Specification for Approval

Customer:_____

Model Name:_____

Supplier Approval			Customer approval
R&D Designed	R&D Approved	QC Approved	
Peter	Peng Jun		

Revision Record

REV NO.	REV DATE	CONTENTS	Note
A	2013-02-27	NEW ISSUE	

CONTENTS:

1. BASIC SPECIFICATION

1.1 Mechanical specifications

Items	Nominal Dimension	Unit
Active screen size	5.7” diagonal	-
Dot Matrix	320 x RGB x 240	Pixel
Module Size (W x H x T)	144.0 x 104.6 x 15.2	mm.
Active Area (W x H)	115.2 x 86.4	mm.
Dot Pitch (W x H)	0.36 x 0.36	mm.
Color depth	262K	color
Interface	Parallel 18-bit RGB	-
Driving IC Package	COG	-
Module weight	243±10%	g

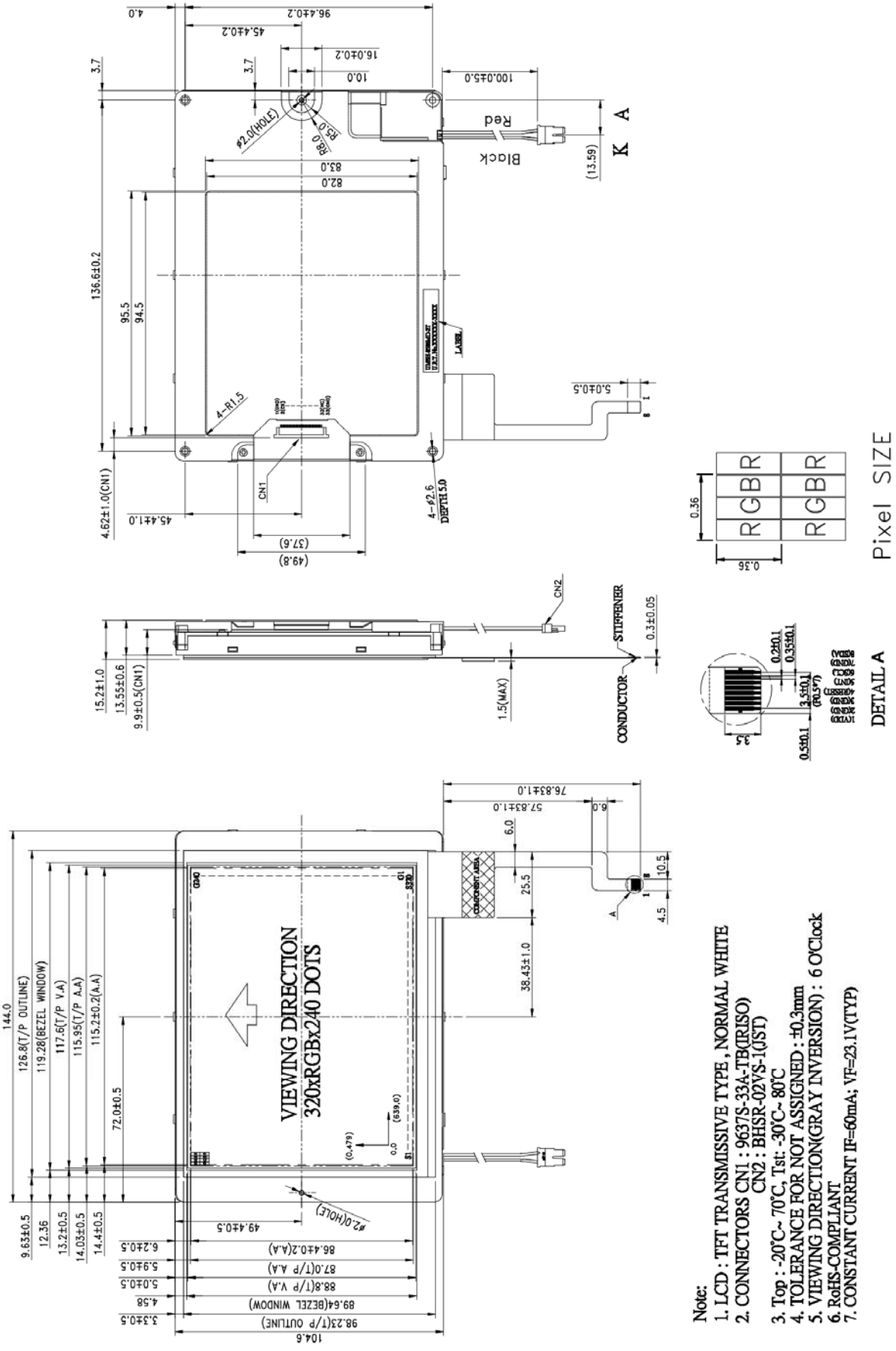
1.2 Display specification

Display	Descriptions	Note
LCD Type	a-Si TFT	-
LCD Mode	TN / Normal white	-
Polarizer Mode	Transmissive	-
Polarizer Surface	Normal	-
Pixel arrangement	RGB-stripe	-
Backlight Type	LED	-
Viewing Direction(Gray inversion)	6 O'clock Direction	1

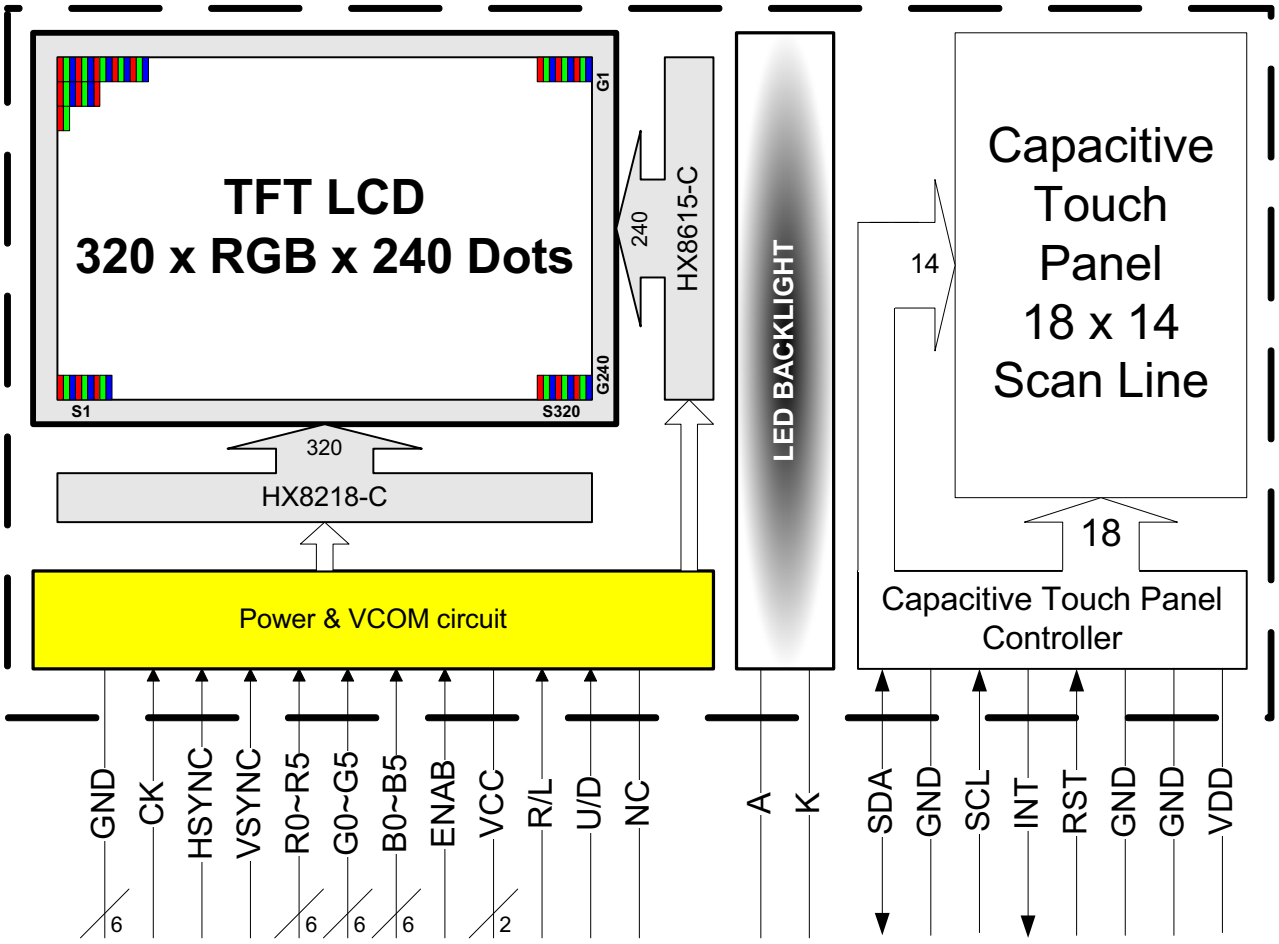
* Color tone is slightly changed by temperature and driving voltage.

