	20180604

- Preliminary Specification** 样品规格书
- Final Specification** 量产规格书

### Customer Confirmation 客户确认

Approved by	Notes

Please return one of the copies of the specification with your signature to us within two weeks after you receive this document. If it is not returned, we will assume that you agree to the entire contents of this specification document.

请贵司在收到规格书的两周内, 将签好字的规格书原件或者复印件寄回. 如果没有返回, 我司将会认为贵司已经默认接受产品规格书中的全部资料和规范.

### VIEWE Confirmation 优奕确认

Prepared by	Reviewed by	Approved by



## TABLE of CONTENTS

<b>1. GENERAL INFORMATION</b> .....	4
1.1 Features .....	4
1.2 Mechanical Specification .....	4
<b>2. ABSOLUTE MAXIMUM RATINGS</b> .....	5
<b>3. MECHANICAL DRAWING</b> .....	6
<b>4. I/O CONNECTION &amp; BLOCK DIAGRAM</b> .....	7
4.1 I/O Connection .....	7
4.2 Block Diagram .....	8
<b>5. ELECTRICAL CHARACTERISTICS</b> .....	9
5.1 TFT-LCD Panel Driving Section .....	9
5.2 Back Light Driving Section .....	9
5.3 Power On/Off Sequence.....	10
5.4 Timing Characteristics .....	10
5.5 Timing Diagram .....	11
<b>6. OPTICAL CHARACTERISTICS</b> .....	12
<b>7. RELIABILITY</b> .....	15
<b>8. PACKAGE DRAWING</b> .....	16

## 1. GENERAL INFORMATION

### 1.1 Features

- 1) Pixel Arrangement: RGB Vertical Stripe
- 2) Interface Mode: i80-system 16bit
- 3) Driver IC: -
- 4) Operation Temperature: -20~60°C
- 5) Storage Temperature: -30~70°C
- 6) Backlight Type: White LED
- 7) Display mode: Normally Black, Transmissive
- 8) Pixel Density: 165PPI
- 9) LED life time: 30,000 Hours

### 1.2 Mechanical Specification

Item 项目	Specification 规格	Unit 单位	Remark 备注
<b>Pixel Driving element</b>	A-Si TFT	-	
<b>Screen Size</b>	3.5	Inch	Diagonal
<b>Resolution</b>	320(W)*3(RGB)*480(H)	Dots	
<b>Interface</b>	i80-system 16bit	-	50PIN
<b>Module Power Consumption</b>	0.412	Watt	Typ.
<b>Active Area</b>	48.96(W)*73.44(H)	mm	
<b>Pixel pitch (W*H)</b>	0.051(W)*0.153(H)	mm	
<b>Module Size (W*H*D)</b>	54.5(W)*83(H)*2.1(D)	mm	Tolerance: ± 0.2
<b>Luminance</b>	300	cd/m <sup>2</sup>	Typ.
<b>Viewing Direction</b>	All	O'clock	
<b>Display Color</b>	262K	Colors	

## 2. ABSOLUTE MAXIMUM RATINGS

Item 项目	Symbol 符号	Min. 最小值	Max. 最大值	Unit 单位	Remark 备注
Power supply voltage	VCI	-0.3	3.3	V	Note1
LED forward current	I <sub>F</sub>	-0.001	30	mA	For each led,Note1
LED Reverse Voltage	V <sub>R</sub>	-	5	V	For each led,Note1
Operating temperature	T <sub>op</sub>	-20	60	°C	Note1,2
Storage temperature	T <sub>st</sub>	-30	70	°C	Note1,2
Humidity	H <sub>st</sub>	10	90	%RH	Note1,3

(T<sub>a</sub>=+25°C,GND=0V)

Note1:If the module exceeds the absolute maximum ratings, it may be damaged permanently. Also if the module operates with the absolute maximum ratings for a long time, the reliability may drop.

Note2: In case of temperature below 0°C, the response time of liquid crystal (LC) becomes slower and the color of panel darker than normal one.

