晶采光電科技股份有限公司
AMPIRE CO., LTD.

SPECIFICATIONS FOR LCD MODULE

CUSTOMER	
CUSTOMER PART NO.	
AMPIRE PART NO.	AG-240128GSTQW-T30H-G(T)(R)
APPROVED BY	
DATE	

☐ Approved For Specifications
☐ Approved For Specifications & Sample

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RECORD OF REVISION

Revision Date	Page	Contents	Editor
2018/04/16	--	New Release	Mark

1 FEATURES

(1) Display format : 240 × 128 dot-matrix ; 1/ 128 duty.

(2) Construction : STN LCD, Bezel, Zebra ,Heat Seal, white LED back-light, Touch Panel and PCB.

(3) Display Type : STN Blue mode, Negative , 6 o'clock view.

(4) Built in controller RA6963 or equivalent.

(5) PCB: 240128G Rev.G

(6) 5V single power input. Built-in DC/DC converter for LCD driving.

(7) Extended temperature type.

(8) ROHS compliant

(9) LCD Driver : NT7086

(10) DC/DC Converter AIC1652

(11) New LED Back-light vender. Back-light without metal housing.

2 MECHANICAL DATA

Parameter	Standard Value	Unit
Dot size	0.40 (W) × 0.40(H)	mm
Dot pitch	0.45(W) × 0.45(H)	mm
Viewing area	114.0(W) × 64.0(H)	mm
Module size (LED back-light)	151.4(W) × 104.0(H) × 16.5 max (T)	mm

3 ABSOLUTE MAXIMUM RATINGS

Parameter		Symbol	Min	Max	Unit
Logic Circuit Supply Voltage		VDD-VSS	0	7.0	V
LCD Driving Voltage		VDD-VO	0	26	V
Input Voltage		VI	VSS	VDD	V
Extended temp. type	Operating Temp.	TOP	-20	70	°C
	Storage Temp.	TSTG	-30	80	°C

4 ELECTRICAL CHARACTERISTICS

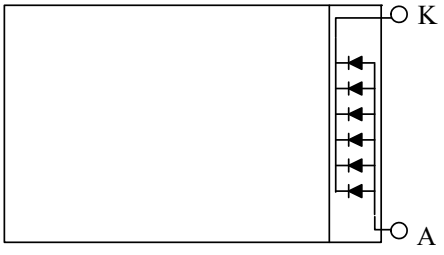
Parameter	Symbol	Condition	Min	Typ	Max	Unit	Note
----- Electronic Characteristics -----							
Logic Circuit Supply Voltage	VDD-VSS	--	4.5	5.0	5.5	V	
LCD Driving Voltage	VDD-VO	0 °C	17.6	18.5	19.4	V	0 ~ 50 °C for Normal Temp. type
		25 °C	17.3	18.2	19.1		
		50°C	16.9	17.8	18.7		
Input Voltage	VIH	--	0.7 VDD	--	VDD	V	
	VIL	--	VSS	--	0.3 VDD	V	
Logic Supply Current	IDD	VDD = 5V	--	30	--	mA	
----- Optical Characteristics -----							
Contrast	CR	STN type	--	5	--		Note 1
Rise Time	tr	25°C	--	105	--	ms	Note 2
Fall Time	tf	25°C	--	129	--	ms	
Viewing Angle Range	θ f	25°C & CR≥2	--	40	--	Deg.	Note 3
	θ b		--	30	--		
	θ l		--	35	--		
	θ r		--	35	--		
Frame Frequency	fF	25°C	--	64	--	Hz	
----- White LED Back-light Characteristics -----							
Parameter	**Symbol**	**Condition**	**Min**	**Typ**	**Max**	**Unit**	**Note**
Forward Current	IF	--	--	90	120	mA	Note 4 & 7
LCM Luminous intensity (Full White pattern)		IF=90mA	--	15	--	cd/m^2	Note 4
Forward Voltage	VF	IF=90mA	--	3.2	3.5	V	Note 5
LED C.I.E	X	IF=90mA	0.26	0.30	0.34		Note 6
	Y	IF=90mA	0.27	0.31	0.35		

Note 4: Luminous intensity is decided by forward current of White LED.

Note 5: White LEDs are with voltage tolerance.

Note 6: White LEDs are with color tolerance.

