华田信科电子有限公司

HTDISPLAY ELECTRONICS CO.,LTD.

The professional LCD manufacturer

www.htdisplay.com

SPECIFICATIONS

Product Name: ___LCM___

Model PartNumber: ___HT480043R___

Revision: ___01___   Date: ___2013-11-20___

Prepared By:	Reviewed By:	Approved By:
HT		

Customer: _____

Custoer Approved Result: _____ □ OK _____ □ NG _____

Custoer Confirmed Message: _____

_____

Approved By: _____ Date: _____

Records of Revision

DATE	REF. PAGE PARAGRAPH DRAWING No.	REVISED No.	SUMMARY	REMARK
2013-11-20		01	First issue	

Contents

1. Introduction

1.1 Scope of application

This specification applies to the Negative type TFT transmissive dot matrix LCD module that is supplied by HTdisplay ELECTRONICS CO.,LTD . This LCD module should be designed for mobile phone use.

LCD specification: Dots 480x272.

As to basic specification of the driver IC, refer to the IC (OTA5180A) specification and datasheet.

1.2 Structure:

Double display structure:

TFT Module + FPC +BL

FULL 16.7M Color 4.3inch TFT LCD size for main LCD;

One bare chip with gold bump (COG) TECH;

24 BITS RGB interface;

1.3 TFT features:

Structure: TFT PANNEL+IC+FPC+BL;

Transmissive Type LCD

480 dot-source and 272 dot-gate outputs;

White LED back light;

24 BITS RGB   interface;
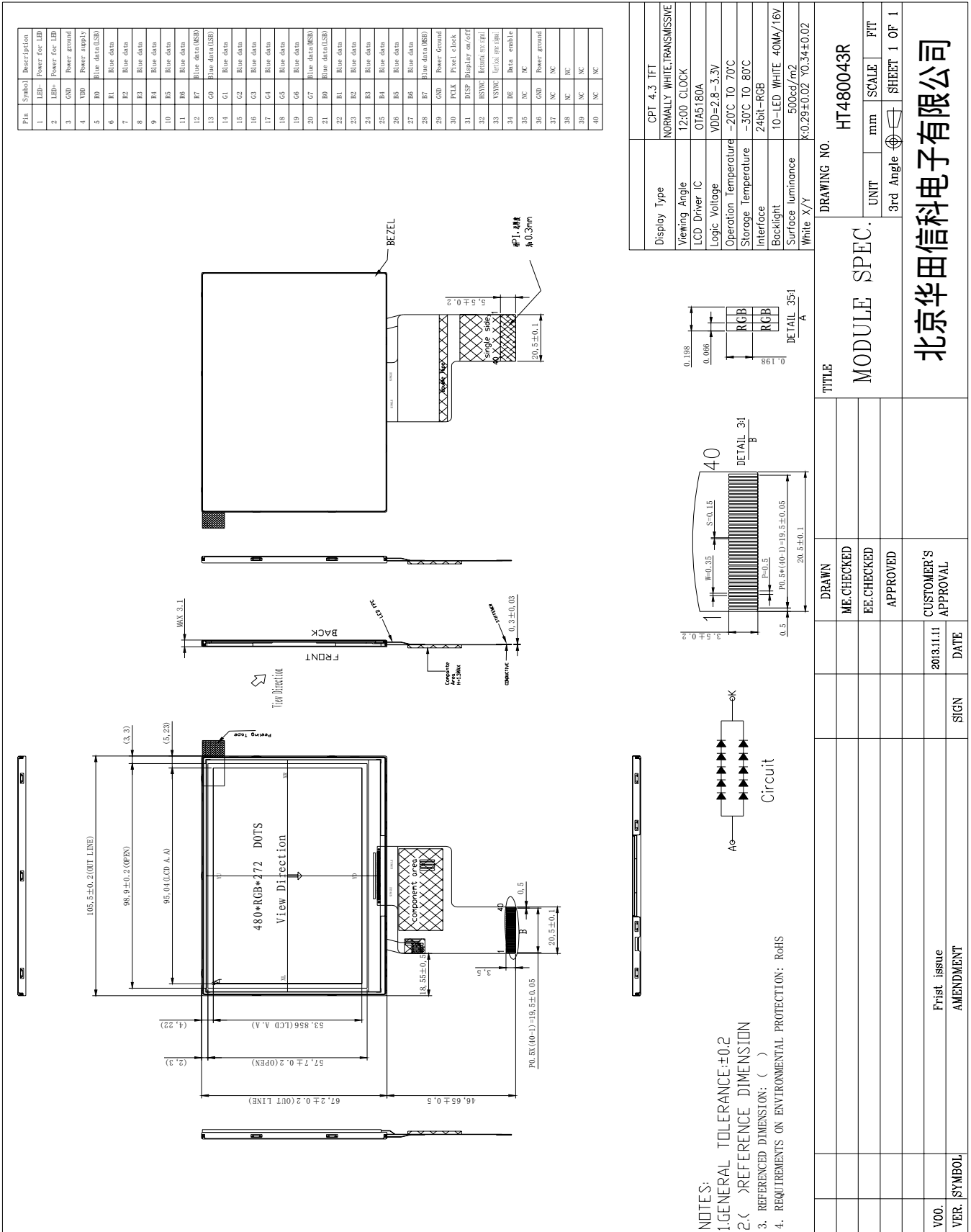
1.4 Applications:

Mobile phone

 PSP

 PDA

 GPS

 Etc…

2. General specification

ITEM	Standard value	UNIT
LCD Type	TFT Transmissive	---
Driver element	a-Si TFT Active matrix	
Number of Dots	480*272	Dots
Pixel Arrangement	RGB Delta Stripe	
Active Area	95.04*53.856	mm
Viewing Direction	12 O'clock	
Driver IC	OTA5180A	
Module Size(W*H*T)	105.5x67.2x3.1	mm
Approx. Weight	TBD	g
Back Light	White LED	
System interface	24 BITS RGB interface	

