



FANScoo

Document No. 1404GGS

1.38 Inch 65K/262K Color TFT LCD Module SPECIFICATIONS

CUSTOMER	
MODEL	F14-04
CUSTOMER APPROVED	

APPROVED BY	CHECKED BY	ORGANIZED BY

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1.1 Caution

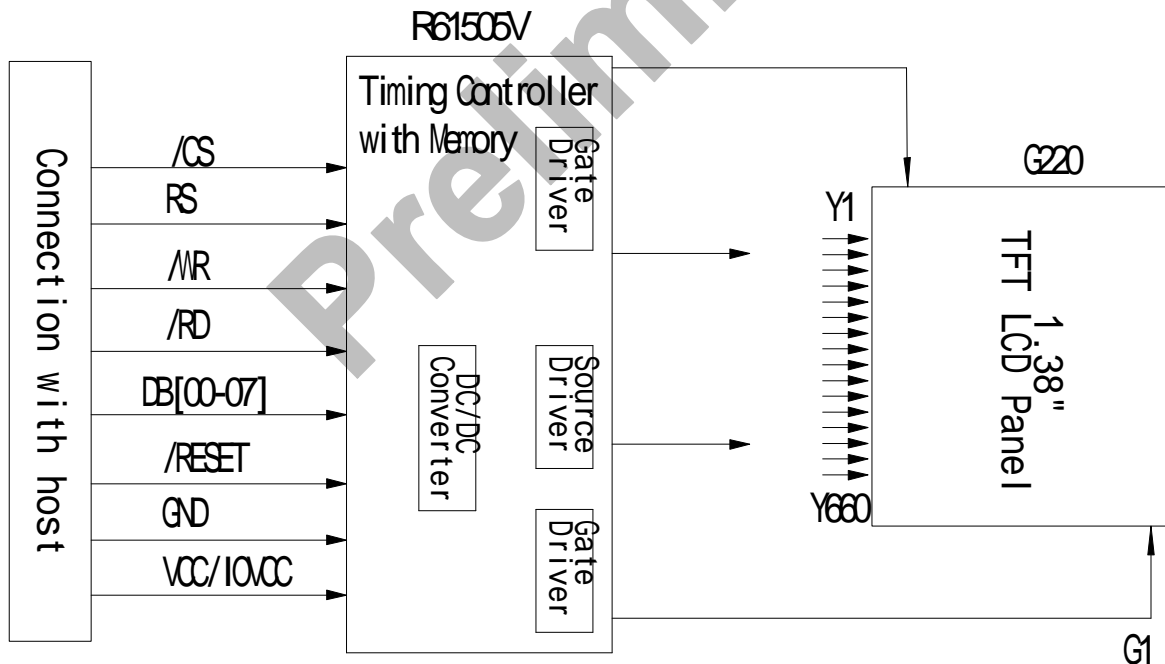
1. This Fanscoo LCD module has been specifically designed for use only in Electronic devices in the areas of mobile phone. The module should not be used in applications where panel failure could result in physical harm or loss of life, and Fanscoo expressly disclaims any and all liability relating in any way to the use of the module in such applications.

2. Customer agrees to indemnity, defend and hold Fanscoo harmless from and against any and all actions, claims, losses, damages, liabilities, awards, costs, and expenses, including legal fees, resulting from or arising out of Customer's use, or sale for use, of Fanscoo module in applications.

1.2 Description

F14-04 is a transmissive type color active matrix TFT liquid crystal display that use amorphous silicon TFT as switching devices. This module is composed of a TFT-LCD module , a driver circuit and back-light unit. The resolution of 1.38" contains 220*220 pixels and can display up to 65K/262K colors.

