



**SPECIFICATION
FOR
LCM Module
KD050WVFLA022-RT**

MODULE:	KD050WVFLA022-RT
CUSTOMER:	

REV	DESCRIPTION	DATE
1.0	FIRST ISSUE	2017.11.17

STARTEK	INITIAL	DATE
PREPARED BY		
CHECKED BY		
APPROVED BY		

CUSTOMER	INITIAL	DATE
APPROVED BY		

Part. No	KD050WVFLA022-RT	REV	V1.0	Page 1 of 30
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常备库存
Stock For Sale

长期供货
Long Time supply

支持小量
NO MOQ

品种齐全
In Full Range



Revision History

[illegible]

Part. No	KD050WVFLA022-RT	REV	V1.0	Page 2 of 30
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Contents

1. Block Diagram	5
2. Outline dimension	6
3. Input terminal Pin Assignment	7
4. LCD Optical Characteristics	9
4.1 Optical specification	9
5. Electrical Characteristics	11
5.1 Absolute Maximum Rating (Ta=25 VSS=0V)	11
5.2 DC Electrical Characteristics	11
5.3 LED Backlight Characteristics	12
6. TP Feature	14
6.1 Conditions of use and storage	14
6.2 Electrical property	14
6.3 Mechanical property	15
6.4 Optical property	15
7. AC Characteristic	16
7.1 LVDS 6-bit vs. 8-bit mode	16
7.2 LVDS input timing	18
7.3 Reset timing	20
8. LCD Module Out-Going Quality Level	21
8.1 VISUAL & FUNCTION INSPECTION STANDARD	21
8.1.1 Inspection conditions	21
8.1.3 Sampling Plan	22
8.1.4 Criteria (Visual)	23
9. Reliability Test Result	28
9.1 Condition	28
10. Cautions and Handling Precautions	29
10.1 Handling and Operating the Module	29
10.2 Storage and Transportation	29
11. Packing	30

Part. No	KD050WVFLA022-RT	REV	V1.0	Page 3 of 30
----------	------------------	-----	------	--------------

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Stock For Sale

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*** Description**

This is a color active matrix TFT (Thin Film Transistor) LCD (liquid crystal display) that uses amorphous silicon TFT as a switching device. This model is composed of a Transmissive type TFT-LCD Panel, driver circuit, back-light unit. The resolution of a 5.0'TFT-LCD contains 800X480 pixels, and can display up to 65K/262K/16.7M colors.

*** Features**

-Low Input Voltage: 3.3V(TYP)

-Display Colors of TFT LCD: 65K/262K/16.7M colors

Interface: 6/8BIT LVDS

General Information Items	Specification	Unit	Note
	Main Panel		
Display area(AA)	108.0(H) *64.80(V) (5.0inch)	mm	-
Driver element	TFT active matrix	-	-
Display colors	65K/262K/16.7M	colors	-
Number of pixels	800(RGB)*480	dots	-
TFT Pixel arrangement	RGB vertical stripe	-	-
Pixel pitch	0.135(H) x 0.135 (V)	mm	-
Viewing angle	ALL	o'clock	-
TFT Controller IC	HX8678C/HX8249A	-	-
Display mode	Transmissive/Normally Black	-	-
Operating temperature	-30~+85	°C	-
Storage temperature	-40~+90	°C	-

*** Mechanical Information**

Item		Min.	Typ.	Max.	Unit	Note
Module size	Horizontal(H)		124.90		mm	-
	Vertical(V)		78.10		mm	-
	Depth(D)		4.05		mm	-
Weight			TBD		g	-

Part. No	KD050WVFLA022-RT	REV	V1.0	Page 4 of 30
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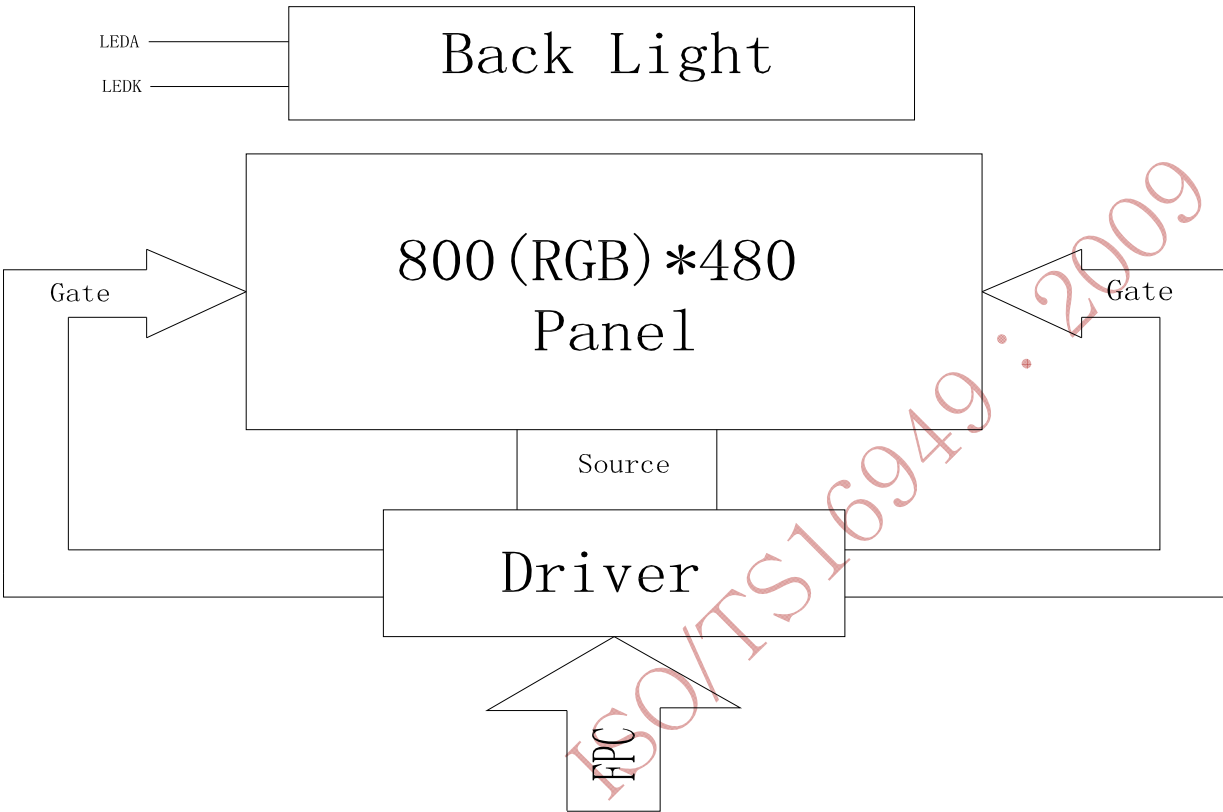
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1. Block Diagram



Part. No	KD050WVFLA022-RT	REV	V1.0	Page 5 of 30
常备库存 Stock For Sale	长期供货 Long Time supply	支持小量 NO MOQ	品种齐全 In Full Range	



