

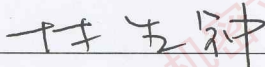
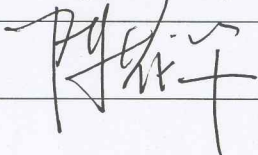
SPECIFICATION

DESCRIPTION: K490WD7-LJ330

ART NO: _____

Ver. 3.0

DATE: 2014.10.11

Approved by KTC		
Prepared by 编写	Checked by 审核	Approved by 批准
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深圳市康冠技术有限公司

Shenzhen KTC Technology Group Co., LTD

Address: Northern Wuhe Road, Banxuegang Industry Area, Buji, Shenzhen, China

TEL: +86-755-33610000 33615555 FAX: +86-755-33615559

<http://www.ktc.com.cn>

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深圳市康冠集团有限公司
SHENZHEN KTC TECHNOLOGY GROUP

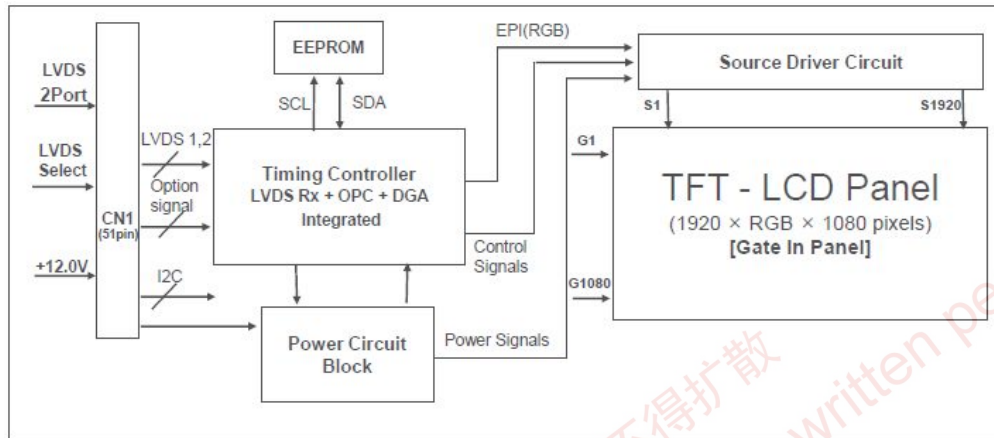
REVISION HISTORY

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1. GENERAL DESCRIPTION

1.1 OVERVIEW

K490WD7 is a 48.5 inch TFT Liquid Crystal Display module with LED Backlight unit and 2ch-LVDS interface. This module supports 1920*1080 Full HD mode and can display 16.7M colors (8-bit colors).



1.2 APPLICATION

- Home Alone Multimedia TFT-LCD TV
- Display Terminals for Control System
- High Definition TV(FHD TV)
- AV application Products

1.3 GENERAL SPECIFICATIONS

Item	Specification	Unit	No te
Active Area	48.5 inch (1232.0mm)diagonal	mm	(1)
Cell Size (glass)	1085.5(H) x 617.7 (V) x 1.4 (D)	mm	
Driver Element	a-si TFT active matrix	-	
Pixel Number	1920 x 1080	pixel	
Pixel Pitch (Sub Pixel)	0.5593 (H) x 0.5593 (V)	mm	
Pixel Arrangement	RGB stripe arrangement	-	
Display Colors	16.7M(8-bit)	color	
Cell Transmittance	6.93%		
Display Operation Mode	Transmissive mode / Normally black	-	
Power Consumption	Total Watt 78.7 (Logic=6.8W, Backlight=71.82W)	-	
Surface Treatment	Anti-glare, Haze1%, Hard Coating(3H)	-	

2. ABSOLUTE MAXIMUM RATINGS

2.1 ABSOLUTE RATINGS OF ENVIRONMENT

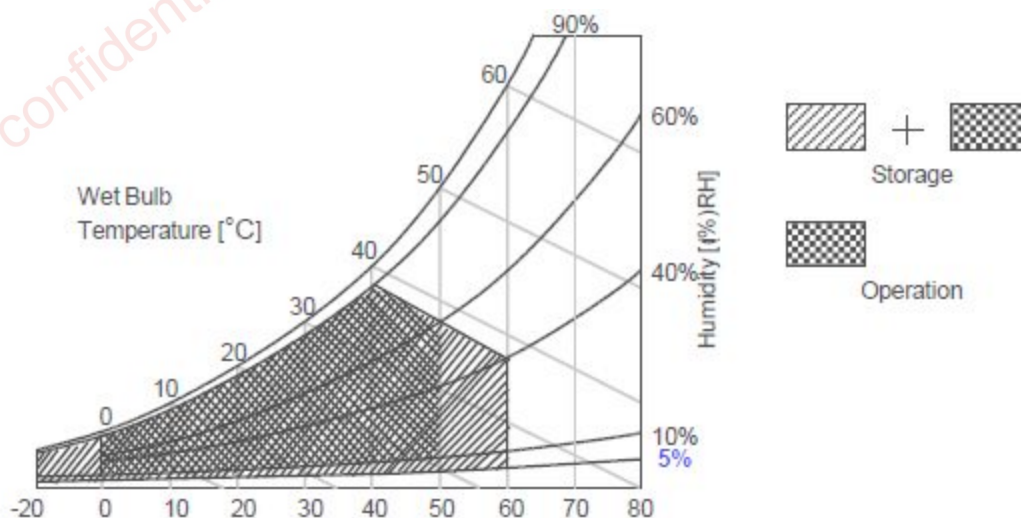
The followings are maximum values which, if exceeded, may cause damage to the unit.

Parameter		Symbol	Value		Unit	Note
			Min	Max		
Power Input Voltage	LCD Circuit	V _{LCD}	-0.3	+14.0	V _{DC}	1
T-Con Option Selection Voltage		V _{LOGIC}	-0.3	+4.0	V _{DC}	
Operating Temperature		T _{OP}	0	+50	°C	2,3
Storage Temperature(without packing)		T _{ST}	-20	+60	°C	
Panel Front Temperature		T _{SUR}	-	+68	°C	4
Operating Ambient Humidity		H _{OP}	10	90	%RH	2,3
Storage Humidity		H _{ST}	5	90	%RH	

2.2 ABSOLUTE RATINGS OF ENVIRONMENT

Note

- 1.Ambient temperature condition
- 2.Temperature and relative humidity range are shown in the figure below
Wet bulb temperature should be Max 39°C, and no condensation of water
- 3.Gravity mura can be guaranteed below 40°C condition
- 4.The maximum operating temperatures is based on the test condition that the surface temperature of display area is less than or equal to 68°C with LCD module alone in a temperature controlled chamber.thermal management should be considered in final product design to prevent the surface temperature of display area from being over 68°C.the range of operating temperature may be degraded in case of improper thermal management in final product design.



