Chunghwa Picture Tubes, Ltd.
Technical Specification

To　:

Date　: 2005/4/3

TFT LCD
CLAA070VA01

ACCEPTED BY :

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REVISION STATUS

Revision Notice	Description	Page	Rev. Date
		-	

1. OVERVIEW

CLAA070VA03 **is 7'' color TFT-LCD (Thin Film Transistor Liquid Crystal Display) module composed of LCD panel, driver ICs , control circuit , and backlight. Utilizes a panel with a 16:9 aspect ratio.**

The 7.0" screen produces a high resolution image that is composed of 384,000(800×480) pixel elements in a stripe arrangement. Inverter for backlight is not included in this module.
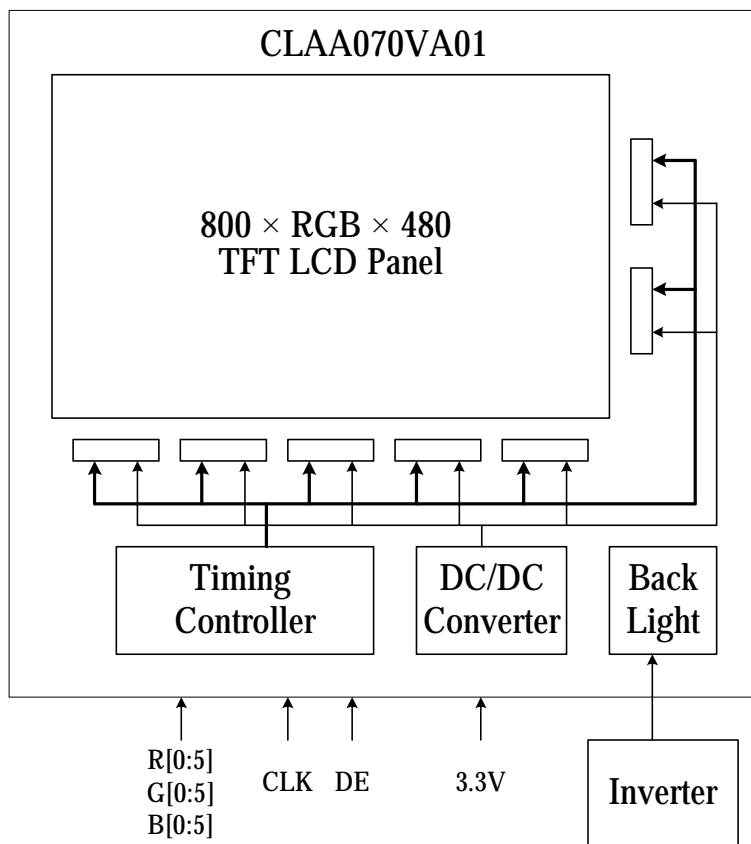
General specifications are summarized in the following table:

ITEM	SPECIFICATION
Panel Size	7'' inch
Display Area (in mm)	152.4(W) x 91.44(H)
View Area (in mm)	154.8(W) x 93.84(H)
Number of Pixels	800(W) x 480(H)
Pixel Pitch (in mm)	0.1905x0.1905
Color Pixel Arrangement	RGB vertical strip
Display Mode	Normally white
Number of color	262k
Brightness(cd/m^2)	185nit(min)/220nit(typ)
Contrast Ratio	400:1
Response Time (Tr+Tf)	30ms (typ)
Outline Dimension (in mm)	165.0 (W)x 104.0(H) x 5.5(D)
Viewing Angle(Typical) (BL On,CR>10)	70/-70 degree (Horizontal.) 60/-40 degree (vertical)
NTSC ratio	50%
Driving Method	TFT active matrix
BL unit	CCFL
Input signal	TTL
Viewing Direction	6 o'clock
BL Power Consumption(W)	2.2W (I = 5.5mA)
weight(g)	145g

2.FEATURE:

1. 7 inch TFT AMLCD, wide screen (16:9).

