



PRODUCT SPECIFICATIONS

For Customer: _____

Customer Model No. _____

Module No.: TG030NH007A0

Date : 2018.02.04

Version : Y0

Preliminary Product SPEC

Final Product SPEC

For Customer's Acceptance:

Approved By	Comment

Approved by DIV	Reviewed by QA	Reviewed by RD



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Preliminary



1. General Specifications

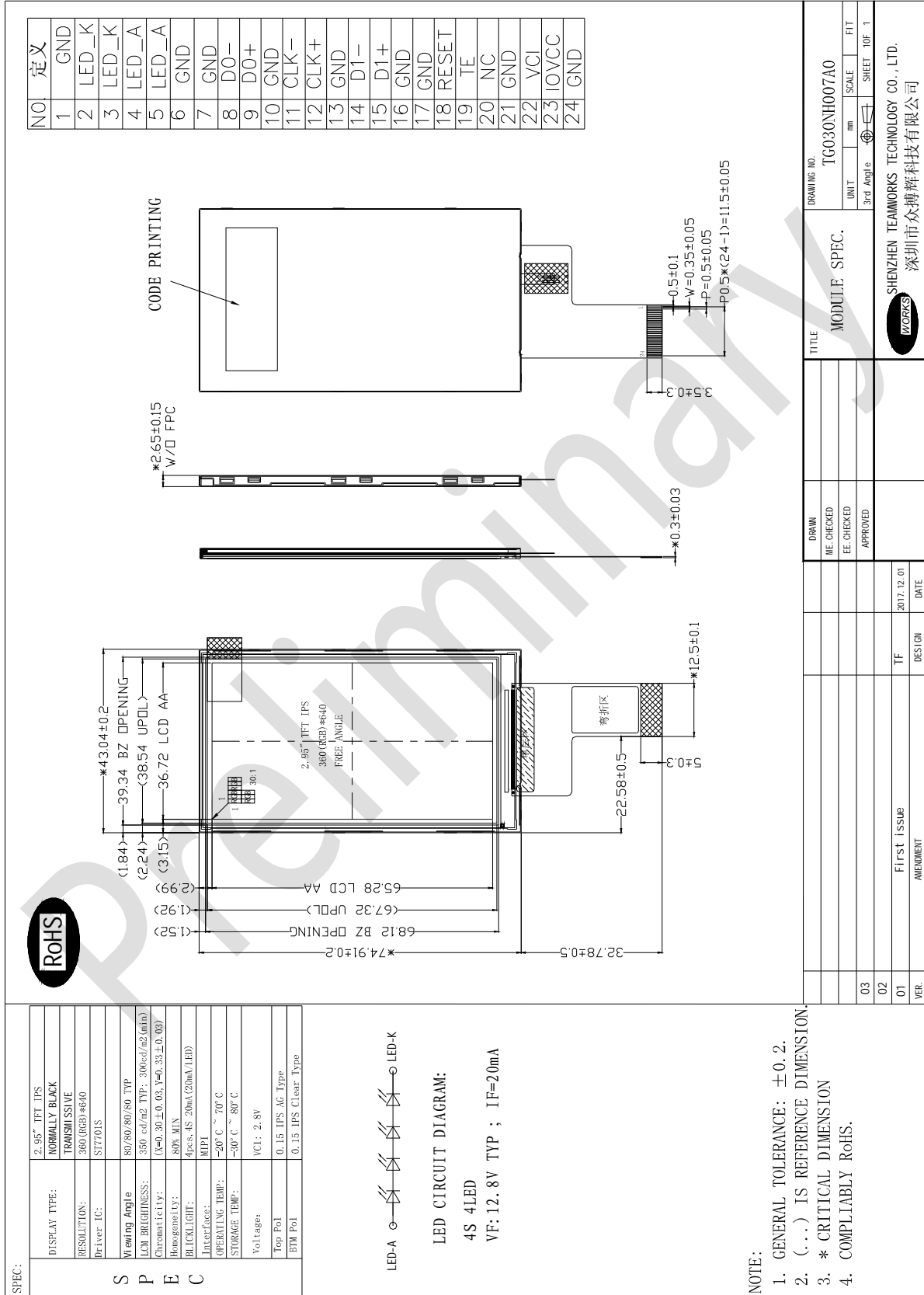
TG030NH007A0 is a TFT-LCD module. It is composed of a TFT-LCD panel, driver IC, FPC, a back light unit. The 3.0'' display area contains 360x 640 pixels and can display up to 16.7 M colors. This product accords with RoHS environmental criterion.