1.3 Block diagram



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1.4 General Specifications

ITEM	Specification
LCD Mode	TFT; RGB Color; Normal White; Transmissive
Controllable Color	Indication data: Red-5/6bit, Green-6bit, Blue-5/6bit gradation control
Background Color	Indication data: Red (1,1,1,1,1,(1)) / Green(1,1,1,1,1,1) / Blue (1,1,1,1,1,(1))
Viewing direction	6 o'clock
Backlight	LED white colored Backlight (LED unit, 2chip LED)
Driver IC	R61505V
Mounting methods	COG
Operating temperature	-20℃~70℃
Storage temperature	-30℃~80℃
Operating humidity	Temp. ≤40℃,85%RH MAX. Temp. >40℃,Absolute humidity shall be less than 85%RH at 40℃
Storage humidity	Temp. ≤40℃,85%RH MAX. Temp. >40℃,Absolute humidity shall be less than 85%RH at 40℃

(Note) Color tone is slightly changed by temperature and driving voltage.
This product measure up Rohs standard.

1.5 Mechanical Specifications

ITEM	Specification
Outline Dimension	According to the annexed outline drawing No. 1404
Dots Matrix	(220×3) (W) × 220(H) Dots
OUTLINE(mm)	38.3*44.81
Active Area (mm)	Diameter: 35.1
Mass	TBD

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1.6 Terminal Functions

NO	Symbol	Function	I/O
1	GND	Ground	P
2	VCC	POWER 2.8V~3.0V	P
3	IOVCC	I/O POWER 1.8V/2.8V(typ)	P
4	GND	Chip select signal.	P
5	/CS	Chip select input pin ("Low" enable). Amplitude:IOVCC-GND Low: the driver is selected and accessible High: the driver is not selected and not accessible.	I
6	RS	Register select signal.Amplitude:IOVCC-GND Low: select Index register High: select control register .	I
7	/WR	Write strobe signal in 80-system bus interface operation and enables write operation when WRX is low. Synchronous clock signal (SCL) in serial interface operation. Amplitude:IOVCC-GND	I
8	/RD	Read strobe signal in 80-system bus interface operation and enables read operation when RDX is low.Amplitude:IOVCC-GND	I
9	DB00	8-bit parallel bi-directional data bus for 80-system interface operation (Amplitude: IOVCC-GND).	P
10	DB01		-
11	DB02		P
12	DB03		P
13	DB04		-
14	DB05		P
15	DB06		P
16	DB07		
17-2	NC	No connection.	-
25	/RESET	Reset pin. low initializes the LSI. Must be reset after power-on.	I
26	IM0	No connection.	-
27	LEDK1	LED cathode pin	-
28	LEDK2	LED cathode pin	-
29	LEDA	LED anode pin	-
30	GND	Ground	P

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2.1 Absolute maximum ratings

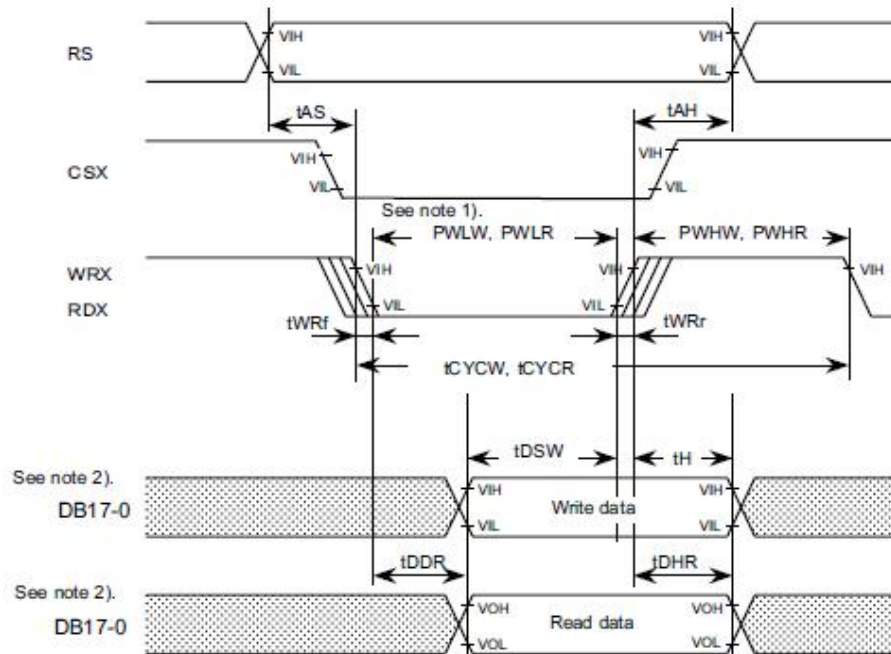
Item	Symbol	Value	Unit
Operation Temperature	Top	-20~70	°C
Storage Temperature	Tstr	-30~80	°C
Power supply voltage	V _{DD}	-0.3~3.0	V