Note 1：The viewing direction defined in this specification is according to the rubbing direction of its TFT surface treatment by the TFT glass manufacturer. The grayscale inversion is at this direction as well. However, the optimal viewing direction for human view is normally where the color does NOT change to grayscale inversion, and this would be the opposite site of the specified viewing direction in this specification. In any case we advise customers to judge by themselves, and be aware of this phenomenon.

1.3 Outline dimension



1.4 Block diagram:



1.5 Interface pin :

Pin No.	Pin Symbol	I/O	Description
1	GND	P	Ground. (0V)
2	CK	I	Clock signal for sampling each data signal.
3	Hsync	I	Horizontal synchronous signal (Negative)
4	Vsync	I	Vertical synchronous signal (Negative)
5	GND	P	Ground. (0V)
6-11	R0-R5	I	RED data signal.
12	GND	P	Ground. (0V)
13-18	G0-G5	I	GREEN data signal.
19	GND	I	Ground. (0V)
20-25	B0-B5	I	BLUE data signal.
26	GND	I	Ground. (0V)
27	ENAB	I	Signal to settle the horizontal display position (Positive).
28,29	VCC	P	+3.3V power supply.
30	R/L	I	Horizontal display mode select signal L: Normal, H: Left / Right reverse mode.
31	U/D	I	Vertical display mode select signal H: Normal, L: Up / Down reverse mode.
*32	NC	-	No connect.
33	GND	P	Ground. (0V)

*This pin doesn't support the V/Q mode as the NO.32 pin of SHARP spec.

1	A	P	Power supply input pin for backlight.
2	K	P	Ground pin for backlight.

Touch Panel interface Pin:

1	VDD	P	Power supply. (+3.3V)
2~3	GND	P	Ground.
4	RST	I	System reset signal input, active low. Note (1)
5	INT	O	Active low when data output from touch panel.
6	SCL	I	Serial clock.
7	GND	P	Ground.
8	SDA	I/O	Serial data access.

Note (1) : Reset pin is low active and needs hold low for 1ms to take effect.

2. ELECTRICAL CHARACTERISTICS

2.1 Absolute Maximum Ratings

Items	Symbol	Min.	Max.	Unit
Power supply voltage	VCC	-0.3	7.0	V
Input voltage	Vin	-0.3	VCC+0.3	V
Operate temperature range	TOP	-20	70	℃
Storage temperature range	TST	-30	80	℃

2.2 DC Characteristics

T_a= 25℃

Items	Symbol	Min.	Typ.	Max.	Unit	Condition
Supply voltage	V_{CC}	3.0	3.3	3.6	V	-
	V_{DD}	-	3.3	-	V	
Input Voltage	V_{IL}	0	-	0.3V_{CC}	V	L level
	V_{IH}	0.7V_{CC}	-	V_{CC}	V	H level
Current consumption	I_{CC}	-	-	80	mA	Note 1
	I_{DD}	-	-	8	mA	Note 1

*Note1 :

Measuring Condition:

Standard Value MAX.

Ta = 25℃

VCC -GND = 3.3V

Display Pattern

0 gray black pattern

2.2.1 Back-light Characteristics

PARAMETER	SYMBOL	MIN	TYP	MAX	Unit	Test Condition	NOTE
Supply Current	If	-	-	60	mA	Ta=25℃	-
Supply Voltage	Vf	-	23.1	-	V	Ta=25℃	-
Half-Life Time	Lf	-	50000	-	hrs	Ta=25℃	1

Note 1：The " Half-Life Time "is defined as the module brightness decrease to 50% original brightness. Base on Ta 25±2℃ , 60±10% RH condition.

2.3 AC Characteristics

Digital Parallel RGB interface

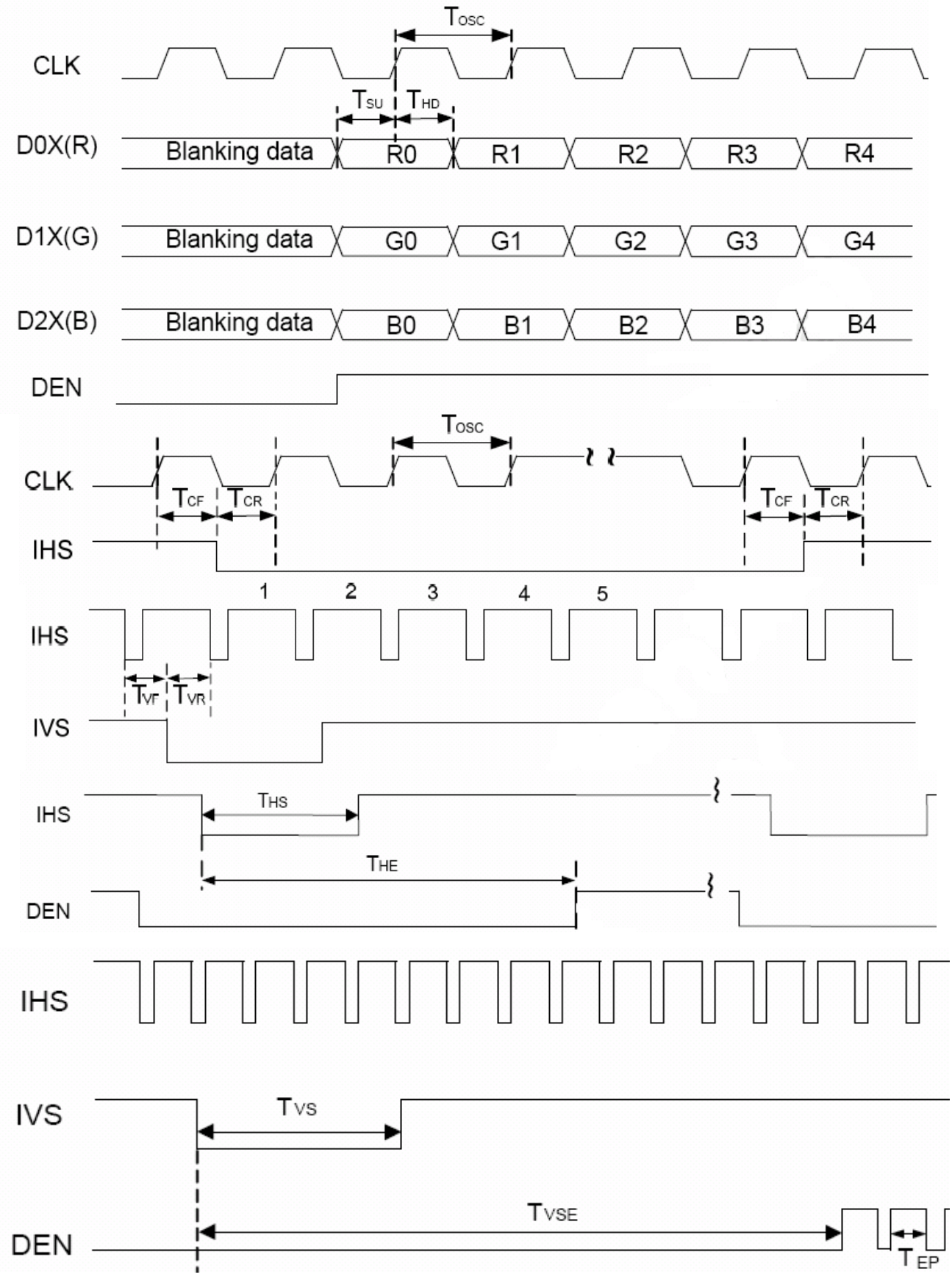
PARAMETER		Symbol	Spec.			Unit
			Min.	Typ.	Max.	
CLK period		T_{OSC}	-	156	-	ns
Data setup time		T_{SU}	12	-	-	ns
Data hold time		T_{HD}	12	-	-	ns
IHS period		T_H	-	408	-	T_{OSC}
IHS pulse width		T_{HS}	5	30	-	T_{OSC}
IHS setup time		T_{Cr}	12	-	-	ns
IHS hold time		T_{Cf}	12	-	-	ns
IVS pulse width		T_{VS}	1	3	5	T_H
IVS setup time		T_{Vr}	12	-	-	ns
IVS hold time		T_{Vf}	12	-	-	ns
IVS-DEN time	NTSC	T_{VSE}	-	18	-	T_H
	PAL	T_{VSE}	-	26	-	T_H
IHS-DEN time		T_{HE}	36	68	88	T_{OSC}
DEN pulse width		T_{EP}	-	320	-	T_{OSC}
IVS period	NTSC	-	-	262.5	-	T_H
	PAL	-	-	312.5	-	T_H