Note3: Temp. ≤ 60°C , 90% RH MAX.

Temp. > 60°C , Absolute humidity shall be less than 90% RH.



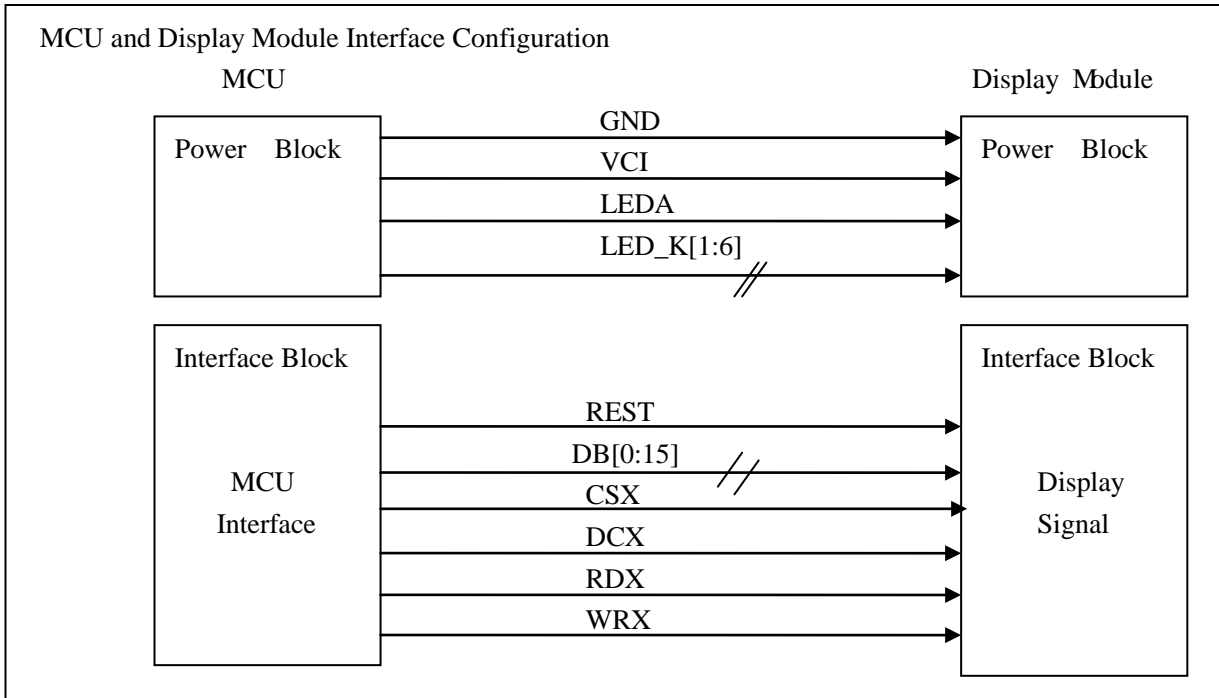
## 4. I/O CONNECTION & BLOCK DIAGRAM

### 4.1 I/O Connection

Pin No. 序号	Symbol 符号	I/O	Description 描述
1	GND	P	Power Ground
2-5	VCI	P	A supply voltage to the analog circuit
6-8	NC	-	Dummy
9	REST	I	Reset input signal
10-15	NC	-	Dummy
16-31	DB15-DB0	I/O	Data Bus
32	GND	P	Dummy
33-34	NC	-	Dummy
35	RDX	I	Read Data signal
36	WRX	I	Write Data/Command signal
37	DCX	I	Data/Command Selection pin
38	CSX	I	Chip select input signal
39-42	NC	-	Dummy
43	LED_A	P	Power supply for backlight anode
44-49	LED_K1-K6	P	Power supply for backlight cathode
50	GND	P	Power Ground