2.2 LED back light specification (per a Chip)

Item	Symbol	Condition	Min	Type	Max	Unit
Forward voltage	V _f	I _f =15mA	-	3.2	-	V
Forward current	I _{pn}	/1-chip	-	15	-	mA
Reverse voltage	V _r	per chip	-	-	4.0	V
Reverse Current	I _r	V _r =4V	-	-	15	uA
Uniformity (with L/G)	-	I _f =15mA	70	-	-	%
Luminance	No LCD	Lv	I _f =15mA	3500	4000	cd/m2
	With LCD	Lv	I _f =15mA	-	300	cd/m2
Luminous color		White				

2.3 Time Sequence

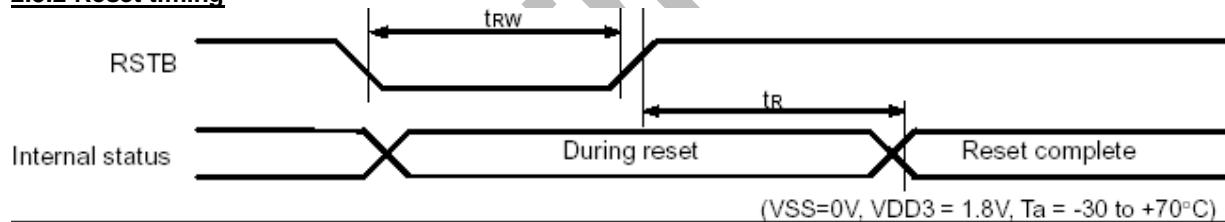
2.3.1 80-System Bus Interface Timing Characteristics



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Item		Symbol	Unit	Timing Diagram	Min.	Typ.	Max.
Bus cycle time	Write	tCYCW	ns	Figure A	70	—	—
	Read	tCYCR	ns	Figure A	450	—	—
Write low-level pulse width		PWLW	ns	Figure A	30	—	—
Read low-level pulse width		PWLR	ns	Figure A	170	—	—
Write high-level pulse width		PWHW	ns	Figure A	25	—	—
Read high-level pulse width		PWHR	ns	Figure A	250	—	—
Write / Read rise/ fall time		tWRr, WRf	ns	Figure A	—	—	25
Setup time	Write (RS to CSX, WRX)	tAS	ns	Figure A	0	—	—
	Read (RS to CSX, RDX)		ns	Figure A	10	—	—
Address hold time		tAH	ns	Figure A	2	—	—
Write data setup time		tDSW	ns	Figure A	25	—	—
Write data hold time		tH	ns	Figure A	10	—	—
Read data delay time		tDDR	ns	Figure A	—	—	150
Read data hold time		tDHR	ns	Figure A	5	—	—