Note: When SYNC mode is used, 1st data start from 68th CLK after IHS falling.

Note：CLK = CK、IHS = Hsync、IVS = Vsync、DEN = ENAB

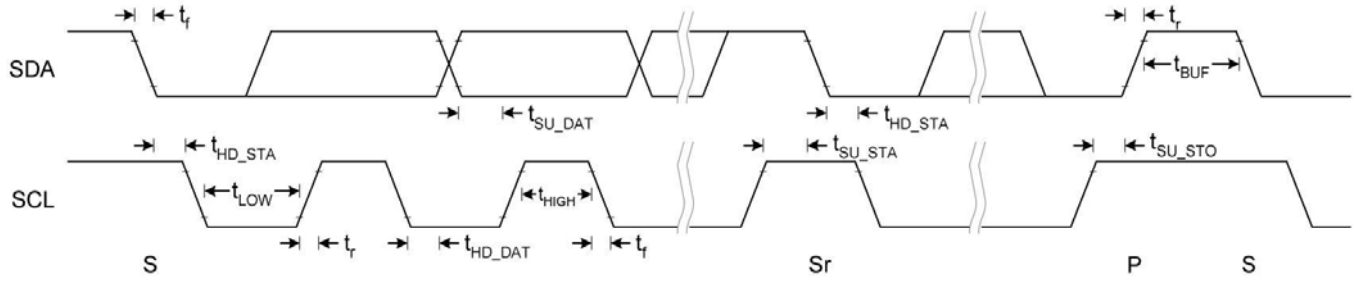
2.4 Interface Timing Chart

- Digital Parallel RGB



2.4.1 Capacitive touch panel controller Timing Specifications: (ST1232)

AC Electrical Characteristics



I2C Fast Mode Timing

I2C Fast Mode Timing Characteristic

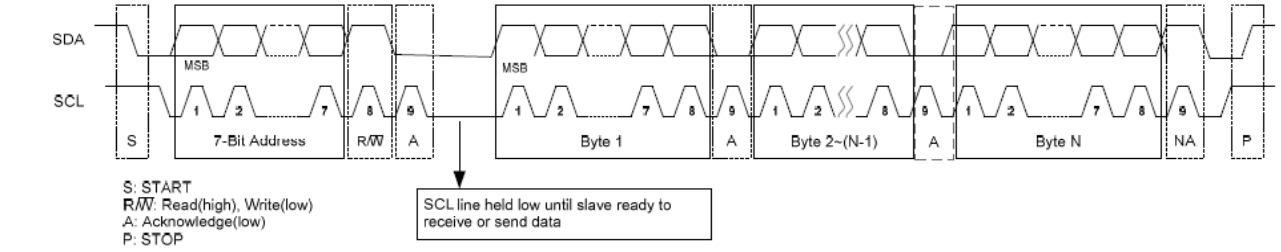
Conditions: VDD = IOVDD = 3.3V, GND = 0V, T_A = 25°C

Symbol	Parameter	Rating			Unit
		Min.	Typ.	Max.	
f_{SCL}	SCL clock frequency	0	-	400	kHz
t_{LOW}	Low period of the SCL clock	1.3	-	-	us
t_{HIGH}	High period of the SCL clock	0.6	-	-	us
t_f	Signal falling time	-	-	300	ns
t_r	Signal rising time	-	-	300	ns
t_{SU_STA}	Set up time for a repeated START condition	0.6	-	-	us
t_{HD_STA}	Hold time (repeated) START condition. After this period, the first clock pulse is generated	0.6	-	-	us
t_{SU_DAT}	Data set up time	100	-	-	ns
t_{HD_DAT}	Data hold time	0	-	0.9	us
t_{SU_STO}	Set up time for STOP condition	0.6	-	-	us
t_{BUF}	Bus free time between a STOP and START condition	1.3	-	-	us
C_b	Capacitive load for each bus line	-	-	400	pF

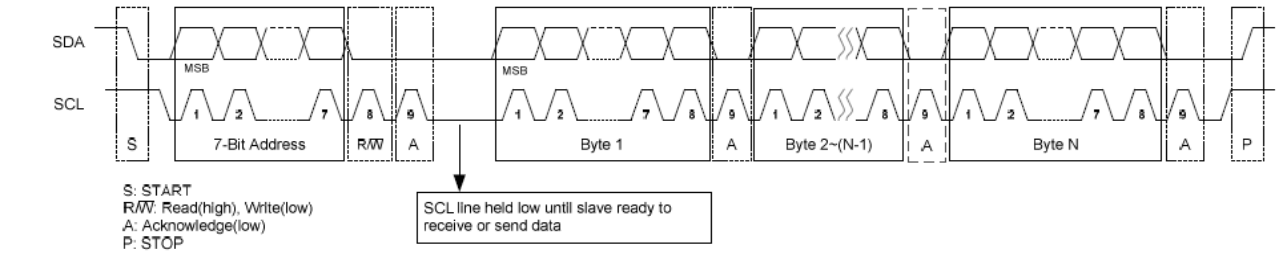
2.5 I2C Host Interface Protocol:

I2C Slave Interface

Read



Write



2.6 Capacitive touch panel controller I2C host interface protocol:

2.6.1 Register Read

For reading register value from I2C device, host has to tell I2C device the *Start Register Address* before reading corresponding register value.

I2C Start	I2C Header (W)	Start Reg. Addr. (a)	I2C Stop	I2C Start	I2C Header (R)	Value of Reg(a)	Value of Reg(a+1)	…	Value of Reg(a+n)	I2C Stop

ST1232/ST1332 I2C host interface protocol supports *Repeated Register Read*. That is, once the *Start Register Address* has been set by host, consequent I2C Read(R) transactions will directly read register values starting from the *Start Register Address* without setting address first, as shown in Figure 2.