2. 6 bit TTL data signal input, resolution 800×480×RGB WVGA.
3. Maximum data clock rate: 50 MHz.
4. Input interface voltage: 3.3 V.
5. Data enable mode.
6. Data inverted function for reducing EMI.
7. Maximum power consumption: below 3.5 W.

3.ABSOLUTE MAXIMUM RATINGS

The following values are maximum operation conditions. If exceeded, it may cause faulty operation or damage.

ITEM	SYMBOL	MIN.	MAX.	UNIT
Power Supply Voltage for LCD	V_{CC}	-0.5	4.6	V
Signal input voltage	DCLK,DE,R0, G0,B0~R5,G5, B5	-0.5	4.6	V
Operation Temperature	Top	0	50	℃
Storage Temperature	Tstg	-20	70	℃
Static Electricity	VESDc	-4	4	kV

4.ELECTRICAL CHARACTERISTICS

(1)TFT LCD

ITEM		SYMBOL	MIN	TYP	MAX	UNIT
Power Supply Voltage		V_{CC}	3.0	3.3	3.6	V
Power Supply Current		I_{CC}	-	0.15	0.2	A
Logic input Voltage	Input Voltage	V_{IN}	0	-	VCC	V
	Threshold Voltage (High)	VTH	2.0	-	VCC	V
	Threshold Voltage (Low)	VTL	0	-	0.8	V

(2)Backlight(Temperature = 25℃)

ITEM		SYMBOL	SPECIFICATION	UNIT
Lamp Voltage		V_L	375±5% (at 8 mA)	$V_{(RMS)}$
			395±5% (at 5.5 mA)	$V_{(RMS)}$
			421±5% (at 4 mA)	$V_{(RMS)}$
Lamp Current		I_L	Max : 8	mA
			Typ : 5.5	mA
			Min : 4	mA
Lamp Frequency		F_L	45 (Min) to 80 (Max)	kHz
Lamp life time			15000 (at 5.5 mA)	hr
Starting Lamp Voltage	Ta = 25℃	Vs	700 (Max)	$V_{(RMS)}$
	Tb = 0℃		900 (Max)	

(3)Power Sequence

t_{DE} > 50 mSec
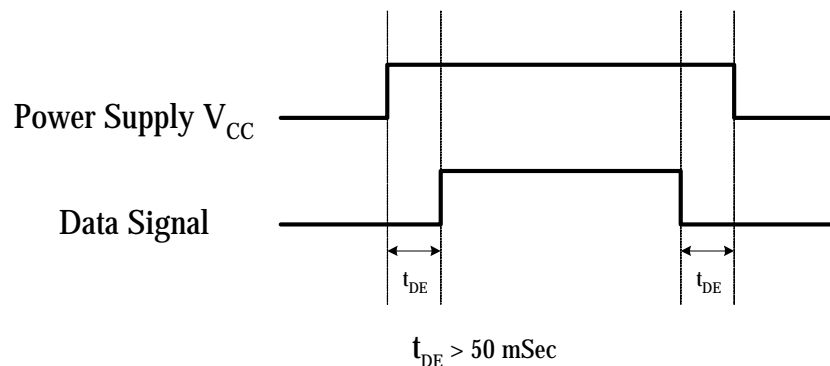
5.INTERFACECONNECTION:

Pin NO.	SYMBOL	DESCRIPTION
1	V_{SS}	Ground
2	V_{SS}	Ground
3	NC	No Connection
4	V_{CC}	Power Supply
5	V_{CC}	Power Supply
6	V_{CC}	Power Supply
7	V_{CC}	Power Supply
8	NC	No Connection
9	DE	Data Enable Timing Signal
10	V_{SS}	Ground
11	V_{SS}	Ground
12	V_{SS}	Ground
13	B5	Blue Data 5 (MSB)
14	B4	Blue Data 4
15	B3	Blue Data 3
16	V_{SS}	Ground
17	B2	Blue Data 2
18	B1	Blue Data 1
19	B0	Blue Data 0 (LSB)
20	V_{SS}	Ground
21	G5	Green Data 5 (MSB)
22	G4	Green Data 4
23	G3	Green Data 3
24	V_{SS}	Ground
25	G2	Green Data 2
26	G1	Green Data 1
27	G0	Green Data 0 (LSB)
28	V_{SS}	Ground
29	R5	Red Data 5 (MSB)
30	R4	Red Data 4
31	R3	Red Data 3
32	V_{SS}	Ground
33	R2	Red Data 2
34	R1	Red Data 1
35	R0	Red Data 0
36	V_{SS}	Ground
37	V_{SS}	Ground
38	DCLK	Data Clock
39	V_{SS}	Ground
40	V_{SS}	Ground

6.TIMING SPECIFICATION

ITEM		SYMBOL	MIN.	TYP.	MAX.	UNIT
DCLK	Period	t_{CLK}	20	37.0	40.0	ns
	Dot Clock	f_{CLK}	25	27	50	MHz
	Low Level Width	t_{WCL}	6	-	-	ns
	High Level Width	t_{WCH}	6	-	-	
	Rise/Fall Time	t_{CLKr}, t_{CLKf}	-	-	10	
	Duty	-	0.45	0.5	0.55	-
DE	Setup Time	t_{DES}	5	-	-	ns
	Hold time	t_{DEH}	10	-	-	
	Rise/Fall Time	t_{Der}, t_{DEf}	-	-	16	
	Horizontal Period	t_{HP}	850	900	1056	t_{CLK}
	Horizontal Valid	t_{HV}		800		
	Horizontal Blank	t_{HBK}	50	100	$t_{HP}-t_{HV}$	
	Vertical Period	t_{VP}	490	500	550	t_{HP}
	Vertical Valid	t_{VV}		480		
	Vertical Blank	t_{VBK}	10	20	$t_{HP}-t_{HV}$	
	Vertical Frequency	f_V		60		Hz
DATA	Setup Time	t_{DS}	5	-	-	ns
	Hold Time	t_{DH}	10	-	-	
	Rise/Fall Time	t_{Dr}, t_{Df}	-	-	10	

7.TIMING CHARACTERISTIC
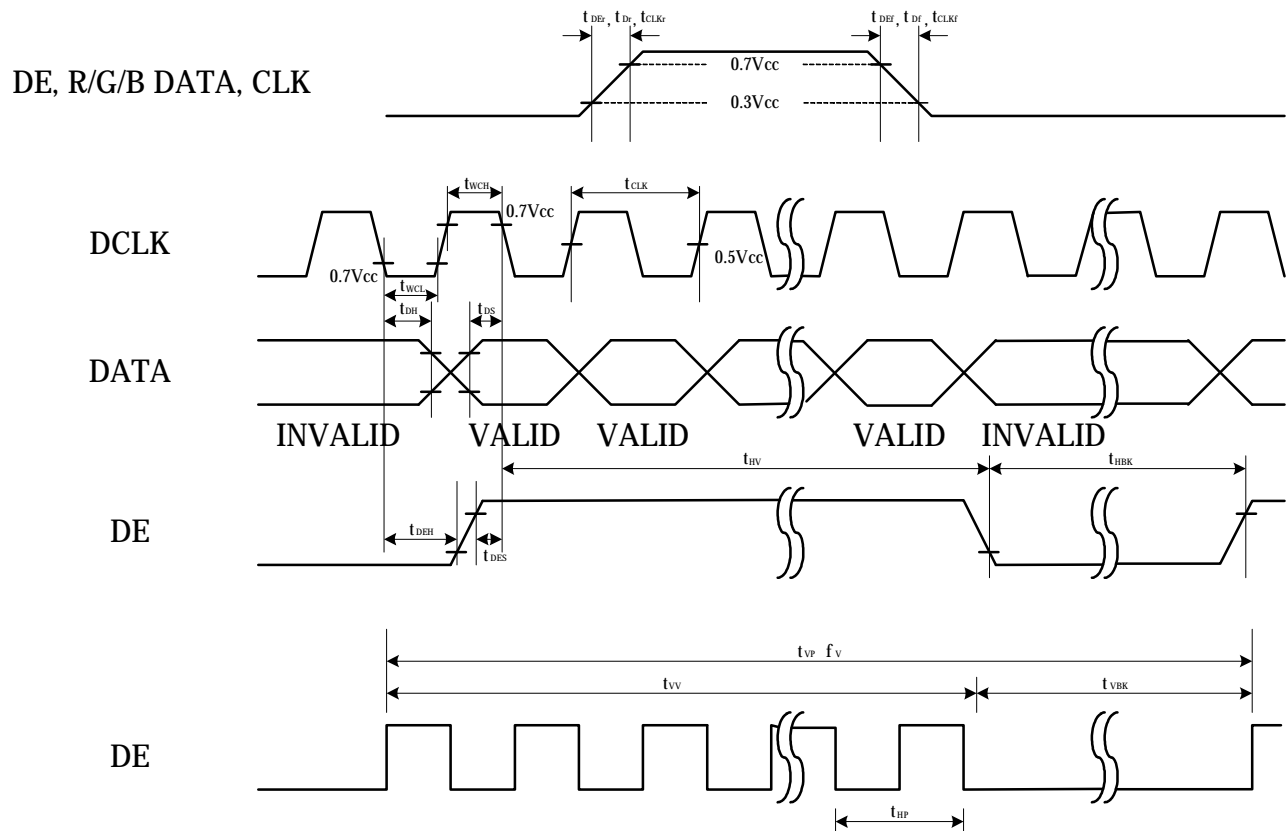
8. MECHANICAL DIMENSION

