KENTEC DISPLAY

K430WQA-V4-F

Product

Standard LCD Module
480 x RGB x 272 Dots
4.3" 16.7M colors TFT display
Wide temperature
With white LED backlight
With touch screen

CONTENTS

KENTEC DISPLAY

1. Document revision history :

DOCUMENT REVISION	DATE	DESCRIPTION	PREPARED BY	APPROVED BY
01	2010.11.22	First Release.	MF Zou	
02	2011.07.13	Updated the LED backlight driving current	XW Lee	

2. General Description

- 4.3"(diagonal), 480 x RGB x 272 dots, 16.7M colors, Normal white TN, TFT LCD module.
- Viewing Direction: 6 o'clock.
- RGB 24-bits
- With internal voltage booster.
- Logic voltage: 3.3V (typ.).
- With 4-wire resistive touch screen

3. Mechanical Specifications

The mechanical detail is shown in Fig. 1 and summarized in Table 1 below.

Table 1

Parameter		Specifications	Unit
Outline dimensions		105.5(W) x 67.2(H) x 4.1(D) (Exclude FPC, cables of backlight)	mm
Color TFT 480xRGBx272	View area	97.9(W) x 56.7(H)	mm
	TP active area	96.7(W) x 55.5(H)	mm
	LCD active area	95.04(W) x 53.86(H)	mm
	Display format	480 x RGB x 272	dots
	Color configuration	RGB Side-stripes	-
	Dot size	0. 198 (W) x 0.198(RGB)	mm
Weight		TBD	grams

NO	DEFINE	NO	DEFINE
1	VLED-	21	B0
2	VLED+	22	B1
3	GND	23	B2
4	VDD	24	B3
5	R0	25	B4
6	R1	26	B5
7	R2	27	B6
8	R3	28	B7
9	R4	29	GND
10	R5	30	DCLK
11	R6	31	DISP
12	R7	32	HSYNC
13	G0	33	VSYNC
14	G1	34	DE
15	G2	35	NC
16	G3	36	GND
17	G4	37	XR
18	G5	38	YD
19	G6	39	XL
20	G7	40	YU

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PART TYP: Spec Sheet

K430WQA-V4-F

SCALE:	FIT
SHEET: 1 OF 1	

PROJECTION	UNIT mm

GENERAL TOL.: ± 0.2	
MODEL NUMBER K430WQA	

APPROVALS	DATE
APP:	
CHK:	2011-06-30
DWN: MF Zou	DO NOT SCALE THIS DRAWING.

REV 版本	DESCRIPTION 描述	DATE 日期
01	1st ISSUE	2011-05-30

LED CIRCUIT

K

R   R

A

5.00

4.10±0.2
2.95±0.3

TP
front

STIFFENER

CONTACT SIDE

0.3±0.05

0.198
0.066
0.198

480(RGB)*272

XR

YU

YD

XL

R
G
B

Components Area
H=1.5 Max

3.79
4.39
5.18

105.5±0.3B/L)
97.90(V.A)
96.70(TP AA)
95.04(LCD A/A)

23.90
40
0.35
1

P0.5*(40-1)=19.50±0.05

18.80±0.3

0.50±0.1
20.50±0.1

3.50±0.3

4.27
3.45
2.85

53.86(A./A.)
55.50(TP A.A)
56.70(V.A.

67.2±0.3(B/L)

46.00±0.5

NOTES:
1. DISPLAY TYPE: 4.3"TFT-LCD, 16.7M COLOR
2. DRIVER IC: COG
3. OPERATING TEMP: -20°C~70°C
4. STORAGE TEMP:-30°C~80°C
5. BACKLIGHT: 8 LEDs
6. :CRITICAL DIMENSION, ():REFERENCE DIMENSION
7. MEASURING UP THE ROHS RULES

Figure 1: Outline Drawing

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4. Interface signals

Table 2: Pin assignment

Pin No	Symbol	I/O	Function
1	V_{LED-}	P	Power for LED backlight cathode
2	V_{LED+}	P	Power for LED backlight anode
3	GND	P	Power ground
4	V_{DD}	P	Power voltage
5	R0	I	Red data (LSB)
6	R1	I	Red data
7	R2	I	Red data
8	R3	I	Red data
9	R4	I	Red data
10	R5	I	Red data
11	R6	I	Red data
12	R7	I	Red data (MSB)
13	G0	I	Green data (LSB)
14	G1	I	Green data
15	G2	I	Green data
16	G3	I	Green data
17	G4	I	Green data
18	G5	I	Green data
19	G6	I	Green data
20	G7	I	Green data (MSB)
21	B0	I	Blue data (LSB)
22	B1	I	Blue data
23	B2	I	Blue data
24	B3	I	Blue data
25	B4	I	Blue data
26	B5	I	Blue data
27	B6	I	Blue data
28	B7	I	Blue data (MSB)
29	GND	P	Power ground
30	DCLK	I	Pixel clock
31	DISP	I	Display on/ off
32	HSYNC	I	Horizontal sync signal
33	VSYNC	I	Vertical sync signal
34	DE	I	Data enable
35	NC	-	No connect
36	GND	P	Power ground
37	X_R	I/O	Right electrode - differential analog
38	Y_B	I/O	Bottom electrode - differential analog
39	X_L	I/O	Left electrode - differential analog
40	Y_T	I/O	Top electrode - differential analog

I/O: I: input, O: output, P: power

5. Absolute Maximum Ratings

5.1   Electrical Maximum Ratings – for IC Only

Table 3: Electrical Maximum Ratings – for IC

Parameter	Symbol	Min.	Max.	Unit	Note
Supply voltage	VCC	-0.3	+4.0	V	1
Input voltage	AVDD	-0.3	+5.0	V	

 Note:

1.VCC, GND must be maintained.

2.The modules may be destroyed if they are used beyond the absolute maximum ratings.