I: Input; O: Output; P: Power

## 4.2 Block Diagram





## 5. ELECTRICAL CHARACTERISTICS

### 5.1 TFT-LCD Panel Driving Section

Item 项目	Symbol 符号	Min. 最小值	Typ. 典型值	Max. 最大值	Unit 单位	Remark 备注
Power Supply Voltage	VCI	2.5	2.8	3.3	V	-
Power Supply Current	IvCI	-	10	-	mA	Note1
Logic Input High Voltage	V <sub>IH</sub>	0.7VCI	-	VCI	V	-
Logic Input Low Voltage	V <sub>IL</sub>	0	-	0.3VCI	V	-
Panel Power Consumption	PvCI	-	0.028	-	Watt	Note1
Module Power Consumption	PLCM	-	0.412	-	Watt	Note1,2

(Ta=+25°C,GND=0V)

Note1:Measurement Conditions (Video Mode): Full Screen Red Pattern,VCI=2.8V,60Hz Refresh.

Note2: PLCM= PvCI+ P<sub>B</sub>L, About P<sub>B</sub>L information, inference to 5.2 Back Light Driving Section.

### 5.2 Back Light Driving Section

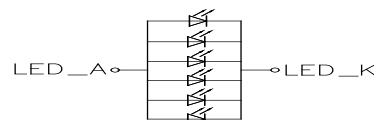
Item 项目	Symbol 符号	Min. 最小值	Typ. 典型值	Max. 最大值	Unit 单位	Remark 备注
Forward Voltage	V <sub>F</sub>	-	3.2	-	V	Note1
Forward Current	I <sub>F</sub>	-	120	-	mA	Note1
Backlight Power consumption	P <sub>B</sub> L	-	0.384	-	Watt	Note1
LED life time	-	30000	-	-	Hrs	Note2
LED Quantity			6		PCS	

(Ta=+25°C,GND=0V)

Note1: The LED driving condition is defined for each LED module (1 LED Serial, 6 LED Parallel)。

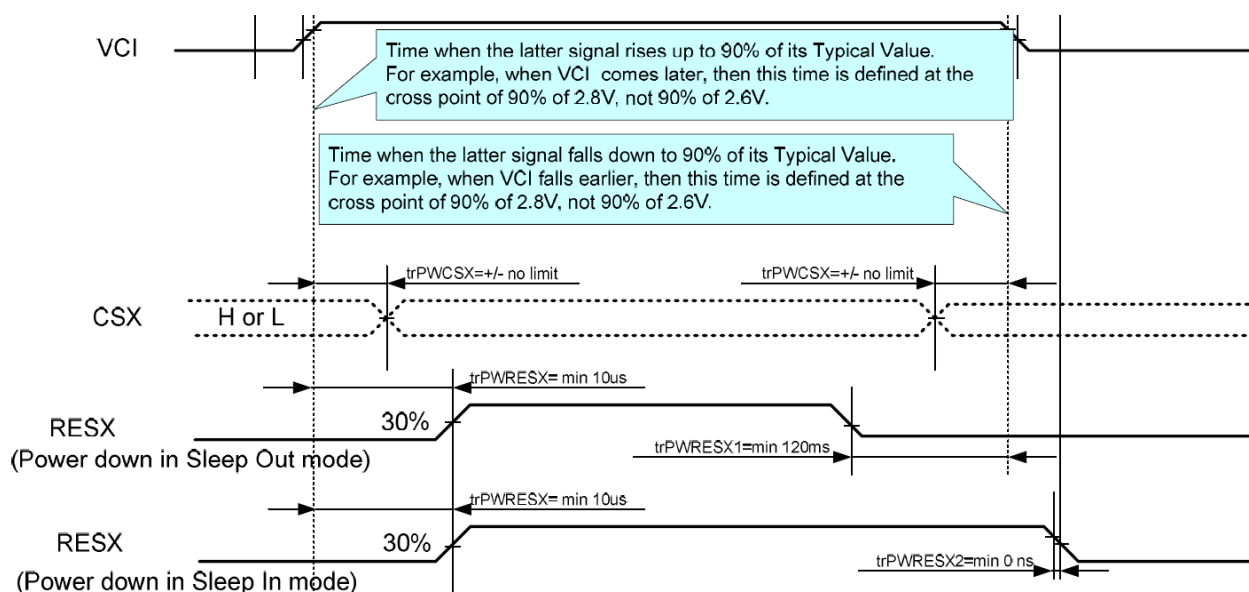
For each LED : I<sub>F</sub>=20mA,V<sub>F</sub>=3.2V(Typ.)/3.4V(Max.),Ta=25°C。

