KH28B59C02E-V1

Product

Standard LCD Module
240 x RGB x 320 Dots
2.83” TFT LCD
Wide temperature
With white LED backlight
With Touch Panel

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1. Document revision history :

DOCUMENT REVISION	DATE	DESCRIPTION	PREPARED BY	APPROVED BY
01	2008.05.12	First Release.	Van Ng	

2. General Description

- 2.83”(diagonal), 240 x RGB x 320 dots, 262k colors, Transmissive, TFT LCD module.
- Viewing Direction: 12 o’clock.
- Driving IC: ILI9338B or equivalent TFT controller/driver.
- 8/16-bits data bus (I80 system interface).
- Logic voltage: 2.8V (typ.).
- Touch panel.

3. Mechanical Specifications

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

Table 1

Parameter		Specifications	Unit
Outline dimensions		50.0(W) x 69.2(H) x 3.88(D) (Exclude FPC, cables of touch panel and backlight)	mm
Color TFT 240xRGBx320	View area	45.8(W) x 63.6 (H)	mm
	TP active area	44.8(W) x 63.0(H)	mm
	LCD active area	43.2(W) x 57.6(H)	mm
	Display format	240 x RGB x 320	dots
	Color configuration	RGB stripes	-
	Dot pitch	0.180(RGB)(W) x 0.180(H)	mm
Weight		TBD	grams