3. Mechanical drawing

Pin	Symbol	Description
1	LED-	Power for LED
2	LED+	Power for LED
3	GND	Power ground
4	VDD	Power supply
5	R0	Blue data(LSB)
6	R1	Blue data
7	R2	Blue data
8	R3	Blue data
9	R4	Blue data
10	R5	Blue data
11	R6	Blue data(MSB)
12	R7	Blue data(MSB)
13	G0	Blue data(LSB)
14	G1	Blue data
15	G2	Blue data
16	G3	Blue data
17	G4	Blue data
18	G5	Blue data
19	G6	Blue data
20	G7	Blue data(MSB)
21	B0	Blue data(LSB)
22	B1	Blue data
23	B2	Blue data
24	B3	Blue data
25	B4	Blue data
26	B5	Blue data
27	B6	Blue data
28	B7	Blue data(MSB)
29	GND	Power Ground
30	PCLK	Pixel clock
31	DISP	Display on/off
32	HSYNC	행산호 신호(행 검색)
33	VSYNC	업(세로 방향)첫호
34	DE	Data enable
35	NC	NC
36	GND	Power ground
37	NC	NC
38	NC	NC
39	NC	NC
40	NC	NC

Display Type	CPT 4.3 TFT NORMALLY WHITE,TRANSMISSIVE
Viewing Angle	12:00 CLOCK
LCD Driver IC	OTA5180A
Logic Voltage	VDD=2.8~3.3V
Operation Temperature	-20℃ TO 70℃
Storage Temperature	-30℃ TO 80℃
Interface	24bit-RGB
Backlight	10-LED WHITE 40MA/16V
Surface luminance	500cd/m2
White X/Y	X:0.29±0.02 Y:0.34±0.02

DRAWING NO. HT480043R

MODULE SPEC.

TITLE

UNIT mm SCALE FTT

3rd Angle SHEET 1 OF 1

DRAWN		
ME.CHECKED		
EE.CHECKED		
APPROVED		
CUSTOMER'S APPROVAL		

SIGN DATE 2013.11.11

V00. Frist issue

VER. SYMBOL AMENDMENT

NOTES:
1.GENERAL TOLERANCE:±0.2
2.( )REFERENCE DIMENSION
3. REFERENCED DIMENSION: ( )
4. REQUIREMENTS ON ENVIRONMENTAL PROTECTION: RoHS

4. ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Min	Max	Unit
Supply voltage for logic	VDD	-0.3	3.3	V
Input voltage for logic	V_{IN}	-0.5	V_{cc} +0.3	V
Supply current (One LED)	I_{LED}		30	mA
Operating temperature	T_{OP}	-20	+70	℃
Storage temperature	T_{ST}	-30	+80	℃

5. ELECTRICAL CHARACTERISTICS

Item	Symbol	Min	Typ	Max	Unit	Applicable terminal
Supply voltage for logic	VDD	3.0	3.3	3.6	V	V_{DD}
Input voltage	V_{IL}	-0.3	-	0.2 V_{DD}	V	
	V_{IH}	0.8 V_{cc}	-	V_{cc}	V	
Input leakage current	I_{LKG}	-1.0		1.0	μA	
LED Forward voltage	V_f	-	3.2	-	V	--
Input backlight current	I_{LED}	-	20	-	mA	With One LED

Backlight driving conditions

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Voltage for LED backlight	V_L	-	16	-	V	Note 1
Current for LED backlight	I_L	-	40	-	mA	
LED life time	-	20,000	-	-	Hr	Note 2

Timing characteristics

1. Vertical timing

Item	Min.	Typ.	Max.	Unit
V display t_{VD}		272		
V blanking t_{VB}		12		
V front porch t_{VFP}		3		H
VSYNC width t_{VSW}		10		
1 frame		287		
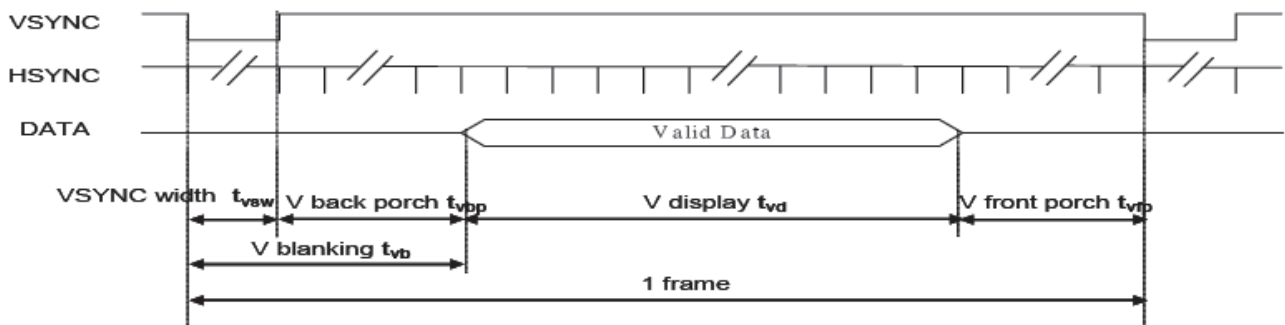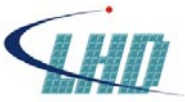
2. Horizontal timing

640x240 mode	Min	Min	Max	UNIT
H display t_{hd}		480		
1 H t_H		576		
H blanking t_{hb} (*)		88		DCLK
H front porch t_{hfp}		8		
HSYNC width t_{hsw}		41		
Frequency		9.0		MHz