2.3 PACKAGE STORAGE

When storing modules as spares for a long time, the following precaution is necessary.

- (a) Do not leave the module in high temperature, and high humidity for a long time. It is highly recommended to store the module with temperature from 20 to 30°C at and 50±10%RH.
- (b) The module shall be stored in dark place. Do not store the TFT-LCD module in direct sunlight or fluorescent light.

3. ELECTRICAL CHARACTERISTICS

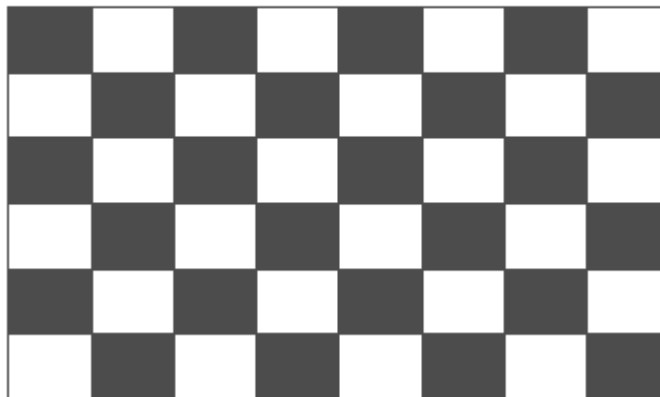
3.1 Open Cell Power Consumption

Parameter		Symbol	Value			Unit	Note
			Min	Typ	Max		
Circuit :							
Power Input Voltage		V _{LCD}	10.8	12.0	13.2	V _{DC}	
Power Input Current		I _{LCD}	-	290	377	mA	1
			-	400	520	mA	2
T-CON Option Selection Voltage	Input High Voltage	V _{IH}	2.7	-	3.6	V _{DC}	
	Input Low Voltage	V _{IL}	0	-	0.7	V _{DC}	
Power Consumption		P _{LCD}	-	3.5	4.5	Watt	1
Rush current		I _{RUSH}	-	-	5.0	A	3

Note:

1. The specified current and power consumption are under the V_{LCD}=12.0V, T_a=25±2° C, f_V=60Hz condition, and mosaic pattern(8 x 6) is displayed and f_V is the frame frequency.
2. The current is specified at the maximum current pattern.
3. The duration of rush current is about 2ms and rising time of power input is 0.5ms (min.).
4. Ripple voltage level is recommended under ± 5% of typical voltage

White : 255 Gray
Black : 0 Gray



3.2 Interface Connections

This LCD module employs two kinds of interface connection, 51-pin connector is used for the module electronics.

No	Symbol	Description	No	Symbol	Description
1	NC or GND	No Connection or Ground	27	NC	No connection
2	NC	No Connection (Note 4)	28	R2AN	SECOND LVDS Receiver Signal (A-)
3	NC	No Connection (Note 4)	29	R2AP	SECOND LVDS Receiver Signal (A+)
4	NC	No Connection (Note 4)	30	R2BN	SECOND LVDS Receiver Signal (B-)
5	NC	No Connection (Note 4)	31	R2BP	SECOND LVDS Receiver Signal (B+)
6	NC	No Connection (Note 4)	32	R2CN	SECOND LVDS Receiver Signal (C-)
7	LVDS Select	'H' = JEIDA, 'L' or NC = VESA	33	R2CP	SECOND LVDS Receiver Signal (C+)
8	NC	No Connection (Note 4)	34	GND	Ground
9	NC	No Connection (Note 4)	35	R2CLKN	SECOND LVDS Receiver Clock Signal(-)
10	NC	No Connection (Note 4)	36	R2CLKP	SECOND LVDS Receiver Clock Signal(+)
11	GND	Ground	37	GND	Ground
12	R1AN	FIRST LVDS Receiver Signal (A-)	38	R2DN	SECOND LVDS Receiver Signal (D-)
13	R1AP	FIRST LVDS Receiver Signal (A+)	39	R2DP	SECOND LVDS Receiver Signal (D+)
14	R1BN	FIRST LVDS Receiver Signal (B-)	40	NC	No connection
15	R1BP	FIRST LVDS Receiver Signal (B+)	41	NC	No connection
16	R1CN	FIRST LVDS Receiver Signal (C-)	42	NC or GND	No Connection or Ground
17	R1CP	FIRST LVDS Receiver Signal (C+)	43	NC or GND	No Connection or Ground
18	GND	Ground	44	GND	Ground (Note 5)
19	R1CLKN	FIRST LVDS Receiver Clock Signal(-)	45	GND	Ground
20	R1CLKP	FIRST LVDS Receiver Clock Signal(+)	46	GND	Ground
21	GND	Ground	47	NC	No connection
22	R1DN	FIRST LVDS Receiver Signal (D-)	48	VLCD	Power Supply +12.0V
23	R1DP	FIRST LVDS Receiver Signal (D+)	49	VLCD	Power Supply +12.0V
24	NC	No connection	50	VLCD	Power Supply +12.0V
25	NC	No connection	51	VLCD	Power Supply +12.0V
26	NC or GND	No Connection or Ground	-	-	-

Note

1. All GND pins should be connected together to the LCD module's metal frame
2. All V_{LCD} pins should be connected together
3. All Input levels of LVDS signals are based on the EIA 644 Standard.
4. #1~#6 & #8~#10 NC (No Connection): These pins are used only for LGD (Do not connect)
5. Specific pin No. #44 is used for "No signal detection" of system signal interface. It should be GND for NSB (No Signal Black) during the system interface signal is not. If this pin is "H", LCD Module displays AGP (Auto Generation Pattern).

