深圳市华源显控技术股份有限公司

Shenzhen Huayuan Display Control Technique Co., Ltd.

深圳市芯云显控技术有限公司

Shenzhen Chiloud Display Control Co., Ltd

GH240160-5001

STN DOTS LCD MODULE

SPECIFICATION

Standard code	Department	Rev No.
		A/0
Checked by	**Written by**	**Date**
		2016-04

1、 GENERAL SPECIFICATIONS

Screen size	5.0" (Diagonal)
Display color	Display color：White Background color：G
Type	STN
View angle direction	6'clock
Driver mode	1/240 DUTY 1/16 BIAS
Backlight	LED
Driver IC	NT7086 Or Compatible IC
Data Bus	8-bit
Temperature range	Operation：-20 ºC ---- +70ºC Storage：-30 ºC ---- +80ºC
Number of Dots	240 x 160
Dot size	0.37 x 0.4mm
Dot pitch	0.43 x 0.4mm
Viewing size	103.1 x 79.7mm
Active area	95.97 x 68.77mm
Outline dimension	139.0 x 96.5x 9.7mm Max.

2、 EXTERNAL DIMENSIONS
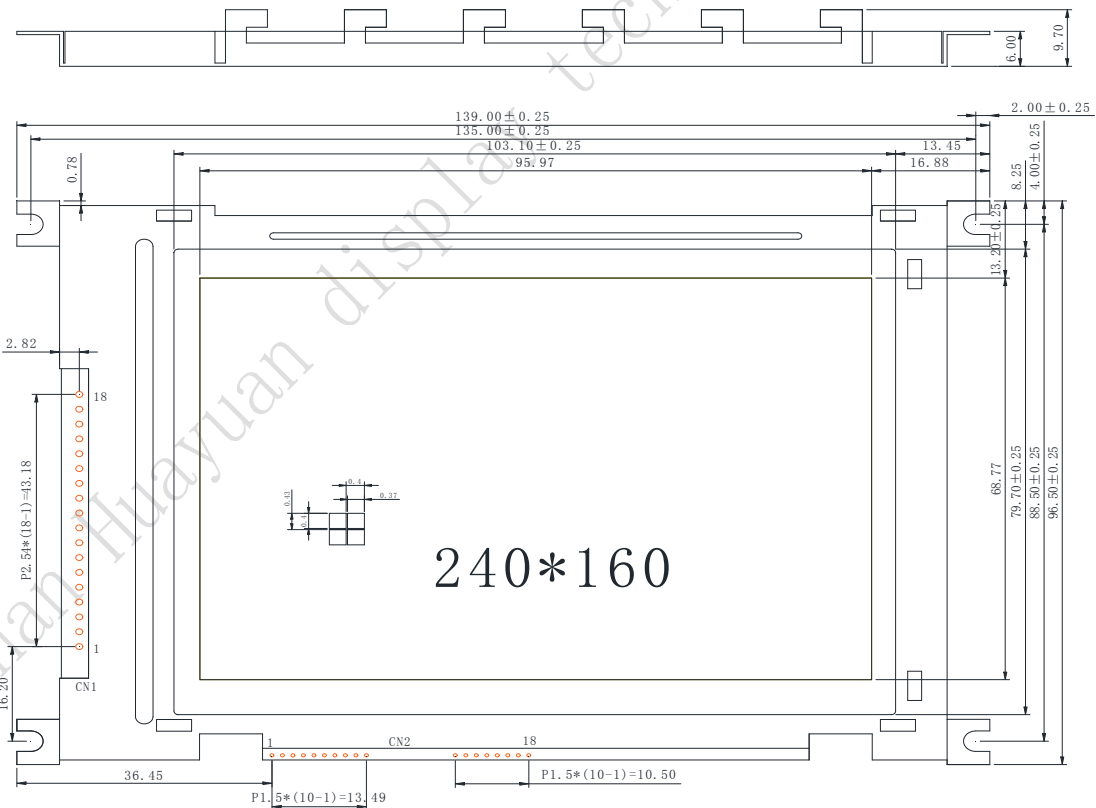
3、   ELECTRICAL CHARACTERISTICS

Parameter	Symbol		Min	Type	Max	Unit
Supply voltage for logic	V_{DD}-V_{SS}		4.75V	5.0V	5.25V	
Supply Voltage for LCD Driving	V_{ADJ}-V_{SS}	Ta=0°C	-	21.2	-	V
		Ta=+25°C	20.2	20.7	21.2	
		Ta=+50°C	-	20.2	-	
Supply current	I_{DD}		-	35	70	
Supply current for LCD Driving	I_{LCD}		-	3.5	5.0	mA
Supply Current for LED	I_{LED} (F=30K_{HZ})		-	180	220	
Supply Voltage for LED	V_{LED}		4.75	5.0	5.25	V DC