3. SYNC-DE MODE

VSYNC

HSYNC

DE

INPUT
DATA

first
line

last
line

VSYNC

Blanking Time

Active Area

HSYNC
DE

DCLK

R[7:0]

G[7:0]

B[7:0]
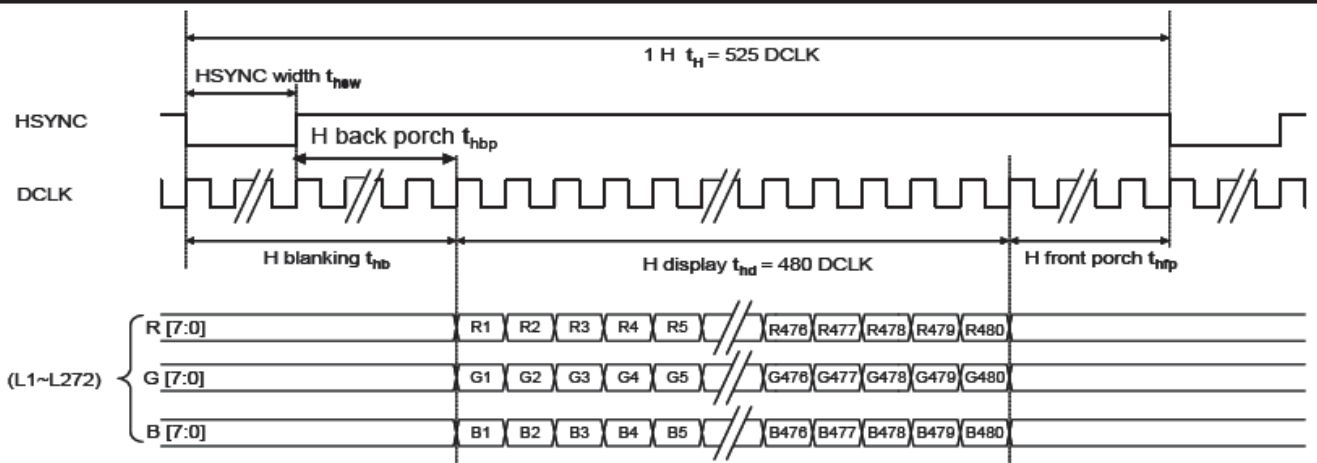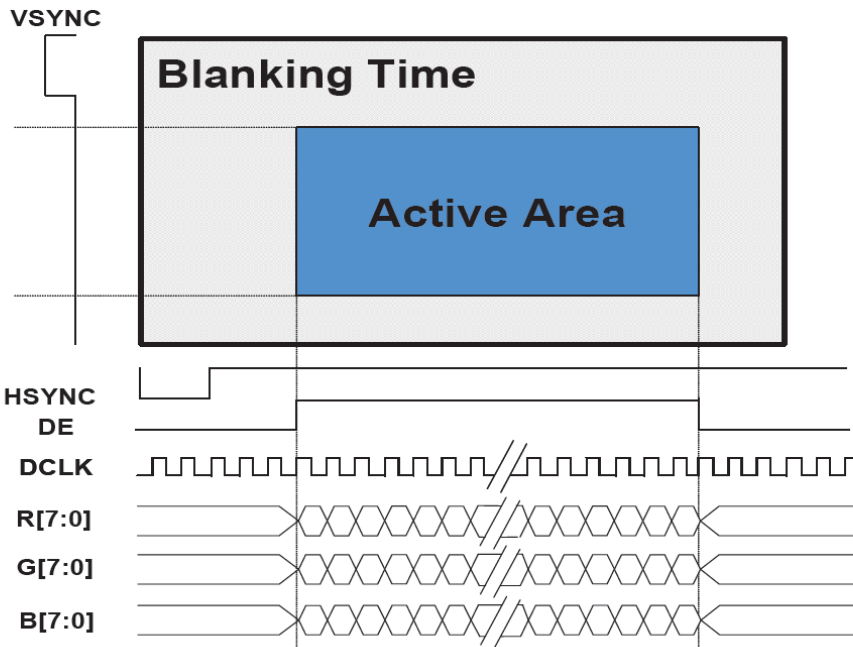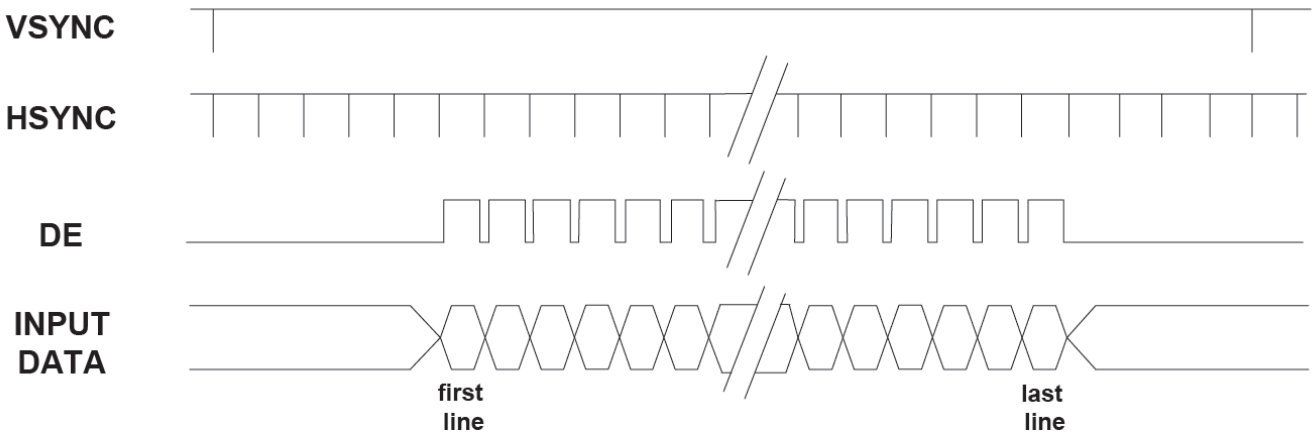
6. OPTICAL CHARACTERISTICS