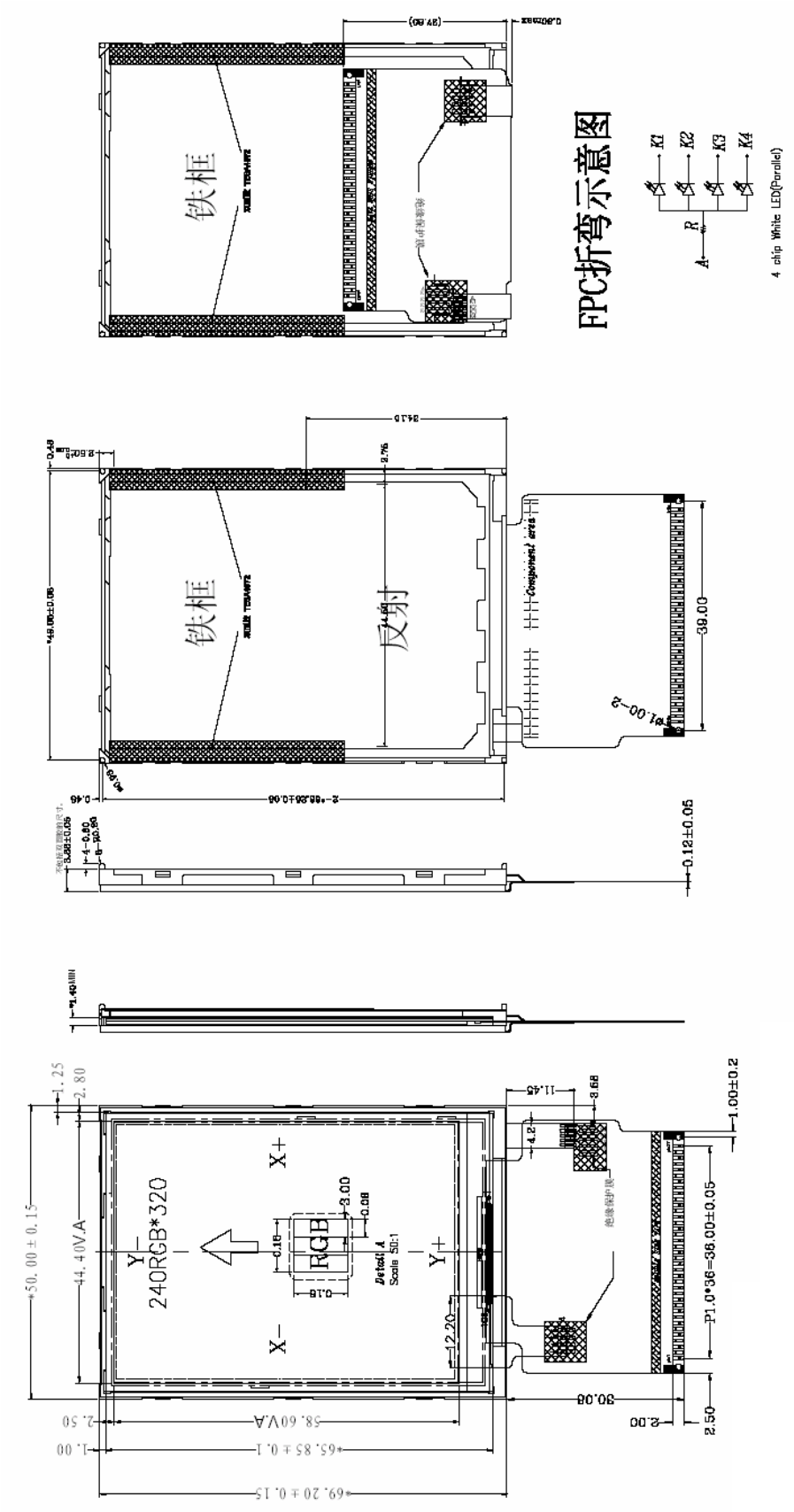

Figure 1: Outline Drawing

4. Interface signals

Table 2: Pin assignment

Pin No.	Symbol	Description
1-4	[DB0-DB3]	16-bit bi-directional data bus.
5	GND1	Ground for the logic and analog circuit.
6	VCC1	A power supply for the internal logic circuit and for the I/O circuit. VCC = 2.2 ~ 3.3V.
7	/CS	Chip select signal. 0: chip can be accessed; 1: chip cannot be accessed.
8	RS	Register Select Signal (H: Data, L: Instruction)
9	/WR	I80 system: Serves as a write signal and writes data at the rising edge.
10	/RD	I80 system: Serves as a read signal and reads data at the low level.
11	IM0	8-bit or 16-bit data interface selection
12	XR	Terminal of touch panel.
13	YD	
14	XL	
15	YU	
16	LEDA	Anode of LED backlight.
17	LEDK1	Cathode of LED backlight.
18	LEDK2	
19	LEDK3	
20	LEDK4	
21	NC	NC
22	DB4	16-bit bi-directional data bus.
23-30	[DB8-DB15]	
31	/RESET	Reset pin. Setting either pin low initializes the LSI. Must be reset the chip after power being supplied.
32	VCI	A power supply for the internal logic circuit and for the I/O circuit. VCC = 2.2 ~ 3.3V.
33	VCC2	
34	GND	Ground for the logic and analog circuit.
35-37	[DB5-DB7]	16-bit bi-directional data bus.

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
Power supply voltage (VCC)	VCC	-0.3	+4.6	V	1

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 ≤ 40°C < 50% RH for 40°C < Ta ≤ 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= 2.2V to 3.3V, GND=0V.

Table 5

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Supply voltage (logic)	VCC-GND		2.6	2.8	3.3	V
Supply current (Logic & LCD)	ICC	VCC=2.8V	-	-	10	mA
Supply voltage of white LED backlight	VLED =$V_{(BL+)}$-$V_{(BL-)}$	Forward current =72 mA Number of LED dies = 4	2.9	3.2	3.5	V
Luminance (on the module surface)			-	150	-	cd/m^2

7. Optical Characteristics

Table 7: Optical specifications

Items		Symbol	Condition	Specifications			Unit	
				Min.	Typ.	Max.		
Contrast Ratio		CR		-	300	-	-	
Response Time		T_R		-	10	-	ms	
		T_F		-	15	-	ms	
Chromaticity	Red	X_R		-	0.6457	-	-	
		Y_R		-	0.3391	-	-	
	Green	X_G		-	0.3438	-	-	
		Y_G		-	0.6012	-	-	
	Blue	X_B		-	0.1476	-	-	
		Y_B		-	0.1110	-	-	
	White	X_W		-	0.313	-	-	
		Y_W		-	0.329	-	-	
Viewing angle	Hor.	ϕ1(3 o'clock)	Center CR=10	-	50	-	deg.	
		ϕ2(9 o'clock)		-	50	-		
	Ver.	θ2(12 o'clock)		-	60	-		
		θ1(6 o'clock)		-	55	-		
NTSC ratio					61		%	