3. Input terminal Pin Assignment

NO.	SYMBOL	DISCRIPTION	I/O
1	NC		
2	VDD	Supply voltage(3.3V).	P
3	VDD	Supply voltage(3.3V).	P
4	NC		
5	RESET	Reset pin. The chip is in reset state when RESET=0.	I
6	STBYB	Standby mode setting pin. The chip is in standby mode when S TBYB=0.	I
7	GND	Ground.	P
8	RXIN0-	- LVDS differential data input	I
9	RXIN0+	+ LVDS differential data input	I
10	GND	Ground.	P
11	RXIN1-	- LVDS differential data input	I
12	RXIN1+	+ LVDS differential data input	I
13	GND	Ground.	P
14	RXIN2-	- LVDS differential data input	I
15	RXIN2+	+ LVDS differential data input	I
16	GND	Ground.	P
17	RXCLKIN-	- LVDS differential clock input	I
18	RXCLKIN+	+ LVDS differential clock input	I
19	GND	Ground.	P
20	RXIN3-	- LVDS differential data input	I
21	RXIN3+	+ LVDS differential data input	I
22	GND	Ground.	P
23	NC		
24	NC		
25	GND	Ground.	P

Part. No	KD050WVFLA022-RT	REV	V1.0	Page 7 of 30
----------	------------------	-----	------	--------------

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长期供货
Long Time supply

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品种齐全
In Full Range



26	NC		
27	NC		
28	SLEB	Input data format selection. SLEB=0, 6-BIT SLEB=1, 8-BIT	I
29	NC		
30	GND	Ground.	I
31	LED-	LED Cathode	P
32	LED-	LED Cathode	P
33	L/R	Horizontal shift direction (source output) selection(NOTE1)	I
34	U/D	Vertical shift direction (gate output) selection(NOTE1)	I
35	XR(NC)	Touch panel Right Glass Terminal	A/D
36	YD(NC)	Touch panel Bottom Film Terminal	A/D
37	XL(NC)	Touch panel LIFT Glass Terminal	A/D
38	YU(NC)	Touch panel Top Film Terminal	A/D
39	LED+	LED Anode	P
40	LED+	LED Anode	P

NOTE1

L/R	1	Set left to right scan direction
L/R	0	Set right to left scan direction.
U/D	1	Set top to bottom scan direction
U/D	0	Set bottom to top scan direction

Part. No	KD050WVFLA022-RT	REV	V1.0	Page 8 of 30
----------	------------------	-----	------	--------------

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4. LCD Optical Characteristics

4.1 Optical specification

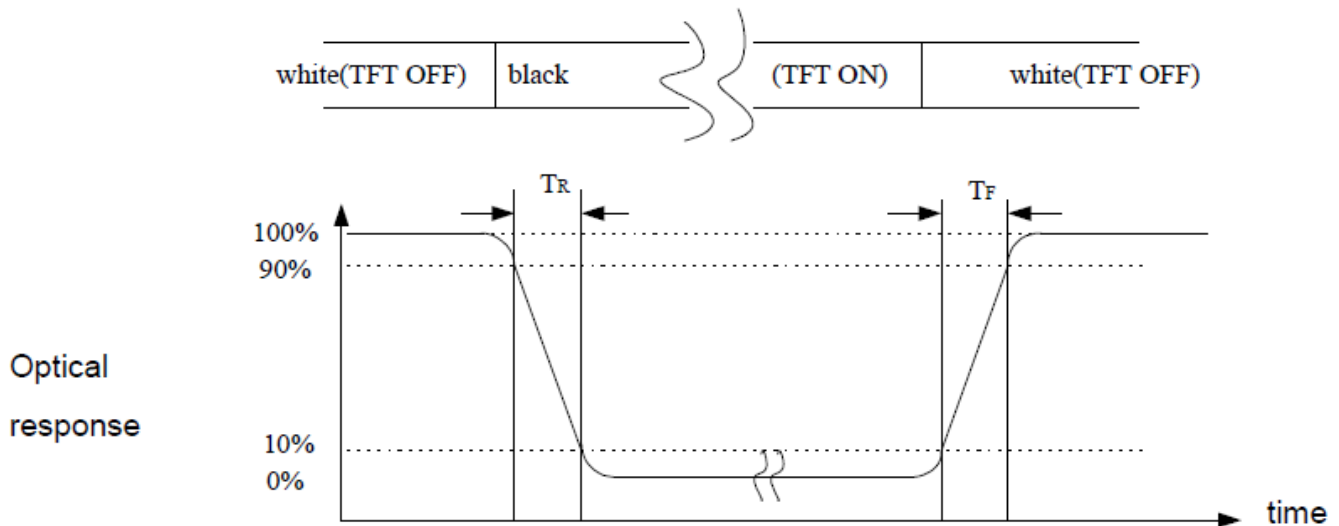
Item		Symbol	Condition	Min.	Typ.	Max.	Unit.	Note
Contrast Ratio		CR	$\Theta=0$ Normal viewing angle	--	1000	--		2
Response time	Rising	T_{R+T_F}		--	35	40	msec	3
	Falling			--				
Color gamut		S(%)		--	65.84	--	%	
Color Filter Chromaticity	White	W_X		0.275	0.325	0.365		
		W_Y		0.326	0.366	0.406		
	Red	R_X		0.579	0.619	0.659		
		R_Y		0.306	0.346	0.386		
	Green	G_X		0.286	0.326	0.366		
		G_Y		0.585	0.625	0.665		
	Blue	B_X		0.105	0.145	0.185		
		B_Y		0.045	0.085	0.125		
Viewing angle	Hor.	Θ_L	CR>10	--	85	--		
		Θ_R		--	85	--		
	Ver.	Θ_U		--	85	--		
		Θ_D		--	85	--		
		Option View Direction		Free				



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 T_R and T_F



Part. No	KD050WVFLA022-RT	REV	V1.0	Page 10 of 30
常备库存 Stock For Sale	长期供货 Long Time supply	支持小量 NO MOQ	品种齐全 In Full Range	



5. Electrical Characteristics

5.1 Absolute Maximum Rating (Ta=25 VSS=0V)

Characteristics	Symbol	Min.	Max.	Unit
Digital Supply Voltage	VDD	-0.3	4.0	V
Operating temperature	T _{OP}	-30	+85	°C
Storage temperature	T _{ST}	-40	+90	°C

NOTE: If the absolute maximum rating of even is one of the above parameters is exceeded even momentarily, the quality of the product may be degraded. Absolute maximum ratings, therefore, specify the values exceeding which the product may be physically damaged. Be sure to use the product within the range of the absolute maximum ratings.

5.2 DC Electrical Characteristics

Characteristics	Symbol	Min.	Typ.	Max.	Unit	Note
Digital Supply Voltage	VDD	3.0	3.3	3.6	V	
Normal mode Current consumption	IDD	--	65	--	mA	
Level input voltage	V _{IH}	0.7V _{DD}		VDD	V	
	V _{IL}	GND		0.3V _{DD}	V	
Level output voltage	V _{OH}	0.8VDD		VDD	V	
	V _{OL}	GND		0.2VDD	V	

Part. No	KD050WVFLA022-RT	REV	V1.0	Page 11 of 30
----------	------------------	-----	------	---------------

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5.3 LED Backlight Characteristics

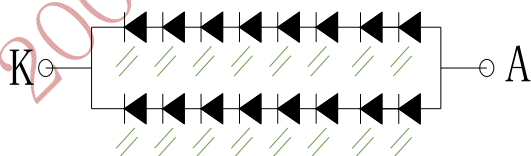
The back-light system is edge-lighting type with 16 chips White LED

Item	Symbol	Min.	Typ.	Max.	Unit	Note
Forward Current	I_F	30	40	--	mA	
Forward Voltage	V_F	--	25.6	--	V	
LCM Luminance	L_v	500	560	--	cd/m ²	Note3
LED life time	Hr	50000	--	--	Hour	Note1,2
Uniformity	AVg	80	--	--	%	Note3

Note (1) LED life time (Hr) can be defined as the time in which it continues to operate under the condition:

$T_a=25\pm3\text{ }^{\circ}\text{C}$, typical IL value indicated in the above table until the brightness becomes less than 50%.