5.2   Environmental Condition

Table 4

Item	Operating temperature (Topr)		Storage temperature (Tstg) (Note 1)		Remark
	Min.	Max.	Min.	Max.	
Ambient temperature	-20°C	+70°C	-30°C	+80°C	Dry
Humidity (Note 1)	80% max. RH for Ta $\leq$ 40°C $< 50\%$ RH for 40°C $<$ Ta $\leq$ Maximum operating temperature				No condensation

 Note 1: Product cannot sustain at extreme storage conditions for long time.

6. Electrical Specifications

Typical Electrical Characteristics

 At Ta = 25 °C, VCC=IOVCC= 3.3V, GND=0V.

Table 5

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Supply voltage (logic)	VDD-GND		3.0	3.3	3.6	V
Input signal voltage	VIH		**0.7VDD**	-	VDD	V
	VIL		**GND**	-	0.3VDD	V
Supply current (Logic & LCD)	IDD	VDD=3.3V	-	15	19	mA
LED Backlight Supply current	ILED	Forward voltage VLED = ~13.5V @ 40mA	-	36	40	mA

Note (1): LED backlight required current constant power supply. LED circuit was in 2 chain parallel and

 with 4 LEDs serial per chain. LED backlight power consumption is 0.55W.

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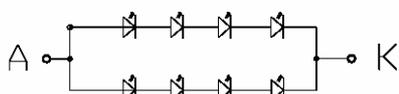
7. Optical Characteristics

Table 7: Optical specifications

Items		Symbol	Condition	Specifications Min.	Specifications Typ.	Specifications Max.	Unit	
Contrast Ratio		CR		150	300	-	-	
Response Time		T_R		-	15	30	ms	
		T_F		-	35	50	ms	
Chromaticity	Red	X_R		0.604	0.624	0.644	-	Note
		Y_R		0.302	0.322	0.342	-	
	Green	X_G		0.268	0.288	0.308	-	
		Y_G		0.540	0.560	0.580	-	
	Blue	X_B		0.127	0.147	0.167	-	
		Y_B		0.097	0.117	0.137	-	
	White	X_W		-	0.307	-	-	
		Y_W		-	0.328	-	-	
Viewing angle	Hor.	$\phi1$(3 o'clock)	Center CR=10	-	45	-	deg.	
		$\phi2$(9 o'clock)		-	45	-		
	Ver.	$\theta2$(12 o'clock)		-	15	-		
		$\theta1$(6 o'clock)		-	35	-		
NTSC ratio					61.5		%	

Note 1: Definition of Contrast Ratio (CR):

The contrast ratio can be calculated by the following expression.

Contrast Ratio (CR) = L63 / L0

L63: Luminance of gray level 63

L0: Luminance of gray level 0

CR = CR (10)

CR (X) is corresponding to the Contrast Ratio of the point X at Figure in Note 5.

Note 2: Definition of Response Time (TR, TF):
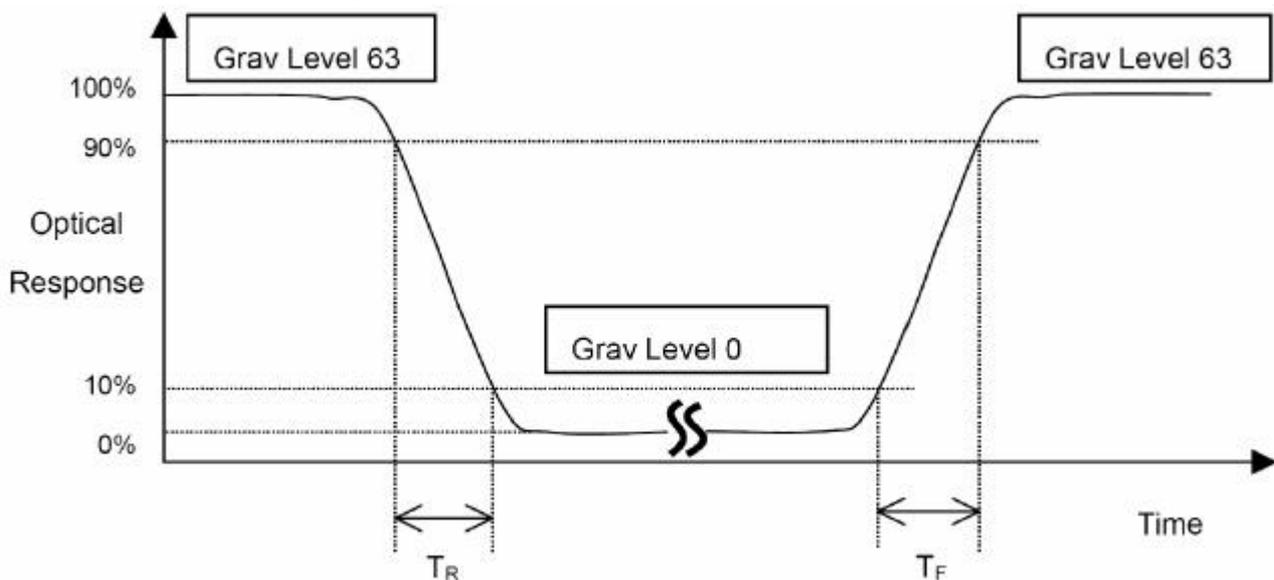
Figure 3