2.3.2 Reset timing



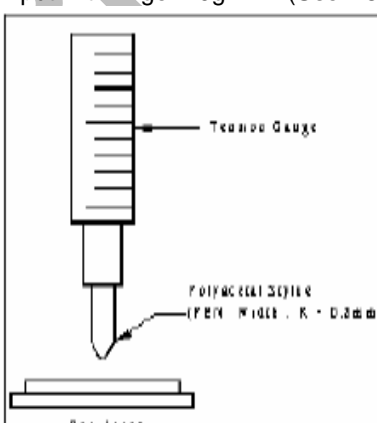
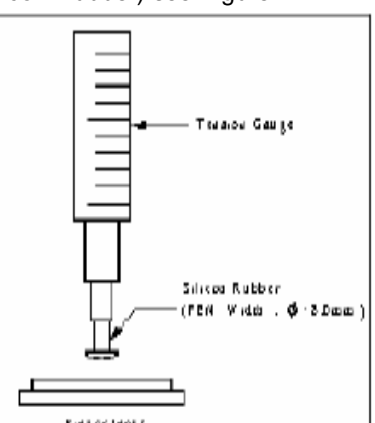
Item	Signal	Symbol	Condition	Min.	Max.	Unit
Reset low pulse width	RSTB	Trw		1000	-	ns
Reset time	-	tr		-	1000	ns

2.4 Electrical characteristics

Item	Symbol	Condition	Min	Type	Max	Unit
Input high voltage	Vih		0.8 V _{DD}	-	V _{DD}	V
Input low voltage	Vil		-0.3	-	0.2 V _{DD}	V
Output high voltage	Voh	Ioh=-0.1mA	0.8 V _{DD}	-	-	V
Output low voltage	Vol	Iol=0.1mA	-	-	0.2 V _{DD}	V
Input leakage current	Iil	Vin=0--Vdd	-1.0	-	1.0	uA
Current consumption	Idd	-	-	-	9.0	mA

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2.5 Touch Panel Specification

Item	Descripton
2.5.1 Rating	
The maximum voltage	DC5V Max
Operating temperature range	-20℃~60℃: -20℃~40℃ 90%RH or less 40℃~60℃ 60%RH or less
Storage temperature range	-40℃~70℃: -40℃~40℃ 90%RH or less 40℃~60℃ 60%RH or less 60℃~70℃ 50%RH or less and 168 hours or less Avoid storage in high temperature and high humidity. When long-term storage is required. Keep the panels at a temperature of 15℃ to 35℃ and a relative humidity of 60%RH or less.
2.5.2 Electrical	
Resistance between leads	Direction "X" (Film side): 200~900Ω Direction "Y" (Glass side): 200~900Ω
Linearity	±1.5%, Measured per appendix A
Insulation resistance	20MΩ or more, Apply DC 25V between upper and lower electrodes.
Chattering time	10 msec or less
2.5.3 Mechanical	
Activation force	<p>Input with pen 10~80g (Use R0.8, Polyacetal stylus) see Figure 1 Input with finger 20g Min. (Use R8, HS40°Silicon Rubber) see Figure 2</p>   <p>Figure 1 Figure 2</p>
Surface hardness	3 H min. (Pencil test per JISK5600)
FPC peeling strength	300g/cm at speed 100mm/min upward 90°



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Static load test	<p>Min.5kg at speed 20 mm/min,</p>
2.5.4 Optical	
Light Transparency	80%Min., Total light Transparency according to JISK7105
2.5.5 Durability	
Knocking life	1,000,000 time, The test shall be done at the load of 250g, 5Hz with 0.8R polyacetal stylus. After test, there is no pitting allowed on the product.
Pen sliding resistance	100,000 cycles, The test shall be done at least 5mm from A/A edge, Using R0.8 polyacetal stylus on the load of 250g and with a stylus change after every 10,000 cycles, one cycle is a 35mm straight line in one direction @60 mm/sec. No visible scratches when viewed with the naked eye, using office lighting conditions, at a distance of 6 inches and at viewing angles of 90 and 45 degrees with the backlight off.