Item	Contents	Unit	Note
LCD Type	TFT	-	
Display color	16.7M		1
Viewing Direction	ALL	O'Clock	
Operating temperature	-20~+70	°C	
Storage temperature	-30~+80	°C	
Module size	43.04*74.91*2.65	mm	2
Active Area(W×H)	36.72*65.28	mm	
Number of Dots	360×RGB×640	dots	
Power Supply Voltage	2.8	V	
Backlight	4LEDs (white)	pcs	
Brightness(LCM)	350(TYP)	CD/M ²	
Data Transfer	MIPI	-	

Note 1: Color tune is slightly changed by temperature and driving voltage.

Note 2: Without FPC and Solder.

2.Outline.Drawing





3 .Interface signals

Pin No.	Symbol	Function
1	GND	Ground
2-3	LEDK	Backlight LED Ground
4-5	LEDA	Backlight LED Power
6-7	GND	Ground
8	MIPI-D0-	MIPI Data lane0 input
9	MIPI-D0+	
10	GND	Ground
11	MIPI-CLK-	MIPI Data lane0 input
12	MIPI-CLK+	
13	GND	Ground
14	MIPI-D1-	MIPI Data lane1 input
15	MIPI-D1+	
16-17	GND	Ground
18	RESET	This signal will reset the device and it must be applied to properly initialize the chip.
19	TE	Tearing effect signal is used to synchronize MCU to frame memory writing.
20	NC	NC
21	GND	Ground
22	VCI	Power supply for analog circuit
23	IOVCC	Power supply for logic circuit
24	GND	Ground



4. Absolute Maximum Ratings(Ta=25°C)

4.1 Environmental Absolute Maximum Ratings.

Item	Storage		Operating		Note
	MIN.	MAX.	MIN.	MAX.	
Ambient Temperature	-30°C	80°C	-20°C	70°C	1,2
Humidity	-	-	-	-	3

1. The response time will become lower when operated at low temperature.
2. Background color changes slightly depending on ambient temperature.

The phenomenon is reversible.

3. Ta≤40°C:85%RH MAX.

Ta>=40°C:Absolute humidity must be lower than the humidity of 85%RH at 40°C.

4.2 Electrical Absolute Maximum Ratings.(Vss=0V ,Ta=25°C)

Parameter	Symbol	Condition	Min	Typ	Max	Unit	Note
Power supply	VCI	Ta=25°C	-0.3	-	3.6	V	
Power supply	IOVCC	Ta=25°C	-0.3	-	3.6	V	

5. Electrical Specifications and Input Timing Table

5.1 Electrical characteristics(Vss=0V ,Ta=25°C)

Parameter	Symbol	Condition	Min	Typ	Max	Unit	Note	
Power supply	VCI	Ta=25°C	2.5	2.8	3.6	V		
Power supply	IOVCC	Ta=25°C	1.65	2.8	3.3	V		
Input voltage	'H'	V _{IH}	V _{CC} =2.8V	0.7V _{CC}	-	V _{CC}	V	
	'L'	V _{IL}	V _{CC} =2.8V	0	-	0.3V _{CC}	V	



Note:

1:When an optimum contrast is obtained in transmissive mode.

2: Tested in 1×1 chessboard pattern.

3: LCD power consumption is around 0.154W.

5.2 LED backlight specification(VSS=0V ,Ta=25°C)

Item	Symbol	Condition	Min	Typ	Max	Unit	Note
Supply voltage	V _f	-	-	12.8	-	V	1
Supply current	I _f	-	-	20	-	mA	2
Number of LED	-	4Sx1P	-	4	-	Piece	

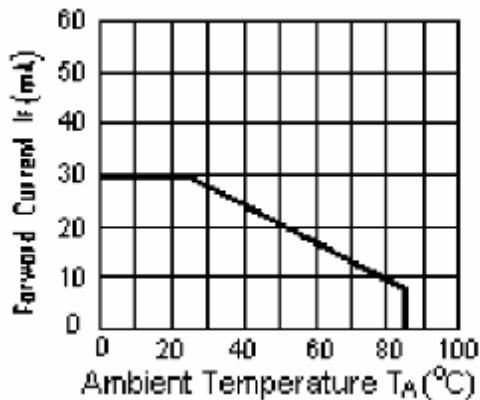
Note:

1: $V_{LED} = V_{LED(+)} - V_{LED(-)}$.