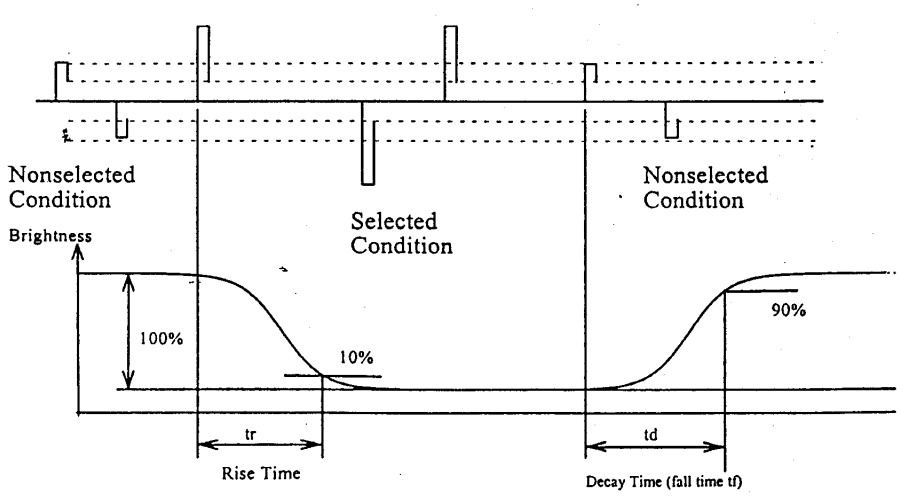
* LED Dice number = 6



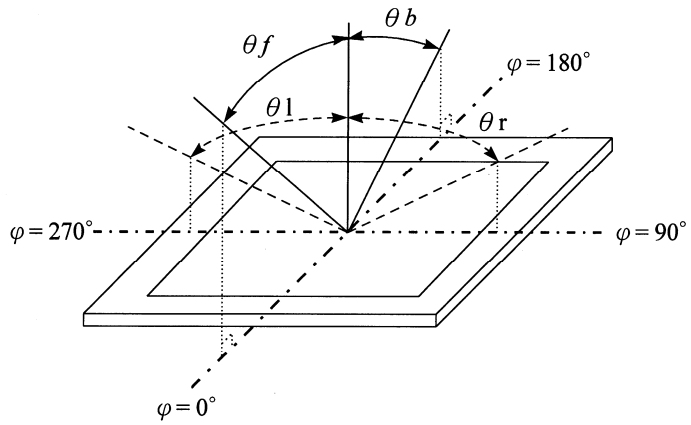
(NOTE 1) Contrast ratio :

CR = (Brightness in ON state) / (Brightness in OFF state)

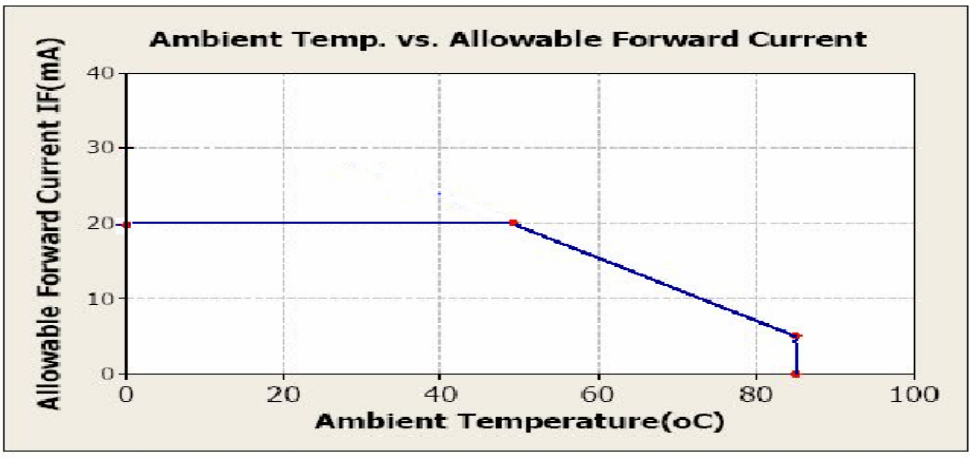
(NOTE 2) Response time :



(NOTE 3) Viewing angle



(NOTE 7) One LED Dice curve Diagram



4.1 Touch Panel Electrical Specification

Parameter	Condition	Standard Value
Terminal Resistance	X Axis	360 ~ 1240 Ω
	Y Axis	100 ~ 640 Ω
Insulating Resistance	DC 25 V	More than 20MΩ
Linearity	--	±1.5 %

Note A .