ITEM		SYMBOL	CONDITIONS	SPECIFICATIONS			UNIT	NOTE
				MIN.	TYP.	MAX		
Brightness		B		---	500	--	Cd/m^2	
Contrast Ratio		CR		250	350	--	--	
Response Time		Tr+Tf		--	30	40	ms	
CIE Color coordinate	Red	X_R	Viewing normal angle	--				All left side data are based on CPT's product reference only
		Y_R						
	Green	X_G		--				
		Y_G						
	Blue	X_B		--				
		Y_B						
	White	X_W		0.270	0.290	0.310		
		Y_W		0.320	0.340	0.360		
Viewing Angle	Hor.	θ_{X+}	Center CR>=10	55	65	--	Deg.	
		θ_{X-}		55	65	--		
	Ver.	θ_{Y+}		45	55	--		
		θ_{Y-}		45	55			
Uniformity		Un		80	85		%	

Note 1 : Definition of Viewing Angle θx and θy :
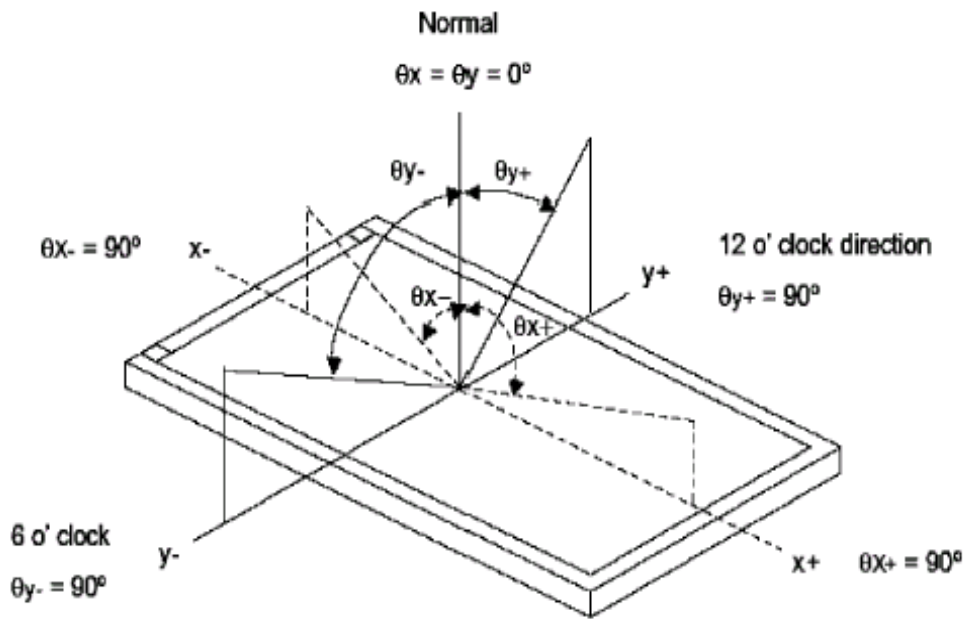
Note 2: Definition of contrast ratio CR:

$$CR = \frac{\text{Brightness of non-selected dots (white)}}{\text{Brightness of selected dots (black)}}$$

Note 3: Definition of response time (T_R, T_F)
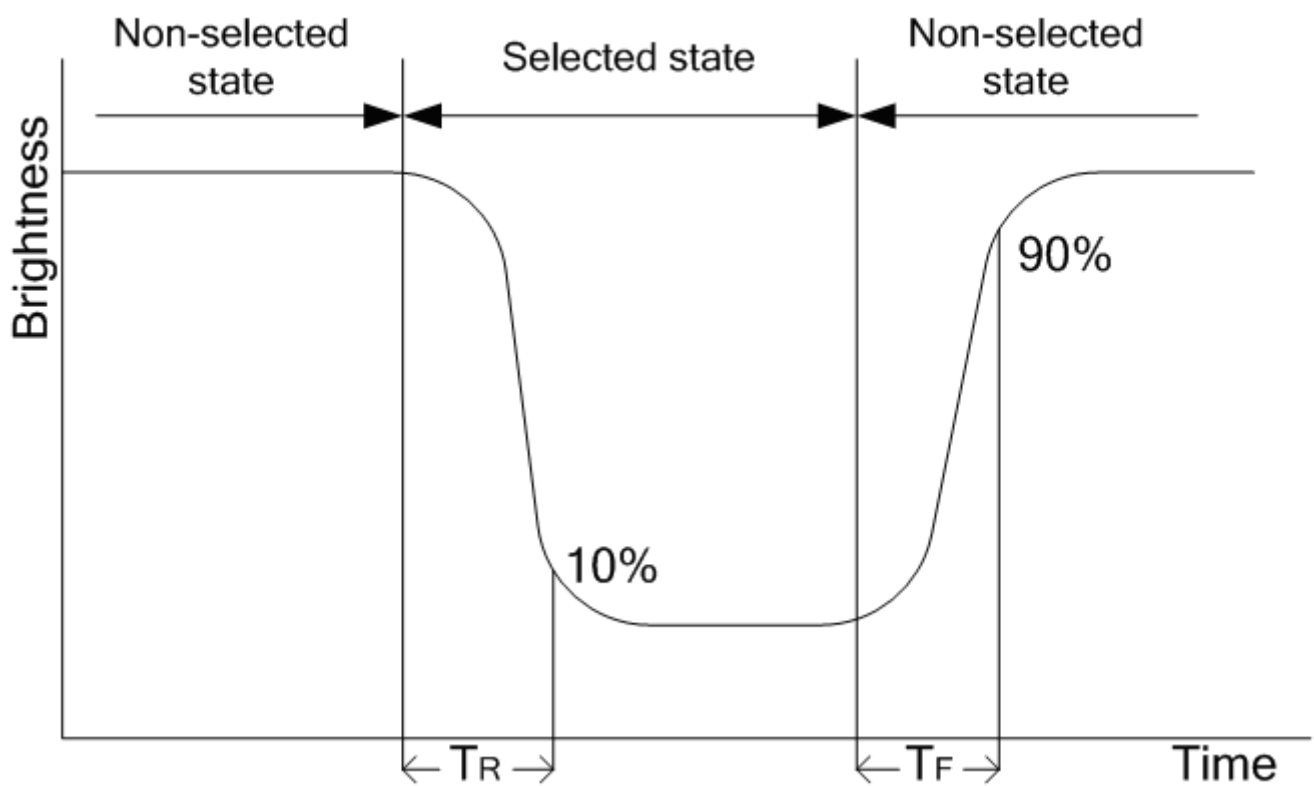
: The brightness test equipment setup
   20mA   Field=2° (As measuring "black" image, field=2° is the best testing condition)