2:The current of LED is 20mA.

A LED drive in constant current mode is recommended.

3: LED power consumption is around 0.248W.



CIRCUIT DIAGRAM



6. Optical Characteristics

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Brightness	Bp	$\theta=0^\circ$	300	350	-	Cd/m ²	1
Uniformity	ΔBp	$\Phi=0^\circ$	75	80	-	%	1,2
Viewing Angle	3:00	$Cr \geq 10$	-	80	-	Deg	3
	6:00		-	80	-		
	9:00		-	80	-		
	12:00		-	80	-		
Contrast Ratio	Cr	$\theta=0^\circ$	600	800	-	-	4
Response Time	T_r+T_f	$\Phi=0^\circ$	-	30	-	ms	5
Color of CIE Coordinate	W	x	0.270	0.300	0.330	-	1,6
		y	0.300	0.330	0.360	-	
	R	x	0.617	0.647	0.677	-	
		y	0.299	0.329	0.359	-	
	G	x	0.249	0.279	0.309	-	
		y	0.520	0.550	0.580	-	
	B	x	0.104	0.134	0.164	-	
		y	0.093	0.123	0.153	-	
NTSC Ratio	S		54	60	-	%	

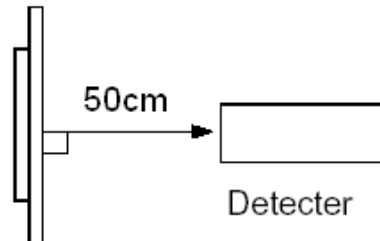
Note: The parameter is slightly changed by temperature, driving voltage and material

Note 1: The data are measured after LEDs are turned on for 5 minutes. LCM displays full white. The brightness is the average value of 9 measured spots. Measurement equipment PR-705 ($\Phi 8mm$)

Measuring condition:

- Measuring surroundings: Dark room.
- Measuring temperature: $T_a=25^\circ C$.
- Adjust operating voltage to get optimum contrast at the center of the display.

Measured value at the center point of LCD panel after more than 5 minutes while backlight turning on.

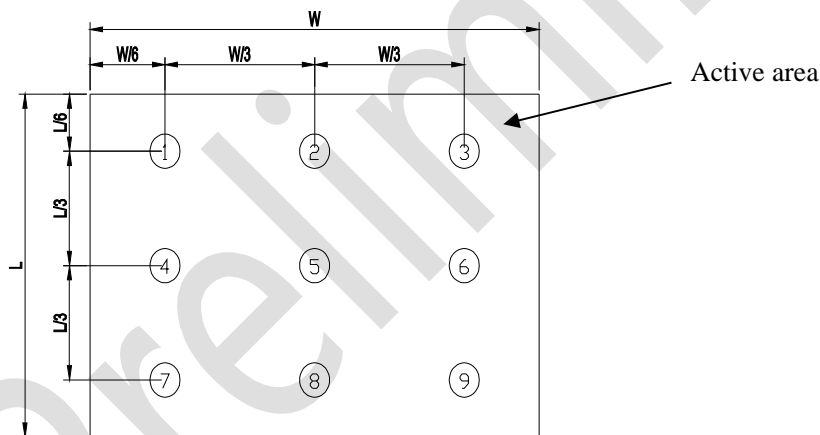


Note 2: The luminance uniformity is calculated by using following formula.