(1) Front / Rear side
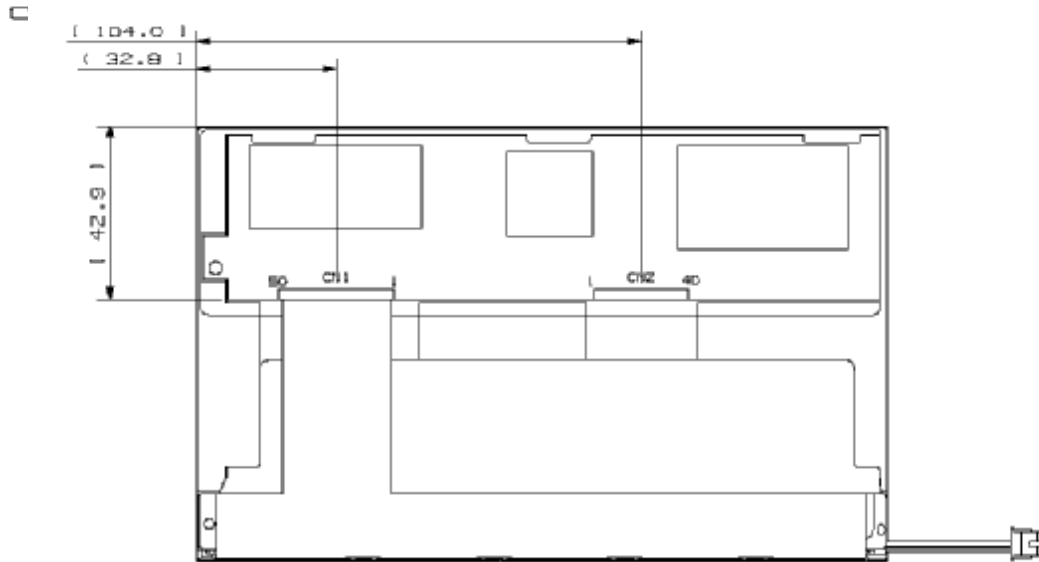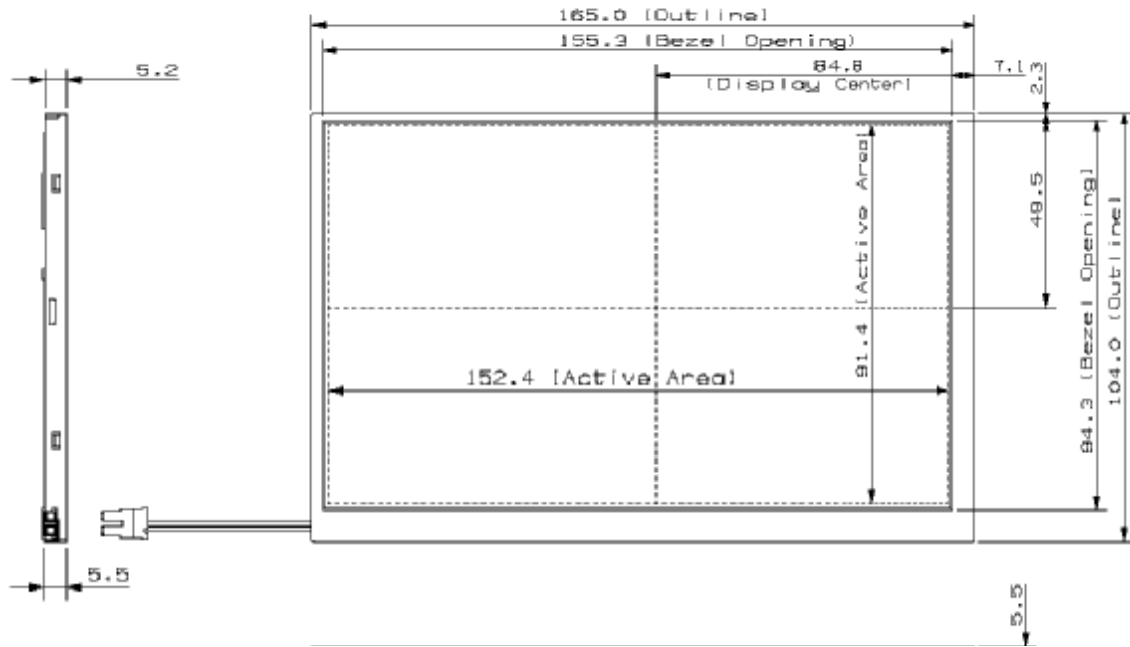
CN1 FH19S-50S-0.5SH(Hirose)
CN2 FH19S-40S-0.5SH(Hirose)
CCFL connector: BHSR-02VS-1 (JST)