Note 3: Viewing Angle

NORMAL
θ,φ = 0°

12 O'CLOCK DIRECTION

9 O'CLOCK

θ1   θ2
φ2
φ1

3 O'CLOCK
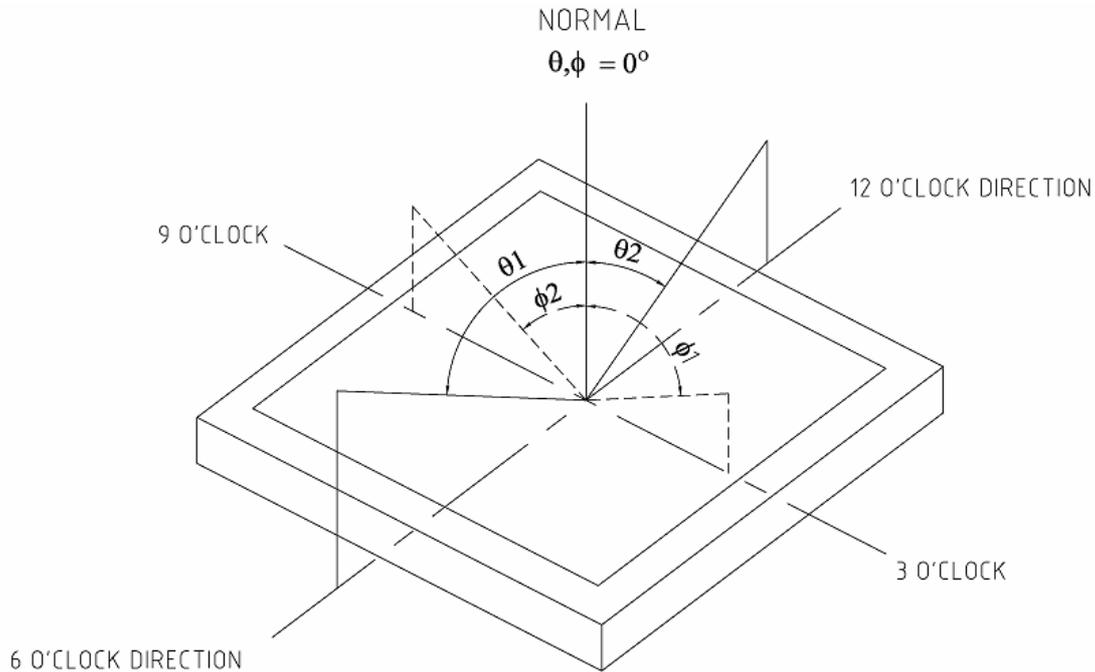
6 O'CLOCK DIRECTION

Figure 4

The above "Viewing Angle" is the measuring position with Largest Contrast Ratio; not for good image quality. View Direction for good image quality is 6 O'clock. Module maker can increase the "Viewing Angle" by applying Wide View Film.

Note 4: Measurement Set-Up:

The LCD module should be stabilized at a given temperature for 20 minutes to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting Backlight for 20 minutes in a windless room.

LCD Module
LCD Panel
Center of the Screen
Photometer
(TOPCON BM-5A)
Field of View = 2°
500 mm
Light Shield Room
(Ambient Luminance < 2 lux)

Figure 5

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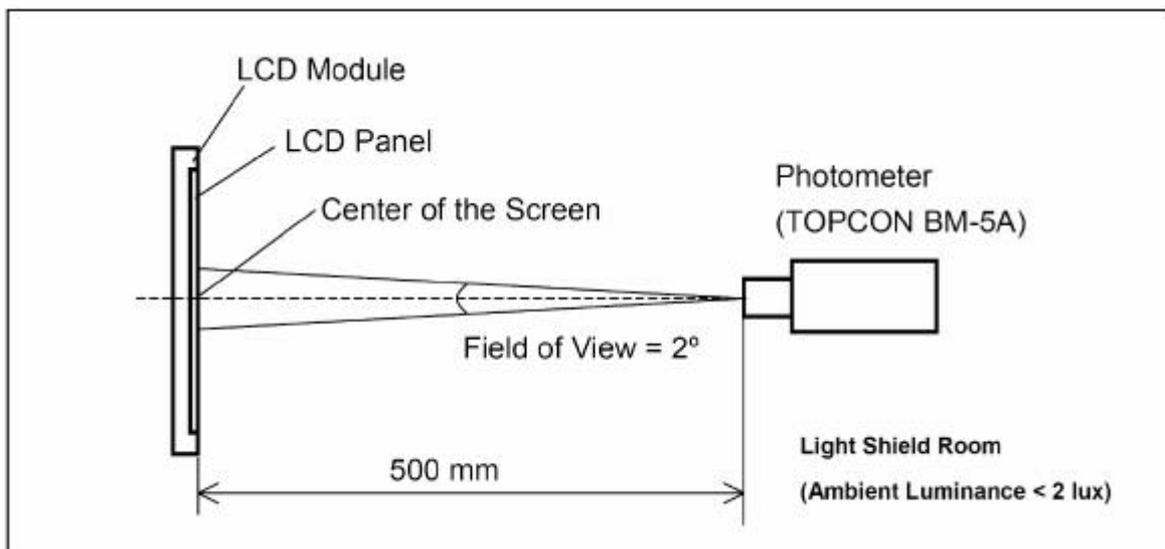
8. AC Characteristics

Parameters	Symbol	Min.	Typ.	Max.	Unit	Conditions
DCLK period time	Tclk	83.3	111.1	200	ns	Parallel 24-bit RGB mode
		33.3	37.0	41.7	ns	Serial 8-bit RGB mode
DCLK rising time	Trck	-	-	9	ns	
DCLK falling time	Tfck	-	-	9	ns	
DCLK pulse duty	Tcwh	40	50	60	%	
DE setup time	Tdesu	12	-	-	ns	
DE hold time	Tdehd	12	-	-	ns	
HSYNC pulse width	Thwh	1	-	-	DCLK	
HSYNC setup time	Thsu	12	-	-	ns	
HSYNC hold time	Thhd	12	-	-	ns	
VSYNC pulse width	Tvwh	1	-	-	Th	
VSYNC setup time	Tvsu	12	-	-	ns	
VSYNC hold time	Tvhd	12	-	-	ns	
Data setup time	Tdsu	12	-	-	ns	
Data hold time	Tdhd	12	-	-	ns	