$$\Delta Bp = Bp (\text{Min.}) / Bp (\text{Max.}) \times 100 (\%)$$

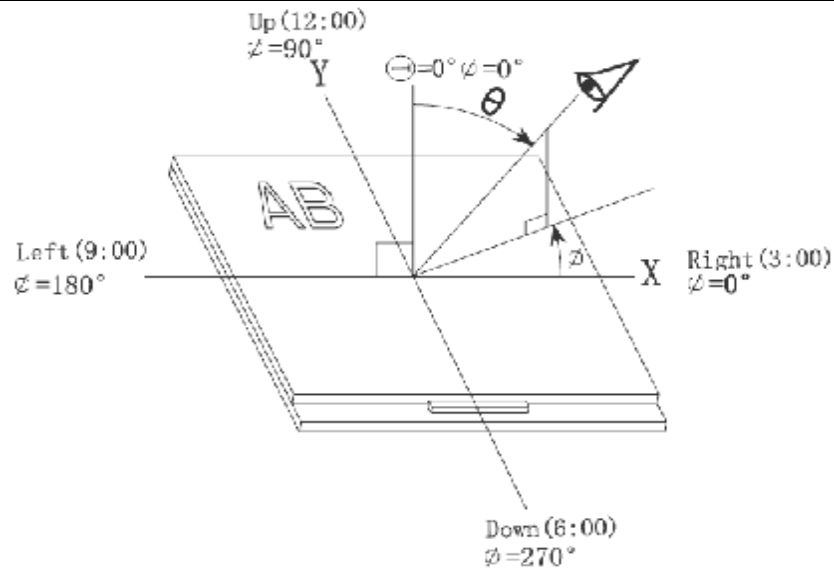
$Bp (\text{Max.})$ = Maximum brightness in 9 measured spots

$Bp (\text{Min.})$ = Minimum brightness in 9 measured spots.

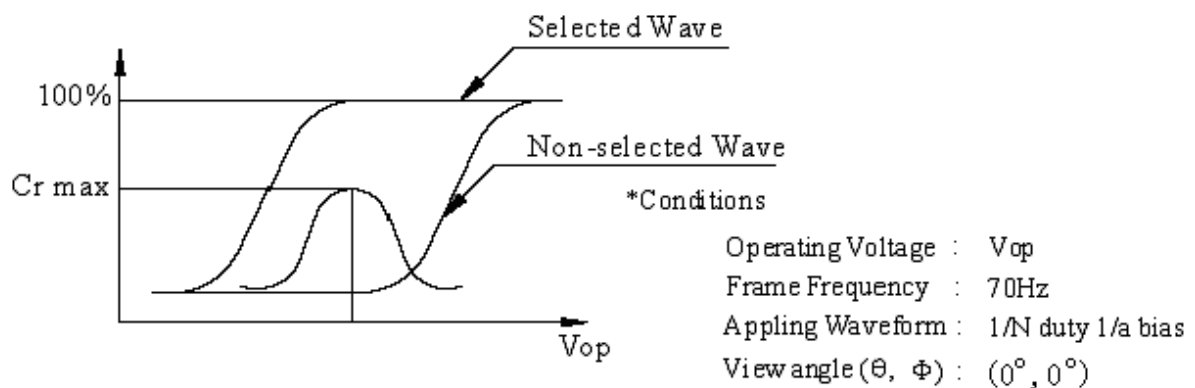


Note 3: The definition of viewing angle:

Refer to the graph below marked by θ and ϕ



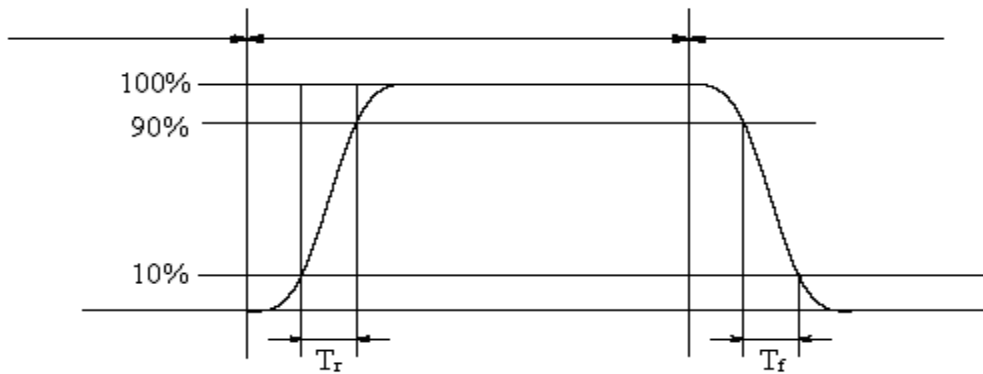
Note 4: Definition of contrast ratio.(Test LCD using DMS501)



$$\text{Contrast ratio}(Cr) = \frac{\text{Brightness of selected dots}}{\text{Brightness of non-selected dots}}$$

