



深圳市勋瑞光电科技有限公司

Xunrui Shenzhen Optoelectronics Technology Co., Ltd.



CERT. No. QAC0946535 (ISO9001) CERT. No. HKG002005 (ISO14001)

Product Specification

Customer: _____

Model Name: **H0144HQQ15E2508**

Date: _____

Version: _____

Preliminary Specification

Final Specification

For Customer's Acceptance

Approved by	Comment

Approved by	Reviewed by	Prepared by



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2 General Specifications

	Feature	Spec
Characteristics	LCD Size	1.44 inch
	Display Format	128 (RGB) ×128
	Interface	SPI
	Color Depth	262 K
	Technology type	a-Si
	Display Spec.	0.219(W)*0.219(H)um
	Display Mode	Normally White
	Driver IC	ST7735S
	Surface Treatment	HC
	Viewing Direction	6 O'clock
	Gray Viewing Direction	12 O'clock
Mechanical	LCM (W x H x D) (mm)	29.5 (W) ×36.5(H)×2.44(T)
	Active Area(mm)	25.50(W) × 26.50(H) mm
	With /Without TSP	Without TSP
	Weight (g)	TBD
	LED Numbers	2 LEDs

Note 1: Viewing direction is following the data which measured by optics equipment.

Note 2: Requirements on Environmental Protection: RoHS

Note 3: LCM weight tolerance: +/- 5%



3 Input/Output Terminals

NO.	SYMBOL	Description	I/O
1	BL_K	LED backlight input (Cathode)	Power supply
2	NC	/	
3	NC	/	
4	NC	/	
5	NC	/	
6	BL A	Power supply/LED anode	Power supply
7	BL A	Power supply/LED anode	Power supply
8	VSS	System Ground	Power supply
9	VSS	System Ground	Power supply
10	SDA	Serial Data	I/O
11	SCL	Serial Clock.	I/O
12	CS	Chip select	I/O
13	A0	-Display data/command selection pin in parallel interface.	I/O
14	RESET	Reset PIN	I/O
15	NC	/	



4 Absolute Maximum Ratings

Item	Symbol	MIN	MAX	Unit	Remark
Supply Voltage	V_{DD}	-0.3	3	V	
Input Signal Voltage	V_{in}	-0.3	$V_{DD}+0.3$	V	
Logic Output Voltage	V_{OUT}	-0.3	$V_{DD}+0.3$	V	
Operating Temperature	T_{OPR}	-20	70	°C	
Storage Temperature	T_{STG}	-30	80	°C	

5 Electrical Characteristics

5.1 Operating conditions:

Parameter	Symbol	MIN	TYP	MAX	Unit	Remark
Power Voltage	V_{CC}	2.6	2.8	3	V	
Digital Operation Current	I_{CC}				mA	

5.2 Driving Backlight

Item	Symbol	MIN	TYP	MAX	Unit	Remark
LED current	I_F	-	40		mA	Note 1 Note 2,3
Power Consumption					mW	
LED Voltage	V_F		3.2		V	
LED Life Time	W_{BL}	-	TBD	-	Hr	

Note 1 : There are 1 Groups LED

Note 2 : $T_a = 25^{\circ}\text{C}$

Note 3 : Brightness to be decreased to 50% of the initial value



6 Interface Timing

6.1 AC Electrical Characteristics

Parameter	Symbol	Condition	Specification			Unit	Related Pins
			Min	Typ	Max		
Power & Operation Voltage							
System Voltage	VDD	Operating Voltage	2.5	2.75	4.8	V	
Interface Operation Voltage	VDDI	I/O Supply Voltage	1.65	1.8	3.7	V	
Gate Driver High Voltage	VGH		11		18	V	Note 4
Gate Driver Low Voltage	VGL		-13		-7.5	V	
Gate Driver Supply Voltage		VGH-VGL	18.5		29	V	Note 4
Input / Output							
Logic-High Input Voltage	VIH		0.7VDDI		VDDI	V	Note 1
Logic-Low Input Voltage	VIL		VSS		0.3VDDI	V	Note 1
Logic-High Output Voltage	VOH	IOH = -1.0mA	0.8VDDI		VDDI	V	Note 1
Logic-Low Output Voltage	VOL	IOL = +1.0mA	VSS		0.2VDDI	V	Note 1
Logic-High Input Current	IIH	VIN = VDDI			1	uA	Note 1
Logic-Low Input Current	IIL	VIN = VSS	-1			uA	Note 1
Input Leakage Current	IIL	IOH = -1.0mA	-0.1		+0.1	uA	Note 1
VCOM Voltage							
VCOM Amplitude	VCOM		-2		-0.425	V	
Source driver							
Source Output Range	Vsout		0.1		GVDD	V	
Gamma Reference Voltage	GVDD		3.15		4.7	V	
Source Output Settling Time	Tr	Below with 99% precision			20	us	Note 2
Output Offset Voltage	Voffset				35	mV	Note 3