The center of the screen

Note 4 :

Unit: mm
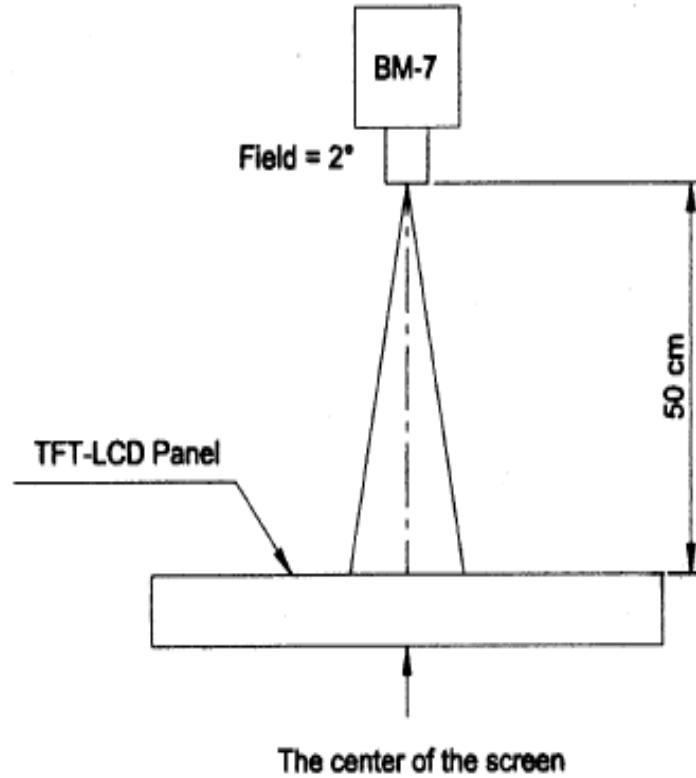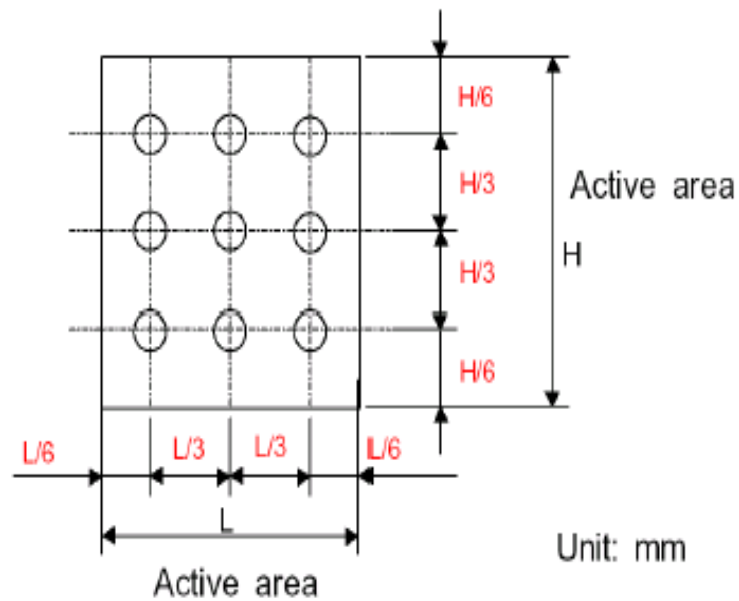
7. MCU Interface Pin Function

NO.	SYMBOL	Description
1	VLED-	Power for LED backlight cathode
2	VLED+	Power for LED backlight anode
3	GND	Ground
4	VDD	Power supply
5	R0	Data bus
6	R1	Data bus
7	R2	Data bus
8	R3	Data bus
9	R4	Data bus
10	R5	Data bus
11	R6	Data bus
12	R7	Data bus
13	G0	Data bus
14	G1	Data bus
15	G2	Data bus
16	G3	Data bus
17	G4	Data bus
18	G5	Data bus
19	G6	Data bus
20	G7	Data bus
21	B0	Data bus
22	B1	Data bus
23	B2	Data bus
24	B3	Data bus
25	B4	Data bus
26	B5	Data bus
27	B6	Data bus
28	B7	Data bus
29	GND	Ground