Clock and Data Input Timing Diagram
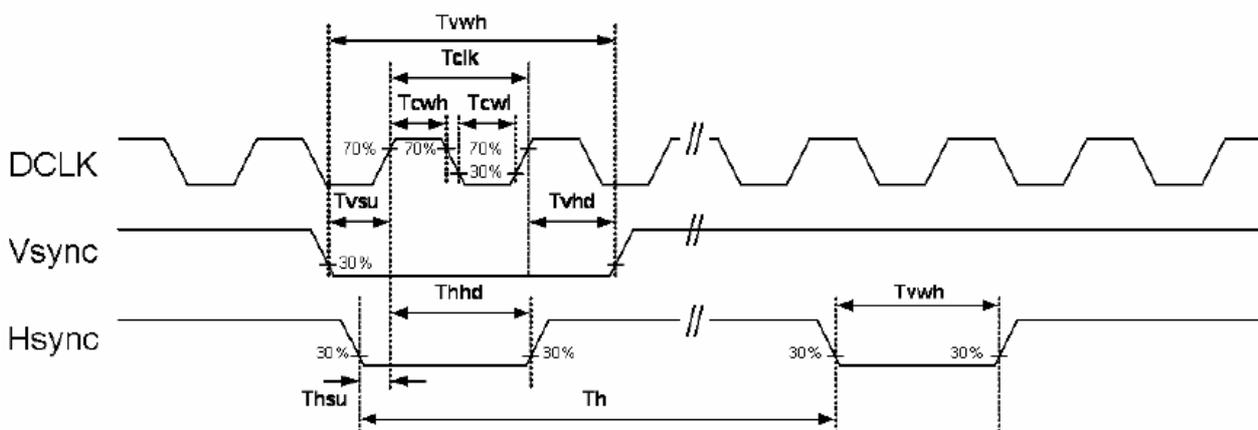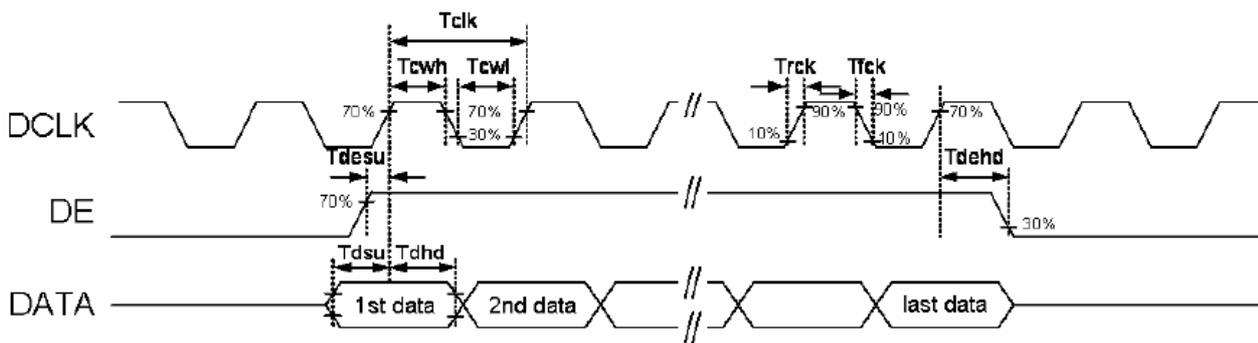
Power On Sequence
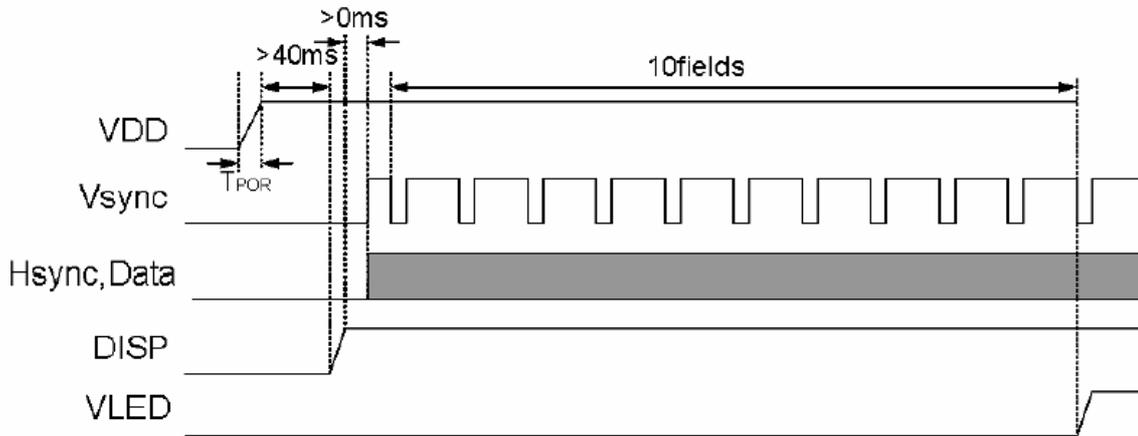
Power Off Sequence
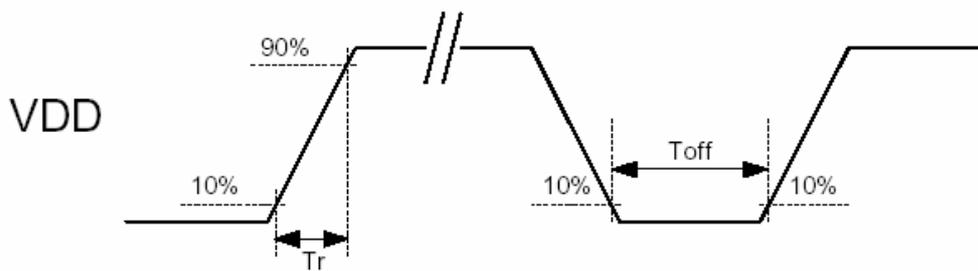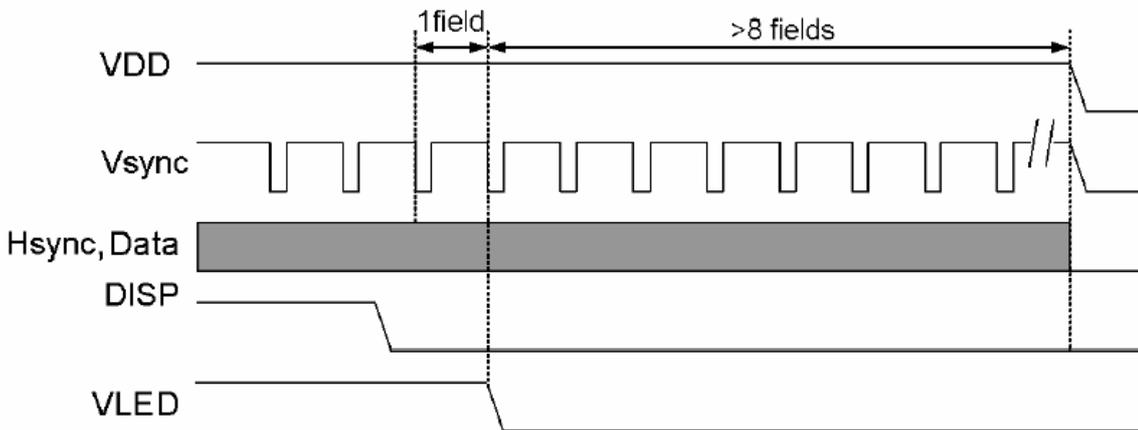
VDD power input timing