Table 2 DC Characteristic



6.2 Timing chart

Serial Interface Characteristics (3-line Serial)

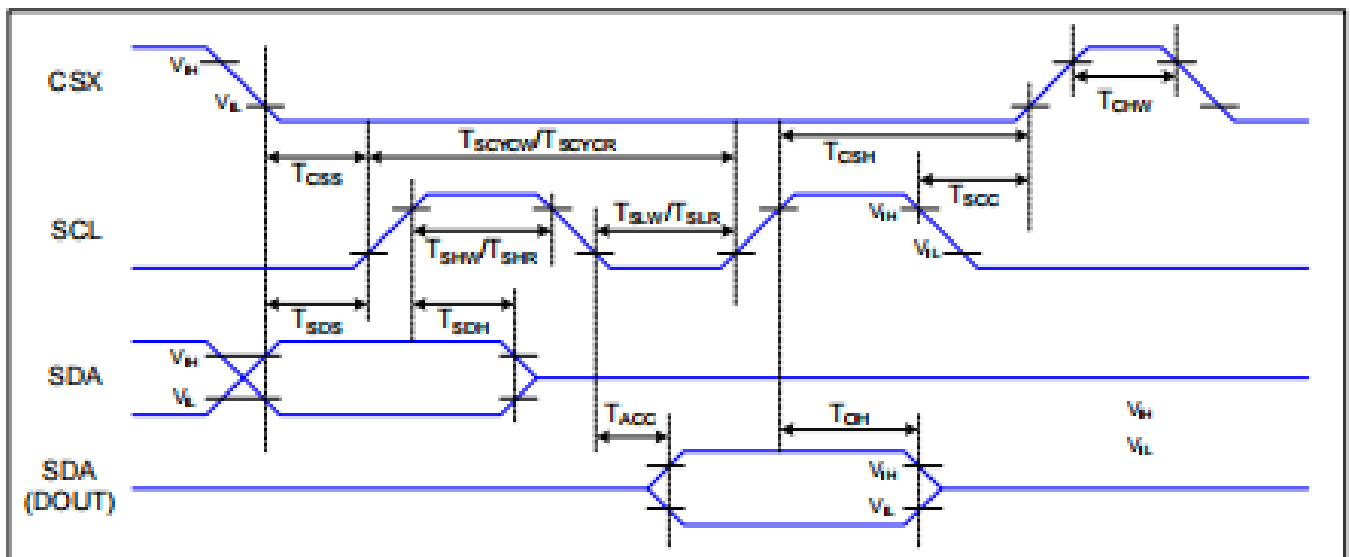


Figure 6 3-line Serial Interface Timing

$T_a=25\text{ }^\circ\text{C}$, $V_{DDI}=1.65\text{--}3.7\text{V}$, $V_{DD}=2.5\text{--}4.8\text{V}$

Signal	Symbol	Parameter	Min	Max	Unit	Description
CSX	T_{CSS}	Chip Select Setup Time (Write)	15		ns	
	T_{CSH}	Chip Select Hold Time (Write)	15		ns	
	T_{CSS}	Chip Select Setup Time (Read)	60		ns	
	T_{SCC}	Chip Select Hold Time (Read)	65		ns	
	T_{CHW}	Chip Select "H" pulse width	40		ns	
SCL	T_{SCYCW}	Serial Clock Cycle (Write)	66		ns	
	T_{SHW}	SCL "H" Pulse Width (Write)	15		ns	
	T_{SLW}	SCL "L" Pulse Width (Write)	15		ns	
	T_{SCYCR}	Serial Clock Cycle (Read)	150		ns	
	T_{SHR}	SCL "H" Pulse Width (Read)	60		ns	
	T_{SLR}	SCL "L" Pulse Width (Read)	60		ns	
SDA (DIN) (DOUT)	T_{SDS}	Data Setup Time	10		ns	For Maximum $CL=30\text{pF}$ For Minimum $CL=8\text{pF}$
	T_{SDH}	Data Hold Time	10		ns	
	T_{ACC}	Access Time	10	50	ns	
	T_{OH}	Output Disable Time	15	50	ns	