4、   ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Min	Max	Unit	Remark
Supply voltage for logic	V_{DD}–V_{SS}	-	+7.0	V	
Supply Voltage for LCD Driving	V_{ADJ}–V_{SS}	-	-25		
Operating temperature	T_{OP}	-20	+70	^{o}C	
Storage temperature	T_{ST}	-30	+80		

5、   OPTICAL CHARACTERISTICS

Item	Symbol	Condition	Typ.	Unit	Remark
Viewing angle	Øf	C_R≥2	40	Radian	Øf
	Øb		30		Øb
	Øl		30		Øl
	Ør		30		Ør
Response time	T_R	TA=25°C	150	ms	
	T_F		250		
Frame Frequency	F_{RM}		70	Hz	
Contrast ratio	C_R		6.0	-	

6、   INTERFACE DESCRIPTION (CN1)

PIN	DESC	Function
1	VSS	Ground
2	VDD	Power supply for Logic circuit and LCD
3	V0	Contrast adjust
4	WR	Write Control
5	RD	Read Control
6	CS	Chip Select
7	A0	Command/Data Select
8	RST	Reset signal
9-16	D0-D7	Data Bus
17	LED-EN	H:ON L:OFF
18	VEE	Internal LCD drive power

INTERFACE DESCRIPTION (CN2)

PIN	DESC	Function
1	D3	Data Bus
2	D4	Data Bus
3	D5	Data Bus
4	D6	Data Bus
5	D7	Data Bus
6	LED-EN	H:ON L:OFF
7	VEE	Internal LCD drive power
8	VSS	Ground
9	VCC	Power Input
10	V0	Contrast adjust
11	WR#	8080：#WR 6800：R/W
12	RD#	8080：#RD 6800：E
13	CS#	Chip Select：RA8835
14	A0	RA8835 Command/Data Select
15	RST#	Reset Signal：RA8835
16	D0	Data Bus
17	D1	Data Bus
18	D2	Data Bus

7、   BLOCK DIAGRAM
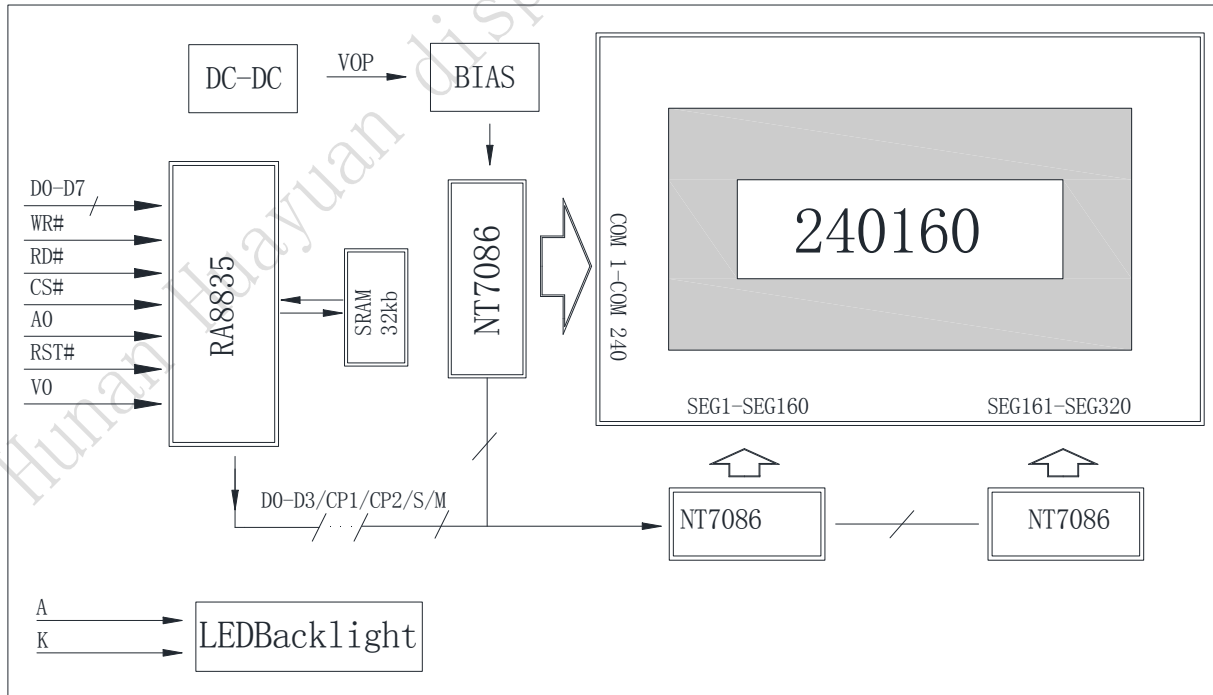
8、   AC CHARACTERISTICS