Notes:

Data include R0~R7, G0~G7, B0~B7, HSD, VSD, DCLK, DE

Power on sequence: VDD → DISP → Data → V_{LED}

Power off sequence: DISP → V_{LED} → Data → VDD

VDD power input timing: 0.5ms < Tr < 10ms; Toff > 500ms

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Parallel 24-bit RGB Input Timing Table

Parameters	Symbol	Min.	Typ.	Max.	Unit	Conditions
DCLK frequency	fclk	5	9	12	MHz	
VSYNC period time	Tv	277	288	400	Th	
VSYNC display area	Tvd		272		Th	
VSYNC back porch	Tvbp	3	8	31	Th	
VSYNC front porch	Tvfp	2	8	93	Th	
HSYNC period time	Th	520	525	800	DCLK	
HSYNC display area	Thd		480		DCLK	
HSYNC back porch	Thbp	36	40	255	DCLK	
HSYNC front porch	Thfp	4	5	65	DCLK	

Vertical Input Timing
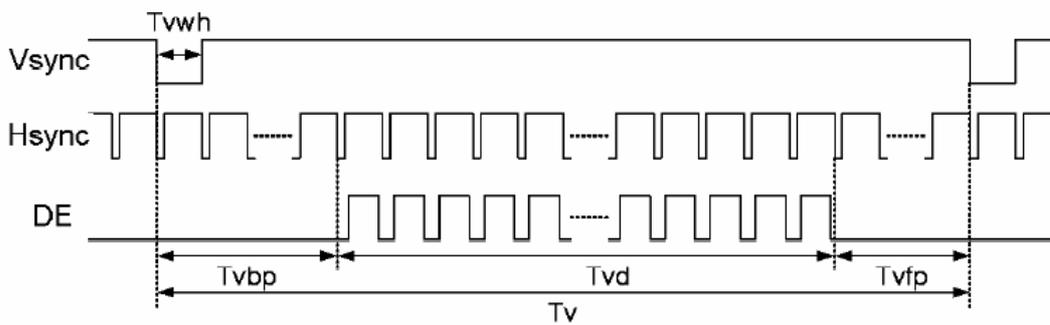
Parallel 24-bit RGB Mode Data Format (DE Mode)

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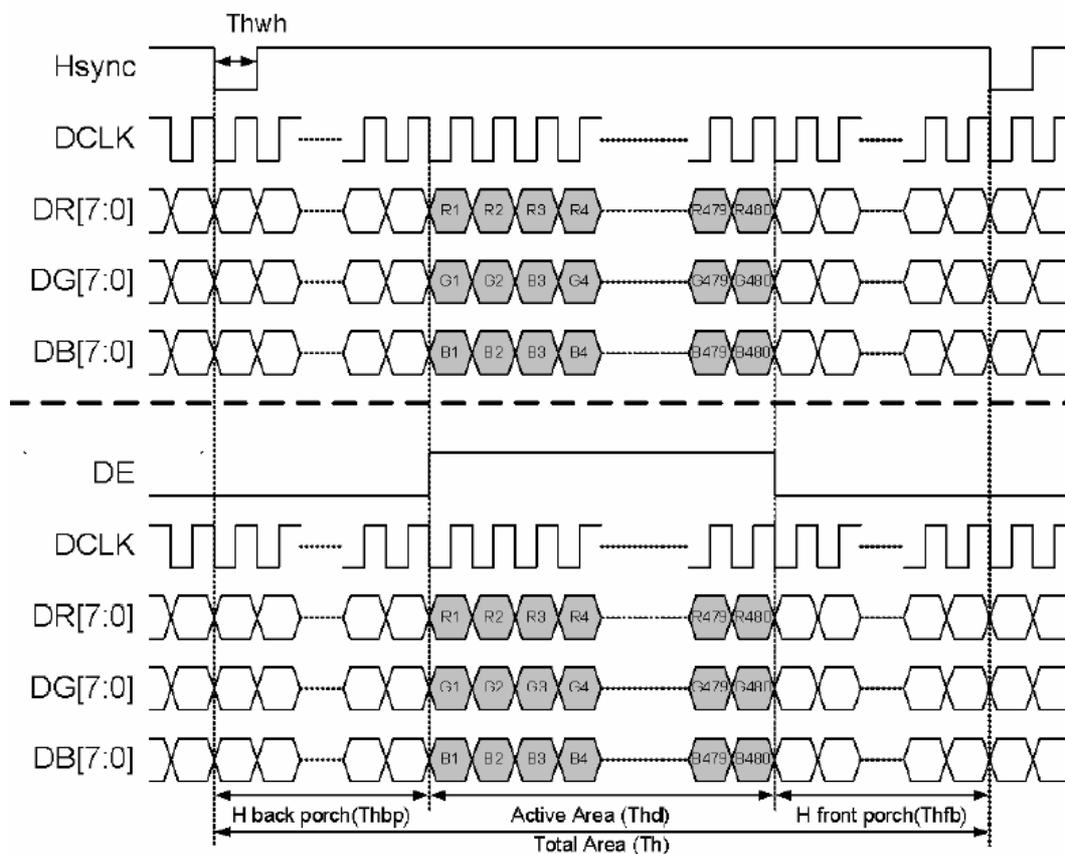
9. Reliability Test Item