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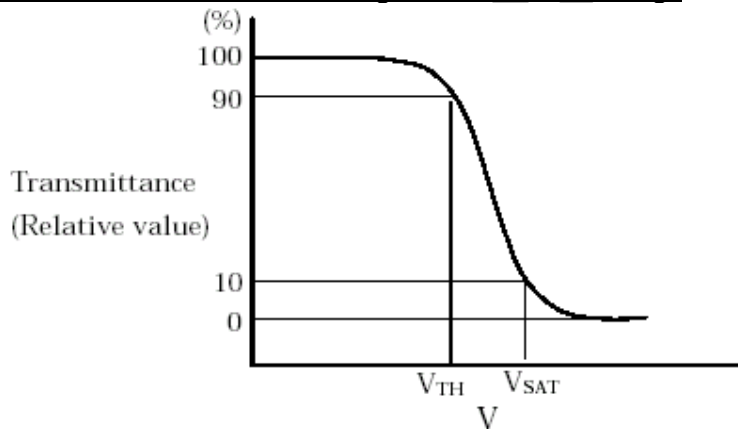
3.1 Optical Characteristics

Item	Symbol	Temp	Min	Type	Max	Unit	Condition
Response time*1	Tr	25℃	-	-	TBD	ms	$\Phi=0^\circ \theta=0^\circ$
	Td		-	-	TBD	ms	
Viewing Angle*1	Hor.	25℃	-61	-	+73	Deg.	$\theta=0^\circ$
	Ver.	25℃	-51	-	+64		$\theta=90^\circ$ CR>2
Threshold voltage*1	Vsat	25℃	-	-	-	V	$\Phi=0^\circ$
	Vth		-	-	-		$\theta=0^\circ$
Contrast Ratio	Cr	25℃	-	355	-	-	$\Phi=0^\circ$ $\theta=0^\circ$
Color of CIE Coordinate	W	x	-	0.313	-		$\Phi=0^\circ$ $\theta=0^\circ$
			-	0.334	-		
	R	x	-	0.614	-		
			-	0.350	-		
	G	x	-	0.330	-		
			-	0.584	-		
	B	x	-	0.140	-		
			-	0.073	-		
NTSC Ratio	S			TBD		%	

(Note*1)The data above is only for panel.

3.2 Definition of Optical Characteristics

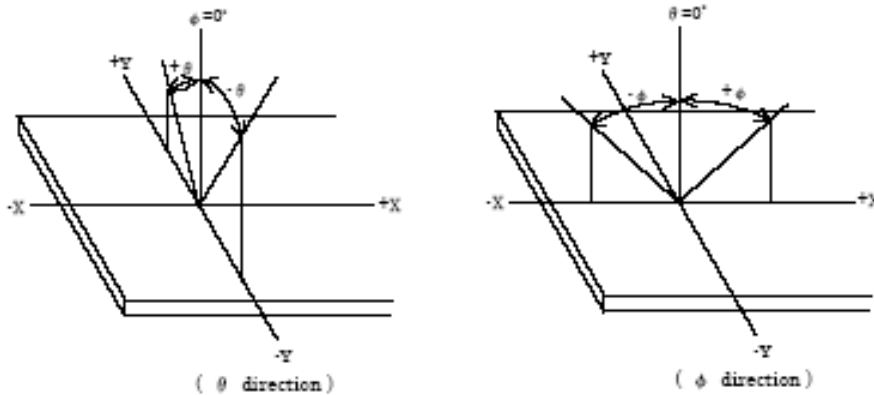
3.2.1 Definition of Threshold voltage and Saturation voltage