Table 6 3-line Serial Interface Characteristics



7 Optical Characteristics

Items	Symbol	Condition	Min.	Typ.	Max.	Unit	Remark	
Viewing angles	θ_T	Center CR \geq 10		55	-	Degree.	Note2	
	θ_B			45	-			
	θ_L			55	-			
	θ_R			55	-			
Contrast Ratio	CR	$\Theta = 0$	-	350	-	-	Note1, Note3	
Response Time	T_{ON}	25°C	-	20	35	ms	Note1, Note4	
	T_{OFF}		-	25	40			
Chromaticity	White	Backlight is on	X_W	0.282	0.312	0.342	-	Note1, Note5
			Y_W	0.319	0.349	0.379	-	
	Red		X_R	0.609	0.639	0.669	-	
			Y_R	0.314	0.344	0.374	-	
	Green		X_G	0.264	0.294	0.324	-	
			Y_G	0.557	0.587	0.617	-	
	Blue		X_B	0.102	0.132	0.162	-	
			Y_B	0.106	0.136	0.166	-	
Uniformity	U		80	-	-	%	Note1, Note6	
NTSC				50		%	Note5	
Luminance	L			250			Note1, Note7	

Test Conditions:

1. IF= 20mA(one channel),the ambient temperature is 25°C.
2. The test systems refer to Note 1 and Note 2.

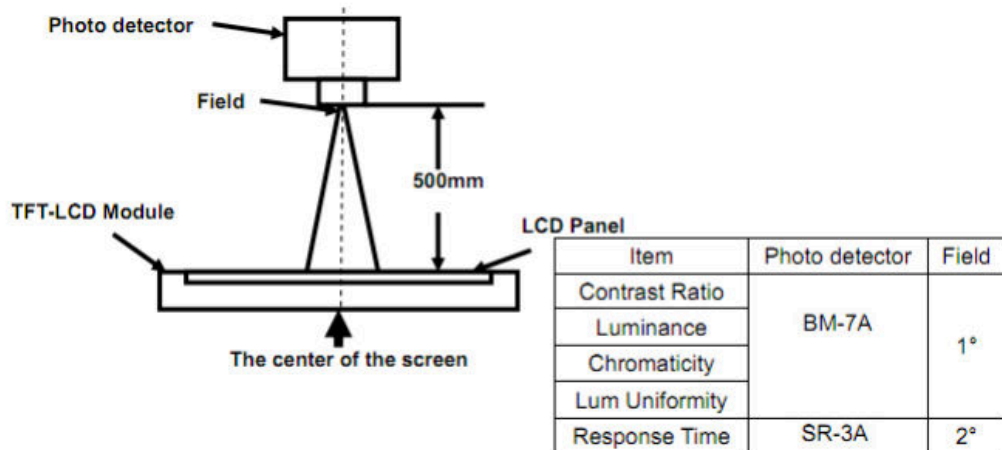
Note 1: Definition of optical measurement system.

The optical characteristics should be measured in dark room. After 5 minutes operation, the optical Properties are measured at the center point of the LCD screen. All input terminals LCD panel must be ground when measuring the center area of the panel.



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Note 2: Definition of viewing angle range and measurement system.

Viewing angle is measured at the center point of the LCD by CONOSCOPE (ergo-80).