1) 68 Family Interface Timing
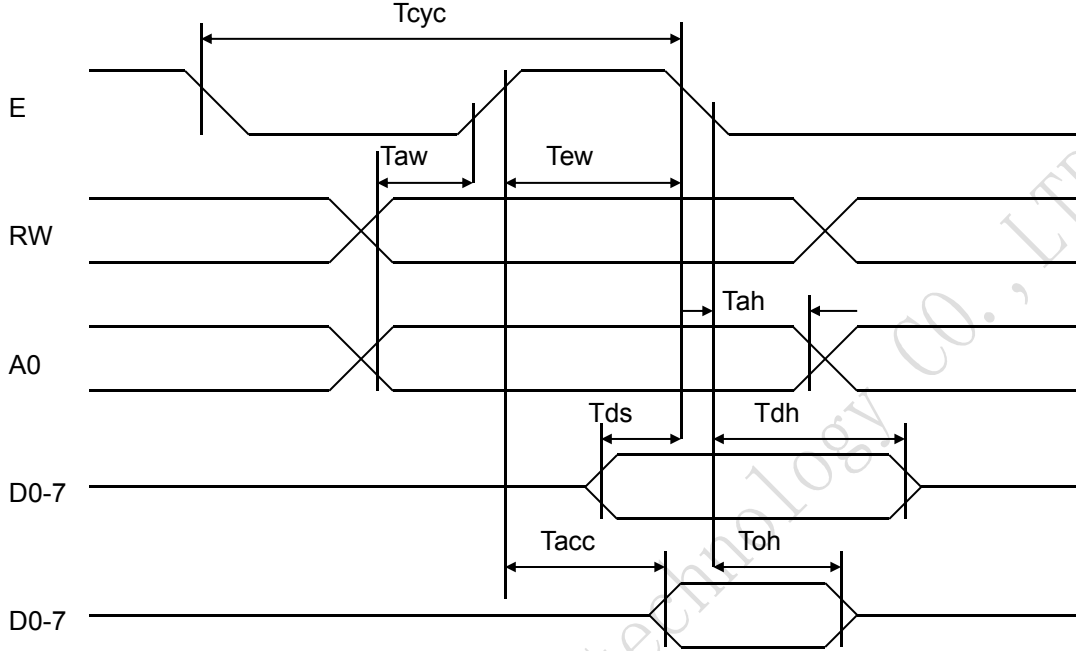
Parameter		Symbol	Min	Max.	Unit
Address Setup Time		Taw	20		ns
Address Hold Time		Tah	10		ns
System Clock Cycle		Tcycs	1000		ns
E Pulse Width	Read	Tew	100		ns
	Write		80		ns
Data Setup Time		Tds	80		ns
Write Data Hold Time		Tdh	10		ns
Access Time		Tacc		90	ns
Read Data Hold Time		Toh	10	60	ns