Note

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):

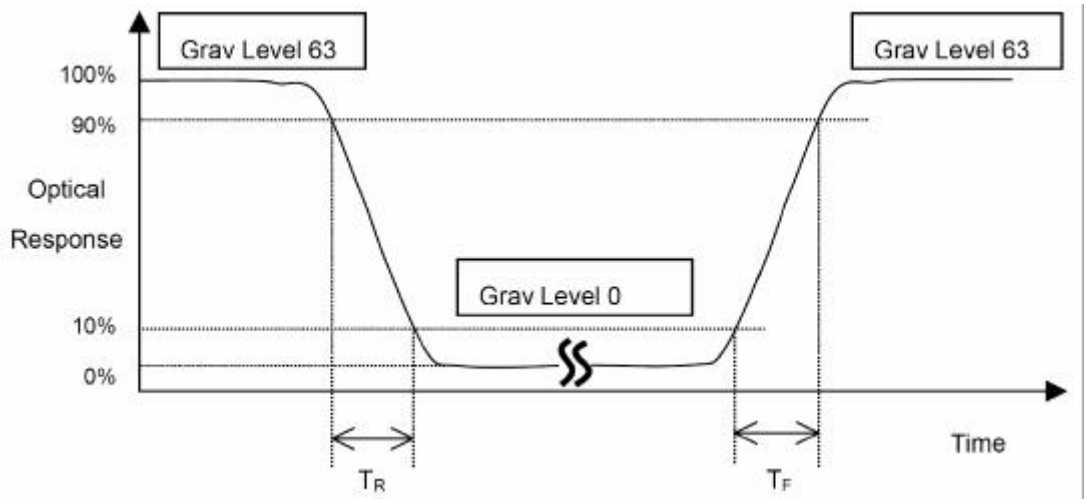

Figure 3

Note 3: Viewing Angle

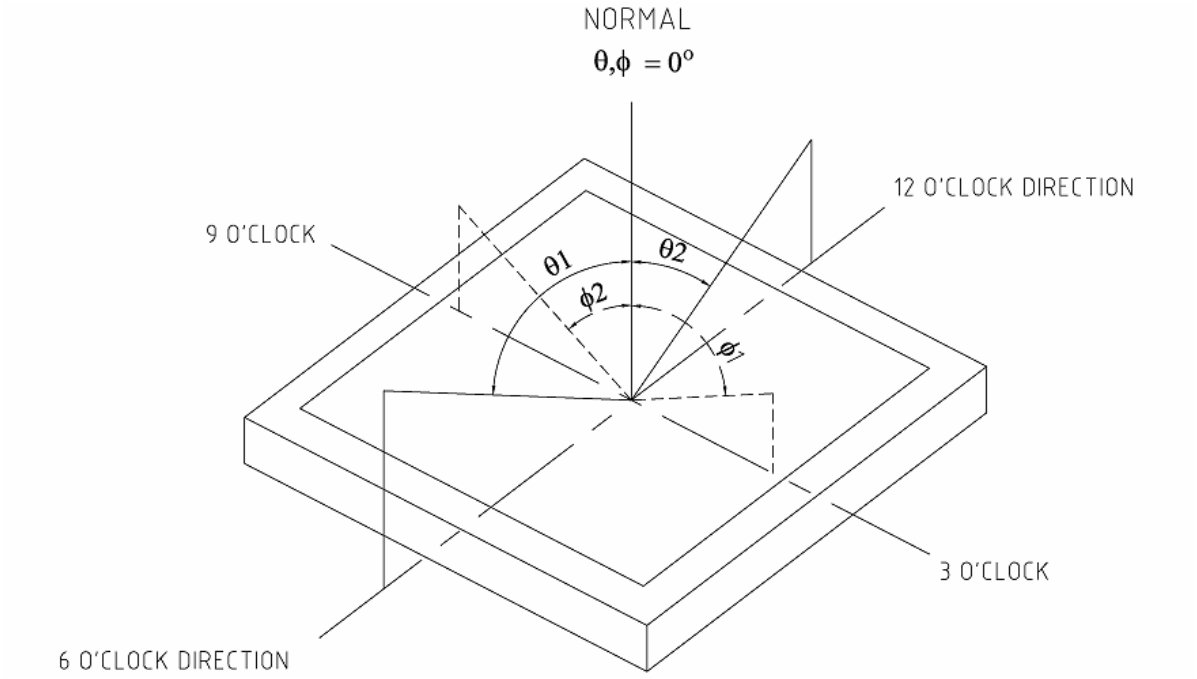

Figure 4

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.