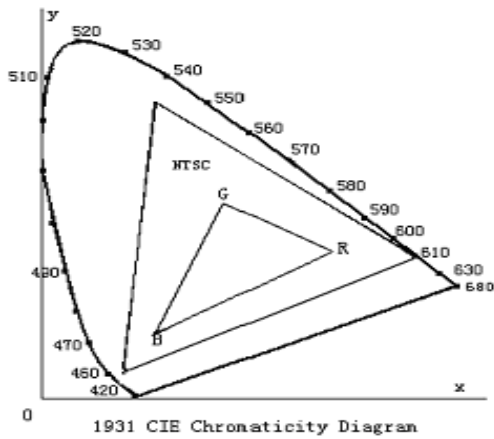
Note 5: Definition of Response time. (Test LCD using DMS501):

The output signals of photo detector are measured when the input signals are changed from “black” to “white”(falling time) and from “white” to “black”(rising time), respectively. The response time is defined as the time interval between the 10% and 90% of amplitudes.Refer to figure as below.



The definition of response time

Note 6: Definition of Color of CIE Coordinate and NTSC Ratio.

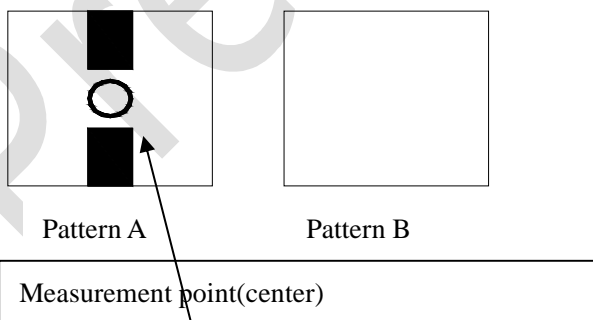


Color gamut:

$$S = \frac{\text{area of RGB triangle}}{\text{area of NTSC triangle}} \times 100\%$$

Note 7: Definition of cross talk.

$$\text{Cross talk ratio}(\%) = \frac{|\text{pattern A Brightness} - \text{pattern B Brightness}|}{\text{pattern A Brightness}} \times 100$$



Electric volume value=3F+/-3Hex



7. Reliability Test Items and Criteria

No	Test Item	Test condition	Criterion
1	High Temperature Storage	80°C 96H Restore 2H at 25°C Power off	1. After testing, cosmetic and electrical defects should not happen. 2. Total current consumption should not be more than twice of initial value.
2	Low Temperature Storage	-30°C 96H Restore 2H at 25°C Power off	
3	High Temperature Operation	70°C 96H Restore 2H at 25°C Power on	
4	Low Temperature Operation	-20°C 96H Restore 4H at 25°C Power on	
5	High Temperature/Humidity Operation	60°C 90%RH 96H Power on	
6	Temperature Cycle	-30°C ←————→ 80°C 30min 5min 30min after 5 cycle, Restore 2H at 25°C Power off	Not allowed cosmetic and electrical defects.
7	Vibration Test	Frequency range:10~55Hz Stroke:1.5mm Sweep:10Hz~55Hz~10Hz 2 hours for each direction of X. Y. Z. (6 hours for total)	
8	Shock Test	100G 6ms,±X, ±Y, ±Z 3 times for each direction	
9	ESD Test	Air discharge:±8KV,(150PF,330Ω) Contact discharge:±4KV(150PF,330Ω)	

Note: Operation: Supply 2.8V for logic system.

The inspection terms after reliability test, as below

ITEM	Inspection
Contrast	CR>50%
IDD	IDD<200%
Brightness	Brightness>60%
Color Tone	Color Tone+/-0,05



8 Quality level

As Quality department <<Product Cosmetic SPEC>>.

9. Precautions for Use of LCD Modules

9.1 Handling Precautions

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

9.1.2 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.

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

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

9.1.5 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

— Ketone

— Aromatic solvents

9.1.6 Do not attempt to disassemble the LCD Module.

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

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



- a. Be sure to ground the body when handling the LCD Modules.
- b. Tools required for assembly, such as soldering irons, must be properly ground.
- c. To reduce the amount of static electricity generated, do not conduct assembly and other work under dry conditions.
- d. 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.

9.2 Storage precautions

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

9.2.2 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 : $0^{\circ}\text{C} \sim 40^{\circ}\text{C}$

Relatively humidity: $\leq 80\%$

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

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