Note2:The “LED life time” is defined as the module brightness decrease to 50% of original brightness at I<sub>LED</sub>=20mA(Per Led). The LED life time could be decreased if operating I<sub>LED</sub> is larger than 20mA.



BACKLIGHT CIRCUIT DIAGRAM 20mA/LED (6LED)  
 LED V<sub>f</sub>: 3.2V(TYP)  
 I<sub>f</sub>: 6\*20=120mA  
 背光电路图  
 (CIRCUIT DIAGRAM)

## 5.3 Power On/Off Sequence



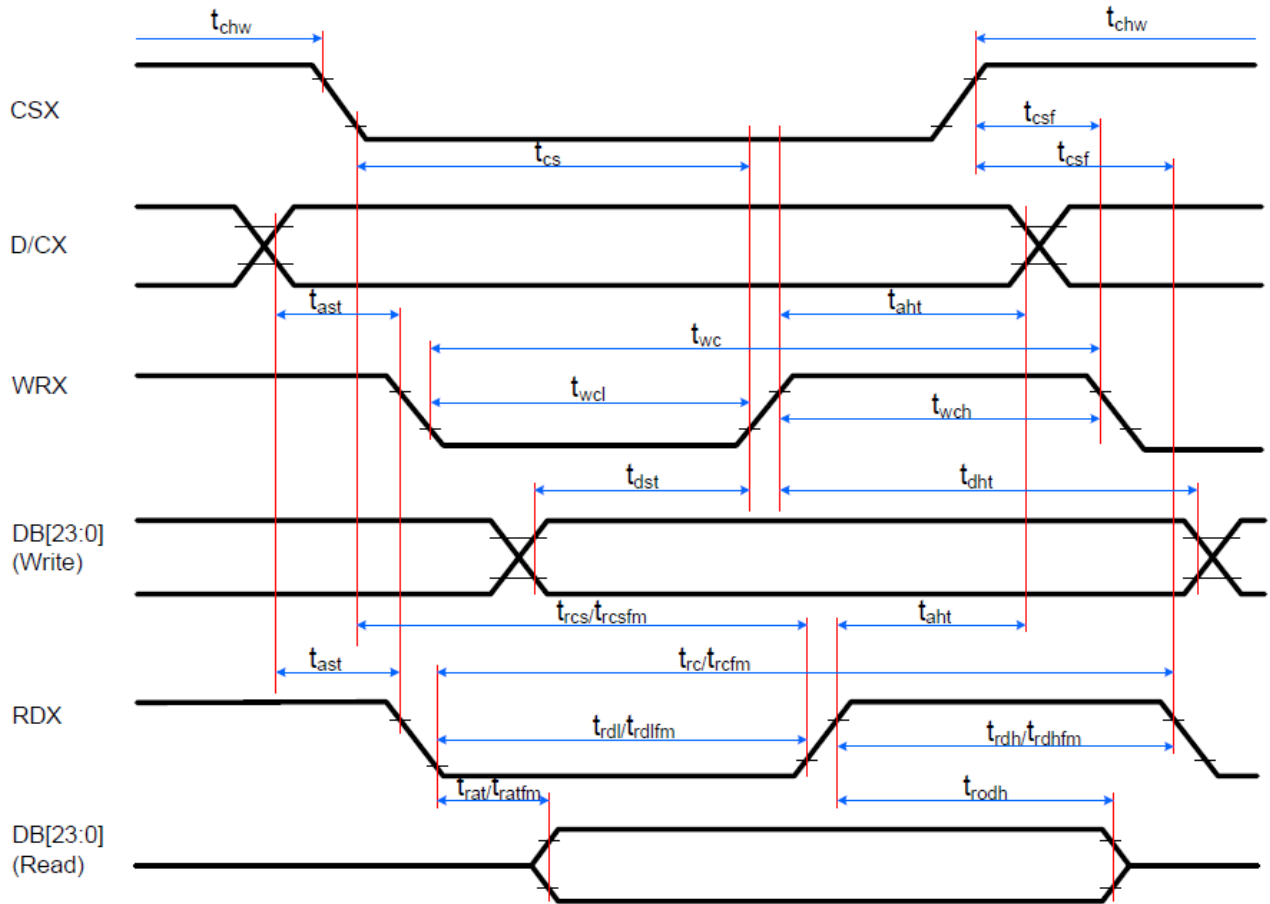
## 5.4 Timing Characteristics

Signal	Symbol	Parameter	min	max	Unit	Description
DCX	tast	Address setup time	0	-	ns	-
	that	Address hold time (Write/Read)	0	-	ns	-
CSX	tchw	CSX "H" pulse width	0	-	ns	-
	tcs	Chip Select setup time (Write)	15	-	ns	-
	trcs	Chip Select setup time (Read ID)	45	-	ns	-
	trcsfm	Chip Select setup time (Read FM)	355	-	ns	-
	tcsf	Chip Select Wait time (Write/Read)	0	-	ns	-
WRX	twc	Write cycle	40	-	ns	-
	twrh	Write Control pulse H duration	15	-	ns	-
	twrl	Write Control pulse L duration	15	-	ns	-
RDX (FM)	trcfm	Read Cycle (FM)	450	-	ns	When read from Frame Memory
	trdhfm	Read Control H duration (FM)	90	-	ns	
	trdlfm	Read Control L duration (FM)	355	-	ns	
RDX (ID)	trc	Read cycle (ID)	160	-	ns	When read ID data
	trdh	Read Control pulse H duration	90	-	ns	
	trdl	Read Control pulse L duration	45	-	ns	
DB [23:0], DB [17:0], DB [15:0], DB [8:0], DB [7:0]	tdst	Write data setup time	10	-	ns	For maximum, CL=30pF For minimum, CL=8pF
	tdht	Write data hold time	10	-	ns	
	trat	Read access time	-	40	ns	
	tratfm	Read access time	-	340	ns	
	trod	Read output disable time	20	80	ns	

(Ta=+25°C,GND=0V)