Test Item	Test Condition	Test result determinant gist
High temperature storage	80±3 ;96H	the inspection of appearance and function character.
Low temperature storage	-30±3 ;120H	
High temperature /humidity storage	50 ±3 ,90%±3%RH;96H	
High temperature operation	70±3 ;96H	no objection of the function character; no fatal objection of the appearance.
Low temperature operation	-20±3 ;96H	
Temperature Shock	-20±3 ,30min? 70±3 , 30min;10cycle	inspect the objections appearance function & the whole structure

10. Suggestions for using LCD modules

10.1 Handling of LCM

1. The LCD screen is made of glass. Don't give excessive external shock, or drop from a high place.

2. If the LCD screen is damaged and the liquid crystal leaks out, do not lick and swallow. When the liquid is attach to your hand, skin, cloth etc, wash it off by using soap and water thoroughly and immediately.

3. Don't apply excessive force on the surface of the LCM.

4. If the surface is contaminated ,clean it with soft cloth. If the LCM is severely contaminated , use Isopropyl alcohol/Ethyl alcohol to clean. Other solvents may damage the polarizer . The following solvents is especially prohibited: water , ketone Aromatic solvents etc.

5. Exercise care to minimize corrosion of the electrode. Corrosion of the electrodes is accelerated by water droplets, moisture condensation or a current flow in a high-humidity environment.

6. Install the LCD Module by using the mounting holes. When mounting the LCD module make sure it is free of twisting, warping and distortion. In particular, do not forcibly pull or bend the I/O cable or the backlight cable.

7. Don't disassemble the LCM.

8. To prevent destruction of the elements by static electricity, be careful to maintain an optimum work

environment.

- Be sure to ground the body when handling the LCD modules.

- Tools required for assembling, such as soldering irons, must be properly grounded.

- To reduce the amount of static electricity generated, do not conduct assembling and other work under dry conditions.

- The LCD module is coated with a film to protect the display surface. Exercise care when peeling off this protective film since static electricity may be generated.

9. Do not alter, modify or change the the shape of the tab on the metal frame.

10. Do not make extra holes on the printed circuit board, modify its shape or change the positions of components to be attached.

11. Do not damage or modify the pattern writing on the printed circuit board.

12. Absolutely do not modify the zebra rubber strip (conductive rubber) or heat seal connector

13. Except for soldering the interface, do not make any alterations or modifications with a soldering iron.

14. Do not drop, bend or twist LCM.

10.2 Cautions for installing and assemabling if the module has Touch Panel

1. Use a buffer material (Gasket) between the touch panel and Front-case to protect damage and wrong operating. The dimension of the buffer material's edge between the TP V.A. edge is Min. 0.3mm.

2. We recommend to design a case that it can't over the boundary of the active area Max. 0.5mm in order to prevent an operation at outside of the active area which can't guarantee the specified durability, because operation at the outside of the active area cause serious damage of a transparent.

3. When design case for installing Module, you would consider give a distance about 0.2± 0.15mm between the module edge to case inside.

4. The corners of the product are not chamfered. When positioning and fixing the product on the case, we sugguest that you would provide a R part on the conner of the case so as not to apply load on the corner of the transparent module.

Min. 0.3mm

Max. 0.5mm

0.5±0.2mm

Front Case

Touch Panel

Buffer material(gasket)
( )

Insulation area
( )

Backlight( )

TP Active area( )

TP View area( )