Notes area for pen notes life test is 10 x 9 mm.

Size of word is 7.5 x 6.72

Shape of pen end : R0.8

Load : 250 g

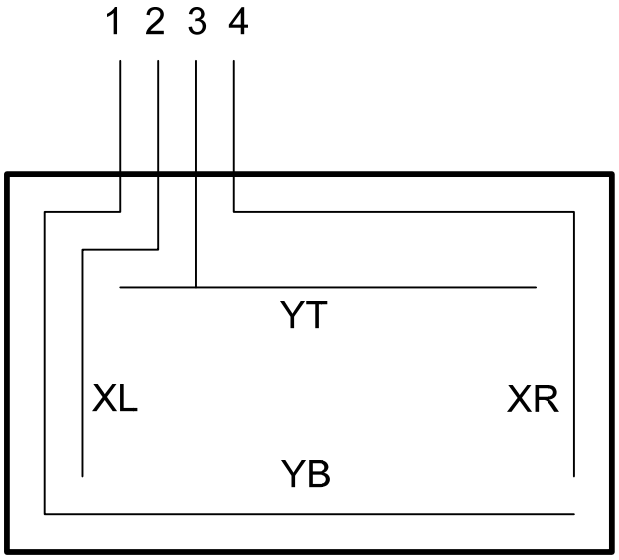
Note B

By Silicon rubber tapping at same point

Shape of rubber end : R8

Load : 200g

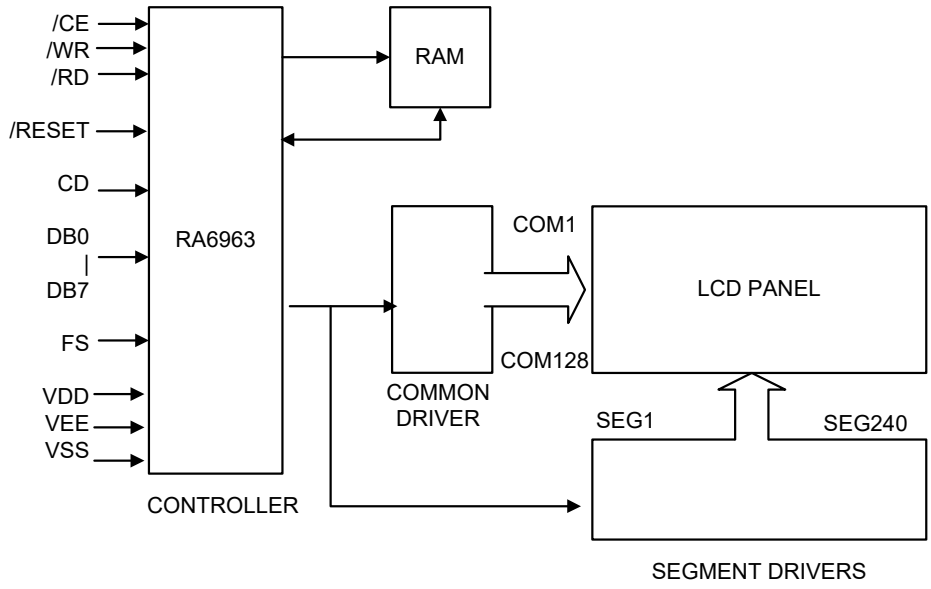
Frequency : 5 Hz

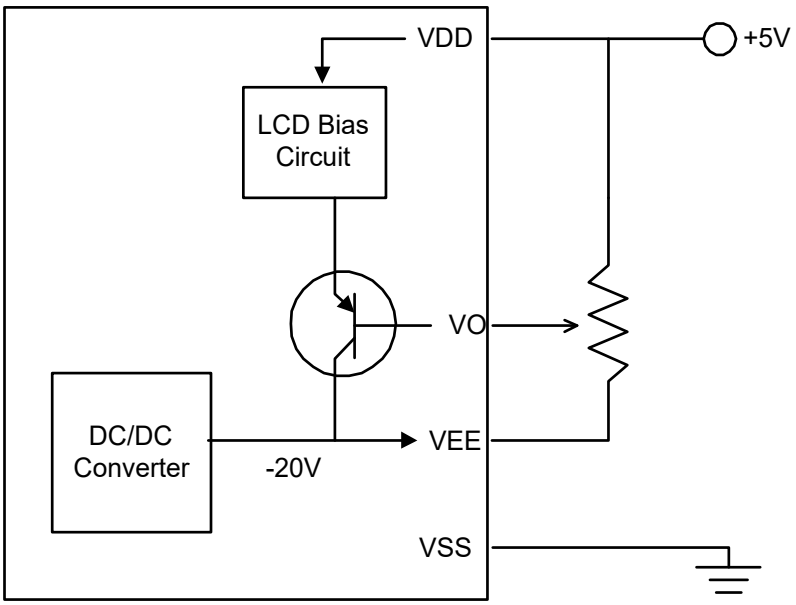


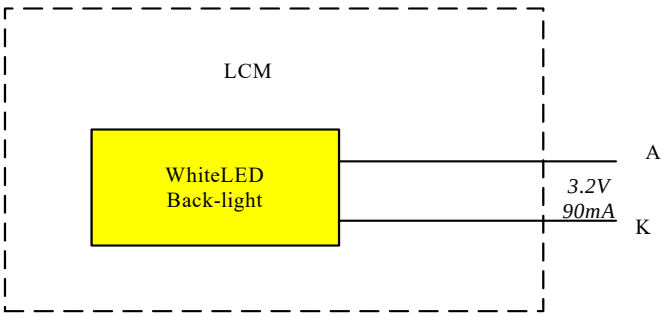
CONNECTION

NO.	SYMBOL
1	YB
2	XL
3	YT
4	XR

5 BLOCK DIAGRAM & POWER SUPPLY



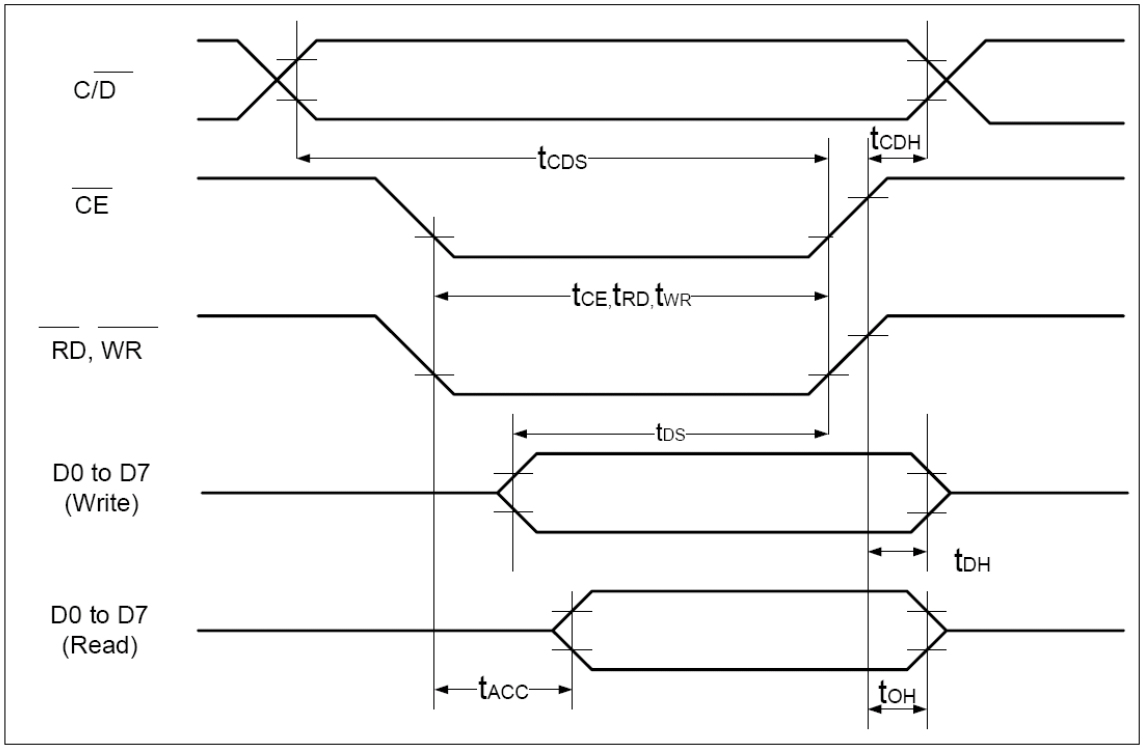




6 PIN CONNECTIONS

Pin No.	Symbol	Function
1	VSS	Ground (0V)
2	VDD	Logic Supply Voltage(+5V)
3	VO	LCD Power Supply
4	C/D	WR = L --- C/D = H : Command Write C/D = L : Data Write RD = L --- C/D = H : Status Read C/D = L : Data Read
5	/RD	Read data when RD = L
6	/WR	Write data when WR = L
7-14	DB0 - DB7	Data Bus Line
15	/CE	Chip Enable
16	/RES	H --- Normal L --- Initialize RA6963
17	VEE	VEE Negative power output (-20V)
18	MD2	Pin for selection of number of columns H – 32 columns L – 40 columns
19	FS	FS : Pin for selection of font H -- Font 6x8 (default) L -- Font 8x8
20	NC	No Connection