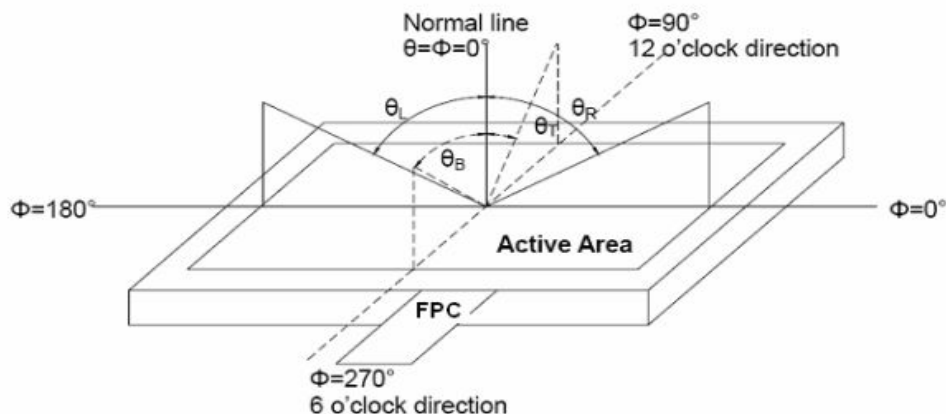


Fig. 1 Definition of viewing angle

Note 3: Definition of contrast ratio

$$\text{Contrast ratio (CR)} = \frac{\text{Luminance measured when LCD is on the "White" state}}{\text{Luminance measured when LCD is on the "Black" state}}$$

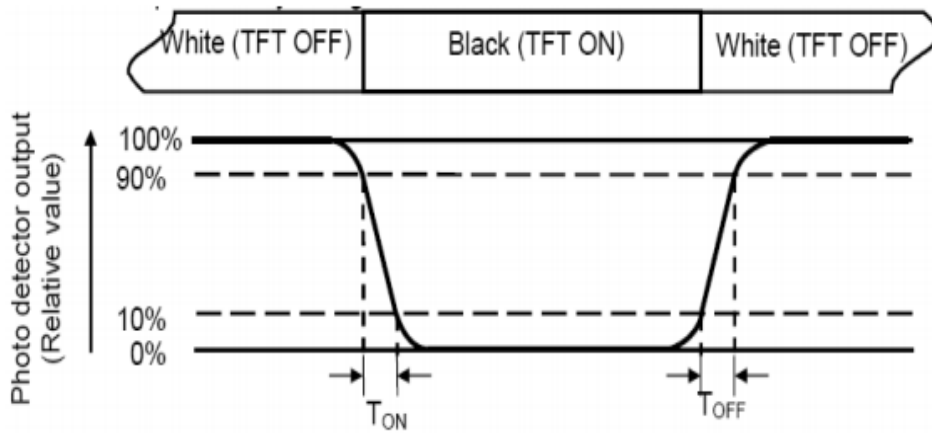
Note 4: Definition of Response time

The response time is defined as the LCD optical switching time interval Between "White" state and "Black" state. Rise time (TON) is the time between Photo detector output intensity changed from 90% to 10%. And fall time (TOFF) is The time between photo detector output intensity changed from 10% to 90%



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Note 5: Definition of color chromaticity (CIE1931)
Color coordinates measured at center point of LCD.

Note 6: Definition of Luminance Uniformity

Active area is divided into 9 measuring areas (Refer Fig. 2). Every measuring point is placed at the Center of each measuring area