9. OPTICAL CHARACTERISTICS

ITEM		SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Contrast Ratio		CR	*1)	300	400	--	--
Luminance *)		L	*2) I_L = 5.5mA	185	220	--	cd/m^2
5P Luminance				--	--		
Luminance Uniformity		ΔL	*4)	--	80	--	%
Response Time		Tr	*5)	--	12	--	ms
		Tf		--	18	--	ms
Viewing Angle	Horizontal	ϕ *3)	CR≧10	--	70~-70	--	°
	Vertical	θ *3)		--	60~-40	--	°
Color Coordinate	White	x	$\theta = \phi = 0°$	0.283	0.313	0.343	--
		y		0.299	0.329	0.359	
Color Coordinate	Red	x	$\theta = \phi = 0°$	0.550	0.580	0.610	--
		y		0.284	0.314	0.284	
Color Coordinate	Green	x	$\theta = \phi = 0°$	0.271	0.301	0.331	--
		y		0.534	0.564	0.594	
Color Coordinate	Blue	x	$\theta = \phi = 0°$	0.118	0.148	0.178	--
		y		0.093	0.123	0.153	

Ta=25℃，VCC=3.3V

[Note]
l   These items are measured by BM-5A (TOPCON) or CA-1000(MINOLTA) in the dark room. (no ambient light).
l   Brightness conditions : I_L = 5.5 mA , Inverter:DIT xx001.00 (Logah made)