30	PCLK	Pixel clock
31	DISP	Display on/off
32	HSYNC	Horizon YNC signal
33	VSYNC	Vertical YNC signal
34	DE	Data enable
35	NC	No connect
36	GND	Ground
37	NC	No connect
38	NC	No connect
39	NC	No connect
40	NC	No connect

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8. BLOCK DIAGRAM

Driver IC: OTA5180A or Compatible
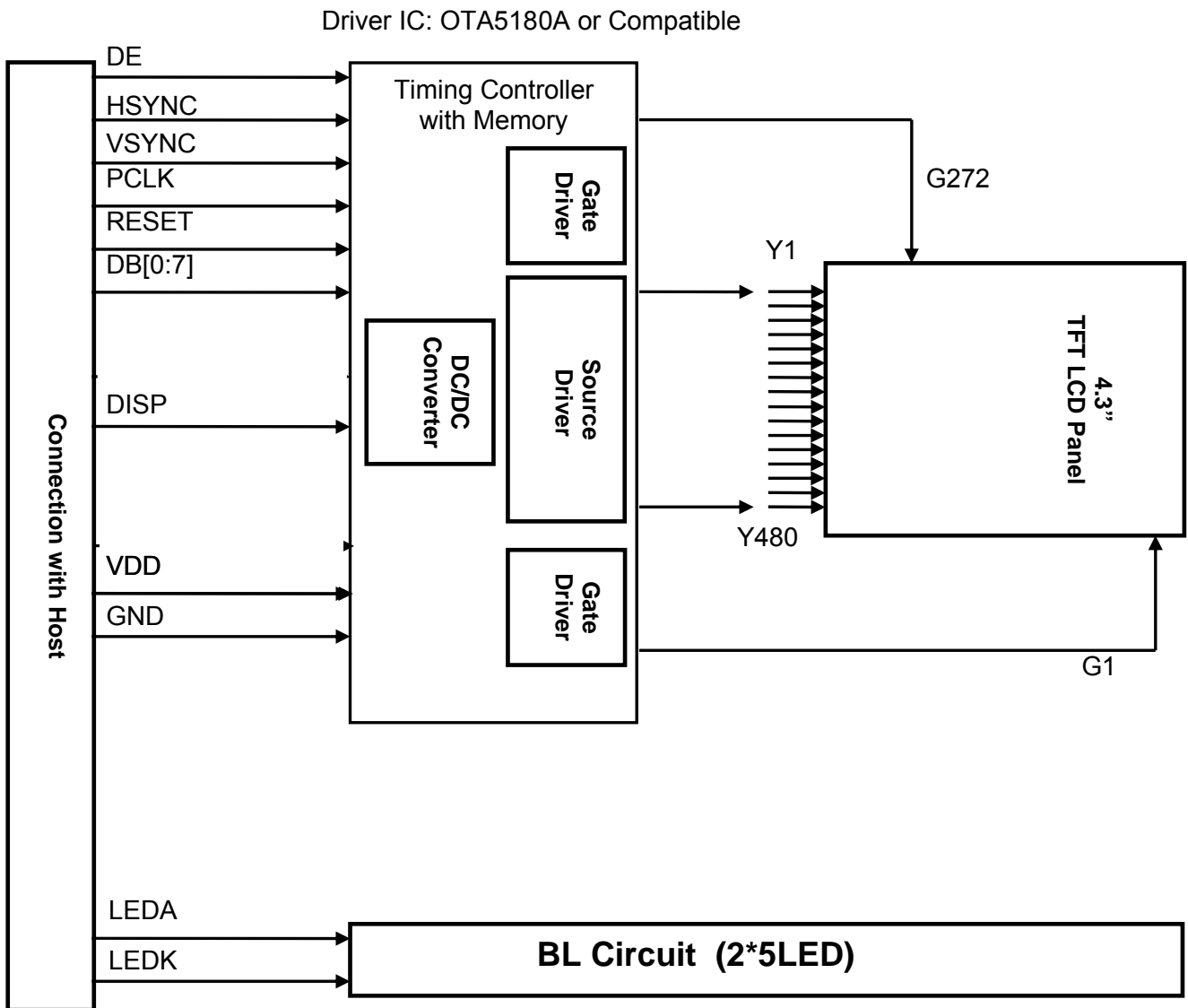
9.LCM Quality Criteria

9.1 VISUAL & FUNCTION INSPECTION STANDARD

9.1.1 Inspection conditions

Inspection performed under the following conditions is recommended.

Temperature : 25±5℃
Humidity : 65%±10%RH
Viewing Angle : Normal viewing Angle.
Illumination: Single fluorescent lamp (300 to 700Lux)
Viewing distance:30-50cm
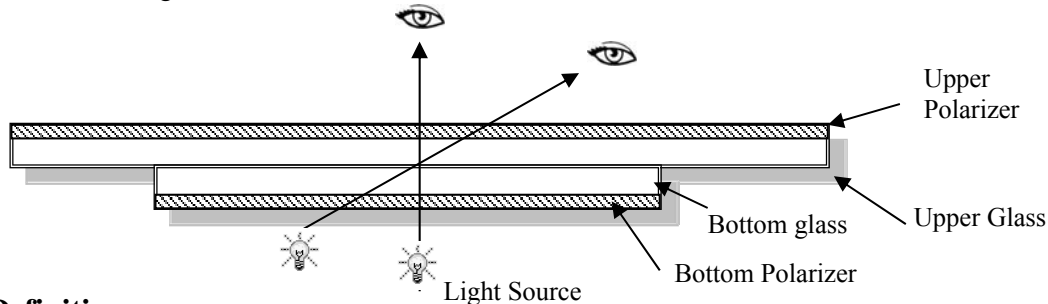
9.1.2 Definition
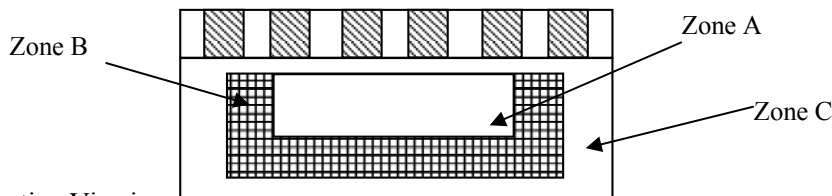
Zone A : Effective Viewing Area(Character or Digit can be seen)
Zone B : Viewing Area except Zone A
Zone C : Outside (Zone A+Zone B) which can not be seen after assembly by customer .)
Note:
     As a general rule ,visual defects in Zone C can be ignored when it doesn't effect product function
 or appearance after assembly by customer.