$$\text{Luminance Uniformity (U)} = \text{Lmin} / \text{Lmax} \times 100\%$$

L-----Active area length W----- Active area width

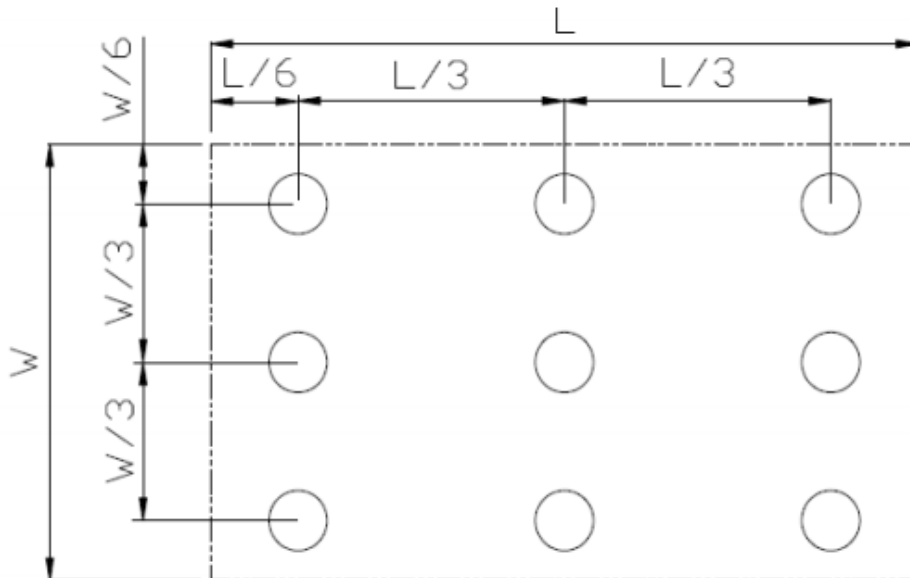


Fig. 2 Definition of uniformity

Lmax: The measured maximum luminance of all measurement position.

Lmin: The measured minimum luminance of all measurement position.

Note 7: Definition of Luminance:

Measure the luminance of white state at center point.