3.3 BACKLIGHT UNIT

LED LIGHTBAR UNIT CHARACTERISTICS (Ta = 25 ± 2 °C)

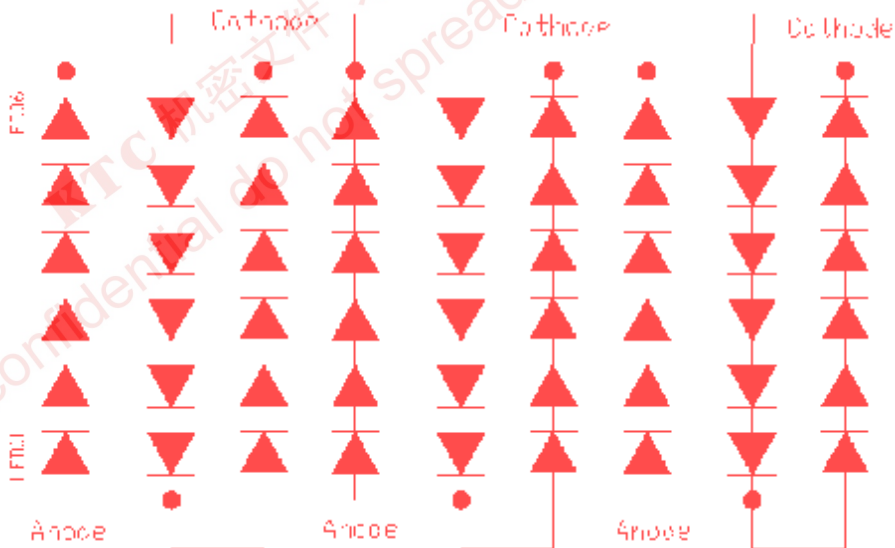
Parameter	Symbol	Value			Unit	Note
		Min.	Typ.	Max.		
Light bar input Voltage	V	54	-	68.4	V _{RMS}	/ch
	△V _{op}	-	-	3.0	V	(2)
Light bar input current	I _L	-	335	350	mA	/ch
Power consume	W	-	-	23.94	W	/ch
Light bar Life Time	L _{BL}	30000	-	-	Hrs	(1)

Note (1) The lifetime is defined as the time which luminance of the LED decays to 50% compared to the initial value, Operating condition: Continuous operating at $T_a = 25 \pm 2^\circ\text{C}$, $I_L = 335\text{mA}$.

Note(2) V_f variation of each string is Max. 3.0V in 1 BLU Set. (3 Strings)

The pin configuration for the housing and leader wire is shown in the table below.

Pin No	symbol	Description	Wire Color
1	VLED-	Channel 1 Current Feed Back	White
2			
3	VLED-	Channel 2 Current Feed Back	White
4			
5	VLED-	Channel 3 Current Feed Back	White
6			
7			
8			
9			
10			
11	VLED+	LED Power Supply	Red
12	VLED+	LED Power Supply	Red
13	VLED+	LED Power Supply	Red



LED Numbers: 6pcs/bar , 9bar/BLU.

4.0 INPUT TERMINAL PIN ASSIGNMENT

4.1 Signal Timing Specifications

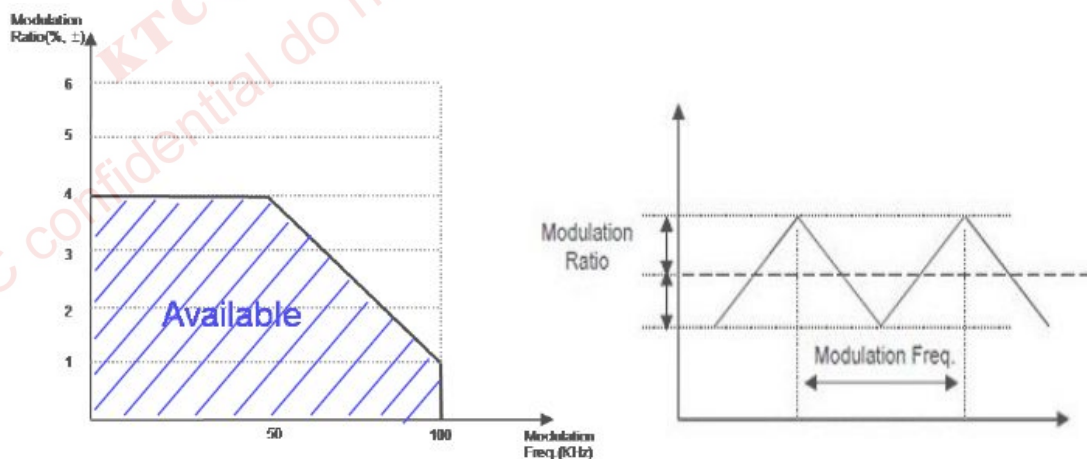
The signal timing required at the input of the LVDS transmitter. All of the interface signal timings should be satisfied with the following specification for normal operation

ITEM		Symbol	Min	Typ	Max	Unit	notes
Horizontal	Display Period	t _{HV}	960	960	960	tCLK	1920 / 2
	Blank	t _{HB}	100	140	240	tCLK	1
	Total	t _{HP}	1060	1100	1200	tCLK	
Vertical	Display Period	t _{VV}	1080	1080	1080	Lines	
	Blank	t _{VB}	20	45	300	Lines	1
	Total	t _{VP}	1100	1125	1380	Lines	

ITEM		Symbol	Min	Typ	Max	Unit	notes
Frequency	DCLK	f _{CLK}	60.00	74.25	78.00	MHz	
	Horizontal	f _H	57.3	67.5	70	KHz	2
	Vertical	f _V	47	60	63	Hz	2

Notes:

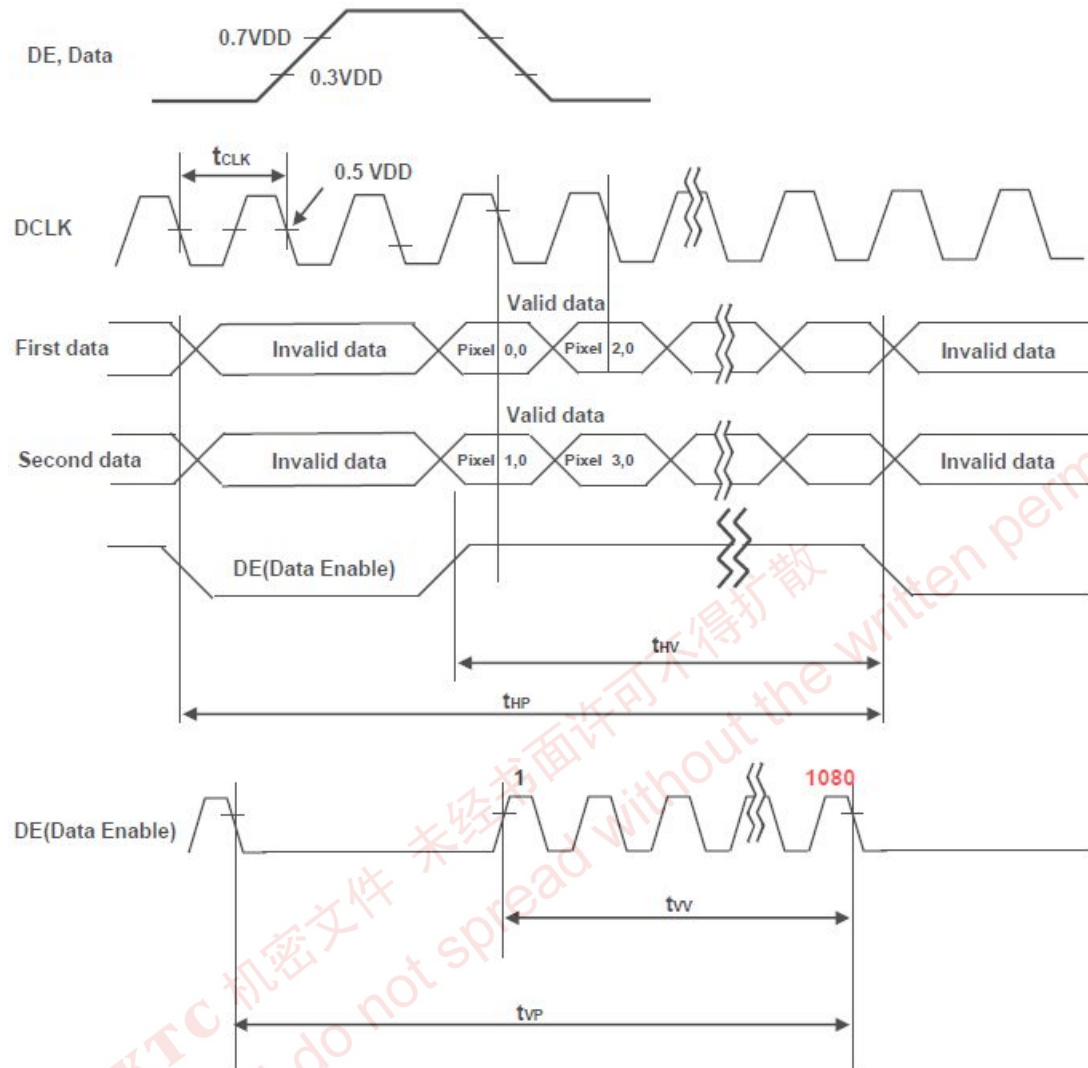
1. The input of HSYNC & VSYNC signal does not have an effect on normal operation (DE Only Mode). If you use spread spectrum of EMI, add some additional clock to minimum value for clock margin.
2. The performance of the electro-optical characteristics may be influenced by variance of the vertical refresh rate and the horizontal frequency
3. Spread Spectrum Rate (SSR) for 50KHz ~ 100kHz Modulation Frequency(FMOD) is calculated by $(7 - 0.06 * F_{mod})$, where Modulation Frequency (FMOD) unit is KHz. LVDS Receiver Spread spectrum Clock is defined as below figure



Please pay attention to the followings when you set Spread Spectrum Rate(SSR) and Modulation Frequency(FMOD)

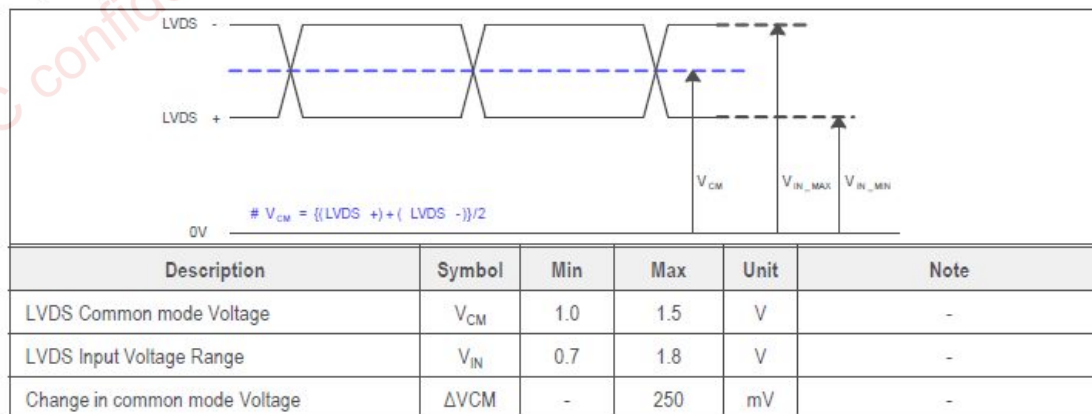
1. Please set proper Spread Spectrum Rate(SSR) and Modulation Frequency (FMOD) of TV system LVDS output.
2. Please check FOS after you set Spread Spectrum Rate(SSR) and Modulation Frequency(FMOD) to avoid abnormal display. Especially, harmonic noise can appear when you use Spread Spectrum