9.1.3 Sampling Plan

According to GB/T 2828-2003；, normal inspection, Class Ⅱ
AQL:

Major defect	Minor defect
0.65	1.5
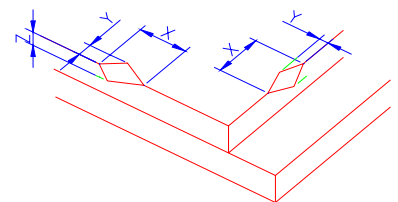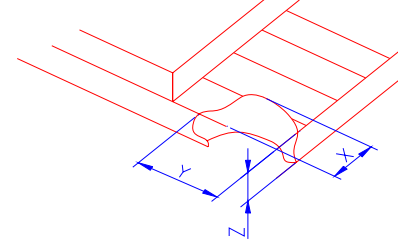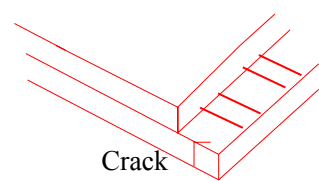
LCD: Liquid Crystal Display , TP: Touch Panel , LCM: Liquid Crystal Module
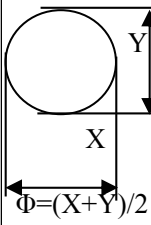
No	Items to be inspected	Criteria	Classification of defects
1	Functional defects	1) No display, Open or miss line 2) Display abnormally, Short 3) Backlight no lighting, abnormal lighting. 4) TP no function	Major
2	Missing	Missing component	
3	Outline dimension	Overall outline dimension beyond the drawing is not allowed	
4	Color tone	Color unevenness, refer to limited sample	Minor
5	Soldering appearance	Good soldering , Peeling off is not allowed.	
6	LCD/Polarizer/TP	Black/White spot/line, scratch, crack, etc.	

9.1.4 Criteria (Visual)

Number	Items	Criteria(mm)
1.0 LCD Crack/Broken NOTE: X: Length Y: Width Z: Height L: Length of ITO, T: Height of LCD	(1) The edge of LCD broken	<table><tr><td>X</td><td>Y</td><td>Z</td></tr><tr><td>≤3.0mm</td><td><Inner border line of the seal</td><td>≤T</td></tr></table>
	(2)LCD corner broken	<table><tr><td>X</td><td>Y</td><td>Z</td></tr><tr><td>≤3.0mm</td><td>≤L</td><td>≤T</td></tr></table>
	(3) LCD crack	Crack Not allowed

Number	Items	Criteria (mm)					

2.0 Spot defect

Φ=(X+Y)/2

① light dot（LCD/TP/Polarizer black/white spot , light dot, pinhole, dent, stain）

Zone / Size (mm)	Acceptable Qty		
	A	B	C
Φ≤0.10	Ignore		Ignore
0.10<Φ≤0.15	3(distance≧10mm)		
0.15<Φ≤0.2	1		
0.2<Φ	0		

②Dim spot（LCD/TP/Polarizer dim dot, light leakage、dark spot）

Zone / Size (mm)	Acceptable Qty		
	A	B	C
Φ≤0.1	Ignore		Ignore
0.1<Φ≤0.2	2(distance≧10mm)		
0.2<Φ≤0.3	1		
Φ＞0.3	0		

③ Polarizer accidented spot

Zone / Size (mm)	Acceptable Qty		
	A	B	C
Φ≤0.2	Ignore		Ignore
0.2<Φ≤0.5	2(distance≧10mm)		
Φ>0.5	0		

Line defect (LCD/TP/Polarizer black/white line, scratch, stain)

Width(mm)	Length(mm)	Acceptable Qty		
		A	B	C
Φ≤0.03	Ignore	Ignore		Ignore
0.03<W≤0.05	L≤3.0	N≤2		
0.05<W≤0.08	L≤2.0	N≤2		
0.08<W	Define as spot defect			

3.0	Polarizer Bubble	Size (mm) ╲ Zone	Acceptable Qty		
			A	B	C
		Φ≤0.2	Ignore		Ignore
		0.2<Φ≤0.4	2(distance≧10mm)		
		0.4<Φ≤0.6	1		
		0.6<Φ	0		

4.0	SMT	According to IPC-A-610C class Ⅱ standard . Function defect and missing part are major defect ,the others are minor defect.

5.0	TP Related	TP bubble/ accidented spot	Size Φ(mm)	Acceptable Qty		
				A	B	C
			Φ≤0.1	Ignore		Ignore
			0.1<Φ≤0.2	2		
			0.2<Φ≤0.3	1		
			0.3<Φ	0		
		Assembly deflection	beyond the edge of backlight ≤0.15mm			
		Newton Ring	Newton Ring area>1/3 TP area　NG Newton Ring area≤1/3 TP area　OK			

		TP corner broken X：length Y：width Z：height				

X	Y	Z
X≤3.0mm	Y≤3.0mm	Z<LCD thickness

* Circuitry broken is not allowed.