*1) Definition of contrast ratio：

Measure contrast ratio on the below 5 points (refer to figure1, #1~#5 point) and take the average value.
Contrast ratio is calculated with the following formula：
Contrast Ratio (CR)= (White) Luminance of ON ÷ (Black) Luminance of OFF

*2) Definition of luminance：

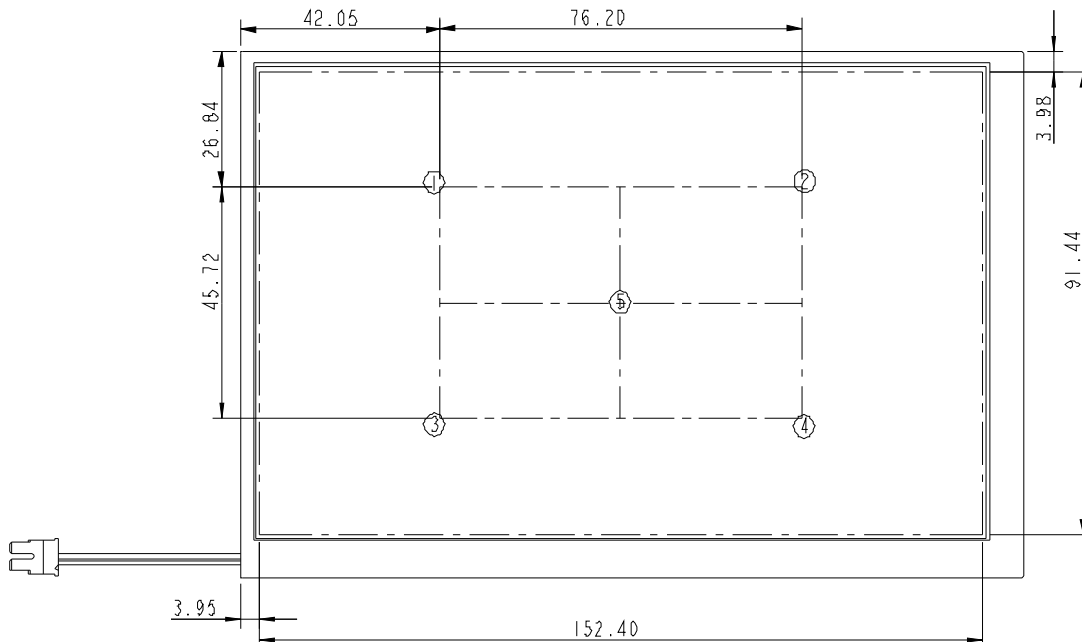Measure white luminance on the same 5 points and take the average value.

Fig.1   Measuring point

*3) Definition of Viewing Angle(θ, ϕ),refer to Fig.2 as below：
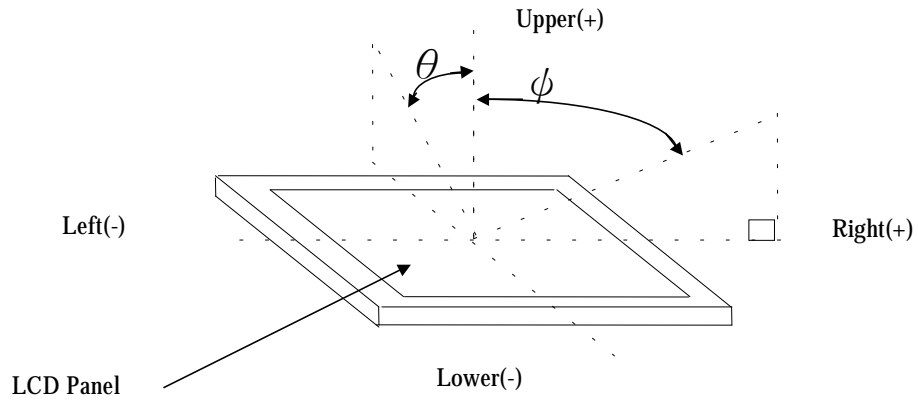

Fig.2 Definition of Viewing Angle

*4) Definition of Luminance Uniformity

Measure maximum luminance(L(MAX))and minimum luminance (L(MIN))on the 5 points as figure 1.Luminance Uniformity is calculated with the following formula ：

$\triangle L = [L(MAX)/L(MIN)-1]\times100$

*5) Definition of Response Time.