0.2±0.15mm
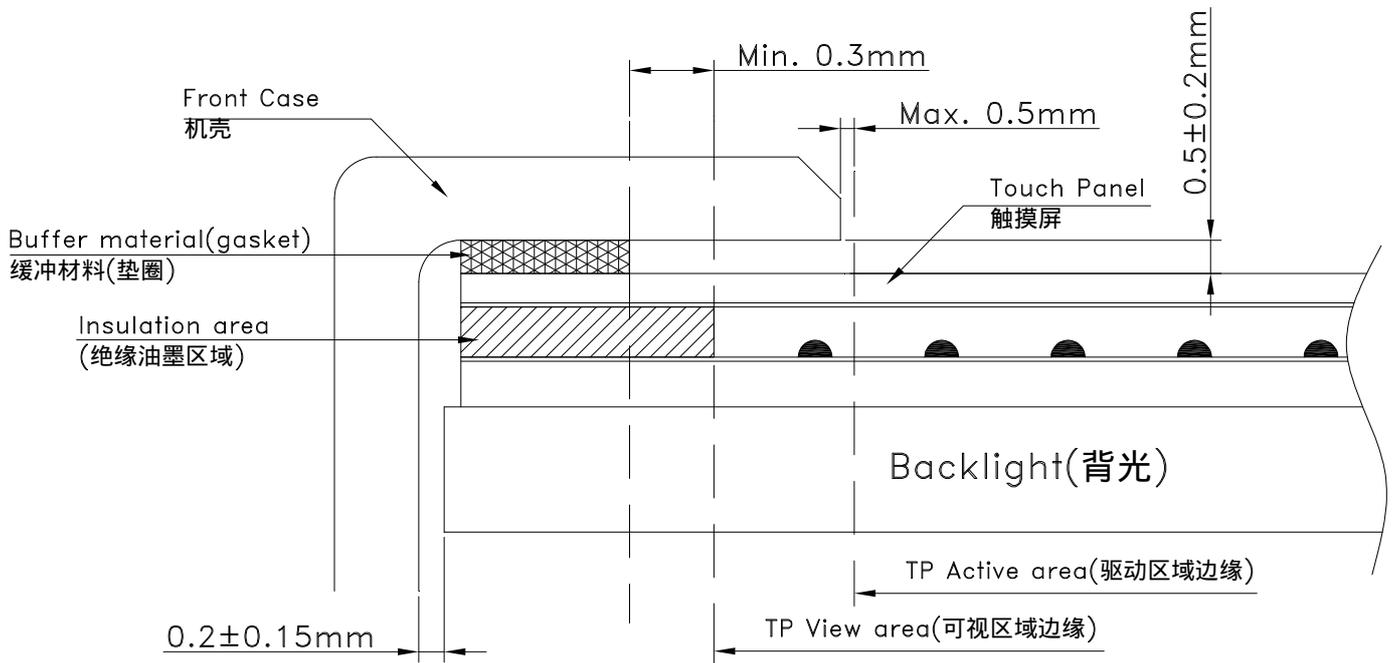
10.3 Storage

1. Store in an ambient temperature of 5 to 45 °C, and in a relative humidity of 40% to 60%. Don't expose

   to sunlight or fluorescent light.

2. Storage in a clean environment, free from dust, active gas, and solvent.

3. Store in antistatic container.

11. Inspection Standard

This specification is made to be used as the standard acceptance/rejection criteria for Color mobile phone LCM with touch pannel.

11.1 Sample plan and Inspection condition
11.1.1 Sample plan

Sampling plan according to MIL-STD-105E , normal level 2 and based on:

Major defect: AQL 0.65;

Minor defect: AQL 1.5.

11.1.2 Inspection condition

Viewing distance for cosmetic inspection is about 30cm with bare eyes, and under an environment of 20~40W light intensity, all directions for inspecting the sample should be within 45 against perpendicular line.

11.2 Definition of inspection zone in LCD
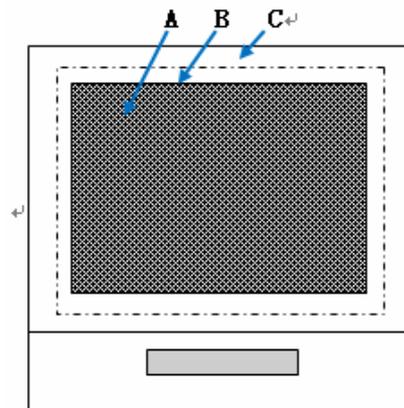
Inspection zones in an LCD

Zone A: character/Digit area;

Zone B: viewing area except Zone A (ZoneA+ZoneB=minimum Viewing area);

Zone C: Outside viewing area (invisible area after assembly in customer's product);

Note: As a general rule, visual defects in Zone C are permissible, when it is no trouble for quality and assembly of customer's product. Defects are classified as major defects and minor defects according to the degree of defectiveness defined herein.

11.3 Major defects and Minor defects
11.3.1 Major defects

A major defect is a defect that is likely to result in failure, or to reduce the usability of the product for its intended purpose.

11.3.1.1 Abnormal operation: modules cannot display normally;

11.3.1.2 Line defect;

11.3.1.3 There is serious distortion or sharp burr on mechanical housing;

11.3.1.4 Glass breakage.

11.3.2 Minor defects:

A minor defect is a defect that is not likely to reduce the usability of the product for its intended purpose.

11.3.2.1 Dot defect:

11.3.2.1.1 Inspection pattern : Full white, full black, red, green and blue screens;

11.3.2.1.2 Criteria :(acceptable);
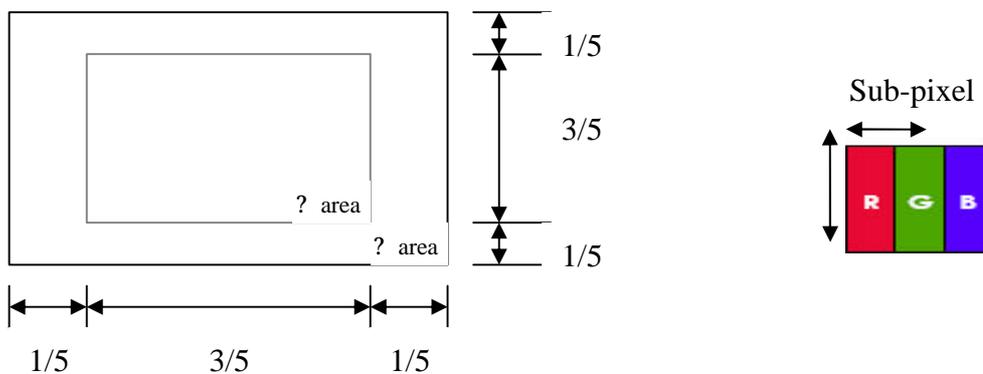
Note: 1. Dot defect is defined as the defective area of the dot area is larger than 50% of the dot area . And the bright dot defect must be visible through 5% ND filter.