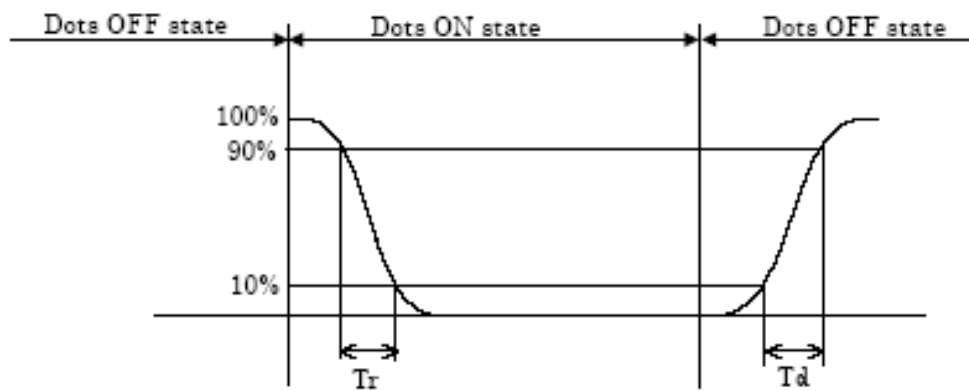


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3.2.2 Definition of Viewing Angle



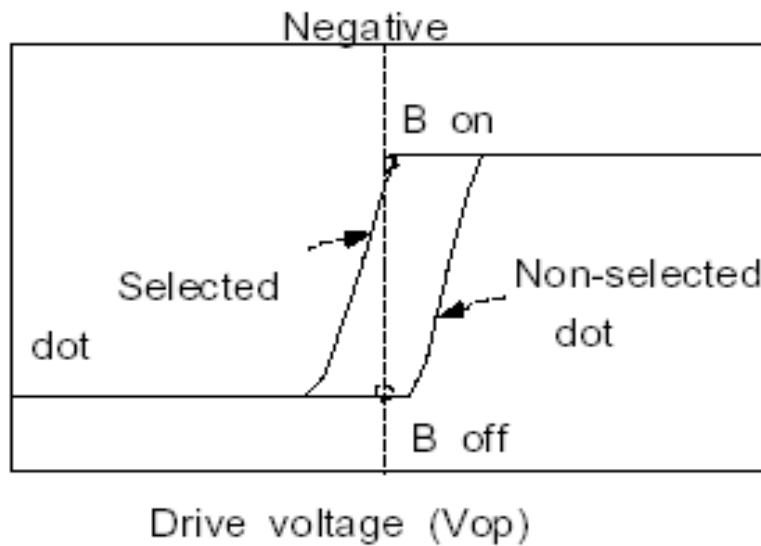
3.2.3 Definition of Response Time





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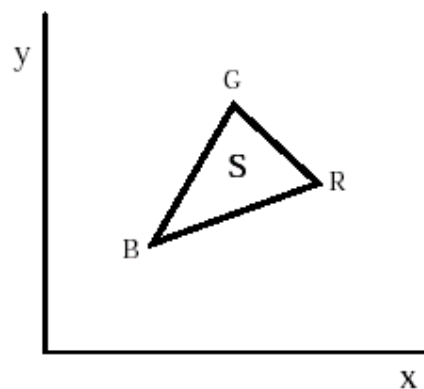
3.2.4 Definition of Contrast Ratio



$$\text{Contrast Ratio} = \frac{\text{Brightness of all pixel white}}{\text{Brightness of all pixel black}}$$

3.2.5 Definition of Color gamut

$$\text{Color gamut: } S = (\text{RGB triangle Area} / \text{NTSC triangle Area}) \times 100$$



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4.1 Content of Reliability Test

NO.	TEST ITEMS	TEST CONDITION
1	High Temperature Storage Test	TA=80℃, 48hrs/96hrs
2	Low Temperature Storage Test	TA=-30℃, 48hrs/96hrs
3	High Temperature and High Humidity Operation Test	TA=40℃, 90RH%, 48hrs/96hrs (No Condensation Dew)
4	High Temperature Operation Test	TA=70℃, 48hrs/96hrs
5	Low Temperature Operation Test	TA=-20℃, 48hrs/96hrs
6	Heat Shock Test	TA=-30℃(0.5hrs)~80℃(0.5hrs)/10Cycle

* A test LCD panel is used in all the tests./Each test item uses a test LCD panel only once. The tested LCD panel is not used in any other tests.