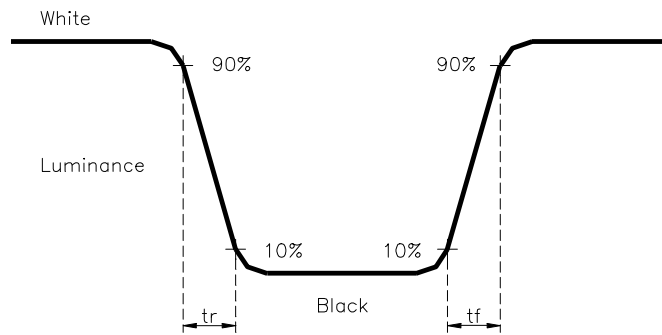The response time is defined as the time interval between the 10% and 90% amplitudes.Refer to figure 3 as below.

Fig.3 Definition of Response Time

10. RELIABILITY TEST CONDITIONS

(1) Temperature and Humidity

TEST ITEMS	CONDITIONS
HIGH TEMPERATURE OPERATION	70°C ；240Hrs
HIGH TEMPERATURE AND HIGH HUMIDITY OPERATION	60°C ；95％ RH ； 48Hrs
HIGH TEMPERATURE AND HIGH HUMIDITY STORAGE	60°C ；90％ RH Max. ；48Hrs
HIGH TEMPERATURE STORAGE	70°C ；240Hrs
LOW TEMPERATURE OPERATION	-10°C ；240Hrs, Backlight unit always turn on
LOW TEMPERATURE STORAGE	-30°C ；240Hrs
THERMAL SHOCK (No operation)	-20°C (1Hr)～60°C (1Hr) 200 CYCLE

(2) Shock & Vibration

TEST ITEMS	CONDITIONS
SHOCK (NON-OPERATION)	l Shock level: 980m/s^2(equal to 100G). l Waveform: half sinusoidal wave,6ms. l Number of shocks: one shock input in each direction of three mutually perpendicular axes for a total of three shock inputs.
VIBRATION (NON-OPERATION)	l Frequency range:5~55Hz l Stoke：1.5 mm l Vibration: sinusoidal wave, perpendicular axis(both x, y,z axis: 2Hrs). l Sweep: 2.9G,5 Hz -55 Hz -5Hz l Cycle: 15 min

(3) Judgment standard

The judgment of the above test should be made as follow:

Pass: Normal display image with no obvious non-uniformity and no line defect. Partial transformation of the module parts should be ignored.

Fail: No display image, obvious non-uniformity, or line defects.

11. HANDLING PRECAUTIONS FOR TFT-LCD MODULE

Please pay attention to the followings in handling- TFT-LCD products;

(A) ASSEMBLY PRECAUTION

(1) Please use the mounting hole on the module side in installing and do not beading or wrenching LCD in assembling. And please do not drop, bend or twist LCD module in handling.

(2) Please design display housing in accordance with the following guide lines.

(2.1) Housing case must be destined carefully so as not to put stresses on LCD all sides and not to wrench module. The stresses may cause non-uniformity even if there is no non-uniformity statically.

(2.2) Keep sufficient clearance between LCD module back surface and housing when the LCD module is mounted. Approximately 1.0 mm of the clearance in the design is recommended taking into account the tolerance of LCD module thickness and mounting structure height on the housing.

(2.3) When some parts, such as, FPC cable and ferrite plate, are installed underneath the LCD module, still sufficient clearance is required, such as 0.5mm. This clearance is, especially, to be reconsidered when the additional parts are implemented for EMI countermeasure.