4.2 LVDS Signal Specification

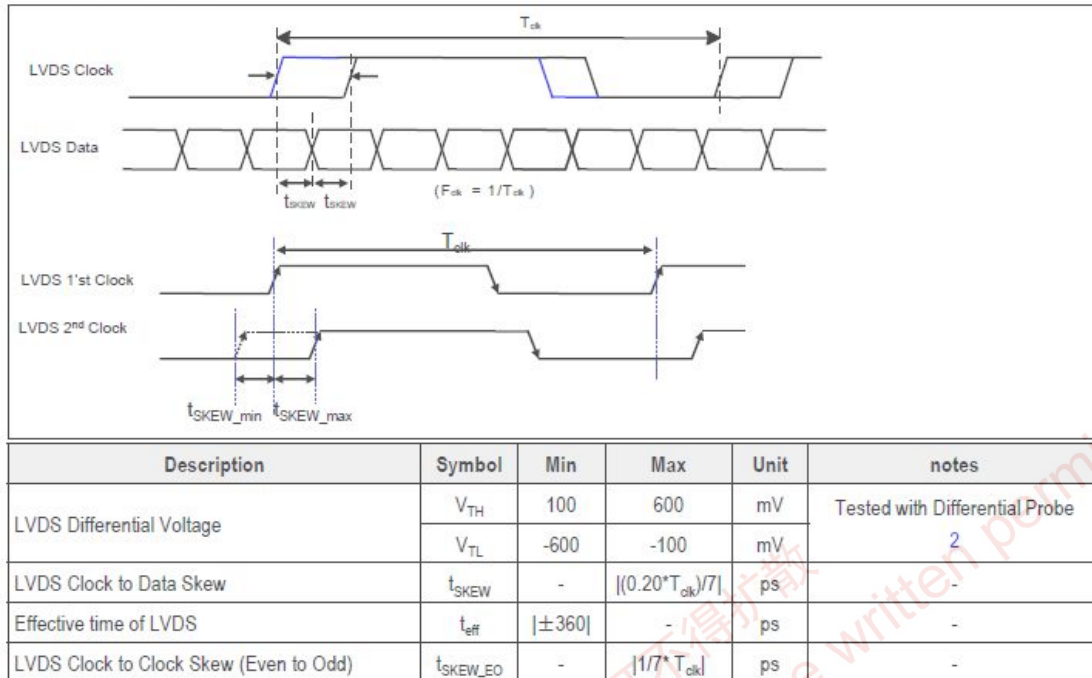


4.3 LVDS Input Signal Characteristics

1) DC Specification

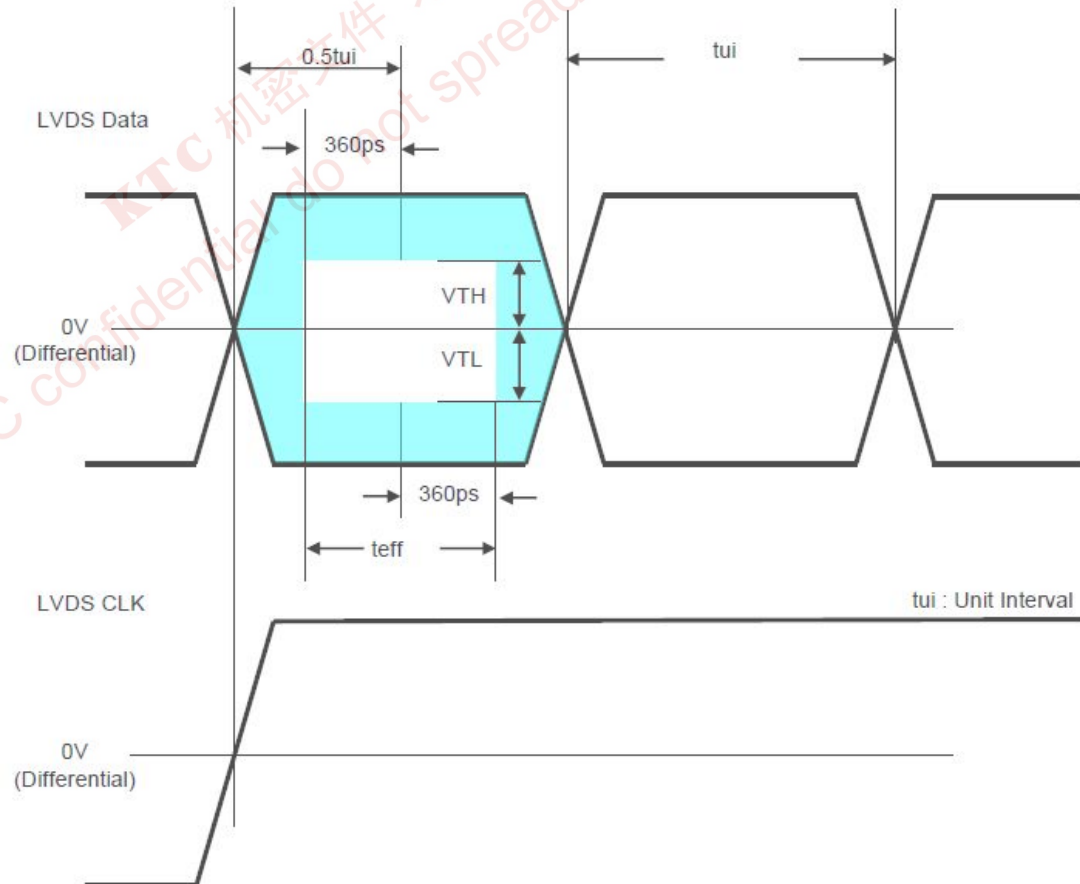


2) AC Specification



Note

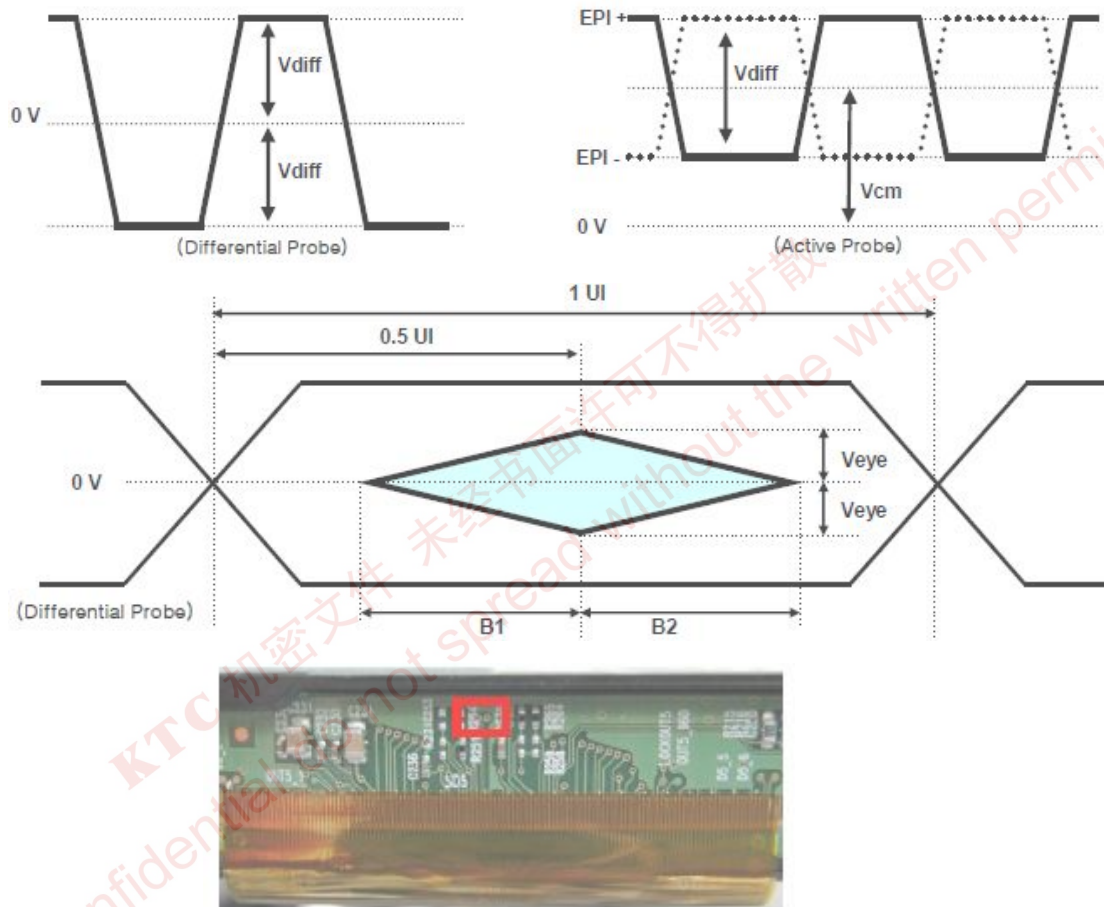
1. All Input levels of LVDS signals are based on the EIA 644 Standard.
2. LVDS Differential Voltage is defined within t_{eff}



5. INTERFACE TIMING

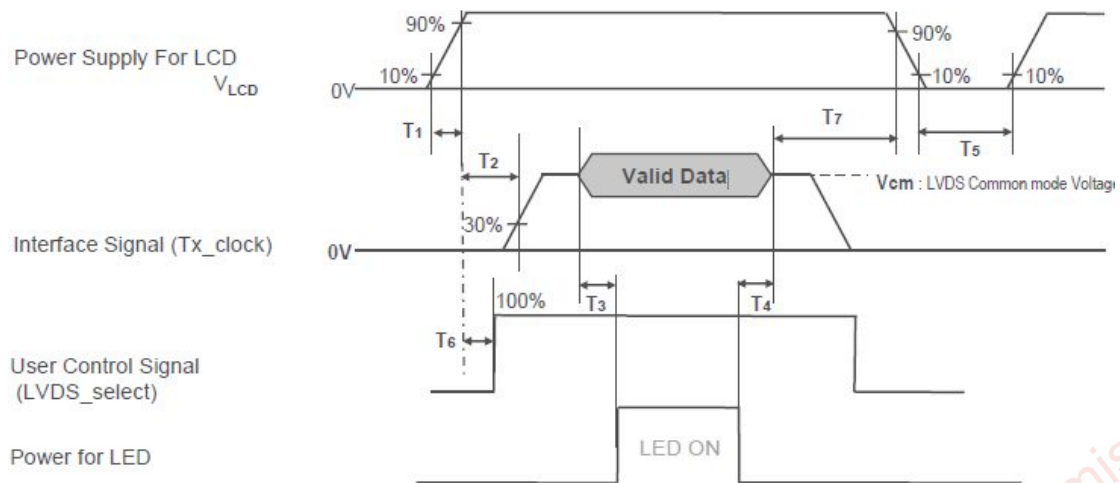
5.1 Intra interface Signal Specification

Parameter	Symbol	Condition	MIN	TYP	MAX	Unit	notes
Logic & EPI Power Voltage	VCC	-	1.62	1.8	1.98	V _{bc}	
EPI input common voltage	VCM	LVDS Type	0.8	VCC/2	1.3	V	
EPI input differential voltage	V _{diff}	-	150	-	500	mV	
EPI Input eye diagram	Veye	-	90	-	-	mV	



5.2 POWER ON/OFF SEQUENCE

To prevent a latch-up or DC operation of the Open cell, the power on/off sequence should be as the diagram below.



Parameter	Value			Unit	Notes
	Min	Typ	Max		
T1	0.5	-	20	ms	1
T2	0	-	-	ms	2
T3	400	-	-	ms	3
T4	100	-	-	ms	3
T5	1.0	-	-	s	4
T6	0	-	T2	ms	5
T7	0	-	-	ms	6

Note

- Even though T1 is over the specified value, there is no problem if I2T spec of fuse is satisfied.
 - If T2 is satisfied with specification after removing LVDS Cable, there is no problem.
 - The T3 / T4 is recommended value, the case when failed to meet a minimum specification, abnormal display would be shown. There is no reliability problem.
 - T5 should be measured after the Module has been fully discharged between power off and on period.
 - If the on time of signals (Interface signal and user control signals) precedes the on time of Power (V_{LCD}), it will be happened abnormal display. When T6 is NC status, T6 doesn't need to be measured.
 - It is recommendation specification that T7 has to be 0ms as a minimum value.
- ※Please avoid floating state of interface signal at invalid period.
 ※When the power supply for LCD (V_{LCD}) is off, be sure to pull down the valid and invalid data to 0V

5.3 Color Data Reference

The brightness of each primary color(red,green,blue) is based on the 8bit gray scale data input for the color.The higher binary input, the brighter the color. Table 6 provides a reference for color versus data input.