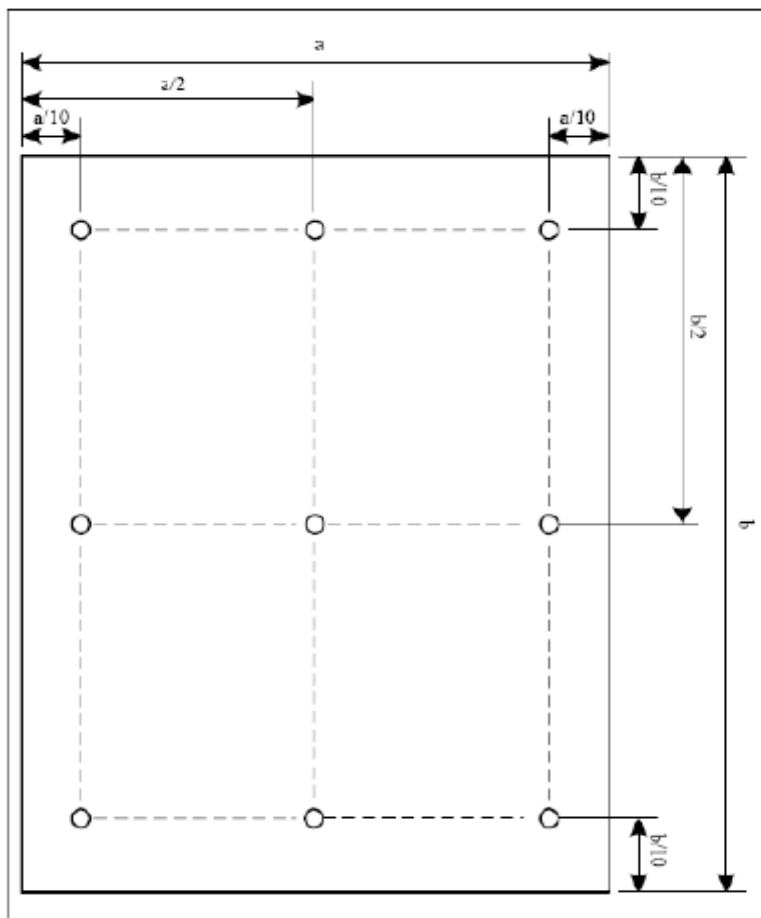
Note (2) The “LED life time” is defined as the module brightness decrease to 50% original brightness at $T_a=25^{\circ}\text{C}$ and $I_L=40\text{mA}$. The LED lifetime could be decreased if operating I_L is larger than 40mA. The constant current driving method is suggested.



Backlight LED Circuit



NOTE 3: Luminance Uniformity of these 9 points is defined as below:



$$\text{Uniformity} = \frac{\text{minimum luminance in 9 points (1-9)}}{\text{maximum luminance in 9 points (1-9)}}$$

$$\text{Luminance} = \frac{\text{Total Luminance of 9 points}}{9}$$

Part. No	KD050WVFLA022-RT	REV	V1.0	Page 13 of 30
常备库存 Stock For Sale	长期供货 Long Time supply	支持小量 NO MOQ	品种齐全 In Full Range	



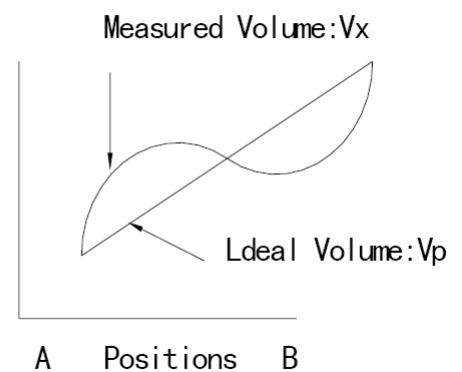
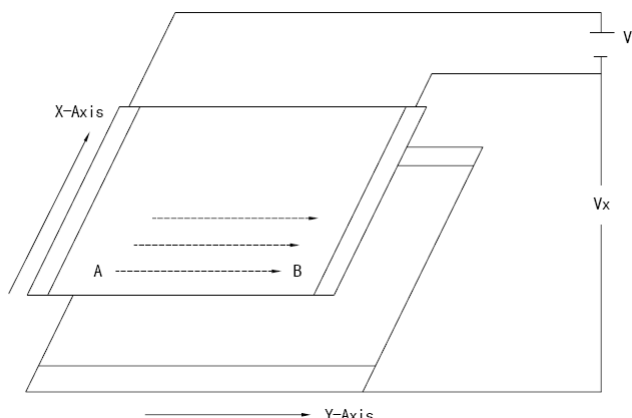
6. TP Feature

6.1 Conditions of use and storage

Item	Value(condition)	Note
Temperature range upon operation	Humidity: 20%~90% non dew, condensation -30℃~85℃	In a simple substance
Temperature range upon storage	Humidity: 20%~90% non dew, condensation -40℃~90℃	In a simple substance

6.2 Electrical property

Item	Value	Note
Maximum voltage	DC5V	
Resistance between terminals	X direction[Film side]:200-600Ω	
	Y direction [Glass side]:300-900Ω	
Insulation resistance	DC 25V 20MΩor above	Connect X + ~X- and Y+ ~Y-, apply 25VDC Between X and Y for perform measurements
Chattering	10 msec or below	
Rating	Voltage is DC 5V	



Part. No	KD050WVFLA022-RT	REV	V1.0	Page 14 of 30
----------	------------------	-----	------	---------------

常备库存
Stock For Sale

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Long Time supply

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NO MOQ

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6.3 Mechanical property

Item	Performance		Note
Input method	Used of an exclusive pen or finger		
Load upon operation	Exclusive pen	60-100g or below	Operation and measurement with a pen must be carried out under the following tip conditions: Stylus pen material : POM(ployacetal) . Tip : Diameter 3.0mm, SR 0.8 mm
	Finger	60-100g or below	Operations and measurement methods simulated for a finger must be carried out under the following tip conditions. Material :Silicon rubber (Hardness : 30°Hs) Tip : Diameter 12.0 mm, SR 12.5mm
Surface hardness	Pencil hardness : 3H or above		It complies with the way of test method JIS K5400.