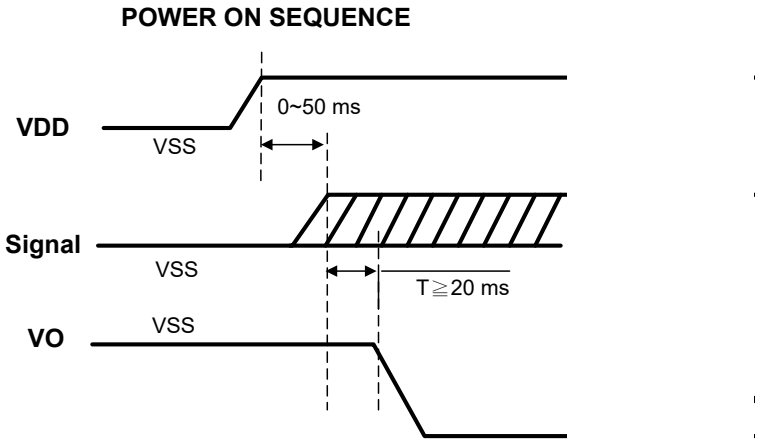
7 TIMING CHARACTERISTICS

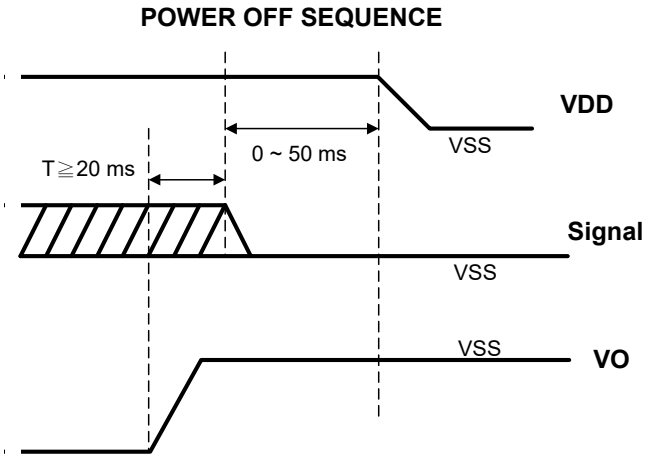


(V_{DD}=+5V±5%,GND=0V,Ta= -20 to +70℃)

Item	Symbol	Test Conditions	Min.	Max.	Unit
C/$\overline{D}$ Set Up Time	t_{CDS}	--	100	--	ns
C/$\overline{D}$ Hold Time	t_{CDH}	--	10	--	ns
$\overline{CE}$, $\overline{RD}$, $\overline{WR}$ Pulse Width	t_{CE}, t_{RD}, t_{WR}	--	80	--	ns
Data Set Up Time	t_{DS}	--	80	--	ns
Data Hold Time	t_{DH}	--	40	--	ns
Access Time	t_{ACC}	--	--	150	ns
Output Hold Time	t_{OH}	--	10	50	ns

7.1 Power ON/OFF Sequence





8 QUALITY AND RELIABILITY

8.1 TEST CONDITIONS

Tests should be conducted under the following conditions :

Ambient temperature : 25 ± 5°C

Humidity : 60 ± 25% RH.

8.2 SAMPLING PLAN

Sampling method shall be in accordance with MIL-STD-105E , level II, normal single sampling plan .

8.3 ACCEPTABLE QUALITY LEVEL

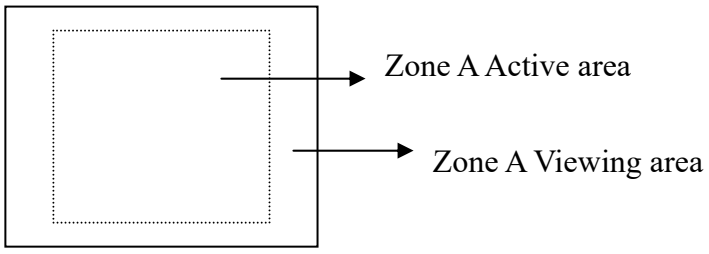
A major defect is defined as one that could cause failure to or materially reduce the usability of the unit for its intended purpose. A minor defect is one that does not materially reduce the usability of the unit for its intended purpose or is an infringement from established standards and has no significant bearing on its effective use or operation.