Color		Input Color Data																							
		RED								GREEN								BLUE							
		MSB				LSB				MSB				LSB				MSB				LSB			
		R7	R6	R5	R4	R3	R2	R1	R0	G7	G6	G5	G4	G3	G2	G1	G0	B7	B6	B5	B4	B3	B2	B1	B0
Basic Color	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red (255)	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Green (255)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	Blue (255)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	Cyan	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Magenta	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	Yellow	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	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	1	1	1	1	1	1
RED	RED (000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RED (001)	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	...	...								...								...							
	RED (254)	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RED (255)	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GREEN	GREEN (000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GREEN (001)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
	...	...								...								...							
	GREEN (254)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0
	GREEN (255)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
BLUE	BLUE (000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	BLUE (001)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
	...	...								...								...							
	BLUE (254)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0
	BLUE (255)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1

6. OPTICAL CHARACTERISTICS

6.1 TEST CONDITIONS

Item	Symbol	Value	Unit
Ambient temperature	Ta	25±2	°C
Ambient humidity	Ha	50±10	%RH
Supply voltage	Vcc	12.0	V
Input signal	According to typical value in "3. ELECTRICAL CHARACTERISTICS"		
Vertical Refresh Rate	F _R	120	Hz

The LCD module should be stabilized at given temperature for 1 hour to avoid abrupt temperature change during measuring in a windless room.