## 5.5 Timing Diagram



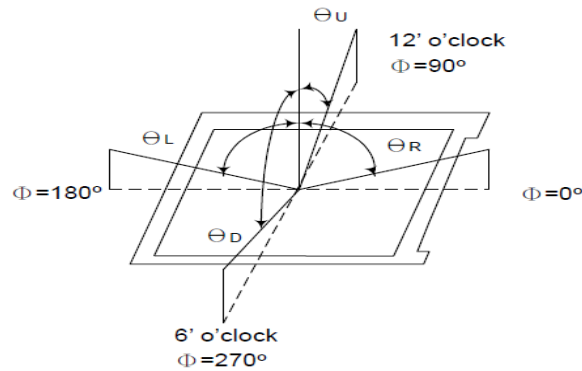
## 6. OPTICAL CHARACTERISTICS

Parameter 参数	Symbol 符号	Condition 条件	Min. 最小值	Typ. 典型值	Max. 最大值	Unit 单位	Remark 备注
Contrast Ratio	C/R	$\theta = 0^\circ$	-	700	-	-	Note(4)
NTSC Ratio	S	$\theta = 0^\circ$	-	69	-	%	Note(7)
Luminance	L	$\theta = 0^\circ$	-	300	-	cd/m <sup>2</sup>	Note(5)
Luminance uniformity	U <sub>w</sub>	$\theta = 0^\circ$	80	-	-	%	Note(3)
Response Time	T <sub>R+</sub> T <sub>F</sub>	25 °C	-	30	-	ms	Note(2)
Color Coordination	W <sub>X</sub>	$\theta = 0^\circ$ (Center) Normal viewing angle B/L On	-0.02	0.309	+0.02	NTSC (x,y)	Note(6)
	W <sub>Y</sub>			0.332			
	R <sub>X</sub>			0.660			
	R <sub>Y</sub>			0.325			
	G <sub>X</sub>			0.277			
	G <sub>Y</sub>			0.568			
	B <sub>X</sub>			0.145			
	B <sub>Y</sub>			0.072			
Viewing Angle	$\theta_L$	C/R>10	-	80	-	Degree	Note(1)
	$\theta_R$		-	80	-		
	$\theta_U$		-	80	-		
	$\theta_D$		-	80	-		

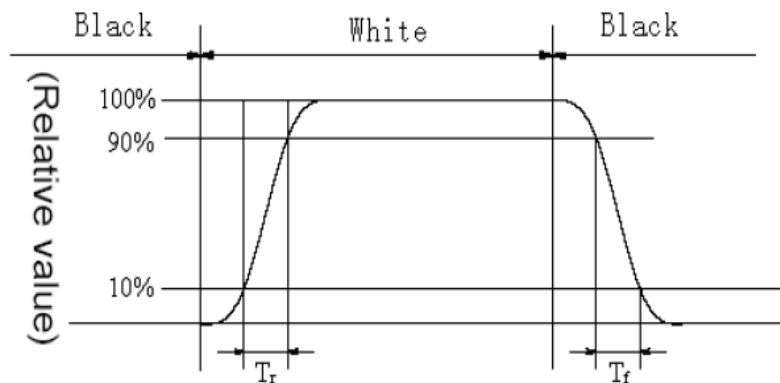
Test Conditions:

1. VCI=2.8V, I<sub>F</sub>=120mA (Backlight current), the ambient temperature is +25°C.
2. The test systems refer to Note 8.

**Note1:** Definition of Viewing Angle: The viewing angle range that the CR>10

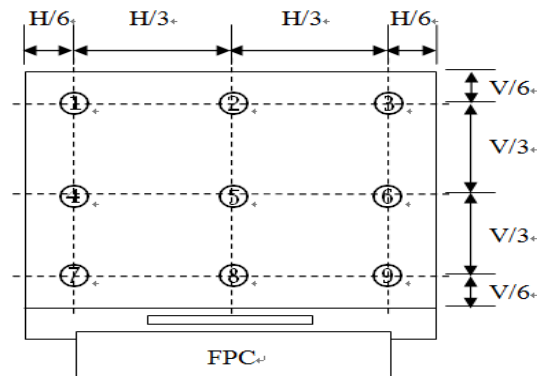


**Note2:** Definition of Response time: Sum of T<sub>R</sub> and T<sub>F</sub>



**Note 3:** Definition of Luminance Uniformity: Active area is divided into 9 measuring areas, every measuring point is placed at the center of each measuring area.

$$\text{Luminance Uniformity} = \frac{\text{Min Luminance of white among 9-points}}{\text{Max Luminance of white among 9-points}} \times 100\%$$



**Note4:** Definition of Contrast Ratio (CR): measured at the center point of panel

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

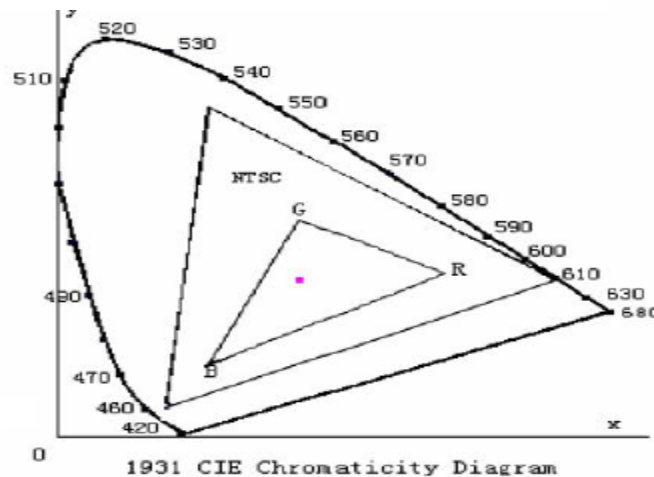
**Note 5:** Definition of Luminance: Center Luminance of white is defined as luminance values of 1point average across the LCD surface.