6.4 Optical property

Item	Performance	Note
Total light transmittance	80% or above	JIS K7105
Haze	5% or below	JIS K7136
Film specification	Polished type with hard coated surface	

Part. No	KD050WVFLA022-RT	REV	V1.0	Page 15 of 30
----------	------------------	-----	------	---------------

常备库存
Stock For Sale

长期供货
Long Time supply

支持小量
NO MOQ

品种齐全
In Full Range



7. AC Characteristic

7.1 LVDS 6-bit vs. 8-bit mode

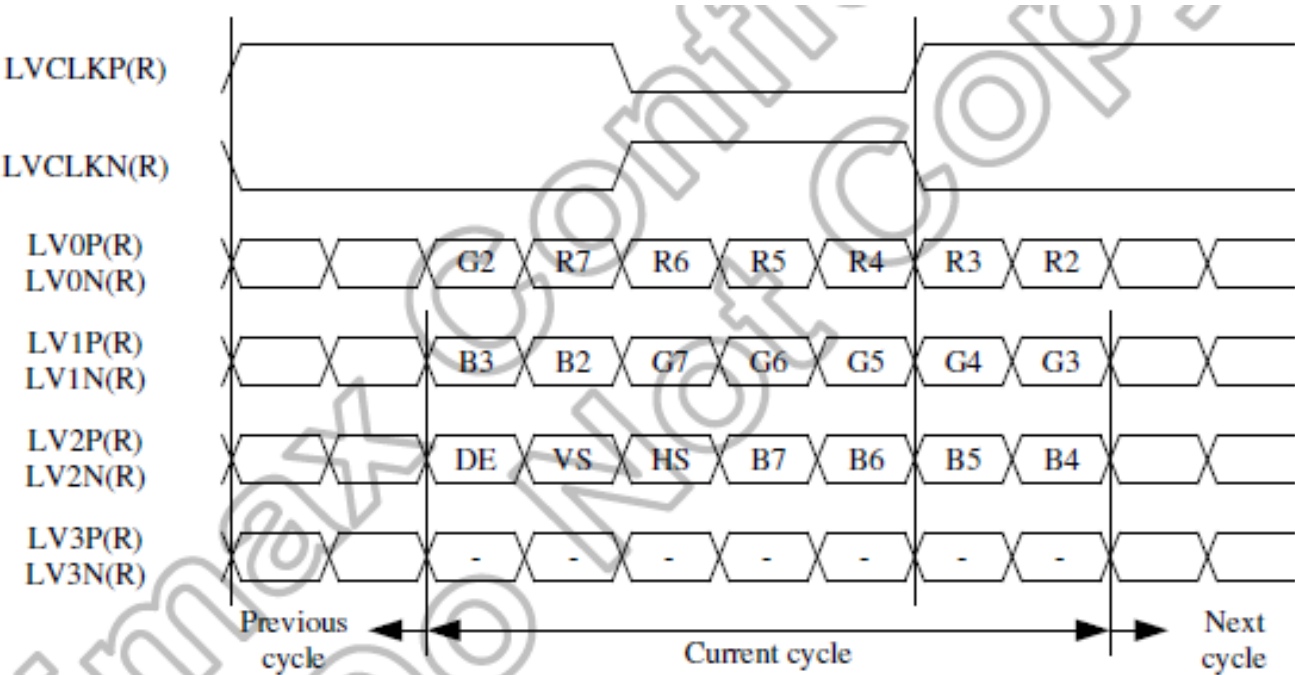


Figure 4.1: LVDS 6-bit

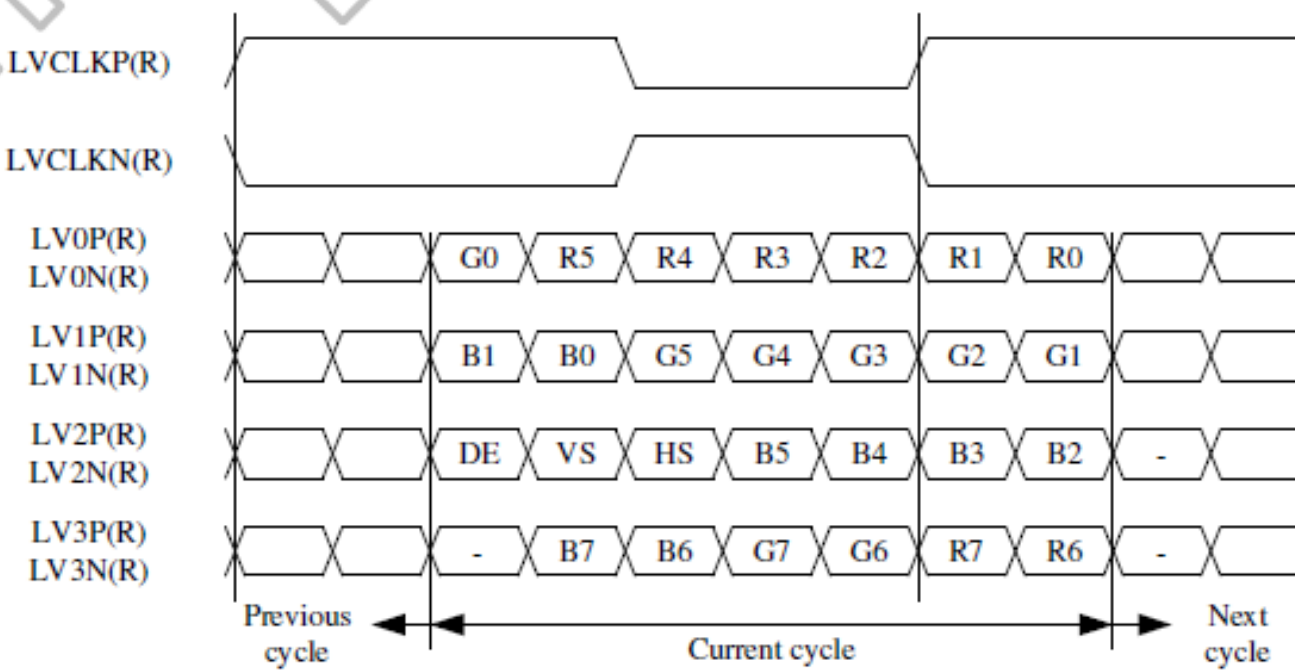


Figure 4.2: LVDS 8-bit (VESA format)