2) 80 Family Interface Timing
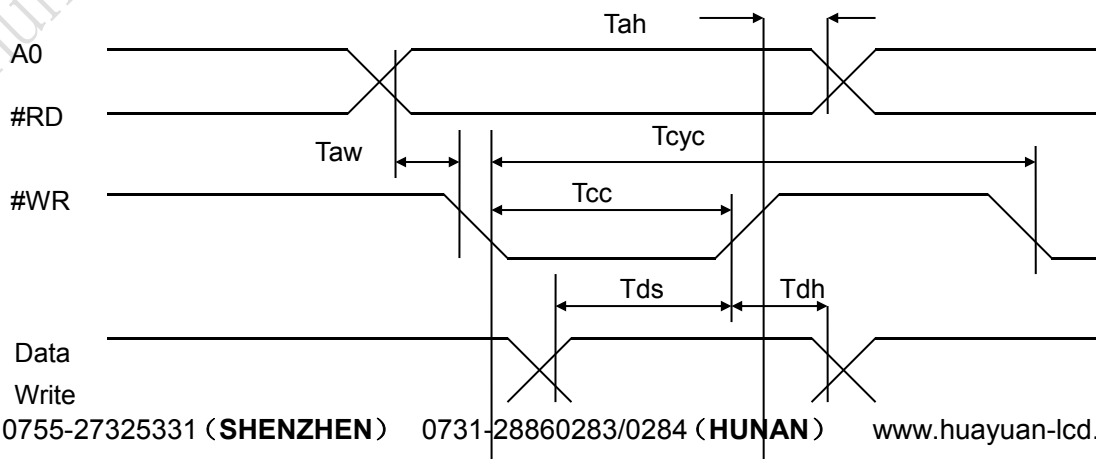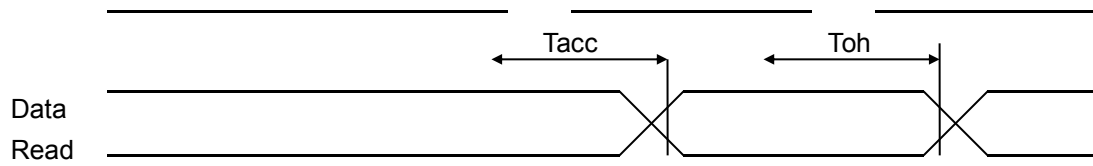
Parameter	Symbol	Min	Max.	Unit
Address Setup Time	Taw	20		ns
Address Hold Time	Tah	10		ns
#RD,#WR Cycle	Tcyc	1000		ns
#RD,#WR Pulse Width	Tcc	200		ns
Data Setup Time	Tds	80		ns
Write Data Hold Time	Tdh	10		ns
Read Access Time	Tacc		90	ns
Read Data Hold Time	Toh	10	60	ns