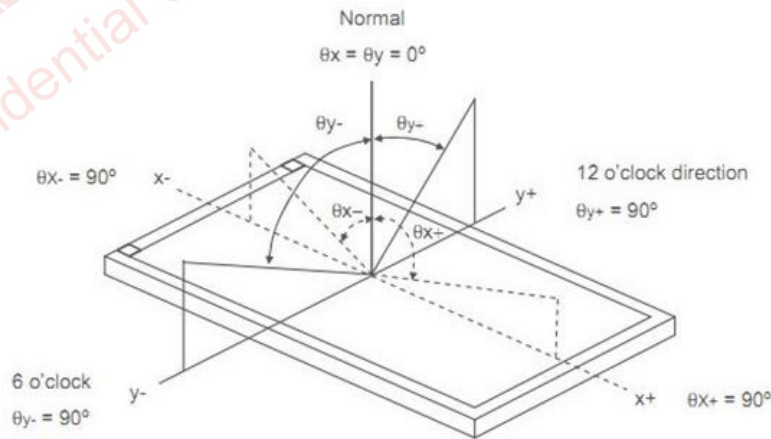
6.2 OPTICAL SPECIFICATIONS

The relative measurement methods of optical characteristics are shown as below. The following items should be measured under the test conditions described in 6.1 and stable environment shown in 6.1.

Item		Symbo l	condition	Min	Typ	Max	Unit	Note
Contrast Ratio		CR	$\theta_x=0^\circ$, $\theta_y=0^\circ$ Viewing Angle at Normal Direction	800	1200	-	-	(2)
Response Time		G toG		-	9	12	ms	(3)
Center Luminance of White		L _C		280	330	-	nit	(4)
White Variation		δW		-	-	1.53	-	(6)
Color Chroma ticity	White	W _x		Typ.- 0.03	0.270	Typ.+ 0.03	-	(5)
		W _y			0.290		-	
	Color Gamut	CG	62	65	-	%	NTSC	
Viewing Angle	Horizontal	θ _{x+}	CR≥10	-	89	-	Deg.	(1)
		θ _{x-}		-	89	-		
	Vertical	θ _{y+}		-	89	-		
		θ _{y-}		-	89	-		
Cell Transmittance		T%	-	6.93	-	%	(7)	

Note (1) Definition of Viewing Angle (θ_x , θ_y):

Viewing angle is the angle at which the contrast ratio is greater than 10. The angles are determined for the horizontal or x axis and the vertical or y axis with respect to the z axis which is normal to the LCD module surface.



Note (2) Definition of Contrast Ratio (CR):

The contrast ratio can be calculated by the following expression.

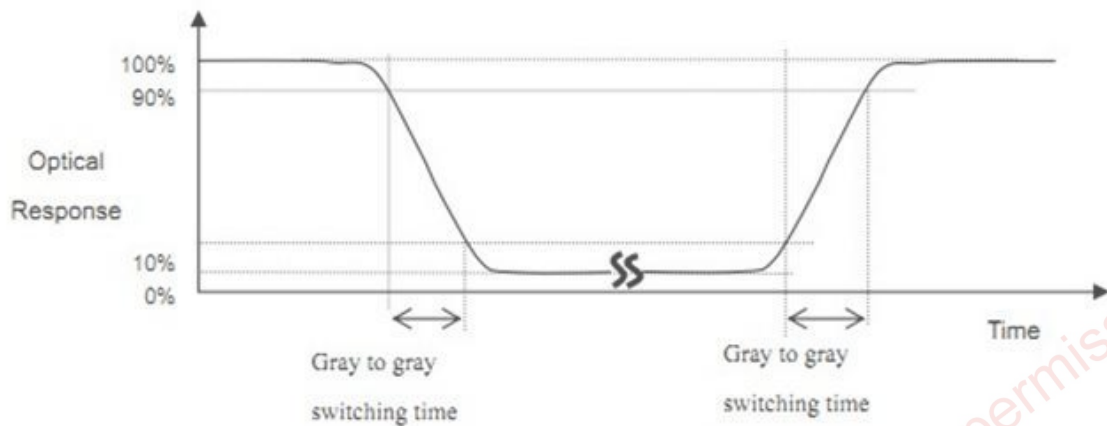
Contrast Ratio (CR) = L_{255} / L_0

L_{255} : Luminance of gray level 255

L_0 : Luminance of gray level 0

CR = CR (5), where CR (X) is corresponding to the Contrast Ratio of the point X at the figure in Note (6).

Note (3) Definition of Gray to Gray Switching Time:



The driving signal means the signal of luminance 0%,20%,40%,60%,80%,100%.

Gray to gray average time means the average switching time of luminance 0% 20%,40%,60%,80%,100% to each other.

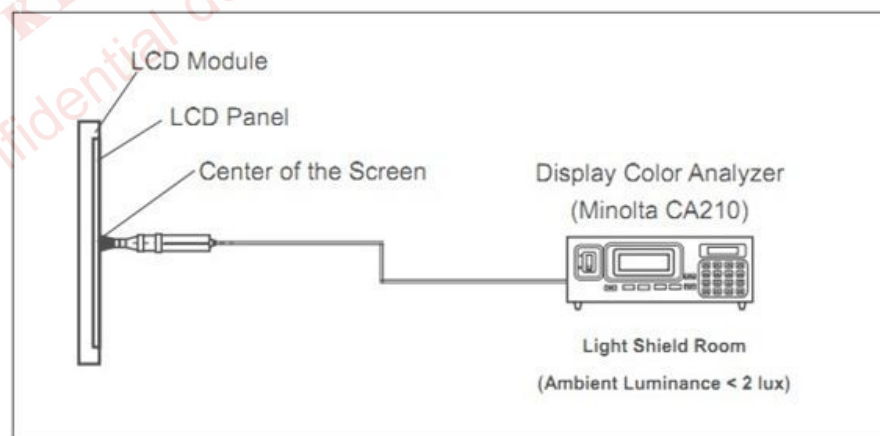
Note (4) Definition of Luminance of White (LC):