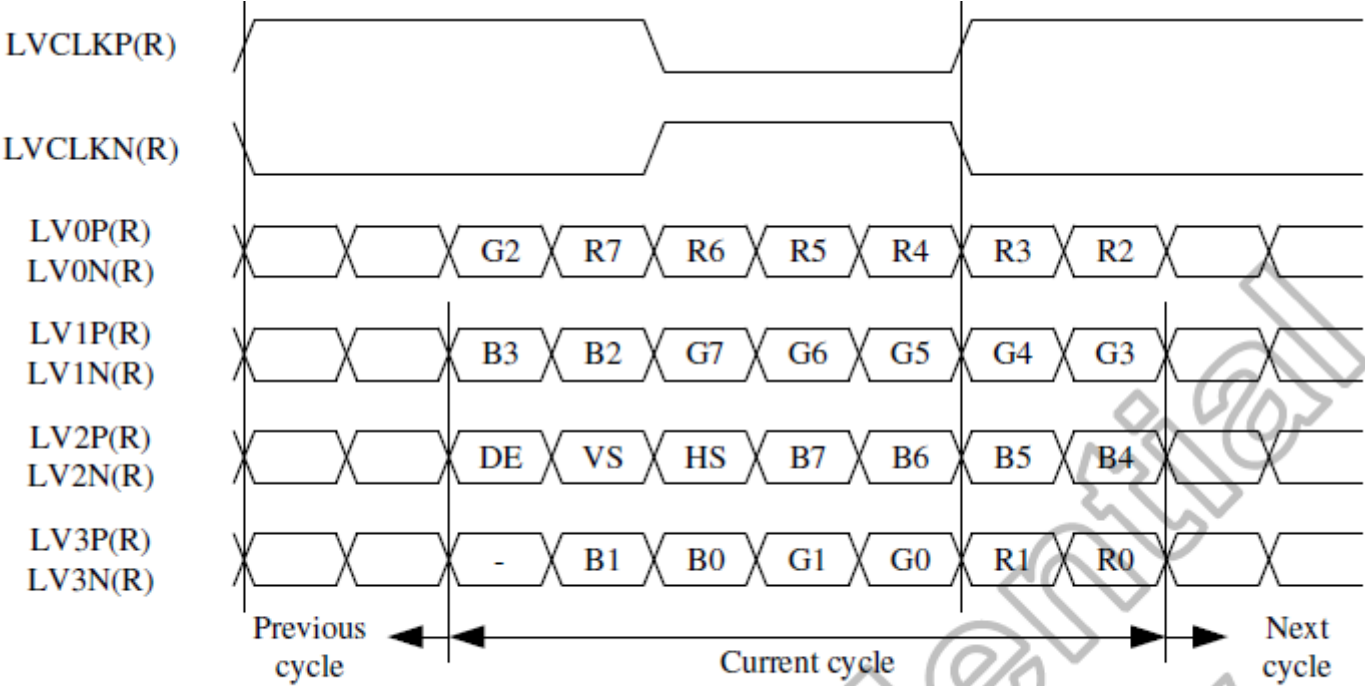


Figure 4.3: LVDS 8-bit (JEIDA format)



7.2 LVDS input timing

LVDS input timing is described as below.

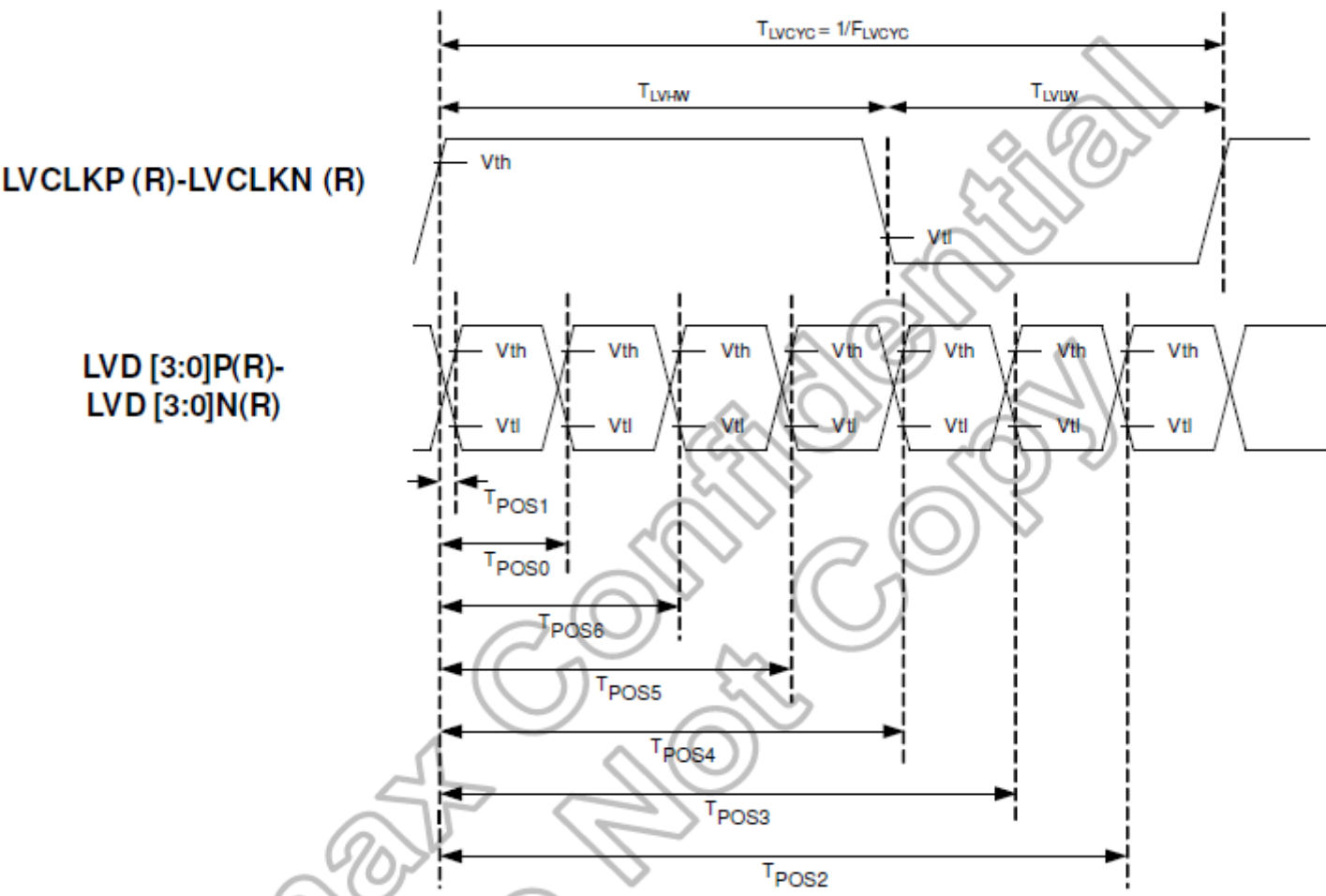


Figure 7.2: LVDS input timing

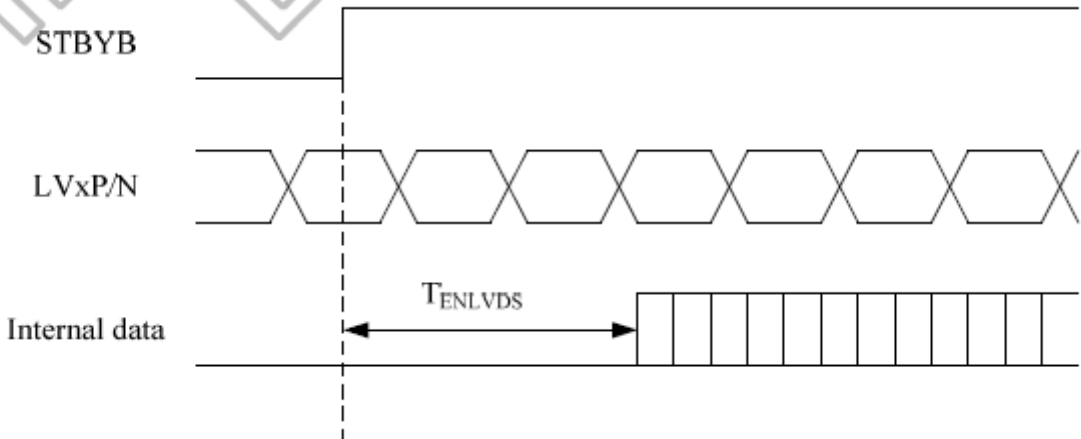
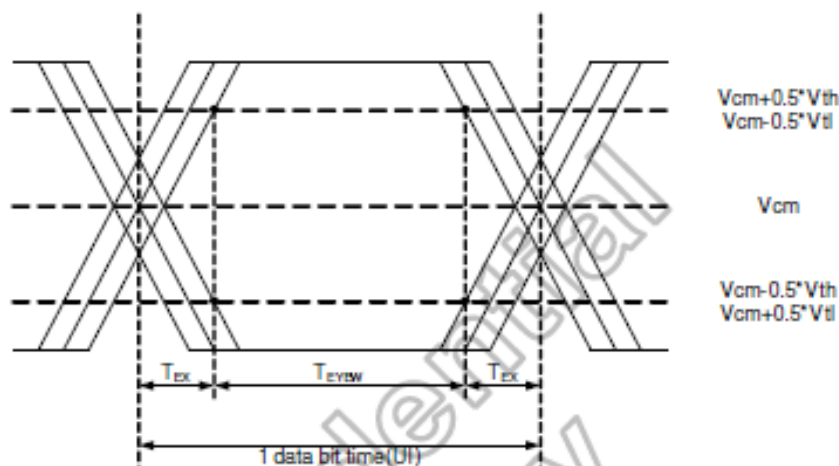