I2C Start	I2C Header (R)	Value of Reg(a)	Value of Reg(a+1)	…	Value of Reg(a+n)	I2C Stop	I2C Start	I2C Header (R)	Value of Reg(a)	Value of Reg(a+1)	…	Value of Reg(a+n)	I2C Stop

Header Value : 0xab

2.6.2 Register Write

For writing register to I2C device, host has to tell I2C device the Start Register Address in each I2C Register Write transaction. Register values to the I2C device will be written to the address starting from the Start Register Address described in Register Write I2C transaction as shown in Figure 3.

I2C Start	I2C Header (W)	Start Reg. Addr. (a)	Value to Reg(a)	Value to Reg(a+1)	…	Value to Reg(a+n)	I2C Stop

Header Value : 0xaa

2.7 Capacitive touch panel controller Report page registers:

ST1232 provides a register set for host to configure device attributes and retrieve information about fingers , gestures , XY Coordinates through device host interface. Host interface registers are listed below.

Host Interface Registers (Report Page)									
Reg Addr.	Name	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
0x00	----	Reserved							
0x01	----								
0x02	Device Control Reg	Reserved				Reserved	Reserved	Power Down (R/W)	Reset (R/W)
0x03	Timeout to Idle Register	Timeout to Idle (Sec) (R/W)							
0x04 ~ 0x0F	------	Reserved							
0x10	Fingers/Gesrure	Gesture Code(RO)					Fingers(RO)		
0x11	------	Reserved							
0x12	XY0 Coord (High Byte)	Valid 0 (RO)	X0_H(RO)			Reserved	Y0_H (RO)		
0x13	X0 Coord (Low Byte)	X0_L(RO)							
0x14	Y0 Coord (Low Byte)	Y0_L(RO)							
0x15	XY1 Coord (High Byte)	Valid 1 (RO)	X1_H(RO)			Reserved	Y1_H (RO)		
0x16	X1 Coord (Low Byte)	X1_L(RO)							
0x17	Y1 Coord (Low Byte)	Y1_L(RO)							

2.8 Device Control Register:

Reg Addr.	Name	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0x02	Device Control Reg	Reserved				Reserved	Reserved	Power Down (R/W)	Reset (R/W)

Device Control Register provides device control bits for host to reset the device , power down the device.

2.9 Timeout to Idle Register:

Reg Addr.	Name	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0x03	Timeout to Idle Register	Timeout to Idle (Sec) (R/W)							

Timeout to Idle Register provides timeout control to entering Idle Mode for host.

The touch controller will enter Idle Mode after the number of seconds specified in Timeout to Idle Register if there is no touch detected in this period.

Set the field to 0xFF will disable Idle Mode. Set the field to 0 will entering Idle Mode immediately.

The default value of Timeout to Idle Register is set to 0x08 for 8 seconds to Idle Mode.

2.10 Fingers and Gesture Register:

Reg Addr.	Name	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0x10	Fingers/Gesture	Gesture Code(RO)					Fingers(RO)		

Fingers field represents number of fingers detected by touch controller.

The coordinates of each finger detected are represents in X Coordinate and Y Coordinate fields.

Gesture Register tells host which gesture is detected by the controller .Gesture Code for each gesture are listed below.

Gesture Code	
0x00	No Detected
0x01	Single Touch Tap
0x02	Single Touch Double Tap
0x03	Single Touch Slide Up
0x04	Single Touch Slide Down
0x05	Single Touch Slide Left
0x06	Single Touch Slide Right
0x0B	Pitch In (Zoom In)
0X0C	Pitch Out (Zoom Out)

2.11 XY Coordinate Registers:

Reg Addr.	Name	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0x12	XY0 Coord (High Byte)	Valid 0 (RO)	X0_H(RO)			Reserved	Y0_H (RO)		
0x13	X0 Coord (Low Byte)	X0_L(RO)							
0x14	Y0 Coord (Low Byte)	Y0_L(RO)							
0x15	XY1 Coord (High Byte)	Valid 1 (RO)	X1_H(RO)			Reserved	Y1_H (RO)		
0x16	X01Coord (Low Byte)	X1_L(RO)							
0x17	Y01Coord (Low Byte)	Y1_L(RO)							

XY Coordinate Registers represent the XY coordinates for each touch point ID.

Valid bit field tells that this point ID is valid and the XY information represents a real touch point on touch sensor.

2.12 Touch Panel Specifications

Display	Descriptions	Note
Type	Capacitive Touch Panel	-
Structure	ITO Glass：T=0.7mm	-
	ITO Glass：T=0.7mm	-
Surface Hardness	≧ 3H	3H pencil, pressure 500g/45° (JIS-K5600)
Input mode	Finger	-
Connector Type	FPC	-
Resolution	320 x 240	1024*1024 (Max)

2.12.1 Electric Characteristics

Items	Descriptions	Note
FPC Strength (Vertical)	Strength ≧600g/cm	-
FPC Bending	Min. 10 times for each side	Normal performance after bending 90° test, no damage on FPC.

2.12.2 Optical Characteristics

Items	Descriptions	Note
Transmittance	Typ： 85%	-

3. OPTICAL CHARACTERISTICS

3.1 Characteristics

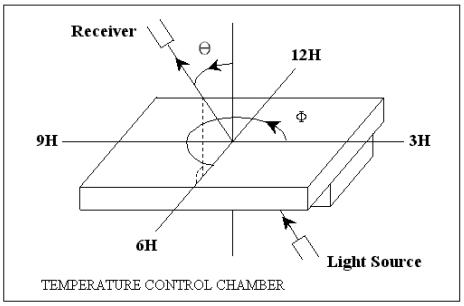
Electrical and Optical Characteristics

No.	Item		symbol	temp.	Min.	Typ.	Max.	Unit	Note
1	Response Time		Tr	25 ℃	-	15	30	ms	2
			Tf	25 ℃	-	35	50		
2	Viewing Angle	Hor.	Θ_{2+}	0°	60	75	-	degree	3
			Θ_{2-}	180°	60	75	-		
		Ver.	Θ_{1+}	270°	45	50	-		
			Θ_{1-}	90°	60	75	-		
3	Contrast Ratio		Cr	25 ℃	500	700	-	-	4
4	Red x-code		Rx	25 ℃	0.57	0.62	0.67	-	5
	Red y-code		Ry		0.31	0.36	0.41		
	Green x-code		Gx		0.30	0.35	0.40		
	Green y-code		Gy		0.54	0.59	0.64		
	Blue x-code		Bx		0.09	0.14	0.19		
	Blue y-code		By		0.04	0.09	0.14		
	White x-code		Wx		0.27	0.32	0.37		
	White y-code		Wy		0.29	0.34	0.39		
	Brightness		Y		300	360	-	cd/m^2	
5	Brightness Uniformity			25 ℃	80	-	-	%	6

3.2 Definition of optical characteristics

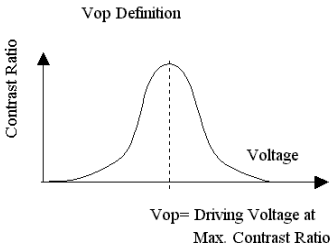
Measurement condition :