* The LCD panel is tested in circumstances in which there is no condensation.

* The tested LCD is inspected after 2 hours of storage at room temperature and room humidity after each test is finished.

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5.1 Handling Precautions of panel

*As LCD module is glass product of precision processing and special treatment, it is vulnerable enough to have chips and cracks easily. And especially edges should be protected from shocks. If the liquid crystals in LCD flows out when the product is broken pay most attention to that you do not put the liquid crystal into your eyes and mouth. If the liquid crystal touches your hand, skin, or clothing, wash it away with soap and water immediately and completely.

*The polarizer on LCD is soft and easily scratched. If the surface is stained, use soft dry cloth and wipe gently. If the surface is heavily stained, use the following solvents: 1, Isopropyl alcohol. 2, Ethyl alcohol. Other solvents may damage the polarizer. Especially, do not use water, ketone and aromatic solvents.

*Do not give any pressure to the surface of LCD, and do not give excessive stresses to the side of LCD module. It may cause a distortion of color on the LCD.

*As LCD module uses CMOS devices, it is very sensitive to static electricity.

*Touching the IC of LCD module may cause abnormal display that cannot recover. Do not touch the IC of LCD module.

*If the logic circuit power is OFF, do not apply the input signals.

*Be sure to ground the body when handling the LCD module.

*Tools required for assembly, such as soldering irons, must be properly grounded.

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

*Do not forcibly pull or bend the I/O cable.

*Do not disassemble or process the LCD module.

*NC terminal should be open. Do not connect anything.

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

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

*Please handle carefully, because the glass has a sharp edge.

5.2 Storage Precautions

*Take care to minimize corrosion of the electrode. Moisture condensation on a current flow in a high humidity environment accelerates corrosion of the electrode.

*When storing the LCD module, avoid exposure to direct sunlight or to the light of fluorescent lamps. Keep the LCD module in bags designed to prevent static electricity charging under low temperature/normal humidity conditions (avoid high temperature/ high humidity and low temperature below 0°C).

5.3 Design Precautions

*The absolute maximum ratings represent the rated value beyond which LCD module can not exceed. When the LCD module is used in excess of this fated value, their operating characteristics may be adversely affected. To prevent the occurrence of erroneous operation caused by the noise, attention must be paid to satisfy VIL, VIH specification values, including taking the precaution of using signal cables that are short.

*The liquid crystal display exhibits temperature dependency characteristics. Since recognition of the display becomes difficult when the LCD is used out of its designated operating temperature range, be sure to use the LCD within this range.

* We recommend that power supply lines (VDD, VEE) have over-current protection line. (Fuse etc.)

*Sufficiently notice the mutual noise interference occurred by peripheral devices.

*To cope with EMI, take measure basically on outputting side.

*When fixing LCD module, which is consisted of glass panel, TCP fixes it at plastic case side. In case PCB is fixed, there is the possibility that the disconnection is occurred by somewhat stress.

*When mounting the LCD module, make sure that it is free of twisting, warping and distortion. Distortion has great influence upon display quality. Also keep the shiftiness enough regarding the outer case.



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5.4 Other

*Liquid crystal solidify under low temperatures (below the storage temperature range) leading to defective orientation or the generation of air bubbles. Air bubbles may also be generated if the LCD module is subjected to a strong shock at a low temperature.

*If the LCD module has been operating for a long time showing the same display patterns, the display patterns may remain on the screen as ghost images and a slight contract irregularity may also appear. A normal operating status can be regained by suspending use for some time it should be noted that this phenomenon does not adversely affect performance reliability.

*To minimize the performance degradation of the LCD modules resulting from destruction caused sections by static electricity, etc, take care to avoid touching the following sections when handing the module.

①Terminal electrode sections, ②Part of pattern wiring on FPC, etc.

Preliminary



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6.1 Module outline

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