Figure 7.3: LVDS wake up time



Single-ended:
LVD [3:0]P,
LVD [3:0]N



Differential:
LVD [3:0]P-LVD [3:0]N

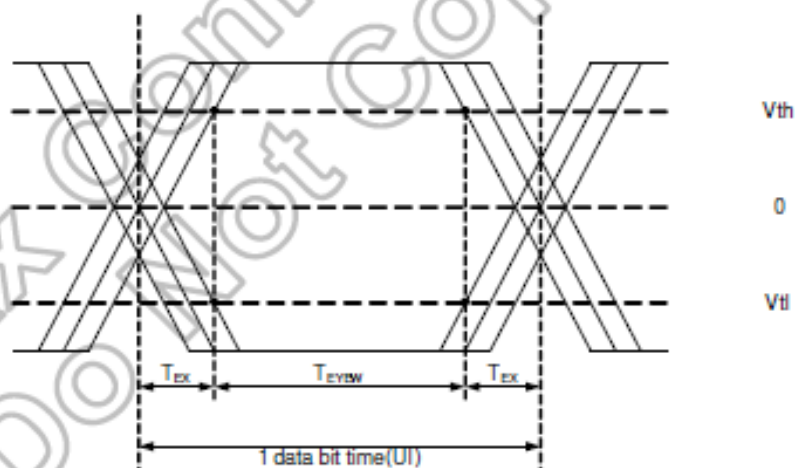


Figure 7.4: LVDS input eye diagram

Parameter	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
Clock frequency	FLVCYC	10	-	85	MHz
Clock period	TLVCYC	11.76	-	100	nsec
1 data bit time	UI	-	1/7	-	TLVCYC
Clock high time	LVHW	2.9	4	4.1	UI
Clock low time	LVLW	2.9	3	4.1	UI
Position 1	TPOS1	-0.2	0	0.2	UI
Position 0	TPOS0	0.8	1	1.2	UI
Position 6	TPOS6	1.8	2	2.2	UI
Position 5	TPOS5	2.8	3	3.2	UI
Position 4	TPOS4	3.8	4	4.2	UI
Position 3	TPOS3	4.8	5	5.2	UI
Position 2	TPOS2	5.8	6	6.2	UI
Input eye width	TEYEW	0.6	-	-	UI
Input eye border	TEX	-	-	0.2	UI
LVDS wake up time	TENLVDS	-	-	150	μs

Table 7.2: LVDS input timing parameters

Part. No	KD050WVFLA022-RT	REV	V1.0	Page 19 of 30
----------	------------------	-----	------	---------------

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7.3 Reset timing

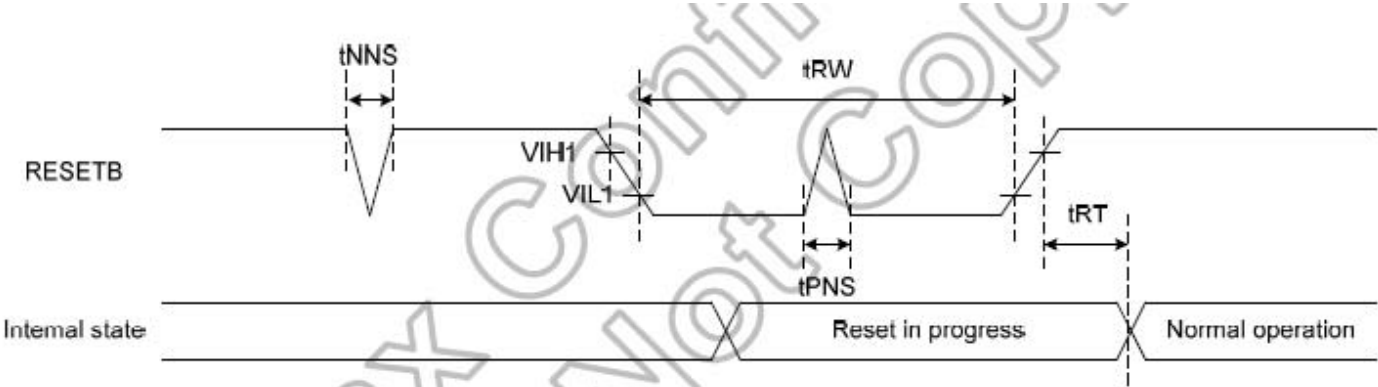


Figure 7.5: Reset timing

(VDD1=VDD2=2.7 to 3.6V, GND=0V, T_A=-40 to +95 °C)

Signal	Paramete	Symbol	Spec.			Unit
			Min.	Typ.	Max.	
RESETB	Reset pulse width	tRW	10	-	-	μs
	Reset complete time	tRT	-	-	5	μs
	Positive spike noise width	tPNS	-	-	100	ns
	Negative spike noise width	tNNS	-	-	100	ns

Table 7.4: Reset timing parameters



8. LCD Module Out-Going Quality Level

8.1 VISUAL & FUNCTION INSPECTION STANDARD

8.1.1 Inspection conditions

Inspection performed under the following conditions is recommended.