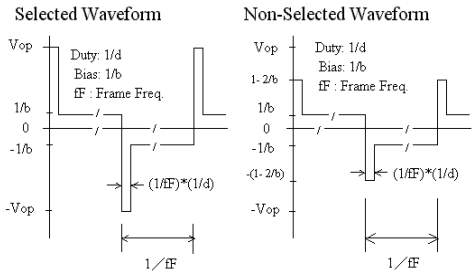
Transmissive and Transflective type



PHOTAL LCD-5000

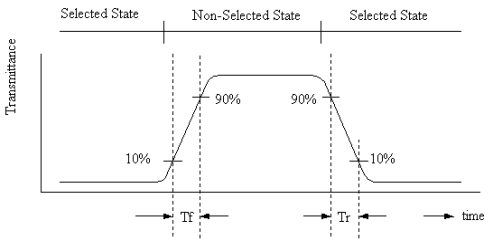
[Note 1] Definition of LCD Driving Vop and Waveform :



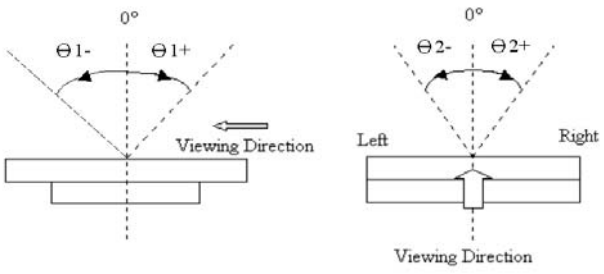


[Note 2] Definition of Response Time

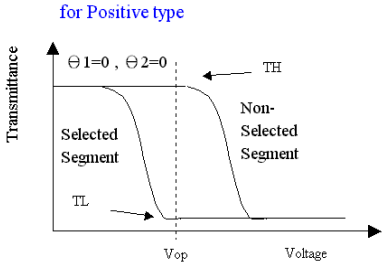
for Positive type :



[Note 3] Definition of Viewing Angle :

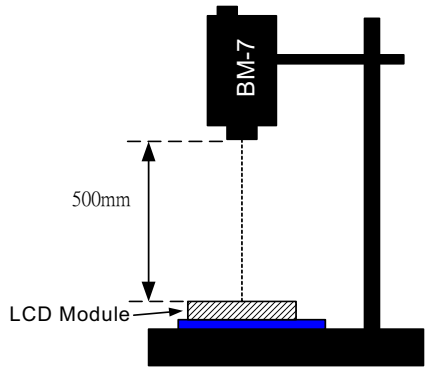


[Note 4] Definition of Contrast Ratio :

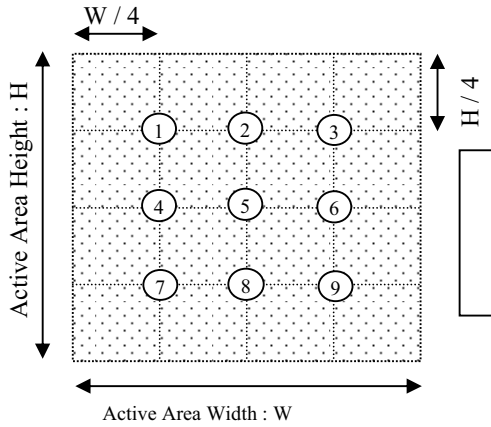


$$\text{Contrast Ratio} = \frac{TH}{TL}$$

[Note 5] Definition of measurement of Color Chromaticity and Brightness

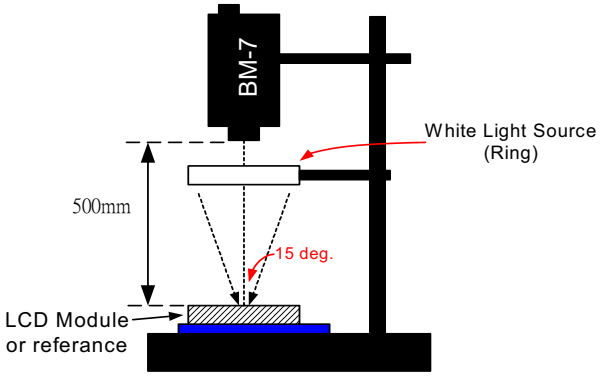


[Note 6] Definition of Brightness Uniformity



$$\text{Brightness Uniformity} = \frac{\text{Minimum Brightness of Point 1~9}}{\text{Maximum Brightness of Point 1~9}}$$

[Note 7] Definition of Measurement of Reflectance



4. RELIABILITY :

Item No	Items	Condition	Note
1	High temperature operating	70 ℃ , 200 hours	1
2	Low temperature operating	-20 ℃ , 200 hours	1
3	High temperature storage	80 ℃ , 200 hours	1
4	Low temperature storage	-30 ℃ , 200 hours	1
5	High temperature & humidity storage	60℃, 90%RH, 100 hours	2
6	Thermal Shock storage	-30℃, 30min.<=> 80℃, 30min. 10 Cycles	1
7	Vibration test	10 => 55 =>10 => 55 => 10 Hz , within 1 minute Amplitude : 1.5mm. 15 minutes for each Direction (X,Y,Z)	
8	Drop test	Packed, 100CM free fall, 6 sides, 1 corner, 3edges	
9	Life time	50,000 hours 25℃ , 60%RH , specification condition driving	

Note 1：The product move into the room temperature for at least 2 hours with no condensation.

Note 2：The product move into the room temperature for at least 24 hours with no condensation.

* One single product test for only one item.

* Judgment after test : keep in room temperature for more than 2 hours.

- Current consumption < 2 times of initial value
- Contrast > 1/2 initial value
- Function : work normally

5. PRODUCT HANDLING AND APPLICATION

☐ PRECAUTION FOR HANDLING LCM

- The LCD module contains a C-MOS LSI. People who operate the LCM should wear ESD protection eguipement to prevent ESD hurt on products.
- Do not input any signal before power is turned on.
- Do not take LCM from its packaging bag until it is assembled.
- Peel off the LCM protective film slowly since static electricity may be generated.
- Pay attention to the humidity of the work shop, 50~60%RH is satisfactory.
- Use a non-leak iron for soldering LCM.
- Do not touch the display surface or connection terminals area with bare hands.Smudges on the display surface reduce the insulation between terminals.
- Cautions for soldering to LCM:

  Condition for soldering I/O terminals:
  Temperature at iron tip :350℃±15℃.
  Soldering time : 3~4sec./ terminals.
  Type of solder : Eutectic solder(rosin flux filled).

☐ PRECAUTION IN USE OF LCM

- Do not contact or scratch the front surface and the contact pads of a LCM with hard materials such as metal or glass or with one's nail.
- To clean the surface , wipe it gently with soft cloth dampened by alcohol.
- Do not attempt to wiped off the contact pads.
- Keep LCM away from direct sunlight , also avoid them in high-temperature & high humidity environment for a long period.
- Do not drive LCM by DC voltage.
- Do not expose LCM to organic solvent.
- Liquid in LCM is hazardous substance. In case a contact with liquid crystal material is occured, be sure to immediately wash such material away by soap and water.
- The polarizer is easily damaged and should be handle with special care. Don't press or rub it with hard objects.

☐ PRECAUTION FOR STORING AND USE OF LCM

- To avoid degradation of the device , do not store the module under the conditions of direct sunlight , high temperature or high humidity . Keep the module in bags designed to prevent static electricity charging under low temperature / normal humidity conditions(avoid high temperature / high humidity and low temperature below 0℃)
- Never use the LCD , LCM under 45 Hz , the liquid crystal will decomposition and cause permently damage on display !!

☐ USING ON MEDICAL CARE , SAFETY OR HAZARDOUS APPLICATION OR SYSTEM

- For the application in medical care, safety and hazardous prodcuts or systems, an authorization from AMSON is required. AMSON will not responsible for any damage or loss which caused by the products without any authorization given by AMSON.
- This product is not allowed to be designed and used for military application and/or purpose.
- The delivery of this product to the countries and/or regions where the embargoes are imposed by U.N. is prohibited.
- The application and delivery of this product must comply with Startegic High-Tech Commodities (SHTC) export control and the sales to the embargoed and/or sanctioned countries or regions are strictly prohibited.