8.4 APPEARANCE

An appearance test should be conducted by human sight at approximately 30 cm distance from the LCD module under flourescent light. The inspection area of LCD panel shall be within the range of following limits.

8.5 INSPECTION QUALITY CRITERIA

ITEM	Description of defects				Class of defects	remark
Function	No display		Reject		Major	
	Display abnormal		Reject		Major	
	Missing line		Reject		Major	
Black spots	Ave. dia. D		Area A	Area B	Minor	Two spots must be between about 5 mm
	D≦0.13		Disregard			
	0.13＜D≦0.15		2	2		
	0.13＜D≦0.25		1	2		
	0.25＜D		0	1		
Black line	Width W	Length L	Area A	Area B	Minor	
	≦3.0	≦0.02	Disregard			
	≦2.0	≦0.04	2	2		
	≦1.0	≦0.06	1	2		
		＞0.06	0	0		
Scratch	Width W		Length L	Accept	Minor	
	W≦0.02		---------	Disregard		
	0.02≦W≦0.05		L≦3.0	2		
	W＞0.05		-------	0		
Appearance	PCB copper circuit showed		Reject		Minor	
	PCB scratch was over 5 mm		Reject			
	Sort pad was damaged		Reject			
★ Back-Light	Function didn't work		Reject		Major	
	Some area didn't work		Reject			
	Bright was not even		Reject			
	B/L color was not correct		Reject			
★T/P (DOTS)	D≦0.2mm		Reject		Major	
	0.2mm＜D≦0.3mm		Reject			
	0.3mm＜D		Reject			
★T/P(Scratch)	W≦0.02mm		10mm＜L	Disregard	Major	
	0.05mm≦W≦0.1mm		10mm＜L	1		
	0.1mm≦W		10mm＜L	0		
『★』 Symbol means LCM has this material.						



8.6 RELIABILITY

Test Item	Test Conditions	Note
	Extended Temp. type	
High Temperature Operation	70±3°C , t=96 hrs	
Low Temperature Operation	-20±3°C , t=96 hrs	
High Temperature Storage	80±3°C , t=96 hrs	1,2
Low Temperature Storage	-30±3°C , t=96 hrs	1,2
Temperature Cycle	-30°C ~ 25°C ~ 80°C 30 m in. 5 min. 30 min. (1 cycle) Total 5 cycle	1,2
Humidity Test	40 °C, Humidity 90%, 96 hrs	1,2
Vibration Test (Packing)	Sweep frequency : 10 ~ 55 ~ 10 Hz/1min Amplitude : 0.75mm Test direction : X.Y.Z/3 axis Duration : 30min/each axis	2

Note 1 : Condensation of water is not permitted on the module.

Note 2 : The module should be inspected after 1 hour storage in normal conditions (15-35°C , 45-65%RH).

Definitions of life end point :

- Current drain should be smaller than the specific value.
- Function of the module should be maintained.
- Appearance and display quality should not have degraded noticeably.
- Contrast ratio should be greater than 50% of the initial value.

9 HANDLING PRECAUTIONS

(1) A LCD module is a fragile item and should not be subjected to strong mechanical shocks.

(2) Avoid applying pressure to the module surface. This will distort the glass and cause a change in color.

(3) Under no circumstances should the position of the bezel tabs or their shape be modified.

(4) Do not modify the display PCB in either shape or positioning of components.

(5) Do not modify or move location of the zebra or heat seal connectors.

(6) The device should only be soldered to during interfacing. Modification to other areas of the board should not be carried out.

(7) In the event of LCD breakage and resultant leakage of fluid do not inhale, ingest or make contact with the skin. If contact is made rinse immediately.

(8) When cleaning the module use a soft damp cloth with a mild solvent, such as Isopropyl or Ethyl alcohol. The use of water, ketone or aromatic is not permitted.

(9) Prior to initial power up input signals should not be applied.

(10) Protect the module against static electricity and observe appropriate anti-static precautions.

(11) AMIPRE will provide one year warrantee for all products and three months warrantee for all repairing products.

10 OUTLINE DIMENSION