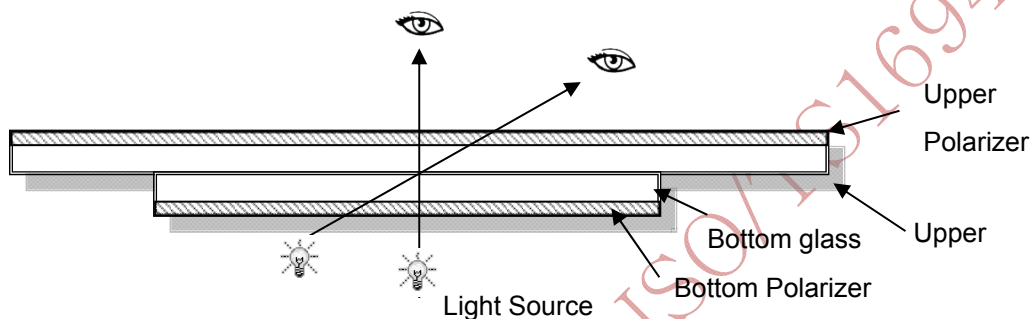
Temperature : $25\pm 5^{\circ}\text{C}$

Humidity : $65\%\pm 10\%\text{RH}$

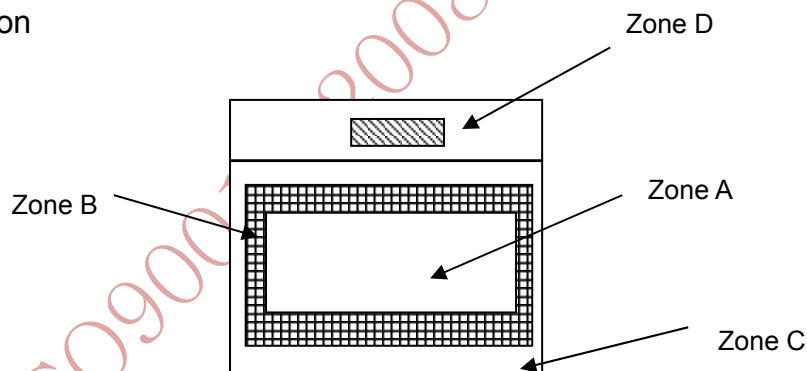
Viewing Angle : Normal viewing Angle.

Illumination: Single fluorescent lamp (300 to 700Lux)

Viewing distance:30-50cm



8.1.2 Definition



Zone A : Effective Viewing Area(Character or Digit can be seen)

Zone B : Viewing Area except Zone A

Zone C : Outside (Zone A+Zone B) which can not be seen after assembly by customer .)

Zone D : IC Bonding Area

Note: As a general rule ,visual defects in Zone C can be ignored when it doesn't effect product function or appearance after assembly by customer

Part. No	KD050WVFLA022-RT	REV	V1.0	Page 21 of 30
常备库存 Stock For Sale	长期供货 Long Time supply	支持小量 NO MOQ	品种齐全 In Full Range	



8.1.3 Sampling Plan

According to GB/T 2828-2003 ; , normal inspection, Class II

AQL:

Major defect	Minor defect
0.65	1.5

LCD: Liquid Crystal Display , TP: Touch Panel , LCM: Liquid Crystal Module

No	Items to be inspected	Criteria	Classification of defects
1	Functional defects	1) No display, Open or miss line 2) Display abnormally, Short 3) Backlight no lighting, abnormal lighting. 4) TP no function	Major
2	Missing	Missing component	
3	Outline dimension	Overall outline dimension beyond the drawing is not allowed	
4	Color tone	Color unevenness, refer to limited sample	Minor
5	Spot Line defect	Light dot , Dim spot,Polarizer Bubble ; Polarizer accidented spot.	
6	Soldering appearance.	Good soldering , Peeling off is not allowed.	
7	LCD/Polarizer/TP	Black/White spot/line, scratch, crack, etc.	

Part. No	KD050WVFLA022-RT	REV	V1.0	Page 22 of 30
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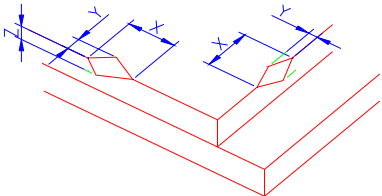
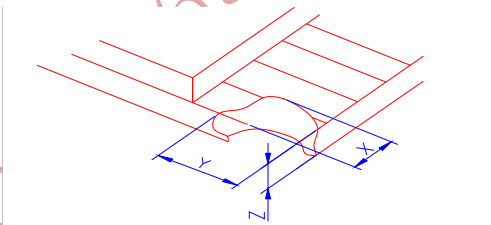
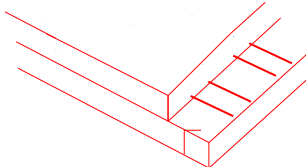
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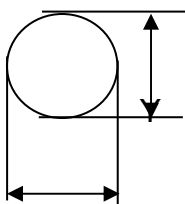
8.1.4 Criteria (Visual)

Number	Items	Criteria(mm)						
1.0 LCD Crack/Broken NOTE: X: Length Y: Width Z: Height L: Length of ITO, T: Height of LCD	(1) The edge of LCD broken	 <table><tr><td>X</td><td>Y</td><td>Z</td></tr><tr><td>≤3.0mm</td><td><Inner border line of the seal</td><td>≤T</td></tr></table>	X	Y	Z	≤3.0mm	<Inner border line of the seal	≤T
	X	Y	Z					
	≤3.0mm	<Inner border line of the seal	≤T					
(2)LCD corner broken	 <table><tr><td>X</td><td>Y</td><td>Z</td></tr><tr><td>≤3.0mm</td><td>≤L</td><td>≤T</td></tr></table>	X	Y	Z	≤3.0mm	≤L	≤T	
X	Y	Z						
≤3.0mm	≤L	≤T						
(3) LCD crack	 Crack Not allowed							



2.0

Spot defect



X

$$\Phi = (X + Y) / 2$$

① light dot (LCD/TP/Polarizer black/white spot, light dot, pinhole, dent, stain)

Zone Size (mm)	Acceptable Qty		
	A	B	C
$\Phi \leq 0.10$	Ignore		
$0.10 < \Phi \leq 0.25$	3(distance $\geq 10\text{mm}$)		
$0.25 < \Phi \leq 0.3$	2		
$\Phi > 0.35$	0		

② Dim spot (LCD/TP/Polarizer dim dot, light leakage, dark spot)

Zone Size (mm)	Acceptable Qty		
	A	B	C
$\Phi \leq 0.1$	Ignore		
$0.10 < \Phi \leq 0.25$	3(distance $\geq 10\text{mm}$)		
$0.25 < \Phi \leq 0.3$	2		
$\Phi > 0.35$	0		

③ Polarizer accidented spot

Zone Size (mm)	Acceptable Qty		
	A	B	C
$\Phi \leq 0.2$	Ignore		
$0.3 < \Phi \leq 0.5$	2(distance $\geq 10\text{mm}$)		
$\Phi > 0.5$	0		

④ Pixel bad points (light dot, Dim dot, color dot)

Zone Size (mm)	Acceptable Qty		
	A	B	C
$\Phi \leq 0.1$	Ignore		
$0.15 < \Phi \leq 0.25$	2(distance $\geq 10\text{mm}$)		
$\Phi > 0.3$	0		

⑤ Polarizer Bubble

Zone Size (mm)	Acceptable Qty		
	A	B	C
$\Phi \leq 0.2$	Ignore		
$0.3 < \Phi \leq 0.4$	3(distance $\geq 10\text{mm}$)		
$0.4 < \Phi \leq 0.5$	2		
$\Phi > 0.5$	0		

Part. No

KD050WVFLA022-RT

REV

V1.0

Page 24 of 30

常备库存
Stock For Sale

长期供货
Long Time supply

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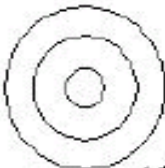
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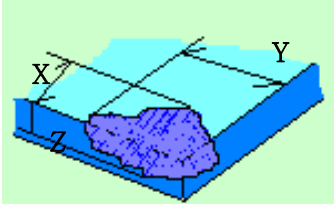
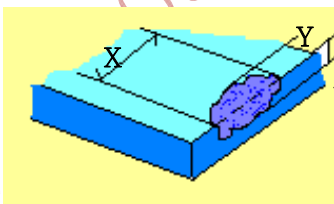
3.0	Line defect (LCD/TP /Polarizer backlight black/white line, scratch, stain)	Width(mm)	Length(m m)	Acceptable Qty		
				A	B	C
		$\Phi \leq 0.05$	Ignore	Ignore		Ignore
		$0.05 < W \leq 0.06$	$L \leq 3.0$	$N \leq 2$		
		$0.07 < W \leq 0.08$	$L \leq 2.0$	$N \leq 1$		
		$0.08 < W$	Define as spot defect			
4.0	Electronic Comp onents SMT	Not allow missing parts , solderless connection , cold solder joint , mis match , The positive and negative polarity opposite				
5.0	Display color& B rightness	1. Color : Measuring the color coordinates, The measurement standar d according to the datasheet or samples.				
		2. Brightness : Measuring the brightness of White screen, The measu rement standard according to the datasheet or Samples.				