3)   LCD DISPLAY AREA MAPPING DIAGRAM
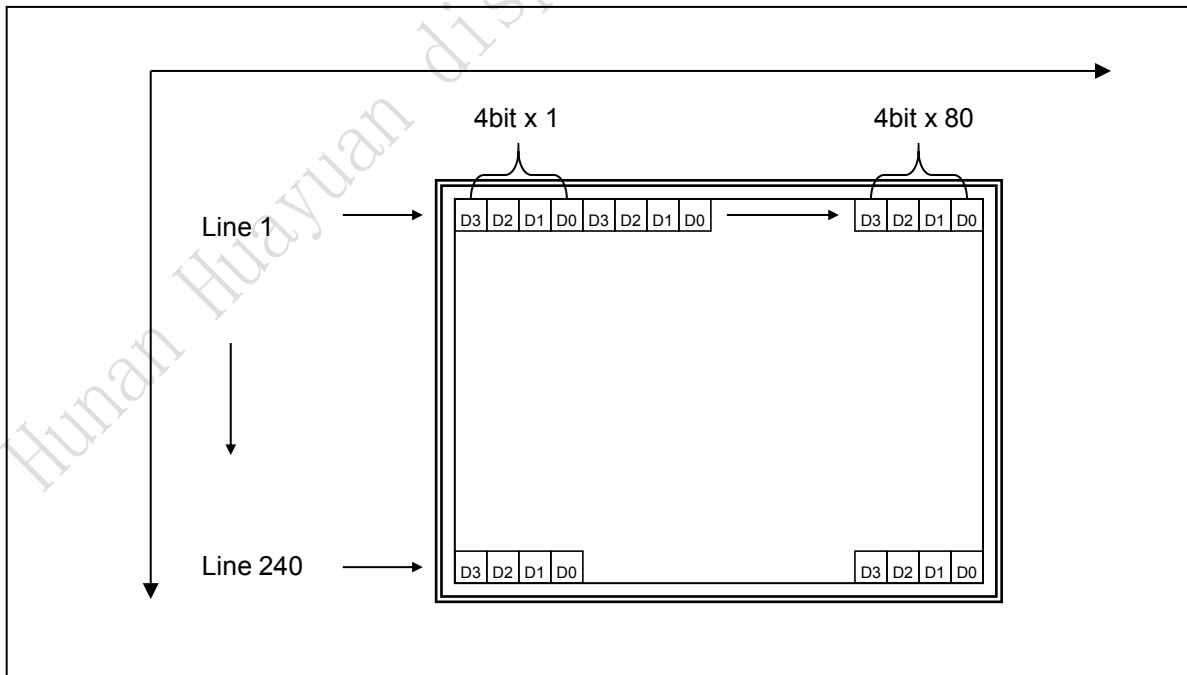
9、　　CONTROL INSTRUCTION LIST

Class	Command	code											HEX	Command Description	Command Read Parameters
		$\overline{RD}$	$\overline{WR}$	A0	D7	D6	D5	D4	D3	D2	D1	D0			No. of Bytes
System control	SYSTEM SET	1	0	1	0	1	0	0	0	0	0	0	40	Initialize device and display	8
	SLEEP IN	1	0	1	0	1	0	1	0	0	1	1	53	Enter standby mode	0
Display control	DISP ON/OFF	1	0	1	0	1	0	1	1	0	0	D	58' 59	Enable and disable display and display flashing	1
	SCROLL	1	0	1	0	1	0	0	0	1	0	0	44	Set display start address and display regions	10
	CSRFORM	1	0	1	0	1	0	1	1	1	0	1	5D	Set cursor type	2
	CGRAM ADR	1	0	1	0	1	0	1	1	1	0	0	5C	Set start address of character generation RAM	2
	CSRDIR	1	0	1	0	1	0	0	1	1	CD1	CD0	4C to 4F	Set direction of cursor movement	0
	HDOT SCR	1	0	1	0	1	0	1	1	0	1	0	5A	Set horizontal scroll position	1
	OVLAY	1	0	1	0	1	0	1	1	0	1	1	5B	Set display overlay format	1
Drawing control	CSRW	1	0	1	0	1	0	0	0	1	1	0	46	Set cursor address	2
	CSRR	1	0	1	0	1	0	0	0	1	1	1	47	Read cursor address	2
Memory control	MWRITE	1	0	1	0	1	0	0	0	0	1	0	42	Write to display memory	-
	MREAD	1	0	1	0	1	0	0	0	0	1	1	43	Read from display memory	-

10、   RELIABILITY TEST

NO	Test Project	Test Condition	Remark
1	High temperature	70℃±2℃ 72H	After testing, the appearance and electrical performance deficiencies should not happen.
2	Low temperature	−20℃±2℃ 72H	
3	High temperature and humidity test	50℃±5℃×90%RH/72H	
4	Hot and cool shock test	−30℃±2➔ 25℃ ➔ 80℃±2 (30min) (5min) (30min) 10 cycles	
5	Vibration test	10Hz−50Hz−10Hz Amplitude 1.5mm X、Y、Z each 3H	

Remark：

1.Above test number is 2 piece.

2.Do moistureproof test, should use the pure water (10M Ω resistor ").

3.individual products caused by electrostatic discharge failure damage, if the products will be reset after the restore to the normal state as a good use.

When the panel protective film LCM, Tear down the labels slowly (more than a second recommendation).

4 Please use the automatic switching menu (or scroll) test mode, test mode of operation.

5 Suggestions Use the menu to adjust the contrast model.

11、 LIQUID CRYSTAL MODULE USE MATTERS NEEDING ATTENTION

1. When using the liquid crystal module you design your product, pay attention to the liquid crystal perspective and uses your consistent.

2. The LCD screen is the glass based, dropping or with a hard object impact will cause cracking or crushing the LCD screen. Especially in the corner.

3. In spite of the polarizer, liquid crystal surface can inhibit the reflective surface, should be careful not to scratch the surface, generally recommend using the protective screen of transparent plastic material in the liquid crystal surface.

4. If the LCD module storage in the following below the required temperature, liquid crystal material condenses and performance deterioration. If the LCD module storage above the specified temperature, molecular crystal orientation will be transformed into liquid, may not be restored to the original state. Beyond the temperature and humidity range, will cause the polarizer peeling or foaming. Therefore, the LCD module should be stored at the specified temperature range.