2. Except for the allowed numbers of adjacent dots, the distance between dot defects should be more than 3mm apart.

11.3.2.1.3 The definitions of the inner display area and outer display area.

11.4 Inspection standards table:

11.4.1 Major defect

Item No.	Items to be	Inspection Standard	Classification of defects
11.4.1.1	All functional defects	1) No display 2) Display abnormally 3) Missing vertical/horizontal segment 4) Short circuit 5) Back-light no lighting, flickering and abnormal lighting.	Major
11.4.1.2	Missing	Missing component	
11.4.1.3	Outline dimension	Overall outline dimension beyond the drawing is not allowed.	
11.4.1.4	linearity	No more than 1.5%	

11.4.2 Cosmetic Defect (spot defect)

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Item No	Itemsto be	Inspection Standard				Classification of defects
11.4.2.1	**Clear Spots** Black and white Spot defect Pinhole, Foreign Particle, polarizer Dirt	For dark/white spot, sizeF is defined as $F = (x + y)/2$				Minor
		Zone Size(mm)	A	B	C	Minor
			Acceptable Qty			
		$F = 0.1$	Ignore			
		$0.10 < F = 0.15$	2		Ignore	
		$0.15 < F = 0.20$	1			
		$F > 0.20$	0			
11.4.2.2	**Clear Spots** TP Dirt	Zone Size(mm)	A	B	C	Minor
			Acceptable Qty			
		$F = 0.1$	Ignore			
		$0.10 < F = 0.15$	2		Ignore	
		$0.15 < F = 0.25$	1			
		$F > 0.25$	0			
11.4.2.3	**Dim Spots** Circle shaped and dim edged defects	Zone Size(mm)	A	B	C	Minor
			Acceptable Qty			
		$F = 0.2$	Ignore			
		$0.20 < F = 0.4$	2		Ignore	
		$0.4 < F = 0.6$	1			
		$F > 0.6$	0			
11.4.2.4	**Dot defect**	dot =sub-pixel				Minor
			Acceptable Qty			
			I	II		
		Bright dot	0	2		
		Dark dot	1	2		
		The distance of two point >5mm				

11.4.3 Cosmetic Defect (linear defect)

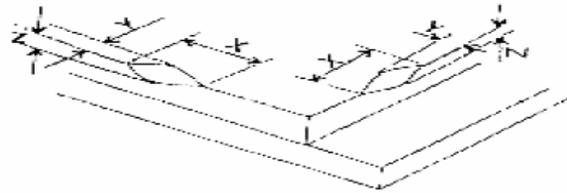| Item No	Items to be	Inspection Standard					Classification of defects
11.4.3.1	**Line defect** Black line, White line, Foreign material on polarizer	Size(mm)		Acceptable Qty			Minor
		L(Length)	W(Width)	zone			
				A	B	C	
		Ignore	$W = 0.02$	Ignore			
		$L = 3.0$	$0.02 < W = 0.03$	2		Ignore	
		$L = 2.0$	$0.03 < W = 0.05$	1			
			$W > 0.05$	Define as spot defect			

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| 11.4.3.2 | **Dim line defect** Polarizer &BL scratch TP film scratch | If the scratch can be seen after mobile phone cover assembling or in the operating condition, judge by the line defect of 11.4.3.1. If the scratch can be seen only in non-operating condition or some special angle, judge by the following. | Minor |

Size(mm)		Acceptable Qty		
L(Length)	W(Width)	zone		
		A	B	C
Ignore	W=0.02	Ignore		
L=3.0	0.02< W=0.03	2		Ignore
L=2.0	0.03< W=0.05	1		
	W> 0.05	Define as spot defect		

| 11.4.3.3 | Polarize Air bubble | Air bubbles between glass & polarizer | Minor |

	Acceptable Qty		
	A	B	C
F =0.2	Ignore		
0.20< F =0.3	2		Ignore
0.3< F =0.5	1		
F > 0.5	0		

11.4.4 Chipping Defect

Item No	Items to be	Inspection Standard	Classification of defects
11.4.4.1	Glass defect	Chips on corner **A:LCD Glass defect** Notes: S=contact pad length Chips on the corner of terminal shall not be allowed to extend into the ITO pad or expose perimeter seal. **B:TP Glass defect**	Minor
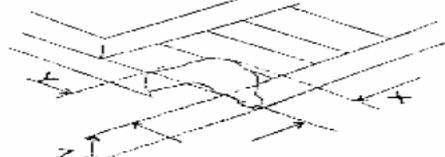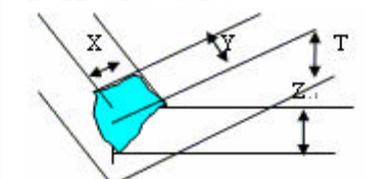
X	Y	Z
=0.2	=S	Disregard

X	Y	Z
=3.0	=3.0	Disregard

Usual surface cracks
A:LCD Glass defect

X	Y	Z
=3.0	<Inner border line of the seal	Disregard

B:TP Glass defect
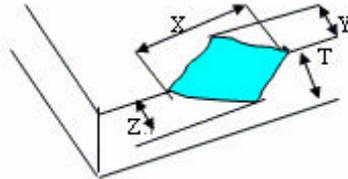
X	Y	Z
=6.0	=2.0	Disregard

Crack: Cracks tend to break are not allowed.

crack
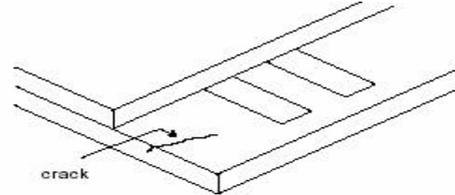
11.4.5 Parts Defect

Item No	Items to be	Inspection Standard	Classification of defects
11.4.5.1	Parts contra position	1　Not allow IC and FPC/heat-seal lead width is more than 50% beyond lead pattern. 2　Not allow chip or solder component is off center more than 50% of the pad outline.	Major
11.4.5.2	SMT	According to the <Acceptability of electronic assemblies>IPC-A-610C class 2 standard. Component missing or function defect are Major defect, the others are Minor defect.	Major
11.4.5.3	Backlight elements	1 Illumination source flickers when lit. 2 Spots or scratches that appear when lit must be judged using LCD spot, lines and contamination standards. 3 Backlight doesn't light or color is wrong	Major
11.4.5.4	Soldering	1 No unmelted solder paste may be present on the FPC 2 No cold solder joints, missing solder connections, oxidation or icicle. 3 No short circuits in components on FPC	Major

11. Packing
T.B.D.