6. DATE CODE OF PRODUCTS

- Date code will be shown on each product :

- **YY MM DD - XXXX**

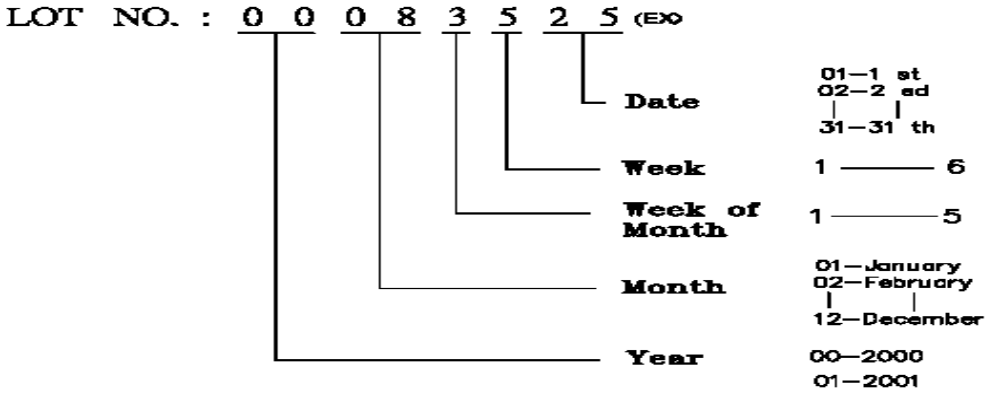
  Year Month Day - Production lots

- Example: 121108 - 0003 ==> Year 2012, November,8th , Batch no.0003

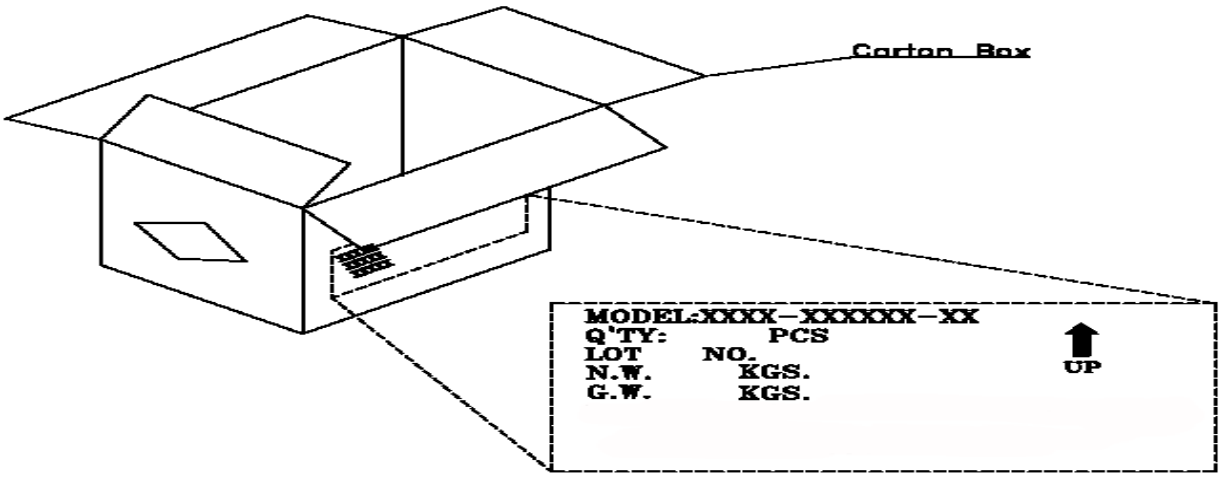
Note ： The lot no. attached on the packing box will be used for tracking once the part is too small to print the date code.

7. PACKING

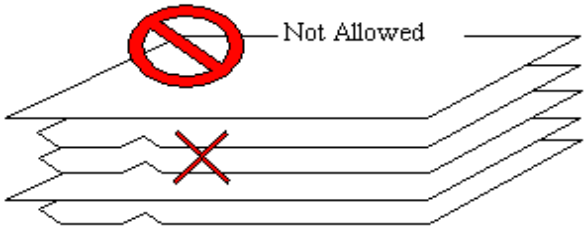
Instruction of lot number:

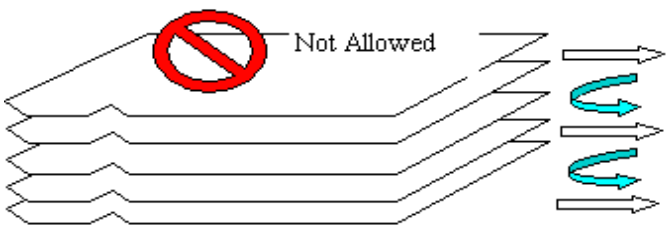


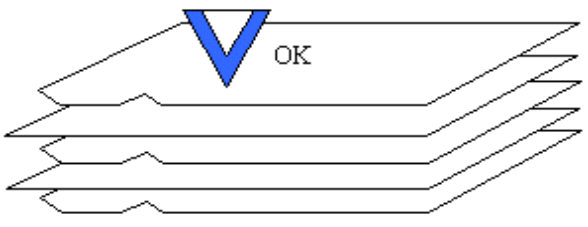
Lable of carton:



Packing tray must be stacked with alternated direction to each others.
To tacks packing trays in same direction will cause product damaged.