X	Y	Z
X≤6.0mm	Y≤2.0mm	Z<LCD thickness

TP edge broken
X：length
Y：width
Z：height

* Circuitry broken is not allowed.

Criteria (functional items)

Number	Items	Criteria (mm)
1	No display	Not allowed
2	Missing segment	Not allowed
3	Short	Not allowed
4	Backlight no lighting	Not allowed
5	TP no function	Not allowed

9.2 RELIABILITY TEST

NO	ITEM	CONDTTION	STANDARD
1	High Temp. Storage	70℃, 12 hours	1. Functional test is OK. Missing Segment, short, unclear segment, non-display, display abnormally and liquid crystal leak are un-allowed. 2. No low temperature bubbles, end seal loose and fall, frame rainbow.
2	Low Temp. Storage	-20℃, 12 hours	
3	High Temp. Operation	60℃, 12 hours	
4	Low Temp. Operation	-10℃, 12 hours	
5	High temperature and high Humidity storage	40℃,90%RH ,12 hours	
6	Thermal and cold shock	Static state， -20℃（30 Min）~70℃（30 Min）~ -20℃（30Min）， packaging， 10 cycles	
7	Vibration test	Packaging，Frequency : 10-55Hz Amplitude : 1.0mm， Each direction on X,Y axe 0.5 houre， circle 2 hours	1. Function test is OK. 2. No glass crack, chipped glass, end seal loose and fall, epoxy frame crack and so on. 3. No structure loose and fall.
8	Dropping test	Pack products into the carton box. Drop it from 80cm height to ground. Once for each side of the carton	

NOTE：

    9.2.1 The reliability items will be fully performed in new sample qualification,

    9.2.2 The reliability status will be tested as monitor during mass production. Individual reliability test shall be performed by lot , Moreover, the individual reliability item shall be decided according to reliability plan.

    9.2.3 All samples are inspected after keeping in the room with normal temperature and humidity for 2 hours or above.

9.2.4 Vibration test: It is not necessary to test for those products without assembly frame , back light ,PCB and so on.

9.2.5 Dropping test : It is necessary for affirming new package.

9.2.6 For the high temperature and high humidity test, pure water of over 10 MΩ.cm should be used.

9.2.7 Each test item applies for test LCM only once .Then tested LCM cannot be used again in any other test item.

9.2.8 The quantity of LCM examination for each test item is 5pcs to 10pcs.

9.3 Safetv instructions

10.3.1 If the LCD panel breaks, be careful not to get any liquid crystal substance in your mouth.

9.3.2 If the liquid crystal substance touches your skin or clothes, please wash it off immediately by using soap and water.

9.4 Handling Precautions

9.4.1 Avoid static electricity damaging the LSI.

9.4.2 Do not remove the panel or frame from the module .

9.4.3 The polarizing plate of the display is very fragile . So, please handle it very carefully.

9.4.4 Do not wipe the polarizing plate with a dry cloth, as it may easily scratch the surface of the plate.

9.4.5 The color tone of display and background of LCM has the possibility to be changed in the storage temperature range.

9.4.6 Pay attention to the working environment, as the element may be destroyed by static electricity.

--Be sure to ground human body and electric appliance during work.

--Avoid working in a dry environment to minimize the generations of static electricity.

--Static electricity may be generated when the protective film is fast peeled off.

9.4.7 When soldering the terminal of LCM, make certain the AC power source of soldering iron does not leak.

9.4.8 If the display surface becomes contaminated ,breathe on the surface and gently wipe it with a soft-dry- clean cloth .If it is heavily contaminated ,moisten cloth with the following solvent(ex:Ethyl alcohol).Solvents other than those above-mentioned may damage the polarizer(Especially ,do not use them .ex: Warter / Ketone)

9.5 Operation instructions

9.5.1 It is recommended to drive the LCD within the specified voltage limits, try to adjust the operating voltage for the optimal contrast, the color and contrast of LCD panel will varies at different temperature.

9.5.2 Response time is greatly delayed at low operating temperature range. However, this does not mean the LCD will be out of the order, It will recover when it returns to the specified temperature range.

9.5.3 If the display area is pushed hard during operation, the display will become abnormal.

9.5.4 Do not operate the LCD at the environments over the specified conditions, this may cause damage on the LCD and shorten the lifetime.

9.6 Storage instructions:

9.6.1 Store LCDs in a sealed polyethylene bag.

9.6.2 Store LCDs in a dark place, Do not expose to sunlight or fluorescent light. Keep the temperature between 0℃ and 35℃.

9.6.3 Avoid the polarizer touch any other object, (It is recommended to store them in the container in which they were shipped.)

9.7 Limited Warranty

9.7.1 will replace or repair any of its LCD modules, which are found to be defective, when inspected in accordance with LCM acceptance standards (copies available upon request) for a period of 12 months from ink- print date on product

9.7.2 Any defects must be returned to within 60 days since ship-out. Confirmation of such date shall be based on freight documents. The warranty liability of wasam limited to repair and/or replacement on defects above (7.1,7.2)

9.7.3 No warranty can be granted if the precautions stated above have been disregarded. The typical samples are as below:

-- LCD glass crack/break

--PCB outlet is damaged or modified.

--PCB conductors damaged.

--Circuit modified with by grinding, engraving or painting varnish.

--FPC crack

9.7.4 Modules must be returned with sufficient description of the failures of defects. Any connectors or cable

installed by the customer must be removed completely without damaging the PCB outlet, conductors and

terminals. Modules must be packed with the container in which they were shipped.

10.   Packing method

------TBD