**Note 6:** Definition of Color Chromaticity (CIE 1931)

Color coordinates of white & red, green, blue measured at center point of LCD.

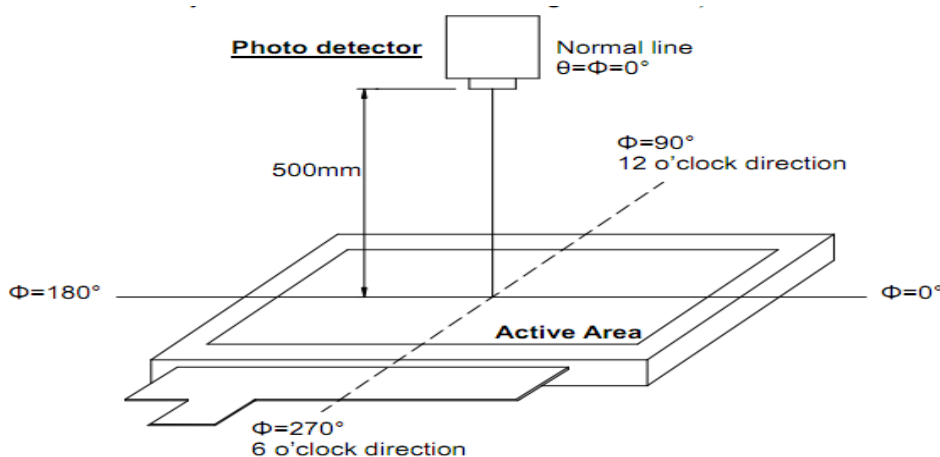
**Note 7:** Definition of NTSC ratio:

$$\text{NTSC ratio} = \frac{\text{Area of RGB triangle}}{\text{Area of NTSC triangle}}$$



**Note 8:** Definition of optical measurement system.

The optical characteristics should be measured in dark room. After 5 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, Field of view: 1°/Height: 500mm.)



## 7. RELIABILITY

Item 项目	Test Condition 测试条件	Remark 备注
High Temperature Storage	Ta =+70°C / 240Hours	Note1,2,3
Low Temperature Storage	Ta =-30°C / 240Hours	Note1,2,3
High Temperature Operating	Ta =+60°C / 240Hours	Note1,2,3
Low Temperature Operating	Ta =-20°C / 240Hours	Note1,2,3
Temperature Cycle storage Test	-30°C/30min ↔+70°C /30min for 30cycles,Transfer time less than 5min	Note2,3
Thermal humidity storage Test	60°C x 90%RH / 240Hours	Note2,3
Package Vibration Test	Frequency: 10Hz~55Hz,Amplitude:1.5mm, 1 hrs for each direction of X, Y, Z	Note2
Packing shock test	Drop to the ground from 60cm height, 1 corner, 3 edges, 6 surfaces.	Note2
ESD(Whole Machine)	Contact: ±8KV,Air: ±12KV 150PF/330Ω,5Points/panel,5times	Note4

### Inspection after Test:

Note1:Ta is the ambient temperature of samples.

Note 2: In the standard condition, there shall be no practical problem that may affect the display function. After the reliability test, the product only guarantees operation, but doesn't guarantee all the cosmetic specification.

Note 3: Before cosmetic and function tests , the product must have enough recovery time, at least 2 hours at room temperature.

Note 4: In case of malfunction defect caused by ESD damage, if it would be recovered to normal state after resetting, it would be judged as a good part.

Note5: The final interpretation of the above reliability test standard is owned by VIEWE.



## 8. PACKAGE DRAWING