MODEL NO: UM*

T.B.D. pcs / Tray

T.B.D. Tray / Box

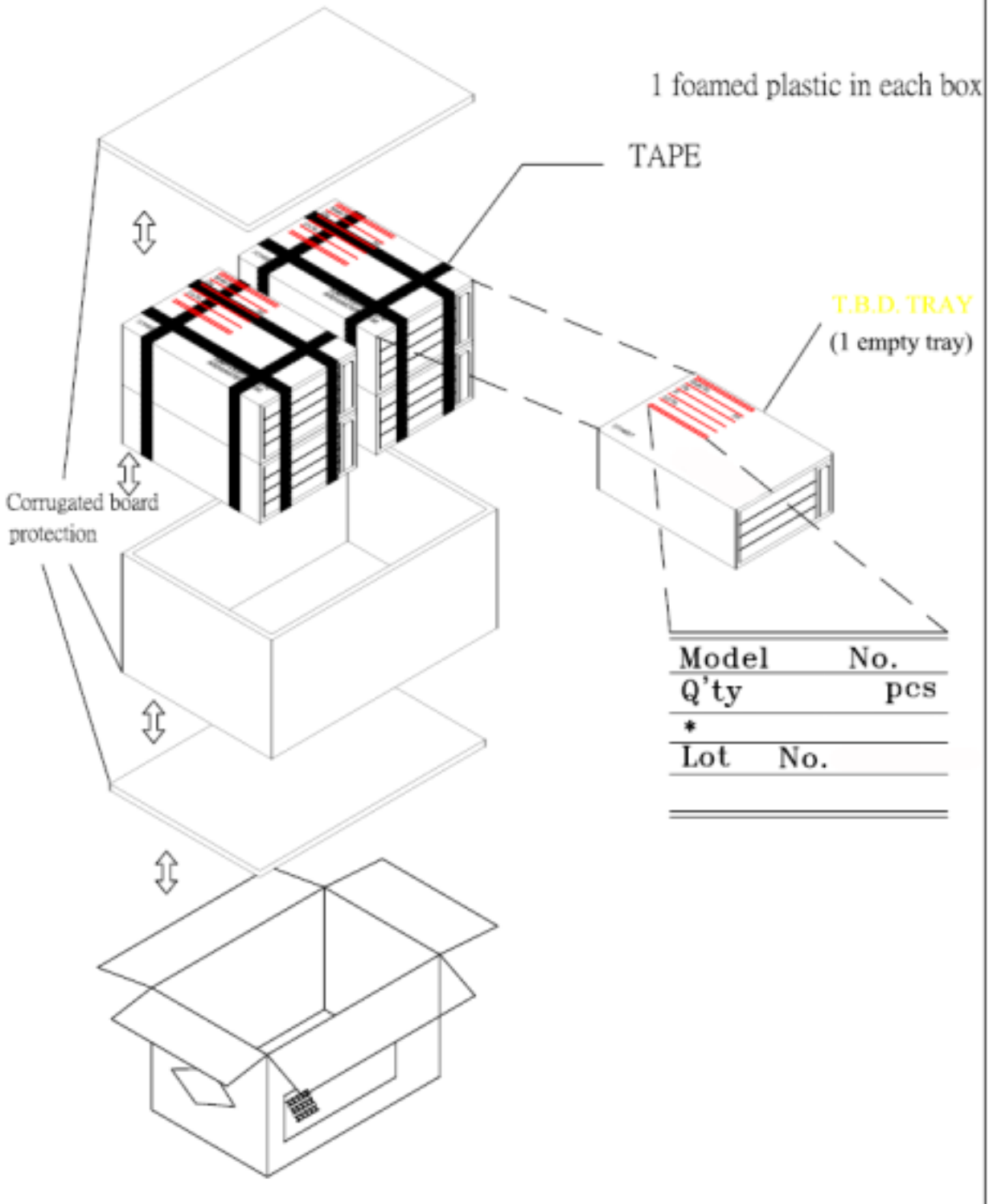
T.B.D. Box / Carton

T.B.D. pcs / Carton

NOTE:

(1)Be warned ,the direction of the tray has to turn it by 180 degree before stack it up.Otherwise, it will be packager's responsibility!!

(2)Safe Stack : 5 cartons only



8. INSPECTION STANDARD

8.1. QUALITY :

THE QUALITY OF GOODS SUPPLIED TO PURCHASER SHALL COME UP TO THE FOLLOWING STANDARD.

8.1.1. THE METHOD OF PRESERVING GOODS

AFTER DELIVERY OF GOODS FROM AMSON TO PURCHASER. PURCHASER SHALL CONTROL THE LCM AT -10 ℃ TO 40 ℃ ,AND IT MIGHT BE DESIRABLE TO KEEP AT THE NORMAL ROOM TEMPERATURE AND HUMIDITY UNTIL INCOMING INSPECTION OR THROWING INTO PROCESS LINE.

8.1.2. INCOMING INSPECTION

(A) THE METHOD OF INSPECTION

IF PURCHASER MAKE AN INCOMING INSPECTION , A SAMPLING PLAN SHALL BE APPLIED ON THE CONDITION THAT QUALITY OF ONE DELIVERY SHALL BE REGARDED AS ONE LOT.

(B) THE STANDARD OF QUALITY

ISO-2859-1 (or MIL-STD-105E) , LEVEL Ⅱ SINGLE PLAN.

CLASS	AQL(%)
CRITICAL	0.4 %
MAJOR	0.65 %
MINOR	1.5 %
TOTAL	1.5 %

EVERY ITEM SHALL BE INSPECTED ACCORDING TO THE CLASS.

(C) MEASURE

IF AS THE RESULT OF ABOVE RECEIVING INSPECTION , A LOT OUT IS DISCOVERED. PURCHASER SHALL BE INFORM SELLER OF IT WITHIN SEVEN DAYS. BUT FIRST SHIPMENT WITHIN FOURTEEN DAYS.

8.1.3. WARRANTY POLICY

AMSON WILL PROVIDE ONE-YEAR WARRANTY FOR THE PRODUCTS ONLY IF UNDER SPECIFICATION OPERATING CONDITIONS. AMSON WILL REPLACE NEW PRODUCTS FOR THESE DEFECT PRODUCTS WHICH UNDER WARRANTY PERIOD AND BELONG TO THE RESPONSIBILITY OF AMSON.

8.2. CHECKING CONDITION

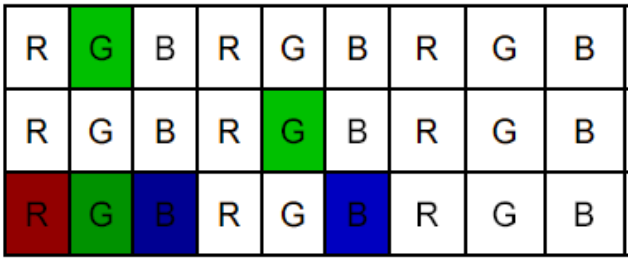
8.2.1. CHECKING DIRECTION SHALL BE IN THE 45 DEGREE AREA TO FACE THE SAMPLE.

8.2.2. CHECKER SHALL SEE OVER 300±25 mm. WITH BARE EYES FAR FROM SAMPLE AND USING 2 PCS. OF 20W FLUORESCENT LAMP.

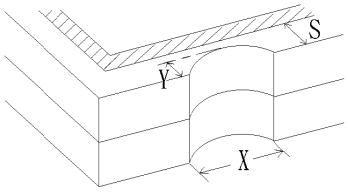
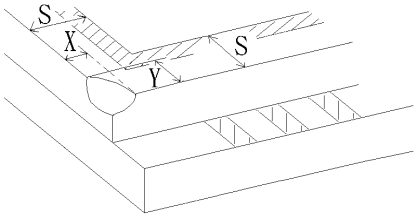
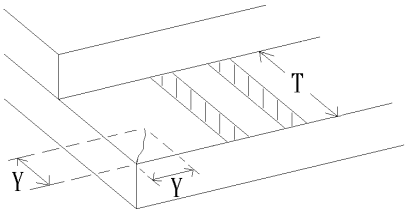
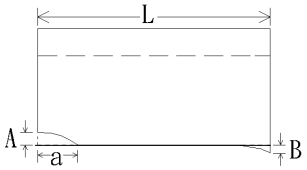
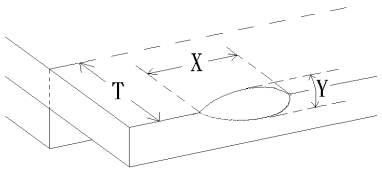
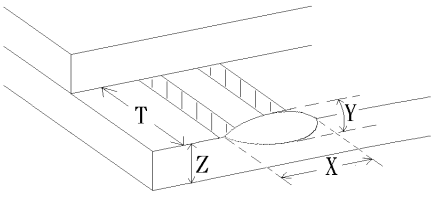
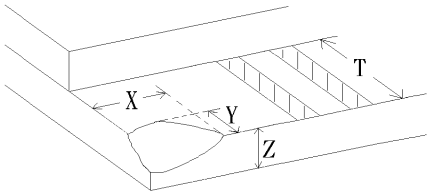
8.3. INSPECTION PLAN :