(2.4) Design the inverter location and connector position carefully so as not to give stress to lamp cable, or not to interface the LCD module by the lamp cable.

(2.5) Keep sufficient clearance between LCD module and the others parts, such as inverter and speaker so as not to interface the LCD module. Approximately 1.0mm of the

clearance in the design is recommended.

(3) Please do not push or scratch LCD panel surface with any-thing hard. And do not soil LCD panel surface by touching with bare hands. (Polarizer film, surface of LCD panel is easy to be flawed.)

(4) Please do not press any parts on the rear side such as source TCP, gate TCP, control circuit board and FPCs during handling LCD module. If pressing rear part is unavoidable, handle the LCD module with care not to damage them.

(5) Please wipe out LCD panel surface with absorbent cotton or soft cloth in case of it being soiled.

(6) Please wipe out drops of adhesives like saliva and water on LCD panel surface immediately. They might damage to cause panel surface variation and color change.

(7) Please do not take a LCD module to pieces and reconstruct it. Resolving and reconstructing modules may cause them not to work well.

(8) Please do not touch metal frames with bare hands and soiled gloves. A color change of the metal frames can happen during a long preservation of soiled LCD modules.

(9) Please pay attention to handling lead wire of backlight so that it is not tugged in connecting wit inverter.

(B) OPERATING PRECAUTIONS

(1) Please be sure to turn off the power supply before connecting and disconnecting signal input cable.

(2) Please do not change variable resistance settings in LCD module. They are adjusted to the most suitable value. If they are changed, it might happen LCD does not satisfy the characteristics specification.

(3) Please consider that LCD backlight takes longer time to become stable of radiation characteristics in low temperature than in room temperature.

(4) A condensation might happen on the surface and inside of LCD module in case of sudden charge of ambient temperature.

(5) Please pay attention to displaying the same pattern for very long time. Image might stick on LCD. If then, time going on can make LCD work well.

(6) Please obey the same caution descriptions as ones that need to pay attention to ordinary electronic parts.

(C) PRECAUTFONS WITHELECTROSTATICS

(1) This LCD module use CMOS-IC on circuit board and TFT-LCD panel, and so it is easy to be affected by electrostatics. Please be careful with electrostatics by the way of your body connecting to the ground and so on.

(2) Please remove protection film very slowly on the surface of LCD module to prevent from electrostatics occurrence.

(D) STORAGE PRECAUTIONS

(1) When you store LCDs for a long time, it is recommended to keep the temperature between 0℃-40℃ without the exposure of sunlight and to keep the humidity less than 90%RH.

(2) Please do not leave the LCDs in the environment of high humidity and high temperature such as 60℃ 90%RH.

(3) Please do not leave the LCDs in the environment of low temperature; below -20℃.

(E) SAFETY PRECAUTIONS

(1) When you waste LCDS, it is recommended to crush damaged or unnecessary LCDs into pieces and wash them off with solvents such as acetone and ethanol, which should later be burned.

(2) If any liquid leaks out of a damaged-glass cell and comes in contact with the hands, wash off throughly with soap and water.

(F) OTHERS

(1) A strong incident light into LCD panel might cause display characteristics' changing inferior because of polarizer film, color filter, and other materials becoming inferior. Please do not expose LCD module direct sunlight Land strong UV rays.

(2) Please pay attention to a panel side of LCD module not to contact with other materials in preserving it alone.

(3) For the. packaging box, please pay attention to the followings:

(3.1) Packaging box and inner case for LCD are designed to protect the LCDs from the damage or scratching during transportation. Please do not open except picking LCDs up from the box.

(3.2) Please do not pile them up more than 5 boxes. (They are not designed so.) And please do not turn over.

(3.3) Please handle packaging box with care not to give them sudden shock and vibrations. And also please do not throw them up.

(3.4) Packing box and inner case for LCDs are made of cardboard. So please pay attention not to get them wet. (Such like keeping them in high humidity or wet place can occur getting them wet.)