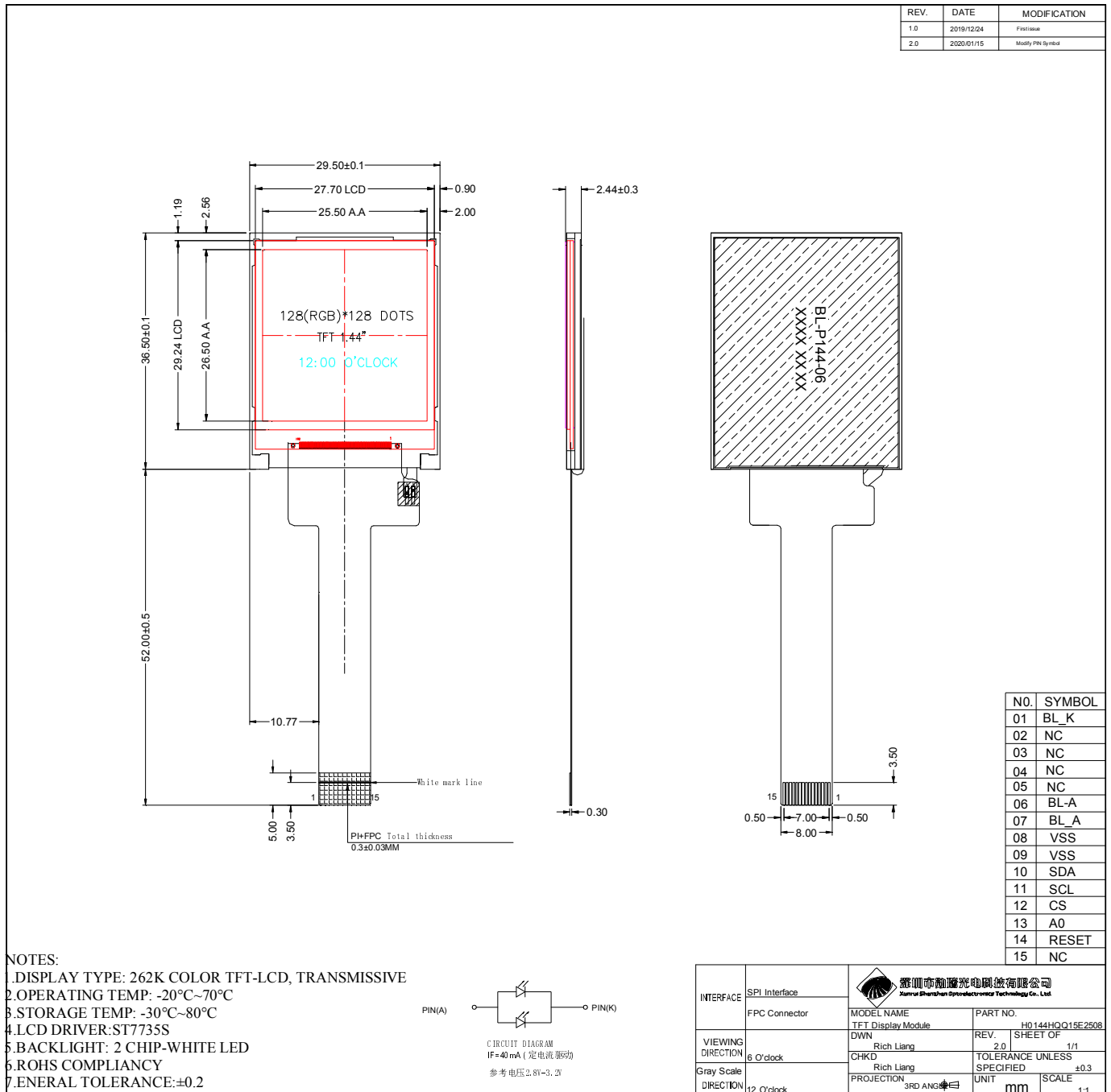
8 Environmental / Reliability Tests

No	Test Item	Condition	Remarks
1	High Temperature Operation	T _s = +70°C, 240hrs	Note 1 IEC60068-2-2, GB2423. 2-89
2	Low Temperature Operation	T _a = -20°C, 240hrs	Note 2 IEC60068-2-1 GB2423.1-89
3	High Temperature Storage	T _a = +80°C, 240hrs	IEC60068-2-2 GB2423. 2-89
4	Low Temperature Storage	T _a = -30°C, 240hrs	IEC60068-2-1 GB/T2423.1-89
5	High Temperature & Humidity Storage	T _a = +60°C, 90% RH max, 160 hours	IEC60068-2-3 GB/T2423.3-2006
6	Thermal Shock (Non-operation)	-30°C 30 min ~ +80°C 30 min Change time: 5min, 30 Cycle	Start with cold temperature, end with high temperature IEC60068-2-14, GB2423.22-87
7	Electro Discharge (Operation) Static	C=150pF, R=330 Ω, 5 points/panel Air:±8KV, 5 times; Contact: ±4KV, 5 times; (Environment: 15°C ~ 35°C, 30% ~ 60%, 86Kpa ~ 106Kpa)	IEC61000-4-2 GB/T17626.2-1998
8	Vibration (Non-operation)	Frequency range: 10~55Hz, Stroke: 1.mm Sweep: 10Hz~55Hz~10Hz 2 hours for each direction of X .Y. Z. (package condition)	IEC60068-2-6 GB/T2423.5-1995
9	Shock (Non-operation)	60G 6ms, ± X, ±Y , ± Z 3 times for each direction	IEC60068-2-27 GB/T2423.5-1995
10	Package Drop Test	Height: 60 cm, 1 corner, 3 edges, 6 surfaces	IEC60068-2-32 GB/T2423.8-1995

Note: 1. T_s is the temperature of panel's surface.
2. T_a is the ambient temperature of sample.



9 Mechanical Drawing





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1 0.Packing

TBD



11. Precautions for Use of LCD modules

11.1 Handling Precautions

11.1.1. The display panel is made of glass. Do not subject it to a mechanical shock by dropping it from a high place, etc.

11.1.2. If the display panel is damaged and the liquid crystal substance inside it leaks out, be sure not to get any in your mouth, if the substance comes into contact with your skin or clothes, promptly wash it off using soap and water.

11.1.3. Do not apply excessive force to the display surface or the adjoining areas since this may cause the color tone to vary.

11.1.4. The polarizer covering the display surface of the LCD module is soft and easily scratched. Handle this polarizer carefully.

11.1.5. If the display surface is contaminated, breathe on the surface and gently wipe it with a soft dry cloth. If still not completely clear, moisten cloth with one of the following solvents:

- Isopropyl alcohol
- Ethyl alcohol

Solvents other than those mentioned above may damage the polarizer. Especially, do not use the following:
Water ; Ketene ; Aromatic solvents

11.1.6. Do not attempt to disassemble the LCD Module.

11.1.7. If the logic circuit power is off, do not apply the input signals.

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

11.1.8.1. Be sure to ground the body when handling the LCD Modules.

11.1.8.2. Tools required for assembly, such as soldering irons, must be properly ground.

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

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

11.2 Storage Precautions

11.2.1. When storing the LCD modules, avoid exposure to direct sunlight or to the light of fluorescent lamps.

11.2.2. The LCD modules should be stored under the storage temperature range. If the LCD modules will be stored for a long time, the recommend condition is:

Temperature : 0℃ ~ 40℃ Relatively humidity: ≤80%

11.2.3. The LCD modules should be stored in the room without acid, alkali and harmful gas.

11.3 Transportation Precautions

The LCD modules should be no falling and violent shocking during transportation, and also should avoid excessive press, water, damp and sunshine.