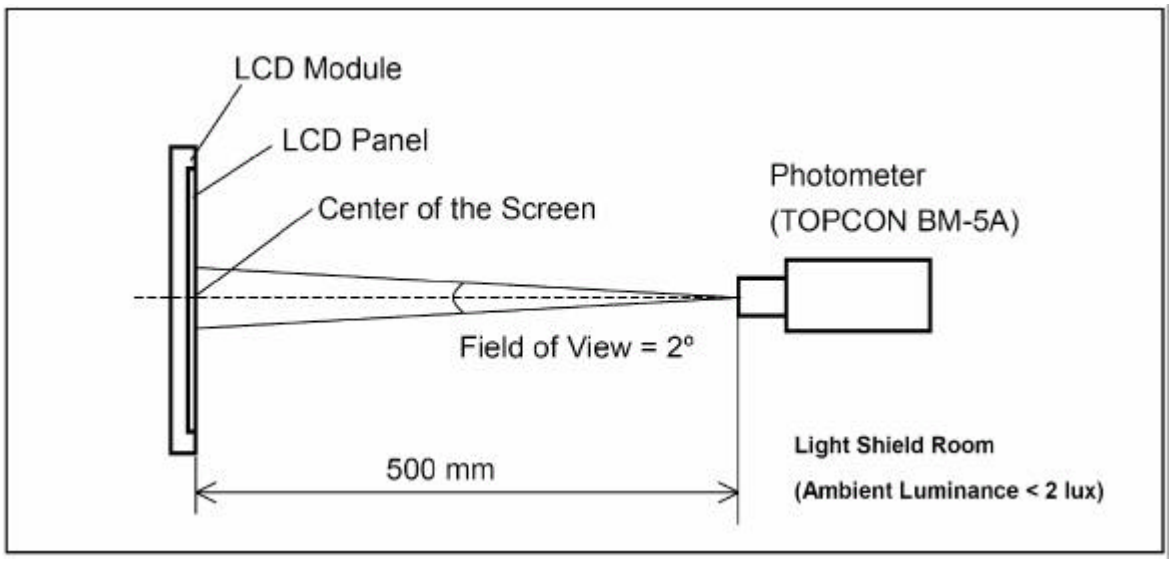

Figure 5

8. Timing Characteristics

Please refer ILI9338B datasheet.

9. Reliability Test Item

Test Item	Sample Type	Test Condition	Test result determinant gist
High temperature storage	Normal temperature	70±3℃;96H	the inspection of appearance and function character.
	Wide temperature	80±3℃;96H	
Low temperature storage	Normal temperature	-20±3℃;120H	
	Wide temperature	-30±3℃;120H	
High temperature /humidity storage	Normal temperature	50℃±3℃,90%±3%RH;96H	
	Wide temperature	60℃±3℃,90%±3%RH;96H	
High temperature operation	Normal temperature	60±3℃;96H	no objection of the function character; no fatal objection of the appearance.
	Wide temperature	70±3℃;96H	
Low temperature operation	Normal temperature	0±3℃;96H	
	Wide temperature	-20±3℃;96H	
High temperature /humidity operation	Normal temperature	40℃±3℃,90%±3%RH;96H	
	Wide temperature	50℃±3℃,90%±3%RH;96H	
Temperature Shock	Normal temperature	-20±3℃,30min? 70±3℃,30 min;10cycle	inspect the objections appearance、function & the whole structure
	Wide temperature	-30±3℃,30min 80±3,30min;10cycle	The inspection of 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 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. Packing

TBD

- END -