CLASS	ITEM	JUDGEMENT	CLASS
PACKING & INDICATE	1. OUTSIDE AND INSIDE PACKAGE	"MODEL NO." , "LOT NO." AND "QUANTITY" SHOULD INDICATE ON THE PACKAGE.	Minor
	2. MODEL MIXED AND QUANTITY	OTHER MODEL MIXED.....REJECTED QUANTITY SHORT OR OVER.....REJECTED	Critical
	3. PRODUCT INDICATION	"MODEL NO." SHOULD INDICATE ON THE PRODUCT	Major
ASSEMBLY	4. DIMENSION, LCD GLASS SCRATCH AND SCRIBE DEFECT.	ACCORDING TO SPECIFICATION OR DRAWING.	Major
APPEARANCE	5. VIEWING AREA	POLARIZER EDGE OR LCD'S SEALING LINE IS VISABLE IN THE VIEWING AREA ……..REJECTED	Minor
	6. BLEMISH、BLACK SPOT、 WHITE SPOT IN THE LCD AND LCD GLASS CRACKS	ACCORDING TO STANDARD OF VISUAL INSPECTION (INSIDE VIEWING AREA)	Minor
	7. BLEMISH、BLACK SPOT WHITE SPOT AND SCRATCH ON THE POLARIZER	ACCORDING TO STANDARD OF VISUAL INSPECTION (INSIDE VIEWING AREA)	Minor
	8. BUBBLE IN POLARIZER	ACCORDING TO STANDARD OF VISUAL INSPECTION (INSIDE VIEWING AREA)	Minor
	9. LCD'S RAINBOW COLOR	STRONG DEVIATION COLOR (OR NEWTON RING) OF LCD.....REJECTED. OR ACCORDING TO LIMITED SAMPLE (IF NEEDED, AND INSIDE VIEWING AREA)	Minor
ELECTRICAL	10. ELECTRICAL AND OPTICAL CHARACTERISTICS (CONTRAST、VOP、 CHROMATICITY … ETC)	ACCORDING TO SPECIFICATION OR DRAWING . (INSIDE VIEWING AREA)	Critical
	11.MISSING LINE	MISSING DOT、LINE、CHARACTER ....REJECTED	Critical
	12.SHORT CIRCUIT、 WRONG PATTERN DISPLAY	NO DISPLAY、WRONG PATTERN DISPLAY、CURRENT CONSUMPTION OUT OF SPECIFICATION..... REJECTED	Critical
	13. DOT DEFECT (FOR COLOR AND TFT)	ACCORDING TO STANDARD OF VISUAL INSPECTION	Minor

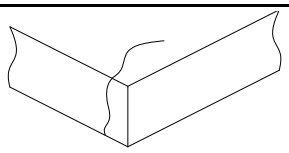
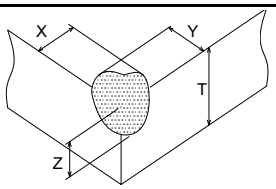
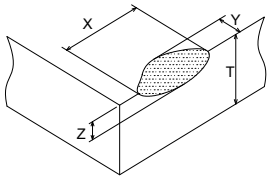
8.4. STANDARD OF VISUAL INSPECTION

<table>
<tr><th>NO.</th><th>CLASS</th><th>ITEM</th><th>JUDGEMENT</th></tr>
<tr><td>8.4.1</td><td>MINOR</td><td>BLACK AND WHITE SPOT
FOREIGN MATERIEL
DUST IN THE CELL
BLEMISH
SCRATCH</td><td>(A) ROUND TYPE: unit : mm.
<table>
<tr><th>DIAMETER (mm.)</th><th>ACCEPTABLE Q'TY</th></tr>
<tr><td>Φ ≦ 0.1</td><td>DISREGARD</td></tr>
<tr><td>0.1 < Φ ≦ 0.25</td><td>3 (D>5mm)</td></tr>
<tr><td>0.25 < Φ</td><td>0</td></tr>
</table>
NOTE: Φ=(LENGTH+WIDTH)/2
(B) LINEAR TYPE: unit : mm.
<table>
<tr><th>LENGTH</th><th>WIDTH</th><th>ACCEPTABLE Q'TY</th></tr>
<tr><td>------</td><td>W ≦0.03</td><td>DISREGARD</td></tr>
<tr><td>L ≦ 5.0</td><td>0.03 < W ≦0.07</td><td>3 (D>5mm)</td></tr>
<tr><td>------</td><td>0.07 < W</td><td>FOLLOW ROUND TYPE</td></tr>
</table></td></tr>
<tr><td>8.4.2</td><td>MINOR</td><td>BUBBLE IN POLARIZER
DENT ON POLARIZER</td><td>unit : mm.
<table>
<tr><th>DIAMETER</th><th>ACCEPTABLE Q'TY</th></tr>
<tr><td>Φ ≦0.2</td><td>DISREGARD</td></tr>
<tr><td>0.2 < Φ ≦ 0.5</td><td>2 (D>5mm)</td></tr>
<tr><td>0.5 < Φ</td><td>0</td></tr>
</table></td></tr>
<tr><td>8.4.3</td><td>MINOR</td><td>Dot Defect</td><td>
<table>
<tr><th>Items</th><th>ACC. Q'TY</th></tr>
<tr><td>Bright dot</td><td>N≦ 4 (D>5mm)</td></tr>
<tr><td>Dark dot</td><td>N≦ 4 (D>5mm)</td></tr>
</table>
Pixel Define


Not 1: The definition of dot: The size of a defective dot over 1/2 of whole dot is regarded as one defective dot.
Not 2: Bright dot: Dots appear bright and unchanged in size in which LCD panel is displaying under black pattern.
Not 3: Dark dot: Dots appear dark and unchanged in size in which LCD panel is displaying under pure red, green ,blue pattern.</td></tr>
</table>

NO.	CLASS	ITEM	JUDGEMENT
8.4.4	MINOR	LCD GLASS CHIPPING	 Y > S Reject
8.4.5	MINOR	LCD GLASS CHIPPING	 X or Y > S Reject
8.4.6	MAJOR	LCD GLASS GLASS CRACK	 Y > (1/2) T Reject
8.4.7	MAJOR	LCD GLASS SCRIBE DEFECT	 1. a> L/3 , A>1.5mm. Reject 2. B : ACCORDING TO DIMENSION
8.4.8	MINOR	LCD GLASS CHIPPING (ON THE TERMINAL AREA)	 Φ= (x+y)/2 > 3.0 mm Reject
8.4.9	MINOR	LCD GLASS CHIPPING (ON THE TERMINAL SURFACE)	 Y > (1/3) T Reject
8.4.10	MINOR	LCD GLASS CHIPPING	 Y > T Reject

8.5 INSPECTION STANDARD OF TOUCH PANEL

NO.	CLASS	ITEMS		JUDGEMENT	
8.5.1	MAJOR	Touch Panel Crack			Reject
8.5.2	MINOR	Touch Panel Chipping	Corner		X≦2mm, Y≦2mm, Z＜1/2T — Accept
			Edge		X≦3mm, Y≦3mm, Z＜1/2T — Accept
8.5.3	MINOR	Scratch Dust and Foreign materiel (Linear Type)		W≦0.05, L≦10mm	Accept
				0.05mm<W≦0.07mm；L≦10.0mm Distance between seratch＞5.0mm	Accept 3 ea Max.
				W>0.07mm	Reject
8.5.4	MINOR	Scratch Dust and Foreign materiel (Round Type：Φ=(Length+Width)/2)		Φ≦0.25mm	Accept
				0.25mm＜Φ≦0.35mm Distance between spots＞5.0mm	Accept 5 ea Max.
				Φ＞0.35mm	Reject
8.5.5	MINOR	Touch Panel Dent / Fish Eyes		Φ≦0.35mm	Accept
				0.35mm＜Φ≦1.0mm Distance ＞5.0mm	Accept 3 ea Max.
				Φ＞1.0mm	Reject
8.5.6	MINOR	Touch Panel Air Bubble		Φ≦0.2mm	Accept
				0.2mm＜Φ≦0.5mm Distance between bubbles＞5.0mm	Accept 3 ea Max.
				Φ＞0.5mm	Reject
8.5.7	MINOR	Touch Panel Printing area Scratch		0.03mm<W≦0.05mm, L≦5mm Distance between scratch＞5.0mm	Accept 3 ea Max.
				W＞0.05mm or L＞5mm (W>0.05 Follow 8.5.4 Round type)	Reject
8.5.8	MINOR	Touch Panel White Haze Mark / Dust		Can not be removed	Reject