6.0	RTP Related	TP film • bubble/ accidented spot				
			Size Φ (mm)	Acceptable Qty		
				A	B	C
			$\Phi \leq 0.1$	Ignore		Ignore
			$0.1 < \Phi \leq 0.2$	3 (distance $\geq 10\text{mm}$)		
			$0.25 < \Phi \leq 0.3$	2		
$\Phi > 0.35$	0					



TP film scratch	Width(mm)	Length(mm)	Acceptable Qty		
			A	B	C
	$\Phi \leq 0.05$	Ignore	Ignore		Ignore
	$0.05 < W \leq 0.06$	$L \leq 3.0$	$N \leq 2$		
	$0.07 < W \leq 0.08$	$L \leq 2.0$	$N \leq 1$		
$0.08 < W$	Define as spot defect				
Assembly deflection	beyond the edge of backlight $\leq 0.2\text{mm}$				
Bulge (undulation included)	The ITO film plumped below 0.40mm, it's ok.  $< 0.4\text{mm}$				
Newton Ring	Newton Ring area $> 1/3$ TP area NG Newton Ring area $\leq 1/3$ TP area OK		 1 规律性  2 非规律性  似牛顿环		



		TP corner broken X : length Y : width Z : height	<table><tr><td>X</td><td>Y</td><td>Z</td></tr><tr><td>X≤3mm</td><td>Y≤3mm</td><td>Z<COVER thickness</td></tr></table> * *Circuitry broken is not allowed.	X	Y	Z	X≤3mm	Y≤3mm	Z<COVER thickness	
X	Y	Z								
X≤3mm	Y≤3mm	Z<COVER thickness								
		TP edge broken X : length Y : width Z : height	<table><tr><td>X</td><td>Y</td><td>Z</td></tr><tr><td>X≤4mm</td><td>Y≤2mm</td><td>Z<COVER thickness</td></tr></table> * Circuitry broken is not allowed.	X	Y	Z	X≤4mm	Y≤2mm	Z<COVER thickness	
X	Y	Z								
X≤4mm	Y≤2mm	Z<COVER thickness								

Criteria (functional items)

Number	Items	Criteria (mm)
1	No display	Not allowed
2	Missing segment	Not allowed
3	Short	Not allowed
4	Backlight no lighting	Not allowed
5	TP no function	Not allowed

Part. No	KD050WVFLA022-RT	REV	V1.0	Page 27 of 30
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支持小量
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9. Reliability Test Result

9.1 Condition

Item	Condition	Sample Size	Test Result	Note
Low Temperature Operating Life test	-30℃, 96HR	3ea	pass	-
Thermal Humidity Operating Life test	85℃90%RH, 96HR	3ea	pass	-
Temperature Cycle ON/OFF test	-30℃ ↔ 85℃, ON/OFF, 20CYC	3ea	pass	(1)
High Temperature Storage test	90℃, 96HR	3ea	pass	-
Low Temperature Storage test	-40℃, 96HR	3ea	pass	-
ESD test	150pF, 330Ω, ±6KV(Contact)/± 8KV(Air), 5 points/panel, 10 times/point	3ea	pass	
Thermal Shock Resistance	The sample should be allowed to stand the following 5 cycles of operation: TSTL for 30 minutes -> normal temperature for 5 minutes -> TSTH for 30 minutes -> normal temperature for 5 minutes, as one cycle, then taking it out and drying it at normal temperature, and allowing it stand for 24 hours	3ea	pass	
Box Drop Test	1 Corner 3 Edges 6 faces, 66cm(MEDIUM BOX)	1box	pass	-

Note (1) ON Time over 10 seconds, OFF Time under 10 seconds

Part. No	KD050WVFLA022-RT	REV	V1.0	Page 28 of 30
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长期供货
Long Time supply

支持小量
NO MOQ

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10. Cautions and Handling Precautions

10.1 Handling and Operating the Module

- (1) When the module is assembled, it should be attached to the system firmly.
Do not warp or twist the module during assembly work.
- (2) Protect the module from physical shock or any force. In addition to damage, this may cause improper operation or damage to the module and back-light unit.
- (3) Note that polarizer is very fragile and could be easily damaged. Do not press or scratch the surface.
- (4) Do not allow drops of water or chemicals to remain on the display surface.
If you have the droplets for a long time, staining and discoloration may occur.
- (5) If the surface of the polarizer is dirty, clean it using some absorbent cotton or soft cloth.
- (6) The desirable cleaners are water, IPA (Isopropyl Alcohol) or Hexane.
Do not use ketene type materials (ex. Acetone), Ethyl alcohol, Toluene, Ethyl acid or Methyl chloride. It might permanent damage to the polarizer due to chemical reaction.
- (7) 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) Protect the module from static; it may cause damage to the CMOS ICs.
- (9) Use finger-stalls with soft gloves in order to keep display clean during the incoming inspection and assembly process.
- (10) Do not disassemble the module.
- (11) Protection film for polarizer on the module shall be slowly peeled off just before use so that the electrostatic charge can be minimized.
- (12) Pins of I/F connector shall not be touched directly with bare hands.
- (13) Do not connect, disconnect the module in the "Power ON" condition.
- (14) Power supply should always be turned on/off by the item 6.1 Power On Sequence & 6.2 Power Off Sequence

10.2 Storage and Transportation.

- (1) Do not leave the panel 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 and relative humidity of less than 70%
- (2) Do not store the TFT-LCD module in direct sunlight.
- (3) The module shall be stored in a dark place. When storing the modules for a long time, be sure to adopt effective measures for protecting the modules from strong ultraviolet radiation, sunlight, or fluorescent light.
- (4) It is recommended that the modules should be stored under a condition where no condensation is allowed. Formation of dewdrops may cause an abnormal operation or a failure of the module.
In particular, the greatest possible care should be taken to prevent any module from being operated where condensation has occurred inside.
- (5) This panel has its circuitry FPC on the bottom side and should be handled carefully in order not to be stressed.

Part. No	KD050WVFLA022-RT	REV	V1.0	Page 29 of 30
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常备库存
Stock For Sale

长期供货
Long Time supply

支持小量
NO MOQ

品种齐全
In Full Range



11. Packing

---TBD-----

ISO9001 : 2008 ISO/TS16949 : 2009

Part. No	KD050WVFLA022-RT	REV	V1.0	Page 30 of 30
常 备 库 存 Stock For Sale	长 期 供 货 Long Time supply	支持小量 NO MOQ	品 种 齐 全 In Full Range	