Measure the luminance of gray level 255 at center point and 5 points

LC = L (5), where L (X) is corresponding to the luminance of the point X at the figure in Note (6)

Note (5) Measurement Setup:

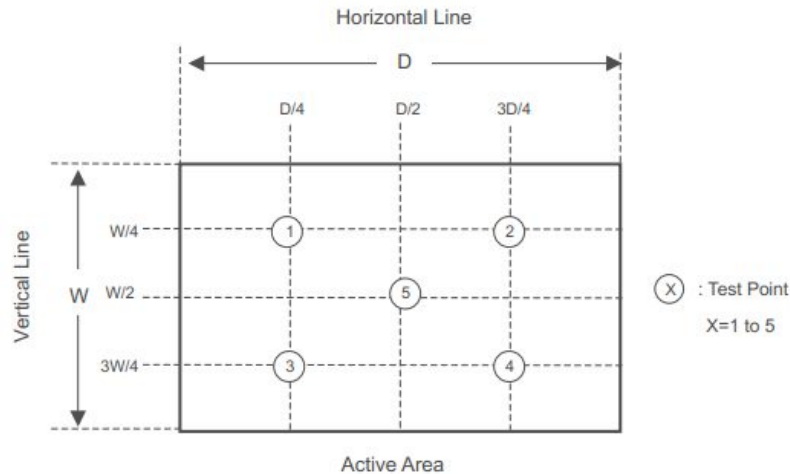
The LCD module should be stabilized at given temperature for 30 minutes to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting Backlight for 30 minutes in a windless room.



Note (6) Definition of White Variation (δW) :

Measure the luminance of gray level 255 at 5 points

$\delta W = \text{Maximum} [L (1), L (2), L (3), L (4), L (5)] / \text{Minimum} [L (1), L (2), L (3), L (4), L (5)]$



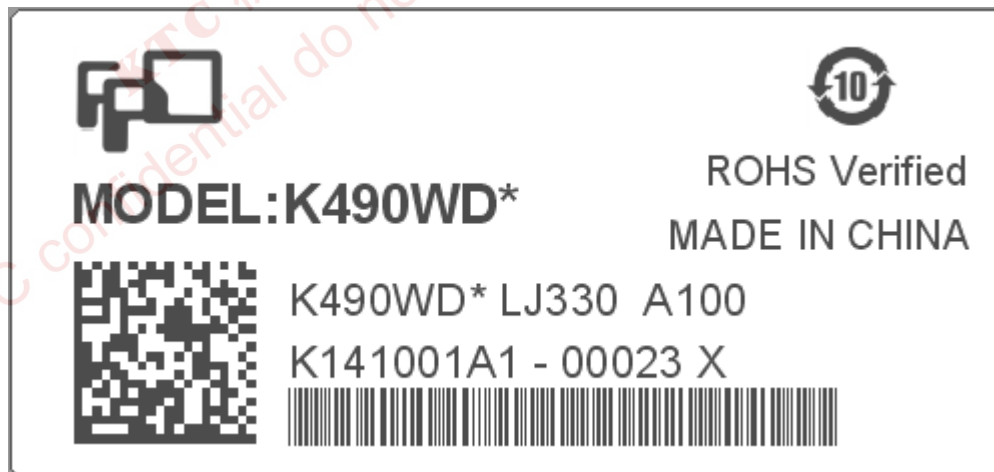
Note (7) Definition of Transmittance (T%):

$$\text{Transmittance} = \frac{\text{Luminance of LCD module}}{\text{Luminance of backlight}} * 100\%$$

7. DEFINITION OF LABELS

KTC LCD MODULE LABEL

The barcode nameplate is pasted on each module as illustration, and its definitions are as following explanation.



Model Name: K490WD*

K490WD*:"K"means"KTC", "490WD"means"Backlight size", "*"means"Internal number", "L*****" is KTC's Internal code.

8. RELIABILITY

ENVIRONMENT TEST CONDITION

Test item	Condition
High temperature storage test	Ta= 60℃ 240h
Low temperature storage test	Ta= -20℃ 240h
High temperature operation test	Ta= 50℃ 240h
Low temperature operation test	Ta= 0℃ 240h
Vibration test (non-operating)	Vibration level : 1.0Grms Bandwidth : 10-55Hz Duration : X,Y,Z, 10 min One time each direction
Humidity condition Operation	Ta= 40℃ ,90%RH

Note : Before and after Reliability test, LCM should be operated with normal function.

9. PRECAUTIONS

9.1 ASSEMBLY AND HANDLING PRECAUTIONS

- (1) Do not apply rough force such as bending or twisting to the module during assembly.
- (2) It is recommended to assemble or to install a module into the user's system in clean working areas. The dust and oil may cause electrical short or worsen the polarizer.
- (3) Do not apply pressure or impulse to the module to prevent the damage of LCD panel and backlight.
- (4) Always follow the correct power-on sequence when the LCD module is turned on. This can prevent the damage and latch-up of the CMOS LSI chips.
- (5) Do not plug in or pull out the I/F connector while the module is in operation.
- (6) Do not disassemble the module.
- (7) Use a soft dry cloth without chemicals for cleaning, because the surface of polarizer is very soft and easily scratched.
- (8) Moisture can easily penetrate into LCD module and may cause the damage during operation.
- (9) High temperature or humidity may deteriorate the performance of LCD module. Please store LCD modules in the specified storage conditions.

9.2 SAFETY PRECAUTIONS

- (1) The operation voltage of a backlight is over 60 Volts. It may cause an electrical shock while assembling with the power. Do not disassemble the module or insert anything into the backlight unit.
- (2) 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, skin or clothes, it has to be

washed away thoroughly with soap.

- (3) After the module's end of life, it is not harmful in case of normal operation and storage.

9.3 STORAGE PRECAUTIONS

When storing modules as spares for a long time, the following precaution is necessary.

- (1) Do not leave the module in high temperature, and high humidity for a long time. It is highly recommended to store the module with temperature from 0 to 35°C at normal humidity without condensation.
- (2) The module shall be stored in dark place. Do not store the TFT-LCD module in direct sunlight or fluorescent light.