5. Such as liquid crystal surface in slobber or drop, should immediately erase, avoid long time after induced color changes or leave a stain. The water vapor will cause erosion of ITO electrode

6. If you need to clean the surface of the LCD screen, should use cotton or soft cloth lightly wipe, is still not clear, smooth and then wipe.

7. LCD module driver shall comply with the provisions of the rating index, and avoid the fault and permanent damage. DC voltage applied to the liquid crystal materials, liquid crystal materials will cause rapid deterioration, should ensure the continuous application of M signal to provide AC waveform. Especially, when a power switch shall comply with the order of power supply, avoid driving latch and DC added directly to the LCD screen.

8. Machine Matters needing attention

a) The LCD module is arranged on the high precision of the debugging. To avoid the impact of external force, do not modify or change

b) Do not tamper with Any prominent part of the metal frame

c) Don't punch a hole in PCB or change in shape, do not move or modify elements.

d) Don't touch the conductive rubber, especially in the insert backlight board. (such as EL backlight).

e) In the installation of the LCD module, ensure that the PCB was not affected by the twisting or bending force force. Conductive rubber contact is very precise, dislocation slightly in the original basis will lead to the missing pixels.

f) To avoid pressure on the metal clamping part, otherwise it will lead to the conductive rubber deformation and lost contact, causing the missing pixels.

9. Static electricity：Because the liquid crystal module internal assembly CMOS circuit, must take the following measures to prevent electrostatic

a)   The operator

1.   Wear anti-static clothing, otherwise the body will produce static electricity.

2.   Any part of the body of the time should not be exposed conductive parts and modules, such as: integrated circuit pin, copper wire PCB, terminal interface part.

b)   Equipment

1.   The detachment or friction may cause the equipment to generate static electricity, such as personnel, iron, table etc.

2.   the equipment connected to the appropriate resistance (1x108 ohm).

3.   Just only Reasonable grounding soldering iron can use

4.   If the use of electric screwdriver, electric batch should be well grounded and adapter (brush) isolation

5.   normally Should be observed overalls, anti static measurement work benches, for work bench, recommend the use of conductive rubber pad

c)   Floor

1.   The floor is the electrostatic equipment and personnel are an important part of the release. May be due to electrostatic floor insulation cannot release. Set the floor to ground (1x108 Ohm)

d)   Humidity

1.   Probability of proper humidity can reduce static electricity. General relative humidity should be maintained at more than 50%.

e)   Transportation and storage

1.   Because people and packaging materials may be separated or friction caused by static electricity, packaging materials need antistatic treatment. Module should be stored in anti-static bag or other ESD container.

f)   Welding

1.   Welding of I/O terminal only. Use only the reasonable grounding and no leakage of iron. Low temperature tin wire filled with solder paste.

2.   If the use of flux, should cover the liquid crystal surface, prevent solder spatter. After the removal of flux residues.

3.   The welding temperature: 280 ° C+10 ° C

4.   Welding time: 3-4 seconds.

g)   Other: with the protective film attached to the surface of the liquid crystal screen and to prevent scratches on the surface or pollution, in stripping the protective film, should use the static eliminator. Static eliminator should also be installed in the table, from static to prevent

10. operating

1). The drive voltage should be controlled within a specified range, beyond the range will shorten the service life of the liquid crystal

2). Liquid crystal response time will increase with the decrease of temperature

3). When the temperature is higher than the operating temperature range, the liquid crystal display will turn black or dark blue, which may lead to "break" column. No matter what, do not squeeze the display area

4) Mechanical disturbance during operation (such as in the display region extrusion) may lead to "break" column

11. If the outflow of liquid glass layer damaged, wash thoroughly with soap and water come into contact with the body, although very low toxicity, still need to remind the attention

12. Dismantling the LCD module can cause permanent damage, should be strictly prohibited

13. Liquid crystal with image retention afterglow, in order to avoid image afterglow don't long time display fixed pattern. Image persistence is not liquid crystal deterioration, when the display pattern changes will automatically eliminate

14. Do not use a volatile epoxy resin and silicone adhesives, to prevent the resulting Polaroid color

15. To avoid the liquid crystal module long time exposure to sunlight or ultraviolet irradiation

16. Brightness of the LCD module may be due to the coupling of shunt CCFL lead to the metal shell of the affected. Inverter design should take full account of this part of the leakage. It is necessary to fully assess the LCD module and the inverter is installed in the host apparatus, ensure the requirement of brightness